



CLI CONFIGURATION GUIDE

QoE Appliance

Release 4.20



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Contents

Contents	3
Introduction	22
Chapter 1: Command Line Interface	23
Default Users and User Profiles	23
Accessing QoE Shell	23
Using the CLI	24
Configuration mode	27
Chapter 2: System Administration	30
User accounts	30
Network interfaces	32
Locating network interfaces	33
Network management interface	34
Data plane interfaces (Wires)	38
Time Management	39
License Management	41
Showing subscriber information	42
Showing flow information	43
SNMP service	45
Introduction	45
SNMP configuration	46
QoE MIB	46
Dell open manage server administrator	48
Packet capture	49
Bypassing traffic	50
File operations	50
System status	52
Diagnostic generation	52
Software updates	53

Logging service	55
Network cards with physical bypass	57
Chapter 3: Traffic Management	60
Overview	60
Profiles	63
Interface profiles	63
VLAN profiles	64
Internet profiles	65
Access profiles	66
Throughput profiles	67
DPI profiles	67
Subscriber flow policies	68
Subscriber rate policies	70
Rate policies via APIs	71
Subscriber identification	72
Time to apply rate policy changes	72
Subscriber monitoring policies	72
UDRs in subscriber flow policies	73
Denial-of-service (DoS)	73
DoS in subscriber rate policies	74
Policy rules	75
Rule conflicts	76
Chapter 4: Traffic Management APIs	78
Overview	78
Radius	78
Mikrotic-Rate-Limit AVP	80
Mikrotik-Address-List AVP	82
REST API	83
Chapter 5: Traffic Analytics	87
Overview	87

Subscriber statistics	87
Generation of subscriber information	87
Top subscriber statistics	89
Subscriber volume statistics	89
Subscriber flow statistics	90
Subscriber latency statistics	90
Subscriber maximum speed statistics	91
Subscriber retransmission statistics	91
Subscriber policy statistics	92
Throughput statistics	92
Throughput overview	92
Throughput per interface	93
Throughput per policy	94
TCP metrics	95
TCP speeds	95
TCP acceleration	97
TCP metrics thresholds	97
Traffic flow statistics	98
Flows per policy	98
Flows per protocol type	99
Traffic latency statistics	99
Application statistics	100
DoS statistics	101
Volumetric attack statistics	101
SYN flooding statistics	102
System statistics	102
CPU load statistics	102
CPU temperature statistics	103
CPU frequency statistics	103
Memory statistics	104

Chapter 6: Troubleshooting	105
Overview	105
Problems accessing the management interface	105
CPU usage issues	107
A process not part of QoE product	108
Not enough IO PKTENG processes	110
Overloaded PKTENG worker	111
CPUs running at lower than expected frequency	113
Disk issues	114
Disk usage issues	114
Disk hardware issue	116
Wire problems (Data plane interfaces)	118
Non-Intel interfaces	122
SFP+ modules	123
High memory usage	125
Unbalanced DPDK memory usage	126
License unavailable issues	129
License expiration issues	131
Traffic above the license limit	131
No traffic in uplink or downlink directions	132
Traffic too low	133
Traffic inverted	134
Process issues	137
Time issues	139
NTP not configured	139
NTP Service not synchronized	141
Server clock not set to UTC	142
Contacting Cambium Networks support	143
Command Reference	144
Address	144

Affinity	145
allow	145
api common	146
api radius	146
api rest	147
api policy delete	148
api storage write	149
avp disabled	149
avp rate-limit-percentage	150
block	151
bta	151
btc	152
burst-duration	153
burst-rate	154
burst-threshold	155
burst-threshold-window	156
burst-transition-duration	158
bypass	159
capture	160
clear api radius client	161
clear api radius proxy	161
clear api rest client	162
clear api rest server	162
clear api rest user	163
clear api subscriber	163
clear flow	164
clear ip route	164
clear subscriber	165
clear config candidate	165
clear config changes	167

clear interface firewall input	168
clear interface ip address	168
clear pkteng dos syn	169
clear pkteng dos volume	170
clear pkteng rtt	170
clear pkteng rtti	171
clear service ntp server	172
clear wire	172
comment	173
commit	174
community	175
compression	175
configure	176
cpu governor	177
cpu level alarm	177
cpu level nice	178
cpu level threshold	179
delay-start	180
dellmgr	180
dimension	182
disabled	183
dos max-attacks	184
dos mode	185
dos syn period	186
dos syn rate	186
dos volume	187
dpdk poll	188
dpi	189
drop	189
enabled	190

end	191
exit	191
feature	192
file chmod	195
file cksum	196
file cp	196
file diff	197
file grep	197
file less	198
file ln	199
file ls	200
file md5sum	200
file mkdir	201
file mv	201
file rm	202
file rmdir	203
file stat	203
firewall input	204
flow ipother inactivity	205
flow udp inactivity	205
fragment ignore	206
fragment maximum	206
fragment no-cksum	207
gro	208
gso	209
gzip	210
gzip compress-level	211
gzip content-length-maximum	212
gzip content-length-minimum	213
hash	215

http host	215
https sni	216
image	216
image content-length-minimum	218
image gif	219
image gif colors-percentage	220
image jpeg	221
image jpeg quality	222
image pixels-maximum	223
image pixels-minimum	225
image png	226
image png colors-percentage	227
image png compress-level	228
image png gaussian-blur	229
image png pixelate	231
image png selective-blur	232
image webp	233
image webp quality	234
interface	235
interface-id	236
interrupt	237
ip address	238
license	239
load config	240
load rollback	241
logging	243
lro	243
mac	244
management	245
management memory	245

management time	246
management traffic	246
memory	247
metering	248
mtu	248
net ping	250
net tracepath	250
nic io affinity	251
nic io numa	252
nic irq affinity	253
nic pcap	254
op	255
optimization	256
platform	256
pkteng	257
pkteng interface-id	257
pkteng mirroring	258
pkteng mss-max	258
policy flow	259
policy monitor	260
policy rate	261
process dead-interval	263
process resume	264
process stop	265
process suspend	267
profile access	269
profile dpi	270
profile interface	271
profile internet	272
profile policy-rate	273

profile selection sub-attr	274
profile sub-attr	275
profile throughput	276
profile vlan	277
quic mvfst	278
quic sni	278
rate	278
rate-limit (policy flow)	279
rate-limit (policy rate)	280
remctr bqnmgr	280
remctr disabled	281
ring-slot	281
root	283
route	283
router static	284
rule flow	285
rule monitor	286
rule rate	287
rx-cksum-offload	288
save config	290
sdr	291
sdr aggregation	291
sdr deletion	292
sdr mode	292
sdr partials	293
server	293
service ntp	294
service ssh	295
service web	295
set api radius client	296

set api radius proxy	297
set api rest client	297
set api rest server	298
set api rest user	298
set bta optimization	299
set interface firewall input	300
set interface ip address	301
set interface management	302
set ip route	303
set license load	303
set pkteng dos syn	304
set pkteng dos volume	305
set pkteng rtt	306
set pkteng rtti	306
set service ntp server	307
set wire	308
shaping	309
show api policy	309
show api radius client	310
show api radius parameters	311
show api radius proxy	311
show api rest client	312
show api rest server	312
show api rest user	312
show api statistics	313
show api status	314
show api subscriber	314
show bta optimization	315
show bta parameters	316
show bta statistics	317

show btc parameters	318
show btc statistics	319
show cli commands	320
show cli history	321
show cli parameters	321
show config candidate	322
show config commit	322
show config diff	323
show config running	324
show flow ipother	325
show flow tcp	327
show flow udp	329
show hardware chassis	331
show hardware cpu	332
show hardware disk	332
show hardware id	333
show hardware memory	334
show hardware network	334
show hardware pci	336
show interface	337
show interface device	340
show interface pkteng bandwidth	341
show interface bta statistics	341
show interface capture	343
show interface firewall	344
show interface flow-control	345
show interface management	346
show interface pkteng statistics	346
show interface pkteng status	348
show interface pkteng steering	349

show interface pkteng tx-error-detect	351
show ip address	351
show ip arp	352
show ip route	353
show license	354
show license eula	355
show license feature	356
show license integrity	356
show logging feature	357
show pkteng affinity	358
show pkteng cpu	359
show pkteng latency	359
show pkteng memory	360
show pkteng parameters	361
show pkteng polling	363
show pkteng ring slots	364
show pkteng ring statistics	365
show pkteng sdr	366
show pkteng speed	366
show pkteng statistics	369
show pkteng status	373
show pkteng udr	374
show pkteng trace	375
show pkteng wire	375
show policy	376
show policy flow	379
show policy monitor	380
show policy rate	381
show policy statistics	382
show process affinity	382

show process all	384
show process mandatory	385
show process name	386
show profile	387
show profile access	389
show profile dpi	390
show profile interface	391
show profile internet	391
show profile policy-rate	392
show profile sub-attr	393
show profile throughput	394
show profile vlan	394
show remctr license	395
show remctr status	396
show rule	396
show rule error	397
show rule flow	398
show rule monitor	399
show rule rate	399
show rule usage	400
show service	401
show service dellmgr	402
show service ntp	403
show service snmp	404
show service snmp config	404
show service ssh	405
show service web	406
show shaping statistics	407
show shaping status	408
show snmp alarm	408

show snmp client	409
show snmp community	410
show snmp query	410
show snmp state	411
show snmp trap	411
show subscriber	412
show subscriber all	413
show subscriber dos syn	414
show subscriber dos volume	415
show subscriber usage	416
show statistics	416
show statistics bta	417
show statistics compress	418
show statistics cpu	419
show statistics cpu frequency	421
show statistics dos	421
show statistics dpi	422
show statistics dpi latency bins	423
show statistics dpi latency bins	425
show statistics dpi latency top	427
show statistics feature	428
show statistics flow	430
show statistics interface speed	431
show statistics latency	431
show statistics memory	432
show statistics policy flow	433
show statistics policy monitor	435
show statistics policy rate	436
show statistics sensors	438
show statistics shaping	439

show statistics speed acceleration	440
show statistics speed optimized	441
show statistics speed tracked	442
show statistics subscribers	443
show statistics subscribers flows	445
show statistics subscribers latency	446
show statistics subscribers max-speed	447
show statistics subscribers retransmission	448
show statistics subscribers top	449
show statistics subscribers volume	452
show system alarms	453
show system cpu	454
show system cpu level alarm	455
show system cpu level threshold	455
show system cpu frequency	456
show system cpu governor	457
show system date	457
show system date timezone	458
show system filesystem	459
show system functionality	459
show system hostname	460
show system interrupts	460
show system ipmi fru	461
show system ipmi lan	462
show system ipmi mc	463
show system ipmi sdr	464
show system ipmi sel	466
show system ipmi sensor	466
show system ipmi user	467
show system memory	468

show system ntp	468
show system partition	469
show system process top	470
show system sensors	471
show system software	472
show system status	473
show system users	473
show users	474
size-max	474
size-max-total	476
snmp	477
speed	478
statistics feature	480
statistics flush	481
statistics reset	481
statistics rotate	482
strict-rx-cksum-offload	482
subscriber ipv6-prefix	484
sys contact	484
sys description	485
sys location	485
sys name	486
system	486
system date local	487
system date timezone	488
system diagnostic	489
system hostname	490
system interface capture	490
system interface sfp-qualification	493
system interface sfp-support	494

system ipmi lan	496
system ipmi reset	496
system ipmi user	496
system ipmi vlan	497
system partition mount	498
system partition umount	499
system reboot	500
system remctr	501
system shell	502
system shutdown	502
system software boot	503
system software install	504
system software reload	506
system users add	507
system users delete	508
system users passwd	508
tcp port	509
tcs experimental	509
tcs high-loss-percent	510
tcs high-loss-threshold	510
tcs init-wnd	511
tcs no-adaptive-init-wnd	511
tcs srtt-target-mult	512
threshold	512
time-activation	513
time-expiration	513
timeout ack	514
timeout closing	515
timeout handshake	515
timeout drop internet	516

timeout inactivity	516
timeout ip-endpoint inactivity	517
timeout ip-endpoint send	517
timeout pacing	518
timeout rto-lifetime	518
timeout rto-min	519
trace	519
trace level	520
trace rotation	521
trace size	521
tracking	522
trap-v1	523
trap-v2c	523
tso	524
tx-queue-len	525
udp port	527
udr	527
udr min-active-pkt	528
udr min-independent-download	528
udr mode	529
udr non-active	529
udr partials	530
usage	530
vlan	531
wire	531
wizard bta	532
Intel Ethernet Controller X710 Firmware Update	534
Cambium Networks	538

Introduction

Quality of Experience (QoE) is a network application that can optimize data traffic by applying traffic policies. Traffic policies include acceleration of TCP connections, shaping, and rate limits. QoE also supports the reporting capabilities (for example, generating a report specific to traffic usage per client IP address).

QoE product consists of a physical Intel-based server with a Linux-based operating system that is customized to run QoE software. QoE is managed through a CLI (Command Line Interface) shell. CLI provides all the system administration functionality required by a telco-grade network element, including interface and service configuration, logging, monitoring, and software management. A web interface (UI) is also available over HTTPS to provide basic configuration and monitoring of the system. The UI is described in the *QoE Quick Start Guide*.

Chapter 1: Command Line Interface

This chapter contains the following topics:

- [Default Users and User Profiles](#)
- [Accessing QoE Shell](#)
- [Using the CLI](#)
- [Configuration mode](#)

Default Users and User Profiles

For accessibility and security purposes, QoE defines two user profiles:

- **Operator:** Users with operator privileges will be able to execute commands that do not modify the configuration of the QoE, such as query status commands. By default, the system creates the bqnop operator user.
- **Administrator:** Users with administrator privileges will be able to fully manage and configure the QoE. A user with administrator privileges also has operator permissions. By default, the system creates the bqnam administrator user.

Users may be associated with one of these profiles, which specify the type of commands and actions that the user is allowed to execute. Users who are not associated with either of these profiles will not be able to access any of the QoE services. The [User accounts](#) section describes how to create, delete and manage QoE users.

The user group ID mechanism provided by the operating system is used to implement the user profiles and enforce the security mechanism. The users that belong to the bqadmin group have administrator permissions, and users that belong to the bqoperator group have operator permissions.

The root user always has administrator permissions.

After a QoE installation and the [wizard bta](#) command is executed, the default admin and operator users are created with administrator and operator profiles respectively.

[Command Reference](#) contains all the available CLI commands and the user profile required to execute them.

Accessing QoE Shell

The Command Line Interface (CLI) is the main interface to the QoE.

The CLI process is called the BQN shell (BQNSH). The QoE can be accessed through the terminal console or remotely using SSH. When a user with an operator or administrator profile logs in, the user is presented with the BQNSH:

```
% ssh admin@192.168.0.121
Password:
Last login: Fri Dec 17 19:44:33 2013 from 192.168.0.10
Have a lot of fun...
Copyright (c) 2009-2015 Bequant S.L.
```

admin@bqn#



Note
The last character of the prompt indicates the user profile: the > character indicates the user has an operator profile; otherwise, the # character indicates the user has an administrator profile.

By default, the root user executes the BASH shell after logging in. To start the BQNSH, execute the following command:

```
bqn:/# bqnsh
```

```
Copyright (c) 2009-2015 Bequant S.L.
```

```
root@bqn#
```

Users created with the [system users add](#) command will be configured to directly start the BQNSH shell when the user logs in.

Using the CLI

A valid command consists of a series of keywords and parameters. Information about the available keywords or parameters is shown by pressing the TAB key. For example, the list of valid keywords available under the operational mode is as follows.

```
admin@bqn#
```

```
+ api          API related commands
+ clear        Clear settings
configure      Enter configuration mode
exit           End session
+ file         File operations
+ net          Network operations
+ process      Process management
+ set          Modify settings
+ show         Show information
+ statistics   Statistics management
+ system       Set system properties
+ test         Testing functionality
+ wizard       Wizard commands
```

```
admin@bqn#
```

The column on the left lists the available keywords or parameters, while the column on the right shows a brief description of the command. To the left of the keyword or parameter the + character indicates that there may be more keywords or parameter, to complete the command. For example, the keyword system has more parameters to form a valid command; after entering this keyword, press TAB, and the following available keywords or parameters are shown:

```
admin@bqn# system
```

Available completions:


```

+ bqn          Set bqn properties
+ date         Time and date management
+ diagnostic   Generate diagnostic
+ hostname     Set hostname
+ interface    Interface properties
+ ipmi         IPMI settings
+ partition    Partition management
+ reboot       Reboot system
+ remctr       Remote control commands
+ service      Service management
shell         Start shell
+ shutdown     Shutdown system
+ software     Software management commands
+ users        User management commands

```

```
admin@bqn# system
```

If a parameter is required, the data type is shown between angled brackets (< and >), and the description column indicates the type of parameter. For example, the partial command [system software install](#) requires a string parameter that indicates the URI.

```
admin@bqn# system software install
```

Available completions:

```
+ <string> Package URI (schemas: file, ftp, http, https, scp, sftp)
```

```
admin@bqn# system software install
```

[Table 1](#) lists and describes the parameter types supported.

The **<enter>** parameter is shown when the TAB key is pressed and indicates that the command is complete.

Table 1: Parameter types

Type	Description
<date>	Date string in ISO 8601 standard format: YYYY-MM-DD[THH:MM[:SS[szzzz]]]
<decimal>	Signed integer number (-2^{63} to $2^{63} - 1$)
<udecimal>	Unsigned integer number (0 to $2^{64} - 1$)
<double>	Floating point number
<file>	File name
<hexadecimal>	Hexadecimal number

Type	Description
<iface>	Network interface
<ipaddr>	IPv4 address (dotted-decimal notation)
<iprange>	IPv4 address range (CIDR notation)
<ip6range>	IPv6 address range (RFC 4291 notation)
<string>	String parameter. If the string contains spaces, the string must be enclosed within double quotes
<tstamp>	Time stamp in seconds (optional fraction of a second, up to nanoseconds, separated by a dot)
<word>	String parameter without spaces

```
admin@bqn# system software install file://bqn-R4.0.9.bpkg
```

Available completions:

```
noboot Do not set boot flag for new package
```

```
<enter> Enter command
```

```
admin@bqn# system software install file://bqn-R4.0.9.bpkg
```



Note

Some commands may allow more keywords and parameters in addition to the <enter> parameter (noboot in the previous example).

The BQNSH also auto-completes partial keywords when the TAB key is pressed. If there are several options available, the shell shows the possible completions:

```
admin@bqn# s
```

```
set show statistics system
```

```
bqnad@bqn# s
```

When a command is executed successfully, the BQNSH, in general, doesn't display anything unless the command has requested the information. If there is an error, the command will show a line with the following format:

```
%ERR[- ECODE]: Error message
```

In the event of a warning, the command will show a line with the following format:

```
%WARN[- ECODE]: Warning message
```

In both cases, the keyword ECODE is an optional error code that may help identify the cause of the error or warning, based on the error numbers (errno) defined in The Open Group Base Specifications Issue 6 IEEE Std 1003.1, 2004 Edition.

For example, if a command that does not exist is entered, the BQNSH displays the following message with the EINVAL error code (invalid argument):

```
admin@bqn# asdfg
```

```
%ERR-EINVAL: Syntax error
```

```
admin@bqn#
```

Configuration mode

The available commands in the CLI are grouped in a hierarchy of modes, each one containing related commands. There are two main modes:

- **Operational mode:** This mode contains commands that show information about the QoE and the different services. In addition, this mode contains commands that set system properties but are not part of the QoE configuration.
- **Configuration mode:** This mode contains commands to configure the QoE. Some properties are organized into sub-modes that provide commands to configure different features.

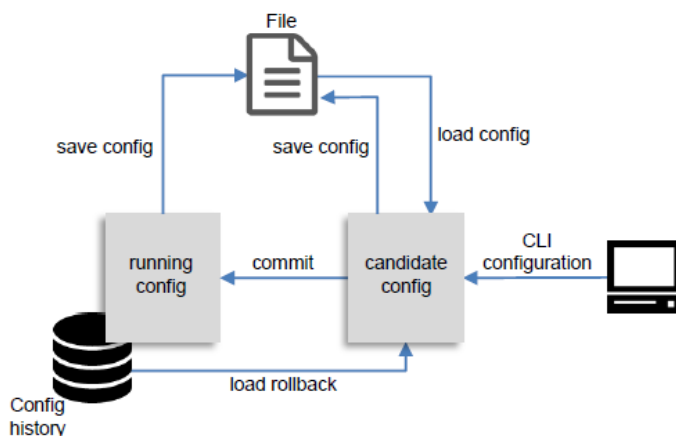
[Command Reference](#) contains all the available CLI commands and the mode where they are usable.

The QoE follows the configuration model defined as Candidate Configuration Capability and described in RFC 6241, Network Configuration Protocol (NETCONF).

The active configuration of the QoE is called the running configuration. The configuration can be modified at any time without disrupting the active configuration. The configuration which is modified is called the candidate configuration. When the new configuration is complete and ready to be set, the candidate configuration can be applied automatically with the commit operation, becoming the new running configuration.

The commit process first validates the candidate configuration for syntactic, semantic, and functional errors before applying the configuration.

Figure 1: QoE configuration process



The QoE is configured by entering commands in the configuration mode. To enter the configuration mode, you must have an administrator profile; otherwise, the request is denied.

Use the `configure` command to switch from the operational mode and enter the configuration mode.

```
admin@bqn# configure
admin@bqn (config)#
```



Note

The prompt changes and displays the current mode in parentheses. If the user enters a sub-mode, all modes are displayed and separated by a hyphen.

```
admin@bqn(config)# service ntp
```

```
admin@bqn (config-ntp)#
```

To navigate through the hierarchy of modes, the following commands are available:

- **end**: Exit configuration mode and directly return to operational mode from within any sub-mode.
- **exit**: Return to the previous mode. If the configuration session is in the top configuration mode, this command returns to operational mode. Pressing the CTRL-D keyboard sequence at the CLI prompt has the same effect as entering the exit command.
- **root**: Go back to the top configuration mode from any sub-mode.

The BQNSH provides the `op` command in all configuration sub-modes, which allows the user to execute an operational mode command from inside any configuration sub-mode.

```
admin@bqn(config)# op
```

Available completions:

```
+ api          API related commands
+ clear        Clear settings
configure      Enter configuration mode
exit           End session
+ file         File operations
+ net          Network operations
+ process      Process management
+ set          Modify settings
+ show         Show information
+ statistics   Statistics management
+ system       Set system properties
+ test         Testing functionality
+ wizard       Wizard commands
```

```
admin@bqn(config)# op show users
```

```
USER  PROFILE          bqn TTY LOGIN          IDLE
root  administrator    0 pts/1  2013-12-18 16:53  0:00:00
```

```
admin@bqn(config)#
```

The commands entered while in configuration mode will be applied to the candidate configuration, which will start as a copy of the running configuration. During this process, the running configuration will not be affected. The user can verify at any time whether or not the candidate configuration is complete. When the candidate configuration is applied with the [commit](#) command, the candidate configuration becomes the new running configuration.

Use the [show config running](#), [show config candidate](#) and [show config diff](#) commands to show both the running and candidate configuration and their differences. Ongoing changes not committed can be cleared from the candidate configuration using the [clear config changes](#) command.

Both the running and candidate configurations can be saved into a file with the [save config](#) command. Similarly, the candidate configuration may also be loaded from a file using the [load config](#) command.

After a candidate configuration has been committed, the last running configuration is stored internally for backup. Use the [show config commit](#) to show the history of committed configurations:

```
admin@bqn(config)# show config commit
```

ID	USER	DEVICE	TIMESTAMP
91377160	root	pts/1	2015/04/06 02:12:08 +0200
84039617	root	-	2015/03/25 19:33:22 +0100
55914314	root	-	2015/03/25 18:46:22 +0100
02545395	bqnadm	pts/1	2015/03/22 13:10:46 +0100
02158868	bqnadm	pts/1	2015/03/22 13:10:10 +0100
01116035	bqnadm	pts/1	2015/03/22 13:08:27 +0100
97011860	bqnadm	pts/0	2015/03/22 13:01:38 +0100
96929042	bqnadm	pts/0	2015/03/22 13:01:30 +0100

```
admin@bqn (config)#
```

Use the [load rollback](#) command to load a previously committed configuration as the candidate configuration.

[Command Reference](#) describes all the CLI commands indicated above with examples on how to use them.

Chapter 2: System Administration

This chapter describes how to manage different services in a QoE. It contains the following topics:

- [User accounts](#)
- [Network interfaces](#)
- [Network management interface](#)
- [Data plane interfaces \(Wires\)](#)
- [Time management](#)
- [License management](#)
- [Showing subscriber information](#)
- [Showing flow information](#)
- [SNMP service](#)
- [Packet capture](#)
- [Bypassing traffic](#)
- [File operations](#)
- [System status](#)
- [Diagnostic generation](#)
- [Software updates](#)
- [Logging service](#)
- [Network cards with physical bypass](#)

User accounts

As described in the [Default Users and User Profiles](#) section, there are two user profiles: administrator and operator. The system administrator should create several QoE users for different people who require an account to access the system. The profile assigned to each user depends on what tasks they need to perform.

It is recommended to create at least one user with administrator profile to manage the system instead of using the root user.



Note

The initial password should also be set at the same time to allow the new user to log in.

In installations using the [wizard bta](#) command, the `bqnamd` user with administration profile and the `bqnop` user with operator profile are created.

```
bqn0: / # bqnsh
```

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```
root@bqn0# system users add bqnadm bqn Administrator administrator
```

```
root@bqn0# show system users
```

User	Profile	Name
root	administrator	root
bqnadm	administrator	bqn Administrator

```
root@bqn0# system users passwd bqnadm
```

```
New password:
```

```
Retype new password:
```

```
passwd: password updated successfully
```

All the services in a QoE should be managed by an administrator user, including creating other users. In this example, the bqnadm user is used to create an operator user with limited privileges. If the network management interface was configured at installation time, then log into the QoE using SSH; otherwise, log into the QoE through the console until the SSH service is configured.

```
% ssh admin@192.168.1.75
```

```
Password:
```

```
Have a lot of fun...
```

```
Copyright (c) 2009-2015 Bequant S.L. admin@bqn0# show users
```

User	Profile	bqnTTY	Login	Idle
bqnadm	administrator	0 pts/1	2015-04-09 15:40	0:00:00

```
admin@bqn0# system users add bqnop "QoE Operator" operator
```

```
admin@bqn0# system users passwd bqnop
```

```
New password:
```

```
Retype new password:
```

```
passwd: password updated successfully
```

```
admin@bqn0# show system users
```

User	Profile	Name
root	administrator	root
bqnadm	administrator	QoE Administrator
bqnop	operator	QoE Operator

A user can be completely removed with the [system users delete](#) command.



Note

To remotely log in to a QoE the ssh service must be configured as described in the [Network management interface](#) section.

Network interfaces

The QoE requires one network interface for management and two or more interfaces for processing user traffic (data interfaces).

Network interfaces in the QoE have the following name format:

```
<IFTYPE><bqnID> [<IFLOCATION>] [.<VID>]
```

where **IFTYPE** is the interface type, **bqnID** is the **bqn ID** number, **IFLOCATION** is the interface physical hardware location, and **VID** is the **VLAN ID** number (if a VLAN is available). For example, the name of an ethernet network interface located in **bqn ID 0** may be **en0o1**.

The following interface types are currently supported:

- **lo**: Loopback interface type, which only contains the bqn ID number.
e.g.: **lo0**
- **en**: Ethernet interface, which contains the bqn ID and the interface physical hardware location. Optionally it may include a VLAN ID number.

e.g.: **en0o1**, **en0o1.15**, **en0p0s8**, **en0p0s10**

While not supported in this release, a QoE is designed to be grouped with other QoE nodes into a cluster of bqns for scalability and ease of management. Each QoE in the cluster will be uniquely identified by an integer called the bqn ID. Currently, some commands use the bqn ID, in which case it is set to 0.

The physical hardware location part contains information about the physical location of the network interface port in the QoE, which is used to provide predictable names to network interfaces. Some of the fields used to compose the physical hardware locations are the following:

b<number>: BCMA bus core number.

ccw<name>: CCW bus group name.

o<index>: On-board device index number.

s<slot> [f<function>] [d<devport>]: Hotplug slot index number.

x<MAC>: MAC address.

[P<domain>]p<bus>s<slot> [f<function>] [d<devport>]: PCI geographical location.

[P<domain>]p<bus>s<slot> [f<function>] [u<port>] [..] [c<config>] [i<interface>]: USB port number chain.



Note

The physical hardware location of a network interface is provided by the firmware, BIOS or the operating system and cannot be changed unless the network card is moved to a different hardware location.

The network interfaces available in the QoE can be listed with the [show interface](#) command. The state of a network interface is undefined unless it is configured, in which case its state is up if it is not manually disabled. Configuring a network interface makes it available to be used as a management interface or for data processing.

```
admin@bqn0# show interface
```


IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0p0s8	ethernet	08:00:27:73:f6:c4	down	no
en0p0s9	ethernet	08:00:27:8d:8c:2a	down	no
en0p0s10	ethernet	08:00:27:9a:6e:53	down	no
en0p0s17	ethernet	08:00:27:0a:85:1f	up	yes

```
admin@bqn0# configure
```

```
admin@bqn0 (config)# interface en0p0s10
```

```
admin@bqn0 (config-iface)# commit
```

```
admin@bqn0 (config-iface)# op show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0p0s8	ethernet	08:00:27:73:f6:c4	down	no
en0p0s9	ethernet	08:00:27:8d:8c:2a	down	no
en0p0s10	ethernet	08:00:27:9a:6e:53	up	yes
en0p0s17	ethernet	08:00:27:0a:85:1f	up	yes

The link state of a network interface indicates whether the physical link has a carrier or not. If an interface has no carrier it is most likely that the physical connection is down (cable disconnected or switch problem).

The default and maximum MTU for data network interfaces are 2026; however, only TCP traffic with a maximum MTU of 2026 can be optimized (see the [mtu](#) command for more information).

Locating network interfaces

The available network interfaces are listed using the [show interface](#) command. In case the physical port of a network interface is unknown, the following methods may help locate the port:

- **PCI information:** The system PCI information may be used to locate the network card, which may be known by the manufacturer and the PCI bus and slot.

```
admin@bqn0# show hardware pci
```

```
00:00.0 Host bridge: Intel Corporation 4th Gen Core Processor DRAM Controller (rev 06)
```

```
00:02.0 VGA compatible controller: Intel Corporation Xeon E3-1200 v3/4th Gen Core Processor
```

```
00:03.0 Audio device: Intel Corporation Xeon E3-1200 v3/4th Gen Core Processor HD Audio Con
```

```
00:14.0 USB controller: Intel Corporation Device 8cb1
```

```
00:16.0 Communication controller: Intel Corporation Device 8cba
```

```
00:19.0 Ethernet controller: Intel Corporation Ethernet Connection (2) I218-V
```

```
00:1a.0 USB controller: Intel Corporation Device 8cad
```

```

00:1b.0 Audio device: Intel Corporation Device 8ca0
00:1c.0 PCI bridge: Intel Corporation Device 8c90 (rev d0)
00:1c.3 PCI bridge: Intel Corporation Device 8c96 (rev d0)
00:1d.0 USB controller: Intel Corporation Device 8ca6
00:1f.0 ISA bridge: Intel Corporation Device 8cc4
00:1f.2 SATA controller: Intel Corporation Device 8c82
00:1f.3 SMBus: Intel Corporation Device 8ca2
02:00.0 Network controller: Broadcom Corporation BCM4352 802.11ac Wireless
Network Adapter
03:00.0 Ethernet controller: Realtek Semiconductor Co., Ltd. RTL8111/8168/8411
PCI Express

```

In this example, there are 2 Ethernet cards: one manufactured by Intel in bus 0 and slot 25 (0x19 hexadecimal), and another by Realtek in bus 3 and slot 0. This information concurs with the available network interface names en0p0s25 and en0p3s0 respectively.

```
admin@bqn0# show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0p0s25	ethernet	d0:50:99:2b:ad:be	up	yes
en0p3s0	ethernet	00:01:2e:67:19:f9	up	yes

- **Link state:** The network interface link state can be used to identify the physical port of a network card. If a specific cable is unplugged from a network port, the link state is set to no, indicating that there is no carrier.

```
admin@bqn0# show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0p0s25	ethernet	d0:50:99:2b:ad:be	up	no
en0p3s0	ethernet	00:01:2e:67:19:f9	up	yes



Note

The network interface must be enabled to show the link state. Do not forget to plug back the cable into the right port.

- **Layer 3 connectivity:** Assign an IP address to a network interface and use the [net ping](#) command to reach another known IP in the same subnet.

Network management interface

The network management interface can be configured during the installation process if the QoE setup instructions are followed. However, this section describes how to set it manually if it isn't configured at installation time or if changes are required.

- Supermicro /Dell /HPE servers
 - On pre-configured Supermicro, Dell and HPE servers, the first embedded network interface is used as the management interface: en0o1.
 - This convention of selecting the first integrated network interface should always be followed unless there is a strong reason to the contrary.
 - In addition, pre-configured servers use the 192.168.0.121/24 management IP address and the 192.168.0.1 gateway IP address.

One quick way to configure the management interface is to use the [set interface management](#) helper command. In this section we describe detailed configuration steps that such command uses internally and that allow more advanced scenarios.

Under configuration mode, add a network interface and the IP address to use for management. Use the procedure described in the [Locating network interfaces](#) section to select the desired management interface.

```
root@bqn0# configure
root@bqn0(config)# interface en0o1
root@bqn0(config-iface)# ip address 192.168.1.75/24
```

Next mark the interface as the management interface (note that only one management interface is allowed per QoE):

```
root@bqn0(config-iface)# management
root@bqn0(config-iface)# root
root@bqn0(config)#
```

Change the default gateway if needed:

```
root@bqn0(config)# router static
root@bqn0(config-static)# route 0.0.0.0/0 via 192.168.1.1
root@bqn0(config-static)# root
root@bqn0(config)#
```

To access the QoE remotely, enable the SSH and WEB services and commit the configuration.

```
root@bqn0(config)# service ssh
root@bqn0(config-ssh)# root
root@bqn0(config)# service web
root@bqn0(config-web)# root
root@bqn0(config)# commit
root@bqn0(config)# end
root@bqn0#
```

If required, use the [firewall input](#) command to restrict the access to the management IP to a white list of source IP addresses (any IP may establish a connection with the QoE by default).

```
root@bqn0# configure
```

```

root@bqn0(config)# interface en0o1
root@bqn0(config-iface)# firewall input 192.168.0.0/24
root@bqn0(config-iface)# firewall input 10.0.0.0/8
root@bqn0(config-iface)# firewall input 172.16.0.0/12
root@bqn0(config-iface)# firewall input 142.250.185.14/32
root@bqn0(config-iface)# root
root@bqn0(config)# commit
root@bqn0(config)# end
root@bqn0#

```

Verify that the new running configuration is set up correctly and that the SSH and WEB services are up and running.

```

root@bqn0# show config running
service ssh
service web
interface en001
    ip address 192.168.1.75/24 management
router static
    route 0.0.0.0/0 via 192.168.1.1
root@bqn0# show interface management
en0o1
root@bqn0# show service ssh
sshd.service - OpenSSH Daemon
    Loaded: loaded (/bqn/img/linux/usr/lib/systemd/system/sshd.service)
    Active: active (running) since Thu, 2014-04-03 14:15:17 CEST; 9h ago
    Process: 6179 ExecReload=/bin/kill -HUP $MAINPID (code=exited,
    status=0/SUCCESS) Main PID: 2627 (sshd)
CGroup: name=systemd:/system/sshd.service\~2627 /usr/sbin/sshd -D
root@bqn0# show service web
sshd.service - OpenSSH Daemon
bqnweb.service - bqn WEB Service
    Loaded: loaded (/bqn/img/bqn/usr/lib/systemd/system/bqnweb.service;
    disabled)
    Active: active (running) since Thu, 2014-04-03 14:15:17 CEST; 9h ago
Main PID: 6252 (node)
CGroup: /system.slice/bqnweb.service
root@bqn0#

```

If the management interface has a VLAN tag (15 in the example), the configuration is as follows:

```

root@bqn0# configure
root@bqn0(config)# interface en0o1
root@bqn0(config-iface)# root
root@bqn0(config)# interface en0o1.15
root@bqn0(config-iface)# ip address 192.168.1.75/24
root@bqn0(config-iface)# management
root@bqn0(config-iface)# root
root@bqn0(config)# commit
root@bqn0(config)# end
root@bqn0#

```

More than one IP address is possible (for example, to keep the factory default 192.168.0.121/24):

```

root@bqn0# configure
root@bqn0(config)# interface en0o1
root@bqn0(config-iface)# ip address 192.168.1.75/24
root@bqn0(config-iface)# ip address 192.168.0.121/24
root@bqn0(config-iface)# management
root@bqn0(config-iface)# root
root@bqn0(config)# commit
root@bqn0(config)# end
root@bqn0#

```

The IP addresses configured in the QoE can be listed with the [show ip address](#) command.

```
admin@bqn0# show ip address
```

IFACE	IP-ADDR	BROADCAST	Scope	Flags
lo0	127.0.0.1/8	127.255.255.255	host	permanent
en0p0o1	192.168.1.75/24	-	global	permanent

The system ARP table is managed by the operating system kernel.

```
admin@bqn0# show ip arp
```

IP-ADDR	HW-TYPE	HW-ADDR	IFACE	State
192.168.1.1	ethernet	00:22:4d:69:5c:c6	en0o1	reach

The QoE routing table is managed by the operating system. New static routes must be configured appropriately.

```
admin@bqn0# show ip route
```

IFACE	Destination	Gateway	Flags
en0p0s17	0.0.0.0/0	192.168.1.1	UG

```

lo0          127.0.0.0/8      -          U
en0p0s17    192.168.1.0/24   -          U
en0p0s17    10.8.0.0/24      -          U

admin@bqn0# configure
admin@bqn0(config)# router static
admin@bqn0(config-static)# route 10.0.0.0/8 via 10.8.0.1
admin@bqn0(config-static)# commit
admin@bqn0(config-static)# op show ip route

IFACE      Destination      Gateway      Flags
en0p0s17  0.0.0.0/0        192.168.1.1  UG
lo0        127.0.0.0/8     -           U
en0p0s17  192.168.1.0/24  -           U
en0p0s17  10.8.0.0/24     -           U
en0p0s17  10.0.0.0/8      10.8.0.1    UG

```

Data plane interfaces (Wires)

The QoE product processes data packets that receives and sends through dedicated network interfaces. Network interfaces are bridged in pairs we call wires. At least one wire must be defined in the QoE.

Note that a data interface cannot be used as the management network interface. No IP addresses or routing should be configured on the data interfaces.

In the following example, the QoE is configured with one wire: en0p0s8 and en0p0s9.

```

admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0p0s9
admin@bqn0(config-iface)# root
admin@bqn0(config-iface-ifpkteng)# root
admin@bqn0(config)#

```

Both interfaces are associated in a wire:

```

admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# wire en0p0s8 en0p0s9
admin@bqn0(config-pkteng)# exit
admin@bqn0(config)#

```

By default, a high-performance packet capture mechanism is used which requires network interface compatibility. Some non-Intel network interfaces may not be compatible. You will notice it because the affected interfaces are down despite being configured. The problem is fixed by configuring the affected

interfaces to use PCAP mode, a less performing but more broadly supported packet capture mechanism. For example:

```
admin@bqn0# show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0o1	ethernet	08:00:27:0a:85:1f	up	yes
en0p0s8	ethernet	08:00:27:73:f6:c4	down	no
en0p0s9	ethernet	08:00:27:8d:8c:2a	down	no

```
admin@bqn0# configure
```

```
admin@bqn0(config)# interface en0p0s8
```

```
admin@bqn0(config-iface)# nic pcap
```

```
admin@bqn0(config-iface)# root
```

```
admin@bqn0(config)# interface en0p0s9
```

```
admin@bqn0(config-iface)# nic pcap
```

```
admin@bqn0(config-iface)# root
```

```
admin@bqn0(config)# commit
```

```
admin@bqn0(config-iface)# op show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes
en0o1	ethernet	08:00:27:0a:85:1f	up	yes
en0p0s8	ethernet	08:00:27:73:f6:c4	up	no
en0p0s9	ethernet	08:00:27:8d:8c:2a	up	no

Time Management

The system should always have the right system clock set for all the services to work correctly, as indicated in the System Clock section in the installation process.

The timezone should always be set correctly to indicate the location of the server. Use the [system date timezone](#) command to adjust the timezone if it has changed since the installation process.

The local time can be modified using the [system date local](#) command, however, it is always recommended that the Network Time Protocol (NTP) service is used, which synchronizes the system clock between computers over a data network..

The NTP service uses the management network interface to communicate with other NTP servers. Therefore, follow the instructions in the [Network Management Interface](#) section to set up the management interface.

Under configuration mode, enable the NTP service.

```
admin@bqn1# configure
```

```
admin@bqn1(config)# service
```

```
ntp admin@bqn1(config-ntp)#
```

Add the IP addresses of the NTP servers used for synchronization (multiple servers can be added) and commit the changes.

```
admin@bqn1(config-ntp)# server 18.26.4.105
admin@bqn1(config-ntp)# server 145.238.203.14
admin@bqn1(config-ntp)# server 188.119.192.10
admin@bqn1(config-ntp)# server 193.145.15.15
admin@bqn1(config-ntp)# commit
```

Verify that the NTP service is active and running.

```
admin@bqn1(config-ntp)# op show service
```

Name	State	Substate	Started
ntp	active	running	Wed 2015-04-08 22:02:57 CEST
ssh	active	running	Wed 2015-04-08 19:23:03 CEST

```
admin@bqn1(config-ntp)# op show system ntp
```

Remote	REFID	ST	T	When	POLL	Reach	Delay	Offest	JITTER
-188.119.192.10	150.214.94.5	2	U	439	512	377	55.216	-4.518	0.994
*145.238.203.14	.MRS.	1	U	511	512	377	48.416	-1.770	0.056
+193.145.15.15	193.147.107.33	2	U	371	512	377	31.298	1.634	0.123
+18.26.4.105	.M12.	1	U	455	512	377	124.918	4.712	0.299

Make sure that there is connectivity with the NTP servers by setting the appropriate routes. For high availability, it is recommended that several NTP servers are used.

To see the current time and time zone:

```
admin@bqn1# show system date full
```

```
Local time: Tue 2021-06-15 17:35:56 CEST
Universal time: Tue 2021-06-15 15:35:56 UTC
RTC time: Tue 2021-06-15 15:35:56
Timezone: Europe/Madrid (CEST, +0200) NTP enabled: n/a
NTP synchronized: yes RTC in local TZ: no
```

To change the local time and date use [system date local](#):

```
admin@bqn1# system date local 2021-06-15 19:35:00
```

To change the timezone:

```
admin@bqn1# system date timezone Americas/Chicago
```

The valid timezones can be obtained from the [show system date timezone](#) command.

License Management

The QoE software provides a mechanism to configure software licenses in order to control the use of certain features.

A license feature is provided by Cambium Networks depending on the service deployed. Each license feature is unique for a QoE.

The normal way to obtain a valid license is by contacting Cambium Networks license manager over the Internet. This requires access from the QoE server to the 13152 TCP port of IP addresses 146.59.206.4 and 46.26.190.166.

To check access to the license manager, log as root and use telnet command:

```
bqn1:~# telnet 146.59.206.4 13152
Trying 146.59.206.4...
Connected to 146.59.206.4.
Escape character is '^]'.

```

If telnet cannot connect, review the firewall rules on your Internet access.

To check license state, run the [show license](#) command:

```
admin@bqn1# show license

Feature    Expiration Valid          USAGE-MAX
bta       2021-07-16T18:00:00-0400 yes 18000

```

If there is no license listed, check that the remote connection with the license manager exists:

```
admin@bqn1# show remctr status

State: idle

Timer expiration: 00:22:45.573

Last in "connected" state: 01:47:14.427

Session ID: 21f33afb29c838d1

```

If a Session ID of all zeros is displayed, this indicates an error in reaching the license manager.

If the session ID is fine and yet there is no license listed, it may be because the server has yet to contact the license manager. To force such contact, type:

```
admin@bqn1# system remctr connect
admin@bqn1#

```

If the session ID is fine, recently contacted, and yet there is no license listed, it may be because there is no license activated yet for that server. Contact your sales representative.

On some occasions, the license will be provided as a file to be loaded into the QoE server using the [set license load](#) command. In the following example, a license file has been transferred to the bqnadm home directory using scp (if not transferred to the home directory, a full path to the file must be indicated):

```
root@bqn0# set license load file://bqn0.lic

```

To show the properties of a specific license feature use the [show license feature](#) command:

```
root@bqn0# show license feature bta

```

Feature: bta

State: ready

Static: no

Valid: yes

Clients: 47

Activation time: n/a

Expiration time: 2021-07-16T18:00:00-0400 Usage maximum: 18000

Usage current: 7586 Usage current pct: 42% Hash: n/a

Comment: n/a



Note

If the license feature has an activation or/and expiration time, then the feature is valid between that time period (that is it will start being valid at the activation time and stop being valid at the expiration time). In the example, the license will expire the 16th of July 2021 at 18:00 GMT-04.

Showing subscriber information

Active subscribers can be listed with the command [show subscriber](#).

```
admin@bqn0# show subscriber all | less
```

ADDR	FL-ACTIVE	FL-CREATED	BYTES-UPLINK	BYTES-DOWNLINK	LIFETIME
10.1.16.5	0	10	0	936	0:20:43
196.168.20.7	0	1548	0	93514	7:50:30
. . .					

To get details of one subscriber in particular:

```
admin@bqn0# show subscriber 10.1.16.12
```

```
Absolute RTT-min:          n/a
Active flows:              1
Active shaped flows:       0
Address:                   10.1.16.12
Average downlink TCP RTX rate: n/a
Blocked subscriber:        no
DoS SYN detection/attack:  no/no
DoS volume detection/attack: no/no
Downlink Speed (Mbps):     0.000
Downlink TCPO bytes:       0
Duration:                   8:00:15.609
```

```

Instance:                                0
Latest downlink TCP RTX rate:           n/a
Latest RTT-min:                         n/a
Policy monitor:                          monitor-default
Policy rate:                             rate-default
Rate-limit enabled:                      no
Recv bytes downlink:                     109892
Recv bytes uplink:                       0
Total created flows:                     1658
UDR generation enabled:                  yes (0.50%)

```

```

SUBS-RATE-POLICY  DOWNLINK-RCV  DOWNLINK-SND  UPLINK-RCV  UPLINK-SND
rate-default      109892          109892         0             0

```

Showing flow information

TCP, UDP or IP other flows can be listed with the [show flow tcp](#), [show flow udp](#) and [show flow ipother](#) commands respectively. For example, to list TCP flows (TCP connections):

```
admin@bqn0# show flow tcp all | less
```

ACC-ADDR	APORT	INET-ADDR	IPOINT	ST	TY	INS	PKT-RECV	PKT-SENT	LIFETIME
196.168.68.94	38950	23.217.26.13	80	HD	EM	0	4	5	0:09:49
192.168.199.103	49202	23.223.205.40	443	ES	EM	0	36	39	0:01:17
192.168.253.178	55092	175.190.215.188	5228	ES	EM	0	53	55	0:07:22

To get details of one flow in particular:

```
admin@bqn0# show flow tcp 10.1.16.12 54250 55.11.66.15 443
```

```

Access IP address:      10.1.16.12      Internet IP address:    55.11.66.15
Access port:           54250          Internet port:          443
State:                 ESTABLISHED      Lifetime:               0:06:26.521
State tracking:        DISABLED          State compress:         DISABLED
bqn ID:                0              BTA instance:          0
Type:                  EMPTY           Random ID:              47.71
Interface ID:          0x0000          Access IP Time ID:     0x291cb788
Access interface:      en0p136s0f2      Internet interface:     en0p216s0f1
Dnlink L2 hdr(18/00): 01 02 5a 3b ce 2a 34 ed 1b 13 85 54 81 00 00 6f 08 00
Uplink L2 hdr(18/00): 14 e5 1a 13 85 54 00 01 5c 3b ce 2a 81 00 00 6f 08 00

```

Policy flow:	flow-default	Policy monitor:	monitor-default
Policy rate:	rate-default		
Uplink BytesRecv:	7421	DnLink BytesRecv:	172182
Uplink PktRecv:	91	DnLink PktRecv:	161
Uplink BytesSent:	9469	DnLink BytesSent:	174373
Uplink PktSent:	144	DnLink PktSent:	181
Uplink PktSentFailed:	0	Dnlink PktSentFailed:	0
Uplink ByteSentRtx:	0	DnLink ByteSentRtx:	1715
Meter:	no	Domain:	n/a
Shaping downlink:	no	Shaping uplink:	no
Experimental congestion:	yes		
UpLink shaping bytes:	0	DnLink shaping bytes:	0
UpLink in segment queue:	0	DnLink in segment queue:	0
UpLink out segment queue:	0	DnLink out segment queue:	0
Window scale in SYN:	yes		
UpLink window scale:	2	DnLink window scale:	8
UpLink mss:	1460	DnLink mss:	1460
UpLink SACK permitted:	yes	DnLink SACK permitted:	yes
Timestamps option:	no		
UpLink recent timestamp:	6998864	DnLink recent timestamp:	6998864
Address:	10.1.16.12	Instance:	0
Active flows:	1	Total created flows:	1658
Active shaped flows:	0	Rate-limit enabled:	no
Duration:	8:00:15.609		
DoS volume detection/attack:	no/no	DoS SYN detection/attack:	no/no
UDR generation enabled:	yes (0.50%)	Blocked subscriber:	no
Recv bytes uplink:	0	Recv bytes downlink:	109892
Latest downlink TCP RTX rate:	n/a	Average downlink TCP RTX rate:	n/a
Latest RTT-min:	n/a	Absolute RTT-min:	n/a
Downlink Speed (Mbps):	0.000	Downlink TCPO bytes:	0
Policy monitor:	monitor-default	Policy rate:	rate-default

SUBS-RATE-POLICY	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND
rate-default	109892	109892	0	0

SNMP service

Introduction

Simple Network Management Protocol (SNMP) is an Internet-standard protocol for managing devices on IP networks. In an SNMP-managed network, one or more network management stations (NMS) execute applications that monitor and control managed devices.

The variables accessible via SNMP are organized in hierarchies. These hierarchies, and other metadata (such as type and description of the variable), are described by Management Information Bases (MIBs).

The QoE uses the net-snmp software suite for the SNMP implementation.

<http://www.net-snmp.org>

By default, the following MIBs are fully or partially supported:

- **SNMPv2-MIB:** MIB module for SNMP entities. This version of the MIB module is part of RFC 3418.
- **SNMPv2-SMI:** Structure of Management Information Version 2, defined in RFC 2578.
- **IF-MIB:** MIB module to describe generic objects for network interface sub-layers. This MIB is an updated version of MIB-II's ifTable, and incorporates the extensions defined in RFC 1229.
- **IP-MIB:** MIB module for managing IP and ICMP implementations, but excluding their management of IP routes. This version of this MIB module is part of RFC 4293.
- **IP-FORWARD-MIB:** MIB module for the management of CIDR multipath IP Routes. This version of this MIB module is a part of RFC 4292.
- **TCP-MIB:** MIB module for managing TCP implementations. This version of this MIB module is a part of RFC 4022.
- **UDP-MIB:** MIB module for managing UDP implementations. This version of this MIB module is part of RFC 4113.
- **EtherLike-MIB:** MIB module to describe generic objects for ethernet-like network interfaces. This version of this MIB module is part of RFC 3635.
- **HOST-RESOURCES-MIB:** MIB module used in managing host systems. This version of this MIB module is part of RFC 2790.
- **DISMAN-EVENT-MIB:** MIB module for defining event triggers and actions for network management purposes. This version of this MIB module is part of RFC 2981.
- **NOTIFICATION-LOG-MIB:** MIB module for logging SNMP Notifications (traps). This version of this MIB module is part of RFC 3014.

The MIB files are located in the following directory:

```
/usr/share/snmp/mibs
```

or are accessible online at:

<http://tools.ietf.org/html/>

<http://www.net-snmp.org/>

Currently, SNMP versions v1 and v2c are supported.

SNMP configuration

This section describes an example SNMP configuration. To enable the SNMP, the minimum configuration must define at least one community, either for all NMSs or for a specific NMS to restrict access to individual systems.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# community commstr 192.168.1.64
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show snmp state

bqn  Running  State
0    Yes      running
```



Note:

The agent address used for the SNMP service is the configured management IP address. Once the SNMP service is running, an NMS can request information from the QoE system.

```
% snmpget -v2c -OS -c commstr 192.168.1.95 SNMPv2-MIB::sysName.0
SNMPv2-MIB::sysName.0 = STRING: bqn0
```

Several objects in the SNMPv2-MIB can be modified using the [sys contact](#), [sys description](#), [sys location](#) and [sys name](#) commands. For example, to set the system name to a value different than the hostname:

```
admin@bqn0(config-snmp)# sys name MyName
admin@bqn0(config-snmp)# commit
```

and the new value can be retrieved from the NMS:

```
% snmpget -v2c -OS -c commstr 192.168.1.95 SNMPv2-MIB::sysName.0
SNMPv2-MIB::sysName.0 = STRING: MyName
```

The SNMP service can send SNMPv1 or SNMPv2c traps to specific NMSs. If a community is not indicated, the latest trap-community in net-snmp is used to send traps (in most cases it is public). A specific community may be indicated for each NMS if required.

```
admin@bqn0(config-snmp)# trap-v2c 192.168.1.98
admin@bqn0(config-snmp)# trap-v2c 192.168.1.99 mycommunity
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show snmp trap

NMS          TRAP-TYPE  Community
192.168.1.98  SNMPv2c    n/a
192.168.1.99  SNMPv2c    mycommunity
```

QoE MIB

In addition to the net-snmp functionality, the snmpagt QoE process implements an AgentX subagent to extend management capabilities to the QoE software. The QoE-MIB module contains the bqn MIB under

the Bequant OID, 1.3.6.1.4.1.39453 (Bequant's Private Enterprise Number is 39453).

The bqn-MIB provides the state and statistics of the QoE software, and it is located in the following directory:

```
/usr/share/snmp/mibs/bqn-MIB.txt
```



Note

Several of the data objects in the QoE MIB referencesymbols defined in SNMPv2-SMI that are not available in SNMPv1, such as Counter64.

```
% snmpwalk -v 1 -m +bqn-MIB.txt -c commstr 192.168.1.95 enterprises.bequant
BQN-MIB::bqnInfoCpuLoad.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoMemoryUsage.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoDisk.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoProcess.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoWire.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoTrafficFlow.0 = INTEGER: normal(0)
BQN-MIB::bqnInfoLicenseStatus.0 = INTEGER: normal(0)
BQN-MIB::bqnInfoLicenseUsage.0 = INTEGER: normal(0)
BQN-MIB::bqnStatsSubscribers.0 = Gauge32: 3
BQN-MIB::bqnStatsFlowTcp.0 = Gauge32: 1
BQN-MIB::bqnStatsFlowUdp.0 = Gauge32: 3
BQN-MIB::bqnStatsFlowIpOther.0 = Gauge32: 2
```

Therefore, protocol version 2c should be used to access those objects from a network management station.

```
% snmpwalk -v 2c -m +bqn-MIB.txt -c commstr 192.168.1.95
enterprises.bequant
BQN-MIB::bqnInfoCpuLoad.0 = INTEGER: normal(1)
BQN-MIB::bqnInfoMemoryUsage.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoDisk.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoProcess.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoWire.0 = INTEGER: unknown(0)
BQN-MIB::bqnInfoTrafficFlow.0 = INTEGER: noTraffic(1)
BQN-MIB::bqnInfoLicenseStatus.0 = INTEGER: missing(2)
BQN-MIB::bqnInfoLicenseUsage.0 = INTEGER: unknown(2)
BQN-MIB::bqnStatsRxUplinkIp.0 = Counter64: 0
BQN-MIB::bqnStatsRxDownlinkIp.0 = Counter64: 0
BQN-MIB::bqnStatsTxUplinkIp.0 = Counter64: 0
BQN-MIB::bqnStatsTxDownlinkIp.0 = Counter64: 0
BQN-MIB::bqnStatsRxUplinkTcpc.0 = Counter64: 0
```

```

BQN-MIB::bqnStatsRxDownlinkTcpc.0 = Counter64: 0
BQN-MIB::bqnStatsTxUplinkShaping.0 = Counter64: 0
BQN-MIB::bqnStatsTxDownlinkShaping.0 = Counter64: 0
BQN-MIB::bqnStatsSubscribers.0 = Gauge32: 3
BQN-MIB::bqnStatsFlowTcp.0 = Gauge32: 2
BQN-MIB::bqnStatsFlowUdp.0 = Gauge32: 1
BQN-MIB::bqnStatsFlowIpOther.0 = Gauge32: 1

```



Note

In the above examples the `-m` command line option is passed, which replaces the OIDs with their identifiers.

For testing purposes and not provided by Cambium Networks, the `snmptrapd` program included in the `net-snmp` package may be used to receive notifications:

```

# snmptrapd -f -Lo -n -m +bqn-MIB.txt 192.168.1.99
NET-SNMP version 5.9.1
2021-06-24 21:16:33 UDP: [192.168.1.77]:41878->[192.168.1.99]:162
[UDP: [192.168.1.77]:41878->[192.168.1.99]:162]:
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (529) 0:00:05.29
    SNMPv2-MIB::snmpTrapOID.0 = OID: BQN-MIB::bqnCpuLoadNotify
    BQN-MIB::bqnInfoCpuLoad = INTEGER: normal(1)

```

Dell open manage server administrator

On Dell PowerEdge servers, the `dellmgr` BPKG contains the Dell OpenManage Server Administrator software used to monitor Dell servers.

<http://linux.dell.com/repo/hardware/omsa.html>

The MIBs supported by this software is located under several subdirectories in:

```
/opt/dell/srvadmin/etc
```

To enable the Dell OpenManage software use the `dellmgr` command:

```

admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# community public
admin@bqn0(config-snmp)# dellmgr
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show service dellmgr
dataeng.service - LSB: Systems Management Data Engine
    Loaded: loaded (/etc/init.d/dataeng)
    Active: active (running) since Sat 2015-10-03 13:31:34 CEST; 30min ago
Process: 6987 ExecStart=/etc/init.d/dataeng start (code=exited, status=0/SUCCESS)

```



```
CGroup: /system.slice/dataeng.service
|-7174 /opt/dell/srvadmin/sbin/dsm_sa_datamgrd
|-7263 /opt/dell/srvadmin/sbin/dsm_sa_eventmgrd
\ -7280 /opt/dell/srvadmin/sbin/dsm_sa_snmpd
```

The content of the Dell object identifier (OID) 1.3.6.1.4.1.674 may be retrieved by a NMS.

Packet capture

To capture traffic passing through a data traffic interface, use the system interface capture command.

Packet capture functionality can impact the performance of the system. Use it in a targeted fashion, knowing the traffic you are looking for and when generating captures to disk, make sure you define a small size limit that does not compromise the system.

The following example captures three packets from interface en0p0s8.

```
admin@bqn0# system interface en0p0s8 capture 3
17:48:06.147 OUT FrameLen:84 IPv4 116.48.111.46:443 172.10.1.23:62837
IpLen:70 Frags:0x4000 . . .
17:48:06.149 IN  FrameLen:71 IPv4 172.10.1.23:62837 116.48.111.46:443
IpLen:57 Frags:0x4000 . . .
17:48:06.450 IN  FrameLen:60 IPv4 172.10.1.23:57435 153.154.50.95:443
IpLen:41 Frags:0x4000 . . .
```

If no number of packets is specified, the capture continues until you stop it by pressing <Ctrl>C.

This command accepts a filter to capture only part of the traffic. The capture filter uses the PCAP filter expression syntax, which is commonly used by the tcpdump program.

For example, to capture traffic involving IP address 10.10.1.2:

```
admin@bqn0# system interface en0p0s8 capture filter "host 10.10.1.2"
```

If there are VLAN or PPPoE, you need to specify it in the filter to apply layer-3 parameters such as host.

For example, in traffic with both VLAN and PPPOE

```
admin@bqn0# system interface en0p0s8 capture filter "pppoe and vlan and
host 10.10.1.2"
```

This command can store the captures in a file with PCAP format. For example, to store 10 MB of traffic involving IP 10.10.10.10:

```
admin@bqn0# system interface en0p0s8 capture filter "host 10.10.10.10" file
myfile.pcap 10
```

Alternatively, capture instructions can be configured on some interfaces, and pcap files will be generated in the /opt/bqn/var/capture directory.

The following example shows how to capture all the ingress and egress traffic from the 10.0.0.0/8 network at the en0p0s8 network interface.

```
admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# capture "net 10.0.0.0/8"
```

```
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# op show interface capture en0p0s8

Interface: en0p0s8
Mode: configuration
State: active
Size: 5582848
Size max: 1000000000
Rotation: 10
File: /opt/bqn/var/capture/en0p0s8 Filter: net 10.0.0.0/8
PID: 6802
```

To stop the capture, remove the capture configuration from the interface:

```
admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# no capture
admin@bqn0(config-iface)# commit
```

Bypassing traffic

In exceptional cases, you can instruct the bqn to directly forward some traffic types to bypass all bqn internal processing. This means that the traffic will not be optimized in any way by the bqn.

The command [bypass](#) is used for this purpose.

For example, to bypass all ipv6 traffic:

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# bypass ipv6
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# end
admin@bqn0#
```

Similarly, it is possible to bypass IPv4, UDP, TCP, IP-other traffic (neither UDP or TCP) and traffic with a specific VLAN tag.

File operations

The CLI provides several commands to manage files located in the bqn file system. All these commands start with the file keyword, and in most cases, implement an equivalent UNIX command.

```
admin@bqn0# show interface
```

IFACE	Type	MAC	State	Link
lo0	loopback	00:00:00:00:00:00	up	yes

```

en0p0s8    ethernet    08:00:27:38:04:5d    up    yes
en0p0s9    ethernet    08:00:27:dd:c4:e8    up    yes
en0p0s10   ethernet    08:00:27:33:f4:d4    down  no
en0p0s16   ethernet    08:00:27:d7:28:b0    down  no
en0p0s17   ethernet    08:00:27:33:9e:15    up    yes

```

total 4

```
-rw-r--r-- 1 bqnam users 419 Dec 26 19:15 interface.txt
```

```
admin@bqn0# file less interface.txt
```

```

IFACE      Type      MAC              State  Link
lo0        loopback  00:00:00:00:00:00  up    yes
en0p0s8    ethernet  08:00:27:38:04:5d  up    yes
en0p0s9    ethernet  08:00:27:dd:c4:e8  up    yes
en0p0s10   ethernet  08:00:27:33:f4:d4  down  no
en0p0s16   ethernet  08:00:27:d7:28:b0  down  no
en0p0s17   ethernet  08:00:27:33:9e:15  up    yes

```

```
admin@bqn0# file md5sum interface.txt
```

```
5863aa474c8448e9b90bc73a79a12f8d interface.txt
```

```
admin@bqn0# file rm interface.txt
```

```
/usr/bin/rm: remove regular file 'interface.txt'? y
```

```
admin@bqn0# file ls -l
```

total 0

Currently, the following file operation commands are available:

```
admin@bqn0# file
```

Available completions:

```

+ chmod  Change file mode
+ cksum  Compute CRC checksum
+ cp     Copy file
+ diff   Compare two files
+ grep   Search a file for a pattern
+ less   Show file content
+ ln     Create link
+ ls     Show file list
+ md5sum Compute MD5 checksum
+ mkdir  Create directory

```

```
+ mv      Move or rename file
+ rm      Remove file
+ rmdir   Remove directory
+ stat    Show file status
```

```
admin@bqn0# file
```

For more information about the file operation commands see the [Command Reference](#) section.

System status

The global system status of the QoE can be obtained using the [show system status](#) command.

```
admin@bqn0# show system status

CPU usage:          normal
Disk usage:         normal
Network interfaces: up
PKTENG status:     ready
BTA status:        ready
BTC status:        disabled
SSH service status: ready
WEB service status: ready
NTP service status: ready
```

Use the output of this command to verify that everything is running properly, and go to each section to fix any problem encountered. See the [Troubleshooting](#) chapter for instructions to solve individual problems.

Diagnostic generation

A diagnostic is a file that contains the state of the system, which can be used by Cambium staff to analyze problems.

```
admin@bqn0# system diagnostic

Get OS information...done
Get system information...done
Get network information...done
Get bqn information...done
Get BTA information...done
Get files...done
```

```
Created diagnostic file: /home/bqnadm/diagnostic-20150410022453
```

When a diagnostic is requested by Cambium Networks staff, execute the [system diagnostic](#) command and provide the created file located in the home directory of the user issuing the command. In addition, a

diagnostic may optionally include BTA trace files and network interface traffic captures, which may be requested if needed.

```
admin@bqn0# system diagnostic trace
```

Software updates

QoE software is encapsulated into individual packages, grouped by functionality. These packages are called Bequant Packages (BPKG). All QoE software is provided in BPKG format, and it is managed through the command line interface.

```
admin@bqn0# show system software
```

Name	Version	Active	Boot	Reload
bqnos	R3.0.4	yes	yes	no
linux	R3.0.1-20210119	yes	yes	no
bqkernel	R3.0.3-4.12.14-155.g4755291-default	yes	yes	no
kernel	R3.0.2-4.12.14-155.g4755291-default	yes	yes	no
gui	R3.0.1	yes	yes	no
bqn	R4.0.6	yes	yes	yes

When a new version of a BPKG is available, an administrator user can install it using the [system software install](#) command.

```
admin@bqn0# system software install scp://bqn@192.168.1.64:bqn-R4.0.9.bpkg
```

```
Password:
```

```
bqn-R4.0.9.bpkg 100%
```

```
Name: bqn
```

```
Version: R4.0.9 Priority: 50
```

```
Size: 7835561
```

```
Reload: 1
```

```
Files: 2
```

```
Install package bqn-R4.0.9
```

```
Enable boot flag
```

```
admin@bqn0# show system software
```

Name	Version	Active	Boot	Reload
bqnos	R3.0.4	yes	yes	no
linux	R3.0.1-20210119	yes	yes	no
bqkernel	R3.0.3-4.12.14-155.g4755291-default	yes	yes	no
kernel	R3.0.2-4.12.14-155.g4755291-default	yes	yes	no
gui	R3.0.1	yes	yes	no
bqn	R4.0.6	yes	no	yes
bqn	R4.0.9	no	yes	yes



Note
 when using the [system software install](#) command, all the schemes except file require that the protocol is remotely supported. If this is not the case, the BPKG may be pushed into the QoE using the SCP (secure copy) protocol provided by the ssh service in the management interface.

The scp command is available in most UNIX based operating systems and Windows 10. For Windows systems, if not available, use a client that provides SCP functionality, such as:

- PSCP: Part of the PuTTY suite (use with the -scp option).
<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>
- WinSCP: <http://winscp.net/>
- Cygwin: <https://www.cygwin.com/>

The installed BPKG has the BOOT flag enabled, which means that it will be activated the next time the system boots. For those BPKGs with the RELOAD flag set to yes, a software reload is enough to activate the BPKG instead of rebooting the system (reloading time is a few seconds, depending on the system).

```
admin@bqn0# system software reload bqn R4.0.9
Package "bqn-R4.0.6" must be stopped first.
```



WARNING
 Service may be interrupted during the reload.

```
Continue? (yes/no): yes
admin@bqn0#
%ERR-EIO: Process terminated
Connection to 192.168.1.75 closed.
When the user logs in again the new BPKG is already active.
% ssh admin@192.168.1.75
Password:
Have a lot of fun...
Copyright (c) 2013 Bequant S.L.
admin@bqn0# show system software
```

Name	Version	Active	Boot	Reload
bqnos	R3.0.4	yes	yes	no
linux	R3.0.1-20210119	yes	yes	no
bqkernel	R3.0.3-4.12.14-155.g4755291-default	yes	yes	no
kernel	R3.0.2-4.12.14-155.g4755291-default	yes	yes	no
gui	R3.0.1	yes	yes	no
bqn	R4.0.6	no	no	yes
bqn	R4.0.9	yes	yes	yes

Under environments where network access is not available, the BPKG files can be stored on a USB stick or USB hard drive and plugged at any time into one of the QoE USB ports. The [show hardware disk](#) command can be used to find the USB disk inserted, and the [show system partition](#) command can be used to locate the partition where the BPKG is stored. Once the partition is located, the [system partition mount](#) command can be used to mount the partition.

```
admin@bqn1# show system partition
```

bqn	Partition	Size
0	/dev/sda1	2048 MB
0	/dev/sda2	8192 MB
0	/dev/sdb1	997 MB
0	/dev/sdb2	17539 MB
0	/dev/sdc1	1946 MB

In this example, a 2GB USB stick plugged has a file system, /dev/sdc1, which contains the BPKG to be installed. Note that the full path to the BPKG file must be passed to the [system software install](#) command.

```
admin@bqn1# system partition mount /dev/sdc1 /mnt
```

```
admin@bqn1# file ls /mnt
```

```
bqn-R1.2.2.bpkg
```

```
admin@bqn1# system software install /mnt/bqn-R4.0.9.bpkg
```

```
Name: bqn
```

```
Version: R4.0.9 Priority: 50
```

```
Size: 10002367
```

```
Reload: 1
```

```
Files: 2
```

```
Install package bqn-R4.0.9
```

```
Enable boot flag
```

Remember to unmount the filesystem after the BPKGs have been installed and before removing the USB stick or USB hard drive.

```
admin@bqn1# system partition umount /mnt
```

Logging service

QoE uses the system logger to log information about different events that monitor the status of the system.

The QoE software defines several features that generate log messages about the status of the features depending on their associated logging level. The features and logging levels are described in the [feature](#) command documentation. By default, all features are assigned the info logging level.

```
admin@bqn0# show logging feature
```

Feature	Level
api	info

```

btc          info
cluster     info
config      info
control     info
dns         info
fragment    info
generic     info
iface       info
internal    info
ipc         info
ipctask     info
license     info
memory      info
packet      info
pktcap      info
pkteng      info
proc        info
remctr      info
routing     info
snmp        info
stats       info

```

The different logging levels of each feature is configured inside the logging command mode. For example, to change the iface feature to debug logging level execute the following commands.

```

admin@bqn0# configure
admin@bqn0(config)# logging
admin@bqn0(config-logging)# feature iface debug
admin@bqn0(config-logging)# commit
admin@bqn0(config-logging)# op show logging feature

Feature    Level
api        info
btc        info
cluster    info
config     info
iface      info
internal   info

```



```

ipc          info
ipctask     info
license     info
memory      info
packet      info
pkteng      info
proc        info
routing     info
snmp        info
stats       info

```

The system logger uses the `/var/log/messages` file to log the messages generated by the QoE software. This file is rotated hourly if it reaches a certain size.



Note

Logging should only be activated if requested by Cambium Networks staff, since it can impact the performance of the system.

Network cards with physical bypass

QoE supports network cards from [Silicom Ltd.](#) to implement a physical bypass inside the QoE server when there is a power outage or when indicated by QoE configuration.

The supported models are based on Intel XL710-BM1 and X540.

The Silicom card associates the ports in master-slave pairs that will be physically connected while in bypass. One port is master and its consecutive slave. The configured QoE wires must match those pairs.

This example corresponds to a quad-port interface with pairs `en0s3f0-en0s3f1` and `en0s3f2-en0s3f3`, with the first port in the pair acting as master.

To show the bypass configuration status:

```

admin@bqn0# show interface bypass

Master   Slave   POWER-CFG  POWER-LIVE  STEER-CFG  STEER-LIVE
en0s3f0  en0s3f1  on          on           enabled    enabled
en0s3f2  en0s3f3  on          on           enabled    enabled

```

```
admin@bqn0#
```

In this example, the server shows the default configuration, that will trigger the bypass if there is a power outage (POWER-CFG on and, when the bypass is off, it will steer the traffic through the QoE Software (STEER-CFG on). POWER-LIVE and STEER-LIVE report the current status on the network card and should be equal to the configured state.

The port pairing should match the QoE configured wires:

```
admin@bqn0# show pkteng wire
```

ACC-IFACE	ACC-PCAP	INET-IFACE	INET-PCAP	DIRECTED
en0s3f0	no	en0s3f1	no	yes
en0s3f2	no	en0s3f3	no	yes

```
admin@bqn0#
```

To activate the bypass manually (for example to perform a planned maintenance task on the QoE server), the following configuration changes must be done on the master interfaces:

```
admin@bqn0# configure
admin@bqn0(config)# interface en0s3f0
admin@bqn0(config-iface)# no bypass steer
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0s3f2
admin@bqn0(config-iface)# no bypass steer
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
admin@bqn0#
```

To steer the traffic back through the QoE system (for example, once the maintenance task is complete), the changes are reverted;

```
admin@bqn0# configure
admin@bqn0(config)# interface en0s3f0
admin@bqn0(config-iface)# bypass steer
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0s3f2
admin@bqn0(config-iface)# bypass steer
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
admin@bqn0#
```

It is also possible to disable the triggering of the bypass (for example, because an external bypass path based on dynamic routing is going to be used instead):

```
admin@bqn0# configure
admin@bqn0(config)# interface en0s3f0
admin@bqn0(config-iface)# no bypass power
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0s3f2
admin@bqn0(config-iface)# no bypass power
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
```

admin@bqn0#

Chapter 3: Traffic Management

This chapter contains the following topics:

- [Overview](#)
- [Profiles](#)
- [Subscriber flow policies](#)
- [Subscriber rate policies](#)
- [Subscriber monitoring policies](#)
- [Denial-of-service \(DoS\)](#)
- [Policy rules](#)

Overview

QoE supports the following traffic management functionalities:

- TCP Optimization (TCPO).
- Limit application speeds on a per-application basis (shaping).
- Blocking of specific traffic types.
- Limit the maximum total speed of a subscriber (rate plan management).
- Denial-of-service (DoS) attacks detection.
- Usage monitoring per subscriber and application.

All IP data packets flowing through the bqn belong to a subscriber and a flow. QoE acts on traffic grouped per subscriber and per-flow.

- A subscriber is an IPv4 address on the access side or any IPv6 address from the same /64 subnet on the access side.
- A flow is a TCP connection or a UDP flow, or a flow of another IP protocol (for example, ICMP ping). A subscriber can have many flows at the same time.

To decide which functionalities apply to which flows or subscribers, QoE uses three concepts: policies, profiles, and rules.

- Policies define the actions to perform on the traffic, along with action parameters (for example, a speed limit). There are three types of policies:
 - Subscriber Flow Policies: are applied to some flows of a subscriber.
 - Subscriber Rate Policies: are applied to all the traffic of a subscriber to control that traffic.

- Subscriber Monitor Policies: are applied to a subscriber to obtain information about that subscriber traffic, but without acting on it.
- Profiles classify the traffic according to some criteria (for example, an access profile identifies all the traffic from subscribers whose IP address is within that access profile).
- Rules relate to policies and profiles, where the traffic matching all the profiles indicated in the rule is assigned a policy. For example, a rule may specify that a specific access profile is limited by a rate policy, that is the subscribers whose IP addresses are in the same subnet will have a specific rate limit.

Policies, profiles and rules are defined in configuration mode. For example, to define a flow policy to apply TCP optimization to all TCP Traffic:

```

bqnadmt@bqn0# configure
admin@bqn0(config)# policy flow flow-default
admin@bqn0(config-polflow)# optimization 0 99
admin@bqn0(config-polflow)# tracking 99 100
admin@bqn0(config-polflow)# dpi
admin@bqn0(config-polflow)# metering
admin@bqn0(config-polflow)# root
admin@bqn0(config)# rule flow any policy flow-default
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0#

```

The policy of this example flow-default will apply TCP optimization to 99% of the traffic (optimization 0 99), leave 1% without optimization as a reference group for acceleration metrics (tracking 99 100), generate those metrics, and enable the dpi inspection of the flows. The rule applies flow-default policy to all traffic (any special profile).

Policies can be applied to only part of the traffic. For example, to limit to 100Mbps downlink and uplink to all subscribers in VLANs 123 and 124:

```

admin@bqn0(config)# policy rate rate-100Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 100000
admin@bqn0(config-polrate-rrldown)# exit
admin@bqn0(config-polrate)# rate-limit uplink
admin@bqn0(config-polrate-rrlup)# rate 100000
admin@bqn0(config-polrate-rrlup)# root
admin@bqn0(config)# profile vlan vlans-limited
admin@bqn0(config-pfvlan)# vlan 123
admin@bqn0(config-pfvlan)# vlan 124
admin@bqn0(config-pfvlan)# root

```

```
admin@bqn0(config)# rule rate vlans-limited policy rate-100Mbps
```

Once defined, you can see statistics about the traffic matching the policy with the [show policy](#) command. For example, for policy flows:

```
admin@bqn0# show policy flow statistics
```

NAME	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND	FLWS
flow-default	2853518171	2893466888	702701498	705618613	55826

You can also check the subscribers matching a policy. For example, for flow-default:

```
admin@bqn0# show policy rate-100Mbps subscribers
```

ADDR	FL-ACTIVE	FL-CREATED	BYTES-UPLINK	BYTES-DOWNLINK	LIFETIME
172.22.80.34	39	768	72510705	2635167481	0:16:30
192.168.12.4	87190	499713	1028343169	2020000116	0:16:31

And if you know the IP of the subscriber you are looking for:

```
admin@bqn0# show subscriber 172.22.80.34
```

Address:	172.22.80.34	Instance:	4
Active flows:	35	Total created flows:	506
Active shaped flows:	0	Rate-limit enabled:	no
Duration:	0:10:57.237		
DoS volume detection/attack:	yes/no	DoS SYN detection/attack:	yes/no
UDR generation enabled:	yes (2.00%)	Blocked subscriber:	no
Recv bytes uplink:	48573215	Recv bytes downlink:	1779331575
Latest downlink TCP RTX rate:	10.85%	Average downlink TCP RTX rate:	16.74%
Latest RTT-min:	12.730	Absolute RTT-min:	6.887
Downlink Speed (Mbps):	24.303	Downlink TCPO bytes:	1156800669
Policy monitor:	monitor-default	Policy rate:	rate-100 Mbps

SUBS-RATE-POLICY	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND
rate-default	1779331575	1972385299	48573215	35000700

Along with the monitor and rate policies, the command shows information about transmissions (TCP RTX rate) and minimum round-trip-time (RTT-min), among others.

The next sections describe in more detail the different profiles and policies and how to combine them into complex rules.

Profiles

Profiles classify the traffic and, according to the rules, determine which policies are applied to each subscriber and flow. There are different profile types, according to the properties being used for classification.

The current version supports the following profile types:

- **Interface Profile:** Identifies the flows or subscribers whose first data packet comes into the QoE through a network interface specified by the interface profile.
- **VLAN Profile:** Identifies the flows or subscribers whose first data packet uses a VLAN tag in the profile (or the absence of any tag).
- **Internet Profile:** Identifies the flows coming from or going to an IP address on the Internet side specified by the profile. Optionally, Internet-side ports can also be specified (for example, port 80).
- **Access Profile:** Identifies the flows or subscribers coming from or going to an IP address on the Access side, specified by the profile. Optionally, access-side ports can also be specified.
- **Throughput Profile:** Identifies all the flows which were created during a time in which the total downlink traffic going through the QoE was above the threshold specified by the profile.
- **DPI(Deep Packet Inspection) Profile:** Identifies the flows that use an HTTP/HTTPS/QUIC domain that matches any of the domain signatures of the profile.



Note

This profile may not be available in the countries with export restrictions.

Interface profiles

An interface profile can be used to restrict a policy only to one network sector. In the following example, the bqn has two wires, and optimization is applied only to one of them:

```
admin@bqn0(config)# op show pkteng wire

  ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
  en0o3      no        en0o4       no
  en0o5      no        en0o6       no

admin@bqn0(config)# interface en0o3
admin@bqn0(config-iface)# pkteng interface-id 0x1
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0o4
admin@bqn0(config-iface)# pkteng interface-id 0x1
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0o5
admin@bqn0(config-iface)# pkteng interface-id 0x2
admin@bqn0(config-iface)# root
```

```

admin@bqn0(config)# interface en0o6
admin@bqn0(config-iface)# pkteng interface-id 0x2
admin@bqn0(config-iface)# root
admin@bqn0(config)# profile interface ifaces-1
admin@bqn0(config-pfiface)# interface-id 0x1
admin@bqn0(config-pfiface)# root
admin@bqn0(config)# policy flow flow-opt
admin@bqn0(config-polflow)# optimization
admin@bqn0(config-polflow)# root
admin@bqn0(config)# policy flow flow-no-opt
admin@bqn0(config-polflow)# tracking
admin@bqn0(config-polflow)# root
admin@bqn0(config)# rule flow ifaces-1 policy flow-no-opt
admin@bqn0(config)# rule flow any policy flow-opt

```

In the flow policies, optimization without explicit percentages defaults to 100% and the same happens with tracking.

VLAN profiles

A VLAN profile can be used to restrict a policy only to some VLANs. In the following example, we apply different subscriber rate limits to VLAN 10 and 20, another rate limit to traffic without VLAN, and no limit to the rest.

```

admin@bqn0(config)# profile vlan vlans-example
admin@bqn0(config-pfvlan)# vlan 10
admin@bqn0(config-pfvlan)# vlan 20
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# policy vlan vlans-none
admin@bqn0(config-pfvlan)# vlan none
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# policy rate rate-10Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 10000
admin@bqn0(config-polrate-rrldown)# exit
admin@bqn0(config-polrate)# rate-limit uplink
admin@bqn0(config-polrate-rrlup)# rate 10000
admin@bqn0(config-polrate-rrlup)# root
admin@bqn0(config)# policy rate rate-50Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 50000

```



```

admin@bqn0(config-polrate-rrldown)# exit
admin@bqn0(config-polrate)# rate-limit uplink
admin@bqn0(config-polrate-rrlup)# rate 50000
admin@bqn0(config-polrate-rrlup)# root
admin@bqn0(config)# policy rate rate-default
admin@bqn0(config-polrate)# root
admin@bqn0(config)# rule rate vlans-example policy rate-10Mbps
admin@bqn0(config)# rule rate vlans-none policy rate-50Mbps
admin@bqn0(config)# rule flow any policy rate-default

```

More than one VLAN tag can belong to the same VLAN profile, as vlans-example shows. To specify the absence of a VLAN tag, use the command `vlan none`. VLAN profiles are disjointed to avoid potential rule conflicts. For more information, refer to [Rule conflicts](#) section.

If QinQ is in use, the profile matches the outer tag.

Internet profiles

An Internet profile is a collection of IP addresses and/or IP address ranges that belong to hosts on the Internet side of the bqn server. For example, it can be used to identify servers over the cloud and caches internal to your network (but also on the Internet side):

```

admin@bqn0(config)# profile internet myservice
admin@bqn0(config-pfinet)# address 10.10.0.100/32
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 10.10.0.101/32
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 142.250.0.0/15
admin@bqn0(config-pfinet-inetaddr)# root
admin@bqn0(config)#

```

It is possible to specify TCP and/or UDP ports:

```

admin@bqn0(config)# profile internet myservice
admin@bqn0(config-pfinet)# address 10.10.0.100/32
admin@bqn0(config-pfinet-inetaddr)# tcp port 443
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 10.10.0.101/32
admin@bqn0(config-pfinet-inetaddr)# tcp port 443
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 142.250.0.0/15
admin@bqn0(config-pfinet-inetaddr)# tcp port 8080
admin@bqn0(config-pfinet-inetaddr)# tcp port 443
admin@bqn0(config-pfinet-inetaddr)# udp port 443

```

```
admin@bqn0 (config-pfinet-inetaddr) # root
admin@bqn0 (config) #
```

It is also possible to specify a port number regardless of IP address using the 0.0.0.0/0 address range, but bear in mind that Internet profiles should be kept disjoint to avoid rule conflicts and a profile fully port-based is usually too broad.

For example:

```
admin@bqn0 (config) # profile internet another-service
admin@bqn0 (config-pfinet) # address 0.0.0.0/0
admin@bqn0 (config-pfinet-inetaddr) # tcp port 2020
admin@bqn0 (config-pfinet-inetaddr) # tcp port 2021
admin@bqn0 (config-pfinet-inetaddr) # root
admin@bqn0 (config) #
```

If two profiles overlap, but one of them is more specific, the most specific will take precedence.

For example:

```
admin@bqn0 (config) # profile profile internet
```

Name	Address	Ports
inet-1	10.1.1.0/24	0
inet-1	10.1.2.0/32	0
inet-2	10.1.1.201/32	0

For traffic to Internet IP 10.1.1.201, both profiles would match but inet-2 will prevail because it is more specific (matches the exact IP address, while inet-1 matches with the IP range 10.1.10/24).

Internet profiles cannot be used with Rate and Monitor policies.

Overlaps should be avoided to eliminate the possibility of rule conflicts. For more information, refer to [Rule conflicts](#) section.

Access profiles

An Access profile is a collection of IP addresses and/or IP address ranges that belong to hosts on the access side of the bqn server. It can be used to identify subscribers or access subnets. The following example distinguishes the FTTH and the Cable subnets based on the IP pools they allocate their subscribers:

```
admin@bqn0 (config) # profile access my-ftth
admin@bqn0 (config-pfinet) # address 10.1.0.0/16
admin@bqn0 (config-pfinet-inetaddr) # exit
admin@bqn0 (config-pfinet) # address 10.2.0.0/16
admin@bqn0 (config-pfinet-inetaddr) # root
admin@bqn0 (config) # profile access my-cable
admin@bqn0 (config-pfinet) # address 10.11.0.0/16
```

```
admin@bqn0 (config-pfinet-inetaddr) # exit
admin@bqn0 (config-pfinet) # address 10.12.0.0/16
admin@bqn0 (config-pfinet-inetaddr) # exit
admin@bqn0 (config-pfinet) # address 10.13.0.0/16
admin@bqn0 (config-pfinet-inetaddr) # root
admin@bqn0 (config) #
```

As with other profiles, overlaps should be avoided to eliminate the possibility of rule conflicts. For more information, refer to [Rule conflicts](#) section.

Throughput profiles

A throughput profile defines a level of overall traffic (counting all wires in the QoE server in the downlink directions) and is true if that level is exceeded. It is useful to define a flow policy that will take effect only during peak hours (defining peak hours as those exceeding a throughput level).

For example, to define a level of 4.5 Gbps (given in Kbps in the CLI command):

```
admin@bqn0 (config) # profile throughput above-4.5 Gbps
admin@bqn0 (config-pftp) # throughput 4500000
admin@bqn0 (config-pftp) # root
admin@bqn0 (config) #
```

Throughput profiles can only be used with Flow policies, for example to limit video streaming during peak hours to improve the overall user experience.

DPI profiles

A DPI profile defines a set of DPI domain signatures. If the flow DPI information matches any of these signatures, the profile is evaluated as true.

Signatures can be of the following types:

- http host: the host field of HTTP traffic
- https sni: the Server Name Indication (SNI) field of HTTPS traffic
- quic sni: the Server Name Indication (SNI) field of QUIC traffic
- quic mvfst: all MVFST traffic

The signature syntax allows up to two wildcard characters *.

The following example defines a DPI profile for an application that uses different combinations of protocols and signatures:

```
admin@bqn0 (config) # profile dpi my-service
admin@bqn0 (config-pfdpi) # http host *mydomain.com
admin@bqn0 (config-pfdpi) # http host *mysubdomain*
admin@bqn0 (config-pfdpi) # http host myprefix*myotherdomain.com
admin@bqn0 (config-pfdpi) # https sni *mydomain.com
```

```

admin@bqn0(config-pfdpi)# https sni *mysubdomain*
admin@bqn0(config-pfdpi)# https sni myprefix*myotherdomain.com
admin@bqn0(config-pfdpi)# quic sni *mydomain.com
admin@bqn0(config-pfdpi)# quic sni *mysubdomain*
admin@bqn0(config-pfdpi)# quic sni myprefix*myotherdomain.com
admin@bqn0(config-pfdpi)# root
admin@bqn0(config)#

```



Note

If a signature is in more than one protocol, separate entries are needed. In the example, we have defined the same signatures for HTTP, HTTPS, and QUIC, because in this particular application, all three are possible.

Signatures can overlap across DPI profiles and cause ambiguities. To avoid them, you can use the optional priority field.

For example:

```

admin@bqn0(config)# show config running
...
profile dpi dpi-1
http host *mydomain.com
profile dpi dpi-2
http host *mydomain*
...

```

A flow with a host ending in mydomain.com will match both profiles, but we can give preference to one of the profiles using the optional priority field. The lower the number, the higher the priority. For example, to give dpi-1 priority over dpi-2:

```

admin@bqn0(config)# profile dpi dpi-1
admin@bqn0(config-pfdpi)# http host *mydomain.com priority 10
admin@bqn0(config-pfdpi)# root
admin@bqn0(config)# profile dpi dpi-2
admin@bqn0(config-pfdpi)# http host *mydomain.com priority 20
admin@bqn0(config-pfdpi)# root
admin@bqn0(config)#

```

DPI profiles can only be used with Flow policies.

Subscriber flow policies

When a new flow is created, the set of flow policy rules are evaluated to determine the flow policy to apply. A flow policy specifies how to treat all the flows within that subscriber matching that policy.

The following are the actions that can be defined in a flow policy:

- TCP Optimization. Improves TCP traffic performance.
- Application speed limit (shaping). It limits the speed to a given value. It is possible to limit the downlink and/or uplink direction. The limit applies to all flows matching the policy belonging to the same subscriber. For example, if a limit of 6 Mbps is specified for video streaming, and the subscriber has three video streaming flows from different servers, the three flows will share the 6 Mbps limit (getting around 2 Mbps each).
- Bursts. In relation to shaping limits, bursts allow flows to exceed temporally the limit.

Block: It blocks this traffic type and does not let it proceed. It should be used with care, to avoid affecting traffic different from the one intended. For example, it is not recommended to use blocking in default rules.

The following example defines a flow policy that optimizes 99% of TCP flows, leaves 1% without optimization to generate acceleration metrics, includes DPI analysis, and defines a speed limit of 10 Mbps in the downlink direction and 5 Mbps in the uplink direction:

```
admin@bqn0(config)# policy flow flow-10 Mbps
admin@bqn0(config-polflow)# optimization 0 99
admin@bqn0(config-polflow)# tracking 99 100
admin@bqn0(config-polflow)# dpi
admin@bqn0(config-polflow)# metering
admin@bqn0(config-polflow)# shaping downlink
admin@bqn0(config-polflow-shpfdn)# rate 10000
admin@bqn0(config-polflow-shpfdn)# exit
admin@bqn0(config-polflow)# shaping uplink
admin@bqn0(config-polflow-shpfup)# rate 5000
admin@bqn0(config-polflow-shpfup)# root
admin@bqn0(config)#
```

Shaping rates are given in Kbps in the CLI commands.

A flow policy can include bursts that allow temporally exceeding the shaping limits. In the previous example, we will add bursts of 20 Mbps in downlink and 10 Mbps in uplink with a duration of 5 seconds:

```
admin@bqn0(config)# policy flow flow-10Mbps
admin@bqn0(config-polflow)# shaping downlink
admin@bqn0(config-polflow-shpfdn)# burst-rate 20000
admin@bqn0(config-polflow-shpfdn)# burst-duration 5
admin@bqn0(config-polflow-shpfdn)# burst-threshold 10000
admin@bqn0(config-polflow-shpfdn)# burst-threshold-window 300
admin@bqn0(config-polflow-shpfdn)# exit
admin@bqn0(config-polflow)# shaping uplink
admin@bqn0(config-polflow-shpfup)# burst-rate 10000
admin@bqn0(config-polflow-shpfup)# burst-duration 5
```

```

admin@bqn0 (config-polflow-shpfdwn) # burst-threshold 5000
admin@bqn0 (config-polflow-shpfdwn) # burst-threshold-window 300
admin@bqn0 (config-polflow-shpfup) # root
admin@bqn0 (config) #

```

When to grant a new burst is governed by burst-threshold and burst-threshold-window. An average speed is calculated using a moving window (in the example of 300 seconds) and a new burst is granted when that speed falls below the threshold (in the example, 5 Mbps).

When rate policies are also applied, it is possible to define a flow policy that is not restricted by the rate policy limit. This can be useful to have the best possible quality in rate-sensitive applications to prevent degradation when a subscriber is using the rate plan to its maximum speed. In the previous example:

```

admin@bqn0 (config) # policy flow flow-10Mbps
admin@bqn0 (config-polflow) # no rate-limit
admin@bqn0 (config-polflow) # root
admin@bqn0 (config) #

```

Use block directive to block the traffic. If present, any shaping parameters are ignored:

```

admin@bqn0 (config) # policy flow flow-block
admin@bqn0 (config-polflow) # block
admin@bqn0 (config-polflow) # dpi
admin@bqn0 (config-polflow) # optimization
admin@bqn0 (config-polflow) # root
admin@bqn0 (config) #

```

Subscriber rate policies

If a new subscriber is detected, then the subscriber rate policy rules are evaluated to determine the rate policy to apply. The rate policy specifies how to treat all the traffic of that subscriber.

The following are the actions that can be defined in a subscriber rate:

- **Maximum speed limits:** It limits the speed of that subscriber to a given value. It is possible to limit the downlink and/or uplink direction. The limit applies to all traffic going to and from that subscriber,
- **Bursts:** In relation to speed limits, bursts allow subscribers to exceed temporarily the limit. They are identical to flow policy bursts, only that applies to all the subscriber traffic as part of the rate policy.
- **Block:** It blocks subscribers with this policy. It should be used with care, to avoid affecting subscribers different from the ones intended.

The following example defines a rate policy with 50 Mbps in downlink and 25 Mbps in uplink and with bursts of twice the rate limit with a duration of 5 seconds.

```

admin@bqn0 (config) # policy rate rate-50Mbps
admin@bqn0 (config-polrate) # rate-limit downlink
admin@bqn0 (config-polrate-rrldwn) # rate 50000

```

```

admin@bqn0(config-polrate-rrldown)# burst-rate 100000
admin@bqn0(config-polrate-rrldown)# burst-duration 5
admin@bqn0(config-polrate-rrldown)# burst-threshold 50000
admin@bqn0(config-polrate-rrldown)# burst-threshold-window 300
admin@bqn0(config-polrate-rrldown)# exit
admin@bqn0(config-polrate)# rate-limit uplink
admin@bqn0(config-polrate-rrlup)# rate 25000
admin@bqn0(config-polrate-rrlup)# burst-rate 50000
admin@bqn0(config-polrate-rrlup)# burst-duration 5
admin@bqn0(config-polrate-rrlup)# burst-threshold 25000
admin@bqn0(config-polrate-rrlup)# burst-threshold-window 300
admin@bqn0(config-polflow-rrlup)# root
admin@bqn0(config)#

```

To see the parameter settings of a policy:

```

admin@bqn0# show policy rate rate-50Mbps
Name: rate-50 Mbps
Type: rate
Source: static
Blocking: no
DOS: no
Dynamic update: yes
Rate Limit downlink: yes
Burst rate: 100000
Burst duration: 5.000000
Burst threshold: 50000
Burst threshold window: 300.000000
Rate: 50000
Rate Limit uplink: yes
Burst rate: 50000
Burst duration: 5.000000
Burst threshold: 25000
Burst threshold window: 300.000000
Rate: 25000

```

Rate policies via APIs

This section describes the rate policies and rules defined locally at the QoE server. It is possible to select policies and define them using QoE APIs. In these cases, local rules and policies act as a default when the API has no instructions for some subscribers.

For more information, refer to [Traffic management APIs](#) section.

Subscriber identification

QoS identifies subscribers using IP addresses on the access side. If there is a NAT between the QoS server and the real subscribers, subscriber whose IP address is translated to the same IP address is considered as the same subscriber.

A new subscriber is identified when the first packet from an IP address is received. This is when the subscriber rate and monitoring rules are evaluated.

In IPv4, a subscriber is identified by a unique IP address. In IPv6, a subscriber is identified by a /64 subnet.

It is possible to configure a different mask of the IPv6 subnet. For example, if the network uses a /32 mask:

```
admin@bqn0 (config) # pkteng
admin@bqn0 (config-pkteng) # subscriber ipv6-prefix 32
admin@bqn0 (config-pkteng) # root
admin@bqn0 (config) #
```

Time to apply rate policy changes

The changes in subscriber rate policies take a minute to apply. The reason for this delay is to reduce the performance impact on the system by grouping changes in one minute intervals. It is possible to set a shorter interval, but proceed with care. For example, to reduce the interval to 30 seconds:

```
admin@bqn0 (config) # pkteng
admin@bqn0 (config-pkteng) # control config-change 30
admin@bqn0 (config-pkteng) # root
admin@bqn0 (config) #
```

Subscriber monitoring policies

A Subscriber Monitor Policy contains the instructions to generate detailed traffic records for a random percentage of flows.

The following are the possibilities:

- **Usage Data Records or UDRs:** Provide input to DPI charts. The recommended value is small (between 0.5% to 2%).
- **Subscriber Data Records or SDRs:** Provide traffic volume counters per subscriber. The recommended value is 100%.
- **Traces:** These are detailed software logging used only under Cambium Networks supervision to debug problems.

One default policy serves most purposes, with some policies that are created temporarily to help in diagnosing problems. The following example creates a default monitoring policy with typical values (2% of UDRs and 100% of SDRs):

```
admin@bqn0 (config) # policy monitor monitor-default
admin@bqn0 (config-polmon) # udr 2
```



```
admin@bqn0 (config-polmon) # sdr
admin@bqn0 (config-polmon) # root
admin@bqn0 (config) # rule monitor any policy monitor-default
admin@bqn0 (config) #
```

UDRs in subscriber flow policies

Monitoring policies are the recommended way to generate UDR records. However, it is possible to define UDR generation directives in a flow policy that takes precedence over monitor policies for those flows matching the policy.

The following example creates a flow policy to generate 25% of UDRs.

```
admin@bqn0 (config) # policy flow flow-detailed
admin@bqn0 (config-polflow) # optimization
admin@bqn0 (config-polflow) # dpi
admin@bqn0 (config-polflow) # udr 75 100
admin@bqn0 (config-polflow) # root
admin@bqn0 (config) #
```



Note

In flow policies, specify the initial and final percentages, whose difference is the % of records generated (for example, 100-75=25).

Denial-of-service (DoS)

QoS can be configured to detect denial-of-service attacks (DoS). Two types are detected:

- **SYN flooding:** Where multiple TCP handshakes are generated to leave targeted hosts with half-open connections, depriving them of resources. SYN flooding can be initiated in a subscriber (for example, because the subscriber equipment has been compromised) or have the subscriber at the receiver end of the flooding.
- **Volumetric attacks:** Traffic is directed towards a subscriber with a throughput the subscriber rate limit.

The detection of such attacks requires some thresholds to be configured. A threshold, when exceeded, will signal abnormal traffic and identify it as an attack.

Those thresholds can be defined for all traffic under the pkteng configuration mode section.

For example:

```
admin@bqn0 (config) # pkteng
admin@bqn0 (config-pkteng) # dos syn rate client egress 50
admin@bqn0 (config-pkteng) # dos syn rate client ingress 50
admin@bqn0 (config-pkteng) # dos volume min 50000
admin@bqn0 (config-pkteng) # dos volume multiplier 3
admin@bqn0 (config-pkteng) # root
```

```
admin@bqn0 (config) #
```

The previous configuration detects SYN flooding attacks with a subscriber as origin or destination (egress and ingress respectively) when the rate of failed SYNs is above 50 per second. It also detects volumetric attacks, when a rate of at least 50 Mbps is above three times the subscriber rate policy limit (if the subscriber has no rate limit defined, then only the minimum volume rate is applied).

To see ongoing DoS attacks, use the [show statistics dos](#) command.

For example, to list volumetric attacks:

```
admin@bqn0# show statistics dos volume
```

Time	IP-ADDRESS	Side	Direction	MBYTE S	RATE- Mbps	Durati on	TOP- CONTRIBUTOR
2021-06-27T09:41:00	162.13.223.3	access	ingress	85258	166.06	00:00:11	14.25.205.6
2021-06-27T09:56:54	43.129.176.126	access	ingress	686571	51.06	04:27:29	182.107.253.11

```
admin@bqn0#
```

This command lists one attack per line, including the time of detection, the subscriber involved, the direction of the attack (ingress means towards the subscriber), traffic volume, traffic rate, attack duration (or ongoing if still active), and IP address which is the main source of the attack (top contributor).

Likewise, for syn flooding:

```
admin@bqn0# show statistics dos syn
```

Time	IP-ADDRESS	Side	Direction	FAIL-SYN	MAX-RATE	Duratio n	TOP- CONTRIBUTOR
2021-06-28T09:31:28	172.12.14.2	access	egress	19458580	296	ongoing	n/a
2021-06-28T09:31:28	10.2.58.7	access	egress	23148447	290	00:02:12	24.105.065.232

```
admin@bqn0#
```

In the above example, the attacks originated in subscriber IP addresses. The command provides a total of failed SYNs since the attack started, the maximum rate of failed SYNs reached, the duration (or ongoing if it has not ended yet), and the main IP address involved on the other side.

DoS in subscriber rate policies

The commands under pkteng configuration mode are the recommended way to configure DoS global thresholds. However, it is possible to define DoS thresholds in a rate policy that takes precedence over the global setting.

The following example creates a rate policy with DoS thresholds:

```
admin@bqn0 (config) # policy rate rate-my-dos
```

```
admin@bqn0(config-polrate)# dos
admin@bqn0(config-polrate-dos)# syn client ingress 100
admin@bqn0(config-polrate-dos)# syn client egress 100
admin@bqn0(config-polrate-dos)# volume 200000
admin@bqn0(config-polrate-dos)# root
admin@bqn0(config)#
```

Failed SYN rates are 100/sec for traffic marching this policy instead of the global value of 50. Also, if the rate is above 200 Mbps, a volume attack is detected.

Policy rules

In previous sections, we have introduced some examples of the use of the rule command. It is explained in this section.

There are three sets of rules, one for each of the policy types: flow, rate, and monitor.

The structure of all rules is the same, with a list of profiles to match and the policy to apply if the rule is true. Only one profile of the same type is possible.

Depending on the type of rule, the allowed profiles are different. For flow rules, all profile types are accepted. They can be specified in any order. For example, to define a shaping rule for video streaming in some VLANs and when the network is above 2.5 Gbps:

```
admin@bqn0(config)# rule flow above-2.5Gbps vlan-A dpi-video policy flow-10Mbps
admin@bqn0(config)#
```

A rule can be generic (not depending on any profile) using the any directive:

```
admin@bqn0(config)# rule flow any policy flow-default
admin@bqn0(config)#
```

Rate and monitor rules can only use the following profile types:

- interface
- vlan
- access

The other profile types are not applicable because rate and monitor rules apply to all the subscriber traffic, so profiles that can be true only for part of that traffic do not make sense in this context.

Examples of rate and monitor rules:

```
admin@bqn0(config)# rule rate vlan-A policy rate-10Mbps
admin@bqn0(config)# rule monitor any policy monitor-default
admin@bqn0(config)#
```

To see the list of configured rules:

```
admin@bqn0# show rule
```

TYPE	ID	STATUS	POLICY	PROFILE
flow	14	ok	flow-default	n/a
flow	16	ok	flow-10 Mbps	vlan-A, above-2.5 Gbps, dpi-video
rate	13	ok	rate-10 Mbps	vlan-A
monitor	8	ok	monitor-default	n/a

```
admin@bqn0#
```

Rule conflicts

When there are rules that depend on profiles with overlaps and lead to different policies, there is an ambiguity about what to do with traffic and a conflict arises.

The following example defines two overlapping VLAN profiles (tags 20 and 30 are in both profiles) and two rules in conflict (they lead to different policies):

```
admin@bqn0(config)# profile vlan vlan-A
admin@bqn0(config-pfvlan)# vlan 10
admin@bqn0(config-pfvlan)# vlan 20
admin@bqn0(config-pfvlan)# vlan 30
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# profile vlan vlan-B
admin@bqn0(config-pfvlan)# vlan 20
admin@bqn0(config-pfvlan)# vlan 30
admin@bqn0(config-pfvlan)# vlan 40
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# policy rate rate-10Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 10000
admin@bqn0(config-polrate-rrldown)# root
admin@bqn0(config)# policy rate rate-20Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 20000
admin@bqn0(config-polrate-rrldown)# root
admin@bqn0(config)# rule rate vlan-A policy rate-10Mbps
admin@bqn0(config)# rule rate vlan-B policy rate-20Mbps
admin@bqn0(config)#
```

To see the rule conflicts at any time, use the [show rule error](#) command:

```
admin@bqn0# show rule error

%WARN-EALREADY: Conflict between rate rules 12 and 13: vlan(20) policy(rate-10Mbps)
```

```
%WARN-EALREADY: Conflict between rate rules 13 and 12: vlan(30) policy(rate-20Mbps) admin@bqn0#
```

In this example, two conflicts are described: VLAN tags 20 and 30 are the cause of conflicts between rules 12 and 13.

You can get a list of the rules with their numbering with the [show rule](#) command (in this case, we look for rate rules):

```
admin@bqn0# show rule rate

IDPF-RANDOM  PF-INTERFACE  PF-VLAN  PF-ACCESS  PF-THROUGHPU  Policy
13 n/a          n/a          vlan-A    n/a          n/a            rate-10Mbps
12 n/a          n/a          vlan-B    n/a          n/a            rate-20Mbps

admin@bqn0#
```

Looking at the listing, it is clear that rule 13 depends on VLAN profile vlan-A and rule 12 on VLAN profile vlan-B. We need to decide on which one we want to keep tags 20 and 30 (or whether to remove them) to solve the conflict. For example, we can remove them from vlan-B :

```
admin@bqn0(config)# profile vlan vlan-B
admin@bqn0(config-pfvlan)# no vlan 20
admin@bqn0(config-pfvlan)# no vlan 30
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show rule error
admin@bqn0(config)#
```

And the conflict is resolved.

Chapter 4: Traffic Management APIs

This chapter contains the following sections:

- [Overview](#)
- [RADIUS](#)
- [REST API](#)

Overview

In the [Subscriber rate policies](#) section, we saw how to implement rate plans using rules that combined profiles and rate policies, all locally configured in the QoE.

QoE has a control interface that allows external systems to define aspects of the rate policies, in particular:

- For a Policy Rate locally configured in the QoE, assign it to a subscriber (regardless of what the local rules mandate).
- Define rate policies dynamically.

Currently, there are two available APIs:

- **RADIUS:** It is used by a RADIUS client (for example, a PPPoE server) to communicate with the QoE, which acts as a RADIUS server.
- **REST API:** It is based on REST principles to implement the QoE control API as a web service. It can be used by any external element (for example, a billing system).

For more information on those APIs, refer to [RADIUS](#) and [REST API](#) sections.

Radius

Currently, the RADIUS API acts as a RADIUS accounting server so a RADIUS client manages aspects of the QoE policy rates. At the moment, the RADIUS API supports the mapping of a subscriber IP address to a rate policy locally configured in the QoE.

To activate the RADIUS in the QoE:

```
admin@bqn0# configure
admin@bqn0(config)# api radius
admin@bqn0(config-radius)# proxy 10.10.10.10
admin@bqn0(config-radius-rproxy)# root
admin@bqn0(config)#
```

This setup reuses the management network interface and address (we selected 10.10.10.10, which in this example is the QoE OAM IP address).

The RADIUS clients must be registered with their IP addresses and secrets so the access can be validated. An optional client description can also be added:

```

admin@bqn0(config)# api radius
admin@bqn0(config-radius)# client 10.10.10.21
admin@bqn0(config-radius-rclient)# secret "my secret 1"
bqnamd@bqn0(config-radius-rclient)# description pppoe-server-1
admin@bqn0(config-radius-rclient)# exit
admin@bqn0(config-radius)# client 10.10.10.22
admin@bqn0(config-radius-rclient)# secret "my secret 2"
bqnamd@bqn0(config-radius-rclient)# description pppoe-server-2
admin@bqn0(config-radius-rclient)# root
admin@bqn0(config)#

```

A different interface and address can be configured. For example, using a spare en0o2 network interface:

```

admin@bqn0(config)# interface en0o2
admin@bqn0(config-iface)# ip address 10.10.10.11/24
admin@bqn0(config-iface)# root
admin@bqn0(config)# api radius
admin@bqn0(config-radius)# proxy 10.10.10.11
admin@bqn0(config-radius-rproxy)# interface en0o2
admin@bqn0(config-radius-rproxy)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0# show api radius proxy

```

IFACE	Address	State
en0o2	10.10.10.11	ready

```

admin@bqn0# show api radius client

```

ADDRESS	DESCRIPTION	SECRET
10.10.10.21	pppoe-server-1	my secret 1
10.10.10.22	pppoe-server-2	my secret 2

```

admin@bqn0#

```

On the RADIUS clients, the following steps are needed:

1. The QoE RADIUS address must be configured as a RADIUS accounting server, using the same secret configured in the QoE. Most RADIUS clients allow multiple RADIUS accounting servers and our recommendation is to add the QoE while keeping the existing ones.
2. The RADIUS client must send the following parameters in the RADIUS Accounting request:
 - **Framed-IP-Address:** contains the IPv4 address assigned to the subscriber. It is a standard parameter, part of [IETF RFC 2865](#). This value should be included in the Access-Accept

message by the authenticating RADIUS server.

- **Mikrotik-Rate-Limit:** contains a string with a description of the policy. This field is a Mikrotik AVP, with vendor ID 14988 and value 26. This value is normally included by the Mikrotik PPPoE server in its accounting messages. The QoE parses the AVP format and create dynamically a subscriber rate policy with the given parameters that will be associated to that subscriber IP address. If the *Mikrotik-Address-List* is also present, the dynamic policy is named with the *Mikrotik-Address-List* content.
- **MIKROTIK_ADDRESS_LIST:** contains a string with the name of the rate policy to apply to this subscriber. The policy name must match the name of a rate policy locally configured in the QoE. This field is a Mikrotik AVP, with vendor ID 14988 and value 19. This value is normally included in the Access-Accept message by the authenticating RADIUS server.

3. Check that the QoE IP address used for RADIUS is reachable from the RADIUS clients. If the management interface is being used for RADIUS, and the QoE firewall is activated, the RADIUS client IPs must be added to the firewall rules if not already included (they will be normally included if the RADIUS clients are in the same subnet as the OAM address).

Once all these steps are complete, the QoE should be able to assign local policies based on RADIUS signaling.

Mikrotic-Rate-Limit AVP

If the Mikrotic-Rate-Limit is enabled, once RADIUS signalling is received, one can see the policies created from the RADIUS API with the command:

```
bqnadm@bqn0# show api policy
```

NAME	SOURCE	SUBS-TOTAL	SUBS-ACTIVE	INACTIVITY
10M/10M_0K/0K_0K/0K_0/0	radius	12	4	n/a
2M/5M_0K/0K_0K/0K_0/0	radius	12	4	n/a
50M/100M_100M/200M_50M/100M_5/5	radius	4	4	n/a
rate-default	config	0	0	n/a

```
bqnadm@bqn0#
```



Note

The command marks the policies generated dynamically from RADIUS (SOURCE is set to *radius* in those cases). Also the spaces in the original AVP value are replaced by an underscore to meet QoE policy naming requirements.

To get a list of subscribers associated to RADIUS policies:

```
bqnadm@bqn0# show api subscriber
```

ADDRESS	SOURCE	POLICY	CREATED	UPDATED
10.1.0.3	radius	50M/100M_100M/200M_50M/100M_5/5	2021-12-30T13:41:55	00:01:00

10.1.0.4	radius	50M/100M_100M/200M_50M/100M_5/5	2021-12-30T13:41:56	00:00:59
10.1.0.5	radius	50M/100M_100M/200M_50M/100M_5/5	2021-12-30T13:41:57	00:00:58
10.1.0.6	radius	50M/100M_100M/200M_50M/100M_5/5	2021-12-30T13:41:58	00:00:57
10.1.0.7	radius	10M/10M_0K/0K_0K/0K_0/0	2021-12-30T13:42:00	00:00:55
10.1.0.8	radius	10M/10M_0K/0K_0K/0K_0/0	2021-12-30T13:42:01	00:00:54
10.1.0.9	radius	10M/10M_0K/0K_0K/0K_0/0	2021-12-30T13:42:02	00:00:53
10.1.0.10	radius	10M/10M_0K/0K_0K/0K_0/0	2021-12-30T13:42:03	00:00:52
10.1.0.11	radius	2M/5M_0K/0K_0K/0K_0/0	2021-12-30T13:42:05	00:00:50
10.1.0.12	radius	2M/5M_0K/0K_0K/0K_0/0	2021-12-30T13:42:06	00:00:49
10.1.0.13	radius	2M/5M_0K/0K_0K/0K_0/0	2021-12-30T13:42:07	00:00:48
10.1.0.14	radius	2M/5M_0K/0K_0K/0K_0/0	2021-12-30T13:42:08	00:00:47

bqnadm@bqn0#

And to see the parameters of a policy dynamically created:

```
bqnadm@bqn0# show api policy 50M/100M_100M/200M_50M/100M_5/5
```

```
Name: 50M/100M_100M/200M_50M/100M_5/5
```

```
RateLimitDownlink:
```

```
  BurstDurationMs: 5000
```

```
  BurstRate: 200000
```

```
  BurstThreshold: 100000
```

```
Rate: 100000
```

```
RateLimitUplink:
```

```
  BurstDurationMs: 5000
```

```
  BurstRate: 100000
```

```
  BurstThreshold: 50000
```

```
Rate: 50000
```

```
bqnadm@bqn0#
```

In this example, the rate limits are 100 Mbps in downlink and 50 Mbps in uplink, with a burst of five seconds of double the normal limit, renewable when the average speed goes below a threshold equal to the policy rate limits.

Mikrotik-Address-List AVP

If we use the Mikrotik-Address-List AVP, it is necessary to create the rate policies in the QoS configuration beforehand. For example:

```
bqnam@bqn0# show policy rate

NAME          BCK  DOS  DYNU  RL-D  RL-U
BASIC         no   no   yes   yes   yes
GOLD          no   no   yes   yes   yes
PLATINUM      no   no   yes   yes   yes
rate-default  no   no   yes   no    no

bqnam@bqn0#
```

To see the list of policies managed by the API:

```
bqnam@bqn0# show api policy

NAME          SOURCE  SUBS-TOTAL  SUBS-ACTIVE  INACTIVITY
GOLD          config  3           3            n/a
PLATINUM      config  3           3            n/a
SILVER        config  3           3            n/a
rate-default  config  0           0            n/a
```

Where SOURCE has the value *config* indicating that the policies are part of the QoS configuration and assigned to the subscribers by RADIUS.

To get a list of subscribers associated to RADIUS policies:

```
bqnam@bqn0# show api subscriber

ADDRESS      SOURCE  POLICY  CREATED                UPDATED
10.1.0.3     radius  SILVER  2021-12-30T13:50:53  00:05:46
10.1.0.4     radius  SILVER  2021-12-30T13:50:54  00:05:46
10.1.0.5     radius  SILVER  2021-12-30T13:50:55  00:05:45
10.1.0.6     radius  GOLD    2021-12-30T13:50:57  00:05:43
10.1.0.7     radius  GOLD    2021-12-30T13:50:58  00:05:42
10.1.0.8     radius  GOLD    2021-12-30T13:50:59  00:05:41
10.1.0.9     radius  PLATINUM 2021-12-30T13:51:00  00:05:39
10.1.0.10    radius  PLATINUM 2021-12-30T13:51:02  00:05:38
10.1.0.11    radius  PLATINUM 2021-12-30T13:51:03  00:05:37

bqnam@bqn0#
```

where the SOURCE field set to *radius* indicates that the configured policy has been assigned to the subscriber through the RADIUS API.

You can also see the associated policy of a subscriber with the `show subscriber` command:

```

bqnadm@bqn0# show subscriber 10.1.0.6

Address:                10.1.0.6      Instance:                2
Active flows:           0          Total created flows:    2
Active shaped flows:    0          Duration:               0:11:51.612
Rate-limit enabled:     yes        Automatic Congestion
Management:             no
DoS volume              no/ no    DoS SYN                 no/ no
detection/attack:
UDR generation          yes        Blocked subscriber:     no
enabled:
Uplink sent bytes:      1660     Downlink sent bytes:    1608
Uplink TCPO bytes:      1500     Downlink TCPO bytes:    1500
Uplink current Mbps:    n/a      Downlink current Mbps:  n/a
Uplink max Mbps:        n/a      Downlink max Mbps:      n/a
Uplink current RTT      n/a      Downlink current RTT    n/a
(ms):
Uplink min RTT (ms):    n/a      Downlink min RTT (ms):  n/a
Uplink current TCP RTX  n/a      Downlink current TCP RTX n/a
rate:
Uplink average TCP RTX  0.00%   Downlink average TCP RTX 0.00%
rate:
Policy monitor:         monitor-  Policy rate:            GOLD
                        bqntst

SUBS-RATE-POLICY  DOWNLINK-RCV  DOWNLINK-SND  UPLINK-RCV  UPLINK-SND
GOLD              1608          1608          1660        1660

```

It is possible to use the Mikrotik-Rate-Limit AVP in the same way as the Mikrotik-Address-List AVP. That is as a name of a configured policy and not to create a dynamic policy. To perform this, a change of configuration is needed:

```

bqnadm@bqn0(config)# api radius
bqnadm@bqn0(config-radius)# avp-mikrotik-rate-limit disabled
bqnadm@bqn0(config-radius)# commit
bqnadm@bqn0(config-radius)# end
bqnadm@bqn0#

```

The default behaviour can be restored using the `no avp-mikrotik-rate-limit disabled` command.

REST API

The REST API allows an external element (for example a billing system) to control aspects of the QoS rate policies. It is implemented as a web service following the principles of Representational State Transfer (REST).

The REST API uses the HTTPs protocol in port 3443. To activate the REST API:

```

admin@bqn0# configure
admin@bqn0(config)# api rest
admin@bqn0(config-rest)# address 10.10.10.10
admin@bqn0(config-rest)# root
admin@bqn0(config)#

```

Where 10.10.10.10 is the QoE management IP address (we are reusing the QoE OAM network interface for REST).

Access is validated at two levels: by the source IP address of the requests and by the user issuing the request (our REST uses the HTTP Basic Authentication scheme of [IETF RFC 7617](#)). The following example registers two clients and two users:

```

admin@bqn0(config)# api rest
admin@bqn0(config-rest)# client 10.10.10.21
admin@bqn0(config-rest-restclt)# exit
admin@bqn0(config-rest)# client 10.10.10.22
admin@bqn0(config-rest-restclt)# exit
admin@bqn0(config-rest)# user myuser1 mypassword1
admin@bqn0(config-rest)# user myuser2 mypassword2
admin@bqn0(config-rest)# root
admin@bqn0(config)#

```

A different interface and address can be configured. For example, using a spare en0o2 network interface:

```

admin@bqn0(config)# interface en0o2
admin@bqn0(config-iface)# ip address 10.10.10.11/24
admin@bqn0(config-iface)# root
admin@bqn0(config)# api rest
admin@bqn0(config-rest)# address 10.10.10.11
admin@bqn0(config-rest)# interface en0o2
admin@bqn0(config-rest)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0# show api rest server

```

State: ready Interface: en0o2 Address: 10.10.10.11

Port: 3443

```

admin@bqn0# show api rest client

Address      Authentication
10.10.10.21  yes
10.10.10.22  yes

```

```

admin@bqn0# show api rest user

Name      Password      Restricted      AUTH-BASIC
myuser1   mypassword1   no              bX11c2VyJGSHJSBwYXNzd29yZCAa
myuser2   mypassword2   no              bX11c2VyJGSHJSBwYXNzd29yZCAB

admin@bqn0#

```

The *RESTRICTED* field indicates if the user can only perform read-only operations (GET). By default, an authorized user can perform all the REST API operations. To create a restricted user:

```

admin@bqn0# configure
admin@bqn0(config)# api rest
admin@bqn0(config-rest)# user myuser3 mypassword3 restricted
admin@bqn0(config-rest)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0# show api rest user

Name      Password      Restricted      AUTH-BASIC
myuser1   mypassword1   no              bX11c2VyJGSHJSBwYXNzd29yZCAa
myuser2   mypassword2   no              bX11c2VyJGSHJSBwYXNzd29yZCAB
myuser3   mypassword3   yes             bX11c2VyMTpteSBwYXNzd29yZCAc

admin@bqn0#

```

The REST API is described in full detail in the *QoE REST API Guide*.

You can use any software capable of generating HTTP requests with Basic authentication. To perform a quick test, you can use the [curl](#) open source software. For example, to associate the subscriber of address 192.168.0.56 with rate policy GOLD :

```

$ curl -i -k -m 20 -u myuser1:mypassword1 \
-X PUT https://10.10.10.11:3443/api/v1/subscribers/192.168.0.56 \
-H "Content-Type: application/json" -data '{"policyRate": "GOLD"}'
2021-07-15T18:10:38 HTTP/1.1 200 Ok
Content-Type: application/json
Content-Length: 0

```

When SOURCE has the *rest* value, it indicates that the policies have been dynamically created from the API REST.

To get a list of subscribers associated to REST policies:

```

bqnam@bqn0# show api subscriber

ADDRESS      SOURCE      POLICY      CREATED      UPDATED

```

```
10.1.0.16  rest      my_rest_policy_1 2021-12-30T14:04:56 00:01:21
10.1.0.17  rest      my_rest_policy_1 2021-12-30T14:04:56 00:01:20
10.1.0.18  rest      my_rest_policy_2 2021-12-30T14:04:57 00:01:19
10.1.0.19  rest      my_rest_policy_2 2021-12-30T14:04:59 00:01:17
```

```
bqnadm@bqn0#
```

where the SOURCE field set to *rest* indicated that the policy has been assigned to the subscriber through the REST API.

Chapter 5: Traffic Analytics

This chapter contains the following topics:

- [Overview](#)
- [Subscriber statistics](#)
- [Throughput statistics](#)
- [TCP metrics](#)
- [Traffic flow statistics](#)
- [Traffic latency statistics](#)
- [Application statistics](#)
- [DoS statistics](#)
- [System statistics](#)

Overview

QoS includes the information about many aspects of the traffic, such as usage per subscriber, latencies, protocols used. It also provides information about the applied policies and the use of QoS system resources.

Subscriber statistics

Generation of subscriber information

Subscriber statistics are based on information stored in the server disk, called Subscriber Data Records (SDR). SDR generation is controlled by Subscriber Monitor policies. It should be set to 100% (SDR generated for all subscribers):

```
bqnadm@bqn0# show policy monitor-default | match SDR
SDR: yes
```

If not set, you can set SDRs as follows:

```
bqnadm@bqn0# configure
bqnadm@bqn0(config)# policy monitor monitor-default
bqnadm@bqn0(config-polmon)# sdr
bqnadm@bqn0(config-polmon)# commit
bqnadm@bqn0(config-polmon)# end
bqnadm@bqn0#
```

SDR records are generated following a number of parameters:

```
bqnadm@bqn0# show pkteng parameters | match SDR
SDR partial generation: yes
```

```
SDR partial generation seconds: 600
SDR mode: private
SDR aggregation after days: 7
SDR aggregation into seconds: 3600
SDR deletion after days: 93
SDR aggregation min file seconds: 21600
```

The meaning of each SDR parameter is as follows:

- **SDR partial generation:** If set to *yes*, several SDRs can be generated during the lifetime of the subscriber session, instead of waiting to generate a single SDR at the end of the session (partial SDR generation is the default setting).
- **SDR partial generation seconds:** defines how often partial SDRs are generated. By default the interval is 10 minutes (600 seconds). This is the recommended value. Too short an interval will generate too much information and too long an interval will have less temporal resolution when statistics are requested.
- **SDR mode:** whether subscriber IP addresses are ofuscated (*private*) or not (*public*) when writing to disk. The default is *private*.
- **SDR aggregation after days:** to save disk space and speed up statistics processing, old SDRs are aggregated into records covering a bigger interval. This parameter defines the age of the SDRs subject to aggregation (by default, those older than seven days). Aggregation means a loss of temporal resolution: when requesting intervals shorter than the aggregation period, values will be interpolated.
- **SDR aggregation into seconds:** defines the interval size of the aggregated SDRs. It is 3600 seconds (one hour) by default. For example, with partials every ten minutes and aggregation into one hour, the six records covering the hour will be merged into one single SDR.
- **SDR aggregation min file seconds:** aggregation takes place only if it is worth it. If a file does not covers a long enough period of time, then it will not be aggregated until it does. This parameter defines such minimum period (21600 seconds by default, 6 hours).
- **SDR deletion after days:** to keep disk usage under control, older SDRs are deleted. This parameter defines the age of such deletion (93 days by default, those older than three months).

It is not recommended to change the default SDR generation parameters. Only do it if there is a compelling reason. For example, to increment the partial SDR generation interval to half an hour, because the number of subscribers in the network is very high, do as follows:

```
bqnadm@bqn0# configure
bqnadm@bqn0(config)# pkteng
bqnadm@bqn0(config-pkteng)# sdr partials interval 1800
bqnadm@bqn0(config-pkteng)# commit
bqnadm@bqn0(config-pkteng)# end
bqnadm@bqn0#
```


Top subscriber statistics

It is possible to show a report of the subscribers with the highest traffic usage. Subscribers are identified by their IP addresses.

For example:

```
admin@bqn0# show statistics subscribers hours 4 categories 3 direction downlink
```

TIME	GIGABYTES	172.10.1.23	172.10.1.32	172.10.1.22	REST
2020-01-22T13:00:00	247.3772	2.2130%	1.1993%	0.6542%	95.9335%
2020-01-22T14:00:00	261.7499	2.1081%	0.7947%	1.4244%	95.6728%
2020-01-22T15:00:00	339.5620	1.6051%	0.8853%	1.0632%	96.4464%
2020-01-22T16:00:00	358.0150	1.5167%	1.1141%	1.1117%	96.2574%
2020-01-22T17:00:00	268.8046	2.0476%	1.3987%	0.8703%	95.6834%
	1475.5088	1.8554%	1.0709%	1.0353%	96.0383%

Each row shows the total volume consumed during the period, in GB, and the percentages represented by each subscriber. This example shows the three biggest spenders (categories 3) in the downlink direction (direction downlink) during the last four hours (hours 4). The last row shows the volume and percentages for the whole period.

All traffic should be associated to a monitor policy with 100% SDR generation (this is the default). For more information, refer to [Subscriber monitoring policies](#) section.

Subscriber volume statistics

To show the traffic volume usage of a subscriber identified by the IP addresses, use the command:

```
bqnamd@bqn0# show statistics subscribers volume 11.1.0.1 hours 5
```

TIME	DOWN-MBYTES	UP-MBYTES
2021-12-30T04:00:00	134.0000	14.3000
2021-12-30T05:00:00	133.0000	14.4000
2021-12-30T06:00:00	129.0000	14.2000
2021-12-30T07:00:00	134.0000	12.2000
2021-12-30T08:00:00	137.0000	14.3000
2021-12-30T09:00:00	122.0000	13.5000

Usage is given in Megabytes in the downlink and uplink direction during each of the reporting intervals (one hour by default). It is possible to specify a smaller interval (for example, 10 minutes):

```
bqnamd@bqn0# show statistics subscribers volume 11.1.0.1 hours 1 interval 10
```

TIME	DOWN-MBYTES	UP-MBYTES
2021-12-30T08:00:00	25.0000	2.7000
2021-12-30T08:10:00	25.0000	2.7000
2021-12-30T08:20:00	22.0000	2.1000
2021-12-30T08:30:00	25.0000	2.7000
2021-12-30T08:40:00	20.0000	2.1000
2021-12-30T08:50:00	20.0000	2.0000
2021-12-30T09:00:00	20.0000	2.0000
2021-12-30T09:10:00	20.0000	2.7000
2021-12-30T09:20:00	22.0000	2.0000
2021-12-30T09:30:00	20.0000	2.0000
2021-12-30T09:40:00	20.0000	2.7000
2021-12-30T09:50:00	20.0000	2.1000

Subscriber flow statistics

To show the flow usage of a subscriber identified by the IP addresses, use the command:

```
bqnamd@bqn0# show statistics subscribers flow 11.1.0.1 hours 5
```

TIME	FL-CREATED	FL-ACTIVE
2021-12-30T06:00:00	1450	500
2021-12-30T07:00:00	1300	500
2021-12-30T08:00:00	1100	500
2021-12-30T09:00:00	1300	500
2021-12-30T10:00:00	1052	500
2021-12-30T11:00:00	1250	500

Flows can be TCP connections, UDP flows or flows of any other IP protocol.

The information provided is:

- **FL-CREATED:** total of new flows created during the period.
- **FL-ACTIVE:** total of current flows active (with traffic) during the period.

Subscriber latency statistics

To show the latency measurements of a subscriber identified by the IP addresses, use the command:

```
bqnamd@bqn0# show statistics subscribers latency 11.1.0.1 hours 5
```

TIME	DOWN-SUBS-RTT-MS	DOWN-NETWORK-RTT-MS
2022-02-01T07:00:00	11.056	n/a

2022-02-01T08:00:00	11.587	29.733
2022-02-01T09:00:00	10.577	27.550
2022-02-01T10:00:00	10.129	25.866
2022-02-01T11:00:00	10.069	30.547
2022-02-01T12:00:00	10.790	27.527
2022-02-01T13:00:00	10.918	23.357
2022-02-01T14:00:00	11.190	20.456
2022-02-01T15:00:00	11.121	20.964
2022-02-01T16:00:00	12.088	25.264

The information provided is:

- **DOWN-SUBS-RTT-MS:** latency in downlink direction, between the BQN server and the subscribers (access RTT). In milliseconds.
- **DOWN-NETWORK-RTT-MS:** average latency in downlink direction, for all subscribers in the network. In milliseconds.

Subscriber maximum speed statistics

To show the maximum speed measurements of a subscriber identified by the IP addresses, use the command:

```
bqnam@bqn0# show statistics subscribers max-speed 11.1.0.1 hours 1
interval 10
```

TIME	DOWN-MBPS	UP-MBPS
2021-12-30T11:00:00	21.4352	13.4352
2021-12-30T11:10:00	22.8683	15.5462
2021-12-30T11:20:00	35.6473	14.9671
2021-12-30T11:30:00	22.5365	15.5463
2021-12-30T11:40:00	31.4351	17.6573
2021-12-30T11:50:00	28.8637	12.8583
2021-12-30T12:00:00	26.7683	11.6472

The information provided is:

- **DOWN-MBPS:** maximum speed reached during that period in the downlink direction. Speed is given in megabits per second (Mbps).
- **UP-MBPS:** maximum speed reached during that period in the uplink direction. Speed is given in megabits per second (Mbps).

Subscriber retransmission statistics

To show the retransmissions of a subscriber identified by the IP addresses, use the command:

```
bqnam@bqn0# show statistics subscribers retransmission 11.1.0.1 hours 4
```

TIME	DOWN-SUBS-RTX-%	DOWN-NETWORK-RTX-%
2022-02-01T07:00:00	0.45	0.000
2022-02-01T08:00:00	1.66	0.989
2022-02-01T09:00:00	1.39	1.061
2022-02-01T10:00:00	1.78	1.259
2022-02-01T11:00:00	0.54	1.229

The information provided is:

- **DOWN-SUBS-RTX-%:** average TCP retransmission during that period in the downlink direction, as a percentage.
- **DOWN-NETWORK-RTX-%:** average TCP retransmission in the downlink direction for all subscribers in the network.

Subscriber policy statistics

The subscriber policy statistics is used to show a report of the subscribers matching a given policy (for example flow-default):

```
admin@bqn0# show policy flow-default subscribers | less
```

Subscriber	FL-ACTIVE	BYTES-UPLINK	BYTES-DOWNLINK
10.10.11.3	84	2322845	2955256
10.10.10.12	8	350219	178288
10.10.11.8	4	4268	1860
10.10.10.4	3	0	148
10.10.11.13	3	0	148

Throughput statistics

Throughput overview

To show a report of traffic per protocol type:

```
admin@bqn0# show statistics bta lines 12
```

TIME	TOT-RCV	TOT-SNT	TCPO-RCV	TCPO-SNT	TCP-TRCK	TCP-FWD	UDP-SNT	OTHER-SNT	SHAPED
2021-06-30T11:39:53	496.6	545.6	327.7	376.8	1.586	1.090	166.0	0.125	0.000
2021-06-30T11:44:53	515.2	563.5	337.2	385.5	2.509	0.740	174.7	0.131	0.000

```

2021-06-    503.7  554.3  326.2  376.8  2.161  1.764  172.7  0.843  0.000
30T11:49:5
3

2021-06-    478.5  526.8  323.1  371.4  2.539  0.981  150.0  1.879  0.000
30T11:54:5
3

2021-06-    479.1  526.3  308.3  355.6  3.126  0.805  165.0  1.774  0.000
30T11:59:5
3

2021-06-    491.2  538.2  318.6  365.6  2.494  1.113  168.1  0.964  0.000
30T12:04:5
3

2021-06-    486.5  534.8  319.9  368.2  2.066  0.860  163.3  0.402  0.000
30T12:09:5
3

2021-06-    495.3  544.1  332.7  381.4  1.910  0.838  158.2  1.754  0.000
30T12:14:5
3

2021-06-    492.0  540.0  319.3  367.3  1.829  0.704  168.2  1.994  0.000
30T12:19:5
3

2021-06-    516.9  563.5  317.2  363.9  1.872  0.658  195.7  1.496  0.000
30T12:24:5
3

2021-06-    508.9  551.0  300.5  342.5  1.973  1.675  203.0  1.794  0.000
30T12:29:5
3

2021-06-    510.5  554.1  321.5  365.2  3.352  1.096  183.3  1.159  0.000
30T12:34:5
3

```

In the above example, we request the last hour (lines 12 because statistics are generated every five minutes). Each line contains the throughput rates in Mbps of the total traffic received and sent (TOT-RCV and TOT-SNT respectively), optimized TCP traffic received and sent (TCPO-RCV and TCPO-SNT respectively), TCP traffic in tracking (TCP-TRK), IP traffic forwarded without any processing (TCP- FWD), UDP traffic sent (UDP.snt), rest of IP traffic sent (OTHER-SNT) and traffic subject to a rate limitation (SHAPED).

Throughput per interface

To show a report of traffic per network interface port:

```
admin@bqn0# show statistics interface speed lines 12
```

```

                en0o7                en0o8                Access                Internet
TIME          TX-          RX-          TX-          RX-          TX-          RX-          TX-Mbps          RX-
              Mbps          Mbps          Mbps          Mbps          Mbps          Mbps
2021-06-    510.08    43.93    44.23    459.75    510.08    43.93    44.23    459.75
30T11:49:53

```

2021-06-30T11:54:53	486.22	40.45	40.54	438.01	486.22	40.45	40.54	438.01
2021-06-30T11:59:53	486.12	39.81	40.20	439.27	486.12	39.81	40.20	439.27
2021-06-30T12:04:53	495.54	42.09	42.66	449.11	495.54	42.09	42.66	449.11
2021-06-30T12:09:53	496.60	38.13	38.21	448.38	496.60	38.13	38.21	448.38
2021-06-30T12:14:53	501.45	42.45	42.61	452.88	501.45	42.45	42.61	452.88
2021-06-30T12:19:53	499.20	40.56	40.84	451.48	499.20	40.56	40.84	451.48
2021-06-30T12:24:53	515.08	48.51	48.47	468.38	515.08	48.51	48.47	468.38
2021-06-30T12:29:53	507.41	43.49	43.59	465.45	507.41	43.49	43.59	465.45
2021-06-30T12:34:53	511.57	42.12	42.53	468.37	511.57	42.12	42.53	468.37
2021-06-30T12:39:53	531.51	40.49	40.49	481.25	531.51	40.49	40.49	481.25
2021-06-30T12:44:53	517.28	36.53	36.37	470.41	517.28	36.53	36.37	470.41

Each line contains the throughput rates in Mbps per network interface (en0o7 and en0o8 in this example) and also the subtotals aggregating all interfaces on the access and Internet side (in the example there is only one interface per side, so the total is equal to the corresponding interface throughput). Both the transmitting rate (TX-Mbps) and receiving rate (RX-Mbps) are provided. This information is useful to verify if interfaces are on the access or Internet sides. Because the traffic is typically asymmetric, interfaces on the access side have more transmitted than received throughput (there is more traffic in the downlink direction) and the opposite is usually true for Internet interfaces.

Throughput per policy

To show a report of traffic per policy, for example for policies of rate type:

```
admin@bqn0# show statistics policy rate speed lines 12
```

TIME	MBPS-RX-DOWN	MBPS-RX-UP	SUBSCRIB	MBPS-RX-DOWN	MBPS-RX-UP	SUBSCRIB
2021-06-30T11:10:29	0.000	0.000	0	636.691	97.352	20703
2021-06-30T11:15:29	0.000	0.000	0	586.846	101.401	20644
2021-06-30T11:20:29	0.000	0.000	0	623.940	117.307	20599
2021-06-30T11:25:29	0.000	0.000	0	610.597	86.938	20609

2021-06-30T11:30:29	0.000	0.000	0	597.424	101.648	20572
2021-06-30T11:35:29	0.000	0.000	0	601.390	89.731	20472
2021-06-30T11:40:29	0.000	0.000	0	614.539	88.516	20578
2021-06-30T11:45:29	0.000	0.000	0	637.131	102.956	20554
2021-06-30T11:50:29	0.000	0.000	0	647.811	90.793	20602
2021-06-30T11:55:29	0.000	0.000	0	661.737	104.325	20347
2021-06-30T12:00:29	0.000	0.000	0	642.238	96.114	20650

Each line contains the throughput rates in Mbps and the number of subscribers broken down by rate policy. In this example, there are two rate policies, one is the name rate-12Mbps, which has not to be applied to any traffic (all its fields are 0), and another called rate-default which is being applied to all traffic in downlink (MBPS-RX-DOWN) and uplink directions (MBPS-RX-UP). The SUBSCRIB field shows the total of subscribers subject to that policy at that particular time.

TCP metrics

TCP speeds

QoE keeps average speeds of TCP connections optimized (accelerated by QoE) and not optimized (tracking).

To see the former:

```
admin@bqn0# show statistics speed optimized downlink rtt-large lines 12.
```

TIME	SMALL-RTTi			MEDIUM-RTTi			LARGE-RTTi		
	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-06-30T09:38:48	1.20	2.43	4.56	1.10	1.91	3.36	0.82	1.41	3.67
2021-06-30T09:43:48	1.20	2.38	4.44	1.10	1.86	3.36	0.82	1.40	3.70
2021-06-30T09:48:48	1.20	2.41	4.47	1.09	1.83	3.37	0.82	1.42	3.74
2021-06-30T09:53:48	1.20	2.43	4.34	1.09	1.83	3.40	0.82	1.41	3.71
2021-06-30T09:58:48	1.19	2.40	4.33	1.09	1.84	3.48	0.82	1.41	3.70
2021-06-30T10:03:48	1.20	2.38	4.28	1.09	1.85	3.42	0.81	1.42	3.68
2021-06-30T10:08:48	1.20	2.37	4.32	1.08	1.86	3.41	0.80	1.42	3.58

2021-06-30T10:13:48	1.19	2.37	4.24	1.08	1.84	3.34	0.80	1.41	3.51
2021-06-30T10:18:48	1.18	2.35	4.21	1.08	1.87	3.33	0.79	1.41	3.46
2021-06-30T10:23:48	1.18	2.28	4.16	1.07	1.84	3.33	0.78	1.39	3.40
2021-06-30T10:28:48	1.18	2.27	4.13	1.05	1.77	3.27	0.71	1.32	3.34
2021-06-30T10:33:48	1.18	2.27	4.13	1.02	1.74	3.25	0.65	1.21	3.04

The speeds are provided for accelerated TCP connections in the downlink direction and large RTT between the QoE and the subscribers on the access side (rtta-large). Average speeds are given for small RTT between the QoE and the server on the Internet side (SMALL-RTTi), intermediate (MEDIUM-RTTi), and large (LARGE-RTTi). For each of these RTTi ranges, average speeds are provided for three ranges of download sizes: small (up to 100 KB), medium (between 100 KB and 1MB), and large (more than 1 MB). The columns are labeled SMASZ, MIDSZ, and LRGSZ respectively.

The thresholds that define RTTi and RTTa ranges are configurable. For more information, refer to [TCP metrics thresholds](#) section.

Likewise, a report exists for non-accelerated TCP connections:

```
admin@bqn0# show statistics speed tracked rtta-large lines 12.
```

TIME	SMALL-RTTi			MEDIUM-RTTi			LARGE-RTTi		
	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-06-30T09:48:48	1.06	1.54	2.12	0.82	1.33	1.97	0.65	0.91	1.87
2021-06-30T09:53:48	1.05	1.53	2.08	0.82	1.36	1.91	0.65	0.90	1.85
2021-06-30T09:58:48	1.04	1.55	2.08	0.82	1.35	1.81	0.65	0.96	1.85
2021-06-30T10:03:48	1.04	1.54	2.07	0.82	1.37	1.78	0.65	0.96	1.88
2021-06-30T10:08:48	1.04	1.54	2.10	0.81	1.36	1.84	0.64	0.96	1.85
2021-06-30T10:13:48	1.03	1.53	2.11	0.81	1.36	1.86	0.64	0.95	1.84
2021-06-30T10:18:48	1.02	1.54	2.09	0.81	1.36	1.86	0.64	0.95	1.83
2021-06-30T10:23:48	1.02	1.54	2.07	0.80	1.34	1.82	0.63	0.93	1.82
2021-06-30T10:28:48	1.02	1.54	2.05	0.77	1.27	1.80	0.57	0.86	1.68
2021-06-30T10:33:48	1.02	1.54	2.04	0.75	1.22	1.72	0.52	0.80	1.59

2021-06-30T10:38:48	1.02	1.54	2.04	0.73	1.17	1.64	0.47	0.74	1.46
2021-06-30T10:43:48	1.02	1.54	2.05	0.72	1.14	1.62	0.43	0.69	1.39

Where the report has the same structure as the optimized one but for tracked TCP connections.

TCP acceleration

A report of acceleration factors is available:

```
admin@bqn0# show statistics speed acceleration downlink rtt-large lines
12.
```

TIME	SMALL-RTTi			MEDIUM-RTTi			LARGE-RTTi		
	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-06-30T09:53:48	n/a	58.47	n/a	33.53	35.29	78.01	25.81	55.76	101.1
2021-06-30T09:58:48	n/a	55.22	n/a	33.05	36.54	91.52	26.45	47.08	99.39
2021-06-30T10:03:48	n/a	54.42	106.9	32.95	35.69	92.49	26.11	48.49	96.34
2021-06-30T10:08:48	n/a	53.89	105.6	32.95	36.50	85.55	24.58	48.67	93.06
2021-06-30T10:13:48	n/a	54.89	101.5	33.48	35.73	80.26	23.83	48.62	90.98
2021-06-30T10:18:48	n/a	52.58	100.8	34.00	37.97	79.40	23.70	48.17	88.42
2021-06-30T10:23:48	n/a	47.35	100.7	34.04	36.78	82.50	24.64	48.96	86.94
2021-06-30T10:28:48	n/a	47.58	101.8	35.32	38.79	81.52	24.94	53.53	99.32
2021-06-30T10:33:48	n/a	47.58	102.3	36.27	42.22	88.77	26.26	50.50	91.21
2021-06-30T10:38:48	n/a	47.59	102.4	36.65	45.15	99.88	30.63	54.81	106.0
2021-06-30T10:43:48	n/a	47.64	101.9	37.67	46.01	99.50	30.67	55.80	108.1
2021-06-30T10:48:48	n/a	47.64	102.2	37.49	46.49	105.3	34.19	60.10	108.6

The acceleration is measured by the increment percentage in the average speed of optimized vs tracked TCP connections. When there are not enough samples of either of both types or the speed difference is not statistically significant, a n/a is shown instead.

TCP metrics thresholds

TCP metrics use three RTT thresholds to classify the results. Because RTT varies from network to network, these thresholds are configurable.

The following example sets small RTT to up to 20 ms, large to more than 100 ms, and large RTT to more than 40 ms:

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# speed rtti-small 0.02
admin@bqn0(config-pkteng)# speed rtti-large 0.1
admin@bqn0(config-pkteng)# speed rtt 0.04
admin@bqn0(config-pkteng)# root
admin@bqn0(config)#
```

That RTT values are given in seconds.

Traffic flow statistics

Flows per policy

To list the number of flows matching each flow policy:

```
admin@bqn0# show statistics policy flow speed lines 12.
```

TIME	flow-10Mbps			flow-default		
	MBPS-RX-DOWN	MBPS-RX-UP	FLOWS	MBPS-RX-DOWN	MBPS-RX-UP	FLOWS
2021-06-30T10:18:48	0.000	0.000	0	13511.507	1353.296	1523167
2021-06-30T10:23:48	0.000	0.000	0	11869.237	1378.819	1535463
2021-06-30T10:28:48	0.000	0.000	0	8407.238	1357.093	1579218
2021-06-30T10:33:48	0.000	0.000	0	8387.208	1457.191	1586800
2021-06-30T10:38:48	0.000	0.000	0	8429.295	1401.597	1600853
2021-06-30T10:43:48	0.000	0.000	0	8384.801	1448.867	1621211
2021-06-30T10:48:48	0.000	0.000	0	8373.635	1401.178	1597707
2021-06-30T10:53:48	730.016	24.517	34018	12231.293	1698.938	1615708
2021-06-30T10:58:48	1269.125	37.911	15048	10954.202	1428.673	1597054
2021-06-30T11:03:48	244.854	10.049	5284	8314.034	1555.145	1626358
2021-06-30T11:08:48	89.434	3.918	675	8010.627	1369.629	1496751
2021-06-30T11:13:48	42.409	2.155	343	7379.735	1275.595	1454150

Each line contains the throughput rates in Mbps and the number of flows broken down by flow policy. In this example, there are two flow policies, one of the names is flow-10Mbps, and another called flow-default. Downlink rates are under MBPS-RX-DOWN and uplink rates under MBPS-RX-UP. The FLOWS field shows the total of flows subject to that policy at that particular time.

Flows per protocol type

To list the number of flows split by protocol type:

```
admin@bqn0# show statistics flow lines 12.
```

TIME	TCP-HANDSHAKE	TCP-ESTABLISHED	TCP-TRACKING	TCP-OTHER	UDP-ALL	IPOTHER-ALL
2021-06-30T10:28:48	52486	708531	8413	256556	560657	35155
2021-06-30T10:33:48	58427	720710	8453	249350	561401	31422
2021-06-30T10:38:48	54372	729335	8536	249032	569550	31589
2021-06-30T10:43:48	56779	729996	8507	248301	586493	34887
2021-06-30T10:48:48	54595	730124	8440	246425	568732	31103
2021-06-30T10:53:48	53150	712772	8244	279594	607515	31430
2021-06-30T10:58:48	54001	707445	8345	279932	574044	31670
2021-06-30T11:03:48	59792	726060	8559	262174	585258	31903
2021-06-30T11:08:48	52392	690978	52661	255158	591810	35545
2021-06-30T11:13:48	63111	655834	94919	261400	580180	32121
2021-06-30T11:18:48	57811	645346	112616	299024	582811	33375
2021-06-30T11:23:48	54476	644473	114395	265277	581508	34940

TCP-HANDSHAKE is the number of TCP connections at the initial state (the connection is being established), TCP-ESTABLISHED is the total of TCP connections being optimized, TCP-TRACKING is the TCP connections being tracked (not optimized), and TCP-OTHER is the number of TCP connections not in any of the previous states (for example, in the process of being closed). UDP-ALL is the total of UDP flows and IPOTHER-ALL is the number of flows that are neither TCP nor UDP (such as ICMP, OSPF).

Traffic latency statistics

Using its analysis of TCP traffic, the QoE can measure traffic latencies:

```
admin@bqn0# show statistics latency lines 12.
```

TIME	RTT-ACCESS	RTT-INTERNET
2021-06-30T11:03:48	16.432	116.947
2021-06-30T11:08:48	17.203	121.581
2021-06-30T11:13:48	18.883	120.659
2021-06-30T11:18:48	17.755	118.595
2021-06-30T11:23:48	17.890	124.221
2021-06-30T11:28:48	21.270	126.004
2021-06-30T11:33:48	19.521	117.913
2021-06-30T11:38:48	21.382	114.290
2021-06-30T11:43:48	19.790	120.592
2021-06-30T11:48:48	20.742	126.182
2021-06-30T11:53:48	20.759	127.072
2021-06-30T11:58:48	20.409	119.510

Latencies are given in milliseconds, with RTT-ACCESS for the round-trip-time measured between the QoE and the subscribers and RTT-INTERNET for the round-trip-time between the QoE and the content servers over the Internet.

Application statistics

It is possible to show the biggest applications by volume for a given number of hours. For example:

```
admin@bqn0# show statistics dpi hours 5 categories 4 direction downlink.
```

TIME	GIGABYTES	udp:mvfst	tcp:netflix	udp:youtub e	udp:googl e	REST
2021-06-30T07:00:00	2.57	10.1%	14.2%	9.6%	5.6%	60.5%
2021-06-30T08:00:00	2.38	15.5%	5.3%	13.6%	11.6%	54.0%
2021-06-30T09:00:00	2.87	15.6%	7.0%	14.0%	4.6%	58.8%
2021-06-30T10:00:00	4.46	6.2%	11.7%	5.6%	11.8%	64.7%
2021-06-30T11:00:00	3.94	12.0%	12.0%	5.3%	8.0%	62.7%
2021-06-30T12:00:00	0.78	20.5%	10.3%	40.4%	2.9%	25.9%
	16.99	11.7%	10.4%	10.3%	8.3%	59.3%

Each row shows the total volume analyzed during the period, in GB, and the percentages represented by each application. This example shows the four most popular applications (categories 4) in the downlink direction (direction downlink) during the last five hours (hours 5). The last row shows the volume and percentages for the whole period.

If an application domain cannot be established, the QoE uses the server subnet.

For example:

```
admin@bqn0# show statistics dpi hours 3 categories 3 direction uplink
```

TIME	GIGABYTES	udp:10.10.10.0/24	udp:google	tcp:whatsapp	REST
2021-06-30T09:00:00	0.16	48.5%	6.4%	6.0%	39.1%
2021-06-30T10:00:00	0.18	0.0%	11.3%	13.4%	75.3%
2021-06-30T11:00:00	0.08	0.0%	18.3%	0.5%	81.2%
2021-06-30T12:00:00	0.03	0.0%	12.3%	0.0%	87.7%
	0.45	17.8%	10.8%	7.6%	63.8%

In the above example, 10.10.10.0/24 corresponds to a local backup service.

All traffic are associated to a monitor policy with UDR generation (traffic is sampled with no more than 2% flows being recorded). For more information, refer to [Subscriber monitoring policies](#) section.



Note

Application statistics may not be available in countries with export restrictions.

DoS statistics

DoS statistics require the configuration of DoS threshold. For more information, refer to [Denial-of-service \(DoS\)](#) section.

Volumetric attack statistics

This is used to check volumetric DoS attacks:

```
admin@bqn0# show statistics dos volume hours 1
```

TIME	IP-ADDRESS	SIDE	DIRECTI ON	MBYTES	RATE- Mbps	DURATI ON	TOP-CONTRIBUTOR	MBYTES
2021-07-01T05:16:08	10.10.10.15	acces	ingress	32102777	214.45	00:00:11	10.200.0.34	12453815

The above example shows volumetric attacks during the last hour. The attack affects the subscriber IP 10.10.10.15, with a traffic rate of 214.45 during 11 seconds. The origin with the biggest share of the attack is IP 10.200.0.34 with 12453815 MB of volume.

SYN flooding statistics

This is used to check SYN flooding attacks:

```
admin@bqn0# show statistics dos syn hours 1.
```

TIME	IP- ADDRESS	SIDE	DIRECTI ON	FAIL- SYN	MA X- RAT E	DURATI ON	TOP- CONTRIBUT OR	FAI L- SYN
2021-07- 01T05:17: 13	10.10.10. 26	acce s	ingress	158257 5	213	00:00: 32	10.200.0. 45	7536 2

The above example shows SYN flooding attacks during the last hour. The attack affects the subscriber's IP 10.10.10.26, with a maximum rate of 213 during 32 seconds. The origin with the biggest share of the attack is IP 10.200.0.45 with 75362 failed SYNs.

System statistics

The QoE provides statistics of its own system resources such as CPU and memory.

CPU load statistics

To show CPU load figures:

```
admin@bqn0# show statistics cpu all lines 12
```

TIME	USER	NICE	SYS	IO- WA	IRQ	SOFT	STEAL	GUEST	IDLE
2021-07- 01T03:13:48	9.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	89.8
2021-07- 01T03:18:48	8.9	0.0	1.2	0.0	0.0	0.0	0.0	0.0	89.9
2021-07- 01T03:23:48	8.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.1
2021-07- 01T03:28:48	8.7	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.1
2021-07- 01T03:33:48	8.6	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.2
2021-07- 01T03:38:48	8.6	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.2
2021-07- 01T03:43:48	8.5	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.3
2021-07- 01T03:48:48	8.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.6
2021-07- 01T03:53:48	8.1	0.0	1.2	0.0	0.0	0.0	0.0	0.0	90.7

```

2021-07-01T03:58:48      8.1    0.0    1.2    0.0    0.0    0.0    0.0    0.0    90.7
2021-07-01T04:03:48      8.2    0.0    1.2    0.0    0.0    0.0    0.0    0.0    90.6
2021-07-01T04:08:48      8.0    0.0    1.2    0.0    0.0    0.0    0.0    0.0    90.8

```

This command shows the overall CPU load in different task categories. The most interesting part is the percentage of free CPU (under IDLE), which should be at least 20%.

CPU temperature statistics

To verify the temperature of the CPU to check that the server is operating under proper cooling:

```
admin@bqn0# show statistics sensors lines 12.
```

TIME	Core1	PackageId0	Core2	Core0	Core3
2021-07-01T09:21:01	28.0	28.0	26.0	19.0	22.0
2021-07-01T09:26:01	27.0	27.0	27.0	20.0	23.0
2021-07-01T09:31:01	29.0	29.0	27.0	21.0	25.0
2021-07-01T09:36:01	29.0	29.0	27.0	19.0	23.0
2021-07-01T09:41:01	29.0	29.0	26.0	19.0	24.0
2021-07-01T09:46:01	29.0	29.0	27.0	20.0	24.0
2021-07-01T09:51:01	30.0	30.0	27.0	21.0	24.0
2021-07-01T09:56:01	30.0	30.0	28.0	21.0	24.0
2021-07-01T10:01:01	30.0	30.0	29.0	22.0	26.0
2021-07-01T10:06:01	31.0	31.0	30.0	23.0	26.0
2021-07-01T10:11:01	31.0	32.0	32.0	23.0	27.0
2021-07-01T10:16:01	32.0	32.0	30.0	25.0	27.0

Temperatures are shown in Celsius for each CPU core (four cores in this example), plus in the package enclosing the physical CPU chip.

CPU frequency statistics

To check the clock speed of the CPU, use this command:

```
admin@bqn0# show statistics cpu frequency lines 12.
```

TIME	CPU0	CPU1	CPU2	CPU3
2021-07-01T09:31:01	3092	3092	3092	3092
2021-07-01T09:36:01	3092	3092	3092	3092
2021-07-01T09:41:01	3092	3092	3092	3092
2021-07-01T09:46:01	3092	3092	3092	3092

```

2021-07-01T09:51:01 3092 3092 3092 3092
2021-07-01T09:56:01 3092 3092 3092 3092
2021-07-01T10:01:01 3092 3092 3092 3092
2021-07-01T10:06:01 3092 3092 3092 3092
2021-07-01T10:11:01 3092 3092 3092 3092
2021-07-01T10:16:01 3092 3092 3092 3092
2021-07-01T10:21:01 3092 3092 3092 3092
2021-07-01T10:26:01 3092 3092 3092 3092

```

Frequencies are shown in MHz. In this case, all cores are operating at 3.1 GHz. A constant frequency is the expected state. Otherwise, it indicates a bad BIOS setting or a hardware fault.

Memory statistics

To check the memory usage, use the following command:

```

admin@bqn0# show statistics memory lines 12.

TIME                SYS-MB      MPOOL-MB   DPDK0-MB
2021-07-01T09:36:03 4188.922   218.882    163.906
2021-07-01T09:41:03 4188.641   206.157    125.690
2021-07-01T09:46:03 4184.539   226.660    154.705
2021-07-01T09:51:03 4184.305   219.611    146.039
2021-07-01T09:56:03 4185.023   215.678    136.397
2021-07-01T10:01:03 4184.668   232.639    158.248
2021-07-01T10:06:03 4185.746   231.942    173.268
2021-07-01T10:11:03 4186.395   222.819    129.964
2021-07-01T10:16:03 4187.180   238.290    167.718
2021-07-01T10:21:03 4187.574   229.062    155.921
2021-07-01T10:26:03 4188.113   231.635    179.465
2021-07-01T10:31:03 4188.875   224.248    149.386

```

The Memory usage is given in MB. Three blocks are provided:

- **SYS-MB:** system memory usage (around 4.2 GB in this example).
- **MPOOL-MB:** QoE memory pool. It is a memory pool reserved and managed by the QoE software.
- **DPDK0-MB:** DPDK memory pool. It is a memory pool reserved and managed by the DPDK library used by the QoE to manage packet processing. There will be a pool per CPU (one in this example).

Chapter 6: Troubleshooting

This chapter contains the following topics:

- [Overview](#)
- [Problems accessing the management interface](#)
- [CPU usage issues](#)
- [Disk issues](#)
- [Wire problems \(Data plane interfaces\)](#)
- [High memory usage](#)
- [License unavailable issues](#)
- [License expiration issues](#)
- [Traffic above the license limit](#)
- [No traffic in uplink or downlink directions](#)
- [Traffic too low](#)
- [Traffic inverted](#)
- [Process issues](#)
- [Time issues](#)
- [Contacting Cambium Networks support](#)

Overview

This chapter provides general information to conduct troubleshooting on the QoE.

Problems accessing the management interface

As indicated in [Network management interface](#) section, the QoE uses a dedicated network interface for management. The management interface supports both the SSH and WEB (HTTPs) services.

In case of problems accessing the configured management IP, check the following:

- Ensure that the management network interface port is connected to the appropriate network.
- Verify that the link state of the management network interface is up (see [Network interfaces](#) section). If the management interface is connected to a network switch, verify that the port in the switch is up and its attributes match the properties shown by the [show interface](#) command.

- Verify using the system console that the management IP address and network prefix are correct. If accessing the management IP address from a different network, ensure that static routing is configured to the access network, as explained in the [Network interfaces](#) section.
- Verify using the system console, that the SSH service is up and running and its status is active (running).

```
admin@bqn0# show service ssh
ssh.service - OpenSSH Daemon

    Loaded: loaded
            (/bqn/img/linux/usr/lib/systemd/system/ssh.service; disabled)

    Active: active (running) since Tue 2021-06-29 12:22:20 VET; 1
            day 21h ago
```

If the WEB service is used, verify that it is up and running and its status is active (running).

```
admin@bqn0# show service web
admin@bqn-inter_brm# show service web
bqnweb.service - BQN WEB Service

    Loaded: loaded
            (/bqn/img/bqn/usr/lib/systemd/system/bqnweb.service; disabled)

    Active: active (running) since Wed 2021-06-30 04:33:48 VET; 1
            day 4h ago

    . . .
```

- If there are firewalls in the management network, allow access to TCP port 22 for the SSH service and TCP port 443 for the WEB service.
- If you suspect the OAM IP settings are incorrect or unknown, connect a monitor and a keyboard to the server and login as root to change it. For example, to change to OAM IP 10.10.10.12/24:

```
bqn0:~# bqns
root@bqn0# show interface management detail
Interface: en0o1
IP address: 192.168.0.121/24
Default gateway: 192.168.0.1 Nameserver: n/a
root@bqn0# set interface en0o1 management 0 10.10.10.12/24 gateway
10.10.10.1
root@bqn0# show interface management detail
Interface: en0o1
IP address: 10.10.10.12/24 Default gateway: 10.10.10.1
Nameserver: n/a
```

- The QoE management interface may be protected by its own firewall. The problem could be that your source IP address is not included in the firewall white list. This can happen even for addresses from the same subnet of the QoE management IP, if the subnet is not part of the firewall rules. You can disable the firewall temporarily until the connection to the management port is restored.

Connect a monitor and a keyboard to the server and login as root:

```
bqn0:~# bqnsh
root@bqn0# show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  10.0.0.0/8
en0o1  input  172.16.0.0/12
en0o1  input  192.168.0.0/16

root@bqn0# clear interface en0o1 firewall input
root@bqn0# show interface firewall
```

Once the management IP is reachable, you can define the new white list of allowed source IP ranges.

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

CPU usage issues

The system management process monitors the global CPU usage status and detects when a CPU usage is higher than normal. When the CPU usage level is different than normal, it is necessary to analyze which CPU core has the high load and why.

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	critical	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200

```

traffic-downlink  normal    2          2021-07-
                  01T15:37:58+0200

traffic-low       normal    2          2021-07-
                  01T15:37:58+0200

traffic-inverted  normal    2          2021-07-
                  01T15:37:58+0200

wire              normal    4          2021-07-
                  01T15:38:33+0200

```

```
admin@bqn0# show system cpu
```

```

CPU  USER   NICE   SYS   IO-WA  IRQ   SOFT   STEAL  GUEST   IDLE
all  12.91  0.00  0.41  0.00  0.00  0.12  0.00  0.00   86.56
0    0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  100.00
1    97.77  0.00  2.23  0.00  0.00  0.00  0.00  0.00  0.00
2    0.00  0.00  0.41  0.00  0.00  0.41  0.00  0.00  99.19
3    0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  100.00

```

```
admin@bqn0# show system cpu level
```

```

CPU  Level
0    normal
1    high
2    normal
3    normal

```

There are several possible causes of high CPU usage. The following sections cover some common ones.

A process not part of QoE product

In this case, CPU 1 has a high load, and as we can see with the [show system process stop](#) command, the process that causes the high CPU load is a bash process, which is not part of the standard QoE processes.

```
admin@bqn0# show system process top
```

```

top - 19:19:26 up 49 min, 3 users, load average: 0.53, 0.14, 0.05
Tasks: 137 total, 2 running, 135 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.2 us, 0.1 sy, 0.0 ni, 99.7 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem: 4046260 total, 488456 used, 3557804 free, 29668 buffers
KiB Swap: 2097148 total, 0 used, 2097148 free, 213880 cached

PID  USER  PR  NI  VIRT  RES  SHR  S  %CPU  %MEM  TIME+  COMMAND
6145 root  20  0   11556 2404 2196 R  100.0 0.059 0:48.98 bash
1    root  20  0   37148 5060 3420 S   0.000 0.125 0:01.16 systemd

```

```

 2   root  20  0  0  0  0  S  0.000  0.000  0:00.00  kthreadd
 4   root  0  -  0  0  0  S  0.000  0.000  0:00.00  kworker/0:0
      20  H
 5   root  20  0  0  0  0  S  0.000  0.000  0:00.00  kworker/u8:
      0
 6   root  20  0  0  0  0  S  0.000  0.000  0:00.00  ksoftirqd/0
 7   root  20  0  0  0  0  S  0.000  0.000  0:00.07  rcu_preempt
 8   root  20  0  0  0  0  S  0.000  0.000  0:00.00  rcu_sched
 9   root  20  0  0  0  0  S  0.000  0.000  0:00.00  rcu_bh
10   root  rt  0  0  0  0  S  0.000  0.000  0:00.00  migration/0
11   root  0  -  0  0  0  S  0.000  0.000  0:00.00  lru-add-
      20  drain
12   root  rt  0  0  0  0  S  0.000  0.000  0:00.00  watchdog/0
13   root  20  0  0  0  0  S  0.000  0.000  0:00.00  cpuhp/0

```

In this example, the bash process was started to simulate a process with a very high CPU usage, and after terminating it, the global CPU usage level dropped back to normal.

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

Do not stop any process that is part of the QoE software, since the service may be compromised. In addition, avoid executing any program that may affect the performance of the QoE. If you must, use always nice execution mode.

Not enough IO PKTENG processes

The QoE packet processing processes are called PKTENG. Some of them (the IO instances) are dedicated to handling input-output operations between the QoE software and the network cards and others (the workers) are specialized in QoE packet processing as such.

Which CPU cores are assigned to the IOs which ones to the workers, can be obtained with the command:

```
bqnadm@bqn0# show pkteng affinity
```

FUNCTION	AFFINITY	COUNT
cpu-available	ff	8
pkteng-all	ff	8
pkteng-worker	fe	7
pkteng-io	01	1
en0o7-io	01	1
en0o8-io	01	1

In this example, there is one single IO process, running on core number 0, and shared between both ports of the en0o7-en0o8 wire. The other cores are assigned to workers. If the core 0 has a very high load during peak traffic hours, an extra core for IO can be added. For example, to add core number 1.

```
bqnadm@bqn0# configure
bqnadm@bqn0(config)# pkteng
bqnadm@bqn0(config-pkteng)# dimension 6 0x3F 0x3C
bqnadm@bqn0(config-pkteng)# root
bqnadm@bqn0(config)# interface en0o7
bqnadm@bqn0(config-iface)# nic io affinity 0x03
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# interface en0o8
bqnadm@bqn0(config-iface)# nic io affinity 0x03
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)# end
bqnadm@bqn0# show pkteng affinity
```

FUNCTION	AFFINITY	COUNT
cpu-available	ff	8
pkteng-all	3f	6
pkteng-worker	3c	4
pkteng-io	03	2
en0o7-io	03	2
en0o8-io	03	2

```
bqnadm@bqn06#
```

And now two cores (0 and 1) are assigned to IO processes, shared between the two ports of the wire. Note that there is one less worker (6 instead of the original 7). There is a trade off to reach between IOs and workers.

Overloaded PKTENG worker

All traffic from a given customer IP address is processed by one particular QoE worker instance. If the customer concentrates too much traffic (for example, because the QoE is behind a NAT encompassing many end subscribers), the core of that worker may have very high load.

In the following example, core 6 has high load:

```
bqnadm@bqn0# show system cpu
```

CPU	USER	NICE	SYS	IO-WA	IRQ	SOFT	STEAL	GUEST	IDLE
all	5.59	0.00	1.40	0.00	0.00	0.00	0.00	0.00	93.01
0	6.45	0.00	1.61	0.00	0.00	0.00	0.00	0.00	91.94
1	5.65	0.00	1.61	0.00	0.00	0.00	0.00	0.00	92.74
2	3.20	0.00	2.40	0.00	0.00	0.00	0.00	0.00	94.40
3	4.76	0.00	1.59	0.00	0.00	0.00	0.00	0.00	93.65
4	5.56	0.00	1.59	0.00	0.00	0.00	0.00	0.00	92.86
5	7.09	0.00	0.79	0.00	0.00	0.00	0.00	0.00	92.13
6	81.53	0.00	1.57	0.00	0.00	0.00	0.00	0.00	17.90
7	4.80	0.00	0.80	0.00	0.00	0.00	0.00	0.00	94.40

You can verify that core 6 is a worker:

```
bqnadm@bqn0# show pkteng affinity
```

FUNCTION	AFFINITY	COUNT
cpu-available	ff	8
pkteng-all	ff	8
pkteng-worker	fe	7
pkteng-io	01	1
en0o7-io	01	1
en0o8-io	01	1

In this example, all cores are workers except core 0.

To see if one subscriber IP concentrates too much traffic:

```
bqnadm@bqn0# show statistics subscribers top all direction downlink
categories 3
```

TIME	GIGABYTES	192.168.0.17	192.168.0.16	192.168.0.15	REST
		2	2	1	
...					
2022-02-13T20:00:00	1266.7381	21.4273%	1.6588%	1.1133%	1.1133% 75.8006%
2022-02-13T21:00:00	1331.1814	21.5691%	1.6492%	1.2478%	75.5339%
2022-02-13T22:00:00	1300.7372	21.7482%	1.6918%	1.7568%	74.8032%
2022-02-13T23:00:00	996.2735	21.7821%	1.5547%	2.0467%	74.6165%
2022-02-14T00:00:00	592.4524	21.9644%	2.1929%	1.6904%	74.1523%
...					

Here, IP 192.168.0.172 is concentrating during the peak hours more than a fifth of the network traffic. That traffic falls in one single worker. To see which one:

```
bqnamd@bqn0# show subscriber 192.168.0.172
```

```
Address:          192.168.0.172   Instance:          6
Active flows:     1073             Total created flows: 4135963
Active shaped flows: 2             Duration:          142:06:26.563
Rate-limit enabled: no             Automatic Congestion Management:
DoS volume detection/attack: no/ no   DoS SYN detection/attack: no/ no
UDR generation enabled: yes (2.00%)   Blocked subscriber: no
Uplink sent bytes: 74601462570        Downlink sent bytes: 1546323242173
Uplink TCPO bytes: 21459531298        Downlink TCPO bytes: 1023234486404
Uplink current Mbps: 25.046           Downlink current Mbps: 16.566
Uplink max Mbps: 20.210              Downlink max Mbps: 77.392
Uplink current RTT (ms): 0.934        Downlink current RTT (ms): 1.110
Uplink min RTT (ms): 0.544           Downlink min RTT (ms): 0.608
Uplink current TCP RTX rate: 0.03%    Downlink current TCP RTX rate: 4.77%
Uplink average TCP RTX rate: 0.28%    Downlink average TCP RTX rate: 3.41%
Policy monitor:  monitor-default      Policy rate:      rate-default
```


User Name:	n/a	Calling Station Id:	n/a
NAS Identifier:	n/a		
NAS IP Address:	n/a	NAS Port:	n/a

FLOW-SHAPING-POLICY	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND
30Mbps	681204472902	664643445514	12020979178	18434850761
SUBS-RATE-POLICY	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND
rate-default	1552099551638	1546323242173	67542149609	74601462570

The instance processing this subscriber is number 6, which corresponds to core number 6 (in this example core 0 is used by QoE; in machines where core 0 is not used by QoE, an instance 6 would be core 7).

Now that the issue has been identified, if there is a NAT between the subscribers and the QoE, one possible solution is to assign more IP addresses to the NAT so the QoE sees the traffic more evenly distributed between more IPs.

If only TCP Optimization functionality is used (no bandwidth management of any kind), a possible solution is to configure a per-flow distribution across workers. This will solve the load distribution issue, but only TCPO can be used. The rest of features are per subscriber, and requires all subscriber traffic processed by the same worker instance, so they will not be available.

```

bqnadm@bqn0# configure
bqnadm@bqn0(config)# pkteng
bqnadm@bqn0(config-pkteng)# steering flow
bqnadm@bqn0(config-pkteng)# root
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)# end
bqnadm@bqn0#

```

CPUs running at lower than expected frequency

In rare cases, the CPU clock frequency may be reduced due to high temperature, power supply, or hardware problems, which may result in high CPU usage. In those cases make sure that the hardware is working within the recommended working parameters.

```

admin@bqn0# show system cpu frequency

```

CPU	Current	Minimum	Maximum
0	1282	800	2200
1	1808	800	2200
2	1517	800	2200
3	1423	800	2200

```

4      1556      800      2200
5      1047      800      2200
6      1443      800      2200
7      800       800      2200

```

```
admin@bqn0#showsystemsensors
```

```

SENSOR          CURRENT    MAXIMUM    CRITICAL
Core1           41.0      82.0      104.0
PackageId0     41.0      82.0      104.0
Core2           41.0      82.0      104.0
Core0           41.0      82.0      104.0
Core3           41.0      82.0      104.0

```

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

Disk issues

Disk usage issues

The system management process monitors the status of the / filesystem and detects when there is no more space or if the filesystem is in read-only mode. If the usage of a filesystem is above 85%, the status is set to a warning, and if it reaches 99% then the status is critical.

```
admin@bqn0# show system alarms
```

```

Type           Status    Updates    Time
cpu            normal    1          2021-06-29T15:56:56+0200
disk           warning   1          2021-06-09T11:27:41+0200
license-available normal    1          2021-06-09T11:27:41+0200
license-expiration normal    1          2021-06-09T11:27:41+0200
license-usage  normal    1          2021-06-09T11:27:41+0200
memory-dpdk    normal    1          2021-06-29T10:48:18+0200
memory-pool    normal    1          2021-06-29T10:48:18+0200
process        normal    3          2021-07-01T15:37:58+0200
time           normal    2          2021-07-01T15:37:58+0200
traffic-uplink normal    2          2021-07-01T15:37:58+0200
traffic-downlink normal    2          2021-07-01T15:37:58+0200
traffic-low    normal    2          2021-07-01T15:37:58+0200
traffic-inverted normal    2          2021-07-01T15:37:58+0200
wire           normal    4          2021-07-01T15:38:33+0200

```

```
admin@bqn0# show system filesystem
```

File system	Size	Used	Avail	Use%	Mounted on
devtmpfs	2.0G	96K	2.0G	1%	/dev
tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	2.0G	8.6M	2.0G	1%	/run
/dev/sda3	7.0G	6.6G	621M	92%	/
/dev/loop0	1.3M	1.3M	0	100%	/bqn/img/bqnos
/dev/loop1	254M	254M	0	100%	/bqn/img/linux
/dev/loop2	3.4M	3.4M	0	100%	/bqn/img/bqnkernel
/dev/loop3	149M	149M	0	100%	/bqn/img/kernel
/dev/loop4	1.5M	1.5M	0	100%	/bqn/img/gui
/dev/loop5	13M	13M	0	100%	/bqn/img/bqn
tmpfs	2.0G	0	2.0G	0%	/sys/fs/cgroup
tmpfs	2.0G	8.6M	2.0G	1%	/var/run

In this example, the filesystem mounted on / is getting full, and unnecessary files should be deleted.

Once the full filesystem is clean from unnecessary files and the usage of the filesystem is below 85%, the global disk status is restored to normal.

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

```
admin@bqn0# show system filesystem
```

File system	Size	Used	Avail	Use%	Mounted on
devtmpfs	2.0G	96K	2.0G	1%	/dev
tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	2.0G	8.6M	2.0G	1%	/run
dev/sda3	7.0G	597M	6.5G	9%	/
/dev/loop0	1.3M	1.3M	0	100%	/bqn/img/bqnos
/dev/loop1	254M	254M	0	100%	/bqn/img/linux
/dev/loop2	3.4M	3.4M	0	100%	/bqn/img/bqnkernel
/dev/loop3	149M	149M	0	100%	/bqn/img/kernel
/dev/loop4	1.5M	1.5M	0	100%	/bqn/img/gui
/dev/loop5	13M	13M	0	100%	/bqn/img/bqn
tmpfs	2.0G	0	2.0G	0%	/sys/fs/cgroup
tmpfs	2.0G	8.6M	2.0G	1%	/var/run

If the problem persists, follow the instructions in the [Contacting Cambium Networks Support](#) section for assistance.

Disk hardware issue

In the face of hard disk hardware failures, the OS protects itself by placing the filesystem in read-only mode.

The symptom of the problem is that statistics are not shown and configuration changes are not possible. Operations not requiring disk, like traffic processing, are not affected.

To confirm the problem, see if the syslog displays multiple disk errors:

```
bqn0:# less /var/log/messages
. . .
[4486534.464803] print_req_error: I/O error, dev sda, sector 66617040
[4486534.464811] print_req_error: I/O error, dev loop1, sector 42706
[4486534.464815] sd 0:0:0:0: [sda] tag#2 FAILED Result: hostbyte=DID_BAD_
TARGET driverbyte=DRIVER_OK
[4486534.464816] sd 0:0:0:0: [sda] tag#2 CDB: Read(10) 28 00 03 f8 7e d0 00
00 08 00
[4486534.464825] sd 0:0:0:0: [sda] tag#3 FAILED Result: hostbyte=DID_BAD_
TARGET driverbyte=DRIVER_OK
. . .
```

To complete the problem analysis, log into the BQN server root account and run the following command in the Linux shell. Save the response for later reference (note that in this example /dev/sda is the disk device for the hard disk):

```
bqn0:# smartctl -all /dev/sda

smartctl 6.2 2013-07-26 r3841 [x86_64-linux-4.12.14-155.g4755291-default]
(SUSE RPM)
```

```

Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org
=== START OF INFORMATION SECTION ===
Model Family: Seagate Barracuda 7200.14 (AF)
. . .

```

Also, run the following test (it will take a few minutes, the command itself will give an estimate of its duration):

```

bqn0:# smartctl -t short /dev/sda
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-4.12.14-155.g4755291-default]
(SUSE RPM)
Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org
=== START OF OFFLINE IMMEDIATE AND SELF-TEST SECTION ===
Sending command: "Execute SMART Short self-test routine immediately in off-
line mode".
Drive command "Execute SMART Short self-test routine immediately in off-
line mode" successful.
Testing has begun.
Please wait 1 minutes for test to complete.
Test will complete after Tue Feb 15 11:30:27 2022
Use smartctl -X to abort test.
bqn0:~

```

Once the test has been completed, retrieve the result and send it to Bequant support along with the response of the `smartctl -all` command (see [Contacting Cambium Networks support](#) section):

```

bqn0:# smartctl -l selftest /dev/sda
smartctl 6.2 2013-07-26 r3841 [x86_64-linux-4.12.14-155.g4755291-default]
(SUSE RPM)
Copyright (C) 2002-13, Bruce Allen, Christian Franke, www.smartmontools.org
=== START OF READ SMART DATA SECTION ===
SMART Self-test log structure revision number 1

```

Num	Test_ Description	Status	Remaining	LifeTime (hours)	LBA_of_ first_error
# 1	Short offline	Completed without error	00%	17734	-
# 2	Short offline	Completed without error	00%	17695	-
# 3	Extended offline	Completed without error	00%	5419	-
# 4	Extended offline	Completed without error	00%	5085	-

# 5	Extended offline	Completed without error	00%	4791	-
# 6	Extended offline	Completed without error	00%	4517	-
# 7	Extended offline	Interrupted (host reset)	00%	4515	-
# 8	Extended offline	Interrupted (host reset)	00%	4513	-
# 9	Extended offline	Completed without error	00%	4474	-
#10	Extended offline	Completed without error	00%	4250	-
#11	Extended offline	Completed without error	00%	4086	-
#12	Extended offline	Completed without error	00%	4061	-
#13	Short offline	Completed without error	00%	0	-

bqn0:#

Once the disk hardware failure is confirmed, the disk must be replaced by a new one. We recommend a RAID 1 (mirroring) to avoid data losses as a result of disk failures.

Wire problems (Data plane interfaces)

The management system monitors all the configured wires. If there are no wires configured or none of them have their interfaces up, the state of the system wires are critical. If some of the configured wires are up, but others are not, the state is warning.

```
admin@bqn0# show system alarms
```

TYPE	STATUS	UPDATES	TIME
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200

traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	warning	5	2021-07-01T17:28:21+0200

Use the [show interface](#) command to locate the interface with no link:

```
admin@bqn0# show pkteng wire
```

ACC-IFACE	ACC-PCAP	INET-IFACE	INET-PCAP
en0o3	no	en0o4	no
en0o5	no	en0o6	no

```
admin@bqn0# show interface
```

IFACE	TYPE	MAC	STATE	LINK
lo0	loopback	00:00:00:00:00:00	up	yes
en0o1	ethernet	08:00:27:45:36:8c	up	yes
en0o2	ethernet	08:00:27:b8:59:0c	down	no
en0o3	ethernet	08:00:27:0f:f4:1c	up	yes
en0o4	ethernet	08:00:27:0c:46:75	up	no
en0o5	ethernet	08:00:27:9b:3f:4a	up	yes
en0o6	ethernet	08:00:27:9b:3f:4d	up	yes

In the example above, the en0o4 interface has no link and it is part of a wire. Note that the interface en0o2 is not used, and its status does not induce system alarms. After connecting the cable of en0o4 correctly, the status is restored to normal:

```
admin@bqn0# show interface
```

IFACE	TYPE	MAC	STATE	LINK
lo0	loopback	00:00:00:00:00:00	up	yes
en0o1	ethernet	08:00:27:45:36:8c	up	yes
en0o2	ethernet	08:00:27:b8:59:0c	down	no
en0o3	ethernet	08:00:27:0f:f4:1c	up	yes
en0o4	ethernet	08:00:27:0c:46:75	up	yes
en0o5	ethernet	08:00:27:9b:3f:4a	up	yes
en0o6	ethernet	08:00:27:9b:3f:4d	up	yes

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200

license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	5	2021-07-01T17:28:21+0200

The attributes (duplex, speed) of the network interfaces in the QoE must match the network attributes of the port where it is connected (switch, router, server, etc.) Use the [show interface](#) command to check the properties of the network interfaces in the QoE. Note that the default behaviour should be auto-negotiation.

```
admin@bqn0# show interface detail
lo0: UP LOOPBACK RUNNING
    Link type: loopback
    Link detected: yes
    Auto-negotiation: unknown
    MTU: 65536
en0o1: UP BROADCAST RUNNING MULTICAST
    Link type: ethernet
    MAC: 08:00:27:45:36:8c
    Link detected: yes
    Auto-negotiation: on Duplex: Full
    Speed: 1000Mbps
    MTU: 1500
en0o2: BROADCAST MULTICAST
    Link type: ethernet
    MAC: 08:00:27:b8:59:0c
    Link detected: no
    Auto-negotiation: on
    Duplex: unknown
    Speed: unknown
```



```
MTU: 1500
en0o3: UP PROMISC RUNNING
    Link type: ethernet
    MAC: 08:00:27:0f:f4:1c
    Link detected: yes
    Auto-negotiation: on
    Duplex: Full
    Speed: 1000Mbps
    MTU: 2026
en0o4: UP PROMISC RUNNING
    Link type: ethernet
    MAC: 08:00:27:0c:46:75
    Link detected: yes
    Auto-negotiation: on
    Duplex: Full
    Speed: 1000Mbps
    MTU: 2026
en0o5: UP PROMISC RUNNING
    Link type: ethernet
    MAC: 08:00:27:9b:3f:4a
    Link detected: yes
    Auto-negotiation: on
    Duplex: Full
    Speed: 1000Mbps
    MTU: 2026
en0o6: UP PROMISC RUNNING
    Link type: ethernet
    MAC: 08:00:27:9b:3f:4d
    Link detected: yes
    Auto-negotiation: on
    Duplex: Full
    Speed: 1000Mbps
    MTU: 2026
```

Sometimes the problem is that the interface is non-Intel and has to be set in PCAP mode (see [Non-Intel interfaces](#) section).

Another possible source of problems is the compatibility of SFP transceivers (see [SFP+ modules](#) section).

Non-Intel interfaces

When a data network interface is not Intel-based, it may not be compatible unless it is placed in PCAP mode. In the following example, the interfaces `en0p3s0` and `en0p4s0` are Broadcom based and must be in PCAP mode to be part of a wire. Setting an interface in PCAP mode reduces the server throughput capacity significantly.

```
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP  DIRECTED
en0p3s0    no        en0p4s0     no         yes

admin@bqn0# show interface

IFACE      Type      MAC              State  Link
lo0        loopback  00:00:00:00:00:00  up     yes
en0p1s0    ethernet  30:27:14:23:ba:12  up     yes
en0p2s0    ethernet  30:27:14:23:ba:13  down   no
en0p3s0    ethernet  30:27:14:23:ba:14  down   no
en0p4s0    ethernet  30:27:14:23:ba:15  down   no

admin@bqn0# show interface en0p3s0 device
Driver: bnx2
PCI class: 0x20000
PCI vendor ID: 0x14e4 : Broadcom Inc.
PCI device ID: 0x1639 : NetXtreme II BCM5709 Gigabit Ethernet
PCI sub-vendor ID: 0x103c : Hewlett-Packard Company
PCI sub-device ID: 0x7055 PCI slot: 0000:02:00.0
NUMA node: 0

admin@bqn0# show interface en0p4s0 device
Driver: bnx2
PCI class: 0x20000
PCI vendor ID: 0x14e4 : Broadcom Inc.
PCI device ID: 0x1639 : NetXtreme II BCM5709 Gigabit Ethernet
PCI sub-vendor ID: 0x103c : Hewlett-Packard Company
PCI sub-device ID: 0x7055 PCI slot: 0000:02:00.0
NUMA node: 0

admin@bqn0# configure
admin@bqn0(config)# interface en0p3s0
admin@bqn0(config-iface)# nic pcap
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0p4s0
```

```

admin@bqn0(config-iface)# nic pcap
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0# show interface

IFACE      Type      MAC              State  Link
-----
lo0        loopback  00:00:00:00:00:00  up    yes
en0p1s0    ethernet  30:27:14:23:ba:12  up    yes
en0p2s0    ethernet  30:27:14:23:ba:13  down  no
en0p3s0    ethernet  30:27:14:23:ba:14  up    yes
en0p4s0    ethernet  30:27:14:23:ba:15  up    yes

admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP  DIRECTED
-----
en0p3s0    yes      en0p4s0    yes        yes

```

SFP+ modules

If SFP+ ports are used, then make sure that the Direct Attach Cable (DAC) or the transceivers are compatible with the network card. In addition, ensure that the transceivers are facing the right way and are fully inserted in both ports.

In general, if there are connectivity problems and the network interfaces have no link, follow the next instructions.

1. Ensure that the transceivers are fully inserted into the network ports, and that they correspond with the configured network interfaces in the QoE.
2. Verify that the transceivers are of the supported types and a flavor compatible with the network interface vendor. The transceiver types supported are:
 - 1G SFP: 1000BASE-SX and 1000BASE-LX
 - 10G SFP+: 10GBASE-SR/1000BASE-SX and 10GBASE-LR/1000BASE-LX
 - 40G QSFP+: 40GBASE-SR4 and 40GBASE-LR4
3. If the network interface uses the Intel Ethernet Controller X710, make sure that the adapter qualification mechanism is disabled (to support SFP modules by vendors different than Intel) and that all the available SFP modes are fully supported. To verify the SFP+ module state the interfaces must be in PCAP mode.

```

admin@bqn0# system interface en0s1f1 sfp-qualification disable
admin@bqn0# system interface en0s1f1 sfp-support
admin@bqn0# show interface en0s1f1 device Driver: i40e

PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation

```

```

PCI device ID: 0x1572 : Ethernet Controller X710 for 10GbE SFP+
PCI sub-vendor ID: 0x8086 : Intel Corporation
PCI sub-device ID: 0x0000 PCI slot: 0000:08:00.1
X710 SFP+ qualification: no X710 SFP+ support: full

```

The last 2 lines indicate the SFP+ compatibility status.



Warning

If these parameters are modified, reboot the system for the changes to take effect.

If the X710 SFP+ information displayed does not show meaningful values, execute the `/opt/bqn/sbin/x710tool` program from the bash shell (as root user), indicating the operating system name of the interface.

```

bqn0:~# /opt/bqn/sbin/x710tool en0s1f1

DATA-STRUCT      OFFSET  VALUE      DESCRIPTION
PHY-Capability  0x0000  0x000c     Section Length
PHY-Capability  0x0001  0x0022     INT-EXT PHY Select
PHY-Capability  0x0002  0x0083     Internal PHY Type
PHY-Capability  0x0003  0x1871     External PHY Type
PHY-Capability  0x0004  0x0000     PHY ID 0
PHY-Capability  0x0005  0x0000     PHY ID 1
PHY-Capability  0x0006  0x3303     Module Type 0
PHY-Capability  0x0007  0x000b     Module Type 1
PHY-Capability  0x0008  0x630c     PHY Capabilities Misc0
PHY-Capability  0x0009  0x0a00     PHY Capabilities Misc1
PHY-Capability  0x000a  0x0a1e     40 LESM Timer Values
PHY-Capability  0x000b  0x0003     PHY Capabilities Misc2
PHY-Capability  0x000c  0x0000     PHY Capabilities Misc3

```

The `-v` flag shows more detailed information.

4. If the network interface uses the Intel Ethernet Controller X710, make sure that the adapter firmware version is up to date. The interfaces must be in PCAP mode to verify the adapter firmware. Execute the `ethtool` program from the bash shell (as root user), indicating the operating system name of the interface.

```

bqn0:~# ethtool -i en0s1f1

driver: i40e
version: 2.4.10
firmware-version: 4.60 0x80001f47 1.3072.0
bus-info: 0000:61:00.0
supports-statistics: yes

```

```
supports-test: yes
supports-EEPROM-access: yes
supports-register-dump: yes
supports-priv-flags: yes
```

In this example, the firmware version is 4.60. At this time, the latest firmware version available is 7.2, so the firmware should be updated following the instructions described in [Intel Ethernet Controller X710 Firmware update](#) section.

5. If the first of the interfaces of a wire has a link, then connect that transceiver with its fiber to the second network interface of the wire. If the second network interface now has a link, then the problem may be with the transceiver or the fiber originally used with the second network interface.
6. Connect the two network interfaces of a wire directly with the same fiber.



Note

If both interfaces have a link, the problem may be at the other end of QoE.

High memory usage

The system monitors the QoE and the DPDK memory pools. If either of them are above 90%, the system signals it with a warning :

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	warning	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

To see memory usage:

```
admin@bqn0# show statistics memory lines 1
```

```

TIME                SYS-MB    MPOOL-MB  DPDK0-MB
2021-07-01T10:11:03 4186.395  222.819   3908.420

```

```
admin@bqn0# show pkteng memory dpdk
```

```

NODE  SIZE-USED-MB  SIZE-TOTAL-MB
0      3907.2        4294.9

```

So it is confirmed that the DPDK pool is almost full. The solution to this problem is to upgrade the server RAM. The QoE automatically recognizes the new memory and re-allocates its pools accordingly. The following section covers a scenario where the memory upgrade can be avoided.

Unbalanced DPDK memory usage

The following is applicable only to NUMA servers (a dual-socket server with two CPUs). For performance reasons, a network card uses the DPDK memory pool associated to its NUMA. For example, a network card inserted in a PCI slot associated to NUMA-0 will use the DPDK memory pool of NUMA-0. Therefore, if network cards were inserted unevenly between the two NUMAs, the resulting memory usage will be unbalanced.

The unbalance can be seen with the following command:

```
bqnadm@bqn0# show statistics memory
```

```

TIME                SYS-MB    MPOOL-MB  DPDK0-MB  DPDK1-MB
2022-02-15T05:58:49 31661.758  313.458   183.663   3.232
2022-02-15T06:03:49 31662.598  336.887   191.474   9.693
2022-02-15T06:08:49 31662.094  349.635   200.336   7.392
2022-02-15T06:13:49 31661.887  342.606   200.365   9.657
2022-02-15T06:18:49 31661.789  342.279   194.166   5.401
2022-02-15T06:23:49 31661.199  356.192   199.790   0.923
2022-02-15T06:28:49 31662.246  369.253   212.195   6.996
2022-02-15T06:33:49 31662.492  374.588   207.565   2.248
2022-02-15T06:38:49 31660.426  384.968   203.998   7.128
2022-02-15T06:43:49 31659.539  393.998   215.445   4.333
2022-02-15T06:48:49 31660.500  396.609   221.627   4.992
2022-02-15T06:53:49 31659.562  415.244   215.948   3.416
2022-02-15T06:58:49 31660.484  433.093   220.668   6.716
2022-02-15T07:03:49 31662.738  428.353   218.833   9.735
2022-02-15T07:08:49 31661.539  441.953   221.646   2.435

```

...

In this case, all traffic is being handled by NUMA-0, so its pool (DPDK0) has a much bigger usage.

If the memory is big enough, this imbalance poses no problem and can be left as it is (in future upgrades, extra network cards should be inserted in the NUMA-1 PCI slots). But if DPDK0 has high usage, it is

possible to rebalance the memory by telling the network interfaces to use also the other DPDK pool. The following example uses two wires, both in the same NUMA:

```
bqnadm@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0p5s0f0  no        en0p5s0f1  no
en0p7s0f0  no        en0p7s0f1  no

bqnadm@bqn0# show interface en0p5s0f0 device
Driver: igb_uio
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
PCI device ID: 0x10fb : 82599ES 10-Gigabit SFI/SFP+ Network Connection
PCI sub-vendor ID: 0x1374
PCI sub-device ID: 0x0132
PCI slot: 0000:05:00.0
NUMA node: 0

bqnadm@bqn0# show interface en0p7s0f0 device
Driver: igb_uio
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
PCI device ID: 0x10fb : 82599ES 10-Gigabit SFI/SFP+ Network Connection
PCI sub-vendor ID: 0x1374
PCI sub-device ID: 0x0132
PCI slot: 0000:07:00.0
NUMA node: 0
```

Each wire uses two IO processes:

```
bqnadm@bqn0# show pkteng affinity

FUNCTION          AFFINITY  COUNT
cpu-available    ffffffff,ffffffff  56
pkteng-all      000000,00ffffffe  23
pkteng-worker    000000,00ffff3e   21
pkteng-io        000000,0000f000   4
en0p5s0f1-io    000000,00003000   2
en0p5s0f0-io    000000,00003000   2
en0p7s0f1-io    000000,0000c000   2
en0p7s0f0-io    000000,0000c000   2
```

To balance the memory usage, we can instruct the interfaces to use DPDK0 for some IO processes and DPDK1 for the other IO processes.

```
bqnadm@bqn0# configure
bqnadm@bqn0(config)# interface en0p5s0f0
bqnadm@bqn0(config-iface)# nic io numa 0x1000 0
bqnadm@bqn0(config-iface)# nic io numa 0x2000 1
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# interface en0p5s0f1
bqnadm@bqn0(config-iface)# nic io numa 0x1000 0
bqnadm@bqn0(config-iface)# nic io numa 0x2000 1
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# interface en0p7s0f0
bqnadm@bqn0(config-iface)# nic io numa 0x4000 0
bqnadm@bqn0(config-iface)# nic io numa 0x8000 1
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# interface en0p7s0f1
bqnadm@bqn0(config-iface)# nic io numa 0x4000 0
bqnadm@bqn0(config-iface)# nic io numa 0x8000 1
bqnadm@bqn0(config-iface)# root
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)# end
bqnadm@bqn0#
```

The previous configuration gets the first wire to use DPDK0 for IO 0x1000 and DPDK1 for IO 0x2000 and, similarly for the second wire. The memory usage will be more balanced:

```
bqnadm@bqn0# show statistics memory
```

	TIME	SYS-MB	MPOOL-MB	DPDK0-MB	DPDK1-MB
	2022-02-15T05:54:06	70011.793	2547.534	691.772	557.649
	2022-02-15T05:59:06	70010.953	2582.345	684.435	657.337
	2022-02-15T06:04:06	70010.906	2802.498	864.704	759.575
	2022-02-15T06:09:06	70011.078	2785.494	825.033	658.832
	2022-02-15T06:14:06	70011.055	2845.675	721.519	768.127
	2022-02-15T06:19:06	70011.664	2863.118	675.411	767.531
	2022-02-15T06:24:06	70010.879	2844.638	588.927	709.374
	2022-02-15T06:29:06	70011.711	2951.280	905.278	671.670
	2022-02-15T06:34:06	70011.609	3016.513	689.571	821.960


```

2022-02-15T06:39:06 70010.617 3033.801 874.681 722.075
2022-02-15T06:44:06 70010.719 3136.536 795.822 1016.979
2022-02-15T06:49:06 70012.473 3100.317 679.810 866.036
2022-02-15T06:54:06 70011.285 3122.440 757.506 934.861
2022-02-15T06:59:06 70010.863 3083.912 690.496 862.272
2022-02-15T07:04:06 70010.906 3301.254 795.088 794.413

```

...

License unavailable issues

The management system monitors the availability of licenses.

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	critical	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

If the license-available status is not normal, then follow these steps:

1. Verify that there is a valid license

```
admin@bqn0# show license
```

```
FEATURE EXPIRATION VALID USAGE-MAX
```

2. If there is no license, it may be because the QoE has not retrieved a valid license from the license manager. Ensure that the license manager is contacted:

```
admin@bqn0# show remctr status
```

```
State: idle
```

```
Timer expiration: 00:05:23.599
Last in "connected" state: n/a
Session ID: 5672e81430c7f9b5
```

If so, force the QoE to contact the license manager:

```
admin@bqn0# system remctr connect
admin@bqn0# show license
```

FEATURE	EXPIRATION	VALID	USAGE-MAX
bta	2021-07-04T16:59:59-0500	yes	1000

3. Sometimes the QoE cannot reach the license manager, which needs to access the 13152 TCP port at 146.59.206.4 and 46.26.190.166 IP addresses. To test if the license manager is reachable, enter the following command as root :

```
bqn0:~# telnet 146.59.206.4 13152
Trying 146.59.206.4...
telnet: connect to address 146.59.206.4: Connection refused
bqn0:~#
```

This lack of access can be caused by a firewall rule preventing an outgoing TCP connection to those IP addresses, which requires you to review your firewall rules.

If the QoE firewall is used, make sure the license manager IPs are included. For example, if en0o1 is the management interface and the firewall is active;

```
admin@bqn0# show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  10.0.0.0/8
en0o1  input  172.16.0.0/12
en0o1  input  192.168.0.0/16

admin@bqn0# configure
admin@bqn0(config)# interface en0o1
admin@bqn0(config-iface)# firewall input 46.26.190.166/32
admin@bqn0(config-iface)# firewall input 146.59.206.4/32
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit admin@bqn0(config)# end
admin@bqn0#
```

After sorting out the firewall, the license manager should be reachable, which can be tested by entering the following command as root :

```
bqn0:~# telnet 146.59.206.4 13152
Trying 146.59.206.4...
Connected to 146.59.206.4.
```

```
Escape character is '^]'.
^]Connection closed by foreign host.
bqn0:~ #
```

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

License expiration issues

The system management process monitors if there are licenses which that have expired.

```
admin@bqn0# show system alarms
```

TYPE	STATUS	UPDATES	TIME
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	critical	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

```
admin@bqn0# show license
```

Feature	Expiration	Valid	USAGE-MAX
bta	2021-06-30T00:00:00+0200	no	1000

In that case, a license renewal will be necessary from your sales representative.

It is possible that the renewal is already waiting in the license manager but the license manager is currently not reachable. For more information, refer to [License unavailable issues](#) section.

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

Traffic above the license limit

If the license limit is in a warning state, it indicates that the system is processing more traffic throughput than the purchased license.

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	warning	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

When the license usage is in a warning state, the QoE continues forwarding all the traffic, so the connectivity is not lost, but some flows are not processed to keep the throughput of optimized traffic approximately within the license limit. Flows already optimized continue to be so to mitigate the impact on the end-users experience.

The system alarm is in a warning state when traffic exceeds the license. Purchase a license upgrade from your sales representative.

No traffic in uplink or downlink directions

The QoE monitors that traffic in uplink and downlink directions is flowing through the server. When this is not the case, a warning alert is issued.

For example, if there is no uplink traffic flowing through the QoE:

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200

```

process          normal    3        2021-07-01T15:37:58+0200
time             normal    2        2021-07-01T15:37:58+0200
traffic-uplink   warning   2        2021-07-01T15:37:58+0200
traffic-downlink warning   2        2021-07-01T15:37:58+0200
traffic-low      normal    2        2021-07-01T15:37:58+0200
traffic-inverted normal    2        2021-07-01T15:37:58+0200
wire             normal    4        2021-07-01T15:38:33+0200

```

You can check the traffic flowing through the QoE with the following command:

```

admin@bqn0# show interface pkteng bandwidth

INTERFACE  PKTS-RX-Kpps  BYTES-RX-Mbps  PKTS-TX-Kpps  BYTES-TX-Mbps
en0o7      0.000         0.000          0.000         0.000
en0o8      0.000         0.000          0.000         0.000

```

In this example, there is no traffic through the QoE.

If the traffic goes in only one direction (for example, only downlink), you would see something like:

```

admin@bqn0# show interface pkteng bandwidth

INTERFACE  PKTS-RX-Kpps  BYTES-RX-Mbps  PKTS-TX-Kpps  BYTES-TX-Mbps
en0o7      0.000         0.000          1.897         15.515
en0o8      1.970         18.113         0.000         0.000

```

By default, the system reports a problem if the traffic reaches zero, but you can define a more strict threshold. For example, to report an alarm if the traffic goes below 100 Mbps in downlink and 20 Mbps in uplink:

```

admin@bqn0# configure
admin@bqn0(config)# system
admin@bqn0(config-system)# management traffic threshold 100000 20000
admin@bqn0(config-system)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0#

```

In this example the traffic thresholds are specified in Kbps.

Traffic too low

While there is traffic in uplink and downlink directions, the QoE monitors if the total level of received traffic in both directions goes below a threshold and if it does, signals it with a notice alarm.

```

admin@bqn0# show system alarms

```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	notice	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

You need to check if this low level of traffic is normal.

By default, the level of low traffic is 1 Mbps, but you can define a different threshold. For example, to raise the threshold to 500 Mbps:

```
admin@bqn0# configure
admin@bqn0(config)# system
admin@bqn0(config-system)# management traffic low 500000
admin@bqn0(config-system)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0#
```

In this example the traffic threshold is specified in Kbps. If there is no traffic, this alarm will stay in unknown state.

Traffic inverted

While there is traffic in uplink and downlink directions, the QoE monitors if the uplink received traffic is less than the downlink received traffic. Traffic usually has more throughput in the downlink direction than in the uplink direction. If this is not the case, a warning alarm is issued:

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200

disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	warning	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

For QoE, it is important to the direction of the traffic because it needs to know where the subscribers and the Internet lie. When the traffic is signaled as inverted, it is usually due to some wires that contain ports that have been connected in inverted order (the access interface is the one on the Internet side and vice versa). To verify the directionality, first list the wire configuration:

```
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0o3      no        en0o4        no
en0o5      no        en0o6        no
```

Then check the throughput of those interfaces:

```
admin@bqn0# show statistics interface speed lines 6
```

	en0o3		en0o4		en0o5		en0o6...	
TIME	TX-Mbps	RX-Mbps	TX-Mbps	RX-Mbps	TX-Mbps	RX-Mbps	TX-Mbps	RX-Mbps...
2021-07-02T10:25:29	95.59	345.52	341.16	97.72	270.43	36.81	38.26	266.81 ...
2021-07-02T10:30:29	84.07	308.87	306.04	84.37	264.17	32.00	33.55	261.19 ...
2021-07-02T10:35:29	110.54	357.93	352.72	113.40	268.12	36.70	38.23	265.27 ...

```

2021-07-02T10:40:29 92.36 338.68 336.39 93.59 296.24 40.09 41.87 291.66
...
2021-07-02T10:45:29 97.69 334.42 332.46 99.75 290.77 38.16 39.57 284.97
...
2021-07-02T10:50:29 90.91 351.32 348.21 93.81 278.66 40.51 41.82 274.15
...

```

It can be observed that en0o3 receives more traffic than it transmits, and it is configured as an access interface in the wire. Interface en0o4 sends more traffic than it receives, and it is configured in its wire as the Internet interface. That wire is inverted and causing the inverted traffic alarm. To fix this, either change the physical cables or revert the configuration:

```

admin@bqn0# set wire en0o4 en0o3 0
admin@bqn0# show pkteng wire

ACC-IFACE ACC-PCAP INET-IFACE INET-PCAP
en0o4      no          en0o3      no
en0o5      no          en0o6      no

```

And after a while, the throughput should be correct and the alarm should go to a normal state:

```

admin@bqn0# show statistics interface speed lines 6

          en0o4          en0o30          en0o5          en0o6...

TIME      TX-    RX-    TX-    RX-    TX-    RX-    TX-Mbps    RX-
Mbps     Mbps  Mbps  Mbps  Mbps  Mbps  Mbps
2021-07-02T11:10:29 400.18 92.59 93.00 397.07 318.87 37.97 39.33 312.07
...
2021-07-02T11:15:29 386.63 110.96 112.47 382.89 340.75 42.31 43.59 333.36
...
2021-07-02T11:20:29 400.43 129.60 134.19 396.74 329.78 39.88 41.19 323.03
...
2021-07-02T11:25:29 394.71 86.28 87.74 394.01 331.49 39.52 41.15 325.75
...
2021-07-02T11:30:29 418.99 123.71 126.81 412.89 353.49 38.17 39.97 347.01
...
2021-07-02T11:35:29 394.50 119.44 121.68 390.73 356.91 39.81 41.94 350.53
...

admin@bqn0# show system alarms

```


Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	3	2021-07-01T15:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

If there is no traffic, this alarm will stay in an unknown state.

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

Process issues

The management system monitors the QoE mandatory processes and in case of failure, it automatically restarts them.

When a process fails, the process alarm is triggered, and a new process is restarted within seconds. In the following example, the apimgr process has a failure triggering the process alarm.

```
admin@bqn0# show process mandatory
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	root	7878	stopped	0	0:00:00.925	0	apimgr
0	root	5962	running	0	4:22:53.315	0	cfgmgr
0	root	5943	running	0	4:22:53.467	0	ctrmgr
0	root	5960	running	0	4:22:53.372	0	dnsmgr
0	root	5969	running	0	4:22:53.265	0	ipmgr
0	root	5966	running	0	4:22:53.265	0	licmgr
0	root	5964	running	0	4:22:53.283	0	ossrv
0	root	6048	running	0	4:22:52.787	0	pkteng
0	root	6141	running	0	4:22:52.381	1	pkteng

```

0    root    6142    running  0          4:22:52.381  2    pkteng
0    root    6143    running  0          4:22:52.376  3    pkteng
0    root    6041    running  0          4:22:52.813  0    pktengmgr
0    root    5968    running  0          4:22:53.261  0    remctr
0    root    5965    running  0          4:22:53.283  0    rtmgr
0    root    7862    running  0          4:22:53.292  0    snmpagt
0    root    5963    running  0          4:22:53.314  0    statmgr

```

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	critical	3	2021-07-01T19:37:58+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

After a short time, the process is automatically restarted and the alarm is cleared.

```
admin@bqn0# show process mandatory
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	root	8432	running	1	0:00:01.618	0	apimgr
0	root	5962	running	0	4:29:14.014	0	cfgmgr
0	root	5943	running	0	4:29:14.166	0	ctrmgr
0	root	5960	running	0	4:29:14.071	0	dnsmgr
0	root	5969	running	0	4:29:13.964	0	ipmgr
0	root	5966	running	0	4:29:13.964	0	licmgr
0	root	5964	running	0	4:29:13.982	0	osrv
0	root	6048	running	0	4:29:13.486	0	pkteng

```

0    root    6141    running  0        4:29:13.079  1    pkteng
0    root    6142    running  0        4:29:13.080  2    pkteng
0    root    6143    running  0        4:29:13.075  3    pkteng
0    root    6041    running  0        4:29:13.511  0    pktengmgr
0    root    5968    running  0        4:29:13.960  0    remctr
0    root    5965    running  0        4:29:13.982  0    rtmgr
0    root    7862    running  0        4:29:13.994  0    snmpagt
0    root    5963    running  0        4:29:14.013  0    statmgr

```

```
admin@bqn0# show system alarms
```

Type	Status	Updates	Time
cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	2	2021-07-01T17:21:38+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	4	2021-07-01T19:37:59+0200
time	normal	2	2021-07-01T15:37:58+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	4	2021-07-01T15:38:33+0200

If the problem remains, then follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

Time issues

As indicated in the installation procedure, the QoE must have the correct system time. To that end, the QoE monitors that the NTP service is configured and synchronized.

NTP not configured

The management process triggers a time alarm when the NTP service is not configured.

```
admin@bqn0# show system alarms
```

```

bqnUSER          PIDSTATE  RESPAWN  TIME INST  PROCESS

```

cpu	normal	1	2021-06-29T15:56:56+0200
disk	normal	1	2021-06-09T11:27:41+0200
license-available	normal	1	2021-06-09T11:27:41+0200
license-expiration	normal	1	2021-06-09T11:27:41+0200
license-usage	normal	1	2021-06-09T11:27:41+0200
memory-dpdk	normal	1	2021-06-29T10:48:18+0200
memory-pool	normal	1	2021-06-29T10:48:18+0200
process	normal	4	2021-07-02T14:04:38+0200
time	notice	2	2021-07-02T14:21:26+0200
traffic-uplink	normal	2	2021-07-01T15:37:58+0200
traffic-downlink	normal	2	2021-07-01T15:37:58+0200
traffic-low	normal	2	2021-07-01T15:37:58+0200
traffic-inverted	normal	2	2021-07-01T15:37:58+0200
wire	normal	1	2021-07-02T09:42:21+0200

Ensure that the NTP service is configured. It is recommended to use several NTP servers for redundancy.

```

admin@bqn0# configure
admin@bqn0(config)# service ntp
admin@bqn0(config-ntp)# server 18.26.4.105
admin@bqn0(config-ntp)# server 145.238.203.14
admin@bqn0(config-ntp)# server 188.119.192.10
admin@bqn0(config-ntp)# server 193.145.15.15
admin@bqn0(config-ntp)# root
admin@bqn0(config)# commit
admin@bqn0(config)# end
admin@bqn0# show service ntp

```

ntp.service - LSB: Network time protocol daemon (ntpd)

```
Loaded: loaded (/bqn/img/linux/etc/init.d/ntp)
```

```
Drop-In: /run/systemd/generator/ntp.service.d
-50-insserv.conf-$time.conf
```

Active: active (running) since Fri 2021-07-02 09:41:46 CEST; 4h 44min ago

```
admin@bqn0#
```

NTP Service not synchronized

If the NTP time is not synchronized the time alarm is triggered.

```
admin@bqn0# show system alarms
```

bqn USER	PID STATE	RESPAWN	TIME INST	PROCESS
cpu	normal	1	2021-06-29T15:56:56+0200	
disk	normal	1	2021-06-09T11:27:41+0200	
license-available	normal	1	2021-06-09T11:27:41+0200	
license-expiration	normal	1	2021-06-09T11:27:41+0200	
license-usage	normal	1	2021-06-09T11:27:41+0200	
memory-dpdk	normal	1	2021-06-29T10:48:18+0200	
memory-pool	normal	1	2021-06-29T10:48:18+0200	
process	normal	4	2021-07-02T14:04:38+0200	
time	notice	2	2021-07-02T14:21:26+0200	
traffic-uplink	normal	2	2021-07-01T15:37:58+0200	
traffic-downlink	normal	2	2021-07-01T15:37:58+0200	
traffic-low	normal	2	2021-07-01T15:37:58+0200	
traffic-inverted	normal	2	2021-07-01T15:37:58+0200	
wire	normal	1	2021-07-02T09:42:21+0200	

Ensure that the configured NTP servers are reachable by setting the appropriate static routes to the NTP servers.

If the management interface is behind a firewall, make sure that the NTP server IPs are reachable (NTP uses port 123 of the UDP protocol).

Once the NTP servers are reachable, the QoE NTP service should synchronize:

```
admin@bqn0# show system ntp
```

REMOTE	REFID	ST	T	WHEN	POLL	REACH	DELAY	OFFSE T	JITTE R
+188.119.192. 10	150.214.94.5	2	U	333	1024	377	12.666	- 68.43 3	5.622
*145.238.203. 14	.MRS.	1	U	390	1024	377	25.680	- 78.60 6	7.907
+193.145.15.1 5	193.147.107. 33	2	U	305	1024	377	5.027	- 74.23 7	6.768
18.26.4.105	.M12.	1	U	133M	256	0	100.01 4	- 50.02 6	0.000

In this example, at least three servers are synchronized with the QoE (those marked with +).



Note

If the QoE system time and the network time changing, then it can take some time for the system to reach the right time. During that period, the time alarm is armed.

If the problem persists, follow the instructions in the [Contacting Cambium Networks support](#) section for assistance.

Server clock not set to UTC

A correct installation of BQN requires the server clock in the BIOS to be set to UTC (Coordinated Universal Time). If this has not been done, it could be corrected by setting the local time again. The change should be run at times of low traffic, because changing the system clock may cause a brief service interruption:

```
bqnam@bqn0# show system date full
    Local time: Tue 2022-02-15 13:06:18 CET
    Universal time: Tue 2022-02-15 12:06:18 UTC
    RTC time: Tue 2022-02-15 09:05:45
    Timezone: Europe/Madrid (CET, +0100)
    NTP enabled: n/a
    NTP synchronized: no
    RTC in local TZ: no

bqnam@bqn0# system date local 2022-02-15 13:09:00
bqnam@bqn0# show system date full
    Local time: Tue 2022-02-15 13:09:02 CET
    Universal time: Tue 2022-02-15 12:09:02 UTC
    RTC time: Tue 2022-02-15 12:09:02
    Timezone: Europe/Madrid (CET, +0100)
```

NTP enabled: n/a
NTP synchronized: no
RTC in local TZ: no

Contacting Cambium Networks support

Contact [Cambium Networks support](#) and include the following information:

1. Detailed problem description and the steps performed so far to try to solve the problem.
2. System diagnostic file as indicated in the [Diagnostic Generation](#) section.

If remote access to QoE is available, provide detailed instructions to access it for Cambium Networks engineers to directly analyze the problem.



Note

If a software bug is the cause of the problem, it may be necessary to update the software with a newer version that fixes the problem.

Command Reference

This section contains the bqns CLI commands available to configure and manage QoS. A command entry can contain the following sections:

- **Syntax:** Indicate the syntax of the command.
- **Description:** Describe the command and its operation in full detail.
- **Mode:** The mode where the command is available.
- **Profile:** User profile required to execute the command.
- **Examples:** This section provides some examples about the possible usage of the command.
- **Related commands:** List of commands which may be related with this command.

Address

Syntax: address ip-range

no address ip-range

Description: As part of an access or Internet profile, it defines an entry with the given IP range. It will enter its configuration mode, where TCP and UDR ports can be added.

Mode: [profile access](#) and [profile internet](#) configuration modes.

Profile: Administrator.

Examples : Configure an address to an access and to an internet profile.

```
admin@bqn# configure
admin@bqn(config)# profile access myaccess
admin@bqn(config-pfacc)# address 10.10.0.0/16
admin@bqn(config-pfacc-accaddr)# root
admin@bqn(config)# profile internet myinter
admin@bqn(config-pfinet)# address 10.1.1.0/24
admin@bqn(config-pfinet-inetaddr)# tcp port 443
admin@bqn(config-pfinet-inetaddr)# udp port 443
admin@bqn(config-pfinet-inetaddr)# root
admin@bqn(config)#
```

Related: [profile access](#)

Commands: [profile internet](#)

[tcp port](#)

[udp port](#)

Affinity

Syntax: affinity cpu-mask [share]

no affinity cpu-mask [share]

Description: Set the CPU affinity of the BTC threads. When the BTC feature is enabled, the compression work is executed in a different thread inside each PKTENG process. By default, the BTC thread is executed on the same CPU as the PKTENG process, but it may be modified using this command.

The cpu-mask is a hexadecimal number that indicates the CPUs where each BTC threads will execute. When the share optional parameter is used, all the BTC threads are configured to run in all the CPUs indicated by the cpu-mask value.

Use the no command form to restore the default CPU affinity.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the CPU affinity for the BTC threads to execute in the first and second CPUs.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# affinity 3 share
admin@bqn(config-btc)# commit
admin@bqn(config-btc)#
```

Related [btc](#)

Commands [show btc parameters](#)

[show process affinity](#)

allow

Syntax: allow ip-range

no allow ip-range

Description: Set the SSH service access control by only allowing incoming SSH connections from the configured IP ranges. Several IP ranges can be configured.



Note

If no IP ranges are defined, then any client is allowed to establish a connection with the SSH daemon.

Use the no command form to remove an IP range from the list of IPs allowed to establish an SSH connection.

Mode: SSH configuration mode.

Profile: Administrator.

Examples: Configure an IP range to be allowed to connect with the SSH service.

```
admin@bqn# configure
admin@bqn(config)# service ssh
admin@bqn(config-ssh)# allow 192.168.1.0/24
admin@bqn(config-ssh)# commit
admin@bqn(config-ssh)#
```

Related: [service ssh](#)

Commands: [show service ssh](#)

api common

Syntax: api common

Description: Enters the API configuration mode. This is the mode common to all APIs. It allows changes to API parameters such as inactivity timeouts.

Mode: Top configuration mode.

Profile: Administrator.

Examples: To change API inactivity timeouts to 5 hours (300 seconds):

```
admin@bqn# configure
admin@bqn(config)# api common
admin@bqn(config-api)# timeout policy 300
admin@bqn(config-api)# timeout subscriber 300
admin@bqn(config-api)# root
admin@bqn(config)# commit
```

Related: [api policy delete](#)

Commands: [api radius](#)

[api rest](#)

[api storage write](#)

api radius

Syntax: api radius

Description: Enters the RADIUS API configuration mode.

Mode: Top configuration mode.

Profile: Administrator.

Examples: To configure a RADIUS accounting server accessible by two clients:

```
admin@bqn# configure
admin@bqn(config)# api radius
admin@bqn(config-radius)# proxy 10.1.1.10
admin@bqn(config-radius-rproxy)# exit
```

```

admin@bqn(config-radius)# client 10.1.1.20
admin@bqn(config-radius-rclient)# secret mysecret
admin@bqn(config-radius-rclient)# exit
admin@bqn(config-radius)# client 10.1.1.21
admin@bqn(config-radius-rclient)# secret myothersecret
admin@bqn(config-radius-rclient)# root
admin@bqn(config)# commit
admin@bqn(config)# op show api radius proxy

IFACE    ADDRESS    STATE
en0o1   10.1.1.10  ready

admin@bqn(config)# op show api radius client

ADDRESS    SECRET
10.1.1.20  mysecret
10.1.1.21  myothersecret

```

Related: [api common](#)

Commands: [api policy delete](#)

[api rest](#)

[api storage write](#)

[show api radius proxy](#)

[show api radius client](#)

api rest

Syntax: api rest

Description: Enters the REST API configuration mode.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Configure a REST server accessible by one client using either of two users:

```

admin@bqn# configure
admin@bqn(config)# api rest
admin@bqn(config-rest)# address 10.1.1.11
admin@bqn(config-rest)# client 10.1.1.30
admin@bqn(config-rest-restclt)# authentication
admin@bqn(config-rest-restclt)# exit
admin@bqn(config-rest)# user myuser1 mypwd1
admin@bqn(config-rest)# user myuser2 mypwd2

```

```
admin@bqn(config-rest)# root
admin@bqn(config)# commit
admin@bqn(config)# op show api rest server
```

State: ready

Interface: en0o1

Address: 10.1.1.11

Port: 3443

```
admin@bqn(config)# op show api rest client
```

ADDRESS	AUTHENTICATION
10.1.1.30	yes

```
admin@bqn(config)# op show api rest user
```

NAME	PASSWORD	RESTRICTED	AUTH-BASIC
myuser1	mypw1	no	aXl2c2VyMTpjeXA3MQ==
myuser2	mypw2	no	aXl2c2VyMTpjeXA3MR==

Related: [api common](#)

Commands: [api policy delete](#)

[api rest](#)

[api storage write](#)

[show api rest server](#)

[show api rest client](#)

[show api rest user](#)

api policy delete

Syntax: api policy delete policy-name

Description: Removes a policy previously created using the API.

Mode: Operation mode.

Profile: Operator.

Examples: Remove policy rate-1Mbps previously created using REST API:

```
bqnop@bqn> show api policy

NAME          DYNAMIC  SUBS-TOTAL  SUBS-CURRENT  INACTIVITY
rate-1Mbps    yes      1           1             n/a

bqnop@bqn> api policy delete rate-1Mbps
bqnop@bqn> show api policy
```

```
bqnop@bqn>
```

Related: [api common](#)

Commands: [api radius](#)

[api rest](#)

[api storage write](#)

api storage write

Syntax: `api storage write [flush]`

Description: Force writing API information to disk instead of waiting for the information to be saved periodically. This information includes policies and subscribers created by the RADIUS and REST API. The current API information will be recoverable if the QoE is restarted. If flush is specified, the stored database contains a full set of information instead of partial updates.

Mode: Operation mode.

Profile: Operator.

Examples: Flush to disk API state.

```
bqnop@bqn> api storage write flush
```

Related: [api common](#)

Commands: [api policy delete](#)

[api radius](#)

[api rest](#)

avp disabled

Syntax `avp avp-name disabled`

`no avp avp-name disabled`

Description Ignore decoding AVP RADIUS parameter in used for policy rate selection.

The avp-name indicates the AVP to disable. The supported AVPs are (in priority order):

- mikrotik-rate-limit
- ascend-data-rate
- ascend-xmit-rate
- mikrotik-address-list

Mode RADIUS api mode.

Profile Administrator.

Examples Ignore Ascend AVPs from policy rate assignments (mikrotik-rate-limit will be used if absent, and then mikrotik-address-list).

```
bqnadm@bqn# configure
```

```
bqnadm@bqn(config)# api radius
```

```

bqnadm@bqn(config-radius)# avp ascend-data-rate disabled
bqnadm@bqn(config-radius)# avp ascend-xmit-rate disabled
bqnadm@bqn(config-radius)# commit
bqnadm@bqn(config-radius)# end
bqnadm@bqn# show api radius parameters
Mikrotik-Rate-Limit AVP: enabled
Ascend-Data-Rate AVP: disabled
Ascend-Xmit-Rate AVP: disabled
Mikrotik-Address-List AVP: enabled
Rate-Limit AVP rate percentage: 100 %
bqnadm@bqn#

```

To restore the ascend AVPs:

```

bqnadm@bqn# configure
bqnadm@bqn(config)# api radius
bqnadm@bqn(config-radius)# no avp ascend-data-rate disabled
bqnadm@bqn(config-radius)# no avp ascend-xmit-rate disabled
bqnadm@bqn(config-radius)# commit
bqnadm@bqn(config-radius)# end
bqnadm@bqn# show api radius parameters
Mikrotik-Rate-Limit AVP: enabled
Ascend-Data-Rate AVP: enabled
Ascend-Xmit-Rate AVP: enabled
Mikrotik-Address-List AVP: enabled
Rate-Limit AVP rate percentage: 100 %
bqnadm@bqn#

```

Related [api radius](#)

Commands [avp rate-limit-percentage](#)

[show api radius parameters](#)

avp rate-limit-percentage

Syntax avplimit rate-limit-percentage *pct*

Description Set a scaling factor in rate limits assigned from the RADIUS interface.

The *pct* parameter indicates the percentage applied to the AVP rate limits and threshold when generating the dynamic policy. For example, if the percentage is 90%, the rates of the dynamic policy will be 10% lower than what the AVP specifies.

Mode RADIUS api mode.

Profile Administrator.

Examples Set the rate scaling percentage 10% lower than the limits enforced in the Mikrotiks:

```
bqnadm@bqn# configure
bqnadm@bqn(config)# api radius
bqnadm@bqn(config-radius)# avp rate-limit-percentage 90
bqnadm@bqn(config-radius)# commit
bqnadm@bqn(config-radius)# end
bqnadm@bqn#
```

Related [api radius](#)

Commands [avp disabled](#)

[show api radius parameters](#)

block

Syntax: block [initial-percentage final-percentage]

no block [initial-percentage final-percentage]

Description: Blocks traffic, either as part of a flow or a rate policy. If no percentages are specified, all traffic is blocked. If a range of percentages is specified, flows or subscribers falling randomly within the range will be blocked. Range of percentages is rarely used.

Mode: Policy flow or policy rate configuration mode.

Profile: Administrator.

Examples: Block all traffic as part of a policy rate.

```
admin@bqn0# configure
admin@bqn0(config)# policy rate unsubscribed
admin@bqn0(config-polrate)# block
admin@bqn0(config-polrate)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show policy unsubscribed | match Blocking
Blocking: yes
```

Related: [policy flow](#)

Commands: [policy rate](#)

[show policy](#)

bta

Syntax: bta

no bta

Description: Enter BTA configuration mode.

**Note**

The CLI session prompt changes when entering and leaving BTA mode.

Use the no command form to remove all BTA configuration, in which case the BTA service stops.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters BTA mode and sets TCP flow closing timer to 5 seconds:

```
admin@bqn# configure
admin@bqn(config)# bta
admin@bqn(config-bta)# timeout closing 5
admin@bqn(config-bta)# root
admin@bqn(config)# commit
admin@bqn(config)# op show bta parameters | match Closing

Closing timeout: 5.000000
admin@bqn(config)#
```

Related: [pkteng](#)

Commands: [set bta optimization](#)

[show bta parameters](#)

[show bta statistics](#)

[show interface bta statistics](#)

[show pkteng parameters](#)

[wizard bta](#)

[wire](#)

btc

Syntax: btc

no btc

Description: Enter BTC configuration mode.

**Note**

The CLI session prompt changes when entering and leaving BTA mode.

Use the no command form to remove all BTC configuration, in which case the BTC service is not active.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters BTC mode.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)#
```

Related: [affinity](#)

Commands: [gzip compress-level](#)

[gzip content-length-maximum](#)

[gzip content-length-minimum](#)

[image jpeg quality](#)

[image pixels-maximum](#)

[image pixels-minimum](#)

[pkteng](#)

[show btc parameters](#)

[show btc statistics](#)

[wire](#)

burst-duration

Syntax: burst-duration duration-secs

no burst-duration duration-secs

Description: Sets the burst duration. Bursts are periods of time during which a subscriber subject to shaping or rate limiting can go above that limit. The duration of the burst defines for how long the limit can be exceeded.

Its default value is 0 (no burst). Use the no command form to restore default value.

Mode: shaping configuration submode of policy flow mode.

rate-limit configuration submode of policy rate mode.

Profile: Administrator.

Examples: In this example, a burst duration of 5 seconds is defined in a flow policy with a downlink shaping limit:

```
admin@bqn# configure
admin@bqn(config)# op show policy mypolicy | match Burst
```

Burst rate: 0

Burst duration: 0.000000

Burst transition duration: 1.000000

Burst threshold: 0

Burst threshold window: 300.000000

```
admin@bqn(config)# policy flow mypolicy
admin@bqn(config-polflow)# shaping downlink
admin@bqn(config-polflow-shpfdwn)# burst-duration 5
admin@bqn(config-polflow-shpfdwn)# root
admin@bqn(config)# commit
admin@bqn(config)# op show policy mypolicy | match Burst
```

Burst rate: 0

Burst duration: 5.000000

Burst transition duration: 1.000000

Burst threshold: 0

Burst threshold window: 300.000000

```
admin@bqn#
```

Related: [burst-rate](#)

Commands: [burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[policy flow](#)

[policy rate](#)

[show policy](#)

burst-rate

Syntax: burst-rate speed-kbps

no burst-rate speed-kbps

Description: Sets the burst rate. Bursts are periods of time during which a subscriber subject to shaping or rate limiting can go above that limit. The rate of the burst defines the speed the burst can reach.

Its default value is 0 (no burst). Use the no command form to restore default value.

Mode: shaping configuration submode of policy flow mode.

rate-limit configuration submode of policy rate mode.

Profile: Administrator.

Examples: In this example, a burst is defined with double the limit of a flow policy with a downlink shaping limit of 10Mbps

```
admin@bqn# configure
admin@bqn(config)# op show policy mypolicy | match Burst
```

```

    Burst rate: 0
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 0
    Burst threshold window: 300.000000

admin@bqn(config)# policy flow mypolicy
admin@bqn(config-polflow)# shaping downlink
admin@bqn(config-polflow-shpfdown)# burst-rate 20000
admin@bqn(config-polflow-shpfdown)# root
admin@bqn(config)# commit
admin@bqn(config)# op show policy mypolicy | match Burst

    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 0
    Burst threshold window: 300.000000
admin@bqn#

```

Related: [burst-duration](#)

Commands: [burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[policy flow](#)

[policy rate](#)

[show policy](#)

burst-threshold

Syntax: burst-threshold average-speed-kbps

no burst-threshold average-speed-kbps

Description: Sets the burst average speed threshold. Bursts are periods during which a subscriber is subject to shaping or rate-limiting can go above that limit. The threshold defines the maximum average speed measured before granting a new burst. The average speed is measured over the previous seconds, according to the [burst-threshold-window](#).

Use the no command form to remove the parameter. Its value is 0 by default, meaning that the threshold is equal to the rate of shaping limit, i.e., bursts with the default threshold do not exceed on average the limit defined by the policy for that traffic (if it goes above because of the burst, it must go below to compensate before a new burst can take place).

Mode: Shaping configuration submode of policy flow mode.

rate-limit configuration submode of policy rate mode.

Profile: Administrator.

Examples: In this example, a burst threshold is defined equal to the flow policy downlink shaping of 10Mbps:

```
admin@bqn# configure
admin@bqn(config)# op show policy mypolicy | match Burst

    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 0
    Burst threshold window: 300.000000

admin@bqn(config)# policy flow mypolicy
admin@bqn(config-polflow)# shaping downlink
admin@bqn(config-polflow-shpfdwn)# burst-threshold 10000
admin@bqn(config-polflow-shpfdwn)# root
admin@bqn(config)# commit
admin@bqn(config)# op show policy mypolicy | match Burst

    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 10000
    Burst threshold window: 300.000000

admin@bqn#
```

Related: [burst-duration](#)

Commands: [burst-rate](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[policy flow](#)

[policy rate](#)

[show policy](#)

burst-threshold-window

Syntax: burst-threshold-window window-secs

no burst-threshold-window window-secs

Description: Sets the duration (window) over which to calculate the average speed that is compared with the burst threshold to decide if a new burst can be granted. The bigger the window, the greater the weight of past speeds on the decision of granting a new burst.

The default value is 300 seconds (5 minutes). Use the no command form to restore the default value.

Mode: Shaping configuration submode of policy flow mode.

rate-limit configuration submode of policy rate mode.

Profile: Administrator.

Examples: In this example, a burst threshold window is defined of 180 seconds.

```
admin@bqn# configure
admin@bqn(config)# op show policy mypolicy | match Burst
    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 10000
    Burst threshold window: 300.000000

admin@bqn(config)# policy flow mypolicy
admin@bqn(config-polflow)# shaping downlink
admin@bqn(config-polflow-shpfdwn)# burst-threshold-window 180
admin@bqn(config-polflow-shpfdwn)# root
admin@bqn(config)# commit
admin@bqn(config)# op show policy mypolicy | match Burst
    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 10000
    Burst threshold window: 180.000000

admin@bqn#
```

Related: [burst-duration](#)

Commands: [burst-rate](#)

[burst-threshold](#)

[burst-transition-duration](#)

[policy flow](#)

[policy rate](#)

[show policy](#)

burst-transition-duration

Syntax: burst-transition-duration transition-secs

no burst-transition-duration transition-secs

Description: Sets the duration of the transition at the end of a burst to the normal rate limit. Bursts are periods during which a subscriber subject to shaping or rate-limiting can go above that limit. The transition duration defines the period of going from applying the burst rate down to applying the lower limit of the policy. The transition is gradual to avoid sudden changes that affect the traffic performance.

Use the no command form to remove the parameter. Its value is 1 second by default. We do not recommend changing this value unless requested by Cambium Networks support.

Mode: Shaping configuration submode of policy flow mode.

rate-limit configuration submode of policy rate mode.

Profile: Administrator.

Examples: In this example, a burst transition period of 1.5 seconds is defined.

```
admin@bqn# configure
admin@bqn(config)# op show policy mypolicy | match Burst

    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.000000
    Burst threshold: 10000
    Burst threshold window: 300.000000

admin@bqn(config)# policy flow mypolicy
admin@bqn(config-polflow)# shaping downlink
admin@bqn(config-polflow-shpfdwn)# burst-transition-duration 1.5
admin@bqn(config-polflow-shpfdwn)# root
admin@bqn(config)# commit
admin@bqn(config)# op show policy mypolicy | match Burst

    Burst rate: 20000
    Burst duration: 5.000000
    Burst transition duration: 1.500000
    Burst threshold: 10000
    Burst threshold window: 180.000000

admin@bqn#
```

Related: [burst-duration](#)

Commands: [burst-rate](#)

[burst-threshold](#)

[burst-threshold-window](#)

[policy flow](#)

[policy rate](#)

[show policy](#)

bypass

Syntax: `bypass {ip-other | ipv4 | ipv6 | tcp | udp | vlan}`

`no bypass {ip-other | ipv4 | ipv6 | tcp | udp | vlan}`

Description: Sets QoS to forward traffic of the specified type without further processing. For example, it can be used as a mitigation measure if the node is overloaded by unexpectedly high throughput.

Use the `no` command form to restore normal processing.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Forward IP-other traffic and traffic from vlans with tags 123 and 321.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# bypass ip-other
admin@bqn(config-pkteng)# bypass vlan 123
admin@bqn(config-pkteng)# bypass vlan 321
admin@bqn(config-pkteng)# root
admin@bqn(config)# commit
admin@bqn(config)# op show bta parameters | match Bypass

Bypass VLAN: 123
Bypass VLAN: 346
Bypass VLAN untagged: no
Bypass IPv4: no
Bypass IPv6: no
Bypass tcp: no
Bypass udp: no
Bypass ip-other: no
admin@bqn(config)#
```

Related: [show pkteng parameters](#)

Commands:

capture

Syntax: capture [filter [file-size [max-rotation]]] no capture

Description: Capture data packets at a network interface and save them to disk.

By default, all traffic is captured, both ingress and egress packets. Traffic may be restricted using the optional filter parameter. Note that if the filter contains multiple words, the filter must be enclosed within double-quotes. The filter parameter uses the PCAP filter syntax, as described in: <http://www.tcpdump.org/manpages/pcap-filter.7.html>

The traffic captured may be saved into several files, indicated by the optional file-number parameter (by default, 10 files). The maximum file size is indicated by the optional file-size parameter in MB units, where 1 MB equals 1,000,000 bytes (the default maximum file size is 1,000 MB). Once all the files have been created, the capture process begins overwriting files from the beginning, creating a rotation effect.

The directory where the files are saved is

```
/opt/bqn/var/capture/
```

The format of the saved files is the following:

```
iface-count
```

where iface is the network interface captured and count is an integer indicating the number of files saved, starting from 0.

After the capture functionality has been stopped, the saved files are stored until a new capture is started again.

Note that the traffic capture mechanism may degrade the performance of the system. In addition, verify that there is enough disk space to store the packets captured. Therefore, this command should only be configured if requested by Cambium Networks staff.

Use the no capture command to disable traffic capture.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Capture packets from the 10.0.0.0/8 network at the en0p0s8 network interface.

```
admin@bqn# show interface capture
admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# capture "src net 10.0.0.0/8"
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# op show interface capture

IFACE      MODE           SIZE      FILTER
en0p0s8    configuration  131072    src net 10.0.0.0/8

admin@bqn(config-iface)# op show interface en0p0s8 capture
```

Interface: en0p0s8

Mode: configuration

State: active

Size: 131072

Size max: 1000000000

Rotation: 10

File: /opt/bqn/var/capture/enOp0s8 Filter: src net 10.0.0.0/8

PID: 9056

Related: [show interface capture](#)

Commands: [show interface capture](#)

clear api radius client

Syntax: clear api radius client client-ip

Description: Removes a RADIUS client identified by its IP address.

Mode: Operation mode.

Profile: Administrator.

Examples: Remove a RADIUS client with IP address 10.10.1.30.

```
admin@bqn# show api radius client

ADDRESS      SECRET
10.10.1.30   mysecret

admin@bqn# clear api radius client 10.10.1.30
admin@bqn# show api radius client

admin@bqn#
```

Related: api radius

Commands: [set api radius client](#)

[show api radius client](#)

clear api radius proxy

Syntax: clear api radius proxy

Description: Removes a RADIUS proxy server from QoE configuration.

Mode: Operation mode.

Profile: Administrator.

Examples: Remove the RADIUS proxy server.

```
admin@bqn# show api radius proxy
```

```
IFACE    ADDRESS          STATE
en0o1    192.168.0.121   ready
```

```
admin@bqn# clear api radius proxy
admin@bqn# show api radius proxy
admin@bqn#
```

Related: [api radius](#)

Commands: [set api radius proxy](#)

[show api radius proxy](#)

clear api rest client

Syntax: clear api rest client client-ip

Description: Removes a REST API client identified by its IP address. If it is the last client, the REST API will not be accessible.

Mode: Operation mode.

Profile: Administrator.

Examples: Remove a REST API client with IP address 10.10.2.30.

```
admin@bqn# show api rest client

ADDRESS          AUTHENTICATION
10.10.2.30       yes

admin@bqn# clear api rest client 10.10.2.30
admin@bqn# show api rest client

admin@bqn#
```

Related: [api rest](#)

Commands: [set api rest client](#)

[show api rest client](#)

clear api rest server

Syntax: clear api rest server

Description: Removes the REST server and disables the REST API interface.

Mode: Operation mode.

Profile: Administrator.

Examples: Remove REST API on QoE server.

```
admin@bqn# show api rest server
```

State: ready

Interface: en0o1

Address: 192.168.0.121

Port: 3443

```
admin@bqn# clear api rest server
```

```
admin@bqn# show api rest server
```

State: idle

Interface: n/a

Address: n/a

Port: 3443

```
admin@bqn#
```

Related: [api rest](#)

Commands: [set api rest server](#)

[show api rest server](#)

clear api rest user

Syntax: clear api rest user user-name

Description: Removes a REST API user with the given name.

Mode: Operation mode.

Profile: Administrator.

Examples: Remove a REST user with name myuser.

```
admin@bqn# show api rest user
```

NAME	PASSWORD	RESTRICTED	AUTH-BASIC
myuser	mypassword	no	aX41c2vzOm15cGJzc3dvzmQ=

```
admin@bqn# clear api rest user myuser
```

```
admin@bqn# show api rest user
```

```
admin@bqn#
```

Related: [api rest](#)

Commands: [set api rest user](#)

[show api rest user](#)

clear api subscriber

Syntax: clear api subscriber subscriber-ip

Description: Removes a subscriber session from the API. This session is independent of the subscriber traffic session.

Mode: Operation mode.

Profile: Operator.

Examples: Clear subscriber with IP address 192.168.0.10

```
bqnop@bqn> show api subscriber

ADDRESS          SOURCE  POLICY  CREATED          UPDATED
192.168.0.10    rest    pr10    2021-07-28T12:33:48  00:00:33

bqnop@bqn> clear api subscriber 192.168.0.10
Removed 1 RADIUS subscriber

bqnop@bqn> show api subscriber
```

Related: [show api subscriber](#)

Commands:

clear flow

Syntax: Clear flow [ipother | tcp | udp] subscriber-ip

Description: Removes flows of a certain type from a subscriber identified by the IP address. It affects the traffic being cleared.

Mode: Operation mode.

Profile: Operator.

Examples: Clear TCP flows (connections) of subscriber with IP address 192.168.0.10

```
bqnop@bqn> show flow tcp 192.168.0.10

APOINT  INET-ADDR      IPORT  ST  TY  INS  PKT-RECV  PKT-SENT  LIFETIME
18009   54.220.24.80  27590  SY  EM  0     1          1          0:00:05

bqnop@bqn> clear flow tcp 192.168.0.10
bqnop@bqn> show flow tcp 192.168.0.10
```

Related: [clear subscriber](#)

Commands: [show flow ipother](#)

[show flow tcp](#)

[show flow udp](#)

[show subscriber](#)

clear ip route

Syntax: Clear ip route ip-range via gw-addr

Description: Removes a rule to route IP range ip-range via gateway with IP address gw-addr.

Mode: Operation mode.

Profile: Administrator.

Examples Remove a route for 10.0.0.0/8 via 192.168.0.1 gateway.

```
admin@bqn0# showiproute
```

IFACE	DESTINATION	GATEWAY	FLAGS
en0o1	0.0.0.0/0	192.168.0.1	UG
en0o1	10.0.0.0/0	192.168.0.1	UGH
lo0	127.0.0.0/8	-	U
en0o1	192.168.0.0/24	-	U

```
admin@bqn0# clear ip route 10.0.0.0/8 via 192.168.0.1
```

```
admin@bqn0# show ip route
```

IFACE	DESTINATION	GATEWAY	FLAGS
en0o1	0.0.0.0/0	192.168.0.1	UG
lo0	127.0.0.0/8	-	U
en0o1	192.168.0.0/24	-	U

Related: [set ip route](#)

Commands: [router static](#)

[show ip route](#)

clear subscriber

Syntax: clear subscriber subscriber-ip

Description: Removes a subscriber session and all the associated flows. It involves traffic interruption for that client IP address.

Mode: Operation mode.

Profile: Operator.

Examples: Clear subscriber with IP address 192.168.0.10

```
bqnop@bqn> clear subscriber 192.168.0.10
```

```
bqnop@bqn> show subscriber 192.168.0.10
```

```
%ERR-ENOENT: Cannot find subscriber with "192.168.0.10" IP address
```

Related: [show flow ipother](#)

Commands: [show flow tcp](#)

[show flow udp](#)

[show subscriber](#)

clear config candidate

Syntax: clear config candidate

Description: This command clears the candidate configuration. Use this command with caution since the management configuration is also cleared, and users may not be able to access the system after committing the changes. A commit is required before changes are applied to the running configuration.

Use the [clear config changes](#) command to undo this command and restore the candidate configuration.



Note

If a user configuration session is inside a sub-menu, executing this command does not remove that command.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Clear the candidate configuration.

```
admin@bqn(config)# show config running
service ssh
interface enOp0s17
    ip address 192.168.1.75/24
    management
admin@bqn(config)# clear config candidate
%WARN: The configuration will be erased
admin@bqn(config)# show config diff
service ssh
interface enOp0s17
    ip address 192.168.1.75/24
    management
admin@bqn(config)# show config candidate
admin@bqn(config)#

The previous changes are undone.

admin@bqn(config)# clear config changes
admin@bqn(config)# show config diff
admin@bqn(config)# show config candidate
%WARN: Candidate and running configurations are identical
admin@bqn(config)#
```

Related: [clear config changes](#)

Commands: [commit](#)

[show config candidate](#)

[show config diff](#)

[show config running](#)

clear config changes

Syntax: clear config changes

Description: This command clears the latest changes since the last commit and restores the candidate configuration with the running configuration. Note that this command cannot be undone.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Clear the candidate configuration.

```
admin@bqn(config)# show config running
service ssh
interface enOp0s17
    ip address 192.168.1.75/24
    management
admin@bqn(config)# clear config candidate
%WARN: The configuration will be erased
admin@bqn(config)# show config diff
service ssh
interface enOp0s17
    ip address 192.168.1.75/24
    management
admin@bqn(config)# show config candidate
admin@bqn(config)#
The previous changes are undone.
admin@bqn(config)# clear config changes
admin@bqn(config)# show config diff
admin@bqn(config)# show config candidate
%WARN: Candidate and running configurations are identical
admin@bqn(config)#
```

Related: [commit](#)

Commands: [show config candidate](#)

[show config diff](#)

[show config running](#)

clear interface firewall input

Syntax: Clear interface iface-name firewall input

Description: Clears the firewall rules of the specified network interface. Useful to disable the firewall protecting the management interface.

Mode: Operation mode.

Profile: Administrator.

Examples: Delete all firewall rules of the management interface.

```
admin@bqn# show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  10.0.0.0/8
en0o1  input  192.168.0.0/16

admin@bqn# clear interface en0o1 firewall input
admin@bqn# show interface firewall
```

Related: [firewall input](#)

Commands: [interface](#)

[management](#)

[show interface firewall](#)

clear interface ip address

Syntax: Clear interface iface-name ip address addr

Description: Removes the addr IP address from the iface-name network interface.



Note
If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Delete a configured IP address.

```
admin@bqn# show ip address

IFACE      IP-ADDR      BROADCAST      SCOPE  FLAGS
lo0        127.0.0.1/8  127.255.255.255  host   permanent
en0p0s16   1.1.1./32    -               global permanent
en0p0s17   192.168.1.78/24  -               global permanent
```



```

admin@bqn# clear interface en0p0s16 ip address 1.1.1.1
admin@bqn# show ip address

IFACE      IP-ADDR          BROADCAST        SCOPE  FLAGS
lo0        127.0.0.1/8     127.255.255.255 host    permanent
en0p0s17   192.168.1.78/24 -                  global  permanent

```

Related: [interface](#)

Commands: [set interface ip address](#)

[show interface](#)

clear pkteng dos syn

Syntax: Clear pkteng dos syn

Description: Clears the global thresholds for SYN flooding DoS detection.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Clears the thresholds to defaults (no DoS SYN detection).

```

admin@bqn0# show pkteng parameters | match SYN
DoS SYN period: 10.000
DoS SYN client ingress rate: 100
DoS SYN client egress rate: 50
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0
admin@bqn0# clear pkteng dos syn
admin@bqn0# show pkteng parameters | match SYN
DoS SYN period: 10.000
DoS SYN client ingress rate: 0
DoS SYN client egress rate: 0
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0

```

Related: [set pkteng dos syn](#)

Commands: [pkteng](#)

[show pkteng parameters](#)

[show statistics dos](#)

clear pkteng dos volume

Syntax: Clear pkteng dos volume

Description: Clears the global thresholds for Volume flooding DoS, disabling its detection.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Clear thresholds to defaults (no volume DoS detection).

```
admin@bqn0# show pkteng parameters | match 'DoS volume'
DoS volume period: 10.000
DoS volume minimum rate: 50000
DoS volume multiplier rate: 3.50
admin@bqn0# clear pkteng dos volume
admin@bqn0# show pkteng parameters | match 'DoS volume'
DoS volume period: 10.000
DoS volume minimum rate: 0
DoS volume multiplier rate: 0.00
```

Related: [set pkteng dos volume](#)

Commands: [pkteng](#)

[show pkteng parameters](#)

[show statistics dos](#)

clear pkteng rtt

Syntax: Clear pkteng rtt

Description: Sets the access round-trip-time (RTT_a - the delay measured between the QoE and the subscriber) threshold back to its default value. This threshold is used to classify TCP acceleration metrics.

The threshold is set under [pkteng](#) configuration mode.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set Rtt threshold back to its default.

```
admin@bqn0# show pkteng parameters | match RTTA
Speed RTTA: 0.010000
admin@bqn0# clear pkteng rtt
admin@bqn0# show pkteng parameters | match RTTA
Speed RTTA: 0.000000
```

Related: [clear pkteng rtti](#)

Commands: [pkteng](#)

[set pkteng rtt](#)

[set pkteng rtti](#)

[show pkteng parameters](#)

clear pkteng rtti

Syntax: Clear pkteng rtti

Description: Sets the Internet round-trip-time (RTTi - is measured between the QoE and the content servers on the Internet) thresholds back to default values. These thresholds are used in the classification of TCP acceleration metric samples in those with small, medium, and big RTTi.

The threshold is set under [pkteng](#) configuration mode.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set small and big RTTi thresholds top default.

```
admin@bqn0# show pkteng parameters | match RTTI
Speed RTTI small: 0.020000
Speed RTTI large: 0.070000
admin@bqn0# clear pkteng rtti
admin@bqn0# show pkteng parameters | match RTTI
Speed RTTI small: 0.010000
Speed RTTI large: 0.060000
```

Related: [clear pkteng rtt](#)

Commands: [pkteng](#)

[set pkteng rtt](#)

[set pkteng rtti](#)

[show pkteng parameters](#)

clear service ntp server

Syntax: clear service ntp server ip-addr

Description: This command removes an NTP server from the NTP service that the QoE uses to keep its system time and date synchronized. The server is removed under [service ntp](#) configuration mode.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Removes a local NTP server with IP address 10.10.1.12.

```
admin@bqn0# show system ntp

REMOTE          REFID   ST  T  WHEN  POLL  REACH  DELAY  OFFSET  JITTER
188.119.192.10 .INIT.  16  U  -     64    0     0.000  0.000  0.000
10.10.1.12      .INIT.  16  U  -     64    0     0.000  0.000  0.000

admin@bqn0# clear service ntp server 10.10.1.12
admin@bqn0# show system ntp

REMOTE          REFID   ST  T  WHEN  POLL  REACH  DELAY  OFFSET  JITTER
188.119.192.10 .INIT.  16  U  -     64    0     0.000  0.000  0.000
```

Related: [service ntp](#)

Commands: [set service ntp server](#)

[show system ntp](#)

clear wire

Syntax: Clear wire access-iface inet-iface

Description: This command removes a wire processing user traffic. Use it only if the wire is no longer needed and no traffic is going through it, otherwise, there might be service interruption. The wire is identified by its access-iface on the access side (towards the subscribers) and its inet-iface on the Internet side (towards the interconnection with the Internet). If the wire is the last one, the command fails (the QoEconfiguration must have at least one wire configured).

The changes are done under [pkteng](#) and [interface](#) modes.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Removes the wire using en0o3 access and en0o4 internet interfaces.

```
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0o3      no        en0o4       no
en0o7      no        en0o8       no

admin@bqn0# clear wire en0o3 en0o4
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0o7      no        en0o8       no
```

Related: [interface](#)

Commands: [pkteng](#)

[set wire](#)

[show pkteng wire](#)

comment

Syntax: Comment string

no comment string

Description: Assign a comment to a license feature (use double quotes if the comment consists of several words).



Note

If a property of an existing license is modified, the hash value must be set accordingly to validate the license feature.

Use the no command form to clear the comment associated with a license feature.

Mode: License configuration mode.

Profile: Administrator.

Examples: Set the comment of the bta license feature.

```
admin@bqn0(config)# license bta
admin@bqn0(config-license)# comment "Test example@example.com"
admin@bqn0(config-license)#
```

Related: [hash](#)

Commands: [license](#)

[show license](#)

[time-activation](#)

[time-expiration](#)

[usage](#)

commit

Syntax: commit [validate] [force]

Description: Validate and execute the candidate configuration, and if successful, the candidate configuration becomes the new running configuration. If the candidate and the running configurations are identical, this command does nothing.

If the validate parameter is present, the candidate configuration is only validated and not executed.

If there is an error in the validation process, a message will indicate the cause of the error; otherwise, the command does not show anything.

The committed configuration is stored on a disk, and each committed configuration is assigned a unique commit ID to identify it. Currently, the last 25 committed configurations are saved.

Mode: Any configuration mode.

Profile: Administrator.

Examples: Enter a new command that requires more configuration commands and try to commit the candidate configuration.

```
admin@bqn(config)# show config running
interface en0p0s17
ip address 192.168.1.75/24
admin@bqn(config)# service ssh
admin@bqn(config-ssh)# exit
admin@bqn(config)# commit
%ERR: No management interface defined
```

Mark the en0p0s17 interface as the management interface, which should be enough to validate the candidate configuration.

```
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# management
admin@bqn(config-iface)# commit validate
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# show config running service ssh
interface en0p0s17
ip address 192.168.1.75/24
management
admin@bqn(config-iface)#
```

Related: [clear config changes](#)

Commands: [load rollback](#)

[show config candidate](#)

[show config commit](#)

[show config diff](#)

[show config running](#)

community

Syntax: community string [nms]

no community string [nms]

Description: This command configures the community string for read-only access. By default, this will provide access to the full OID tree for such requests, regardless of where they were sent from. The optional nms parameter (network management station IP address) may be used to restrict access requests to the specified systems. Several instances of this command are allowed when the nms parameter is specified.

Use the no command form to clear the general community string or the community string for a specific NMS.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the community string for several NMS.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# community secret1 192.168.10.1
admin@bqn0(config-snmp)# community secret2 192.168.10.2
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show snmp community

NMS                COMMUNITY
192.168.10.1       secret1
192.168.10.2       secret2
```

Related: [show snmp community](#)

Commands: [snmp](#)

compression

Syntax: Compression [initial-percentage final-percentage]

no compression [initial-percentage final-percentage]

Description: Compresses suitable HTTP traffic falling in this flow policy. If no percentages are specified, all suitable HTTP traffic is compressed. If a range of percentages is specified, flows of suitable HTTP falling randomly within the range is compressed. Range of percentages is rarely used.

Mode: Policy flow configuration mode.

Profile: Administrator.

Examples

```
admin@bqn0(config)# policy rate mypolicy
admin@bqn0(config-polflow)# compress
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [show policy](#)

configure

Syntax: configure

Description: Enter configuration mode.

Under the configuration mode, there is a hierarchy of sub-modes that can be traversed by entering different configuration commands. The end (exit configuration mode), exit (go back one sub-mode), and root (go to the top configuration mode) commands are used to traverse the command hierarchy.

New configuration commands entered will be stored as part of the candidate configuration.



Note

The CLI session prompt changes when entering configuration mode, and traversing the configuration sub-modes also updates the session promptly.

Mode: Operation mode.

Profile: Administrator.

Examples: Exit interface mode and then exit configuration mode.

```
admin@bqn# configure
admin@bqn(config)#
```

Related: [end](#)

Commands: [exit](#)

[op](#)

[root](#)

[show config candidate](#)

[show config diff](#)

[show config running](#)

cpu governor

Syntax: cpu governor name

no cpu governor name

Description: This command sets the CPU frequency governor. The following CPU governors are available:

Conservative, ondemand, performanceand powersave.

By default, the performance governor is set when the system boots, and since it is the default governor, it does not show in the configuration when set. Note that not all the governors are available, which depends on the CPU type and model, and in addition, some CPUs do not support CPU frequency scaling.

Use the no command form to set the default governor.

Mode: System configuration mode.

Profile: Administrator.

Examples: Set the governor to ondemand and then set it back to performance.

```
admin@bqn02# show system cpu governor
performance
admin@bqn02# configure
admin@bqn02(config)# system
admin@bqn02(config-system)# cpu governor ondemand
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu governor ondemand
admin@bqn02(config-system)# no cpu governor ondemand
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu governor performance
```

Related: [system](#)

Commands: [show system cpu governor](#)

cpu level alarm

Syntax: cpu level alarm notice-level warning-level critical-level

no cpu level alarm notice-level warning-level critical-level

Description: Sets the number of CPUs with an excessive load that triggers alarms with Notification, Warning, and Critical levels.

Use the no command form to set the default values.

Mode: System configuration mode.

Profile: Administrator.

Examples: To add one core to the default levels and back to defaults:

```

admin@bqn02# configure
admin@bqn02(config)# op show system cpu level alarm
Notice threshold: 1
Warning threshold: 2
Critical threshold: 3
admin@bqn02(config)# system
admin@bqn02(config-system)# cpu level alarm 2 3 4
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level alarm
Notice threshold: 2
Warning threshold: 3
Critical threshold: 4
admin@bqn02(config-system)# no cpu level alarm 2 3 4
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level alarm
Notice threshold: 1
Warning threshold: 2
Critical threshold: 3

```

Related: [system](#)

Commands: [cpu level threshold](#)

[show system cpu level alarm](#)

cpu level nice

Syntax: cpu level nice

```
no cpu level nice
```

Description: It includes nice load in the calculations of overall system CPU load.

Use the no command form to set the default value (nice load excluded).

Mode: System configuration mode.

Profile: Administrator.

Examples: To add nice load to CPU calculations and back to default:

```

admin@bqn02# configure
admin@bqn02(config)# op show system cpu level threshold
Threshold warning: 80
Threshold high: 90 CPU level nice: no
admin@bqn02(config)# system

```

```
admin@bqn02(config-system)# cpu level nice
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level threshold
Threshold warning: 80
Threshold high: 90 CPU level nice: yes
admin@bqn02(config-system)# no cpu level nice
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level threshold
Threshold warning: 80
Threshold high: 90 CPU level nice: no
```

Related: [system](#)

Commands: [cpu level alarm](#)

[cpu level threshold](#)

cpu level threshold

Syntax: cpu level threshold notice-level warning-level critical-level

no cpu level threshold notice-level warning-level critical-level

Description: Sets the number of CPUs with an excessive load that triggers alarms with Notification, Warning, and Critical levels.

Use the no command form to set the default values.

Mode: System configuration mode.

Profile: Administrator.

Examples: To reduce CPU load thresholds by 10% and back to defaults:

```
admin@bqn02# configure
admin@bqn02(config)# system
admin@bqn02(config-system)# op show system cpu level threshold
Threshold warning: 80
Threshold high: 90 CPU level nice: yes
admin@bqn02(config-system)# cpu level threshold 70 80
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level threshold
Threshold warning: 70
Threshold high: 80 CPU level nice: no
admin@bqn02(config-system)# no cpu level threshold 70 80
admin@bqn02(config-system)# commit
admin@bqn02(config-system)# op show system cpu level threshold
```

```
Threshold warning: 80
Threshold high: 90 CPU level nice: no
```

Related: [system](#)

Commands: [cpu level alarm](#)

[cpu level nice](#)

[show system cpu level threshold](#)

delay-start

Syntax: delay-start number

```
no delay-start number
```

Description: See the delay start period to number seconds. By default, delay start is disabled.

The delay start period is used to delay packet acceleration when the PKTENG process starts. During the delay start period, flows may be created but not accelerated.

Use the no command form to disable the delay start behaviour.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the delay start period to 10 seconds.

```
admin@bqn0# configure
admin@bqn0(config)# bta
admin@bqn0(config-bta)# delay-start 10
admin@bqn0(config-bta)# commit
admin@bqn0(config-bta)#
```

Related: [bta](#)

Commands: [show bta parameters](#)

dellmgr

Syntax: dellmgr

```
no dellmgr
```

Description: Configure the Dell OpenManage Server Administrator software. This software manages and monitors a Dell PowerEdge server, and should only be used when running on such hardware. The official web page of Dell OpenManage is:

<http://linux.dell.com/repo/hardware/omsa.html>



Note

The dellmgr BPKG must be installed to monitor the system. The MIBs supported by Dell OpenManage are located in the following directory:

The information provided by these MIBs are under the Dell enterprise OID:

1.3.6.1.4.1.674

Use the no command form to disable the Dell monitoring software.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the community string and enable the Dell OpenManage monitoring software.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# community public
admin@bqn0(config-snmp)# dellmgr
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show service dellmgr
```

dataeng.service - LSB: Systems Management Data Engine

Loaded: loaded (/etc/init.d/dataeng)

Active: active (running) since Sat 2015-10-03 13:31:34 CEST;
30min ago

Process: 6987 ExecStart=/etc/init.d/dataeng start (code=exited,
status=0/SUCCESS)

CGroup: /system.slice/dataeng.service

```
| -7174 /opt/dell/srvadmin/sbin/dsm_sa_datamgrd
| -7263 /opt/dell/srvadmin/sbin/dsm_sa_eventmgrd
|-7280 /opt/dell/srvadmin/sbin/dsm_sa_snmpd
```

From a NMS traverse the 1.3.6.1.4.1.674.10892.1.100 OID.

```
% snmpbulkwalk -v2c -OS -c public 192.168.1.4 1.3.6.1.4.1.674.10892.1.100
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.1.0 = STRING: "Server
Administrator"
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.2.0 = STRING: "8.1.0"
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.3.0 = INTEGER: 1
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.4.0 = STRING: "Management software
for Dell systems."
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.5.0 = INTEGER: 1
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.6.0 = INTEGER: 1
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.7.0 = STRING: "No Updates"
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.8.0 = ""
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.9.0 = ""
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.10.0 = STRING: "8.1.0"
```

```
SNMPv2-SMI::enterprises.674.10892.1.100.11.0 = INTEGER: 1
SNMPv2-SMI::enterprises.674.10892.1.100.12.0 = INTEGER: 1
SNMPv2-SMI::enterprises.674.10892.1.100.13.0 = STRING: "Dell Inc."
```

Related: [show service dellmgr](#)

Commands: [snmp](#)

dimension

Syntax: dimension pkteng-num [cpu-mask [worker-cpu-mask]]

```
no dimension pkteng-num [cpu-mask [worker-cpu-mask]]
```

Description: This command indicates the number of active PKTENG processes to run. Note that QoE automatically calculates the number of processes and masks suitable to the hardware characteristics, so this command should be used only in special cases and following Cambium Networks support instructions; otherwise, the data packet capture behavior may be unexpected.

The pkteng-num parameter indicates the number of PKTENG instances to run in each QoE. The value of pkteng-num cannot exceed the total number of CPUs in a QoE.

The optional cpu-mask parameter indicates the CPU affinity of the PKTENG processes. This parameter is a hexadecimal value representing the CPU mask where each PKTENG instance should run. The least significant bit of this parameter represents CPU 0. If this parameter is not set, then each PKTENG process will run in a single CPU from the higher CPUs available.

The optional worker-cpu-mask parameter indicates the CPU affinity of the worker PKTENG processes, which are the ones that process the packets. The least significant bit of this parameter represents CPU 0. If this parameter is not set, then the same value as the CPU mask is used.

Use the no command form to clear the manual setting of the number of PKTENG instances and to set the default values.



Note

Changing the number of PKTENG instances of the QoE will start or stop the appropriate number of PKTENG processes. In addition, the existing active flows will be removed. Therefore, this parameter should only be changed when dimensioning the system.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the number of PKTENG processes to 2 and assign the CPU and IRQ masks.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# dimension 2 0xc
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng status detail
PKTENG state: active
```

```
PKTENG processes: ok (2/2)
```

```
PKTENG interfaces: ok
```

bqn	INST	STATE	DPDK	IFACE	DELAYST	OPTPAUSE	THROTTLE
0	0	active	ready	2/2	no	no	0%
0	1	active	ready	2/2	no	no	0%

```
Set the number of PKTENG processes to 4.
```

```
admin@bqn0(config-pkteng)# dimension 4
```

```
admin@bqn0(config-pkteng)# commit
```

```
%WARN: Traffic redistribution from 2 to 4 PKTENG processes
```

```
admin@bqn0(config-pkteng)# op show pkteng status detail
```

```
PKTENG state: active
```

```
PKTENG processes: ok (4/4)
```

```
PKTENG interfaces: ok
```

bqn	INST	STATE	DPDK	IFACE	DELAYST	OPTPAUSE	THROTTLE
0	0	active	ready	2/2	no	no	0%
0	1	active	ready	2/2	no	no	0%
0	2	active	ready	2/2	no	no	0%
0	3	active	ready	2/2	no	no	0%

Related: [pkteng](#)

Commands: [show pkteng parameters](#)

[show pkteng status](#)

[show process affinity](#)

[show system cpu](#)

disabled

Syntax: disabled

Description: This configuration parameter disables a network interface. If an interface is disabled, then no traffic flows through the interface.

When showing the state of an interface, the flag UP indicates that the interface is enabled.

When a new interface is configured, the interface is enabled by default. Note that the configuration of an interface does not include the [enabled](#) keyword when it is enabled.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Disable a network interface.

```

admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# disabled
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8 en0p0s8: BROADCAST MULTICAST

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: no       Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: off
RxChecksumOffload: on  TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 4096/4096  RingSlotTx: 4096/4096
MTU: 1500
rx_bytes: 0             tx_bytes: 35532
rx_packets: 0           tx_packets: 846
rx_errors: 0            tx_errors: 0
rx_dropped: 0           tx_dropped: 0
rx_overrun: 0           tx_carrier: 0
rx_multicast: 0         tx_collision: 0
Index: 3

```

Related: [enabled](#)

Commands: [interface](#)

[show interface](#)

dos max-attacks

Syntax: dos max-attacks max-number

no dos max-attacks max-number

Description: Configures the maximum number max-number of concurrent attacks per PKTENG worker process that will be handled by the QoS.

The default value of 50 can be restored with the no command form.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the maximum number of concurrent attacks.


```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# dos max-attacks 25
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS max"
DoS max attack cnt: 25
admin@bqn0(config-pkteng)# no dos max-attacks 25
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS max"
DoS max attack cnt: 50
```

Related: [dos mode](#)

Commands: [dos syn period](#)

[dos syn rate](#)

[dos volume](#)

[show statistics dos](#)

dos mode

Syntax: dos mode {private | public}

Description: Configures the privacy mode of DoS records. If private (default), DoS records will anonymize subscriber IP addresses. If public, DoS records will store the subscriber's IP address.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the public mode of DoS records.

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS mode"
DoS mode: private
admin@bqn0(config-pkteng)# dos mode public
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS mode"
DoS mode: public
```

Related: [dos max-attacks](#)

Commands: [dos syn period](#)

[dos syn rate](#)

[dos volume](#)

[show statistics dos](#)

dos syn period

Syntax: dos syn period number

Description: Configures the period to calculate SYN rates in DoS Syn flooding detection.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the DoS Syn flooding detection period to 20 seconds.

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS SYN
period"
DoS SYN period: 10.000
admin@bqn0(config-pkteng)# dos syn period 20
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS SYN
period"
DoS SYN period: 20.000
```

Related: [dos max-attacks](#)

Commands: [dos mode](#)

[dos syn rate](#)

[dos volume](#)

[show statistics dos](#)

dos syn rate

Syntax: dos syn rate {client | server} {egress | ingress} rate

no dos syn rate {client | server} {egress | ingress} rate

Description: Configures the fail SYN rate threshold that triggers detection of a SYN DoS attack. The rate threshold can be related to a client receiving those SYNs (ingress) or being a source of them (egress). Rate thresholds can also be established for servers.

By default, no rate thresholds are configured (0 value).

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Configure different scenarios of DoS syn rate threshold.

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS SYN"
DoS SYN period: 10.000
DoS SYN client ingress rate: 0
```

```
DoS SYN client egress rate: 0
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0
admin@bqn0(config-pkteng)# dos syn rate client ingress 300
admin@bqn0(config-pkteng)# dos syn rate client egress 150
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS SYN"
DoS SYN period: 10.000
DoS SYN client ingress rate: 300
DoS SYN client egress rate: 150
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0
```

Related: [dos max-attacks](#)

Commands: [dos mode](#)

[dos syn period](#)

[dos volume](#)

[show statistics dos](#)

dos volume

Syntax: dos volume min min-rate

dos volume multiplier factor

dos volume period period

Description: Configures the parameters related to DoS volume attack detection. The parameters are as follows:

- **min-rate:** defines the minimum speed to be considered a possible volumetric attack.
- **factor:** defines the number of times the measured speed should exceed the policy rate limit for this subscriber.
- **period:** defines the time period to calculate the speeds/rates during volume DoS detection.

By default, the period is 10 and there is no DoS volume detection (minimum 0, multiplier 0).

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set different DoS volume attack parameters.

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS volume"
DoS volume period: 10.000
```

```
DoS volume minimum rate: 0
DoS volume multiplier rate: 0.00
admin@bqn0(config-pkteng)# dos volume min 200000
admin@bqn0(config-pkteng)# dos volume multiplier 4
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match "DoS volume"
DoS volume period: 10.000
DoS volume minimum rate: 200000
DoS volume multiplier rate: 4.00
```

Related: [dos max-attacks](#)

Commands: [dos mode](#)

[dos syn period](#)

[dos syn rate](#)

[show statistics dos](#)

dpdk poll

Syntax: dpdk poll {max | sleep-min | yield} value

Description: Configures parameters related to DPDK library polling. The DPDK pools for packets. This command sets several parameters governing such polling. It should be used only under Cambium Networks support instructions.

The parameters are as follows:

- **max:** maximum time in seconds that the DPDK has before returning to the main process.
- **sleep-min:** minimum time in seconds to sleep between two DPDK calls by the polling loop.
- **yield:** maximum number of polls without sleeping. polls.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples:

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# dpdk poll max TODO
admin@bqn0(config-pkteng)# dpdk poll sleep-min TODO
admin@bqn0(config-pkteng)# dpdk poll yield TODO
admin@bqn0(config-pkteng)# commit
```

Related: [dos max-attacks](#)

Commands: [dos mode](#)

[dos syn rate](#)

[dos volume](#)

[show statistics dos](#)

dpi

Syntax: dpi [initial-percentage final-percentage]

no dpi [initial-percentage final-percentage]

Description: Generates DPI analysis information. If no percentages are specified, all traffic matching the policy will generate DPI information. If a range of percentages is specified, flows falling randomly within the range will generate DPI information. The range of percentages is rarely used.

Mode: [policy flow](#) configuration mode.

Profile: Administrator.

Examples: Enable DPI analysis for the mypolicy policy.

```
admin@bqn0(config)# policy flow mypolicy
admin@bqn0(config-polflow)# dpi
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [show policy](#)

drop

Syntax: drop {internet-ipother|internet-tcp-syn|internet-udp}

Description: Blocks incoming traffic from the internet of the following types.

- **internet-tcp-syn:** incoming TCP connections (SYNs from the Internet).
- **internet-udp:** incoming UDP flows (UDP flows with only Internet-originated packets).
- **internet-ipother:** incoming IP traffic other than TCP or UDP (for example, ICMP ping requests coming from the Internet).

Mode: [policy flow](#) configuration mode.

Profile: Administrator.

Examples: Block incoming TCP SYNs and pings in traffic under default flow policy:

```
bqnadm@bqn0(config)# policy flow flow-default
bqnadm@bqn0(config-polflow)# drop internet-tcp-syn
bqnadm@bqn0(config-polflow)# drop internet-ipother
bqnadm@bqn0(config-polflow)# commit
bqnadm@bqn0(config-polflow)# op show policy flow
NAME BCK COM DPI MET OPT SHPD SHPU TCE TRK UDR DIT DIU DII
```

flow-default no no yes yes yes no no no yes no yes no yes

Related: [policy flow](#)

Commands: [timeout drop internet](#)

enabled

Syntax: enabled

Description: This configuration parameter activates a network interface. If an interface is not enabled, then no traffic flows through the interface.

When showing the state of an interface, the flag UP indicates that the interface is enabled. When a new interface is configured the interface is enabled by default.

When an interface is enabled, the [disabled](#) command is removed. Note that the enabled keyword is not stored as part of the configuration.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Activate a network interface.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# enabled
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: off
RxChecksumOffload: on   TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a    ChannelOther: n/a
RingSlotRx: 4096/4096   RingSlotTx: 4096/4096
MTU: 1500
rx_bytes: 0             tx_bytes: 32172
rx_packets: 0           tx_packets: 766
rx_errors: 0            tx_errors: 0
```

```
rx_dropped: 0          tx_dropped: 0
rx_overrun: 0          tx_carrier: 0
rx_multicast: 0        tx_collision: 0
Index: 3
```

Related: [disabled](#)

Commands: [interface](#)

[show interface](#)

end

Syntax: end

Description: This command is used to exit configuration mode from any configuration sub-mode.



Note

Any configuration changes not committed are still stored as the candidate configuration.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Exit configuration mode directly from within interface mode.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# end
admin@bqn#
```

Related: [configure](#)

Commands:

exit

Syntax: exit

Description: This command is used to traverse the configuration hierarchy and return to the previous configuration mode. If under the top configuration mode, this command exits configuration mode and goes back to operation mode.



Note

Any configuration changes not committed are still stored as part of the candidate configuration.

Mode: Any configuration mode.

Profile: Administrator.

Examples: Exit interface mode and then exit configuration mode.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# exit
admin@bqn(config)# exit
admin@bqn#
```

Related: [configure](#)

Commands:

feature

Syntax: feature feature-name level-name

no feature feature-name level-name

Description: Configure the minimum logging level for the different QoE features.

The QoE software uses the system logger to log information about many different events which may be used to diagnose the state of the QoE. Depending on the priority of an event, it is generated using a specific logging level. If an event's logging level is lower than the configured logging level for that feature, then the event is not logged.

The following feature-names are supported:

- api : RADIUS and REST API logs.
- btc: BTC logs.
- cluster: Cluster management information.
- config: Configuration management information.
- control: Policy control information.
- dns: DNS service.
- fragment : IP defragmentation.
- generic: Generic logs logs.
- iface: Interface and IP address related information.
- internal : Internal information that does not fall into any other feature.
- ipc: Inter-process communication information, such as internal messages.
- iptask : IPC task management information.
- license: License information.
- memory: Memory subsystem information.
- packet: Information about received and transmitted packets.

- pktcap: Packet capture related information.
- pkteng: Packet engine related information.
- proc: Process management information.
- remctr: Remote control information.
- routing: IP routing information.
- snmp: SNMP management information.
- stats: Statistics related information.

The following logging levels are available, in ascending priority order:

- full: Very low debug level messages.
- debug : Debug level messages.
- info: Informational messages.
- notice: Normal but significant conditions.
- warning: Warning conditions.
- error: Error conditions.
- critical: Critical conditions.
- alert: Conditions that require immediate action.
- emergency: Unusable system condition.



Note

The logging levels are the standard levels used by the system logger, except for full, which is available for an extra level of debugging.

Use this command with caution and only when requested by Cambium Networks staff, since the QoE could experience performance degradation.

Use the no command form to reset the logging level of a feature to its default value, info.

Mode: Logging configuration mode.

Profile: Administrator.

Examples: Set the logging level for the pkteng feature to debug.

```
admin@bqn0# configure
admin@bqn0(config)# logging
admin@bqn0(config-logging)# feature pkteng debug
admin@bqn0(config-logging)# commit
admin@bqn0(config-logging)# op show logging feature
```

FEATURE	LEVEL
api	info
btc	info
cluster	info
config	info
control	info
dns	info
fragment	info
generic	info
iface	info
internal	info
ipc	info
ipctask	info
license	info
memory	info
packet	info
pktpcap	info
pkteng	debug
proc	info
remctr	info
routing	info
snmp	info
stats	info

Reset the logging level of the pkteng feature:

```
admin@bqn0(config-logging)# no feature pkteng debug
admin@bqn0(config-logging)# commit
admin@bqn0(config-logging)# op show logging feature
```

FEATURE	LEVEL
api	info
btc	info
cluster	info
config	info
control	info
dns	info

```
fragment    info
generic     info
iface       info
internal    info
ipc         info
ipctask     info
license     info
memory      info
packet      info
pktcap      info
pkteng      info
proc        info
remctr      info
routing     info
snmp        info
stats       info
```

Related: [logging](#)

Commands: [show logging feature](#)

file chmod

Syntax: file chmod mode file

Description: Changes the file mode bits of a file. This command uses the chmod command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnam users 54 Dec 26 16:05 file1
admin@bqn0# file chmod 400 file1
admin@bqn0# file ls -l
total 4
-r----- 1 bqnam users 54 Dec 26 16:05 file1
```

Related: [file ls](#)

Commands: [file stat](#)

file cksum

Syntax: file cksum file

Description: Print the CRC checksum and size of a file. This command uses the cksum command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 54 Dec 26 16:05 file1
admin@bqn0# file cksum file1
3127016815 54 file1
```

Related: [file ls](#)

Commands: [file md5sum](#)

file cp

Syntax: file cp src dst [recursive]

Description: Copy the src file to the dst file. If the optional recursive parameter is used, the src directory is copied recursively to the dst directory. This command uses the cp command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls -l
total 4
-r----- 1 bqnadm users 54 Dec 26 16:05 file1
admin@bqn0# file cp file1 file2
```

```
admin@bqn0# file ls -l
total 8
-r----- 1 bqnadm users 54 Dec 26 16:05 file1
-r----- 1 bqnadm users 54 Dec 26 16:16 file2
```

Related: [file ls](#)

Commands: [file mv](#)

file diff

Syntax: file diff file1 file2

Description: Compare the contents of two files line by line. This command uses the diff command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show system date full | save file1
admin@bqn0# show system date full | save file2
admin@bqn0# file diff file1 file2

1,2c1,2
<      Local time: Sat 2015-12-26 16:32:56 CET
<      Universal time: Sat 2015-12-26 15:32:56 UTC
---
>      Local time: Sat 2015-12-26 16:33:04 CET
>      Universal time: Sat 2015-12-26 15:33:04 UTC
```

Related: [file less](#)

Commands: [file ls](#)

file grep

Syntax: file grep string file

Description: Searches the contents of a file for lines containing a match of the string pattern, which is interpreted as an extended regular expression. This command uses the grep command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show system date full
Local time: Sat 2015-12-26 16:39:22 CET
Universal time: Sat 2015-12-26 15:39:22 UTC
Timezone: Europe/Madrid (CET, +0100)
NTP enabled: n/a
NTP synchronized: no
RTC in local TZ: no
DST active: no
Last DST change: DST ended at
                Sun 2015-10-25 02:59:59 CEST
                Sun 2015-10-25 02:00:00 CET
Next DST change: DST begins (the clock jumps one hour forward) at
                Sun 2016-03-27 01:59:59 CET
                Sun 2016-03-27 03:00:00 CEST

admin@bqn0# show system date full | save file
admin@bqn0# grep 2015 file
                Local time: Sat 2015-12-26 16:39:32 CET
                Universal time: Sat 2015-12-26 15:39:32 UTC
                Sun 2015-10-25 02:59:59 CEST
                Sun 2015-10-25 02:00:00 CET
```

Related: [file less](#)

Commands: [file ls](#)

file less

Syntax: file less [opts] file

Description: Show the contents of a file. This command uses the less command provided by the operating system. The command accepts the optional opts options, which is interpreted as options for the less command.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show system date full | save file
admin@bqn0# file ls
file
admin@bqn0# file less file
Local time: Sat 2015-12-26 16:49:02 CET
Universal time: Sat 2015-12-26 15:49:02 UTC
Timezone: Europe/Madrid (CET, +0100)
NTP enabled: n/a
NTP synchronized: no
RTC in local TZ: no
DST active: no
Last DST change: DST ended at
                Sun 2015-10-25 02:59:59 CEST
                Sun 2015-10-25 02:00:00 CET
Next DST change: DST begins (the clock jumps one hour forward) at
                Sun 2016-03-27 01:59:59 CET
                Sun 2016-03-27 03:00:00 CEST
```

Related: [file grep](#)

Commands: [file ls](#)

file ln

Syntax: file ln file1 file2 [symbolic]

Description: Create a link from file1 to the file2 target file. A hard link is created by default, but a symbolic link is created if the optional symbolic parameter is used. This command uses the ln command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 16:56 file
admin@bqn0# file ln file slink symbolic
admin@bqn0# file ls -l
```

```
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 16:56 file
lrwxrwxrwx 1 bqnadm users 4 Dec 26 16:56 slink -> file
```

Related: [file ls](#)

Commands

file ls

Syntax: file ls [opts] [file]

Description: Show file and directory information. This command uses the ls command provided by the operating system. The command accepts the optional opts options, which is interpreted as options for the ls command. If the optional file parameter is provided, the command shows information about that file; otherwise, the command shows information about the current directory.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls
file slink
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 16:56 file
lrwxrwxrwx 1 bqnadm users 4 Dec 26 16:56 slink -> file
```

Related: [file mkdir](#)

Commands: [file rm](#)

[file stat](#)

file md5sum

Syntax: file md5sum file

Description: Print the MD5 (128-bit) checksum of a file. This command uses the md5sum command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls
file1
admin@bqn0# file md5sum file1
3582bcafff3d608913c8a44416e162a08 file1
```

Related: [file cksum](#)

Commands: [file ls](#)

file mkdir

Syntax: file mkdir dir

Description: Create a directory, if it does not already exist. This command uses the mkdir command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
admin@bqn0# file mkdir dir1
admin@bqn0# file ls -l
total 4
drwxr-xr-x 2 bqnadm users 6 Dec 26 17:19 dir1
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
```

Related: [file ls](#)

Commands: [file rm](#)

[file rmdir](#)

file mv

Syntax: file mv src dst

Description: Rename the src source file to the dst destination file. This command uses the mv command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: Rename a file.

```
admin@bqn0# file ls
file1
admin@bqn0# file mv file1 file2
admin@bqn0# file ls
file2
```

Related: [file ls](#)

Commands: [file rm](#)

file rm

Syntax: file rm file [recursive]

Description: Delete a file. If the optional recursive parameter is used then the file directory and all its contents is removed. Before a file is removed, the user is required to confirm the operation. This command uses the rm command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: Remove a directory.

```
admin@bqn0# file ls -l
total 4
drwxr-xr-x 2 bqnadm users 6 Dec 26 17:42 dir1
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
admin@bqn0# file rm dir1
/usr/bin/rm: cannot remove 'dir1': Is a directory
admin@bqn0# file rm dir1 recursive
/usr/bin/rm: remove directory 'dir1'? y
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
```

Related: [file ls](#)

Commands: [file rmdir](#)

file rmdir

Syntax: file rmdir dir

Description: Delete an empty directory. If the directory is not empty, the files inside must be deleted first, or the [file rm](#) command can be used together with the recursive parameter. This command uses the rmdir command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: Remove a directory.

```
admin@bqn0# file ls -l
total 4
drwxr-xr-x 2 bqnadm users 6 Dec 26 17:55 dir1
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
admin@bqn0# file rmdir dir1
admin@bqn0# file ls -l
total 4
-rw-r--r-- 1 bqnadm users 32 Dec 26 17:15 file1
```

Related: file ls

Commands: file mkdir

file rm

file stat

Syntax: file stat file

Description: Show file system status. This command uses the stat command provided by the operating system.



Note

File operations are relative to the home directory of the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: Show detailed file status information. Remove a directory.

```
admin@bqn0# file ls
file1
admin@bqn0# file stat file1
File: 'file1'
Size: 32   Blocks: 8   IO Block: 4096   regular file
Device: 802h/2050d   Inode: 16906308   Links: 1
Access: (0644/-rw-r--r--)  Uid: ( 1000/  bqnadm)   Gid: ( 100/   users)
Access: 2015-12-26 17:15:59.469608730 +0100
Modify: 2015-12-26 17:15:43.245528279 +0100
Change: 2015-12-26 17:42:23.477463401 +0100
Birth: -
```

Related: [file chmod](#)

Commands: [file less](#)

[file ls](#)

firewall input

Syntax: firewall input ip-range

no firewall input ip-range

Description: Adds an IP range to the white list of the configured interface firewall. If it is the first IP range added, the firewall is enabled. If no mask is specified, a mask of /32 is assumed by default and a single IP is added. The IP range of the management IP address must be added, or connectivity to the server will be lost.

Use the no command to remove the IP range. If it is the last range, the firewall is disabled.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Activate the firewall interface management interface, with the management IP subnet and two other IP addresses.

```
admin@bqn0# configure
admin@bqn0(config)# op show interface management detail
Interface: en0o1
IP address: 192.168.0.21/24 Default gateway: 192.168.0.1
admin@bqn0(config)# interface en0o1
admin@bqn0(config-iface)# firewall input 192.168.0.0/24
admin@bqn0(config-iface)# firewall input 10.10.1.23/32
admin@bqn0(config-iface)# firewall input 10.10.1.24/32
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
```

```
admin@bqn0(config)# op show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  192.168.0.0/24
en0o1  input  10.10.1.23/32
en0o1  input  10.10.1.24/326

admin@bqn0(config)#
```

Related: [interface](#)

Commands: [show interface firewall](#)

[show interface management](#)

flow ipother inactivity

Syntax: Flow ipother inactivity secs-of-inactivity

no flow ipother inactivity secs-of-inactivity

Description: Changes the inactivity timeout that will remove a flow of type ip-other (neither TCP nor UDP) from QoE memory.

Use the no command form to get back to default value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Change inactivity timeout of ipother flows to 60 seconds:

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# flow ipother inactivity 60
admin@bqn0(config-pkteng)# commit
```

Related: [flow udp inactivity](#)

Commands:

flow udp inactivity

Syntax: Flow udp inactivity secs-of-inactivity

no flow udp inactivity secs-of-inactivity

Description: Changes the inactivity timeout that will remove a flow of type UDP from QoE memory.

Use the no command form to get back to default value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Change inactivity timeout of UDP flows to 120 seconds:

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# flow udp inactivity 120
admin@bqn0(config-pkteng)# commit
```

Related: [flow ipother inactivity](#)

Commands:

fragment ignore

Syntax: fragment ignore

```
no fragment ignore
```

Description: Disable processing of received IP fragments, which are directly forwarded. If the fragment can be associated with an existing flow, the flow will be closed as soon as possible (in the QoE, the traffic flow will continue, being now transparently forwarded by the QoE).

By default, the PKTENG processes all received fragments.

Use the no command form to enable traffic processing of fragments.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable fragment processing.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# fragment ignore
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match Fragment
Fragment validate checksum: yes
Fragment ignore: yes
Fragment maximum: 2048
```

Related: [pkteng](#)

Commands: [fragment maximum](#)

[fragment no-cksum](#)

[show pkteng parameters](#)

fragment maximum

Syntax: fragment maximum number-of-fragments

```
no fragment maximum number-of-fragments
```

Description: Sets the maximum number of fragments that will be manageable when defragmenting a packet. If the maximum is exceeded, the packet will not be defragmented and the fragments will be transparently relayed.

Use the no command form to get back to the default maximum.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set maximum number of fragments to one thousand:

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match Fragment
Fragment validate checksum: yes
Fragment ignore: no
Fragment maximum: 2048
admin@bqn0(config-pkteng)# fragment maximum 1000
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match Fragment
Fragment validate checksum: yes
Fragment ignore: no
Fragment maximum: 1000
```

Related: [pkteng](#)

Commands: [fragment ignore](#)

[fragment no-cksum](#)

[show pkteng parameters](#)

fragment no-cksum

Syntax: fragment no-cksum

```
no fragment no-cksum
```

Description: Do not calculate the checksum of received IP fragments and disable fragment validation.

If checksum validation is enabled and the checksum is not valid, the fragment is directly forwarded but the flow parameters are not updated (since the packet contents may be corrupted).

By default, the PKTENG calculates the checksum of received fragments. Use the no command form to enable checksum validation.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable checksum validation of fragments.

```

admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# fragment no-cksum
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match Fragment
Fragment validate checksum: no
Fragment ignore: no
Fragment maximum: 2048

```

Related: [pkteng](#)

Commands: [fragment ignore](#)

[fragment maximum](#)

[show pkteng parameters](#)

gro

Syntax: gro

```
no gro
```

Description: Enable or disable the generic receive offload functionality of a network interface.

When a new interface is configured, GRO is disabled by default. Note that the BTA service requires that GRO is disabled.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Enable GRO in a network interface.

```

admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# gro
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes       Auto-negotiation: on
Duplex: Full             Speed: 1000Mbps
GRO: on                  GSO: off
LRO: off                 TSO: off

```



```
RxCksumOffload: on      TxQueueLen: 1000
ChannelRx: n/a         ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 4096/4096 RingSlotTx: 4096/4096
MTU: 1500              tx_bytes: 51660
rx_bytes: 0
rx_packets: 0          tx_packets: 1230
rx_errors: 0           tx_errors: 0
rx_dropped: 0         tx_dropped: 0
rx_overrun: 0         tx_carrier: 0
rx_multicast: 0       tx_collision: 0
Index: 3
```

Related: [interface](#)

Commands: [show interface](#)

gso

Syntax: gso

```
no gso
```

Description: Enable or disable the generic segmentation offload functionality of a network interface.

When a new interface is configured, GSO is disabled by default. Note that the BTA service requires that GSO is disabled.

Use the no command form to disable the GSO functionality.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Enable GSO in a network interface.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# gso
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8
en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
```

```
Duplex: Full           Speed: 1000Mbps
GRO: off              GSO: on
LRO: off              TSO: off
RxChecksumOffload: on TxQueueLen: 1000
ChannelRx: n/a        ChannelTx: n/a
ChannelCombined: n/a ChannelOther: n/a
RingSlotRx: 4096/4096 RingSlotTx: 4096/4096
MTU: 1500             tx_bytes: 51660
rx_bytes: 0
rx_packets: 0         tx_packets: 1230
rx_errors: 0          tx_errors: 0
rx_dropped: 0         tx_dropped: 0
rx_oversize: 0        tx_carrier: 0
rx_multicast: 0       tx_collision: 0
Index: 3
```

Related: [interface](#)

Commands: [show interface](#)

gzip

Syntax: gzip

no gzip

Description: Control whether HTTP GZIP compression is enabled or disabled. By default GZIP compression is enabled when the BTC is configured.

Use the no command form to disable GZIP compression.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable GZIP compression.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no gzip
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: no
```

```
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [show btc parameters](#)

[show btc statistics](#)

gzip compress-level

Syntax: gzip compress-level value

no gzip compress-level value

Description: Set the GZIP compress level used to compress HTTP GET response payload, an integer between 0 and 9. A low compression level provides faster but less optimized compressions, while a high compression level provides slow but more optimized compressions.

Use the no command form to restore the default compress level value (3).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the GZIP compress level to 5.

```
admin@bqn# configure
admin@bqn(config)# btc
```

```
admin@bqn(config-btc)# gzip compress-level 5
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 5
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [show btc parameters](#)

gzip content-length-maximum

Syntax: gzip content-length-maximum size

no gzip content-length-maximum size

Description: Set the maximum content-length value used for HTTP GZIP compression. If the content-length of the GET response is higher than this value, then the GET response is not compressed.

Use the no command form to restore the default maximum content-length value (10000000).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the maximum content-length to 5000000.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# gzip content-length-maximum 5000000
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yesimage png gaussian-blur
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 5000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [show btc parameters](#)

[show btc statistics](#)

gzip content-length-minimum

Syntax: gzip content-length-minimum size

no gzip content-length-minimum size

Description: Set the minimum content-length value used for HTTP GZIP compression. If the content-length of the GET response is lower than this value, then the GET response is not compressed.

Use the no command form to restore the default minimum content-length value (1500).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the minimum content-length to 10000.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# gzip content-length-minimum 10000
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 10000
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [show btc parameters](#)

[show btc statistics](#)

hash

Syntax: hash hash-value

no hash hash-value

Description: Assign a hash value to a license feature, which is used to validate the properties of the license feature.

The hash-value parameter is a 64-character string that represents the SHA256 checksum of the license feature.



Note

If a property of an existing license is modified, the hash value must be set accordingly to validate the license feature.

Use the no command form to clear the hash associated with a license feature.

Mode: License configuration mode.

Profile: Administrator.

Examples: Set the hash of the bta license feature.

```
admin@bqn0(config)# license bta
admin@bqn0(config-license)# hash
06b61aa056337344657b4f8b9913254f137f07264139af7c8e
admin@bqn0(config-license)#
```



Note

In this example the hash value has been cut to fit in the text above.

Related: [comment](#)

Commands: [license](#)

[show license](#)

[time-activation](#)

[time-expiration](#)

[usage](#)

http host

Syntax: http host pattern

no http host pattern

Description: As part of a DPI profile, it defines an entry for HTTP traffic with the given pattern domain. The * character is a wildcard that can be placed at the beginning, end, or middle of the pattern, up to 2 times.

Mode: [profile dpi](#) configuration modes.

Profile: Administrator.

Examples: Define a DPI profile with several HTTP domains.

```
admin@bqn(config)# profile dpi mydpi
admin@bqn(config-pfdpi)# http host *mydomain.com
admin@bqn(config-pfdpi)# http host *mysubdomain*
admin@bqn(config-pfdpi)# http host myprefix*
```

Related: [https sni](#)

Commands: [profile dpi](#)

[quic mvfst](#)

[quic sni](#)

https sni

Syntax: https sni pattern

```
no https sni pattern
```

Description: As part of a DPI profile, it defines an entry for HTTPs traffic with the given pattern domain. The * character is a wildcard that can be placed at the beginning, end, or middle of the pattern, up to 2 times.

Mode: DPI profile configuration modes.

Profile: Administrator.

Examples: Define a DPI profile with several HTTPs domains.

```
admin@bqn(config)# profile dpi mydpi
admin@bqn(config-pfdpi)# https sni *mydomain.com
admin@bqn(config-pfdpi)# https sni *mysubdomain*
admin@bqn(config-pfdpi)# https sni myprefix*
```

Related: [http host](#)

Commands: [profile dpi](#)

[quic mvfst](#)

[quic sni](#)

image

Syntax: image

```
no image
```


Description: Controls whether BTC image optimization is enabled or disabled. By default image optimization is enabled when the BTC is configured.

Use the no command form to disable image optimization.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable image optimization.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: no
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image gif](#)

[image jpeg](#)

[image png](#)

[image webp](#)

[show btc parameters](#)

[show btc statistics](#)

image content-length-minimum

Syntax: image content-length-minimum value

no image content-length-minimum value

Description: Set the minimum content length indicated in the HTTP GET response required for an image to be compressed.

Use the no command form to restore the default minimum content length value (1500).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the minimum content length to 10000.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image content-length-minimum 10000
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 10000
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
```

```
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image pixels-maximum](#)

[image pixels-minimum](#)

[show btc parameters](#)

image gif

Syntax: image gif

```
no image gif
```

Description: Enable or disable GIF image processing by the BTC.

Use the no command form to restore the default behaviour (enabled).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable GIF image processing.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image gif
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 1000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 10000
IMG buffer maximum: 6220800
IMG pixels minimum: 500
```

```
IMG pixels maximum: 2073600
IMG GIF enabled: no
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image gif colors-percentage](#)

[show btc parameters](#)

image gif colors-percentage

Syntax: image gif colors-percentage value

no image gif colors-percentage value

Description: Set the maximum number of colors when optimizing GIF images. The value is a percentage of the original number of colors. Note that a value too low may reduce the quality of the image too much.

Use the no command form to restore the default value (80%).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the GIF maximum number of colors to 90% of the original image.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image gif colors-percentage 90
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 1000000
```

```
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 10000
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 90%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image gif](#)

[show btc parameters](#)

image jpeg

Syntax: image jpeg

no image jpeg

Description: Enable or disable JPEG image processing by the BTC.

Use the no command form to restore the default behaviour (enabled).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable JPEG image processing.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image jpeg
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
```

BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 10000
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: no
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30

Related: [btc](#)

Commands: [image jpeg quality](#)

[show btc parameters](#)

image jpeg quality

Syntax: image jpeg quality value

no image jpeg quality value

Description: Set the image quality used to optimize images with JPEG format. The quality value must range between 0 and 100, where 0 is the lowest and 100 is the highest quality. A lower quality level provides more data compression at the expense of lower image quality, and vice-versa.

Use the no command form to restore the default JPEG quality value (30).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the JPEG quality value to 50.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image jpeg quality 50
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 50
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: btc

Commands: [image jpeg](#)

show btc parameters

image pixels-maximum

Syntax: image pixels-maximum size

no image pixels-maximum size

Description: Set the maximum number of pixels that an image must have to be processed by the BTC.

**Note**

The image processing libraries allocate an internal buffer to process the image, and the size of the buffer is set using a combination of the number of pixels in an image and the number of bytes used by each pixel depending on the image format. The pixel size limit of an image that can be processed is 8294400 pixels (equivalent to 3840 pixels wide by 2160 pixels tall, or 4K UHD resolution).

Use the `no` command form to restore the default maximum pixel size value to 2073600 bytes (equivalent to a 1920x1080 image, or FullHD resolution).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the maximum content-length to 3686400, equivalent to a 2560x1440 image.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image pixels-maximum 3686400
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 3686400
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
```



```
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image content-length-minimum](#)

[image pixels-minimum](#)

[show btc parameters](#)

image pixels-minimum

Syntax: image pixels-minimum size

no image pixels-minimum size

Description: Set the minimum number of pixels that an image must have to be processed by the BTC. Use the no command form to restore the default minimum pixel size value (500).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the minimum pixel size to 10000.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image pixels-minimum 10000
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 10000
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
```

```
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image content-length-minimum](#)

[image pixels-maximum](#)

[show btc parameters](#)

image png

Syntax: image png

```
no image png
```

Description: Enable or disable PNG image processing by the BTC.

Use the no command form to restore the default behaviour (enabled).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable PNG image processing.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image png
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters

BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
```

```
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: no
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image png colors-percentage](#)

[image png compress-level](#)

[image png gaussian-blur](#)

[image png pixelate](#)

[image png selective-blur](#)

[show btc parameters](#)

image png colors-percentage

Syntax: image png colors-percentage value

no image png colors-percentage value

Description: Set the maximum number of colors when optimizing PNG palette-based images (PNG8). The value is a percentage of the original number of colors. A value too low may reduce the quality of the image too much.

Use the no command form to restore the default value (80%).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the PNG maximum number of colors to 90% of the original image.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image png colors-percentage 90
admin@bqn(config-btc)# commit
```

```
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 90%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image png](#)

[show btc parameters](#)

image png compress-level

Syntax: image png compress-level value

no image png compress-level value

Description: Set the compress level used to compress PNG images after being optimized, an integer between 0 and 9. A low compression level provides faster but less optimized compressions, while a high compression level provides slow but more optimized compressions.

Use the no command form to restore the default PNG compress level value (3).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the PNG compression level to 5.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image png compress-level 5
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 5
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image png](#)

[show btc parameters](#)

image png gaussian-blur

Syntax: image png gaussian-blur

no image png gaussian-blur

Description: This filter blurs an image by using a Gaussian function. It is a widely used effect in graphics software, typically to reduce image noise and reduce detail, which in many cases may result in smaller image size.



Note

This filter only applies to PNG24 and PNG32 images, and it is enabled by default. Use the no command form to disable applying the Gaussian-blur filter to images.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable the Gaussian-blur filter to PNG32 images.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image png gaussian-blur
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: no
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
```

IMG WEBP quality: 30

Related: [btc](#)

Commands: [image png](#)

[show btc parameters](#)

[image png selective-blur](#)

image png pixelate

Syntax: image png pixelate block-size

no image png pixelate block-size

Description: This filter applies a pixelation effect to the image using the indicated block size in pixels.



Note

This filter only applies to PNG24 and PNG32 images. Use the no command form to disable pixelation.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Apply pixelation filter with a block size of 1 pixel to PNG32 images.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image png pixelate 1
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
```

```
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): 1
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image png](#)

[show btc parameters](#)

[image png gaussian-blur](#)

image png selective-blur

Syntax: image png selective-blur

no image png selective-blur

Description: This filter blurs an image by using a Gaussian function, but unlike Gaussian-blur, it only applies to certain pixels that comply with some conditions. In most cases, the resulting image is not blurred as much as with the Gaussian-blur filter.



Note

This filter only applies to PNG24 and PNG32 images. Use the no command form to disable selective-blur filtering.

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Apply selective-blur filter to PNG32 images.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image png selective-blur
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
```



```
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: yes
IMG WEBP enabled: yes
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image png](#)

[show btc parameters](#)

[image png gaussian-blur](#)

image webp

Syntax: image webp

no image webp

Description: Enable or disable WebP image processing by the BTC.

Use the no command form to restore the default behaviour (enabled).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Disable WebP image processing.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# no image webp
admin@bqn(config-btc)# commit
```

```
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: no
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [image webp quality](#)

[show btc parameters](#)

image webp quality

Syntax: image webp quality value

no image webp quality value

Description: Set the image quality used to optimize images with WebP format. The quality value must range between 0 and 100, where 0 is the lowest and 100 is the highest quality. A lower quality level provides more data compression at the expense of lower image quality, and vice-versa.

Use the no command form to restore the default WebP quality value (30).

Mode: BTC configuration mode.

Profile: Administrator.

Examples: Set the WebP quality value to 50.

```
admin@bqn# configure
admin@bqn(config)# btc
admin@bqn(config-btc)# image webp quality 50
admin@bqn(config-btc)# commit
admin@bqn(config-btc)# op show btc parameters
BTC compress rules: yes
BTC license: enabled
GZIP enabled: yes
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: yes
IMG content length minimum: 1500
IMG buffer maximum: 6220800
IMG pixels minimum: 500
IMG pixels maximum: 2073600
IMG GIF enabled: yes
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: yes
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: yes
IMG WEBP quality: 50
```

Related: [btc](#)

Commands: [image webp](#)

[show btc parameters](#)

interface

Syntax: interface iface-name

no interface iface-name

Description: Defines a network interface or selects an already configured network interface, and enters interface configuration mode.

When an interface is configured for the first time, it is enabled by default. An interface is a data interface (can be part of a wire) unless explicitly marked for management.

Currently, up to 16 data interfaces are supported per QoS. For security reasons, a management interface cannot be configured on a data interface.

If iface-name is a VLAN interface, its physical interface must also be configured. Note that the CLI session prompt changes when entering and leaving interface mode.

Use the no interface command to clear a network interface, which removes all the interface related configuration. Note that this will affect the service if done on an interface part of an active wire or make the node inaccessible if done on the management interface.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example a new interface en0p0s17 is defined.

```
admin@bqn(config)# show config candidate
%WARN: Candidate and running configurations are identical
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# show config diff
+interface en0p0s17 admin@bqn(config-iface)#
```

In this other example a management interface en0p0s3 is defined on a VLAN with ID 11.

```
admin@bqn(config)# interface en0p0s3
admin@bqn(config-iface)# exit
admin@bqn(config)# interface en0p0s3.11
admin@bqn(config-iface)# ip address 192.168.10.45/24
admin@bqn(config-iface)# management
admin@bqn(config-iface)# exit
```

Related: [disabled](#)

Commands: [enabled](#)

[pkteng interface-id](#)

[nic irq affinity](#)

[set interface management](#)

[show interface](#)

[show ip address](#)

[show ip arp](#)

interface-id

Syntax: interface-id ID

no interface-id ID

Description: Add an interface identifier to an interface profile. The ID identifier is an hexadecimal number.

Some interfaces should have this identifier using the [pkteng interface-id](#) command.

Mode: profile interface configuration mode.

Profile: Administrator.

Examples: In this example, an interface profile with two identifiers is defined:

```
admin@bqn(config)# op show profile interface
admin@bqn(config)# profile interface trunk-1
admin@bqn(config-pfiface)# interface 0x1
admin@bqn(config-pfiface)# interface 0x2
admin@bqn(config-pfiface)# root
admin@bqn(config)# commit
admin@bqn(config)# op show profile interface

NAME      ID
trunk-1   0x1
trunk-1   0x2
```

Related: [pkteng interface-id](#)

Commands: [profile interface](#)
[show profile interface](#)

interrupt

Syntax: interrupt interrupt-name

no interrupt interrupt-name

Description: Using the no form, disables the interruption identified by the name interrupt-name.

Currently, the supported interrupt names are:

- **gpe6F:** this is an ACPI interrupt that in some BIOS versions is generated so often that it loads CPU core close to 100 %. The solution of the problem is disable it using the no command.

Mode: System configuration mode.

Profile: Administrator.

Examples

```
admin@bqn(config)# system
admin@bqn(config-system)# no interrupt gpe6F
```

Related Commands: [system](#)

ip address

Syntax: ip address addr

no ip address addr

Description: Add a permanent IP address attached to a network interface. It is used to assign an IP address to a management interface.

The format of the addr parameter is:

```
address[/prefix]
```

where address is a valid dotted quad IP address and prefix is a number that encodes the network prefix length. If the optional prefix is not provided, the network prefix length 32 is used for the new IP address; otherwise, in addition to creating the IP address, a route for the network address is added.

Use the no command form to remove an IP address. Note that when a network interface is removed, all its IP addresses are removed from the system as well.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Add an IP address on en0o1 network interface.

```
admin@bqn(config)# interface en0o1
admin@bqn(config-iface)# ip address 10.5.0.21/24
admin@bqn(config-iface)# root
admin@bqn(config)# router static
admin@bqn(config-static)# route 0.0.0.0/0 via 10.5.0.1
admin@bqn(config-static)# root
admin@bqn(config)# commit
admin@bqn(config)# op show ip address
```

IFACE	IP-ADDR	BROADCAST	SCOPE	FLAGS
lo0	127.0.0.1/8	127.255.255.255	host	permanent
en0o1	10.5.0.21/24	-	global	permanent

```
admin@bqn(config)# opshowiproute
```

IFACE	DESTINATION	GATEWAY	FLAGS
en0o1	0.0.0.0/0	10.5.0.1	UG
lo0	127.0.0.0/8	-	U
en0o1	10.5.0.0/24	-	U

Related: [disabled](#)

Commands: [enabled](#)

[management](#)

[net ping](#)

[net tracepath](#)

[show interface](#)

[show ip address](#)

[show ip route](#)

license

Syntax: license feature-name

no license feature-name

Description: Define a static license feature and enter license configuration mode. If the server is under the control of the bqnmgr server, this static license will be ignored.

A license feature and its properties are bound to the hardware where the QoS software is installed, specifically the system ID. A license feature and its properties will be provided by Cambium Networks to activate a specific feature.



Note

The CLI session prompt changes when entering and leaving license mode.

Use the no command form to clear a license feature, which in turn removes all the license related configuration.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Configure the bta license feature.

```
admin@bqn0# configure
admin@bqn0(config)# license bta
admin@bqn0(config-license)# time-activation 2014-01-01
admin@bqn0(config-license)# time-expiration 2014-12-31
admin@bqn0(config-license)# usage 1000
admin@bqn0(config-license)# comment "Test example@example.com"
admin@bqn0(config-license)# hash
06b61aa056337344657b4f8b9913254f137f07264139af7c8e
admin@bqn0(config-license)# commit
admin@bqn0(config-license)# op show license

FEATURE    EXPIRATION                VALID  USAGE
bta        2014-12-31T00:00:00+0100  yes    n/a

admin@bqn0(config-license)# op show license feature bta
Feature: bta
```

```
State: ready
Static: yes
Valid: yes
Clients: 0
Activation time: 2014-01-01T00:00:00+0100
Expiration time: 2014-12-31T00:00:00+0100 Usage maximum: 1000
Usage current pct: n/a
Hash: 06b61aa056337344657b4f8b9913254f137f07264139af7c8e
Comment: Test example@example.com
admin@bqn(config)#
```

Related: [comment](#)

Commands: [hash](#)

[set license load](#)

[show license](#)

[show license feature](#)

[show remctr status](#)

[time-activation](#)

[time-expiration](#)

[usage](#)

load config

Syntax: load config file-name [merge]

Description: Load a configuration file file-name previously saved with the [save config](#) command. The configuration loaded will become the new candidate configuration, unless the merge parameter is indicated, in which case the existing candidate configuration and the contents of the file-name will be merged.

This command shows all the configuration commands which were successfully loaded and the number of errors encountered.

Use the command [show config candidate](#) to verify the loaded configuration and then [commit](#) to apply the new configuration.

Mode: Any configuration mode.

Profile: Administrator.

Examples: Show the current configuration and load the file tmp.conf with BTA configuration.

```
admin@bqn(config)# show config running
service ssh
interface en0p0s17
```



```
ip address 192.168.1.75/24
management

admin@bqn(config)# show config candidate
%WARN: Candidate and running configurations are identical
admin@bqn(config)# load config tmp.conf
Loaded 16 commands (0 errors)
admin@bqn(config)# show config diff
service ssh
+interface en0p0s8
+ bta
+ ip address 10.2.1.254/24
+interface en0p0s9
+ bta
+ ip address 10.2.2.254/24 interface en0p0s17
ip address 192.168.1.75/24 management
+router static
+ route 0.0.0.0/0 via 10.2.1.1
+ route 10.10.0.0/16 via 10.2.2.1
+bta
+pattern 10
admin@bqn(config)#
```

Related: [clear config changes](#)

Commands: [commit](#)

[save config](#)

[show config candidate](#)

[show config diff](#)

load rollback

Syntax: load rollback commit-id

Description: Load a previously committed configuration as the candidate configuration. A committed configuration is identified with a commit ID, and may be shown with the [show config commit](#) command.

Once the commit ID has been loaded, the command shows the number of configuration entries added and removed compared to the running configuration.



Note

In order to apply the loaded configuration a commit is required.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Load configuration with commit ID equal to 94043021.

```
admin@bqn(config)# show config commit
```

ID	USER	DEVICE	TIMESTAMP
94456544	bqnadm	pts/1	2013/12/16 18:37:16 +0100
94183782	root	pts/1	2013/12/16 18:36:50 +0100
94043021	root	pts/1	2013/12/16 18:36:40 +0100
91816643	root	pts/0	2013/12/13 19:26:21 +0100

```
admin@bqn(config)# load rollback 94043021
```

Commands

Added: 11

Removed: 0

Errors: 0

```
admin@bqn(config)# show config diff
```

service ssh

+interface en0p0s8

+ bta

+ ip address 10.2.1.254/24

+interface en0p0s9

+ bta

+ ip address 10.2.2.254/24

interface en0p0s17

ip address 192.168.1.75/24

management

+router static

+ route 0.0.0.0/0 via 10.2.1.1

+ route 10.10.0.0/16 via 10.2.2.1

+bta

Commit the loaded configuration and show the history.

```
admin@bqn(config)# commit
```

```
admin@bqn(config)# show config commit
```

ID	USER	DEVICE	TIMESTAMP
00926258	bqnadm	pts/1	2013/12/16 18:48:11 +0100
94456544	bqnadm	pts/1	2013/12/16 18:37:16 +0100

```
94183782 root pts/1 2013/12/16 18:36:50 +0100
94043021 root pts/1 2013/12/16 18:36:40 +0100
91816643 root pts/0 2013/12/13 19:26:21 +0100
```

Related: [commit](#)

Commands: [show config candidate](#)

[show config commit](#)

[show config diff](#)

logging

Syntax: logging

no logging

Description: Enter logging configuration mode.

The QoE interaction with the system logger is defined inside this mode.



Note

The CLI session prompt changes when entering and leaving the logging mode.

Use the no command form to remove the logging configuration, resetting the logging level of all features.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Enter logging mode.

```
admin@bqn1(config)# logging
admin@bqn1(config-logging)#
```

Related: [feature](#)

Commands: [show logging feature](#)

lro

Syntax: lro

no lro

Description: Enable or disable the large receive offload functionality of a network interface.

When a new interface is configured, LRO is disabled by default. Note that the BTA feature requires that LRO be disabled.

Use the no command form to disable the LRO functionality.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Enable LRO in a network interface.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# lro
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: on                 TSO: off
RxChecksumOffload: on   TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a    ChannelOther: n/a
RingSlotRx: 4096/4096  RingSlotTx: 4096/4096
MTU: 1500               tx_bytes: 51660
rx_bytes: 0
rx_packets: 0           tx_packets: 1230
rx_errors: 0            tx_errors: 0
rx_dropped: 0          tx_dropped: 0
rx_overnrun:           tx_carrier: 0
rx_multicast: 0        tx_collision: 0
Index: 3
```

Related: [interface](#)

Commands: [show interface](#)

mac

Syntax: mac local-mac [remote-mac]

```
no mac local-mac [remote-mac]
```

Description: This command is used to configure a MAC swap. Packets from this interface will have the source MAC as the local MAC configured by this command. If the optional remote MAC is also configured, the destination MAC address will be changed to the remote MAC value. It is used with some load balancers that need the MAC address to change to differentiate traffic to the QoE and traffic from the QoE.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: This example configures two MAC addresses. We use locally administered values:

```
admin@bqn(config)# interface en0o7
admin@bqn(config-iface)# mac 0xAA0000000001
admin@bqn(config-iface)# root
admin@bqn(config)# interface en0o8
admin@bqn(config-iface)# mac 0xAA0000000002
admin@bqn(config-iface)# root
admin@bqn(config)# commit
admin@bqn(config)#
```

Related: [interface](#)

Commands: [show interface](#)

management

Syntax: management

```
no management
```

Description: This command indicates that a network interface is the management interface. Note that only one management interface is allowed per QoE.

The NTP, SNMP and SSH services are only available on the management interface. Use the no command form to clear the management role from an interface.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: This example configures en0p0s17 as the management interface.

```
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# management
admin@bqn(config-iface)#
```

Related: [interface](#)

Commands: [set interface management](#)

[show interface](#)

management memory

Syntax: management memory warning-pct critical-pct

```
no management memory warning-pct critical-pct
```

Description: This command configures the memory usage percentages, that will trigger a system memory alarm of warning level (warning-pct percentage) and critical level (critical-pct level).

The default values are 25 % for warning level and 50 % for critical level. Use the no command to revert to default values.

Mode: System configuration mode.

Profile: Administrator.

Examples: Change the memory percentages.

```
admin@bqn(config)# system
admin@bqn(config-system)# management memory 35 75
admin@bqn(config-system)# commit
```

Related: [management time](#)

Commands: [management traffic](#)

[system](#)

management time

Syntax: management time warning

no management time warning

Description: Controls the system alarm level triggered when there is a problem with the system time. By default, a notice alarm is triggered unless this command is set, in which case a warning alarm is triggered.

Mode: System configuration mode.

Profile: Administrator.

Examples: Set the time alarm level to warning.

```
admin@bqn(config)# system
admin@bqn(config-system)# management time warning
admin@bqn(config-system)# commit
```

Related: [management memory](#)

Commands: [management traffic](#)

[show system alarms](#)

[system](#)

management traffic

Syntax: management traffic low low-threshold

management traffic threshold no-traffic-threshold

Description: This command sets parameters related to a traffic system alarm. With the low option, it sets the throughput threshold low-threshold below, which a low traffic alarm will be triggered. With the threshold option, it sets the throughput threshold no-traffic-threshold below which a no traffic alarm is triggered.

Thresholds are provided in Kbps.

Mode: System configuration mode.

Profile: Administrator.

Examples: Set new management traffic values.

```
admin@bqn(config)# system
admin@bqn(config-system)# management traffic low 10000
admin@bqn(config-system)# management traffic threshold 1000
admin@bqn(config-system)# commit
```

Related: [management memory](#)

Commands: [management time](#)

[system](#)

memory

Syntax: memory size

no memory size

Description: This command indicates the memory size (in megabytes, that is 1,048,576 bytes) to be used by the PKTENG functionality. When the PKTENG uses more than one PKTENG process, the amount of memory allocated by each PKTENG process is size divided by the number of processes.

The minimum allowed value for size is 1 and the maximum allowed value is the physical memory size of the system.

The default value of the memory size used by the PKTENG is 80% of the physical memory size of the system.

Use the no command form to clear the manual setting of the memory size and to set the default memory size.



Note

Changing the memory size of the PKTENG service will restart the PKTENG service; therefore, this parameter should only be used when dimensioning the service.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: This example sets the memory used by the PKTENG service to 500MB. Note that in the example, there are 2 PKTENG processes, so each process allocates 250MB (256000 KB) of memory.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# memory 500
admin@bqn(config-pkteng)# commit
admin@bqn(config-pkteng)# show pkteng memory
```

bqn	INST	POOLSIZEKB	SLABSALLOC	SLABSUSED	CHUNKALLOC	CHUNKUSED	OBJUSED
0	0	256000	16000	0	1024000	0	0
0	1	256000	16000	0	1024000	0	0

Related: [pkteng](#)

Commands: [show pkteng memory](#)

metering

Syntax: metering [initial-percentage final-percentage]

no metering [initial-percentage final-percentage]

Description: Generates metrics of TCP acceleration performance. If no percentages are specified, all traffic matching the policy will metrics. If a range of percentages is specified, flows falling randomly within the range will generate metrics. The range of percentages is rarely used.

Mode: [policyflow](#) configuration mode.

Profile: Administrator.

Examples: Activate metering in mypolicy policy.

```
admin@bqn0(config)# policy flow mypolicy
admin@bqn0(config-polflow)# metering
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [show policy](#)

mtu

Syntax: mtu mtu-value

no mtu mtu-value

Description: Set the maximum transfer unit (MTU) of a network interface. The default and maximum MTU value is 2026 bytes.



Note

The MTU size is the Ethernet frame payload, without counting the Ethernet header (14 bytes without an 802.1Q tag or 18 bytes with an 802.1Q tag). Any other protocol header, such as PPPoE or MPLS, is part of the Ethernet payload and counts towards the MTU. QoS currently only optimizes traffic with a maximum MTU value of 2026.

Virtual interfaces, such as VLAN or bonding interfaces, inherit their MTU from the physical interface unless their MTU is configured. In addition, the MTU of the virtual interfaces cannot be bigger than the MTU of their physical interfaces.

Use the no command form to restore the MTU to the original value before the change.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Change the MTU of a network interface to 1400 bytes.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s8
admin@bqn(config-iface)# mtu 1400
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 40:62:31:01:7b:2a
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: off
RxChecksumOffload: on  TxQueueLen: 1000
ChannelRx: 0/0          ChannelTx: 0/0
ChannelCombined: 1/2   ChannelOther: 1/1
RingSlotRx: 4096/4096  RingSlotTx: 4096/4096
MTU: 2026
rx_bytes: 1610653319    tx_bytes: 12020601511
rx_packets: 8591777     tx_packets: 14117152
rx_errors: 0            tx_errors: 0
rx_dropped: 0          tx_dropped: 0
rx_overnrun: 0         tx_carrier: 0
rx_noBuff: 0           tx_collision: 0
rx_multicast: 89773
Index: 15
```

Related: [interface](#)

Commands: [show interface](#)

net ping

Syntax: net ping dst [source src] [count cnum] [interval inum] [no-df] [size len]

Description: Send ICMP ECHO-REQUEST message to the dst IP address. This command uses the ping command provided by the operating system.

The optional source parameter is used to force the source IP address to src, instead of letting the operating system choose the appropriate source IP address. Note that the src IP address must be configured in the QoS and routing to the destination IP address must exist.

If the optional count parameter is used, this command will send up to cnum ICMP ECHO-REQUEST messages and then terminate. By default, it sends an infinite number of ICMP messages.

If the optional interval parameter is used, the command will wait inum number of seconds between sending each ICMP message. By default, it waits 1 second between messages. Note that the inum value may be a decimal number.

The optional no-df parameter indicates that the ICMP messages sent do not include the DF (don't fragment) flag in the IP header. By default, ping sets the DF flag in the IP header of the ICMP packets sent.

The optional size parameter sets the packet size of the ICMP messages. The default is 56 bytes.

To stop the execution of the ping command at any time, press the CTRL-C key sequence.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# net ping 8.8.8.8 count 3 interval 2
PING 8.8.8.8 (8.8.8.8) from 10.1.1.95 : 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=47 time=43.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=47 time=44.5 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=47 time=44.7 ms
--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 43.191/44.177/44.743/0.741 ms
```

Related: [net tracepath](#)

Commands: [show ip address](#)

[show ip route](#)

net tracepath

Syntax: net tracepath dst [length lnum]

Description: This command traces the path to dst address, discovering the MTU along the path. It sends UDP packets with random ports. This command uses the tracepath command provided by the operating system.

If the optional length parameter is used, the initial size of the packets sent is set to lnum bytes. To stop the execution of the tracepath command at any time, press the CTRL-C key sequence.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# net tracepath 87.222.160.1
1?: [LOCALHOST]    pmtu 1500
1: 10.1.1.91      0.574ms
1: 10.1.1.91      0.474ms
2: no reply
3: 87.222.173.166  1.260ms pmtu 1492
3: 87.222.160.1    34.686ms reached
Resume: pmtu 1492 hops 3 back 253
```

Related: [net ping](#)

Commands: [show ip address](#)

[show ip route](#)

nic io affinity

Syntax: nic io affinity mask

no nic io affinity mask

Description: Set the CPU affinity for the interface IOs processes. The mask parameter is a hexadecimal value representing the CPU mask where each IO process is assigned to handle incoming and outgoing traffic of this interface. The least significant bit of this parameter represents CPU 0. Note that this functionality is only available for interface in DPDK mode (the default mode).

Use the no command form to restore the default IO interface CPU mask, which is set by the [dimension](#) command globally.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: In a server with 16 cores, assign core 1 to one interface IO and core 2 to the other interface IO:

```
admin@bqn# show pkteng affinity

FUNCTION      AFFINITY  COUNT
cpu-available ffff      16
```

```

pkteng-all      fffe      15
pkteng-worker   fff8      14
pkteng-io       1         1
en0o7-io       1         1
en0o8-io       1         1

admin@bqn# configure
admin@bqn(config)# interface en0o7
admin@bqn(config-iface)# nic io affinity 0x1
admin@bqn(config-iface)# root
admin@bqn(config)# interface en0o8
admin@bqn(config-iface)# nic io affinity 0x2
admin@bqn(config-iface)# root
admin@bqn(config)# commit
admin@bqn(config)# op show pkteng affinity

FUNCTION      AFFINITY  COUNT
cpu-available ffff      16
pkteng-all    fffe      15
pkteng-worker fff8      13
pkteng-io     3         2
en0o7-io     1         1
en0o8-io     2         1

```

Related: [interface](#)

Commands: [dimension](#)

[nic io numa](#)

[show pkteng affinity](#)

[show interface](#)

nic io numa

Syntax: nic io numa mask numald

no nic io numa mask numald

Description: By default, the IO processes of an interface and the DPDK memory pool they use are both in the same NUMA, the NUMA of the network interface. The reason for this choice is performance (memory of the same NUMA will be accessed faster) and it is most often the right choice.

If a server has more than one processor and all network interfaces are on the same NUMA, one of the memory pools (the one associated with the other NUMA) will not be used. If the server is memory-restricted and has no CPU issues, this command allows modifying the default affinity, using the memory of the other NUMA. The mask parameter is a hexadecimal value representing an IO process mask and it must be a subnet of the io full mask of this interface as assigned by the [nic io affinity](#) command. The numald value specifies the NUMA to use for these IO processes.

Use the no command form to restore the default affinity.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: In the following example, each data interface has one IO process, both associated to NUMA 0 (where both interfaces are). We change memory NUMA affinities so one keeps using NUMA 0 but the other one uses NUMA 1 in order to make a more balanced use of the memory.

```
admin@bqn# configure
admin@bqn(config)# interface en0o7
admin@bqn(config-iface)# nic io numa 0x1 1
admin@bqn(config-iface)# root
admin@bqn(config)# interface en0o8
admin@bqn(config-iface)# nic io numa 0x2 2
admin@bqn(config-iface)# root
admin@bqn(config)# commit
```

Related: [interface](#)

Commands: [nic io affinity](#)

[show pkteng affinity](#)

[show interface](#)

nic irq affinity

Syntax: nic irq affinity mask

no nic irq affinity mask

Description: Set the CPU affinity for the PKTENG interface IRQs. The mask parameter is a hexadecimal value representing the CPU mask where each IRQ software interrupt handler should run. The least significant bit of this parameter represents CPU 0. Note that this functionality is only available for interface in PCAP mode.

Use the no command to restore the default PKTENG interface CPU mask, which is set by the [dimension](#) command globally.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Set the CPU affinity for an interface.

```

admin@bqn# show interface en0p0s3 irq

NUM   TYPE   IRQ   MASK
0     Rx     19    0x0000000000000000c

admin@bqn# configure
admin@bqn(config)# interface en0p0s3
admin@bqn(config-iface)# nic irq affinity 3
admin@bqn(config-iface)# commit

admin@bqn(config-iface)# op show interface en0p0s3 irq

NUM   TYPE   IRQ   MASK
0     Rx     19    0x00000000000000003

```

Related: [interface](#)

Commands: [show interface](#)

nic pcap

Syntax: nic pcap

```
no nic pcap
```

Description: Sets interface in PCAP mode. It is used for user interfaces not supported by DPDK. Only in this case is recommended its use, as it reduces the system performance.

Use the no command form to put the interface back in DPDK mode (the default).

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Set the interfaces in a wire in PCAP mode.

```

admin@bqn# show pkteng wire

show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP  DIRECTED
en0p3s0    no        en0p4s0     no         yes

admin@bqn# show interface

IFACE      TYPE      MAC              STATE  LINK
lo0        loopback  00:00:00:00:00:00  up     yes
en0p1s0    ethernet  30:71:56:01:b7:27  up     yes
en0p2s0    ethernet  30:71:56:01:b7:28  down   no
en0p3s0    ethernet  30:71:56:01:b7:2a  down   no
en0p4s0    ethernet  30:71:56:01:b7:2b  down   no

```

```

admin@bqn# configure
admin@bqn(config)# interface en0p3s0
admin@bqn(config-iface)# nic pcap
admin@bqn(config-iface)# root
admin@bqn(config)# interface en0p4s0
admin@bqn(config-iface)# nic pcap
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end

admin@bqn# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP  DIRECTED
en0p3s0    no         en0p4s0     yes         yes

admin@bqn# show interface

IFACE      TYPE      MAC              STATE  LINK
lo0        loopback  00:00:00:00:00:00  up     yes
en0p1s0    ethernet  30:71:56:01:b7:27  up     yes
en0p2s0    ethernet  30:71:56:01:b7:28  down   no
en0p3s0    ethernet  30:71:56:01:b7:2a  up     yes
en0p4s0    ethernet  30:71:56:01:b7:2b  up     yes

```

Related: [interface](#)

Commands: [show interface](#)

op

Syntax: op command ...

Description: Execute a command from the operational mode.

The auto-completion mechanisms will indicate the available commands.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Show the IP address information (using the [show ip address](#) operational command) from within the configuration mode.

```

admin@bqn(config)# op show interface

IFACE      TYPE      MAC              STATE  LINK
lo0        loopback  00:00:00:00:00:00  up     yes
en0p1s0    ethernet  50:62:31:01:6a:12  up     yes

```

en0p4s0	ethernet	50:62:31:01:61:2b	down	no
en0p3s0	ethernet	50:62:31:01:b0:2a	up	yes
en0p2s0	ethernet	50:62:31:01:b0:28	up	yes

Related: [configure](#)

Commands

optimization

Syntax: optimization [initial-percentage final-percentage]

no optimization [initial-percentage final-percentage]

Description: Decides the TCP flows to be optimized (accelerated). If no percentages are specified, all traffic matching the policy is accelerated. If a range of percentages is specified, flows falling randomly within the range will be accelerated. The usual practice is to define a 0-99 % range and have a tracking range covering the rest (99-100 %).

Mode: [policy flow](#) configuration mode.

Profile: Administrator.

Examples: Enable 99% of optimization and 1% of tracking in mypolicy policy.

```
admin@bqn0(config)# policy flow mypolicy
admin@bqn0(config-polflow)# optimization 0 99
admin@bqn0(config-polflow)# tracking 99 100
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [show policy](#)

[tracking](#)

platform

Syntax: platform {allot | cambium | viewtinet}

no platform {allot | cambium | viewtinet}

Description: Sets the QoE to use a partner look-and-feel, including logos.

The current supported platforms are:

- allot
- cambium
- viwetinet

To revert back to the default look and feel, use the no command.

Mode: System configuration mode.

Profile: Administrator.

Examples: Set the platform type to cambium:

```
admin@bqn(config)# system
admin@bqn(config-system)# platform cambium
admin@bqn(config-system)# commit
```

Related: [system](#)

Commands

pkteng

Syntax: pkteng

```
no pkteng
```

Description: Enter the packet engine (PKTENG) configuration mode.



Note

The CLI session prompt changes when entering and leaving PKTENG mode. Use the no command form to remove all PKTENG configuration.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters PKTENG mode.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)#
```

Related: [dimension](#)

Commands: [show pkteng parameters](#)

[show pkteng statistics](#)

[show pkteng status](#)

[wire](#)

pkteng interface-id

Syntax: pkteng interface-id number

```
no pkteng interface-id number
```

Description: Set the interface ID value of a PKTENG interface. This value is assigned to all the TCSs depending on the PKTENG interface that received the packet that triggered the TCS creation.

Use the no command form to remove the configured interface ID of a PKTENG interface and set it to its default value of 0.

Mode: PKTENG interface configuration mode.

Profile: Administrator.

Examples: Set the interface ID of a PKTENG interface.

```
admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8.11
admin@bqn0(config-iface)# pkteng interface-id 10
admin@bqn0(config-iface)# commit
```

Related: [interface](#)

Commands

pkteng mirroring

Syntax: pkteng mirroring

```
no pkteng mirroring
```

Description: Set the port mirroring functionality for a PKTENG network interface.

A PKTENG network interface has port mirroring disabled by default, in which case packets are captured and forwarded by the QoE. If port mirroring is enabled, packets are captured but not forwarded. Port mirroring should only be enabled to monitor and measure TCSs, and the network interface should be connected to a switch port that has port mirroring enabled.

Use the no command form to disable port mirroring.

Mode: PKTENG interface configuration mode.

Profile: Administrator.

Examples: Enable port mirroring on a PKTENG network interface.

```
admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# pkteng mirroring
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)#
```

Related: [interface](#)

Commands: [show interface](#)

pkteng mss-max

Syntax: pkteng mss-max value

```
no pkteng mss-max value
```

Description: Set the maximum MSS value for TCP flows associated with this interface. The available values are between 64 and 65496.

Use the no command form to remove the maximum MSS value.

Mode: PKTENG interface configuration mode.

Profile: Administrator.

Examples: Set the maximum MSS to 1400.

```
admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# pkteng mss-max 1400
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)#
```

Related: [interface](#)

Commands: [show interface](#)

policy flow

Syntax: policy flow policy-name

no policy flow policy-name

Description: Defines a flow policy. Flow policies apply to a subset of traffic flows (e.g. TCP connections) of a subscriber.

A flow policy supports different actions on the traffic:

- optimization: applies TCP acceleration between start and end percentages (e.g, 0 99 applies to 99%),
- shaping: applies a speed limit in Kbps to all traffic matching the policy for this subscriber.
- tracking: traffic without optimization but metered to serve as a control group. Normally this is complementary to the optimization range.
- no rate-limit: excludes this traffic from any limit in a rate policy
- block: drops all traffic matching the policy
- compression: applies compression to uncompressed HTTP traffic. A flow policy is applied to the traffic using flow rules.

Use the no command form to remove the policy.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a flow policy that optimizes 99% of the TCP flows and keeps the other 1% in tracking as a control group. It also indicates that TCP metrics should be generated and DPI information obtained.

```
admin@bqn0# configure
admin@bqn0(config)# policy flow flow-default
```

```

admin@bqn0(config-polflow)# optimization 0 99
admin@bqn0(config-polflow)# tracking 99 100
admin@bqn0(config-polflow)# metering
admin@bqn0(config-polflow)# dpi
admin@bqn0(config-polflow)# root
admin@bqn0(config)# commit

admin@bqn0(config)# op show policy flow

NAME      BCK  COM  DPI  MET  OPT  OPTD  SHPD  SHPU  TCE  TRK  UDR
flow-     no   no   yes  yes  yes  no    no    no    no   yes  no
default

```

admin@bqn0(config)#

Related: [block](#)

Commands: [compression](#)

[dpi](#)

[metering](#)

[profile access](#)

[profile dpi](#)

[profile interface](#)

[profile internet](#)

[profile throughput](#)

[profile vlan](#)

[rate-limit \(policy flow\)](#)

[rule flow](#)

[shaping](#)

[show policy](#)

[show policy flow](#)

[tracking](#)

policy monitor

Syntax: policy monitor policy-name

no policy monitor policy-name

Description: Defines a monitor policy. Monitor policies apply to a subscriber.

A monitor policy supports different actions on the traffic, all related to the generation of records on the server for later reference:

- sdr: subscriber usage records. They contain subscriber traffic volumes. They are used for subscriber volume reporting.
- udr: flow usage records. They contain detailed information on traffic flows. They are used for DPI reporting.
- trace: generates debugging information to diagnose problems on QoE software.

A monitor policy is applied to the traffic using monitor rules.

Use the no command form to remove the policy.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a monitor policy that generates SDRs for all the traffic and UDRs for a random 1% of the traffic.

```
admin@bqn0# configure
admin@bqn0(config)# policy monitor monitor-default
admin@bqn0(config-polmon)# sdr
admin@bqn0(config-polmon)# udr 1
admin@bqn0(config-polmon)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show policy monitor

NAME           SDR   TCE   UDR
monitor-default yes    no    yes

admin@bqn0(config)#
```

Related: [profile access](#)

Commands: [profile interface](#)

[profile vlan](#)

[rule monitor](#)

[sdr](#)

[show policy](#)

[show policy monitor](#)

[trace](#)

[udr](#)

policy rate

Syntax: policy rate policy-name

no policy rate policy-name

Description: Defines a static (local) rate policy. Rate policies apply to a subscriber.

A rate policy supports different actions on the traffic, all related to controlling the maximum speed of the subscriber traffic.

rate-limit: places a maximum speed on that subscriber speed. Downlink and uplink directions have independent limits. The parameters are as follows:

- rate: speed limit, in Kbps.
- burst-rate: burst rate in Kbps (normally above rate limit).
- burst-duration: burst duration in seconds.
- burst-threshold: average speed in Kbps the subscriber must go under for a new burst to be granted.
- burst-threshold-window: window in seconds to calculate the average speed.
- burst-transition-duration: burst transition duration in seconds (when the burst ends, time to go from burst rate to rate limit).
- block: drops all subscriber traffic.

Use the no command form to remove the policy.

A rate policy is applied to the traffic using rate rules. It is also possible to assign static policies to subscribers using the supported APIs (for example, RADIUS or REST) instead of rate rules. QoE supports dynamic policies that can be defined using the QoE APIs.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a rate policy with a 100Mbps in downlink and 50Mbps in uplink, with bursts that allow to go to double the speed limit during 5 seconds. The average speed must go below the speed limit before a new burst is allowed:

```
admin@bqn0# configure
admin@bqn0(config)# policy rate rate-gold
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 100000
admin@bqn0(config-polrate-rrldown)# burst-rate 200000
admin@bqn0(config-polrate-rrldown)# burst-duration 5
admin@bqn0(config-polrate-rrldown)# burst-threshold 100000
admin@bqn0(config-polrate-rrldown)# burst-window 300
admin@bqn0(config-polrate-rrldown)# burst-transition-duration 1
admin@bqn0(config-polrate-rrldown)# exit
admin@bqn0(config-polrate)# rate-limit uplink
admin@bqn0(config-polrate-rrlup)# rate 50000
admin@bqn0(config-polrate-rrlup)# burst-rate 100000
admin@bqn0(config-polrate-rrlup)# burst-duration 5
```

```

admin@bqn0(config-polrate-rrlup)# burst-threshold 50000
admin@bqn0(config-polrate-rrlup)# burst-window 300
admin@bqn0(config-polrate-rrlup)# burst-transition-duration 1
admin@bqn0(config-polrate-rrlup)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show policy rate

```

NAME	BCK	DOS	DYNU	RL-D	RL-U
rate-gold	no	no	yes	yes	yes
rate-default	no	no	yes	no	no

Related: [api radius](#)

Commands: [api rest](#)

[block](#)

[burst-duration](#)

[burst-rate](#)

[burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[profile access](#)

[profile interface](#)

[profile vlan](#)

[rate](#)

[rate-limit \(policy rate\)](#)

[rule rate](#)

[show policy](#)

[show policy rate](#)

process dead-interval

Syntax: process dead-interval timeout

no process dead-interval timeout

Description: The mandatory processes are monitored by the CTRMGR process, and if they do not respond after 10 seconds, they are terminated. This command changes the dead interval to timeout seconds.



Note

This command should only be used if requested by Cambium Networks support. To revert back to the default value, use the no command form.

Mode: System configuration mode.

Profile: Administrator.

Examples: Set the dead interval to 20 seconds.

```
admin@bqn(config)# system
admin@bqn(config-system)# process dead-interval 20
admin@bqn(config-system)# commit
```

Related Commands: [system](#)

process resume

Syntax: process resume proc-name [proc-inst]

Description: Resume execution of a suspended QoE process.

A process is identified by the process name and the process instance.



Note

This command should only be used if requested by Cambium Networkssupport.

Mode: Operation mode.

Profile: Administrator.

Examples: Resume execution of the bta process with instance ID 1.

```
admin@bqn# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	27080	running	0	0:00:04.478	0	bqnsh
0	root	32599	running	0	75:16:52.328	0	cfgmgr
0	root	32566	running	0	75:16:52.391	0	ctrmgr
0	root	32600	running	0	75:16:52.325	0	dnsmgr
0	root	32607	running	0	75:16:52.280	0	ipmgr
0	root	32602	running	0	75:16:52.319	0	licmgr
0	root	32605	running	0	75:16:52.294	0	ossrv
0	root	32616	running	0	75:16:52.270	0	pkteng
0	root	32725	suspended	0	75:16:52.136	1	pkteng
0	root	32726	running	0	75:16:52.122	2	pkteng
0	root	32727	running	0	75:16:52.108	3	pkteng


```

0    root    32610    running  0        75:16:52.277  0    pktengmgr
0    root    32601    running  0        75:16:52.321  0    remctr
0    root    32598    running  0        75:16:52.325  0    rtmgr
0    root    32606    running  0        75:16:52.295  0    snmpagt
0    root    32603    running  0        75:16:52.312  0    statmgr

```

```
admin@bqn0# process resume pkteng 1
```



Note
The mandatory process has been restarted and is in running state.

```
admin@bqn0# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	27080	running	0	0:00:04.478	0	bqnsh
0	root	32599	running	0	75:16:52.328	0	cfgmgr
0	root	32566	running	0	75:16:52.391	0	ctrmgr
0	root	32600	running	0	75:16:52.325	0	dnsmgr
0	root	32607	running	0	75:16:52.280	0	ipmgr
0	root	32602	running	0	75:16:52.319	0	licmgr
0	root	32605	running	0	75:16:52.294	0	osrv
0	root	32616	running	0	75:16:52.270	0	pkteng
0	root	32725	running	0	75:16:52.136	1	pkteng
0	root	32726	running	0	75:16:52.122	2	pkteng
0	root	32727	running	0	75:16:52.108	3	pkteng
0	root	32610	running	0	75:16:52.277	0	pktengmgr
0	root	32601	running	0	75:16:52.321	0	remctr
0	root	32598	running	0	75:16:52.325	0	rtmgr
0	root	32606	running	0	75:16:52.295	0	snmpagt
0	root	32603	running	0	75:16:52.312	0	statmgr

Related: [process stop](#)

Commands: [process suspend](#)

[show process all](#)

[show process mandatory](#)

[show process name](#)

process stop

Syntax: process stop proc-name [proc-inst]

Description: Stop a QoE process indicated by the process name and the process instance.



Note
If the stopped process is a mandatory QoE process, the CTRMGR process will automatically restart the stopped process.
This command should only be used if requested by Cambium Networks support.

Mode: Operation mode.

Profile: Administrator.

Examples: Stop the bta process with instance ID 1.

```
admin@bqn# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	27080	running	0	0:00:04.478	0	bqnsh
0	root	32599	running	0	75:16:52.328	0	cfgmgr
0	root	32566	running	0	75:16:52.391	0	ctrmgr
0	root	32600	running	0	75:16:52.325	0	dnsmgr
0	root	32607	running	0	75:16:52.280	0	ipmgr
0	root	32602	running	0	75:16:52.319	0	licmgr
0	root	32605	running	0	75:16:52.294	0	osrv
0	root	32616	running	0	75:16:52.270	0	pkteng
0	root	32725	running	0	75:16:52.136	1	pkteng
0	root	32726	running	0	75:16:52.122	2	pkteng
0	root	32727	running	0	75:16:52.108	3	pkteng
0	root	32610	running	0	75:16:52.277	0	pktengmgr
0	root	32601	running	0	75:16:52.321	0	remctr
0	root	32598	running	0	75:16:52.325	0	rtmgr
0	root	32606	running	0	75:16:52.295	0	snmpagt
0	root	32603	running	0	75:16:52.312	0	statmgr

```
admin@bqn0# process stop pkteng 1
```



Note
The mandatory process has been restarted and the respawn counter has been incremented.

```
admin@bqn0# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	27080	running	0	0:00:04.478	0	bqnsh
0	root	32599	running	0	75:16:52.328	0	cfgmgr

0	root	32566	running	0	75:16:52.391	0	ctrmgr
0	root	32600	running	0	75:16:52.325	0	dnsmgr
0	root	32607	running	0	75:16:52.280	0	ipmgr
0	root	32602	running	0	75:16:52.319	0	licmgr
0	root	32605	running	0	75:16:52.294	0	osrv
0	root	32616	running	0	75:16:52.270	0	pkteng
0	root	32725	running	1	75:16:52.136	1	pkteng
0	root	32726	running	0	75:16:52.122	2	pkteng
0	root	32727	running	0	75:16:52.108	3	pkteng
0	root	32610	running	0	75:16:52.277	0	pktengmgr
0	root	32601	running	0	75:16:52.321	0	remctr
0	root	32598	running	0	75:16:52.325	0	rtmgr
0	root	32606	running	0	75:16:52.295	0	snmpagt
0	root	32603	running	0	75:16:52.312	0	statmgr

Related: [process resume](#)

Commands: [process suspend](#)

[show process all](#)

[show process mandatory](#)

[show process name](#)

process suspend

Syntax: process suspend proc-name [proc-inst]

Description: Stop a mandatory QoS process and suspend it from restarting. To restart a suspended process use the [process resume](#) command.



Note

This command should only be used if requested by Cambium Networks support.

Mode: Operation mode.

Profile: Administrator.

Examples: Suspend the bta process with instance ID 1.

```
admin@bqn# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	27080	running	0	0:00:04.478	0	bqnsh
0	root	32599	running	0	75:16:52.328	0	cfgmgr

```

0    root    32566    running  0          75:16:52.391  0    ctrmgr
0    root    32600    running  0          75:16:52.325  0    dnsmgr
0    root    32607    running  0          75:16:52.280  0    ipmgr
0    root    32602    running  0          75:16:52.319  0    licmgr
0    root    32605    running  0          75:16:52.294  0    ossrv
0    root    32616    running  0          75:16:52.270  0    pkteng
0    root    32725    running  0          75:16:52.136  1    pkteng
0    root    32726    running  0          75:16:52.122  2    pkteng
0    root    32727    running  0          75:16:52.108  3    pkteng
0    root    32610    running  0          75:16:52.277  0    pktengmgr
0    root    32601    running  0          75:16:52.321  0    remctr
0    root    32598    running  0          75:16:52.325  0    rtmgr
0    root    32606    running  0          75:16:52.295  0    snmpagt
0    root    32603    running  0          75:16:52.312  0    statmgr

```

```
admin@bqn0# process suspend pkteng 1
```



Note

The mandatory process is now in suspended state.

```
admin@bqn0# show process all
```

```

bqn  USER      PID      STATE   RESPAWN  TIME          INST  PROCESS
0    bqnadm    27080    running  0          0:00:04.478  0    bqnsn
0    root     32599    running  0          75:16:52.328  0    cfgmgr
0    root     32566    running  0          75:16:52.391  0    ctrmgr
0    root     32600    running  0          75:16:52.325  0    dnsmgr
0    root     32607    running  0          75:16:52.280  0    ipmgr
0    root     32602    running  0          75:16:52.319  0    licmgr
0    root     32605    running  0          75:16:52.294  0    ossrv
0    root     32616    running  0          75:16:52.270  0    pkteng
0    root     32725    running  0          75:16:52.136  1    pkteng
0    root     32726    running  0          75:16:52.122  2    pkteng
0    root     32727    running  0          75:16:52.108  3    pkteng
0    root     32610    running  0          75:16:52.277  0    pktengmgr
0    root     32601    running  0          75:16:52.321  0    remctr
0    root     32598    running  0          75:16:52.325  0    rtmgr
0    root     32606    running  0          75:16:52.295  0    snmpagt

```

Related: [process resume](#)

Commands: [process stop](#)

[show process all](#)

[show process mandatory](#)

[show process name](#)

profile access

Syntax: profile access profile-name

no profile access profile-name

Description: Defines an access profile. This type of profile is a list of IP addresses and/or IP ranges on the access side of the QoE (subscriber IPs).

Use the no command form to remove the profile.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines an access profile with two IP address and an IP range:

```
admin@bqn0# configure
admin@bqn0(config)# profile access my-profile
admin@bqn0(config-pfacc)# address 10.10.0.20
admin@bqn0(config-pfacc-accaddr)# exit
admin@bqn0(config-pfacc)# address 10.10.0.21
admin@bqn0(config-pfacc-accaddr)# exit
admin@bqn0(config-pfacc)# address 192.168.0.0/16
admin@bqn0(config-pfacc-accaddr)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show profile access

NAME          ADDRESS          PORTS
my-profile    192.168.0.0/16   0
my-profile    10.10.0.20/32    0
my-profile    10.10.0.21/32    0

admin@bqn0(config)#
```

Related: [address](#)

Commands: [profile internet](#)

[rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile access](#)

profile dpi

Syntax: profile dpi profile-name

no profile dpi profile-name

Description: Defines a DPI profile. This type of profile is a list of DPI domain patterns to check against the DPI information obtained from a flow.

Domain patterns can use * as a wildcard character. Only a maximum of two wildcard characters are supported in a domain pattern. The pattern also specifies the protocol and the field source of the DPI information that will be compared for a match. Currently, the following are supported:

- http host: hostname part of HTTP protocol.
- https sni: SNI field part of HTTPs protocol.
- quic sni: SNI field part of QUIC protocol.
- quic mvfst: MVFST variant of QUIC protocol. This protocol does not support patterns.

Use the no command form to remove the profile.

If two DPI profiles match the traffic, an optional priority field can be used to decide which one will take precedence. Priorities are defined per domain pattern and the one with the lowest number will take precedence.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a DPI profile with different domain patterns

```
admin@bqn0# configure
admin@bqn0(config)# profile dpi my-service
admin@bqn0(config-pfdpi)# http host *.mydomain.com
admin@bqn0(config-pfdpi)# https sni myprefix*mydomain.net
admin@bqn0(config-pfdpi)# quic sni *mysubdomain*
admin@bqn0(config-pfdpi)# quic mvfst
admin@bqn0(config-pfdpi)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show profile dpi

NAME          PRIORITY  HOST
my-service    0          4

my-service
```

```
admin@bqn0 (config) #
```

A second profile can be added with an overlap with previous profile, but using priorities we can make sure this second profile will take precedence:

```
admin@bqn0# configure
admin@bqn0 (config)# profile dpi my-service
admin@bqn0 (config-pfdpi)# priority 20
admin@bqn0 (config-pfdpi)# root
admin@bqn0 (config)# profile dpi my-service-bis
admin@bqn0 (config-pfdpi)# http host *.mydomain.com
admin@bqn0 (config-pfdpi)# priority 10
admin@bqn0 (config)# commit
admin@bqn0 (config)# op show profile dpi

NAME          PRIORITY  HOST
my-service    20        4
my-service-bis 10        1

admin@bqn0 (config) #
```

Related: [rule flow](#)

Commands: [rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile dpi](#)

profile interface

Syntax: profile interface profile-name

no profile interface profile-name

Description: Defines an interface profile. This type of profile is a list of network interface identifiers.

Use the no command form to remove the profile.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines an interface profile with two interfaces. The interface IDs must match those of these two interfaces.

```
admin@bqn0# configure
admin@bqn0 (config)# interface en0o3
admin@bqn0 (config-iface)# interface-id 0x1
admin@bqn0 (config-iface)# root
```

```

admin@bqn0(config)# interface en0o4
admin@bqn0(config-iface)# interface-id 0x1
admin@bqn0(config-iface)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show profile interface

NAME      ID
wire-A    0x1

admin@bqn0(config)#

```

Related: [interface](#)

Commands: [rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile interface](#)

profile internet

Syntax: profile internet profile-name

no profile internet profile-name

Description: Defines an internet profile. This type of profile is a list of IP addresses and/or IP ranges on the Internet side of the QoE (content server IPs).

Use the no command form to remove the profile.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines an internet profile with two IP address and an IP range:

```

admin@bqn0# configure
admin@bqn0(config)# profile internet server-ips
admin@bqn0(config-pfinet)# address 74.6.143.25
admin@bqn0(config-pfinet-inetaddr)# tcp port 443
admin@bqn0(config-pfinet-inetaddr)# udp port 443
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 74.6.143.26
admin@bqn0(config-pfinet-inetaddr)# tcp port 443
admin@bqn0(config-pfinet-inetaddr)# udp port 443
admin@bqn0(config-pfinet-inetaddr)# exit
admin@bqn0(config-pfinet)# address 216.58.192.0/19

```



```

admin@bqn0 (config-pfinet-inetaddr) # root
admin@bqn0 (config) # commit
admin@bqn0 (config) # op show profile internet

NAME          ADDRESS          PORTS
server-ips    216.58.192.0/19  0
server-ips    74.6.143.25/32   2
server-ips    74.6.143.26/32   2

admin@bqn0 (config) #

```

Related: [address](#)

Commands: [rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile interface](#)

[profile access](#)

profile policy-rate

Syntax: *profile policy-rate profile-name*

no profile policy-rate profile-name

Description: Defines a policy rate profile. This type of profile is a list of policy rate name patterns to check against the policy rate assigned to the subscriber session

Patterns can use * as a wildcard character. Only a maximum of two wildcard characters are supported in a domain pattern.

Use the no command form to remove the profile.

If two policy rate profiles match the policy rate name, an optional priority field can be used to decide which one will take precedence. Priorities are defined per pattern and the one with the lowest number will take precedence.

Policy rate profiles can only be used in policy flow rules, to influence the selection of a policy flow based on the policy rate assigned to the subscriber.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a policy rate profile that matches policy rate names containing the words gold or matching the policy name rate-premium.

```

bqnadm@bqn0 # configure
bqnadm@bqn0 (config) # profile policy-rate vips-plans
bqnadm@bqn0 (config-pfprate) # policy-rate *gold*

```

```

bqnadm@bqn0(config-pfprate)# policy-rate rate-premium
bqnadm@bqn0(config-pfprate)# root
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)# op show profile policy-rate

NAME          POLICY-RATE  PRIORITY
vips-plans    *gold*      9999
vips-plans    rate-premium 9999

admin@bqn0(config)#

```

Related: [rule flow](#)

Commands: [show profile](#)
[show profile policy-rate](#)

profile selection sub-attr

Syntax: profile selection sub-attr *attribute*

no profile selection sub-attr *attribute*

Description: Defines the RADIUS parameter that will be used to find a match with subscriber attribute profiles (sub-attr).

Supported attribute and their types are as follows:

- *calling-station-id*: string.
- *nas-id*: string.
- *nas-ip-address*: IP address.
- *nas-port*: number.
- *user-name*: string.

The sub-attr profiles used in the rules must contain at least one entry of the type of the RADIUS parameter selected.

Use the no command form to remove the selection.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example sets the nas-ip-address RADIUS attribute as the one used to find a match in profiles of type sub-attr

```

bqnadm@bqn0# configure
bqnadm@bqn0(config)# profile selection sub-attr nas-ip-address
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)#

```

Related: [profile sub-attr](#)

Commands: [rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile sub-attr](#)

profile sub-attr

Syntax: profile sub-attr *profile-name*.

no profile sub-attr *profile-name*

Description: Defines a subscriber attribute profile. This type of profile is a list of entries that can match attributes received from the RADIUS API.

There are three types of entries:

- number: an integer
- ip: an IP address (only IPv4 supported).
- string: a chain of characters.

Which RADIUS attribute to use is defined by the profile selection sub-attr command. The profiles used in the rules must contain at least one entry of the type of the RADIUS parameter selected.

Use the no command form to remove the profile.

If two profiles match the same attribute, an optional priority field can be used to decide which one will take precedence. Priorities are defined per profile and the one with the lowest number will take precedence.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example sets the nas-ip-address RADIUS attribute as the one used to find a match in profiles of type sub-attr

```
bqnadm@bqn0# configure
bqnadm@bqn0(config)# profile sub-attr subnet-A
bqnadm@bqn0(config-pfsattr)# number 157432
bqnadm@bqn0(config-pfsattr)# number 157433
bqnadm@bqn0(config-pfsattr)# number 157434
bqnadm@bqn0(config-pfsattr)# root
bqnadm@bqn0(config)# profile selection sub-attr nas-port
bqnadm@bqn0(config)# commit
bqnadm@bqn0(config)# op show profile subnet-A
NAME TYPE VALUE PRIORITY
subnet-A number 157432 n/a
subnet-A number 157433 n/a
```

```
subnet-A number 157434 n/a
bqnadm@bqn0 (config) #
```

Related: [profile selection sub-attr](#)

Commands: [rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile sub-attr](#)

profile throughput

Syntax: profile throughput profile-name

no profile throughput profile-name

Description: Defines a throughput profile. This type of profile defines a threshold in the overall traffic throughput going through the QoE in the downlink direction. If the threshold is exceeded, the profile gives a match.

Use the no command form to remove the profile.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines a throughput profile with 1.5 Gbps of threshold.

```
admin@bqn0# configure
admin@bqn0 (config) # profile throughput above-1.5Gbps
admin@bqn0 (config-pftp) # threshold 1500000
admin@bqn0 (config-pftp) # root
admin@bqn0 (config) # commit
admin@bqn0 (config) # op show profile throughput

NAME                THRESHOLD-Kbps
above-1.5Gbps      1500000

admin@bqn0 (config) #
```

Related: [profile access](#)

Commands: [rule flow](#)

[rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile interface](#)

[show profile throughput](#)

profile vlan

Syntax: profile vlan profile-name

no profile vlan profile-name

Description: Defines a VLAN profile. This type of profile defines a list of VLAN tags.

Use the no command form to remove the profile.

Mode: Top configuration mode.

Profile: Administrator.

Examples: This example defines two VLAN profiles, one with three tags and another for traffic without any tag:

```
admin@bqn0# configure
admin@bqn0(config)# profile vlan myvlans
admin@bqn0(config-pfvlan)# vlan 10
admin@bqn0(config-pfvlan)# vlan 10
admin@bqn0(config-pfvlan)# vlan 30
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# profile vlan no-vlan
admin@bqn0(config-pfvlan)# vlan none
admin@bqn0(config-pfvlan)# root
admin@bqn0(config)# commit
admin@bqn0(config)# op show profile vlan

NAME      VLAN
myvlans   10
myvlans   20
myvlans   30
no-vlan   none

admin@bqn0(config)#
```

Related: [rule flow](#)

Commands: [rule monitor](#)

[rule rate](#)

[show profile](#)

[show profile vlan](#)

quic mvfst

Syntax: quic mvfst

```
no quic mvfst
```

Description: As part of a DPI profile, it indicates that the [MVFAST](#) QUIC by Facebook protocol should be detected.

Mode: [profile dpi](#) configuration mode.

Profile: Administrator.

Examples: Enable MVFAST detection.

```
admin@bqn(config)# profile dpi mydpi
admin@bqn(config-pfdpi)# quic mvfst
```

Related: [http host](#)

Commands: [https sni](#)

[profile dpi](#)

[quic sni](#)

quic sni

Syntax: quic sni pattern

```
no quic sni pattern
```

Description: As part of a DPI profile, it defines an entry for QUIC traffic with the given SNI pattern domain. The * is a wildcard character and can be placed at the beginning, end, or middle of the pattern, up to 2 times.

Mode: [profile dpi](#) configuration mode.

Profile: Administrator.

Examples: Define several QUIC SNI domains for mydpi profile.

```
admin@bqn(config)# profile dpi mydpi
admin@bqn(config-pfdpi)# quic sni *mydomain.com
admin@bqn(config-pfdpi)# quic sni *mysubdomain*
admin@bqn(config-pfdpi)# quic sni myprefix*
```

Related: [http host](#)

Commands: [https sni](#)

[profile dpi](#)

[quic mvfst](#)

rate

Syntax: rate limit

no rate limit

Description: Set a speed limit in a flow or rate policy. The speed limit is given by limit in Kbps.

Mode: [policy flow](#) configuration mode. [policy rate](#) configuration mode.

Profile: Administrator.

Examples: Limit of 100Mbps on the downlink direction.

```
admin@bqn0# configure
admin@bqn0(config)# policy rate rate-100Mbps
admin@bqn0(config-polrate)# rate-limit downlink
admin@bqn0(config-polrate-rrldown)# rate 100000
admin@bqn0(config-polrate-rrldown)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [policy rate](#)

[burst-duration](#)

[burst-rate](#)

[burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[rate-limit \(policy rate\)](#)

[shaping](#)

rate-limit (policy flow)

Syntax: rate-limit

no rate-limit

Description: Makes the flow policy subject to any limits defined by a rate policy. This is the default.

To make the flow policy free from rate policy limits, use the no command form. This option will make traffic matching this flow policy unrestricted by rate policies (and could go above a subscriber plan, for example).

Mode: [policy flow](#) configuration mode.

Profile: Administrator.

Examples: Disable rate-limit in norate policy.

```
admin@bqn0# configure
admin@bqn0(config)# policy flow norate
admin@bqn0(config-polflow)# no rate-limit
admin@bqn0(config-polflow)# root
```

```
admin@bqn0 (config) #
```

Related: [policy flow](#)

Commands: [policy rate](#)

[rate-limit \(policy rate\)](#)

rate-limit (policy rate)

Syntax: rate-limit {downlink | uplink}

```
no rate-limit {downlink | uplink}
```

Description: Enters the rate limitation configuration mode of a rate policy in either the downlink or uplink direction.

Mode: [policy rate](#) configuration mode.

Profile: Administrator.

Examples: Enter rate limitation settings in a policy.

```
admin@bqn0# configure
admin@bqn0 (config)# policy rate rate-100Mbps
admin@bqn0 (config-polrate)# rate-limit downlink
admin@bqn0 (config-polrate-rrldown)# rate 100000
admin@bqn0 (config-polrate-rrldown)# root
admin@bqn0 (config) #
```

Related: [policy rate](#)

Commands: [burst-duration](#)

[burst-rate](#)

[burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[rate](#)

[rate-limit \(policy flow\)](#)

remctr bqnmgr

Syntax: remctr bqnmgr ip-address [port-number]

```
no remctr bqnmgr ip-address [port-number]
```

Description: Sets the IP address of the remote controller. Optionally, a port number other than the default can be specified.

This command is used for testing. In the rest of the situations, the default IP and ports are the ones to use. Using different values will prevent QoE from being monitored, in particular from getting valid licenses.

To revert back to the default look and feel, use the no command.

Mode: System configuration mode.

Profile: Administrator.

Examples:

```
admin@bqn(config)# system
admin@bqn(config-system)# remctr bqnmgr 10.10.10.34
admin@bqn(config-system)# commit
```

Related: [remctr disabled](#)

Commands: [system](#)

remctr disabled

Syntax: remctr disabled

```
no remctr disabled
```

Description: Disables the communication of the QoE with the remote controller. By default, the remote controller is contacted and this is the recommended setup. Disabling the remote controller will prevent the QoE from being monitored, in particular from getting valid licenses.

To enable the communication with the remote controller, use the no command.

Mode: System configuration mode.

Profile: Administrator.

Examples:

```
admin@bqn(config)# system
admin@bqn(config-system)# remctr disabled
admin@bqn(config-system)# commit
```

Related: [remctr bqnmgr](#)

Commands: [system](#)

ring-slot

Syntax: ring-slot rx-size tx-size

```
no ring-slot rx-size tx-size
```

Description: Set the number of slots for the receive and transmit rings of an interface.

By default, the maximum allowed value is set. Note that this setting is only valid for physical interfaces.

Use the no command form to restore the maximum entry number.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Set the number of RX/TX entries to 256 and 512 respectively.

```
admin@bqn# show interface en0p0s16
en0p0s16: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:d7:28:b0
Link detected: yes      Auto-negotiation:on
Duplex: Full            Speed: 1000Mbs
GRO: off                GSO: off
LRO: off                TSO:off
RxChecksumOffload: on   TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a    ChannelOther: n/a
RingSlotRx: 4096/4096   RingSlotTx: 4096/4096
MTU: 1500               tx_bytes: 0
rx_bytes: 0
rx_packets: 0           tx_packets: 0
rx_errors: 0            tx_errors: 0
rx_dropped: 0           tx_dropped: 0
rx_overrun: 0           tx_carrier: 0
rx_multicast: 0         tx_collision: 0
Index:5

admin@bqn# configure
admin@bqn(config)# interface en0p0s16
admin@bqn(config-iface)# ring-slot 256 512
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# op show interface en0p0s16
en0p0s16: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:d7:28:b0
Link detected: yes      Auto-negotiation:on
Duplex: Full            Speed: 1000Mbs
GRO: off                GSO: off
LRO: off                TSO:off
RxChecksumOffload: on   TxQueueLen: 1000
```

```
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 256/4096  RingSlotTx: 512/4096
MTU: 1500              tx_bytes: 0
rx_bytes: 0
rx_packets: 0          tx_packets: 0
rx_errors: 0           tx_errors: 0
rx_dropped: 0         tx_dropped: 0
rx_overrun: 0         tx_carrier: 0
rx_multicast: 0       tx_collision: 0
Index:5
```

Related: [interface](#)

Commands: [show interface](#)

root

Syntax: root

Description: This command is used to go back to the top configuration mode from within any configuration sub-mode.

Mode: Any configuration sub-mode.

Profile: Administrator.

Examples: Go back to configuration mode.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# root
admin@bqn(config)#
```

Related: [configure](#)

Commands:

route

Syntax: route dst via gw

```
no route dst via gw
```

Description: Create a static route to the dst destination network using the gateway gw.

The format of the dst parameter is:

```
address[/prefix]
```

where address is a valid dotted quad IP address and prefix is a number that encodes the network prefix length. If the optional prefix is not provided, the network prefix length 32 is used for the new IP address. To indicate the default route, the value of the dst parameter must be 0.0.0.0/0.

The parameter gw must be a valid dotted quad IP address.

Use the no command form to remove and delete a static route.

Mode: Static router configuration mode.

Profile: Administrator.

Examples: In this example the user creates a static route.

```
admin@bqn# configure
admin@bqn(config)# router static
admin@bqn(config-static)# route 192.168.2.0/24 via 192.168.1.1
admin@bqn(config-static)# commit
admin@bqn(config-static)# end
admin@bqn# show ip route
```

IFACE	DESTINATION	GATEWAY	FLAGS
lo0	127.0.0.0/8	-	U
en0p0s17	192.168.1.0/24	-	U
en0p0s17	192.168.2.0/24	192.168.1.1	UG

In this example the user creates a default gateway

```
admin@bqn# configure
admin@bqn(config)# router static
admin@bqn(config-static)# route 0.0.0.0/0 via 192.168.1.1
admin@bqn(config-static)# commit
admin@bqn(config-static)# end
admin@bqn# show ip route
```

IFACE	DESTINATION	GATEWAY	FLAGS
lo0	127.0.0.0/8	-	U
en0p0s17	0.0.0.0/0	192.168.1.1	UG

Related: [net ping](#)

Commands: [net tracepath](#)

[router static](#)

[show ip route](#)

router static

Syntax: router static

no router static

Description: Enter static router configuration mode, where static routing is defined.



Note

The CLI session prompt changes when entering and leaving static router mode.

Use the no command form to remove all static routing definitions, in which case all defined static routes will be deleted.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters static router mode.

```
admin@bqn# configure
admin@bqn(config)# router static
admin@bqn(config-static)#
```

Related: [ip address](#)

Commands: [show ip route](#)

rule flow

Syntax: rule flow {any | profile-name...} policy policy-name

no rule flow {any | profile-name...} policy policy-name

Description: Defines a flow policy rule. It specifies a list of profiles and flow policy to apply if the traffic matches the profiles. Use any of the rules that have no profiles (the policy will apply if no other flow rules are applied before). A maximum of one profile per profile type can be specified. The allowed profiles in their evaluation order are as follows: types are:

- Interface Profile
- VLAN Profile
- Internet Profile
- Access Profile
- Throughput profile
- DPI profile

The profiles for all the flow rules are checked in the evaluation order. If there is more than one match, the more specific profile takes precedence (e.g. for two access profiles, 10.0.0.0/8 and 10.10.10.10/32, the second one is more specific). If multiple matches cannot be resolved, a rule conflict is reported, and the conflicting rules should be modified so the conflict disappears.

Use the no command form to remove the rule.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Define two rules, one matching a VLAN profile and Access profile, another rule as default:

```
admin@bqn0# configure
admin@bqn0(config)# rule flow vlan-A access-2 policy flow-20Mbps
admin@bqn0(config)# rule flow any policy flow-default
admin@bqn0(config)# commit

admin@bqn0(config)# op show rule flow

IDPF-RANDOM  PF-          PF-          PF-          PF-          ...POLICY
              INTERFACE  VLAN        INTERNET    ACCESS
116 n/a      n/a         n/a         n/a         n/a         . . . flow-
              . . . default
115 n/a      n/a         vlan-A     n/a         access-2    . . . flow-20Mbps

admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [profile access](#)

[profile dpi](#)

[profile interface](#)

[profile internet](#)

[profile throughput](#)

[profile vlan](#)

[show rule flow](#)

[show rule error](#)

rule monitor

Syntax: rule monitor {any | profile-name...} policy policy-name

no rule monitor {any | profile-name...} policy policy-name

Description: Defines a monitor policy rule. It specifies a list of profiles and the monitor policy to apply if the traffic matches the profiles. Use any, if the rule has no profile (the policy will apply if no other monitor rules were applied before). A maximum of one profile per profile type can be specified. The allowed profiles in their evaluation order are as follows:

- Interface Profile
- VLAN Profile
- Access Profile

The profiles for all the monitor rules are checked in the evaluation order. If there are more than one match, the more specific profile takes precedence (e.g. for two access profiles, 10.0.0.0/8 and

10.10.10.10/32, the second one is more specific). If multiple matches cannot be resolved, a rule conflict is reported and the conflicting rules should be modified so the conflict disappears.

Use the no command form to remove the rule.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Define two rules, one matching an Access profile, another rule as default:

```
admin@bqn0# configure
admin@bqn0(config)# rule monitor my-ip policy monitor-full
admin@bqn0(config)# rule monitor any policy monitor-default
admin@bqn0(config)# commit

admin@bqn0(config)# op show rule flow

IDPF-RANDOM  PF-INTERFACE  PF-VLAN  PF-ACCESS  ...POLICY
118 n/a      n/a      n/a      n/a      . . . monitor-default
117 n/a      n/a      n/a      my-ip    . . . monitor-full

admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [profile access](#)

[profile interface](#)

[profile vlan](#)

[show rule error](#)

[show rule monitor](#)

rule rate

Syntax: rule rate {any | profile-name...} policy policy-name

no rule rate {any | profile-name...} policy policy-name

Description: Defines a rate policy rule. It specifies a list of profiles and the rate policy to apply if the traffic matches the profiles. Use any of the rules has no profile (the policy will apply if no other rate rules are applied before). A maximum of one profile per profile type can be specified. The allowed profiles in their evaluation order are as follows: types are:

- Interface Profile
- VLAN Profile
- Access Profile

The profiles for all the rate rules are checked in the evaluation order. If there is more than one match, the more specific profile takes precedence (for example, for two access profiles, 10.0.0.0/8 and 10.10.10.10/32, the second one is more specific). If multiple matches cannot

be resolved, a rule conflict is reported and the conflicting rules should be modified so the conflict disappears.

Use the no command form to remove the rule.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Define two rules, one matching a VLAN profile, another rule as default:

```
admin@bqn0# configure
admin@bqn0(config)# rule monitor vlan-A policy rate-60Mbps
admin@bqn0(config)# rule monitor any policy rate-default
admin@bqn0(config)# commit
admin@bqn0(config)# op show rule flow

IDPF-RANDOM  PF-INTERFACE  PF-VLAN  PF-ACCESS  ...POLICY
120 n/a      n/a      n/a      n/a      . . . rate-default
119 n/a      n/a      vlan-A  n/a      . . . rate-60Mbps

admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [profile access](#)

[profile interface](#)

[profile vlan](#)

[show rule error](#)

[show rule rate](#)

rx-cksum-offload

Syntax: rx-cksum-offload

```
no rx-cksum-offload
```

Description: Enable or disable the receive checksum offload functionality of a network interface.

When a new interface is configured, receive checksum offloading is enabled by default. When enabled, the rx-cksum-offload command is not displayed in the interface configuration. In PKTENG interfaces, when hardware RX checksum offload is enabled, the integrity of the captured TCP packets is validated by the network card, and the software does not require to calculate the checksum of the packets to validate them.

Most modern network interfaces support hardware RX checksum offloading; however, virtual interfaces, PPPoE traffic, and some virtual machines may not provide hardware checksum offload, in which case the checksum is calculated (unless the [strict-rx-cksum-offload](#) command is configured for that interface).

Use the no command form to disable hardware RX checksum offload.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Disable hardware RX checksum offloading on a network interface.

```
admin@bqn0# show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:38:04:5d
Link detected: yes      Auto-negotiation:on
Duplex: Full            Speed: 1000Mbs
GRO: off                GSO: off
LRO: off                TSO:off
RxChecksumOffload: on   TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a    ChannelOther: n/a
RingSlotRx: 4096/4096  RingSlotTx: 4096/4096
MTU: 1500                tx_bytes: 391063
rx_bytes: 317277
rx_packets: 2419         tx_packets: 4567
rx_errors: 0             tx_errors: 0
rx_dropped: 0           tx_dropped: 0
rx_overrun: 0           tx_carrier: 0
rx_multicast:2024       tx_collision: 0
Index: 2

admin@bqn0# configure
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-if)# no rx-cksum-offload
admin@bqn0(config-if)# commit
admin@bqn0(config-if)# op show interface en0p0s8

en0p0s8: UP BROADCAST RUNNING MULTICAST

Link type: ethernet      MAC: 08:00:27:38:04:5d
Link detected: yes      Auto-negotiation:on
Duplex: Full            Speed: 1000Mbs
GRO: off                GSO: off
LRO: off                TSO:off
RxChecksumOffload: on   TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
```

```
ChannelCombined: n/a    ChannelOther: n/a
RingSlotRx: 4096/4096  RingSlotTx: 4096/4096
MTU: 1500               tx_bytes: 391227
rx_bytes: 317359
rx_packets: 2420        tx_packets: 4569
rx_errors: 0            tx_errors: 0
rx_dropped: 0          tx_dropped: 0
rx_overrun: 0          tx_carrier: 0
rx_multicast:2025      tx_collision: 0
Index: 2
```

Related: [interface](#)

Commands: [show interface](#)

[strict-rx-cksum-offload](#)

save config

Syntax: save config file-name [running] [force]

Description: Save the configuration into ASCII file format. By default, the candidate configuration is saved unless the running parameter is indicated, in which case the running configuration is saved.

The force parameter is used to rewrite an existing file.

If file-name does not specify a full PATH, then the file is stored in the HOME directory of the user executing the command.

The file generated by this command can be loaded with the [load config](#) command.

Mode: Any configuration mode.

Profile: Administrator.

Examples: Save the candidate configuration to the file tmp.conf.

```
admin@bqn(config)# save config tmp.conf
Saved candidate configuration at "tmp.conf" (398 bytes) admin@bqn(config)#
Try to save the running configuration into the same file tmp.conf.
admin@bqn(config)# save config tmp.conf running
%ERR-EALREADY: File "tmp.conf" already exists
admin@bqn(config)# save config tmp.conf running force Saved running
configuration at "tmp.conf" (396 bytes)
admin@bqn(config)#
```

Related: [load config](#)

Commands: [show config candidate](#)

[show config running](#)

sdr

Syntax: sdr [initial-percentage final-percentage]

no sdr [initial-percentage final-percentage]

Description: Set the traffic to be counted in SDR records. If no percentages are specified, all traffic matching the policy will generate SDRs. If a range of percentages is specified, flows falling randomly within the range will generate SDRs. Percentage ranges are rarely used.

Mode: [policy monitor](#) configuration mode.

Profile: Administrator.

Examples: Enable SDR generation in mypolicy policy.

```
admin@bqn0 (config) # policy monitor mypolicy
admin@bqn0 (config-polflow) # sdr
admin@bqn0 (config-polflow) # root
admin@bqn0 (config) #
```

Related: [policy monitor](#)

Commands: [show policy](#)

[udr](#)

sdr aggregation

Syntax: sdr aggregation after *DAYS*

sdr aggregation min-file *MIN-SECONDS*

sdr aggregation period *PERIOD-SECONDS*

no sdr aggregation after *DAYS*

no sdr aggregation min-file *MIN-SECONDS*

no sdr aggregation period *PERIOD-SECONDS*

Description: The BQN aggregates several old SDR records of the same subscriber into a single SDR to save storage and processing. This aggregation is done in order to support subscriber statistics several weeks back in time. This command configures the following parameters controlling the aggregation process:

- **after DAYS:** aggregation is performed on SDR records older than this number of days. 7 days by default.
- **min-file MIN-SECONDS:** aggregation is done on SDR files which covers at least a period of time of this number of seconds. 21600 seconds by default, 6 hours.
- **period PERIOD-SECONDS:** aggregation period in seconds. 3600 seconds by default, meaning that all SDRs of the same subscriber within an hour will be aggregated into one record.

Use the no command form to restore the default parameters.

Mode: [PKTENG](#) configuration mode.

Profile: Administrator.

Examples: To aggregated SDRs older than two weeks in half an hour periods:

```
bqnadm@bqn# configure
bqnadm@bqn(config)# pkteng
bqnadm@bqn(config-pkteng)# sdr aggregation after 14
bqnadm@bqn(config-pkteng)# sdr aggregation period 1800
bqnadm@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [sdr](#)

[sdr deletion](#)

[show pkteng parameters](#)

sdr deletion

Syntax: sdr deletion after *DAYS*

no sdr deletion after *DAYS*

Description: This command sets the SDR age in days. That is SDRs older than this value will be removed from the BQN server. It is set to 93 days by default.

Use the no command form to restore the default value:

Mode: [PKTENG](#) configuration mode.

Profile: Administrator.

Examples: To remove SDR after one month:

```
bqnadm@bqn# configure
bqnadm@bqn(config)# pkteng
bqnadm@bqn(config-pkteng)# sdr deletion after 31
bqnadm@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [sdr](#)

[sdr aggregation](#)

[show pkteng parameters](#)

sdr mode

Syntax: sdr mode {private | public}

no sdr mode {private | public}

Description: Configure if client IP addresses are encrypted in SDRs (private mode) or not (public mode).

The default is the private mode, and it is the mode recommended to preserve clients' privacy. Use the no command form to restore the default mode.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set SDR public mode.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# sdr mode public
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [sdr](#)

[show pkteng parameters](#)

sdr partials

Syntax: sdr partials

```
no sdr partials
```

Description: Control the generation of partial SDRs. By default, partial SDRs are generated.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable partial SDR generation.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# no sdr partials
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [sdr](#)

[show pkteng parameters](#)

server

Syntax: server ntp-server

```
no server ntp-server
```

Description: Define an NTP server using its IP address. Multiple servers may be configured.

Once the NTP service is configured and active, the system clock can synchronize to the remote server clock, but not in the opposite direction.

Use the no command form to remove an NTP server from the configuration.

Mode: NTP configuration mode.

Profile: Administrator.

Examples: In this example the NTP service is configured and one NTP server is defined.

```
admin@bqn(config)# service ntp
admin@bqn(config-ntp)# server 192.168.1.1
admin@bqn(config-ntp)# commit
admin@bqn(config-ntp)#
```

Related: [service ntp](#)

Commands: [show service ntp](#)

[show system ntp](#)

service ntp

Syntax: service ntp

no service ntp

Description: Configure the operating system NTP (Network Time Protocol) daemon, and enter the NTP configuration mode.

The NTP service requires that a management interface is defined. Besides, there must exist at least one NTP server.

The NTP daemon will listen for NTP traffic at UDP port 123 on all the IP addresses configured in the management interface.



Note

The CLI session prompt changes when entering and leaving ntp mode. Use the no command form to stop the NTP service.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the NTP service is configured and one NTP server is defined.

```
admin@bqn(config)# service ntp
admin@bqn(config-ntp)# server 192.168.1.1
admin@bqn(config-ntp)# commit
admin@bqn(config-ntp)#
```

Related: [management](#)

Commands: [server](#)

[show service ntp](#)

[show system date](#)

[show system ntp](#)

service ssh

Syntax: service ssh

no service ssh

Description: Configure the operating system SSH daemon that accepts SSH connections, and enter the SSH configuration mode.

The SSH service requires that a management interface is defined. The SSH daemon will listen for connections from clients at TCP port 22 on all the IP addresses configured in the management interface.



Note

The CLI session prompt changes when entering and leaving ssh mode.

Use the no command form to stop the SSH service. Note that if the SSH service is stopped then no more SSH connections will be accepted and remote access to the QoE is not possible.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the SSH service is configured on interface en0p0s17.

```
admin@bqn(config)# service ssh
admin@bqn(config-ssh)# exit
admin@bqn(config)# interface en0p0s17
admin@bqn(config-iface)# ip address 192.168.1.75/24
admin@bqn(config-iface)# management
admin@bqn(config-iface)# commit
admin@bqn(config-iface)#
```

Related: [allow](#)

Commands: [management](#)

[show service ssh](#)

service web

Syntax: service web

no service web

Description: Configure the web service that provides general QoE management using a graphics interface.

The web service starts an HTTPs server listening at TCP port 443 on all IP addresses defined in the management interface.

Use the no command form to stop the web service.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the SSH service is configured on interface enOp0s17.

```
admin@bqn(config)# service web
admin@bqn(config-web)# commit
admin@bqn(config-web)# exit
admin@bqn(config)# op show service web
bqnweb.service - bqn WEB Service
Loaded: loaded (/bqn/img/bqn/usr/lib/systemd/system/bqnweb.service)
Active: active (running) since Thu 2018-04-12 18:47:48 CEST; 24min ago
Main PID: 6879 (node)
CGroup: /system.slice/bqnweb.service
        \-6879 /usr/bin/node /opt/bqn/sbin/bqnguisv.js -a 172.28.28.78
```

Related: [allow](#)

Commands: [management](#)

[show service web](#)

set api radius client

Syntax: set api radius client client-ip [client-secret]

Description: Adds a RADIUS client with given IP address and secret. Use [clear api radius client](#) to remove it.

Mode: Operation mode.

Profile: Administrator.

Examples: Add a RADIUS client with 10.10.1.30 IP address and mysecret secret.

```
admin@bqn# show api radius client
admin@bqn# set api radius client 10.10.1.30 mysecret
admin@bqn# show api radius client
ADDRESS      SECRET
10.10.1.30   mysecret

admin@bqn# clear api radius client 10.10.1.30
admin@bqn# show api radius client
admin@bqn#
```

Related: [api radius](#)

Commands: [clear api radius client](#)

[show api radius client](#)

set api radius proxy

Syntax: set api radius proxy

Description: Sets a RADIUS proxy using the QoE management IP address and network interface. Use `clear api radius proxy` to remove it. To use an IP address and interface other than the ones used by management, use the commands under `api radius` mode.

Mode: Operation mode.

Profile: Administrator.

Examples: Set QoE as a RADIUS server.

```
admin@bqn# show api radius proxy
admin@bqn# set api radius proxy
admin@bqn# show api radius proxy

  IFACE  ADDRESS          STATE
-----  -
en0o1   192.168.0.121   ready

admin@bqn# clear api radius proxy
admin@bqn# show api radius proxy
admin@bqn#
```

Related: [api radius](#)

Commands: [clear api radius proxy](#)

[show api radius proxy](#)

set api rest client

Syntax: set api radius rest client-ip

Description: Adds a REST API client with given IP address. Use [clear api rest client](#) to remove it.

Mode: Operation mode.

Profile: Administrator.

Examples: Add a REST API client with 10.10.2.30 IP address.

```
admin@bqn# show api rest client
admin@bqn# set api rest client 10.10.2.30
admin@bqn# show api rest client

  ADDRESS  AUTHENTICATION
-----  -
10.10.2.30  yes

admin@bqn# clear api rest client 10.10.2.30
admin@bqn# show api rest client
admin@bqn#
```

Related: [api rest](#)

Commands: [clear api rest client](#)

[show api rest client](#)

set api rest server

Syntax: set api rest server [port]

Description: Sets a REST server using the QoE management IP address and network interface. Use the optional port parameter to use a port other than the default 3443. Use the [clear api rest server](#) command to remove it. To use an IP address and interface other than the ones used by management, use the commands under [api radius](#) mode.

Mode: Operation mode.

Profile: Administrator.

Examples: Enable REST API on QoE server.

```
admin@bqn# show api rest server
State: idle
Interface: n/a
Address: n/a
Port: 3443
admin@bqn# set api rest server
admin@bqn# show api rest server
State: ready
Interface: en0o1
Address: 192.168.0.121
Port: 3443
admin@bqn# clear api rest server
admin@bqn# show api rest server
State: idle
Interface: n/a
Address: n/a
Port: 3443
admin@bqn#
```

Related: [api rest](#)

Commands: [clear api rest server](#)

[show api rest server](#)

set api rest user

Syntax: set api rest user user-name user-password

Description: Adds a REST API user with the given name and password. A REST User can interact with the REST API from any of the configured REST clients. Use [clear api rest user](#) to remove it. The user is created with full access to the API methods. To create a user with restricted access, use the commands under [api rest](#) mode.

Mode: Operation mode.

Profile: Administrator.

Examples: Add a REST user with name myuser and password mypassword.

```
admin@bqn# show api rest user
admin@bqn# set api rest user myuser mypassword
admin@bqn# show api rest user

NAME      PASSWORD      RESTRICTED  AUTH-BASIC
myuser    mypassword    no          aX41c2vzOm15cGJzc3dvzmQ=

admin@bqn# clear api rest user myuser
admin@bqn# show api rest user
admin@bqn#
```

Related: [api rest](#)

Commands: [clear api rest user](#)

[show api rest user](#)

set bta optimization

Syntax: set bta optimization percentage [udr udr-pct] [sdr]

[rtta rtti-small rtti-large] [force]

Description: Assign a random percentage of acceleration. This command configures the appropriate optimization, tracking, metering, udr, and sdr options. It is equivalent to entering configuration mode and setting the options of default flow and monitoring policies.

If they do not exist, it will create a flow policy called flow-default and a monitor policy called monitor-default.

If there are unrecognized optimization rules configured, the command asks for permission to remove those rules, unless the force parameter is used, in which case the unrecognized rules are directly removed.

By default, no UDR is generated, unless the udr parameter is configured. The parameter udr-pct indicates the percentage of flows to generate UDRs.

If the rtta, rtti-small, and rtti-large values are provided, the RTT parameters are also configured. If the value of the RTT parameters is -1, then the configured RTT is reset to its default value. Note that the rtti-small value cannot be greater than rtti-large.

Mode: Operation mode.

Profile: Administrator.

Examples: Adjust delay thresholds and reduce UDR generation percentage to 1%.

```
admin@bqn# show bta optimization detail
Optimization: 99%
UDR generation: 2%
RTTa: 0.000000
RTTi-small: 0.010000
RTTi-large: 0.060000
admin@bqn# set bta optimization 99 udr 1 sdr 0 0.03 0.08
admin@bqn# show bta optimization detail
Optimization: 99.000000%
UDR generation: 1.000000%
RTTa: 0.000000
RTTi-small: 0.030000
RTTi-large: 0.080000
```

Related: [speed](#)

Commands: [optimization](#)

[policy flow](#)

[policy monitor](#)

[sdr](#)

[udr](#)

[show bta optimization](#)

[show pkteng parameters](#)

[tracking](#)

[wizard bta](#)

set interface firewall input

Syntax: set interface iface firewall input ip-range...

Description: Sets up to 32 IP ranges to the white list of that interface firewall. The management IP address must be added to the IP range or the connectivity to the server will be lost.

Use the clear interface firewall input command to remove the IP ranges and disable the firewall.

Mode: Operation mode.

Profile: Administrator.

Examples: Activate the firewall interface management interface, with the management IP subnet and another IP address.

```
admin@bqn0# show interface management detail
Interface: en0o1
```

```

IP address: 192.168.0.21/24
Default gateway: 192.168.0.1
admin@bqn0# set interface en0o1 firewall input 192.168.0.0/24 10.10.1.23/32
admin@bqn0# show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  192.168.0.0/24
en0o1  input  10.10.1.23/32

admin@bqn0 (config) #

```

Related: [clear interface firewall input](#)

Commands: [show interface firewall](#)
[show interface management](#)

set interface ip address

Syntax: set interface iface-name ip address addr

Description: Adds addr IP address under iface-name network interface.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Add IP 10.10.1.12/24 to en0o1 interface.

```

admin@bqn0# show ip address

IFACE  IP-ADDR          BROADCAST          SCOPE  FLAGS
lo0    127.0.0.1/8     127.255.255.255   host   permanent
en0o1  192.168.0.21/24 -                   global permanent

admin@bqn0# set interface en0o1 ip address 10.10.1.12/24
admin@bqn0# show ip address

IFACE  IP-ADDR          BROADCAST          SCOPE  FLAGS
lo0    127.0.0.1/8     127.255.255.255   host   permanent
en0o1  192.168.0.21/24 -                   global permanent
en0o1  10.10.1.12/24   -                   global permanent

```

Related: [clear interface ip address](#)

Commands: [show ip address](#)

set interface management

Syntax: set interface iface-name management vlan addr [gateway gw] [nameserver dns]

Description: Configures the management interface from Operator mode.

The interface with iface-name is configured as the management network interface.

- vlan is the VLAN tag of the OAM network (0 if none)
- addr is the OAM IP address and network mask.
- gw is the IP address of the OAM network default gateway.
- dns is the IP address of name server (DNS).

Use this option carefully and only during server initial configuration, as a mistake will require to access the server from the console.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Change the settings of the management interface to IP 10.10.10.12 with network mask 24 and default gateway 10.10.10.1 in an OAM network with VLAN tag 3.

```
admin@bqn0# show interface management detail
Interface: en0o1
IP address: 192.168.0.121/24
Default gateway: 192.168.0.1
Nameserver: n/a

admin@bqn0# set interface en0o1 management 3 10.10.10.12/24 gateway
10.10.10.1

admin@bqn0# show interface management detail
Interface: en0o1.3
IP address: 10.10.10.12/24
Default gateway: 10.10.10.1
Nameserver: n/a
```

Related: [interface](#)

Commands: [management](#)

[show interface management](#)

set ip route

Syntax: set ip route ip-range via gw-addr

Description: Add an IP route for ip-range via the gw-addr gateway IP address. Use [clear ip route](#) to clear a routing rule.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Add a route for 10.0.0.0/8 via 192.168.0.1 gateway.

```
admin@bqn0# show ip route

  IFACE  DESTINATION      GATEWAY      FLAGS
  -----
en0o1   0.0.0.0/0        192.168.0.1  UG
lo0     127.0.0.0/8     -            U
en0o1   192.168.0.0/24  -            U

admin@bqn0# set ip route 10.0.0.0/8 via 192.168.0.1
admin@bqn0# show ip route

  IFACE  DESTINATION      GATEWAY      FLAGS
  -----
en0o1   0.0.0.0/0        192.168.0.1  UG
en0o1   10.0.0.0/0       192.168.0.1  UGH
lo0     127.0.0.0/8     -            U
en0o1   192.168.0.0/24  -            U
```

Related: [clear ip route](#)

Commands: [router static](#)

[show ip route](#)

set license load

Syntax: set license load uri-package

Description: Load and apply a file license containing one or more license features.

The following schemes are supported in the URI:

- file: The file is located in the local filesystem.
- ftp: The file is retrieved using the FTP protocol.
- http: The file is retrieved using the HTTP protocol.

- https: The file is retrieved using the HTTPs protocol.
- scp: The file is accessed using the scp program.
- sftp: The file is accessed using the sftp program.

If none of these protocols is remotely supported, the file may be pushed into the QoE using the SCP (secure copy) protocol provided by the ssh service in the management interface. For a list of clients that provide SCP functionality under Windows look under section [3.15](#). Once the file is available in the QoE, the file scheme can be used to install it.

Mode: Operation mode.

Profile: Administrator.

Examples: This example loads a file using the file scheme. Note that the file is located in the user's home directory; otherwise, a full file path must be used.

```
admin@bqn# set license load file://bta.lic
```

This example loads a file using the scp scheme.

```
admin@bqn# set license load scp://admin@192.168.1.64:bta.lic
admin@192.168.1.64's password:
bta.lic      100% 133      0.1KB/s      00:00
```

Related: [license](#)

Commands: [show license](#)

[show license feature](#)

set pkteng dos syn

Syntax: set pkteng dos syn {client-uplink | default} {client-dnlink | default}

{server-uplink | default} {server-dnlink | default}

Description: Sets the global thresholds for SYN flooding DoS detection. The failed SYN rates on the client side both in uplink (with the client as source) and downlink (with the client as destination) are specified using client-uplink and client-dnlink respectively. For the SYN rates on the server-side, use server-uplink and server-dnlink. To leave no value, use default in the threshold position.

The thresholds are set under [pkteng](#) configuration mode.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set thresholds on client side of 100 failed SYNs per second coming into a client and 50 failed SYN per second for SYNs coming out of the client.

```
admin@bqn0# show pkteng parameters | match SYN
```



```

DoS SYN period: 10.000
DoS SYN client ingress rate: 0
DoS SYN client egress rate: 0
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0
admin@bqn0# set pkteng dos syn 50 100 default default
admin@bqn0# show pkteng parameters | match SYN
DoS SYN period: 10.000
DoS SYN client ingress rate: 100
DoS SYN client egress rate: 50
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0

```

Related: [clear pkteng dos syn](#)

Commands: [pkteng](#)

[show pkteng parameters](#)

[show statistics dos](#)

set pkteng dos volume

Syntax: set pkteng dos syn {client-dnlink-min|default} {client-dnlink-mult|default}

Description: Sets the global thresholds for Volume flooding DoS detection. These kinds of attacks are only detected on the client-side and for the downlink direction. One threshold is the minimum downlink speed in Kbps to qualify as an attack (client-dnlink-min) and the number of times the attack speed must exceed that subscriber rate limit, in case of having one (client-dnlink.mult).

The thresholds are set under [pkteng](#) configuration mode.



Note
If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set thresholds to a minimum of 50 Mbps and a multiplier of three times and a half.

```

admin@bqn0# show pkteng parameters | match 'DoS volume'
DoS volume period: 10.000
DoS volume minimum rate: 0
DoS volume multiplier rate: 0.00
admin@bqn0# set pkteng dos volume 50000 3.5
admin@bqn0# show pkteng parameters | match 'DoS volume'

```

```
DoS volume period: 10.000
DoS volume minimum rate: 50000
DoS volume multiplier rate: 3.50
```

Related: [clear pkteng dos volume](#)

Commands: [pkteng](#)

[show pkteng parameters](#)

[show statistics dos](#)

set pkteng rtt

Syntax: set pkteng rtt rtt-secs

Description: Sets the threshold of access round-trip-time (RTT), used in the classification of TCP acceleration metric samples in those with big and small RTT. The RTT is the delay measured between the QoE server and the subscribers. It is useful only if the access network uses two access technologies with very distinct latencies and there is an interest in measuring the acceleration in each access separately.

By default, it is 0. You can go back to the default value using [clear pkteng rtt](#). The threshold is set under [pkteng](#) configuration mode..



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set a Rtt threshold to 10ms.

```
admin@bqn0# show pkteng parameters | match RTT
Speed RTT: 0.000000
admin@bqn0# set pkteng rtt 0.01
admin@bqn0# show pkteng parameters | match RTT
Speed RTT: 0.010000
```

Related: [clear pkteng rtt](#)

Commands: [clear pkteng rtti](#)

[pkteng](#)

[set pkteng rtti](#)

[show pkteng parameters](#)

set pkteng rtti

Syntax: set pkteng rtti rtti-small-secs rtti-big-secs

Description: Sets the thresholds of Internet round-trip-time (RTTi), used in the classification of TCP acceleration metric samples in those with small, medium and big RTTi. The RTTi is measured between the QoE and, the content servers on the Internet. The thresholds are chosen to reflect the distribution of delays in the interconnection.

Thresholds are 10 ms and 60 ms by default. You can go back to default value using [clear pkteng rtti](#).

The threshold is set under [pkteng](#) configuration mode.



Note
If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Set a small RTTi threshold of 20ms and a big RTTi threshold of 70ms.

```
admin@bqn0# show pkteng parameters | match RTTi
Speed RTTi small: 0.010000 Speed RTTi large: 0.060000
admin@bqn0# set pkteng rtti 0.02 0.07
admin@bqn0# show pkteng parameters | match RTTi
Speed RTTi small: 0.020000 Speed RTTi large: 0.070000
```

Related: [clear pkteng rtti](#)

Commands: [clear pkteng rtti](#)

[pkteng](#)

[show pkteng parameters](#)

[set pkteng rtti](#)

set service ntp server

Syntax: set service ntp server ntp-server-ip

Description: This command adds an NTP server to the NTP service that the QoE uses to keep its system time and date synchronized. The server is added under [service ntp](#) configuration mode.

An NTP server can be removed using [clear service ntp server](#).



Note
If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Add a local NTP server with 10.10.1.12 IP address.

```
admin@bqn0# show system ntp
```

```

REMOTE          REFID    ST  T  WHEN  POLL  REACH  DELAY  OFFSET  JITTER
188.119.192.10 .INIT.  16  U  -     64   0     0.000  0.000  0.000

```

```
admin@bqn0# set service ntp server 10.10.1.12
```

```
admin@bqn0# show system ntp
```

```

REMOTE          REFID    ST  T  WHEN  POLL  REACH  DELAY  OFFSET  JITTER
188.119.192.10 .INIT.  16  U  -     64   0     0.000  0.000  0.000
10.10.1.12      .INIT.  16  U  -     64   0     0.000  0.000  0.000

```

Related: [clear service ntp server](#)

Commands: [service ntp](#)

[show system ntp](#)

set wire

Syntax: set wire access-iface inet-iface pcap-mode

Description: This command adds a wire to process user traffic, linking two network interfaces: access-iface on the access side (towards the subscribers) and inet-iface on the Internet side (towards the interconnection with the Internet). The pcap-mode indicates the pcap mode to use (pcap is a less performing traffic capture mode used for compatibility with non-Intel network interfaces):

- 0: no PCAP mode. This is the default, as provides the best performance
- 1: Internet interface in PCAP mode
- 2: access interface in PCAP mode
- 3: access and Internet interfaces both in PCAP mode

The changes are done under [pkteng](#) and [interface](#) configuration modes.



Note

If the candidate configuration is different from the running configuration, no changes are applied.

Mode: Operation mode.

Profile: Administrator.

Examples: Adds a wire using interfaces en0o3 for access and en0o4 for internet. Both interfaces are Intel, so no PCAP capture mode is needed.

```
admin@bqn0# show pkteng wire
```

```

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0o7      no        en0o8       no

```

```
admin@bqn0# set wire en0o3 en0o4 0
```

```
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0o3      no        en0o4        no
en0o7      no        en0o8        no
```

Related: [clear wire](#)

Commands: [interface](#)

[pkteng](#)

[show pkteng wire](#)

shaping

Syntax: shaping {downlink | uplink}

no shaping {downlink | uplink}

Description: Enter the rate limitation configuration mode of a flow policy in either the downlink or uplink direction.

Mode: [policy flow](#) configuration mode.

Profile: Administrator.

Examples

```
admin@bqn0# configure
admin@bqn0(config)# policy flow flow-10Mbps
admin@bqn0(config-polflow)# shaping downlink
admin@bqn0(config-polflow-shpfdown)# rate 10000
admin@bqn0(config-polflow-shpfdown)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [burst-duration](#)

[burst-rate](#)

[burst-threshold](#)

[burst-threshold-window](#)

[burst-transition-duration](#)

[rate](#)

show api policy

Syntax: show api policy [full]

Description: Show the list of policies created via the RADIUS or REST APIs. A dynamic policy is defined and created by the REST API, while a static policy has not been previously defined directly by the API (which may be the case of a policy used via the RADIUS API).

The full option extends the information displayed.

- NAME: Policy name.
- ID: Optional policy identifier set via the REST API. Shown only in full mode.
- DYNAMIC: Indicates whether the policy is dynamic or not.
- SUBS-TOTAL: Total number of subscribers associated with this policy.
- SUBS-CURRENT: Total number of active subscribers associated with this policy.
- INACTIVITY: For static policies, the inactivity period with no subscribers until the policy is deleted.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current list of API policies.

```
admin@bqn# show api policy

NAME           DYNAMIC  SUBS-TOTAL  SUBS-CURRENT  INACTIVITY
rate-100Mbps   yes      14          14            n/a
rate-10Mbps    yes      4964        4942          n/a
rate-default   no       23          19            n/a
```

Related: [show api statistics](#)

Commands

show api radius client

Syntax: show api radius client

Description: Show the list of RADIUS clients authorized to send RADIUS messages to the QoE server.

- ADDRESS: RADIUS client IP address.
- SECRET: RADIUS secret used by this RADIUS client.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows one configured RADIUS client.

```
admin@bqn# show api radius client

ADDRESS          SECRET
10.10.10.210     mysecret
```

Related: [show api radius proxy](#)

Commands

show api radius parameters

Syntax: show api radius parameters

Description: Show the list of RADIUS parameters:

- AVP parameters enabled/disabled status.
- Rate-Limit Percentage: percentage of rate scaling.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the configured RADIUS parameters.

```
bqnam@bqn# show api radius parameters
Mikrotik-Rate-Limit AVP: enabled
Ascend-Data-Rate AVP: enabled
Ascend-Xmit-Rate AVP: enabled
Mikrotik-Address-List AVP: enabled
Rate-Limit AVP rate percentage: 100 %
```

Related: [avp disabled](#)

Commands [avp rate-limit-percentage](#)

[show api radius proxy](#)

show api radius proxy

Syntax: show api radius proxy

Description: Show the IP and status of the QoE as RADIUS server.

- IFACE: Network interface used by the QoE for RADIUS.
- ADDRESS: IP address used by the QoE to receive RADIUS.
- STATUS: Status of the RADIUS on the QoE (ready when the status is correct).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the RADIUS server configuration of the QoE,

```
admin@bqn# show api radius proxy
IFACE  ADDRESS  STATE
en0o1  10.10.10.10  ready
```

Related: [show api radius client](#)

Commands

show api rest client

Syntax: show api rest client

Description: Show the IP address of a REST client and whether authentication is required for requests from that IP address. By default, authentication is enabled for all REST clients.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the REST API clients.

```
admin@bqn# show api rest client

ADDRESS      AUTHENTICATION
10.10.10.26  yes
```

Related: [show api rest server](#)

Commands: [show api rest user](#)

show api rest server

Syntax: show api rest server

Description: Show the status of the REST server used to receive REST requests, such as the IP address and TCP port.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows a QoE using en0o1 for REST API requests.

```
admin@bqn# show api rest server

State: ready
Interface: en0o1
Address: 10.10.10.10
Port: 3443
```

Related: [show api rest client](#)

Commands: [show api rest user](#)

show api rest user

Syntax: show api rest user

Description: Show the IP and authentication string of REST API users allowed to access the QoE (for example, a billing system).

- **NAME:** User name.
- **PASSWORD:** User password.

- **RESTRICTED:** Indicates if the user is restricted to only query information.
- **AUTH-BASIC:** Basic authentication string.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the REST API users making REST API requests to the QoE.

```
admin@bqn# show api rest user

NAME      PASSWORD      RESTRICTED  AUTH-BASIC
myuser    mypassword    no          gdN546M6cGFzc3dGfge0
```

Related: [show api rest server](#)

Commands: [show api rest user](#)

show api statistics

Syntax: show api statistics

Description: Show statistics on the activity of the QoE APIs.

- Policy active number: Current number of active subscribers.
- Flush number: Number of times that a full flush was executed.
- Write number: API records written to disk storage since latest flush.
- Record read total: API records read from disk since the latest flush.
- Record read error: API records read with error (should be 0).
- Record write total: Total API records written to disk storage.
- Record write error: Total API records written with errors to disk storage (should be 0).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the API statistics.

```
admin@bqn# show api statistics

Policy active number:      18
Subscriber active number: 10136
Flush number:              0
Write number:              21
Record read total:        10327
Record read error:        0
Record write total:       27
Record write error:       0
```

Related: [show api status](#)

Commands

show api status

Syntax: show api status [clients | full]

Description: Show the status of the API interface. When the clients keyword is used, the command shows the status of the API interface at each of the PKTENG processes.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows API status.

```
admin@bqn# show api status
Storage state: ready
Policy active number: 18
Subscriber active number: 10136
```

Related: [show api statistics](#)

Commands

show api subscriber

Syntax: show api subscriber [full | ip-address]

Show subscribers that have been created using the API interface. The optional full flag shows more information in column form, and if a specific ip-address is specified the command shows detailed information about that subscriber.

Description: It shows a list of the subscribers with policies associated by the API.

- **ADDRESS:** Subscriber address.
- **SUBSCRIBER-ID:** Optional subscriber ID (n/a if API assigned none). Shown in full mode.
- **SOURCE:** API type that did the assignment (radius or rest).
- **FLAGS:** Debug information. Shown in full mode.
- **POLICY:** Name of the assigned policy.
- **CREATED:** Subscriber creation time.
- **UPDATED:** Time elapsed since last change.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows API subscribers.

```
admin@bqn# show api subscriber
```

ADDRESS	SOURCE	POLICY	CREATED	UPDATED
10.10.1.210	radius	100Mbps	2021-08-11T22:00:19	00:03:56
10.10.1.145	radius	100Mbps	2021-07-09T10:45:46	402:18:21
10.10.1.12	radius	100Mbps	2021-08-13T14:31:04	00:03:09
10.10.1.8	radius	100Mbps	2021-08-14T20:00:05	00:04:09
10.10.1.230	radius	100Mbps	2021-08-15T19:49:15	00:04:57
10.10.1.244	radius	50Mbps	2021-08-16T14:35:34	00:03:38
10.10.1.17	radius	15Mbps	2021-08-11T22:12:56	00:01:18

This other example show the information of one subscriber.

```
admin@bqn# show api subscriber 10.10.1.210
Address: 94.176.107.2
Subscriber ID: n/a
Source: radius
State: ready
Flags: R..
Change: 0x0
Session ID: 81407613
Policy name: ORO
Policy dynamic: no
Time inactivity: n/a
Time created: 2021-08-11T22:00:19+0200 (114:25:30)
Time updated: 2021-08-16T16:25:15+0200 (00:00:34)
```

Related: [show api statistics](#)

Commands

show bta optimization

Syntax: show bta optimization [detail]

Description: Show the random percentage of optimization configured using the [set bta optimization](#) command.

This command indicates If there are unrecognized optimization rules configured that were not configured with the [set bta optimization](#), If the detail parameter is used, the command shows RTT information as well.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the random optimization configured.

```
admin@bqn# show bta optimization detail
```

```
Optimization: 99%
UDR generation: 2%
RTTa: 0.000000
RTTi-small: 0.020000
RTTi-large: 0.070000
admin@bqn# set bta optimization 50 udr 1
admin@bqn# show bta optimization
Optimization: 50%
UDR generation: 1%
```

Related: [bta](#)

Commands: [set bta optimization](#)

show bta parameters

Syntax: show bta parameters

Description: Show the properties of the BTA service.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current properties of the BTA service.

```
admin@bqn# show bta parameters
BTA optimization config: yes
BTA tracking config: yes
BTA license: enabled
License change flow creation threshold: 5
TLP timeout minimum: 0.005000
ACK timeout: 0.005000
Closing timeout: 3.000000
Handshake timeout: 8.000000
Inactivity timeout: 310.000000
RTO timeout minimum: 0.200000
RTO timeout lifetime: 120.000000
TCS pacing timeout: 0.000100
```

Related: [bta](#)

Commands: [show bta statistics](#)

[show interface bta statistics](#)

[show system status](#)

show bta statistics

Syntax: show bta statistics [full] [detail]

Description: Show the statistics for the BTA feature.

By default, the statistics from all the PKTENG instances are aggregated. Use the optional full parameter to show low-level detailed statistics. In addition, use the optional detail parameter to show information from each of the PKTENG processes.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current statistics for the BTA.

```
admin@bqn# show bta statistics

PktsRcvBta:          159500923374      BytesRcvBta:          154863422813356
PktsRcvBtaFrag:      361001803          PktRcvBtaDefrag:     360995422
PktsRcvBtaFwd:       2390463411          BytesRcvBtaFwd:      483383057201
PktsRcvBtaTrack:    1641560421          BytesRcvBtaTrck:     1607536207236
PktsRcvBtaOpt:       155468899542      BytesRcvBtaOpt:      152772503548919
PktsRcvOptData:     109242730397        BytesRcvOptData:     150134611141858
PktsRcvOptRtx:       285181163          BytesRcvOptRtx:      336835917365
PktsRcvOptOOO:       7536704388          BytesRcvOptOOO:      11050249425216
PktsRcvOptOOOCf:    7250374674          ByteRcvOptOOOCf:     10636844830152
PktsRcvTrackDat:    1122151633          ByteRcvTrackDat:     1579140029236
PktsRcvTrackRtx:    43352697            ByteRcvTrackRtx:     60255484532
PktsRcvTrackOOO:    15077237            ByteRcvTrackOOO:     22114894094
PktsSntBta:          188781548411        BytesSntBta:          158026069588197
PktsSntBtaFwd:       2390463411          BytesSntBtaFwd:      483383057201
PktsSntBtaTrack:    1641560421          BytesSntBtaTrck:     1607536207236
PktsSntBtaOpt:       184749524579        BytesSntBtaOpt:      155935150323760
PktsSntOptErr:       0                    BytesSntOptErr:      0
PktsSntOptData:     110398966775        BytesSntOptData:     152159871288680
PktsSntOptRtx:       2876647954          BytesSntOptRtx:      3405932480502
PktsSntTcpShap:      14953832522          BytesSntTcpShap:     21528502557735
PktsSntOptPace:      83601258090          BytesSntOptPace:     114957842045049
PktsSntTrackDat:    109242730397        BytesSntTrckDat:     150134611141858
PktsSntTrackRtx:    285181163          BytesSntTrckRtx:     336835917365
BytesTcpOptAckd:     143150456676378     BytesTcpTrkAckd:     1496693955351
BytesTcpOptDSack:    344733174341        BytesTcpTrkDSack:    4997386059
```

PktSntOptFstRec:	6434823131	PktSntOptRtoRec:	300482053
BytesRcvLicense:	200942890256409		
EventsFastRec:	125069965	EventsRto:	270696390
EventsFastRecReord:	6461318	EventsFstRecRanLoss:	0
EventsRtoSpurious:	7724614	EventsRcvReorLoss:	367937696
EventsTlpNoRtx:	64280315	EventsTlpRtx:	507902905
EventsInactivity:	1499331872		
EventsCongDet:	0	EventsCongDetUndo:	0
EventsSSEndDet:	0	EventsSSEndDetUndo:	0
TcsDroppdUnkTcpOpt:	372101		

Related: [bta](#)

Commands: [pkteng](#)

[show bta parameters](#)

[show interface bta statistics](#)

show btc parameters

Syntax: show btc parameters

Description: Show the properties of the BTC service.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current properties of the BTC service.

```
admin@bqn# show btc parameters
BTC compression config: no
BTC license: disabled
BTC enabled: no
BTC affinity: 00000
GZIP enabled: no
GZIP content length minimum: 1500
GZIP content length maximum: 10000000
GZIP compress level: 3
IMG enabled: no
IMG content length minimum: 1500
IMG buffer maximum: 6266880
IMG pixels minimum: 500
IMG pixels maximum: 2088960
```

```
IMG GIF enabled: no
IMG GIF maximum number of colors: 80%
IMG JPEG enabled: yes
IMG JPEG quality: 30
IMG PNG enabled: no
IMG PNG compress level: 3
IMG PNG8 maximum number of colors: 80%
IMG PNG32 pixelate filter (block size): no
IMG PNG32 Gaussian-blur filter: yes
IMG PNG32 selective-blur filter: no
IMG WEBP enabled: no
IMG WEBP quality: 30
```

Related: [btc](#)

Commands: [gzip](#)

[image](#)

[show system status](#)

show btc statistics

Syntax: show btc statistics [summary] [detail]

Description: Show the statistics for the BTC feature. Statistics for both HTTP GZIP and image compression are displayed. For each compression type, the following information is presented:

- Total number of compressions.
- Number of bytes to be compressed.
- Number of bytes compressed.
- Number of compressions that were scheduled for compression but were not completed for multiple reasons, such as busy resources, etc.
- Number of bytes that were not compressed.
- Number of potential candidate compressions.
- Number of bytes that are a candidate for compression.

By default, the statistics from all the PKTENG instances are aggregated. Use the optional detail parameter to show information from each of the PKTENG processes. If the optional summary parameter is entered, the sum of all the content types is displayed..

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current statistics for the BTC service.

```
admin@bqn# show btc statistics
```

```
gzipCompress:          13652
gzipCompressBytesIn:   839263167  gzipCompressBytesOut:  406494494
gzipExclude:          302      gzipExcludeBytes:     46420672
gzipCandidate:        13984    gzipCandidateBytes:   888222499
gifCompress:          1555
gifCompressBytesIn:   18616787   gifCompressBytesOut:  15231382
gifExclude:           3618    gifExcludeBytes:     502609411
gifCandidate:         5181    gifCandidateBytes:   525441111
jpegCompress:         140482
jpegCompressBytesIn:  5349540931 jpegCompressBytesOut:  1866361779
jpegExclude:          1869    jpegExcludeBytes:    442957283
jpegCandidate:        142601   jpegCandidateBytes:   5820671876
pngCompress:          12347
pngCompressBytesIn:   547819005  pngCompressBytesOut:  438291155
pngExclude:           16196   pngExcludeBytes:    426166507
pngCandidate:         28587   pngCandidateBytes:   980954062
webpCompress:         1607
webpCompressBytesIn:  67159590   webpCompressBytesOut: 22274402
webpExclude:          24      webpExcludeBytes:    4687881
webpCandidate:        1631    webpCandidateBytes:  71847471
```

Related: [btc](#)

Commands: [gzip](#)

[image](#)

[pkteng](#)

[show pkteng statistics](#)

[show statistics compress](#)

show cli commands

Syntax: show cli commands

Description: Show a list of commands available in the current CLI mode.

Mode: Any operation or configuration mode.

Profile: Operator.

Examples: Show the commands available under the configuration mode (in brief, only the first commands are shown in the example)..

```
admin@bqn# configure
```



```
admin@bqn(config)# show cli commands
api policy delete <word:1..MAX>
api storage write
api storage write flush clear
api radius client
clear api radius client <ipaddr>
clear api radius proxy
clear api rest client <ipaddr>
clear api rest server
```

Related: [configure](#)

Commands

show cli history

Syntax: show cli history

Description: Show the command line history entered by the user executing the command. All the commands entered by a user are stored under the user's history. By default, the last 500 commands are stored.

Mode: Operation mode.

Profile: Operator.

Examples: Show the command history.

```
admin@bqn0# show cli history
```

- show interface
- show ip address
- show ip route
- show cli history

Related: [show cli parameters](#)

Commands

show cli parameters

Syntax: show cli parameters

Description: Show CLI parameters configured for the user executing the command.

Mode: Operation mode.

Profile: Operator.

Examples: Show the command history.

```
admin@bqn0# show cli parameters
History maximum lines: 500
History lines: 146
```

Related: [show cli history](#)

Commands

show config candidate

Syntax: show config candidate [all | control [policy | profile | rule] | network | pkteng | system]

Description: Show the candidate configuration. If the candidate and running configurations are identical, a message will indicate this.

By default, this command shows an abbreviated version of the candidate configuration, marking omitted sections with three periods. Use the all parameter to see the complete candidate configuration. The command can also display parts of the candidate configuration, specifying which section to show (e.g. network will show the interfaces and route candidate configurations).

Mode: Any operation or configuration mode.

Profile: Operator.

Examples: This example shows the message indicating that the candidate and running configurations are the same.

```
admin@bqn# show config candidate
%WARN: Candidate and running configurations are identical
```

Related: [load config](#)

Commands: [load rollback](#)

[show config commit](#)

[show config diff](#)

[show config running](#)

show config commit

Syntax: show config commit [status | statistics]

Description: Show the history of committed configurations. Each committed configuration is assigned a unique commit ID that identifies it.

For each committed configuration the following information is displayed:

- ID: Commit ID.
- USER: User who committed the configuration.

- **DEVICE:** The terminal device name where the user was logged in at the time of the commit.
- **TIMESTAMP:** Time when the configuration was committed.

The commit ID is used by the [load rollback](#) command to restore an older configuration. Currently, the latest 25 committed configurations are saved.

If the optional status flag is used, the command shows the duration of the last commit and if commands are pending.

If the optional flag statistics is used, the command shows, per process, the time of the last validation and last commit and how much time it took.

Mode: Any operation or configuration mode.

Profile: Operator.

Examples: Show the history of committed configurations.

```
admin@bqn(config)# show config commit
```

ID	USER	DEVICE	TIMESTAMP
50530233	bqnadm	pts/0	2021/08/17 09:24:09 +0200
09165952	bqnadm	pts/0	2021/08/16 15:35:13 +0200
08973555	bqnadm	pts/3	2021/08/16 15:34:52 +0200
08936275	bqnadm	pts/2	2021/08/16 15:34:52 +0200
08903031	bqnadm	pts/3	2021/08/16 15:34:49 +0200

```
admin@bqn(config)# show config commit status
```

```
Last commit: 0.030115
```

```
Pending commands: no
```

```
admin@bqn(config)# show config commit statistics
```

bqn	PROCESS	INST	VAL-LAST	VAL-TIME	EXEC-LAST	EXEC-TIME
0	ctrmgr	0	2:32:30.205	0.000001	2:32:30.175	0.000063
0	cfgmgr	0	n/a	n/a	n/a	n/a
0	remctr	0	n/a	n/a	2:33:06.166	0.001352
0	pkteng	0	n/a	n/a	2:33:06.115	0.005960

Related: [load rollback](#)

Commands: [show config candidate](#)

[show config diff](#)

[show config running](#)

show config diff

Syntax: show config diff [all | control {policy | profile | rule} | network | pkteng | system]

Description: Show the difference between the candidate and the running configurations.

If both configurations are the same, the command displays nothing; otherwise, the first character in each line indicates the differences between both configurations. This character may be one of the following:

space The configuration command is common to both configurations.

+ The configuration command is new and is only present in the candidate configuration.

– The configuration command is only present in the running configuration.

By default, this command shows an abbreviated version of the configuration differences, marking omitted sections with three periods. Use the all parameter to see the complete configuration differences. The command can also display parts of the configuration differences, specifying which section to show (e.g. pkteng will show the configuration of the packet processing advanced options).

Mode: Any operation or configuration mode.

Profile: Operator.

Examples: In this example the management IP address is removed and a new IP address is entered.

```
admin@bqn(config)# show config diff
admin@bqn(config)# show config running service ssh
interface en0o1
ip address 192.168.1.75/24 management
admin@bqn(config)# interface en0o1
admin@bqn(config-iface)# ip address 192.168.1.80/24
admin@bqn(config-iface)# no ip address 192.168.1.75/24
admin@bqn(config-iface)# show config diff
service ssh interface en0o1
- ip address 192.168.1.75/24
+ ip address 192.168.1.80/24 management
admin@bqn(config-iface)#
```

Related: [clear config changes](#)

Commands: [load config](#)

[load rollback](#)

[show config candidate](#)

[show config commit](#)

[show config running](#)

show config running

Syntax: show config running [all | control {policy | profile | rule} | network | pkteng | system]

Description: Display the current running configuration of QoE, which is the latest committed configuration.

By default, this command shows an abbreviated version of the running configuration, marking omitted sections with three periods. Use the all parameter to see the complete running configuration. The command can also display parts of the running configuration, specifying at the end of the command which section to show (e.g. control policy will show the policies of the running configurations).

Mode: Any operation or configuration mode.

Profile: Operator.

Examples: Show the running configuration.

```
admin@bqn# show config running
service ssh interface en0p0s17
ip address 192.168.1.75/24
management
router static
route 0.0.0.0/0 via 192.168.1.1
```

Related: [show config candidate](#)

Commands: [show config commit](#)

[show config diff](#)

show flow ipother

Syntax: show flow ipother [all | state] [detail]

```
show flow ipother client-ip-address [server-ip-address protocol]
```

Description: Show information about IP-other flows (IP flows neither TCP nor UDP).

Table 2 lists and describes the flow fields shown by this command.

Table 2: ipother flow fields.

Field	Description
CADDR	Client IP address.
SADDR	Server IP address.
PROTO	IP protocol number.
ST	Flow State: <ul style="list-style-type: none">• OP: OPEN. Flow initial state.• AT: ATTACHED. Flow has seen traffic in both directions.• BL: BLOCKED. Flow blocked by a policy.
INS	Instance number processing this flow.

Field	Description
POL	Policy number matching this flow.
MBYTES-DN	Traffic volume in MBytes in downlink direction (from server to client).
MBYTES-UP	Traffic volume in MBytes in uplink direction (from client to server).
MBYTES-SHP	Traffic volume in MBytes used by shaping policies.
LIFETIME	Flow duration in HH:MM:SS format.

Mode: Operation mode.

Profile: Operator.

Examples: Show summary of ipother flows:

```
admin@bqn0# show flow ipother

CREATED   DELETED   ACTIVE
8676103   8675679   424
```

Show states of ipother flows:

```
admin@bqn0# show flow ipother state

STATE      CREATED   DELETED   ACTIVE
OPEN       8676754   8676623   131
ATTACHED   1343818   1343534   284
BLOCKED    0         0         0
```

Show all ipother flows:

```
admin@bqn0# show flow ipother all

CADDR          SADDR          PROTO  ST   INS  PKT-  PKT-  LIFETIME
              SADDR          PROTO  ST   INS  RECV  SENT
192.198.0.12   177.61.151.115  1      AT   0    87989 87989 214:56:37
192.198.0.24   177.61.151.115  1      AT   0    26180 26180 83:52:41
192.198.0.36   181.56.75.76   1      AT   0    9158  9158  19:36:54
```

Show detailed information of ipother flows of client IP address 192.198.0.12:

```
admin@bqn0# show flow ipother 192.168.0.12 full

SADDR          PROTO  ST   INS  POL  MBYTES-  MBYTES-  MBYTES-  LIFETIME
              PROTO  ST   INS  POL  DN       UP       SHP
192.198.0.12   177.61.151.115  1      AT   0    87989 87989 214:56:37
```

SADDR	PROTO	ST	INS	POL	MBYTES- DN	MBYTES- UP	MBYTES- SHP	LIFETIME
177.61.151.115	1	AT	0	n/a	3.695	3.696	0.000	215:00:54

Related: [show flow tcp](#)

Commands: [show flow udp](#)

show flow tcp

Syntax: show flow tcp [all | state] [detail]

show flow tcp client-ip-address [client-port server-ip-address server-port] [debug | full | sack | sequence | speed | timers]

Description: Show information about TCP flows (TCP connections).

Table 3 lists and describes the flow fields shown by this command.

Table 3: TCP flow fields

Field	Description
CADDR	Client IP address.
CPORT	Client TCP port.
SADDR	Server IP address.
SPORT	Server TCP port.
ST	Flow State: <ul style="list-style-type: none"> • SY: SYN (handshake state). • S2: SYN2 (handshake state) • SS: SYN-SYNACK (handshake state) • SA: SYNACK (handshake state) • ES: ESTABLISHED. Being optimized • CL: CLOSING. In the process of finishing • PH: PROCESS-HEALING. Health check as result of normal process: • EH: ERROR-HEALING. Health check as result of an error. • HD: HEALED. Health check already done. • TR: TRACKING. Being monitored, but not optimized. • BL: BLOCKED. Flow blocked by a policy.
TY	Flow type: -

Field	Description
	<ul style="list-style-type: none"> • DE: DELETED. Marked for deletion • EM: EMPTY. Without buffered packets • TX: TXLAG. With buffered packets pending being sent • AC: ACKLAG. With sent packets pending acknowledgment by destination • UN: UNDELETABLE. Marked so it is not deleted
INS	Instance number processing this flow.
POL	Policy number matching this flow.
MBYTES-DN	Traffic volume in MBytes in downlink direction (from server to client).
MBYTES-UP	Traffic volume in MBytes in uplink direction (from client to server).
MBPS-DN	Speed in Mbps in downlink direction (from server to client).
MBPS-UP	Speed in Mbps in uplink direction (from client to server).
DURATION	Flow duration in seconds.
RTX-DN	Percentage of retransmissions traffic in downlink direction.
RTX-UP	Percentage of retransmissions traffic in uplink direction.
BUFF-DN	Buffered packets in downlink direction.
BUFF-UP	Buffered packets in uplink direction.
RTT-DN	Round trip time in access side (downlink) in milliseconds.
RTT-UP	Round trip time in Internet side (uplink) in milliseconds.
DOMAIN	Domain name extracted by DPI (n/a if none).

Mode: Operation mode.

Profile: Operator.

Examples: Show summary of TCP flows:

CREATED	DELETED	ACTIVE
319866450	319839912	26538

Show states of TCP flows:

```
admin@bqn0# show flow tcp state
```

STATE	CREATED	DELETED	ACTIVE
HANDSHAKE	453196973	453195577	1396


```

ESTABLISHED 146859034 146839141 19893
TRACKING    2296130 2295912 218
OTHER      160975578 160969717 5861

```

Show all TCP flows:

```
admin@bqn0# show flow tcp all
```

```

CADDR          CPORT  SADDR          SPORT  ST  TY  INS  PKT-  PKT-  LIFETIME
              2          54
192.198.0.1    64742          171.10.135.   443    ES  EM  0    10559 21113 175:32:0
              54          6
192.198.0.2    48198          171.13.167.   443    ES  EM  0     80    86    0:00:12
              18
192.198.0.2    35742 32.23.84.14    5222   ES  EM  0    126   137   0:02:46
              44

```

Show detailed information of TCP flows of client IP address 192.198.0.12:

```
admin@bqn0# show flow tcp 192.168.0.12 full
```

```

CPOR  SADDR          SPOR  ST  TY  IN  PO  MBYTE  MBYTE  MBP  MBP  DURATI
T      T          T      T  TY  S  L  S-DN  S-UP  S-DN S-UP  ON
6474          443    ES  EM  0   0.548 0.549 0.00 0.00 632012 .
2          171.10.135   n/   .
              .54          a   .
1309 32.12.84.4    443    ES  EM  0   0.001 0.001 0.00 0.00 151    .
5      2          n/   .
              a   .
6067 3.73.116.1    2350   ES  EM  0   0.046 0.046 0.00 0.00 78558 .
4      16          n/   .
              a   .
. .
.

```

Related: [show flow ipother](#)

Commands: [show flow udp](#)

show flow udp

Syntax: show flow udp [all | state] [detail]

```
show flow udp [client-port server-ip-address server-port] [debug | full]
```

Description: Show information about UDP flows.

Table [A.3](#) lists and describes the flow fields shown by this command.

Field	Description
CADDR	Client IP address.
CPORT	Client UDP port.
SADDR	Server IP address.
SPORT	Server UDP port.
ST	Flow State: <ul style="list-style-type: none"> • OP: OPEN. Flow initial state. • AT: ATTACHED. Flow has seen traffic in both directions. • BL: BLOCKED. Flow blocked by a policy.
INS	Instance number processing this flow.
POL	Policy number matching this flow.
MBYTES-DN	DN Traffic volume in MBytes in downlink direction (from server to client).
MBYTES-UP	UP Traffic volume in MBytes in uplink direction (from client to server).
BYTES-SHP	Traffic volume in bytes dropped due to shaping policies.
LIFETIME	Flow duration in format HH:MM:SS
DOMAIN	Domain name extracted by DPI (n/a if none).

Mode: Operation mode.

Profile: Operator.

Examples: Show summary of UDP flows:

```
admin@bqn0# show flow udp

CREATED      DELETED      ACTIVE
237545343    237534529    10814
```

Show states of UDP flows:

```
admin@bqn0# show flow udp state

STATE      CREATED      DELETED      ACTIVE
OPEN       237552559    237550149    2410
ATTACHED   85117560     85108995     8565
BLOCKED    0            0            0
```

Show all UDP flows:

```
admin@bqn0# show flow udp all
```

CADDR	CPORT	SADDR	SPORT	ST	INS	PKT-RECV	PKT-SENT	LIFETIME
192.198.0.12	33395	54.132.119.205	8802	AT	0	46095	46095	133:52:20
192.198.0.34	57380	54.132.142.241	8802	AT	0	24637	24637	68:44:20
192.198.0.6	6343	104.0.116.80	6343	OP	0	155124	155124	52:08:48
192.198.0.54	46475	188.213.232.33	28678	AT	0	9046	9046	23:17:48

Show detailed information of UDP flows of client IP address 192.198.0.12:

```
admin@bqn0# show flow udp 192.168.0.12 full
```

CPOR T	SADDR	SPOR T	ST	INS	POL	MBYTE S-DN	MBYTE S-UP	BYTE S-SHP	LIFETIM E	DOMAI N
33395	54.233.219.205	8802	AT	0	n/a	1.294	1.801	0.000	133:57:03	n/a
57146	181.15.96.206	443	AT	0	0	1.059	0.076	0.966	0:35:38	n/a
55051	181.15.96.47	443	AT	0	0	5.516	0.188	5.237	0:05:36	n/a

Related: [show flow ipother](#)

Commands: [show flow tcp](#)

show hardware chassis

Syntax: show hardware chassis

Description: Show information about the server model.

Mode: Operation mode.

Profile: Operator.

Examples: Show server information.

```
admin@bqn0# show hardware chassis
Vendor: Supermicro
Product: X10SLH-N6-ST031
Serial: 1234567890
```

Related: [show hardware cpu](#)

Commands

show hardware cpu

Syntax: show hardware cpu [full]

Description: Show physical CPU information of the bqns.

Mode: Operation mode.

Profile: Operator.

Examples: Show CPU information from a QoE.

```
admin@bqn0# show hardware cpu
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 42
Model name: Intel(R) Core(TM) i7-2600 CPU @ 3.40 GHz
Stepping: 7
CPU MHz: 3378.570
BogoMIPS: 6757.14
L1d cache: 32K
L1d cache: 32K
L2d cache: 6144K NUMA node0 CPU(s): 0-3
```

Related: [show hardware id](#)

Commands: [show system cpu](#)

[show system cpu frequency](#)

[show system sensors](#)

show hardware disk

Syntax: show hardware disk

Description: Show physical disk information of the bqns.

Under a multi-QoE setup, this command shows the information about all the bqns in the cluster.

Mode: Operation mode.

Profile: Operator.

Examples: Show disk information from a QoE.

```
admin@bqn0# show hardware disk
26: IDE 00.0: 10600 Disk
[Created at block.245]
Unique ID: 3OOL.b4AWOuImpf0
Parent ID: w7Y8.2ESyehp3PeF
SysFS ID: /class/block/sda
SysFS BusID: 0:0:0:0
SysFS Device Link:
/devices/pci0000:00/0000:00:1f.2/ata1/host0/target0:0:0:0:0:0:0
Hardware Class: disk
Model: "ST2000DL003-9VT1"
Device: "ST2000DL003-9VT1"
Revision: "CC3C"
Serial ID: "6YD16Y7W"
Driver: "ahci", "sd" Driver Modules: "ahci" Device File: /dev/sda
Device Files: /dev/sda, /dev/disk/by-id/ata-ST2000DL003-9VT166_6YD16Y7W,
              /dev/disk/by-id/scsi-1ATA_ST2000DL003-9VT166_6YD16Y7W,
              /dev/disk/by-id/scsi-SATA_ST2000DL003-9VT1_6YD16Y7W,
              /dev/disk/by-id/wwn-0x5000c50045b26222,
              /dev/disk/by-path/pci-0000:00:1f.2-scsi-0:0:0:0
Device Number: block 8:0-8:15
Geometry (Logical): CHS 243201/255/63
Size: 3907029168 sectors a 512 bytes
Capacity: 1863 GB (2000398934016 bytes)
Config Status: cfg=yes, avail=yes, need=no, active=unknown
Attached to: #15 (SATA controller)
```

Related: [show hardware id](#)

Commands

show hardware id

Syntax: show hardware id

Description: Show the system ID for the current hardware. The system ID consists of a 32-bit hexadecimal number that uniquely identifies a QoE. This value is made up of a combination of BIOS parameters to ensure its uniqueness.

Mode: Operation mode.

Profile: Operator.

Examples: Show system IDs.

```
admin@bqn0# show hardware id

bqn  SYSTEM-ID
0    0x17C8C6AC
```

Related: [show config running](#)

Commands

show hardware memory

Syntax: show hardware memory

Description: Show physical memory information of the bqns.

Mode: Operation mode.

Profile: Operator.

Examples: Show memory information for a QoE.

```
admin@bqn0# show hardware memory

01: None 00.0: 10102 Main Memory

    [Created at memory.66]
    Unique ID: rdCR.CxwsZFjVASF
    Hardware Class: memory
    Model: "Main Memory"
    Memory Range: 0x00000000-0x3e7b5dfff (rw)
    Memory Size: 16 GB
    Config Status: cfg=no, avail=yes, need=no, active=unknown
```

Related: [show system memory](#)

Commands

show hardware network

Syntax: show hardware network

Description: Show network interface information.

Mode: Operation mode.

Profile: Operator.

Examples: Show network interface information from a QoE.

```
admin@bqn0# show hardware network
eno1:
    Type: Ethernet
    Driver: ixgbe
    PCI slot: 0000:04:00.0
    Address: 0c:c4:7a:00:00:01 IRQ: 17
    Link detected: yes
    Index: 2

eno2:
    Type: Ethernet
    Driver: ixgbe
    PCI slot: 0000:04:00.1
    Address: 0c:c4:7a:00:00:02
    IRQ: 18
    Link detected: no
    Index: 3

eno5:
    Type: Ethernet
    Driver: ixgbe
    PCI slot: 0000:06:00.0
    Address: 0c:c4:7a:00:00:03 IRQ: 17
    Link detected: no
    Index: 8

eno6:
    Type: Ethernet
    Driver: ixgbe
    PCI slot: 0000:06:00.1
    Address: 0c:c4:7a:00:00:04
    IRQ: 18
    Link detected: no
    Index: 9

lo:
    Type: Loopback
    Address: 00:00:00:00:00:00
    Link detected: yes
```

Related: [show interface](#)

Commands

show hardware pci

Syntax: show hardware pci [full]

Description: Show information about PCI buses in the system and devices connected to them. Use the full parameter to display more detailed information about the PCI hardware.

Mode: Operation mode.

Profile: Operator.

Examples: Show PCI information from a QoE.

```
admin@bqn0# show hardware pci
00:00.0 Host bridge: Intel Corporation Device 1604 (rev 09)
00:02.0 VGA compatible controller: Intel Corporation Device 1616 (rev 09)
00:03.0 Audio device: Intel Corporation Device 160c (rev 09)
00:14.0 USB controller: Intel Corporation Device 9cb1 (rev 03)
00:16.0 Communication controller: Intel Corporation Device 9cba (rev 03)
00:1b.0 Audio device: Intel Corporation Device 9ca0 (rev 03)
00:1c.0 PCI bridge: Intel Corporation Device 9c90 (rev e3)
00:1c.1 PCI bridge: Intel Corporation Device 9c92 (rev e3)
00:1c.2 PCI bridge: Intel Corporation Device 9c94 (rev e3)
00:1c.3 PCI bridge: Intel Corporation Device 9c96 (rev e3)
00:1c.4 PCI bridge: Intel Corporation Device 9c98 (rev e3)
00:1d.0 USB controller: Intel Corporation Device 9ca6 (rev 03)
00:1f.0 ISA bridge: Intel Corporation Device 9cc3 (rev 03)
00:1f.2 SATA controller: Intel Corporation Device 9c83 (rev 03)
00:1f.3 SMBus: Intel Corporation Device 9ca2 (rev 03)
01:00.0 Ethernet controller: Intel Corporation I211 Gigabit Network
Connection (rev 03)
02:00.0 Ethernet controller: Intel Corporation I211 Gigabit Network
Connection (rev 03)
03:00.0 Ethernet controller: Intel Corporation I211 Gigabit Network
Connection (rev 03)
04:00.0 Ethernet controller: Intel Corporation I211 Gigabit Network
Connection (rev 03)
05:00.0 Network controller: Qualcomm Atheros AR9287 Wireless Network
Adapter (PCI-Express) (rev 01)
```

Related: [show hardware id](#)

Commands

show interface

Syntax: show interface [detail]

```
show interface iface-name
```

```
[bandwidth | bypass | device | flow-control | irq | ring slots | xps]
```

Description: Show information about network interfaces.

When no specific interface is indicated, a list of all available interfaces is shown with the following information:

- IFACE: Interface name.
- TYPE: Network interface type.
- MAC: MAC address.
- STATE: Interface state, either up or down.
- LINK: Link state indicating whether the physical link has carrier or not.

If the optional detail parameter is passed, the following information is shown:

- Interface name, state and type (e.g. en0o3: UP PROMISC RUNNING).
- Link type: ethernet or loopback.
- MAC: MAC address.
- Link detected: Link state indicating whether the physical link has carrier or not.
- Auto-negotiation: on if the interfaces negotiate automatically the link speed with its counterpart (should be always on).
- Duplex: Full if full duplex.
- Speed: speed of the link (e.g. 10000Mbps).
- MTU: maximum transmission unit. Normally 1500 in management interfaces and 2026 in data interfaces.

If a specific iface-name interface name is passed, the following information is shown:

- All attributes of [show interface](#) with detailed option.
- Offloading flags (GRO, GSO, LRO, TSO). In data interfaces should be off.
- RxChecksumOffload: card offloading of checksum checking.
- TxQueueLen: length of the transmission queue.
- ChannelRx: number of reception channels.
- ChannelTx: number of transmission channels.

- RingSlotRx: number of slots in reception packet ring.
- RingSlotTx: number of slots in transmission packet ring.
- rx and tx bytes: bytes received and sent, respectively.
- rx and tx packets: packets received and sent, respectively.
- rx and tx errors: reading/writing packets with error.
- rx and tx dropped: received/sent packets being dropped.

Mode: Operation mode.

Profile: Operator.

Examples: Show the list of available network interfaces.

```
admin@bqn# show interface

IFACE   TYPE        MAC                STATE  LINK
lo0     loopback    00:00:00:00:00:00  up     yes
en0o1   ethernet    0c:c4:7a:00:00:01  up     yes
en0o2   ethernet    0c:c4:7a:00:00:02  down   no
en0o3   ethernet    0c:c4:7a:00:00:05  up     yes
en0o4   ethernet    0c:c4:7a:00:00:06  up     yes
```

The next paragraph shows detailed information:

```
admin@bqn# show interface detail

lo0: UP LOOPBACK RUNNING

    Link type: loopback
    Link detected: yes
    Auto-negotiation: unknown
    MTU: 65536

en0o1: UP BROADCAST RUNNING MULTICAST

    Link type: ethernet
    MAC: 0c:c4:7a:00:00:01
    Link detected: yes
    Auto-negotiation: on
    Duplex: Full
    Speed: 100Mbps
    MTU: 1500

en0o2: BROADCAST MULTICAST

    Link type: ethernet
```

```
MAC: 0c:c4:7a:00:00:02
Link detected: no
Auto-negotiation: on
Duplex: unknown
Speed: unknown
MTU: 1500
```

```
en0o3: UP PROMISC RUNNING
```

```
Link type: ethernet
MAC: 0c:c4:7a:00:00:05
Link detected: yes
Auto-negotiation: on
Duplex: Full
Speed: 1000Mbps
MTU: 2026
```

```
en0o4: UP PROMISC RUNNING
```

```
Link type: ethernet
MAC: 0c:c4:7a:00:00:06
Link detected: yes
Auto-negotiation: on
Duplex: Full
Speed: 1000Mbps
MTU: 2026
```

Show detailed information of en0o3 network interface.

```
admin@bqn# show interface en0o3
```

```
en0o3: UP PROMISC RUNNING
```

Link type: ethernet	MAC: 0c:c4:7a:00:00:05
Link detected: yes	Auto-negotiation: on
Duplex: Full	Speed: 1000Mbps
GRO: off	GSO: off
LRO: off	TSO: off
RxCsumOffload: on	TxQueueLen: n/a
ChannelRx: 1/128	ChannelTx: 1/64
ChannelCombined: n/a	ChannelOther: n/a

RingSlotRx: 1024/4096	RingSlotTx: 4096/4096
IfaceNumber: 0	
MTU: 2026	
rx_bytes: 468366858424	tx_bytes: 3687650108597
rx_packets: 1780081317	tx_packets: 3171285311
rx_errors: 0	tx_errors: 0
rx_dropped: 0	tx_dropped: 0
rx_overrun: 0	tx_carrier: 0
rx_noBuff: 0	tx_collision: 0
rx_multicast: 0	
Index: 0	

Related: [interface](#)

Commands: [show hardware network](#)
[show interface device](#)

show interface device

Syntax: show interface iface-name device

Description: Show device information about a network interface.

- Driver: type of network driver.
- PCI class: type of PCI device (0x20000 for an Ethernet controller).
- PCI vendor ID: vendor of the device (e.g. 0x8086 Intel).
- PCI device ID: type of device (e.g 10-Gigabit X540-AT2).
- PCI slot: slot of insertion of interface on the PCI bus.
- NUMA node: id of the CPU associated physically with this interface. In servers with one processor is 0. If more than one processor, this information is useful to select the affinities of IO processes son the IO process runs on the CPU associated with the network interface (see [nic io affinity](#)).

Mode: Operation mode.

Profile: Operator.

Examples: Show device information of the en0o3 network interface.

```
admin@bqn# show interface en0o3
Driver: igb_uio
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
```

```
PCI device ID: 0x1528 : Ethernet Controller 10-Gigabit X540-AT2
PCI sub-vendor ID: 0x15d9
PCI sub-device ID: 0x1528
PCI slot: 0000:05:00.0
NUMA node: 0
```

Related: [show interface](#)

Commands

show interface pkteng bandwidth

Syntax: show interface pkteng bandwidth [seconds-average]

Description: Show bandwidth per network interface. If seconds-average is specified, throughput average is calculated using that number of seconds.

- INTERFACE. Interface name.
- PKTS-RX-Kpps. Packets received in kilo packets per second.
- PKTS-RX-Kpps. Bytes received in Mbps.
- PKTS-TX-Kpps. Packets sent in kilo packets per second.
- PKTS-TX-Kpps. Bytes sent in Mbps.

The last two lines give the total of all interfaces on the access side and on the internet side.

Mode: Operation mode.

Profile: Operator.

Examples: Show throughput per interface:

```
admin@bqn# show interface pkteng bandwidth

INTERFACE    PKTS-RX-Kpps  BYTES-RX-Mbps  PKTS-TX-Kpps  BYTES-TX-Mbps
en0s1f0      106.012       201.718        238.042       2280.031
en0s1f1      227.303       2226.603       146.020       219.493
en0s1f2      109.163       232.804        277.979       2557.041
en0s1f3      272.604       2553.937       150.891       252.270
access       215.175       434.522        516.021       4837.070
internet     499.907       4780.540       296.911       471.763
```

Related: [show interface](#)

Commands

show interface bta statistics

Syntax: show interface bta statistics [detail]

Description: Show BTA statistics for each PKTENG network interface.

When the detail option is used, the command shows detailed information about the PKTENG interfaces for each PKTENG instance.

Mode: Operation mode.

Profile: Operator.

Examples: The following example shows BTA information about the PKTENG network interfaces.

```
admin@bqn# show interface bta statistics
en0o3:

PktsRcvBta:          1115719971      BytesRcvBta:          216471821317
PktsRcvBtaFrag:      5247                PktsRcvBtaDefrg:      0
PktsRcvBtaFwd:       23460633            BytesRcvBtaFwd:       1766686004
PktsRcvBtaTrack:     11328200            BytesRcvBtaTrck:      2433165676
PktsRcvBtaOpt:       1080931138         BytesRcvBtaOpt:       212271969637
PktsRcvOptData:      169197465           BytesRcvOptData:      164666837619
PktsRcvOptRtx:       1281432             BytesRcvOptRtx:       763536220
PktsRcvOptOOO:       543733              BytesRcvOptOOO:       593928496
PktsRcvOptOOCnf:     164874              ByteRcvOptOOOCf:      125515787
PktsRcvTrackDat:     1931176             ByteRcvTrackDat:      1918409984
PktsRcvTrackRtx:     135656             ByteRcvTrackRtx:      102075279
PktsRcvTrackOOO:     6253                ByteRcvTrackOOO:      7205901
PktsSntBta:          1795129605         BytesSntBta:          2189663543958
PktsSntBtaFwd:       23292491           BytesSntBtaFwd:       1754394099
PktsSntBtaTrack:     18020305           BytesSntBtaTrck:      23193842078
PktsSntBtaOpt:       1753816809         BytesSntBtaOpt:       2164715307781
PktsSntBtaErr:       0                   BytesSntBtaErr:       0
PktsSntOptData:      1558235895         BytesSntOptData:      2130969261479
PktsSntOptRtx:       86275470           BytesSntOptRtx:       105569365005
PktsSntOptPace:      515054972          BytesSntOptPace:      699175370844
PktsSntTrackDat:     16644719           BytesSntTrckDat:      23123326606
PktsSntTrackRtx:     290693             BytesSntTrckRtx:      339221863
TcpBytesOptAckd:     1947141092534      TcpBytesTrkAckd:      21887699196
TcpByteOptDSack:     57790577386        TcpByteTrkDuSck:      84410343
PktSntOptFstRec:     55108103           PktSntOptRtoRec:      8133283
EventsFastRec:       137966             EventsRto:            8242268
EventsFastRecReord:  447091             EventsFastRcRanLoss:  0
EventsRtoSpurious:   398036             EventsRcvReorLoss:    391416
EventsTlpNoRtx:      2085029            EventsTlpRtx:         55684301
```

en0o4:

PktsRcvBta:	1677778703	BytesRcvBta:	2113062760843
PktsRcvBtaFrag:	5218	PktsRcvBtaDefrg:	0
PktsRcvBtaFwd:	30864048	BytesRcvBtaFwd:	26263881933
PktsRcvBtaTrack:	18020305	BytesRcvBtaTrck:	23193842078
PktsRcvBtaOpt:	1628894350	BytesRcvBtaOpt:	2063605036832
PktsRcvOptData:	1494459248	BytesRcvOptData:	2056842861183
PktsRcvOptRtx:	6071616	BytesRcvOptRtx:	7773555498
PktsRcvOptOOO:	53815943	BytesRcvOptOOO:	77165451935
PktsRcvOptOOCnf:	11455092	ByteRcvOptOOCf:	16364972624
PktsRcvTrackDat:	16644719	ByteRcvTrackDat:	23123326606
PktsRcvTrackRtx:	290693	ByteRcvTrackRtx:	339221863
PktsRcvTrackOOO:	411326	ByteRcvTrackOOO:	588916016
PktsSntBta:	1483807843	BytesSntBta:	252108545326
PktsSntBtaFwd:	31032190	BytesSntBtaFwd:	26276173838
PktsSntBtaTrack:	11328200	BytesSntBtaTrck:	2433165676
PktsSntBtaOpt:	1441447453	BytesSntBtaOpt:	223399205812
PktsSntBtaErr:	0	BytesSntBtaErr:	0
PktsSntOptData:	182448234	BytesSntOptData:	180754371278
PktsSntOptRtx:	14407722	BytesSntOptRtx:	16922607677
PktsSntOptPace:	78703734	BytesSntOptPace:	98527304728
PktsSntTrackDat:	1931176	BytesSntTrckDat:	1918409984
PktsSntTrackRtx:	135656	BytesSntTrckRtx:	102075279
TcpBytesOptAckd:	155507617579	TcpBytesTrkAckd:	1725775919
TcpByteOptDSack:	1386761277	TcpByteTrkDuSck:	7739112
PktSntOptFstRec:	10008480	PktSntOptRtoRec:	4461047
EventsFastRec:	2813915	EventsRto:	1861256
EventsFastRecReord:	32467	EventsFastRcRanLoss:	0
EventsRtoSpurious:	96870	EventsRcvReorLoss:	24913603
EventsTlpNoRtx:	1197344	EventsTlpRtx:	2989074

Related: [bta](#)

Commands: [interface](#)

[show interface](#)

show interface capture

Syntax: show interface capture [iface-name]

Description: Show information about the currently running packet capture processes.

If the name of the interface is given, only captures configured for that interface will be shown, and the information will be more detailed.

Mode: Operation mode.

Profile: Operator.

Examples: Show the list of captures currently running.

```
admin@bqn# show interface capture

IFACE      MODE          SIZE      FILTER
en0p0s8    configuration  679936    icmp
```

Show detailed information about the captures running in the given interface.

```
admin@bqn# show interface capture en0p0s8

Interface: en0p0s8
Mode: configuration
State: active
Size: 679936
Size max: 13000000
Rotation: 10
File: /opt/bqn/var/capture/en0p0s8 Filter:    icmp
PID: 846
```

Related: [capture](#)

Commands: [show interface](#)

[system interface capture](#)

show interface firewall

Syntax: show interface firewall

Description: List the white list of source IP addresses allowed to access the QoE management interface.

Empty list if the firewall is not activated.

The parameters shown are as follows:

- IFACE: network interface where the rule is applied (always the management interface).
- CHAIN: iptables chain where the rule is applied (always input).
- RANGE: IP range part of the white list.

Mode: Operation mode.

Profile: Operator.

Examples:


```
admin@bqn# show interface firewall

IFACE  CHAIN  RANGE
en0o1  input  10.0.0.0/8
en0o1  input  172.16.0.0/12
en0o1  input  192.168.0.0/16
```

Related: [firewall input](#)

Commands: [set interface firewall input](#)

show interface flow-control

Syntax: show interface iface-name flow-control

Description: Show flow-control related information for a DPDK interface.

The following information is shown:

- High water: High threshold value to trigger XOFF.
- Low water: Low threshold value to trigger XON.
- Pause quota: Pause quota in the Pause frame.
- Send XON: If XON frame needs to be sent.
- Mode: Link flow control mode.
- Forward MAC control frames: Forward MAC control frames.
- Use pause autonegotiation: Whether pause autonegotiation is used.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show interface en0s1f0 flow-control
High water: 33828
Low water: 32328
Pause quota: 1664
Send XON: 1
Mode: NONE
Forward MAC control frames: no
Use pause autonegotiation: yes
```

Related: [interface](#)

Commands: [show interface](#)

show interface management

Syntax: show interface management [detail]

Description: Show the management network interface configured. If the detail flag is present, extra information is shown.

- Interface: interface name
- IP address: management IP address
- Default gateway: default gateway IP address

Mode: Operation mode.

Profile: Operator.

Examples: Show the current management interface.

```
admin@bqn# show interface management
en0o1

Show detailed management interface configuration
admin@bqn# show interface management detail
Interface: en0o1
IP address: 192.168.0.121/24
Default gateway: 192.168.0.1
Nameserver: n/a
```

Related: [interface](#)

Commands: [management](#)

[set interface management](#)

[show interface](#)

show interface pkteng statistics

Syntax: show interface pkteng statistics [detail]

Description: The command shows aggregated statistics for each data interface. Note that the byte values shown do not count the bytes in the ethernet header. The detail parameter shows statistics broken down per process instance.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows statistics per data interface.

```
admin@bqn# show interface pkteng statistics
en0o3:
```

TotalRxPkt:	1801138555	TotalRxBytes:	443354551225
TotalTxPkt:	3208629200	TotalTxBytes:	3672579011758
ProcessRxPkt:	1796966043	ProcessRxBytes:	443228659109
ProcessTxPkt:	3205791493	ProcessTxBytes:	3672498109302
IpBypassRxPkt:	0	IpBypassRxBytes:	0
IpBypassTxPkt:	0	IpBypassTxBytes:	0
IPv6RxPkt:	7492	IPv6RxBytes:	430024
IPv6TxPkt:	0	IPv6TxBytes:	0
TcpRxPkt:	1120828658	TcpRxBytes:	218002040228
TcpTxPkt:	1802748683	TcpTxBytes:	2198386113860
UdpRxPkt:	671901169	UdpRxBytes:	224622081390
UdpTxPkt:	1401066815	UdpTxBytes:	1473905208870
IpOtherRxPkt:	4236216	IpOtherRxBytes:	604537491
IpOtherTxPkt:	1975995	IpOtherTxBytes:	206786572
NoIpRxPkt:	4169384	NoIpRxBytes:	125010110
NoIpTxPkt:	2837707	NoIpTxBytes:	80902456
CapErrRxPkt:	0	CapErrRxBytes:	0
ChkErrRxPkt:	2962	ChkErrRxBytes:	836546
TcpErrRxPkt:	6	TcpErrRxBytes:	1764
UdpErrRxPkt:	7	UdpErrRxBytes:	2346
FormatErrRxPkt:	106	FormatErrRxBytes:	20804
BigErrRxPkt:	0	BigErrRxBytes:	0
IfaceErrRxPkt:	47	IfaceErrTxPkt:	47
RingErrRxPkt:	0	RingErrRxBytes:	0
TotalErrTxPkt:	0	TotalErrTxBytes:	0
ShpTxBytes:	0	RateTxBytes:	0
ShapedDropBytes:	0	BlockDropBytes:	0

en0o4:

TotalRxPkt:	3090681134	TotalRxBytes:	3595592592743
TotalTxPkt:	2170511269	TotalTxBytes:	479119814175
ProcessRxPkt:	3087843208	ProcessRxBytes:	3595511529530
ProcessTxPkt:	2166341885	ProcessTxBytes:	478994804065
IpBypassRxPkt:	0	IpBypassRxBytes:	0
IpBypassTxPkt:	0	IpBypassTxBytes:	0

IPv6RxPkt:	0	IPv6RxBytes:	0
IPv6TxPkt:	7492	IPv6TxBytes:	430024
TcpRxPkt:	1684800380	TcpRxBytes:	2121399533080
TcpTxPkt:	1490204500	TcpTxBytes:	253768185184
UdpRxPkt:	1401066815	UdpRxBytes:	1473905208870
UdpTxPkt:	671901169	UdpTxBytes:	224622081390
IpOtherRxPkt:	1976013	IpOtherRxBytes:	206787580
IpOtherTxPkt:	4236216	IpOtherTxBytes:	604537491
NoIpRxPkt:	2837707	NoIpRxBytes:	80902456
NoIpTxPkt:	4169384	NoIpTxBytes:	125010110
CapErrRxPkt:	0	CapErrRxBytes:	0
ChkErrRxPkt:	116	ChkErrRxBytes:	54506
TcpErrRxPkt:	0	TcpErrRxBytes:	0
UdpErrRxPkt:	0	UdpErrRxBytes:	0
FormatErrRxPkt:	0	FormatErrRxBytes:	0
BigErrRxPkt:	0	BigErrRxBytes:	0
IfaceErrRxPkt:	103	IfaceErrTxPkt:	103
RingErrRxPkt:	0	RingErrRxBytes:	0
TotalErrTxPkt:	0	TotalErrTxBytes:	0
ShpTxBytes:	0	RateTxBytes:	0
ShapedDropBytes:	0	BlockDropBytes:	0

Related: [interface](#)

Commands: [show interface](#)

[wire](#)

show interface pkteng status

Syntax: show interface pkteng status [manager]

Description: The command shows the status of pkteng process instances. The manager parameter shows the status of the packet engine at the PKTENGMR process.

Mode: Operation mode.

Profile: Operator.

Examples

```
admin@bqn# show interface pkteng status
INST  IFACE  STATE  DPDK-STATE  MASK-IO  ERR-RX-DETECT
```

0	en0o3	ready	ready	01	n/a
0	en0o4	ready	ready	01	n/a
1	en0o3	ready	ready	01	n/a
1	en0o4	ready	ready	01	n/a
2	en0o3	ready	ready	01	n/a
2	en0o4	ready	ready	01	n/a
3	en0o3	ready	ready	01	n/a
3	en0o4	ready	ready	01	n/a
4	en0o3	ready	ready	01	n/a
4	en0o4	ready	ready	01	n/a
5	en0o3	ready	ready	01	n/a
5	en0o4	ready	ready	01	n/a
6	en0o3	ready	ready	01	n/a
6	en0o4	ready	ready	01	n/a
7	en0o3	ready	ready	01	n/a
7	en0o4	ready	ready	01	n/a

The following example shows detailed statistics:

```
admin@bqn# show interface pkteng status manager
```

IFACE	STATE	DPDK-STATE	MASK-IO	READY-STATE	ERR-RX-DETECT
en0o3	ready	ready	01	01	n/a
en0o4	ready	ready	01	01	n/a

Related: [interface](#)

Commands: [show interface](#)

[wire](#)

show interface pkteng steering

Syntax: show interface pkteng steering [detail]

Description: Show steering related information of all PKTENG network interfaces.

The following information is shown for each interface:

- RcvInputPkt/RcvInputBytes: Packets and bytes received by an interface.
- RcvBypassPkt/RcvBypassBytes: Packets and bytes which are bypassed by the PKTENG- IO processes and forwarded directly.

- RcvSteerPkt/RcvSteerBytes: Packets and bytes steered from a PKTENG-IO to a PKTENG- worker process.
- RcvErrSteerPkt/RecvErrSteerBytes: Packets and bytes that cannot be steered due to an error.
- SndFwdPkt/SndFwdBytes: Packets and bytes that are forwarded from a worker to an IP PKTENG process.
- SndFwdPktErr/SndFwdBytesErr: Packets and bytes that cannot be forwarded due to an error.
- SndErrOutputPkt/SndOutputBytes: Packets and bytes that are sent to an interface.
- SndErrOutputPkt/SndErrOutputBytes: Packets and bytes that cannot be sent to an interface due to an error.
- SndErrSizePkt: Packets that cannot be sent due to a packet size error.

By default, the statistics of all the interfaces are aggregated. Use the detail option to show detailed information for each PKTENG instance.

Mode: Operation mode.

Profile: Operator.

Examples: Show the aggregated steering counters of all interfaces.

```
admin@bqn# show interface pkteng steering
```

```
en0o3:
```

RcvInputPkt:	1805966269	RcvInputBytes:	444885958737
RcvSteerPkt:	1801789475	RcvSteerBytes:	444760696717
RcvErrSteerPkt:	47	RecvErrSteerBytes:	20546
SndFwdPkt:	3217255152	SndFwdBytes:	3682012047902
SndFwdPktErr:	0	SndFwdBytesErr:	0
SndOutputPkt:	3217255167	SndOutputBytes:	3682017446891
SndErrOutputPkt:	0	SendErrOutputBytes:	0
SndErrSizePkt:	0		

```
en0o4:
```

RcvInputPkt:	3098934127	RcvInputBytes:	3604802234544
RcvSteerPkt:	3096086541	RcvSteerBytes:	3604720948005
RcvErrSteerPkt:	103	RecvErrSteerBytes:	106251
SndFwdPkt:	2176062358	SndFwdBytes:	480732987426
SndFwdPktErr:	0	SndFwdBytesErr:	0
SndOutputPkt:	2176062370	SndOutputBytes:	480733500319
SndErrOutputPkt:	3795250	SendErrOutputBytes:	246619093

```
SndErrSizePkt:      0
```

Related: [interface](#)

Commands: [show interface](#)

show interface pkteng tx-error-detect

Syntax: show interface pkteng tx-error-detect

Description: The command shows the detection of transmission errors in data interfaces.

Mode: Operation mode.

Profile: Operator.

Examples:

```
admin@bqn# show interface pkteng tx-error-detect
```

INST	IFACE	TRIGGER	DETECTION
0	en0p3s0	0	0
0	en0p2s0	0	0
1	en0p3s0	0	0
1	en0p2s0	0	0
2	en0p3s0	0	0
2	en0p2s0	0	0
3	en0p3s0	0	0
3	en0p2s0	0	0

Related: [interface](#)

Commands: [show interface](#)

[wire](#)

show ip address

Syntax: show ip address

Description: Show the existing IP addresses and their attributes.

The following fields are displayed for each IP entry:

- IFACE: The network interface the IP address is attached to.
- IP-ADDR: The IP address.
- BROADCAST: The broadcast address.
- SCOPE: The scope of the area where the IP address is valid.
- FLAGS: IP address flags.

The IP address scope may be one of the following values:

- global: The IP address is globally valid.
- link: The IP address is only valid on the attached network interface.
- host: The IP address is only valid inside this system.

The IP address flag may be one or a combination of the following values:

- permanent: The IP address is permanent.
- primary: When there is more than one IP address with the same network address, the primary IP address indicates that it will be used as the source IP address for outgoing packets.
- secondary: When there is one IP address with the same network address as the IP address added, the new IP address will be tagged as secondary. Secondary IP addresses will not be used as the source IP address for outgoing packets.



Note

It is recommended to not configure multiple IP addresses belonging to the same network and with the same CIDR prefix, and therefore primary or secondary IP addresses should not exist.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the existing IP addresses.

```
admin@bqn# show ip address
```

IFACE	IP-ADDR	BROADCAST	SCOPE	FLAGS
lo0	127.0.0.1/8	127.255.255.255	host	permanent
en0o1	192.168.0.121/24	-	global	permanent

Related: [ip address](#)

Commands: [net ping](#)

[show interface](#)

show ip arp

Syntax: show ip arp

Description: Show the ARP table entries, which represent associations between a neighbor protocol address and its data link-layer address.

The following fields are displayed for each ARP entry:

- IP-ADDR: The IP address of the neighbor.
- HW-TYPE: The hardware type, according to the values defined in RFC 826.

- HW-ADDR: Data link-layer mapping for the IP address.
- IFACE: Network interface to which the neighbor is attached.
- STATE: State of the neighbor entry.

The state of a neighbor may be one or a combination of the following values:

- reach: Reachable host and valid entry until the reachability time expires.
- perm: Permanent entry, which is valid forever unless it is removed manually.
- incomplete: Reachable host and valid entry until the reachability
- publ : Publish entry.
- trail : Entry has requested trailers.
- dontpub: Do not answer this address.
- magic: Automatically added entry.



Note

Some of these values may only be of use to the operating system.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the status of the ARP table at some time.

```
admin@bqn# show ip arp
```

IP-ADDR	HW-TYPE	HW-ADDR	IFACE	STATE
192.168.0.121	ethernet	00:22:4d:00:00:c6	en0o1	reach

Related: [interface](#)

Commands: [show interface](#)

show ip route

Syntax: show ip route

Description: Show the existing IP routing table.

The following fields are displayed for each route entry:

- IFACE: The network interface used for sending packets.
- DESTINATION: Destination network or host.
- GATEWAY: Gateway IP address, or "-" if not set.
- FLAGS: Route flags.

The route flag may be one or a combination of the following values:

- U : Route is up.
- H : Destination is a host.
- G : Destination is a gateway.
- D : Route installed dynamically by daemon or redirect.
- M : Route modified dynamically by daemon or redirect.
- ! : Reject route.



Note

The default route is indicated by the destination 0.0.0.0/0.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the existing routing table.

```
admin@bqn# show ip route

IFACE    DESTINATION      GATEWAY    FLAGS
en0o1    0.0.0.0/0        192.168.0.1  UG
lo0      127.0.0.0/8      -           U
en0o1    192.168.0.121/24 -           U
```

Related: [ip address](#)

Commands: [net ping](#)

[net tracepath](#)

[route](#)

show license

Syntax: show license

Description: Show a list of all the defined licenses.

For each license feature the following information is displayed:

- FEATURE : License feature name.
- EXPIRATION : License expiration time.
- VALID : Whether the license feature is valid or not at the time the command was entered.
- USAGE : Usage number.

Mode: Operation mode.

Profile: Operator.

Examples: Show the defined license features.

```
admin@bqn0# show license

FEATURE      EXPIRATION                VALID  USAGE
bta          2020-05-01T00:00:00+0100  yes    1000
```

Related: [license](#)

Commands: [set license load](#)

[show license eula](#)

[show license feature](#)

[show system alarms](#)

[show system functionality](#)

show license eula

Syntax: show license eula

Description: Show the End User License Agreement of the QoE software.

The complete EULA document is also available in the [End User License Agreement](#) chapter.

Mode: Operation mode.

Profile: Operator.

Examples: Show the defined license features.

```
admin@bqn0# show license eula

THIS END USER LICENSE AGREEMENT ("EULA") IS A LEGAL AGREEMENT BETWEEN YOU
(EITHER AN INDIVIDUAL OR AN ENTITY) AND BEQUANT S.L., A SPANISH PRIVATE
LIMITED LIABILITY CORPORATION, HAVING ITS PRINCIPAL PLACE OF BUSINESS AT
CALLE RAIMUNDO FERNÁNDEZ VILLAVERDE 61, MADRID 28003, SPAIN, WITH CIF (TAX
ID) ES-B85612539, REGISTERED IN THE

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AND CONDITIONS ON BEHALF OF SUCH ENTITY.
```

Related: [license](#)

Commands: [show license](#)

show license feature

Syntax: show license feature name [clients | detail]

Description: Show all the properties of a license feature.

If the optional detail parameter is passed, the command shows more detailed information about a specific license feature. If the optional clients parameter is passed, the command shows information about the state of the license clients when the license feature has usage defined.

Mode: Operation mode.

Profile: Operator.

Examples: Show the defined license features.

```
admin@bqn0# show license feature bta
Feature: bta
State: ready
Clients: 15
Activation time: 2020-01-01T00:00:00+0100
Expiration time: 2020-12-31T00:00:00+0100
Valid: yes
Usage maximum: 10000
Usage current: 8652
Hash: 06b61aa056337344657b4f8b9913254f137f07264139af7c8e
Comment: Test example@example.com
```

Related: [license](#)

Commands: [show license](#)

show license integrity

Syntax: show license integrity

Description: Show the license integrity state. If the system does not validate the integrity of the license then all license features are invalid.

Mode: Operation mode.

Profile: Operator.

Examples: Show the license integrity state.

```
admin@bqn0# show license integrity
```

```
bqn    VALID    LAST-CHECK
0      Yes     0:01:02.983
```

Related: [license](#)

Commands: [show license](#)

show logging feature

Syntax: show logging feature

Description: Show information about the system logger features used by the QoE software.

This command shows the following columns:

- Feature: Feature type.
- Level: Minimum syslog level for each feature.

For a detailed description of the available features and system logger levels see the [feature](#) command.

Mode: Operation mode.

Profile: Operator.

Examples: Show the current state of the system logger features:

```
admin@bqn# show logging feature

FEATURE    LEVEL
api        info
btc        info
cluster    info
config     info
control    info
dns        info
fragment   info
generic    info
iface      info
internal   info
ipc        info
ipctask    info
license    info
memory     info
packet     info
pktpcap    info
```

```
pkteng    info
proc      info
remctr    info
routing   info
snmp      info
stats     info
```

Related: [feature](#)

Commands

show pkteng affinity

Syntax: show pkteng affinity

Description: Show the CPU affinities of PKTENG IO processes and workers. IO processes handle network interfaces packet input/output and workers do the packet processing. The affinities show which CPU cores are associated with which processes. CPU cores are indicated using a hexadecimal mask, with the least significant bit for core 0, next for core 1, etc.

The following information is shown:

- **FUNCTION:** element of the affinity mask.
- **AFFINITY:** mask. For example, cores 1 and 2 have mask 6.
- **COUNT:** Number of cores.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the PKTENG affinities of a server with 24 cores, two cores assigned to IO and 21 assigned as pkteng workers, with the remaining core (core 0) unassigned.

```
admin@bqn# show pkteng affinity

FUNCTION      AFFINITY  COUNT
cpu-available ffffffff  24
pkteng-all    fffffe    23
pkteng-worker fffff8    21
pkteng-io      000006    2
en0s1f0-io     000002    1
en0s1f1-io     000002    1
en0s1f2-io     000004    1
en0s1f3-io     000004    1
```

Related: [nic io affinity](#)

Commands: [show interface device](#)

show pkteng cpu

Syntax: show pkteng cpu

Description: Show the mask of available CPUs and how many are in use. The following information is shown:

- **FUNCTION:** element of the affinity mask: available CPUs (present), unused (offline), and used (online). Normally offline will be 0 and present and online will be equal.
- **AFFINITY:** mask. For example, cores 1 and 2 have mask 6.
- **COUNT:** Number of cores.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows a server with 24 cores, all in use at the moment and unassigned.

```
admin@bqn# show pkteng cpu

FUNCTION      MASK      COUNT
cpus-present  0xFFFFFFFF 24
cpus-offline  0x000000   0
cpus-online   0xFFFFFFFF 24
```

Related: [nic io affinity](#)

Commands: [show interface device](#)

[show pkteng affinity](#)

show pkteng latency

Syntax: show pkteng latency [full] [detail]

Description: Show network latency values. The full flag gives more information and detail, breaking the information down per pkteng worker instance.

The following information is shown:

- **INST:** pkteng worker ID. Only shown if full specified.
- **RTT-MIN-DN:** Minimum RTT value in ms in downlink direction (access RTT).
- **RTT-MEAN-DN:** Average RTT value in ms in downlink direction (access RTT).
- **RTT-MAX-DN:** Maximum RTT value in ms in downlink direction (access RTT).
- **RTT-MIN-UP:** Minimum RTT value in ms in uplink direction (Internet RTT).
- **RTT-MEAN-UP:** Average RTT value in ms in uplink direction (Internet RTT).
- **RTT-MAX-UP:** Maximum RTT value in ms in uplink direction (Internet RTT).

- MBYTES-ACKED-DN: MBytes of acknowledged traffic in downlink direction. Only shown if fully specified.
- MBYTES-ACKED-UP: MBytes of acknowledged traffic in uplink direction. Only shown if fully specified.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the latencies measured by pkteng.

```
admin@bqn# show pkteng latency

RTT-MIN-DN  RTT-MEAN-DN  RTT-MAX-DN  RTT-MIN-UP  RTT-MEAN-UP  RTT-MAX-UP
2.602       14.279       463.743     54.835      56.830       76.387
```

Related: [show statistics latency](#)

Commands

show pkteng memory

Syntax: show pkteng memory [all]

```
show pkteng memory instance
```

Description: Show information about the memory used by the BTA service and its processes.

A PKTENG process uses a pre-allocated pool of memory to store flows, IP packets, and other internal structures. The size of the pre-allocated memory area is indicated in the POOLSIZEKB column or pool size field (in kilobytes). The rest of the fields indicate pool usage counters relevant for Cambium Networks engineers to monitor the system.

If the instance parameter is indicated, the command shows detail memory usage for a specific PKTENG process instance in the active QoE.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the memory usage by the PKTENG processes:

```
admin@bqn# show pkteng memory

bqn  INST  POOLSIZEKB  SLABSALLOC  SLABSUSED  CHUNKALLOC  CHUNKUSED  OBJUSED
0    0     408464     25529       0           1633856     0          0
0    1     408464     25529       2           1633856     18         3
```

The next example shows memory usage of a PKTENG process with instance ID 1.

```
admin@bqn# show pkteng memory 1

Pool size (KB):      408464
```



```
Chunk size (bytes): 256
Slabs allocated: 25529
Chunks allocated: 1633856
Objects used: 2
Slabsused: 2
Chunksused: 10
Memory begin: 0x7fdc17b39010
Memory end: 0x7fdc30a1d010
```

Slab usage:

Size	Partial	Full
256	0	0
512	1	0
768	0	0
1024	0	0
1280	0	0
1536	0	0
1792	0	0
2048	1	0

Related: [memory](#)

Commands: [show system memory](#)

show pkteng parameters

Syntax: show pkteng parameters

Description: Show the properties of the packet engine.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current properties of the PKTENG.

```
admin@bqn# show pkteng parameters
PKTENG processes: 23
Fragment validate checksum: yes
Fragment ignore: no
Fragment maximum: 2048
Access IPv4-endpoint inactivity timeout: 900.000000
Internet IPv4-endpoint inactivity timeout: 900.000000
Access IPv6-endpoint inactivity timeout: 900.000000
```

Internet IPv6-endpoint inactivity timeout: 900.000000
IP-DST send timeout: 0.005000
Per-subscriber RTT calculations: yes
Per-subscriber RTT period: 1.000000
TCS optimization: yes
TCS adaptive initial window: yes
TCS initial window: 10
TCS flush incoming reorder: 0
TCS high loss threshold: 3000
TCS high loss percent: 25.00
TCS delay closing: no
TCS DPI: yes
TCS Max DupAck Thresh: 1000
TCS experimental congestion detection: 100.00%
SDR partial generation: yes
SDR partial generation seconds: 1800
SDR mode: private
UDR inactive generation: no
UDR partial generation: yes
UDR mode: private
UDR minimum active packets: 16
UDR minimum independent download: 0.001000
DoS max attack cnt: 50
DoS volume period: 10.000
DoS SYN period: 10.000
DoS mode: private
DoS SYN client ingress rate: 0
DoS SYN client egress rate: 0
DoS SYN server ingress rate: 0
DoS SYN server egress rate: 0
DoS volume minimum rate: 0
DoS volume multiplier rate: 0.00
Control configuration change interval: 60.000000
Control configuration change ID: 1
Speed mixing: 3 Speed median: yes
Speed RTTA: 0.000000

```
Speed RTTI small: 0.010000
Speed RTTI large: 0.060000
Speed samples expiry: 43200
Speed samples inactivity expiry: 86400
Speed samples maximum: 1000
Speed samples minimum without expiry: 200
Speed samples minimum for calculations: 100
Speed samples rate maximum: 5
Speed Acceleration Confidence Interval: 99.990
Speed shift: 9
Speed size small: 100000
Speed size large: 1000000
Bypass VLAN: no
Bypass VLAN untagged: no
Bypass IPv4: no
Bypass IPv6: no
Bypass tcp: no
Bypass udp: no
Bypass ip-other: no
CPU affinity: fffffe
IRQ affinity: 000000
Error RX detected: n/a
Error RX detection interval: n/a
```

Related: [pkteng](#)

Commands: [set bta optimization](#)

show pkteng polling

Syntax: show pkteng polling

Description: Show statistics related to the times spent on each phase of the pkteng main loop. The packet phase represents the time spent processing a given packet. The sleep phase represents the time spent sleeping due to no more tasks pending. The process phase represents the time spent on the rest of the tasks (non-packet nor sleep-related). On a given loop iteration, the time spent on each phase is measured and statistics are generated. After running the command, the statistics are reset for the next execution.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show pkteng polling
```

INST	PROCESS (usec)			SLEEP (usec)				PACKET (usec)				PROCESS (usec)				
	MIN	A	VG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	INST	MIN	A	MAX	MIN	
0	0.7			4.8	1399.9		52.0	53.1	92.7		0.0	12.1			629.9	
1	0.7			5.2	1833.4		51.9	53.1	92.3		0.0	12.5			984.5	
2	0.7			4.1	873.6		51.7	52.9	92.0		0.0	8.3			1184.7	
3	0.7			5.1	1850.4		52.0	53.0	92.0		0.0	16.8			1619.5	
4	0.7			5.5	650.3		52.0	53.1	91.4		0.0	12.2			810.0	
5	0.7			5.4	634.5		52.0	53.2	92.3		0.0	12.4			512.8	
6	0.7			4.3	495.1		51.8	53.0	92.2		0.0	9.6			1541.5	
7	0.6			1.3	41.5		51.8	53.3	175.9		0.1	3.5			60.7	

Related: [pkteng](#)

Commands

show pkteng ring slots

Syntax: show pkteng ring slots

Description: Show the occupation of the dispatch and forward rings, used to communicate the IP and worker PKTENG processes.

The following information is shown:

- INST: Instance number of the ring owner.
- NUMA-NODE: Numa node owner of the rings (there is a ring for each numa node).
- DISP-FREE: Free entries in the dispatch ring.
- DISP-ALL: Number of entries in the dispatch ring.
- FWD-FREE: Free entries in the forward ring.
- FWD-ALL: Number of entries in the forward ring.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show pkteng ring slots
```

INST	NUMA-NODE	DISP-FREE	DISP-ALL	FWD-FREE	FWD-ALL
0	0	4095	4095	4095	4095
1	0	4095	4095	4095	4095

2	0	4095	4095	4095	4095
3	0	4095	4095	4095	4095
4	0	4095	4095	4095	4095
5	0	4095	4095	4095	4095
6	0	4095	4095	4095	4095
7	0	4095	4095	4095	4095

Related: [show interface](#)

Commands: [show interface pkteng steering](#)

[show pkteng ring statistics](#)

show pkteng ring statistics

Syntax: show pkteng ring statistics

Description: Show statistics of the number of packets send and received from rings.

The following information is shown:

- INST: Instance number reporting the statistic.
- RCV-INPUT: Number of packets received from the hardware ring of an interface.
- SND-DISP: Number of packets sent to the dispatch ring.
- RCV-DISP: Number of packets received from the dispatch ring.
- SND-FWD: Number of packets sent to the dispatch ring.
- RCV-FWD: Number of packets received in the forward ring.
- SND-OUTPUT: Number of packets sent to the hardware ring of an interface.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show pkteng ring statistics
```

INST	RCV-INPUT	SND-DISP	RCV-DISP	SND-FWD	RCV-FWD	SND-OUTPUT
0	1037228046 10	1037227661 09	0	22116	1209838606 17	1209838606 17
1	1387663829 04	1387663357 97	0	11936	1627129506 05	1627129506 05
2	0	0	115068456 60	133953732 60	0	0

3	0	0	112354283 58	130784527 43	0	0
4	0	0	119541327 07	140208414 30	0	0
5	0	0	111285685 85	130530861 20	0	0
6	0	0	107303847 45	126326176 58	0	0
7	0	0	104813476 42	122799813 57	0	0

Related: [show interface](#)

Commands: [show interface pkteng steering](#)

[show pkteng ring slots](#)

show pkteng sdr

Syntax: show pkteng sdr

Description: Show the number of SDR records generated per pkteng worker process.

Mode: Operation mode.

Profile: Operator.

Examples

```
admin@bqn# show pkteng sdr
```

```

bqn  INST  RECORDS
0    0     0
0    1     0
0    2    46632
0    3    48569
0    4    49427
0    5    49165
0    6    42731
0    7    47240

```

Related: [policy monitor](#)

Commands

show pkteng speed

Syntax: show pkteng speed {acceleration | optimized | tracked} [full] [detail]

Description: Show metrics of TCP acceleration. The option acceleration shows acceleration percentages, the option optimized average speeds for optimized (accelerated) TCP flow and tracked the average speed of not accelerated TCP flows.

The following information is shown:

- SmRttiSmRttaDn: downlink samples of small RTTi and small RTTa.
- MdRttiSmRttaDn: downlink samples of medium RTTi and small RTTa.
- LgRttiSmRttaDn: downlink samples of large RTTi and small RTTa.
- SmRttiSmRttaDn: downlink samples of small RTTi and small RTTa.
- MdRttiSmRttaDn: downlink samples of medium RTTi and small RTTa.
- LgRttiSmRttaDn: downlink samples of large RTTi and small RTTa.
- SmRttiSmRttaUp: uplink samples of small RTTi and small RTTa.
- MdRttiSmRttaUp: uplink samples of medium RTTi and small RTTa.
- LgRttiSmRttaUp: uplink samples of large RTTi and small RTTa.
- SmRttiSmRttaUp: uplink samples of small RTTi and small RTTa.
- MdRttiSmRttaUp: uplink samples of medium RTTi and small RTTa.
- LgRttiSmRttaUp: uplink samples of large RTTi and small RTTa.
- SMALL-SIZE: samples of small size (1 KB or less).
- MEDIUM-SIZE: samples of medium size (between 1 KB and 1 MB).
- LARGE-SIZE: samples of large size (more than 1 MB).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the acceleration values (% of speed increase).

```
admin@bqn# show pkteng speed acceleration
```

TYPE	SMALL-SIZE ACCEL	MEDIUM-SIZE ACCEL	LARGE-SIZE ACCEL
SmRttiSmRttaDn	n/a	n/a	n/a
MdRttiSmRttaDn	n/a	n/a	n/a
LgRttiSmRttaDn	n/a	n/a	n/a
SmRttiLgRttaDn	23.8%	9.5%	4.6%
MdRttiLgRttaDn	21.2%	12.9%	18.0%
LgRttiLgRttaDn	16.6%	17.5%	40.0%
SmRttiSmRttaUp	n/a	n/a	n/a
MdRttiSmRttaUp	n/a	n/a	n/a

LgRttiSmRttaUp	n/a	n/a	n/a
SmRttiLgRttaUp	n/a	n/a	n/a
MdRttiLgRttaUp	30.9%	30.5%	28.5%
LgRttiLgRttaUp	7.2%	38.5%	112.0%

This other example shows average speed of accelerated TCP flows:

```
admin@bqn# show pkteng speed optimized
```

TYPE	SMALL-SIZE Mbps	MEDIUM-SIZE Mbps	LARGE-SIZE Mbps
SmRttiSmRttaDn	0.000	0.000	0.000
MdRttiSmRttaDn	0.000	0.000	0.000
LgRttiSmRttaDn	0.000	0.000	0.000
SmRttiLgRttaDn	3.928	5.692	7.685
MdRttiLgRttaDn	2.987	4.197	5.296
LgRttiLgRttaDn	1.010	1.924	3.798
SmRttiSmRttaUp	0.000	0.000	0.000
MdRttiSmRttaUp	0.000	0.000	0.000
LgRttiSmRttaUp	0.000	0.000	0.000
SmRttiLgRttaUp	0.000	0.000	0.000
MdRttiLgRttaUp	3.612	5.221	6.472
LgRttiLgRttaUp	1.218	2.589	5.711

This example shows average speed of non-accelerated TCP flows:

```
admin@bqn# show pkteng speed tracked
```

TYPE	SMALL-SIZE Mbps	MEDIUM-SIZE Mbps	LARGE-SIZE Mbps
SmRttiSmRttaDn	0.000	0.000	0.000
MdRttiSmRttaDn	0.000	0.000	0.000
LgRttiSmRttaDn	0.000	0.000	0.000
SmRttiLgRttaDn	3.188	5.266	7.519
MdRttiLgRttaDn	2.475	3.739	4.663
LgRttiLgRttaDn	0.867	1.637	2.712
SmRttiSmRttaUp	0.000	0.000	0.000
MdRttiSmRttaUp	0.000	0.000	0.000
LgRttiSmRttaUp	0.000	0.000	0.000
SmRttiLgRttaUp	0.000	0.000	0.000
MdRttiLgRttaUp	2.767	3.989	5.034
LgRttiLgRttaUp	1.131	1.878	2.695

Related: [show statistics speed acceleration](#)

Commands: [show statistics speed optimized](#)

[show statistics speed tracked](#)

show pkteng statistics

Syntax: show pkteng statistics [extended] [detail]

Description: Show the packet statistics for the PKTENG service.

By default, the statistics from all the PKTENG instances are aggregated. Use the optional detail parameter to show information from each of the PKTENG processes.

The following tables describe the counters: [Table 4](#) and [Table 5](#) The extended option shows some extra counters. described in [Table 6](#)

Table 4: show pkteng statistics error counters

Counter	Description
TotalDnRxBytes	Total received bytes in downlink direction.
TotalDnTxBytes	Total sent bytes in downlink direction.
TotalUpRxBytes	Total received bytes in uplink direction.
TotalUpTxBytes	Total sent bytes in uplink direction.
ProcessDnRxBytes	Received bytes in downlink direction being processed by pkteng.
ProcessDnTxBytes	Sent bytes in downlink direction being processed by pkteng.
ProcessUpRxBytes	Received bytes in uplink direction being processed by pkteng.
ProcessUpTxBytes	Sent bytes in uplink direction being processed by pkteng.
IpBypassDnRxBytes	Received IP bytes in downlink direction being bypassed (not processed by pkteng).
IpBypassDnTxBytes	Sent IP bytes in downlink direction being bypassed (not processed by pkteng).
IpBypassUpRxBytes	Received IP bytes in uplink direction being bypassed (not processed by pkteng).
IpBypassUpTxBytes	Sent IP bytes in uplink direction being bypassed (not processed by pkteng).
IPv6DnRxBytes	Received IPv6 bytes in the downlink direction processed by pkteng.
IPv6DnTxBytes	Sent IPv6 bytes in the downlink direction processed by pkteng.
IPv6UpRxBytes	Received IPv6 bytes in the uplink direction processed by pkteng.
IPv6UpTxBytes	Sent IPv6 bytes in the uplink direction processed by pkteng.
TcpDnRxBytes	Received TCP bytes in the downlink direction processed by

Counter	Description
	pkteng.
TcpDnTxBytes	Sent TCP bytes in the downlink direction processed by pkteng.
TcpUpRxBytes	Received TCP bytes in the uplink direction processed by pkteng.
TcpUpTxBytes	Sent TCP bytes in the uplink direction processed by pkteng.
UdpDnRxBytes	Received UDP bytes in the downlink direction processed by pkteng.
UdpDnTxBytes	Sent UDP bytes in the downlink direction processed by pkteng.
UdpUpRxBytes	Received UDP bytes in the uplink direction processed by pkteng.
UdpUpTxBytes	Sent UDP bytes in the uplink direction processed by pkteng.
IpOtherDnRxBytes	Received bytes processed by pkteng in the downlink direction other than TCP or UDP.
IpOtherDnTxBytes	Sent bytes processed by pkteng in the downlink direction other than TCP or UDP.
IpOtherUpRxBytes	Received bytes processed by pkteng in the uplink direction other than TCP or UDP.
IpOtherUpTxBytes	Sent bytes processed by pkteng in the uplink direction other than TCP or UDP.
NoIpDnRxBytes	Received bytes in the downlink direction that are not IP.
NoIpDnTxBytes	Sent bytes in the downlink direction that are not IP.
NoIpUpRxBytes	Received bytes in the uplink direction that are not IP.
NoIpUpTxBytes	Sent bytes in the uplink direction that are not IP.
CapErrDnRxBytes	Received bytes in downlink direction dropped because of a capture error (internal error or too small).
CapErrUpRxBytes	Received bytes in uplink direction dropped because of a capture error (internal error or too small).
ChkErrDnRxBytes	Received packets in downlink direction dropped because of an IP checksum error.
ChkErrUpRxBytes	Received packets in uplink direction dropped because of an IP checksum error.
TcpErrDnRxBytes	Received TCP bytes in downlink dropped because of a TCP L4 format error.
TcpErrUpRxBytes	Received TCP bytes in uplink dropped because of a TCP L4 format error.
UdpErrDnRxBytes	Received UDP bytes in downlink dropped because of a UDP L4 format error.

Counter	Description
UdpErrUpRxBytes	Received UDP bytes in uplink dropped because of a UDP L4 format error.
FormatErrDnRxBytes	Received bytes in downlink dropped because of a L2 format error.
FormatErrUpRxBytes	Received bytes in uplink dropped because of a L2 format error.
BigErrDnRxBytes	Received bytes in downlink exceeding QoS maximum packet size.
BigErrUpRxBytes	Received bytes in uplink exceeding QoS maximum packet size.
RingErrDnRxBytes	Received bytes in downlink dropped in ring between IO and worker processes.
RingErrUpRxBytes	Received bytes in uplink dropped in ring between IO and worker processes.
PortErrRxBytes	Received bytes dropped in a worker process because it does not know the network interface. It can happen only temporarily during a worker's startup. It includes both uplink and downlink drops.
TotalErrDnTxBytes	Total of sent bytes in downlink dropped because of an error.
TotalErrUpTxBytes	Total of sent bytes in uplink dropped because of an error.

Table 5: show pkteng statistics other counters

Counter	Description
ShpDnTxBytes	Bytes in downlink subject to a flow policy limit.
ShpUpTxBytes	Bytes in uplink subject to a flow policy limit.
RateDnTxBytes	Bytes in downlink subject to a rate policy limit.
RateUpTxBytes	Bytes in uplink subject to a rate policy limit.
ShapedDropDnTxBytes	Bytes dropped in downlink because of flow or rate policy placing a limit.
ShapedDropUpTxBytes	Bytes dropped in uplink because of flow or rate policy placing a limit.
BlockDropDnTxBytes	Bytes dropped in downlink because of a blocking flow or rate policy.
BlockDropUpTxBytes	Bytes dropped in uplink because of a blocking flow or rate policy.
TcpClosedThrotCpu	Number of TCP flows closed because of high CPU load.
ThrotCpuPkt	Packets forwarded without processing because of a high CPU load. It includes both uplink and downlink directions.

Counter	Description
TcpClosedThrotMemDpdk	Number of TCP flows closed because of high usage of the DPDK memory pool.
ThrotMemDpdkPkt	Packets forwarded without processing because of high usage of the DPDK memory pool. It includes both uplink and downlink directions.
TcpResetBothPeers	Number of TCP flows closed by the QoE sending RESET to both end points.
ThrotMemPoolPkt	Packets forwarded without processing because of high usage of the PKTENG memory pool. It includes both uplink and downlink directions.

Table 6: show pkteng statistics extended counters

Counter	Description
TcpOptDnTxBytes	Sent TCP Bytes in downlink optimized by pkteng.
TcpOptUpTxBytes	Sent TCP Bytes in uplink optimized by pkteng.
TcpLossesDnTxBytes	Sent TCP Bytes of retransmissions (losses) in downlink.
TcpLossesUpTxBytes	Sent TCP Bytes of retransmissions (losses) in uplink.
TotalFlows	Current total of flows.
ActiveSubscribers	Current total of active subscribers (recently with traffic).
ErrorDroppedPkt	Counter of packets being dropped because of an error.
EpocTime	System epoch time when the counters were retrieved. Provided to facilitate a caller to calculate the elapsed time between to command invocation (for example to calculate throughput figures from the byte counters).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current statistics for the PKTENG service overall and the downlink direction only.

```
admin@bqn# show pkteng statistics

TotalDnRxBytes:      208447591639720  TotalDnTxBytes:      208762442759875
TotalUpRxBytes:      13725196606888   TotalUpTxBytes:      15833465506605
ProcessDnRxBytes:    208447552987394   ProcessDnTxBytes:    208762441708051
ProcessUpRxBytes:    13725185475279    ProcessUpTxBytes:    15833464442990
IpBypassDnRxBytes:  0                  IpBypassDnTxBytes:  0
IpBypassUpRxBytes:  0                  IpBypassUpTxBytes:  0
```

IPv6DnRxBytes	0	IPv6DnTxBytes:	0
IPv6UpRxBytes	0	IPv6UpTxBytes:	0
TcpDnRxBytes:	129449048688020	TcpDnTxBytes:	131387112346858
TcpUpRxBytes:	7405613396679	TcpUpTxBytes:	9523833411968
UdpDnRxBytes:	78996213220482	UdpDnTxBytes:	77373040412525
UdpUpRxBytes:	6312119451729	UdpUpTxBytes:	6302185736013
IpOtherDnRxBytes:	2291078892	IpOtherDnTxBytes:	2288948668
IpOtherUpRxBytes:	7452626871	IpOtherUpTxBytes:	7445295009
NoIpDnRxBytes:	1051824	NoIpDnTxBytes:	1051824
NoIpUpRxBytes:	1063615	NoIpUpTxBytes:	1063615
CapErrDnRxBytes:	0	CapErrUpRxBytes:	0
ChkErrDnRxBytes:	607609	ChkErrUpRxBytes:	6693984
TcpErrDnRxBytes:	148157	TcpErrUpRxBytes:	40
UdpErrDnRxBytes:	1031435	UdpErrUpRxBytes:	0
FormatErrDnRxBytes:	0	FormatErrUpRxBytes:	0
BigErrDnRxBytes	0	BigErrUpRxBytes:	0
RingErrDnRxBytes:	35813301	RingErrUpRxBytes:	3373970
PortErrRxBytes:	0		
TotalErrDnTxBytes:	0	TotalErrUpTxBytes:	0
ShpDnTxBytes:	0	RateDnTxBytes:	207456655362011
ShpUpTxBytes:	0	RateUpTxBytes:	15460284184067
ShapedDropDnBytes:	1683245721695	BlockDropDnBytes:	5366025
ShapedDropUpBytes:	9242786188	BlockDropUpBytes:	1473670142
TcpClosedThrotCpu:	0	ThrotCpuPkt:	0
TcpClosedThrotMemDpd k:	0	ThrotMemDpdPkt:	0
TcpResetBothPeers:	65311	ThrotMemPoolPkt:	0

Related: [show interface pkteng statistics](#)

Commands

show pkteng status

Syntax: show pkteng status

Description: Show the status of the PKTENG service.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the current state of the PKTENG service.

```
admin@bqn# show pkteng status
```

```
PKTENG state: active
```

```
PKTENG processes: ok (4/4)
```

```
PKTENG interfaces: ok
```

```
admin@bqn# show pkteng status detail
```

```
PKTENG state: active
```

```
PKTENG processes: ok (4/4)
```

```
PKTENG interfaces: ok
```

bqn	INST	STATE	DPDK	IFACE	DELAYST	OPTPAUSE	THROTTLE
0	0	active	ready	2/2	no	no	0%
0	1	active	ready	2/2	no	no	0%
0	2	active	ready	2/2	no	no	0%
0	3	active	ready	2/2	no	no	0%

Related: [pkteng](#)

Commands: [show pkteng parameters](#)

[show pkteng statistics](#)

[show system status](#)

show pkteng udr

Syntax: show pkteng udr

Description: Show information about the number of UDRs generated.



Note

Information for all the PKTENG instances is shown.

Mode: Operation mode.

Profile: Operator.

Examples: Show the number of UDRs generated.

```
admin@bqn# show pkteng udr
```

bqn	INST	RECORDS
0	0	12
0	1	0

Related: [policy monitor](#)

Commands: [udr](#)

show pkteng trace

Syntax: show pkteng trace [detail]

Description: Show information about BTA tracing.

If the detail optional parameter is used, the command shows detailed information about tracing for each PKTENG process instance.



Note

This command shows information from the active QoE.

Mode: Operation mode.

Profile: Operator.

Examples: Show the state of BTA tracing.

```
admin@bqn0# show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB
Rotation number: 10
Show detailed tracing information.
admin@bqn0# show pkteng trace detail
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB
Rotation number: 10

  INST  INDEX  FILE-SIZE  MAX-SIZE  TOTAL-SIZE
  ----  ----  -
0       0       553513    10000000  0.553MB
1       0       34444     10000000  0.034MB
2       0        0        10000000  0.000MB
3       1      203016    10000000  10.205MB
```

Related: [policy monitor](#)

Commands: [trace](#)

show pkteng wire

Syntax: show pkteng wire

Description: Lists the wires (network interface pairs) defined in the QoE.

- ACC-IFACE: interface name on the access side.
- ACC-PCAP: yes if interface in PCAP mode (normally no).

- INET-IFACE: interface name on the Internet side.
- INET-PCAP: yes if interface in PCAP mode (normally no).

Mode: Operation mode.

Profile: Operator.

Examples:

```
admin@bqn0# show pkteng wire

ACC-IFACE  ACC-PCAP  INET-IFACE  INET-PCAP
en0s1f0    no        en0s1f1     no
en0s1f2    no        en0s1f3     no
```

Related: [interface](#)

Commands: [nic pcap](#)

[wire](#)

show policy

Syntax: show policy [policy-name]

Description: List of configured policies, indicating type and source.

The following information is shown:

- NAME: Name of the policy
- TYPE: Type of policy (flow, rate or monitor).
- SOURCE: Origin of the policy creation. A static policy indicates that it is part of the configuration, while rest or radius if they are defined through the API.

If the policy-name is indicated, more detailed policy information is displayed, depending on the policy type.

For flow policies:

- Name: Name of the policy
- Type: Type of the policy (flow).
- Source: Origin of the policy definition (static if part of the local configuration, rest or
- Radius: If defined through the API).
- Optimization: Yes if optimization enabled, with range of flows being optimized.
- Blocking: No, if no blocking.
- DPI: Yes, if DPI analysis enabled.
- Metering: Yes, if TCP optimization metrics generation enabled.

- Shaping Downlink: Yes, if shaping in downlink defined.
- Shaping Uplink: Yes, if shaping in uplink defined.
- Trace: No if no tracing part of the policy (normally traces are defined in monitor policies).
- Tracking: Yes, if tracking on, along with range (complementary to optimization one).
- UDR: No, if no UDR generation as part of this policy (normally UDRs generated as part of monitor policy).
- Optimization disable: If yes, optimization is disabled and all flows will go to tracking. Normally it will be set to no.
- Allow rate-limit: Yes, if flows in this policy are subject to policy rate limit (the usual setup).

For monitor policies:

- Name: Name of the policy
- Type: Type of the policy (monitor).
- Source: Origin of the policy definition (static if part of the local configuration, rest or radius if defined through the API).
- SDR: Yes if SDR records are generated (this is normal setup).
- Trace: No if no trace debugging information is generated (this is normal setup).
- UDR: Yes if UDR records are generated (this is normal setup), along with the percentage of flows generating UDRs.

For rate policies:

- Name: Name of the policy
- Type: Type of the policy (rate).
- Source: Origin of the policy definition (static if part of the local configuration, rest or radius if defined through the API).
- Radius: If defined through the API).
- Blocking: No, if no blocking.
- DOS: No, if no DoS settings (this is the normal setup, as DoS is configured at pkteng level).
- RateLimit downlink: Yes, if there is a rate limit in the downlink direction.
- RateLimit uplink: Yes, if there is a rate limit in the uplink direction.

Mode: Operation mode.

Profile: Operator.

Examples: Show policies of a server that uses REST API to define rate policies, with default policies locally configured.

```
admin@bqn# show policy

NAME          TYPE      SOURCE
100Mbps       rate     rest
50Mbps        rate     rest
10Mbps        rate     rest
5Mbps         rate     rest
flow-default  flow     static
monitor-default monitor  static
rate-default  rate     static

admin@bqn# show policy flow-default
Name: flow-default
Type: flow
Source: static
Optimization: yes (0.00%-99.00%)
Blocking: no
Compression: no
DPI: yes
Metering: yes
Shaping downlink: no
Shaping uplink: no
Trace: no
Tracking: yes (99.00%-100.00%)
UDR: no
Optimization disable: no
Allow rate-limit: yes
admin@bqn# show policy monitor-default
Name: monitor-default
Type: monitor
Source: static
SDR: yes
Trace: no
UDR: yes (2.00%)
admin@bqn# show policy rate-default
Name: rate-default
```

Type: rate
Source: static
Blocking: no
DOS: no
Dynamic update: yes
RateLimit downlink: no
RateLimit uplink: no

Related: [api rest](#)

Commands: [api radius](#)

[policy flow](#)

[policy rate](#)

[policy monitor](#)

[show policy flow](#)

[show policy monitor](#)

[show policy rate](#)

[show policy statistics](#)

show policy flow

Syntax: show policy flow

Description: List of configured flow policies.

The following information is shown:

- NAME: Name of the policy
- BCK: No, if no blocking.
- COM: No, if no compression.
- DPI: Yes, if DPI analysis enabled.
- MET: Yes, if metrics generation enabled.
- OPT: Yes, if TCP optimization enabled.
- OPTD: Yes, if TCP optimization-disabled enabled.
- SHPD: Yes, if a downlink shaping limits defined.
- SHPU: Yes, if an uplink shaping limits defined.
- TCE: Yes, if traces enabled in flow policy.

- TRK: Yes, if some flows in tracking to generate metrics.
- UDR: Yes, if UDR generation enabled in flow policy.

Mode: Operation mode.

Profile: Operator.

Examples: Show configured flow policies.

```
admin@bqn# show policy flow
```

NAME	BCK	COM	DPI	MET	OPT	OPTD	SHPD	SHPU	TCE	TRK	UDR
flow-default	no	no	yes	yes	yes	no	no	no	no	yes	no
flow-trace	no	no	yes	yes	yes	no	no	no	yes	yes	no

Related: [policy flow](#)

Commands: [show policy](#)

[show policy monitor](#)

[show policy rate](#)

[show policy statistics](#)

show policy monitor

Syntax: show policy monitor

Description: List of configured monitor policies.

The following information is shown:

- NAME: Name of the policy
- SDR: Yes, if SDR records generated.
- TCE: Yes, if debugging traces generated.
- UDR: Yes, if UDR records generated.

Mode: Operation mode.

Profile: Operator.

Examples: Show configured monitor policies.

```
admin@bqn# show policy monitor
```

NAME	SDR	TCE	UDR
monitor-default	yes	no	yes
monitor-trace	yes	yes	yes

Related: [policy monitor](#)

Commands: [show policy](#)

[show policy flow](#)

[show policy rate](#)

[show policy statistics](#)

show policy rate

Syntax: show policy rate

Description: List of configured rate policies.

The following information is shown:

- NAME: Name of the policy
- BCK: No, if no blocking.
- DOS: No, if no DoS detection defined in policy.
- DYNU: Yes, if dynamic updates are allowed.
- RL-D: Yes, if there is a rate limit in downlink direction.
- RL-U: Yes, if there is a rate limit in uplink direction.

Mode: Operation mode.

Profile: Operator.

Examples: Show configured rate policies.

```
admin@bqn# show policy rate

NAME           BCK  DOS  DYNU  RL-D  RL-U
100Mbps        no   no   yes   yes   yes
50Mbps         no   no   yes   yes   yes
10Mbps         no   no   yes   yes   yes
5Mbps          no   no   yes   yes   yes
rate-default  no   no   yes   no    no
```

Related: [api rest](#)

Commands: [api radius](#)

[policy flow](#)

[policy rate](#)

[policy monitor](#)

[show policy](#)

[show policy flow](#)

[show policy monitor](#)

[show policy statistics](#)

show policy statistics

Syntax: show policy statistics

Description: Show statistic information about matching policies.

The following information is shown:

- NAME: Name of the policy
- DOWNLINK-RCV: Received bytes matching that policy in the downlink direction.
- DOWNLINK-SND: Sent bytes matching that policy in the downlink direction.
- UPLINK-RCV: Received bytes matching that policy in the uplink direction.
- UPLINK-SND: Sent bytes matching that policy in the uplink direction.
- COUNT: TODO.

Mode: Operation mode.

Profile: Operator.

Examples: Show the policy statistics.

```
admin@bqn# show policy statistics
```

NAME	DOWNLINK-RCV	DOWNLINK-SND	UPLINK-RCV	UPLINK-SND	COUNT
100Mbps	749648496795	749868671706	64880938730	72256947337	11
50Mbps	154433107779032	155526999732179	9674594641800	11230683881780	4434
10Mbps	38703118928464	38252734070775	2259190621576	2676719059279	1193
5Mbps	31465680474922	31615308629853	1975003442676	2300331837734	715
flow-default	281153552332252	281661298760606	18208110220520	21092199611084	170292
monitor-default	281153645330689	281661401040089	18208117707551	21092206293347	7840
monitor-trace	0	0	0	0	0
rate-default	1698610930613	1741545789259	445191174870	459906216375	143

Related: [show policy](#)

Commands: [show policy flow](#)

[show policy monitor](#)

[show policy rate](#)

show process affinity

Syntax: show process affinity

Description: Show a list of all the QoE processes and threads and their CPU affinity.

The following information is shown for each process:

- bqn: bqn ID where the process is running.
- User: User name that is executing the process.
- PID: Process ID.
- TID: Thread ID.
- Affinity: CPU affinity mask.
- Instance: Process instance.
- Process: Process name.

Mode: Operation mode.

Profile: Operator.

Examples: Show the process affinity. Note that each PKTENG process has another thread (the BTC thread) with a different affinity.

```
admin@bqn# show process affinity
```

bqn	USER	PID	TID	AFFINITY	INST	PROCESS
0	bqnadm	14120	14120	0x000000000000000f	0	bqnsh
0	root	32599	32599	0x000000000000000f	0	cfgmgr
0	root	32566	32566	0x000000000000000f	0	ctrmgr
0	root	32600	32600	0x000000000000000f	0	dnsmgr
0	root	32600	32604	0x000000000000000f	0	dnsmgr
0	root	32607	32607	0x000000000000000f	0	ipmgr
0	root	32602	32602	0x000000000000000f	0	licmgr
0	root	32605	32605	0x000000000000000f	0	osrv
0	root	32616	32616	0x0000000000000001	0	pkteng
0	root	32616	32617	0x0000000000000001	0	pkteng
0	root	32616	32618	0x0000000000000001	0	pkteng
0	root	32616	32619	0x0000000000000001	0	pkteng
0	root	32610	32610	0x000000000000000f	0	pktengmgr
0	root	32601	32601	0x000000000000000f	0	remctr
0	root	32598	32598	0x000000000000000f	0	rtmgr
0	root	32606	32606	0x000000000000000f	0	snmpagt
0	root	32603	32603	0x000000000000000f	0	statmgr

Related: [affinity](#)

Commands: [dimension](#)

[process resume](#)

[process stop](#)

[process suspend](#)

[show process mandatory](#)

[show process name](#)

[show system process top](#)

show process all

Syntax: show process all

Description: Show a list of all the QoE processes.

The following information is shown for each process:

- bqn: bqn ID where the process is running.
- User: User name that is executing the process.
- PID: Process ID.
- State: Process state.
- Respawn: Number of times the process has been restarted.
- Time: Running time (while in running or init states) or time since the process was stopped (while in stopped or suspended states).
- Instance: Process instance.
- Process: Process name.

A process may be in one of the following states:

- init: Process is initializing.
- running: Process is running.
- stopped: Process has stopped unexpectedly.
- suspended: Process execution has been suspended and the process is stopped, and the CTRMGR process does not restart it.

Mode: Operation mode.

Profile: Operator.

Examples: Show all the processes.

```
admin@bqn# show process all
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	bqnadm	14120	running	0	0:05:47.188	0	bqnsh
0	root	32599	running	0	142:41:34.805	0	cfgmgr

0	root	32566	running	0	142:41:34.868	0	ctrmgr
0	root	32600	running	0	142:41:34.801	0	dnsmgr
0	root	32607	running	0	142:41:34.757	0	ipmgr
0	root	32602	running	0	142:41:34.795	0	licmgr
0	root	32605	running	0	142:41:34.770	0	osrv
0	root	32616	running	0	142:41:34.746	0	pkteng
0	root	27126	running	0	142:41:34.778	1	pkteng
0	root	32610	running	0	142:41:34.753	0	pktengmgr
0	root	32601	running	0	142:41:34.797	0	remctr
0	root	32598	running	0	142:41:34.801	0	rtmgr
0	root	32606	running	0	142:41:34.771	0	snmpagt
0	root	32603	running	0	142:41:34.788	0	statmgr

Related: [process resume](#)

Commands: [process stop](#)

[process suspend](#)

[show process affinity](#)

[show process mandatory](#)

[show process name](#)

[show system process top](#)

show process mandatory

Syntax: show process mandatory

Description: Show a list of the QoE mandatory processes.

The mandatory QoE processes are managed by the CTRMGR process and restarted if they stop unexpectedly.

The information displayed by this command for each process is the same displayed by the [show process all](#) command.

Mode: Operation mode.

Profile: Operator.

Examples: Show the mandatory QoE processes.

```
admin@bqn# show process mandatory
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	root	32599	running	0	142:44:08.972	0	cfgmgr
0	root	32566	running	0	142:44:09.035	0	ctrmgr

0	root	32600	running	0	142:44:08.969	0	dnsmgr
0	root	32607	running	0	142:44:08.924	0	ipmgr
0	root	32602	running	0	142:44:08.963	0	licmgr
0	root	32605	running	0	142:44:08.938	0	osrv
0	root	32616	running	0	142:44:08.914	0	pkteng
0	root	27126	running	0	142:44:08.723	1	pkteng
0	root	32726	running	0	142:44:08.766	2	pkteng
0	root	32727	running	0	142:44:08.752	3	pkteng
0	root	32610	running	0	142:44:08.921	0	pktengmgr
0	root	32601	running	0	142:44:08.965	0	remctr
0	root	32598	running	0	142:44:08.969	0	rtmgr
0	root	32606	running	0	142:44:08.939	0	snmpagt
0	root	32603	running	0	142:44:08.956	0	statmgr

Related: [process resume](#)

Commands: [process stop](#)

[process suspend](#)

[show process all](#)

[show process name](#)

show process name

Syntax: show process name proc-name [proc-inst]

Description: Show information about a QoE process.

If the proc-name is the only parameter present, then the command shows all those processes which match the process name.

If the proc-inst parameter is passed, then detailed information about a process is displayed.

Mode: Operation mode.

Profile: Operator.

Examples: Show information about all the pkteng processes.

```
admin@bqn# show process name pkteng
```

bqn	USER	PID	STATE	RESPAWN	TIME	INST	PROCESS
0	root	5476	running	0	1:39:07.222	0	pkteng
0	root	5525	running	0	1:39:07.187	1	pkteng

Show information about the pkteng process with instance ID 1.

```
admin@bqn# show process name pkteng 1
```

Name: pkteng
Instance: 1
bqn ID: 0
PID: 5525
State: running
User: root
Respawn: 0
Affinity: 0x8
Time start: 2017-03-24 00:52:37 +0100 (1:39:35.020)
Time stop: n/a
Monitor: yes (0.934010)

Related: [process resume](#)

Commands: [process stop](#)

[process suspend](#)

[show process all](#)

[show process mandatory](#)

show profile

Syntax: show profile [profile-name]

Description: List of the defined traffic profiles.

The information includes the following:

- NAME: Name of the profile.
- TYPE: Type of the profile (access, dpi, vlan, etc).

If the optional profile-name is indicated, more detailed profile information is displayed. For access and internet profiles, the fields are as follows:

- ADDRESS: IP address or IP address range.
- PROTOCOL: TCP, UDP or * if any protocol.
- PORT: TCP port, UDP port or * if any port.

For DPI profiles, the fields as as follows:

- HOST: Signature pattern.
- PRIORITY: Entry priority (9999 by default).
- TYPE: Type of the entry (e.g. HTTP host, HTTPs SNI, etc).

For interface profiles, the fields as as follows:

- Name: Profile name.
- Number of IDs: Total of interface IDs included in the profile.
- NAME: Name of the profile
- ID: Interface ID of that entry.

For throughput profiles, the fields as as follows:

- Name: Profile name.
- Threshold: Throughput threshold, in Kbps.

For vlan profiles, the fields as as follows:

- Name: Profile name.
- Number of VLANs: Total number of VLANs defined in this profile.
- NAME: Name of the profile
- VLAN: VLAN ID tag of that entry.

Mode: Operation mode.

Profile: Operator.

Examples: Show different profiles.

```
admin@bqn# show profile

NAME            TYPE
my-access       access
my-dpi          dpi
my-interface    interface
my-internet     internet
my-throughput   throughput
my-vlan         vlan

admin@bqn# show profile my-access

ADDRESS        PROTOCOL  PORT
10.10.2.0/24   *         *
10.10.3.0/24   *         *

admin@bqn# show profile my-internet

ADDRESS        PROTOCOL  PORT
10.10.10.35/32 tcp       443

admin@bqn# show profile my-dpi
```

```
HOST                PRIORITY  TYPE
*.mydomain.com     9999      HTTP-host
*.mydomain.com     9999      HTTPS-SNI
```

```
admin@bqn# show profile my-interface
```

```
Name: my-interface
```

```
Number of IDs: 1
```

```
NAME      ID
my-interface 0x1
```

```
admin@bqn# show profile my-throughput
```

```
Name: my-throughput
```

```
Threshold: 5000000 Kbps
```

```
admin@bqn# show profile my-vlan
```

```
Name: my-vlan
```

```
Number of VLANs: 2
```

```
NAME    VLAN
my-vlan 10
my-vlan 20
```

Related: [show policy](#)

Commands: [show profile access](#)

[show profile dpi](#)

[show profile interface](#)

[show profile internet](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

show profile access

Syntax: show profile access

Description: List of access profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- ADDRESS: IP address or IP address range.
- PORTS: Number of ports configured (0 if none).

Mode: Operation mode.

Profile: Operator.

Examples: Show access profiles.

```
admin@bqn# show profile access

NAME          ADDRESS        PORTS
my-access    10.10.2.0/24   0
my-access    10.10.3.0/24   0
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile dpi](#)

[show profile interface](#)

[show profile internet](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

show profile dpi

Syntax: show profile dpi

Description: List of DPI profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- PRIORITY: priority of the DPI profile (9999 by default).
- HOST: number of signature entries part of this profile.

Mode: Operation mode.

Profile: Operator.

Examples: Show DPI profiles.

```
admin@bqn# show profile dpi

NAME    PRIORITY  HOST
my-dpi  9999      2
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile interface](#)

[show profile internet](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

[show profile access](#)

show profile interface

Syntax: show profile interface

Description: List of interface profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- ID: interface identifier part of this profile.

Mode: Operation mode.

Profile: Operator.

Examples: Show interface profiles.

```
admin@bqn# show profile interface

NAME          ID
my-interface  0x1
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile internet](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

[show profile access](#)

[show profile dpi](#)

show profile internet

Syntax: show profile internet

Description: List of internet profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- ADDRESS: IP address or IP address range.

- PORTS: number of ports configured (0 if none).

Mode: Operation mode.

Profile: Operator.

Examples: Show internet profiles.

```
admin@bqn# show profile internet

NAME          ADDRESS          PORTS
my-internet   10.10.10.35/32   1
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile interface](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

[show profile access](#)

[show profile dpi](#)

show profile policy-rate

Syntax: show profile policy-rate

Description: Show a list of policy-rate profiles configured

The fields shown are as follows:

- NAME: Name of the profile.
- POLICY-RATE: policy name pattern.
- PRIORITY: priority of the DPI profile (9999 by default).

Mode: Operation mode.

Profile: Operator.

Examples: Show policy-rate profiles.

```
bqnadm@bqn# show profile policy-rate

NAME          POLICY-RATE  PRIORITY
gold-plans    *gold*       9999
gold-plans    rate-premium 9999
silver-plans  *silver      9999
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile access](#)

[show profile dpi](#)

[show profile interface](#)

[show profile internet](#)

[show profile sub-attr](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

show profile sub-attr

Syntax: show profile sub-attr

Description: Show a list of sub-attr profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- TYPE: Entry type (number, ip, string).
- VALUE: Entry value.
- PRIORITY: entry priority (n/a by default).

Mode: Operation mode.

Profile: Operator.

Examples: Show policy-rate profiles.

```
bqnam@bqn# show profile sub-attr
```

NAME	POLICY-RATE	VALUE	PRIORITY
mysubs	number	157432	n/a
mysubs	number	157433	n/a
mysubs	number	157434	n/a

Related: [show policy](#)

Commands: [show profile](#)

[show profile access](#)

[show profile dpi](#)

[show profile interface](#)

[show profile internet](#)

[show profile sub-attr](#)

[show profile throughput](#)

[show profile vlan](#)

[show rule](#)

show profile throughput

Syntax: show profile throughput

Description: List of throughput profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- THRESHOLD-Kbps: throughput threshold in Kbps.

Mode: Operation mode.

Profile: Operator.

Examples: Show throughput profiles.

```
admin@bqn# show profile throughput
NAME                THRESHOLD-Kbps
my-throughput      5000000
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile interface](#)

[show profile vlan](#)

[show rule](#)

[show profile access](#)

[show profile dpi](#)

[show profile internet](#)

show profile vlan

Syntax: show profile vlan

Description: List of VLAN profiles configured.

The fields shown are as follows:

- NAME: Name of the profile.
- VLAN: VLAN tag entry part of this profile.

Mode: Operation mode.

Profile: Operator.

Examples: Show configured VLAN profiles.

```
admin@bqn# show profile vlan

NAME      VLAN
my-vlan   10
my-vlan   20
my-vlan-2 100
my-vlan-2 200
```

Related: [show policy](#)

Commands: [show profile](#)

[show profile interface](#)

[show profile vlan](#)

[show rule](#)

[show profile access](#)

[show profile dpi](#)

[show profile internet](#)

show remctr license

Syntax: show remctr license

Description: List of the status of licenses synchronized with the remote bqnMGR process.

The fields shown are as follows:

- NAME: Name of license feature (e.g. bta).
- OPERATIVE: Yes, if the license is enabled and operative.
- VALID: Yes, if the license is valid. For example, if the license is temporal and the date is passed, it will be shown as invalid.
- STATIC: Whether the license is locally configured (static) or if the license is defined by the remote controller (normal setup).
- UPDATED: Last time the license entry was updated.

Mode: Operation mode.

Profile: Operator.

Examples: Show the license status information.

```
admin@bqn# show remctr license

NAME    OPERATIVE  VALID  STATIC  UPDATED
bta     yes        yes    no      2021-08-18T05:20:07-0600
```

Related: [show license](#)

Commands: [show remctr status](#)

[system remctr](#)

show remctr status

Syntax: show remctr status

Description: Shows the status of the session with the bqnMGR process.

The fields shown are as follows:

- State: State of the connection. If no activity, idle (normal state).
- bqnMGR reachable: Yes, if the bqnMGR is accessible (should be yes).
- bqnMGR last connected: Time of last contact with the controller and the IP address and port contacted.
- Scheduled connect: Time to go before next contact.
- Session ID: ID of the session used to authenticate with the controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show the status of the bqnMGR connection.

```
admin@bqn# show remctr status
State: idle
bqnMGR reachable: yes
bqnMGR last connected: 00:03:42.710 (192.168.0.55:13152)
Scheduled connect: 00:56:17.289
Session ID: 70cf7f0d5154af68
```

Related: [show license](#)

Commands: [show remctr license](#)

[system remctr](#)

show rule

Syntax: show rule

Description: List of policy rules defined in the QoS configuration.

The fields shown are as follows:

- TYPE: Rule type (flow, monitor or rate).
- ID: Rule internal identifier (unique).
- STATUS: Rule status. OK if fine, not ok if in conflict with other rules.
- POLICY: Name of the policy associated to this rule.
- PROFILE: List of the profile names associated to this rule.

Mode: Operation mode.

Profile: Operator.

Examples: Show all the configured rules.

```
admin@bqn# show rule

TYPE      ID  STATUS  POLICY          PROFILE
flow      6   ok      flow-default    n/a
flow      10  ok      flow-2.2Mbps    my-vlan
rate      7   ok      rate-default    n/a
monitor   8   ok      monitor-default n/a
```

Related: [show rule error](#)

Commands: [show rule flow](#)

[show rule monitor](#)

[show rule rate](#)

[show rule usage](#)

show rule error

Syntax: show rule error

Description: Lists errors in the current set of rules, in particular, rule conflict. Rule conflicts occur when two rules associated with different policies have overlaps in their associated profiles, so for traffic in that overlap, there is a conflict as to what policy to select.

Mode: Operation mode.

Profile: Operator.

Examples: In this example, there is a conflict between two rules because they depend on VLAN profiles with an overlap.

```
admin@bqn# show rule

TYPE      ID  STATUS  POLICY          PROFILE
flow      6   ok      flow-default    n/a
flow      13  ok      flow-2.2Mbps    my-vlan
flow      12  ok      flow-1.8Mbps    my-vlan-2
rate      7   ok      rate-default    n/a
monitor   8   ok      monitor-default n/a
```

```
admin@bqn# show rule error

%WARN-EALREADY: Conflict between flow rules 12 and 13: vlan(10) policy
(flow-2.2Mbps)
```

Related: [show rule error](#)

Commands: [show rule flow](#)

[show rule monitor](#)

[show rule rate](#)

[show rule usage](#)

show rule flow

Syntax: show rule flow

Description: List of policy rules of type flow.

The fields shown are as follows:

- ID: Rule internal identifier (unique).
- PF-RANDOM: Name of profile of random type (normally n/a).
- PF-INTERFACE: Name of interface profile (n/a if no profile in rule).
- PF-VLAN: Name of VLAN profile (n/a if no profile in rule).
- PF-INTERNET: Name of Internet profile (n/a if no profile in rule).
- PF-ACCESS: Name of access profile (n/a if no profile in rule).
- PF-THROUGHPU: Name of throughput profile (n/a if no profile in rule).
- PF-DPI: Name of DPI profile (n/a if no profile in rule).
- POLICY: Name of the policy associated to this rule.

Mode: Operation mode.

Profile: Operator.

Examples: Show all the configured flow rules.

```
admin@bqn# show rule flow
```

ID	PF-RANDOM	PF-INTERFACE	PF-VLAN	PF-INTERNET	PF-ACCESS	PF-THROUGHPU	PF-DPI	POLICY
6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	flow-default
13	n/a	n/a	my-vlan	n/a	n/a	n/a	n/a	flow-2.2Mbps
12	n/a	n/a	my-vlan-2	n/a	n/a	n/a	n/a	flow-1.8Mbps

Related: [show rule](#)

Commands: [show rule error](#)

[show rule flow](#)

[show rule monitor](#)

[show rule rate](#)

[show rule usage](#)

show rule monitor

Syntax: show rule monitor

Description: List of policy rules of type monitor.

The fields shown are as follows:

- ID: rule internal identifier (unique).
- PF-RANDOM: Name of profile of random type (normally n/a).
- PF-INTERFACE: Name of interface profile (n/a if no profile in rule).
- PF-VLAN: Name of VLAN profile (n/a if no profile in rule).
- PF-ACCESS: Name of access profile (n/a if no profile in rule).
- PF-THROUGHPU: Name of throughput profile (normally n/a).
- POLICY: Name of the policy associated to this rule.

Mode: Operation mode.

Profile: Operator.

Examples: Show all the configured monitor rules.

```
admin@bqn# show rule monitor
```

ID	PF-RANDOM	PF-INTERFACE	PF-VLAN	PF-ACCESS	PF-THROUGHPU	POLICY
8	n/a	n/a	n/a	n/a	n/a	monitor-default

Related: [show rule](#)

Commands: [show rule error](#)

[show rule flow](#)

[show rule rate](#)

[show rule usage](#)

show rule rate

Syntax: show rule rate

Description: List of policy rules of type rate.

The fields shown are as follows:

- ID: Rule internal identifier (unique).
- PF-RANDOM: Name of profile of random type (normally n/a).

- PF-INTERFACE: Name of interface profile (n/a if no profile in rule).
- PF-VLAN: Name of VLAN profile (n/a if no profile in rule).
- PF-ACCESS: Name of access profile (n/a if no profile in rule).
- PF-THROUGHPU: Name of throughput profile (normally n/a).
- POLICY: Name of the policy associated to this rule.

Mode: Operation mode.

Profile: Operator.

Examples: Show all the configured rate rules.

```
admin@bqn# show rule rate
```

ID	PF-RANDOM	PF-INTERFACE	PF-VLAN	PF-ACCESS	PF-THROUGHPU	POLICY
7	n/a	n/a	n/a	n/a	n/a	rate-default

Related: [show rule](#)

Commands: [show rule error](#)

[show rule flow](#)

[show rule monitor](#)

[show rule usage](#)

show rule usage

Syntax: show rule usage [detail]

Description: Show information about rule evaluation counters. If detail flag is present, the information is broken down per PKTENG worker process.

The fields shown are as follows:

- INST: ID of the pkteng worker. Only if detail flag used.
- TYPE: Type of rule (flow, monitor and rate).
- ID: Rule internal ID.
- SELECTED: Number of times the rule has been selected.
- PENDING: Number of times the rule has been selected but it is pending DPI evaluation.

Mode: Operation mode.

Profile: Operator.

Examples: In the following example, it can be seen that rule with ID 3 is not matching the traffic.

```
admin@bqn# show rule
```


TYPE	ID	STATUS	POLICY	PROFILE
flow	0	ok	flow-default	n/a
rate	1	ok	rate-default	n/a
monitor	2	ok	monitor-default	n/a
flow	3	ok	flow-10Mbps	n/a

```
admin@bqn# show rule usage
```

TYPE	ID	SELECTED	PENDING
flow	0	762296979	0
rate	1	910146	0
monitor	2	913508	0
flow	3	0	0

Related: [show rule](#)

Commands: [show rule error](#)

[show rule flow](#)

[show rule monitor](#)

[show rule rate](#)

show service

Syntax: show service

Description: Show basic information about the state of the existing services.

In order to show more detailed information about a service, use the appropriate command for the service.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show service
```

NAME	STATE	SUBSTATE	STARTED
dellmgr	inactive	dead	unknown
ntp	active	running	Tue, 2018-03-29 23:13:38 CET
ospf	inactive	deading	unknown
snmp	active	running	Tue, 2018-03-29 20:16:35 CET
ssh	active	running	Tue, 2018-03-29 20:16:34 CET
web	active	running	Tue, 2018-03-29 23:13:38 CET
zebra	inactive	dead	unknown

Related: [show service dellmgr](#)

Commands: [show service ntp](#)

[show service snmp](#)

[show service ssh](#)

[show service web](#)

[show system status](#)

show service dellmgr

Syntax: show service dellmgr [full]

Description: Show detailed information about the state of the Dell OpenManage Server Administrator service.

The Dell OpenManage software manages and monitors a Dell PowerEdge server.

If the full parameter is used, the last system log messages for the service are printed.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show service dellmgr full
dataeng.service - LSB: Systems Management Data Engine
Loaded: loaded (/etc/init.d/dataeng)
Active: active (running) since Sat 2015-10-03 13:31:34 CEST; 41min ago
Process: 6987 ExecStart=/etc/init.d/dataeng start (code=exited,
status=0/SUCCESS) CGroup: /system.slice/dataeng.service

    |-7174 /opt/dell/srvadmin/sbin/dsm_sa_datamgrd
    |-7263 /opt/dell/srvadmin/sbin/dsm_sa_eventmgrd
    \-7280 /opt/dell/srvadmin/sbin/dsm_sa_snmpd

Oct 03 13:31:22 dell systemd[1]: Starting LSB: Systems Management Data
Engine...
Oct 03 13:31:22 dell dataeng[6987]: redirecting to systemctl start
instsvcdrv.service
Oct 03 13:31:23 dell dataeng[6987]: Starting Systems Management Data
Engine:
Oct 03 13:31:31 dell dataeng[6987]: Starting dsm_sa_datamgrd: ..done
Oct 03 13:31:32 dell dataeng[6987]: Starting dsm_sa_eventmgrd: ..done
Oct 03 13:31:34 dell dataeng[6987]: Starting dsm_sa_snmpd: ..done
Oct 03 13:31:34 dell systemd[1]: Started LSB: Systems Management Data
Engine.
```

Related: [dellmgr](#)

Commands: [show service](#)

show service ntp

Syntax: show service ntp [full]

Description: Show detailed information about the state of the NTP service. If the full parameter is used, the last system log messages for the service are printed.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show service ntp

ntp.service - LSB: Network time protocol daemon (ntpd)
Loaded: loaded (/bqn/img/linux/etc/init.d/ntp)
Active: active (running) since Tue, 2013-10-29 23:13:38 CET; 1h 50min ago
Process: 6202 ExecStart=/bqn/img/linux/etc/init.d/ntp start (code=exited,
status=0/SUCCESS)
CGroup: name=systemd:/system/ntp.service
        \-6215 /usr/sbin/ntpd -p /var/run/ntp/ntpd.pid -g -u ntp:ntp -c
        /etc/ntp.conf
```

This is the output when using the full parameter.

```
admin@bqn# show service ntp full

ntp.service - LSB: Network time protocol daemon (ntpd)
Loaded: loaded (/bqn/img/linux/etc/init.d/ntp)
Active: active (running) since Tue, 2013-10-29 23:13:38 CET; 1h 51min ago
Process: 6202 ExecStart=/bqn/img/linux/etc/init.d/ntp start (code=exited,
status=0/SUCCESS)
CGroup: name=systemd:/system/ntp.service
        \-6215 /usr/sbin/ntpd -p /var/run/ntp/ntpd.pid -g -u ntp:ntp -c
        /etc/ntp.conf

Oct 29 23:13:38 bqn ntpd[6215]: Listen and drop on 0 v4wildcard 0.0.0.0 UDP
123
Oct 29 23:13:38 bqn ntp[6202]: Starting network time protocol daemon
(NTPD)..done
Oct 29 23:13:38 bqn systemd[1]: Started LSB: Network time protocol daemon
(ntpd).
Oct 29 23:13:38 bqn ntpd[6215]: Listen normally on 1 lo 127.0.0.1 UDP 123
Oct 29 23:13:38 bqn ntpd[6215]: Listen normally on 2 enp0s17 192.168.1.75
UDP 123
Oct 29 23:13:38 bqn ntpd[6215]: peers refreshed
Oct 29 23:13:38 bqn ntpd[6215]: Listening on routing socket on fd #22 for
interface updates
```

Related: [service ntp](#)

Commands: [show service](#)

[show system ntp](#)

show service snmp

Syntax: show service snmp [full]

Description: Show detailed information about the state of the SNMP service. The net-snmp software package is used as the SNMP service implementation.

If the full parameter is used, the last system log messages for the service are printed.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show service snmp full
snmpd.service - LSB: Net-SNMP agent
Loaded: loaded (/bqn/img/linux/etc/init.d/snmpd)
Active: active (running) since Sat 2015-10-03 16:39:56 CEST; 9min ago
Process: 5464 ExecStop=/bqn/img/linux/etc/init.d/snmpd stop (code=exited,
status=0/SUCCESS)
Process: 5614 ExecStart=/bqn/img/linux/etc/init.d/snmpd start (code=exited,
status=0/SUCCESS)
CGroup: /system.slice/snmpd.service
        \-5637 /usr/sbin/snmpd -r -A -LF n /var/log/net-snmpd.log -p
           /var/run/snmpd.pid
Oct 03 16:39:56 bqn0 systemd[1]: Starting LSB: Net-SNMP agent...
Oct 03 16:39:56 bqn0 snmpd[5614]: Starting snmpd..done
Oct 03 16:39:56 bqn0 systemd[1]: Started LSB: Net-SNMP agent.
```

Related: [show service](#)

Commands: [show service snmp config](#)

[snmp](#)

show service snmp config

Syntax: show service snmp config

Description: Show the running configuration of the SNMP service, which consists of the net-snmp service configuration.

Mode: Operation mode.

Profile: Operator.

Examples: Show the current running configuration of net-snmp.

```
admin@bqn0# show service snmp config
```

```
agentaddress 192.168.1.95
rocommunity public
trap2sink 192.168.1.64
master agentx
```

Related: [show service](#)

Commands: [show service snmp](#)
[snmp](#)

show service ssh

Syntax: show service ssh [full]

Description: Show detailed information about the state of the SSH service. If the full parameter is used, the last system log messages for the service are printed.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show service ssh
sshd.service - OpenSSH Daemon
Loaded: loaded (/bqn/img/linux/usr/lib/systemd/system/sshd.service)
Active: active (running) since Tue, 2013-10-29 20:16:34 CET; 4h 30min ago
Process: 7318 ExecReload=/bin/kill -HUP $MAINPID (code=exited,
status=0/SUCCESS)
Process: 5195 ExecStartPre=/usr/sbin/sshd-gen-keys-start (code=exited,
status=0/SUCCESS)
Main PID: 5199 (sshd)
CGroup: name=systemd:/system/sshd.service
\5199 /usr/sbin/sshd -D
```

This is the output when using the full parameter.

```
admin@bqn# show service ssh full
sshd.service - OpenSSH Daemon
Loaded: loaded (/bqn/img/linux/usr/lib/systemd/system/sshd.service)
Active: active (running) since Tue, 2013-10-29 20:16:34 CET; 4h 34min ago
Process: 7318 ExecReload=/bin/kill -HUP $MAINPID (code=exited,
status=0/SUCCESS)
Process: 5195 ExecStartPre=/usr/sbin/sshd-gen-keys-start (code=exited,
status=0/SUCCESS)
Main PID: 5199 (sshd)
CGroup: name=systemd:/system/sshd.service
\5199 /usr/sbin/sshd -D
```

```
Oct 30 00:39:28 bqn sshd[7212]: Accepted publickey for bqnop from
192.168.1.133 port 48012 ssh2
Oct 30 00:39:28 bqn sshd[7212]: pam_unix(sshd:session): session opened for
user bqnop by (uid=0)
Oct 30 00:39:28 bqn sshd[7241]: Accepted publickey for bqnop from
192.168.1.133 port 48013 ssh2
Oct 30 00:39:28 bqn sshd[7241]: pam_unix(sshd:session): session opened for
user bqnop by (uid=0)
Oct 30 00:39:28 bqn sshd[7268]: Accepted publickey for bqnop from
192.168.1.133 port 48014 ssh2
Oct 30 00:39:28 bqn sshd[7268]: pam_unix(sshd:session): session opened for
user bqnop by (uid=0)
Oct 30 00:39:28 bqn systemd[1]: Reloading OpenSSH Daemon.
Oct 30 00:39:28 bqn sshd[5199]: Received SIGHUP; restarting.
Oct 30 00:39:28 bqn sshd[5199]: Server listening on 192.168.1.75 port 22.
Oct 30 00:39:28 bqn systemd[1]: Reloaded OpenSSH Daemon.
```

Related: [service ssh](#)

Commands: [show service](#)

show service web

Syntax: show service web [full]

Description: Show detailed information about the state of the web service.

If the full parameter is used, the last system log messages for the service are printed.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show service web full
bqnweb.service - bqn WEB Service
Loaded: loaded (/bqn/img/bqn/usr/lib/systemd/system/bqnweb.service)
Active: active (running) since Thu 2018-04-12 18:47:48 CEST; 24min ago
Main PID: 6879 (node)
CGroup: /system.slice/bqnweb.service
└─6879 /usr/bin/node /opt/bqn/sbin/bqnguisv.js -a 172.28.28.78
Apr 12 18:47:48 bqn0 systemd[1]: Started bqn WEB Service.
Apr 12 18:47:49 bqn0 node[6879]: https.listening on 172.28.28.78:443
```

Related: [service web](#)

Commands: [show service](#)

show shaping statistics

Syntax: show shaping statistics [detail]

Description: Show counters of traffic subject to shaping limitation. If the detail flag is present, the command breaks down the information per pkteng worker process.

The fields shown are as follows:

- TcpPktsRcv: Received TCP packets.
- TcpBytesRcv: Received TCP bytes.
- TcpPktsShapeMatch: Received TCP packets matching shaping policy.
- TcpBytesShapeMatch: Received TCP bytes matching shaping policy.
- TcpPktsShaped: Received TCP packets subject to shaping limitation.
- TcpBytesShaped: Received TCP bytes subject to shaping limitation.
- UdpPktsRcv: Received UDP packets.
- UdpBytesRcv: Received UDP bytes.
- UdpPktsShapeMatch: Received UDP packets matching shaping policy.
- UdpBytesShapeMatch: Received UDP bytes matching shaping policy.
- UdpPktsShaped: received UDP packets subject to shaping limitation.
- UdpBytesShaped: Received UDP bytes subject to shaping limitation.
- IpOPktsRcv: Received IP packets not TCP nor UDP.
- IpOBytesRcv: Received UDP bytes not TCP nor UDP.
- IpOPktsShapeMatch: Received IP packets (not TCP nor UDP) matching shaping policy.
- IpOBytesShapeMatch: Received IP bytes (not TCP nor UDP) matching shaping policy.
- IpOPktsShaped: Received IP packets (not TCP nor UDP) subject to shaping limitation.
- IpOBytesShaped: Received IP bytes (not TCP nor UDP) subject to shaping limitation.

Mode: Operation mode.

Profile: Operator.

Examples: Show shaping statistics.

```
admin@bqn0# show shaping statistics

TcpPktsRcv:          195901596818   TcpBytesRcv:          186563309719296
TcpPktsShapeMatch:  137716773448   TcpBytesShapeMatch:  184483300040402
TcpPktsShaped:      22366031       TcpBytesShaped:      34295631868
```

UdpPktsRcv:	131779769049	UdpBytesRcv:	117387108433414
UdpPktsShapeMatch:	130764131150	UdpBytesShapeMatch:	116451228010247
UdpPktsShaped:	63970219883	UdpBytesShaped:	81327658246008
IpOPktsRcv:	141615594	IpOBytesRcv:	13450833332
IpOPktsShapeMatch:	131700768	IpOBytesShapeMatch:	12604118048
IpOPktsShaped:	3656469	IpOBytesShaped:	374816727

Related: [show shaping status](#)

Commands

show shaping status

Syntax: show shaping status

Description: Show information about shaping.

The fields shown are as follows:

- Shaping mode: TODO.
- Shaping bandwidth: TODO.
- Report time: TODO.

Mode: Operation mode.

Profile: Operator.

Examples: Show shaping status.

```
admin@bqn0# show shaping status
Shaping mode: maximum
Shaping bandwidth: 4705962
Report time: 30.000
```

Related: [show shaping statistics](#)

Commands

show snmp alarm

Syntax: show snmp alarm

Description: Show all SNMP alarms (SNMP notifications).

The parameters provided are as follows:

- NOTIFICATION: alarm type.
- STATUS: state of the alarm. normal if alarm not triggered.

- COUNTER: number of state transitions so far of this alarm type.
- TIME: time of the last notification of this type

The alarm types are the following:

- cpu-load: triggered when CPU usage too high.
- memory-usage: triggered when memory usage too high.
- disk: triggered when disk usage too high.
- process: triggered when mandatory processes not running.
- write: triggered when no wires configured, or without links up.
- traffic-flow: triggered when no traffic, traffic too low, or traffic in reversed direction (more uplink than downlink traffic).
- license-status: triggered if license is invalid or no license specified.
- license-usage: triggered if traffic above license capacity.

Mode: Operation mode.

Profile: Operator.

Examples : This example shows the output after executing the command.

```
admin@bqn0# show snmp alarm

NOTIFICATION   STATUS      COUNTER   TIME
cpu-load       normal     1         2021-08-18T11:15:14+0200
memory-usage   normal     1         2021-08-18T11:15:14+0200
disk           normal     1         2021-08-18T11:15:14+0200
process        normal     1         2021-08-18T11:15:14+0200
wire           normal     2         2021-08-18T11:15:16+0200
traffic-flow   noTraffic  1         2021-08-18T11:15:14+0200
license-status normal     1         2021-08-18T11:15:14+0200
license-usage  normal     1         2021-08-18T11:15:14+0200
```

Related: [community](#)

Commands: [snmp](#)

[show system alarms](#)

show snmp client

Syntax: show snmp client

Description: Show all the SNMP client tasks registered to the QoE subagent process. Note that the output of this command may only be of use to Cambium Networks staff.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show snmp client

bqn    TASK-ID    OBJ-GROUP
0      sm069f60  0
0      sm07f680  0
0      sm07fd60  0
0      sm07fd70  0
```

Related: [community](#)

Commands: [snmp](#)

show snmp community

Syntax: show snmp community

Description: Show all the SNMP community strings associated with the different configured Network Management Stations. The NMS of a global community string is indicated with the "*" character.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show snmp community

NMS          COMMUNITY
192.168.1.64 secret1
192.168.1.65 secret2
```

Related: [community](#)

Commands: [snmp](#)

show snmp query

Syntax: show snmp query

Description: Show all the pending SNMP queries from the net-snmp agent process to the QoE subagent.



Note

The output of this command may only be of use to Cambium Networks staff.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show snmp query
```

bqn	OBJ-GROUP	QUERY-ID	PENDING	REQUESTS
0	0	234173392	1	2

Related: [community](#)

Commands: [snmp](#)

show snmp state

Syntax: show snmp state

Description: Show the state of the SNMP service.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show snmp state

bqn  RUNNING  STATE
0    yes      running
```

Related: [show service snmp](#)

Commands: [show service snmp config](#)

[snmp](#)

show snmp trap

Syntax: show snmp trap

Description: Show all the Network Management Stations (NMS) configured to receive traps. The trap type (SNMPv1 or SNMPv2c) to be received is also indicated.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show snmp trap

NMS          TRAP-TYPE  COMMUNITY
192.168.1.64 SNMPv1     n/a
192.168.1.64 SNMPv2c    mycommunity
```

Related: [community](#)

Commands: [snmp](#)

[trap-v1](#)

[trap-v2c](#)

show subscriber

Syntax: show subscriber ip-address [full]

Description: Lists information about the subscriber identified by the given ip-address. The full flag shows extra information.

The parameters shown are:

- Address: Subscriber IP address.
- Instance: pkteng worker processing this subscriber.
- Active flows: Active flows of this subscriber.
- Total created flows: Flows created since the start of the subscriber session.
- Active shaped flows: Flows subject to shaping or rate limiting.
- Rate-limit enabled: Yes, if subject to a rate policy.
- Duration: Duration of the subscriber session so far.
- DoS volume detection/attack: DoS volume detection enable / attacks detected now.
- DoS SYN detection/attack: DoS SYN detection enable / attacks detected now.
- UDR generation enabled: The subscriber generates UDR records.
- Blocked subscriber: No, if the subscriber is not subject to a blocking policy.
- Recv bytes uplink: Received bytes of traffic in uplink since the start of the session.
- Recv bytes downlink: Received bytes of traffic in downlink since the start of the session.
- Latest downlink TCP RTX rate:: Last value of packet retransmissions in TCP flows (in %).
- Average downlink TCP RTX rate: Average value of packet retransmissions in TCP flows (in %)
- Latest RTT-min: Minimum RTT measured in the last period (in milliseconds).
- Absolute RTT-min: Minimum RTT measured so far (in milliseconds).
- Downlink Speed (Mbps): Speed in downlink direction.
- Downlink TCPO bytes: Bytes with TCP optimization on the downlink direction.
- Policy monitor: Name of the monitor policy matching this subscriber (n/a if none).
- Policy rate: Name of the rate policy matching this subscriber (n/a if none).

Mode: Operation mode.

Profile: Operator.

Examples: Show information about a specific subscriber.

```

admin@bqn0# show subscriber 172.10.10.23
Address: 172.10.10.23
Instance: 1
Active flows: 5
Total created flows: 52754
Active shaped flows: 0
Rate-limit enabled: no
Duration: 16:37:26.993
DoS volume detection/attack: no/ no
DoS SYN detection/attack: no/ no
UDR generation enabled: yes (2.00%)
Blocked subscriber: no
Recv bytes uplink: 359197630
Recv bytes downlink: 5217598746
Latest downlink TCP RTX rate: 0.00%
Average downlink TCP RTX rate: 0.68%
Latest RTT-min: 4.655
Absolute RTT-min: 0.960
Downlink Speed (Mbps): 0.000
Downlink TCPO bytes: 1328346663
Policy monitor: monitor-default
Policy rate: rate-default

SUBS-RATE-POLICY DOWNLINK-RCV DOWNLINK-SND UPLINK-RCV UPLINK-SND
rate-default      5217598746    5225425229    359197630    361919353

```

Related: [show subscriber all](#)

Commands

show subscriber all

Syntax: show subscriber all [full]

Description: Lists all subscribers currently active at the QoE server. The full flag shows extra information.

The parameters shown are:

- ADDR: subscriber IP address.
- FL-ACTIVE: active flows of this subscriber.
- FL-CREATED: flows created since the start of the subscriber session.

- BYTES-UPLINK: received bytes of traffic in uplink since the start of the session.
- BYTES-DOWNLINK: received bytes of traffic in downlink since the start of the session.
- LIFETIME: duration of the subscriber session so far.
- RTT-MIN: minimum RTT measured in the last period (in milliseconds). Only shown with full.
- RTT-ABS: minimum RTT measured so far (in milliseconds). Only shown with full.
- DOWN-SPEED: speed in downlink direction (in Mbps). Only shown with full.
- RTX-INST: last value of packet retransmissions in TCP flows (in %). Only shown with full.
- RTX-AVG: average value of packet retransmissions in TCP flows (in %). Only shown with full.

Mode: Operation mode.

Profile: Operator.

Examples: Show list of subscribers.

```
admin@bqn0# show subscriber all | less
```

ADDR	FL- ACTIVE	FL- CREATED	BYTES- UPLINK	BYTES- DOWNLINK	LIFETIME
172.10.10.12	45	86270	1489428475	6910794314	16:27:29
172.10.10.21	7	6561	230665817	4482576823	16:32:31
172.10.10.31	36	11755	324602369	1706277596	16:28:52
172.10.10.210	113	35420	404086739	5911978332	16:32:56
172.10.10.110	117	526166	2157162465	34958483327	96:26:47

Related: [show subscriber](#)

Commands

show subscriber dos syn

Syntax: show subscriber dos syn

Description: Show active DoS SYN attacks.

The parameters shown are:

- ADDR: IP address affected by the attack.
- SIDE: Side of the affected IP address affected (access or Internet).
- DIRECTION: Direction of the attack: towards the affected IP (ingress) or coming out of the affected IP (egress).

- FAIL-SYN-CNT: Total of failed SYNs counted during the attack.
- FAIL-SYN-RATE: Rate of failed SYNs per second during the attack.
- LIFETIME: Duration of the attack.
- TOP-CONTRIBUTOR: IP Address most responsible of the attack.
- FAIL-SYN: TODO.

Mode: Operation mode.

Profile: Operator.

Examples: Show active DoS SYN attacks.

```
admin@bqn0# show subscriber dos syn
```

ADDR	SIDE	DIRECTION	FAIL-SYN-CNT	FAIL-SYN-RATE	LIFETIME	TOP-CONTRIBUTOR	FAIL-SYN
172.10.10.14	access	egress	31420052	179	227:33:13	192.168.50.241	1
172.10.10.145	access	egress	900351109	680	420:05:10	192.168.154.61	1
172.10.10.127	access	egress	3899492	96	85:24:231	192.168.51.20	2

Related: [show subscriber dos volume](#)

Commands

show subscriber dos volume

Syntax: show subscriber dos volume

Description: Show active DoS volume attacks.

The parameters shown are:

- ADDR: IP Address affected by the attack.
- SIDE: Side of the affected IP address affected (access or Internet).
- DIRECTION: Direction of the attack: towards the affected IP (ingress) or coming out of the affected IP (egress).
- MBYTES: Volume in MBytes counted since start of the attack.
- Rate-Mbps: Traffic rate during the attack in Mbps.
- LIFETIME: Duration of the attack.
- TOP-CONTRIBUTOR: IP Address most responsible of the attack.
- MBYTES: TODO. Mode Operation mode. Profile operator.

Examples: Show list of DoS volume attacks.

```
admin@bqn0# show subscriber dos volume
```

ADDR	SIDE	DIRECTI ON	MBYTES	RATE- Mbps	LIFETIM E	TOP- CONTRIBUTOR	MBYTES
172.10.10. 2	acce s	ingress	9580703. 9	221.1 1	140:33: 06	192.168.31. 77	11135 .5
172.10.10. 196	acce s	ingress	53807444 .5	327.8 3	419:58: 39	192.168.14. 202	107073 .4
172.10.10. 197	acce s	ingress	53689467 .3	286.0 5	419:58: 39	192.168.14. 202	103205 .8

Related: [show subscriber dos syn](#)

Commands

show subscriber usage

Syntax: show subscriber usage [detail]

Description: Show counters of subscriber sessions. The detail flag breaks the counter down per pkteng worker process.

The counters shown are:

- Active: Total of active subscriber right now.
- Created: Subscriber sessions created since the start.
- Deleted: Subscriber sessions closed since the start.
- Phantom: TODO.

Mode: Operation mode.

Profile: Operator.

Examples: Show subscriber usage.

```
admin@bqn0# show subscriber usage

Active:      800
Created:    11444
Deleted:    4671
Phantom:    5973
```

Related: [show subscriber](#)

Commands

show statistics

Syntax: show statistics

Description: Show information about the state of the statistics features defined in QoE.

For a detailed description of the information shown see the [show statistics feature](#) command. Note that each statistic feature should be defined in all the STATMGR processes of the QoE.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show statistics

bqn  FEATURE          SIZE      CLIENTS  UPDATE
0    acceleration    2733912   4        0:03:59
0    dos              33392     4        0:03:59
0    dpdk             1071981   4        0:03:59
0    iface            1298794   4        0:03:59
0    network          959579    2        0:03:58
0    pkteng           54901     4        0:03:59
0    pktengmgr        290467    1        0:03:59
0    policy           783124    4        0:03:59
0    sdr              52989     4        0:03:59
0    system           2739925   1        0:03:58
0    udr              1788870   4        0:03:59
```

Related: [statistics flush](#)

Commands: [statistics rotate](#)

[show statistics cpu](#)

[show statistics feature](#)

[show statistics interface speed](#)

[statistics flush](#)

show statistics bta

Syntax: show statistics bta [lines ">number]

Description: Show traffic throughput information.

The below table describes the fields shown by this command. Throughput is given in megabits per second (Mbps) and combining traffic in all the data interfaces of the QoE node.

Field	Description
TIME	Time of generation in format YYYY-MM-DDTHH:mm:SS. TOT-RCV

Field	Description
TOT-RCV	Total received throughput.
TOT-SNT	Total sent throughput.
TCPO-RCV	Throughput of received TCP traffic being optimized.
TCPO-SNT	Throughput of sent TCP traffic being optimized.
TCP-TRCK	Throughput of TCP traffic being tracked (non-accelerated samples).
TCP-FWD	Throughput of TCP traffic being forwarded (neither optimized nor tracked). Corresponds to TCP.
UDP-SNT	Throughput of UDP traffic sent.
OTHER-SNT	Throughput of other IP traffic (neither TCP nor UDP).
POLICY	Throughput of traffic matching a bandwidth management policy.
SHAPED	Throughput of traffic being rate-limited by a bandwidth management policy.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show statistics bta
```

TIME	TOT-RCV	TOT-SNT	TCPO-RCV	TCPO-SNT	TCP-TRCK	TCP-FWD	UDP-SNT
2020-01-17T12:36:14	0.245	0.258	0.195	0.205	0.001	0.019	0.015
2020-01-17T12:41:14	0.701	0.704	0.620	0.621	0.000	0.023	0.041
2020-01-17T12:46:14	0.496	0.503	0.378	0.383	0.000	0.087	0.011

Related: [show statistics](#)

Commands: [show statistics interface speed](#)

[statistics flush](#)

show statistics compress

Syntax: show statistics compress [lines number]

Description: Show BTC compression information from the statistics file. The command shows the following compression data for a specific time interval:

- Number of elements eligible for compression.
- Number of elements which have been compressed.
- Number of bytes to be compressed.
- Number of bytes generated after the compression has been performed.
- Compression ratio percentage.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show statistics interface speed
```

TIME	NUM-DETECT	NUM-COMP	IN-BYTES	OUT-BYTES	%RATIO
2017-10-04T12:24:04	57548	51951	1793085630	764376046	42.6
2017-10-04T12:29:04	53978	48806	1619660548	688422114	42.5
2017-10-04T12:34:04	47759	42602	1607580372	701368183	43.6
2017-10-04T12:39:04	50821	44922	1644450276	693358354	42.2

Related: [show btc statistics](#)

Commands: [show statistics](#)

[statistics flush](#)

show statistics cpu

Syntax: show statistics cpu {all | idle | soft | system | user} [lines number]

```
show statistics cpu core core-id [lines number]
```

Description: Show CPU usage information from the system statistics.

Depending on the parameter used, the following information is displayed:

- If the all parameter is used, the global CPU usage information is shown.
- If the core parameter is used, the CPU usage for core-id only is shown. Note that the first core available has a core-id value of 0.
- If the idle parameter is used, the idle CPU usage for each CPU is shown.
- If the soft parameter is used, the soft interrupt CPU usage for each CPU is shown.

- If the system parameter is used, the system CPU usage for each CPU is shown.
- If the user parameter is used, the user CPU usage for each CPU is shown.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default). Note that the usage values are a percentage of the total usage.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the CPU usage for all the CPUs, then for core 0 only, and finally the idle usage for all CPUs (note that the system has 4 CPUs).

```
admin@bqn0# show statistics cpu all lines 5
```

TIME	USER	NICE	SYS	IO- WA	IRQ	SOFT	STEAL	GUEST	IDLE
2017-09-27T09:40:10	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	99.4
2017-09-27T09:40:11	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	99.4
2017-09-27T09:45:11	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	98.5
2017-09-27T09:50:11	10.7	0.0	1.7	0.0	0.0	0.0	0.0	0.0	87.5
2017-09-27T09:55:11	9.8	0.0	3.9	0.0	0.0	0.0	0.0	0.0	86.2

```
admin@bqn0# show statistics cpu core 0 lines 5
```

TIME	USER	NICE	SYS	IO- WA	IRQ	SOFT	STEAL	GUEST	IDLE
2017-09-27T09:40:10	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	95.5
2017-09-27T09:40:11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
2017-09-27T09:45:11	4.2	0.0	1.9	0.0	0.0	0.1	0.0	0.0	93.9
2017-09-27T09:50:11	8.2	0.0	3.1	0.0	0.0	0.1	0.0	0.0	88.7
2017-09-27T09:55:11	4.5	0.0	0.3	0.0	0.0	0.1	0.0	0.0	95.1

```
admin@bqn0# show statistics cpu idle lines 5
```

TIME	ALL	CPU0	CPU1	CPU2	CPU3
2017-09-27T09:40:10	99.4	95.5	97.7	100.0	100.0
2017-09-27T09:40:11	99.4	100.0	100.0	100.0	100.0

```
2017-09-27T09:45:11 98.5 93.9 100.0 100.0 100.0
2017-09-27T09:50:11 87.5 88.7 100.0 45.7 100.0
2017-09-27T09:55:11 86.2 95.1 100.0 47.6 100.0
```

Related: [show statistics](#)

Commands: [show system cpu](#)
[statistics flush](#)

show statistics cpu frequency

Syntax: show statistics cpu frequency [lines number]

Description: Show the current CPU frequency information for each CPU core from the system statistics in MHz.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the CPU frequency over time.

```
admin@bqn0# show statistics cpu frequency

TIME                CPU0   CPU1   CPU2   CPU3   CPU4   CPU5   CPU6   CPU7
2019-01-16T14:50:09 1414   1789   800    1304   1823   1784   2084   1878
2019-01-16T14:55:09 1587   1196   1115   800    1237   2172   1278   948
2019-01-16T15:00:09 1017   801    1350   1356   2005   805    1923   1380
```

Related: [show statistics](#)

Commands: [show system cpu frequency](#)
[statistics flush](#)

show statistics dos

Syntax: show statistics dos

Description: Show statistics of DoS attacks.

The parameters are as follows:

- TIME: Time of the DoS event,
- IP-ADDRESS: Affected IP address.
- TYPE: Type of attack (syn-flood or volume).
- SIDE: Side of the affected IP (access for clients, inet for Internet).

- **DIRECTION:** Direction of the attack (egress when going out of the affected IP, ingress when going into the affected IP).
- **DURATION:** Duration of the attack.

Mode: Operation mode.

Profile: Operator.

Examples: This server has detected three attack.

```
admin@bqn0# show statistics dos
```

TIME	IP-ADDRESS	TYPE	SIDE	DIRECTION	DURATION
2021-08-17T09:37:07	172.10.10.128	syn-flood	access	egress	00:00:11
2021-08-17T09:42:08	172.10.10.5	volume	access	ingress	00:00:17
2021-08-17T10:03:57	172.10.10.76	syn-flood	access	ingress	00:00:44

Each row shows the volume totals in GB per hour and the percentages of that total that represents each traffic category. Results for the whole period are shown in the last row.

Related: [dos syn rate](#)

Commands: [dos volume](#)

[statistics flush](#)

show statistics dpi

Syntax: show statistics dpi [hours num-hours] [categories num-cat] [direction dir]

Description: Show statistics of DPI traffic analysis. It shows traffic categories starting with those with the highest traffic usage.

The parameters are as follows:

- **num-hours:** Period to cover in the statistics, in hours. By default, 24 hours.
- **num-cat:** Number of DPI traffic categories to show. By default, 20 categories.
- **dir:** Traffic direction to show. Valid values: all, downlink, uplink. By default, all.

Mode: Operation mode.

Profile: Operator.

Examples: Show the two most common traffic categories in the last four hours for the uplink direction.

```
admin@bqn0# show statistics dpi hours 4 categories 2 direction uplink
```

TIME	GIGABYTES	amazon	apple	REST
2020-01-23T01:00:00	0.05	24.4%	33.3%	42.2%

2020-01-23T02:00:00	0.05	29.2%	14.2%	56.6%
2020-01-23T03:00:00	0.06	33.4%	0.9%	65.7%
2020-01-23T04:00:00	0.07	67.2%	0.3%	32.5%
2020-01-23T05:00:00	0.08	22.8%	53.8%	23.4%
	0.31	36.0%	22.1%	41.9%

Each row shows the volume totals in GB per hour and the percentages of that total that represents each traffic category. Results for the whole period are shown in the last row.

Related: [show statistics subscribers](#)

Commands: [statistics flush](#)

show statistics dpi latency bins

Syntax: show statistics dpi latency bins all|category [hours num-hours [bins num-bins [bin-size bin-size [minimum start-latency]]]]

Description: Show the distribution of latencies between the QoE and the application over the Internet. Applications are differentiated using the QoE DPI capabilities. The distribution is shown as an histogram, with the percentage of latency measurements falling in each of the latency intervals or bins.

The parameters are as follows:

- *num-hours*: Period to cover in the statistics, in hours. By default, 24 hours.
- *num-bins*: number of intervals (bins) to use in the latency distribution. By default, 10.
- *bin-size*: size of each bin interval. By default, 5 ms.
- *start-latency*: upper value of the first bin. By default, the bin size.

The command returns the following information:

- *UP-RTT-BIN*: bin range of latency values (for example, 5-10ms).
- *SHARE-%*: percentage of latency measurements falling in that bin.

Mode: Operation mode.

Profile: Operator.

Examples: Show the latency distribution of the last 24 hours.

```
bqnadm@bqn0# show statistics dpi latency bins all
```

```
UP-RTT-BIN  SHARE-%
0-5ms      65.203
5-10ms     0.043
15-20ms    0.002
20-25ms    21.469
25-30ms    0.859
```

30-35ms	0.672
35-40ms	1.693
40-45ms	0.275
>45ms	9.698

Show the latency distribution of the last 12 hours, using 15 bins of 10 ms in size.

```
bqnadm@bqn0# show statistics dpi latency bins all hours 12 bins 15 bin-size 10
```

UP-RTT-BIN	SHARE-%
0-10ms	62.672
10-20ms	0.210
20-30ms	23.512
30-40ms	2.851
40-50ms	1.223
50-60ms	4.374
60-70ms	0.351
70-80ms	0.255
80-90ms	0.426
90-100ms	2.890
100-110ms	0.106
110-120ms	0.014
120-130ms	0.078
130-140ms	0.356
>140ms	0.683

Show the latency distribution of the last 12 hours, using 8 bins of 10 ms in size, ending first bin at 20 ms.

```
bqnadm@bqn0# show statistics dpi latency bins all hours 12 bins 8 bin-size 10 minimum 20
```

UP-RTT-BIN	SHARE-%
0-20ms	63.137
20-30ms	23.455
30-40ms	2.795
40-50ms	1.236
50-60ms	4.294
60-70ms	0.345
70-80ms	0.248
>80ms	4.490

Show the latency distribution of the last 24 hours for Netflix traffic.

```
bqnadm@bqn0# show statistics dpi latency bins netflix
```


UP-RTT-BIN	SHARE-%
0-5ms	86.868
5-10ms	0.303
10-15ms	0.585
15-20ms	0.000
20-25ms	10.263
25-30ms	1.442
30-35ms	0.098
35-40ms	0.083
40-45ms	0.121
>45ms	0.237

Related: [show statistics dpi](#)

Commands: [show statistics dpi latency time](#)

[show statistics dpi latency top](#)

[show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show statistics dpi latency bins

Syntax: show statistics dpi latency bins all|category [hours num-hours [bins num-bins [bin-size bin-size [minimum start-latency]]]]

Description: Show over time the distribution of latencies between the QoE and the application over the Internet. Applications are differentiated using the QoE DPI capabilities. For each time interval, the distribution is shown as an histogram, with the percentage of latency measurements falling in each of the latency intervals or bins.

The parameters are as follows:

- *num-hours*: Period to cover in the statistics, in hours. By default, 24 hours.
- *num-bins*: number of intervals (bins) to use in the latency distribution. By default, 10.
- *bin-size*: size of each bin interval. By default, 5 ms.
- *start-latency*: upper value of the first bin. By default, the bin size.

The command returns the following information:

- *TIME*: time when the distribution was calculated.
- *latency intervals*: one column per latency bin interval, in percentages.

Mode: Operation mode.

Profile: Operator.

Examples: Show the latency distribution of the last 24 hours.

```
bqnadm@bqn0# show statistics dpi latency time all hours 12 bins 5
```

TIME	0-5ms	5-10ms	10-15ms	15-20ms	>20ms
2022-03-07T00:00:00	77.684	0.013	0.000	0.223	22.080
2022-03-07T01:00:00	63.618	0.000	0.000	0.028	36.355
2022-03-07T02:00:00	46.990	0.000	0.000	0.870	52.140
2022-03-07T03:00:00	75.444	0.000	0.000	0.298	24.258
2022-03-07T04:00:00	82.415	0.000	0.000	0.085	17.500
2022-03-07T05:00:00	63.671	0.000	0.000	0.127	36.202
2022-03-07T06:00:00	66.270	0.066	0.000	0.088	33.576
2022-03-07T07:00:00	67.709	0.000	0.000	0.083	32.208
2022-03-07T08:00:00	75.416	0.262	0.000	0.274	24.048
2022-03-07T09:00:00	72.885	0.257	0.000	0.183	26.675
2022-03-07T10:00:00	72.633	0.302	0.000	0.083	26.981
2022-03-07T11:00:00	71.853	0.776	0.000	0.118	27.253
2022-03-07T12:00:00	68.962	0.388	0.000	0.045	30.605

Show the latency distribution of each of the last 12 hours, using 5 bins of 20 ms in size.

```
bqnadm@bqn0# show statistics dpi latency time all hours 12 bins 5 bin-size 20
```

TIME	0-20ms	20-40ms	40-60ms	60-80ms	>80ms
2022-03-07T00:00:00	77.920	15.100	4.076	0.948	1.956
2022-03-07T01:00:00	63.645	20.362	8.835	5.910	1.248
2022-03-07T02:00:00	47.860	41.500	5.783	0.387	4.470
2022-03-07T03:00:00	75.742	17.042	4.276	2.567	0.372
2022-03-07T04:00:00	82.500	13.426	3.147	0.400	0.527
2022-03-07T05:00:00	63.798	23.242	11.481	1.333	0.146
2022-03-07T06:00:00	66.424	22.561	9.711	0.386	0.917
2022-03-07T07:00:00	67.792	22.489	8.373	0.873	0.472
2022-03-07T08:00:00	75.952	14.951	7.717	0.708	0.672
2022-03-07T09:00:00	73.325	14.314	10.589	0.478	1.295
2022-03-07T10:00:00	73.019	16.763	9.151	0.711	0.357
2022-03-07T11:00:00	72.747	12.883	12.735	0.080	1.555
2022-03-07T12:00:00	69.451	17.384	10.654	0.329	2.182

Show the latency distribution of each of the last 12 hours for Netflix traffic using 5 bins.

```
bqnam@bqn0# show statistics dpi latency time category netflix hours 12 bins 5
```

TIME	0-5ms	5-10ms	10-15ms	15-20ms	>20ms
2022-03-07T00:00:00	80.986	0.000	0.000	0.000	19.014
2022-03-07T01:00:00	87.984	0.000	0.000	0.000	12.016
2022-03-07T02:00:00	11.937	0.000	0.000	0.000	88.063
2022-03-07T03:00:00	98.683	0.000	0.000	0.000	1.317
2022-03-07T04:00:00	99.733	0.000	0.000	0.000	0.267
2022-03-07T05:00:00	97.788	0.000	0.000	0.000	2.212
2022-03-07T06:00:00	50.369	3.703	0.000	0.000	45.928
2022-03-07T07:00:00	79.281	0.000	0.000	0.000	20.719
2022-03-07T08:00:00	78.353	0.000	0.000	0.000	21.647
2022-03-07T09:00:00	96.537	0.156	0.000	0.000	3.307
2022-03-07T10:00:00	73.411	0.223	0.000	0.000	26.365
2022-03-07T11:00:00	84.927	0.228	0.000	0.000	14.845
2022-03-07T12:00:00	69.378	1.239	0.000	0.000	29.384

Related: [show statistics dpi](#)

Commands: [show statistics dpi latency bins](#)

[show statistics dpi latency top](#)

[show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show statistics dpi latency top

Syntax: show statistics dpi latency top [hours *num-hours* [category *num-cats*]]

Description: Show the average access latencies of the top applications over a period of time. Applications are differentiated using the QoE DPI capabilities.

The parameters are as follows:

- *num-hours*: Period to cover in the statistics, in hours. By default, 24 hours.
- *num-cats*: number of categories (applications) to include. 20 by default.

The command returns the following information:

- *CATEGORY*: application name.
- *UP-RTT-MS*: average access latency in milliseconds over the period.

Mode: Operation mode.

Profile: Operator.

Examples: Show the latencies of the top 10 applications in the last 24 hours:

```
bqnadm@bqn0# show statistics dpi latency top hours 24 categories 10
```

CATEGORY	UP-RTT-MS
netflix	7.565
tiktok	28.619
youtube	9.868
facebook	4.768
whatsapp	2.032
apple	35.312
amazon-video	54.180
mediafire.com	53.113
kwai.net	37.159
playstation	43.378

Related: [show statistics dpi](#)

Commands: [show statistics dpi latency bins](#)

[show statistics dpi latency time](#)

[show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show statistics feature

Syntax: show statistics feature name [bqn-id]

Description: Show information about the state of a statistics feature.

For a list of all the available features use the [show statistics](#) command. For a statistics feature the following information is shown:

- Feature name: Name of the feature.
- bqn: bqn ID of the STATMGR process.
- File size: Current file size where the feature statistics are being stored.
- File size max: Maximum size of the statistics file.
- Clients: Number of processes registered to generate statistics for the feature.
- Update interval: Period of time in seconds used to generate statistics for the feature.
- Update next: Remaining time for the next statistics update.
- File name: File name where the statistics are stored.

The clients shown indicate the processes generating statistics and the time when the last update occurred.

The directory where the statistics files are stored is:

```
/opt/bqn/var/stats
```

Each feature is stored under this directory using the feature name as the file name. Note that when the file size of the statistics feature reaches the maximum file size, the file is rotated.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show statistics feature pkteng
```

```
Feature:          pkteng
bqn:              0
File size:        9811
File size max:    20000000
Total size max:   375285350
Clients:          2
Update interval:  300
Update next:      0:03:24
```

```
File name: /opt/bqn/var/stats/pkteng
```

```
CLIENT    LAST-ACTIVITY
st015640   0:01:35.002027
st015950   0:01:35.002036
```

Related: [statistics flush](#)

Commands: [statistics rotate](#)

[show statistics](#)

show statistics flow

Syntax: show statistics flow [full] [lines number]

Description: Show statistics over time about the number of active flows in a specific state.

Table 7 lists and describes the fields shown by this command. Throughput is given in megabits per second (Mbps) and combining traffic in all the data interfaces of the QoE node.

Table 7: Flow statistics fields

Field	Description
TIME	Time of generation in format YYYY-MM-DDTHH:mm:SS. TCP-HANDSHAKE
TCP-HANDSHAKE	Concurrent TCP flows in initial state.
TCP-ESTABLISHED	Concurrent TCP flows being accelerated.
TCP-TRACKING	Concurrent TCP flows being monitored (not accelerated).
TCP-OTHER	Concurrent TCP flows is neither of the above states.
UDP-ALL	Concurrent UDP flows.
IPOther-ALL	Concurrent IP-other flows.

If the optional full parameter is passed, then the command shows flow information for all the existing flow states. If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show statistics flow
```

TIME	TCP- HANDSHAKE	TCP- ESTABLISHED	TCP- TRACKING	TCP- OTHER	UDP- ALL
2020-01-17T12:51:14	0	69	1	10	42
2020-01-17T12:56:14	0	74	2	9	52
2020-01-17T13:01:14	0	65	0	9	55

Related: [show pkteng statistics](#)

Commands: [show statistics flow](#)

[statistics flush](#)

show statistics interface speed

Syntax: show statistics interface speed [icmp | tcp | udp] [ifname] [lines number]

Description: Show speed information from the PKTENG interface statistics. The command shows the received and transmitted speed in Mbps (1000000 bits per second) of PKTENG interfaces.

By default, the speed values shown correspond to the total number of bytes sent and received. If the optional icmp option is used, the speed shown corresponds to the ICMP traffic. If the optional tcp option is used, the speed shown corresponds to the TCP traffic. If the optional udp option is used, the speed shown corresponds to the UDP traffic.

If the optional ifname network interface is passed, then the command only shows information for the indicated interface. If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show statistics interface speed
```

	en0p141s0f1.11		en0p141s0f1.21	
TIME	TX-Mbps	RX-Mbps	TX-Mbps	RX-Mbps
2017-07-12T23:30:48	248.03	19.21	20.07	280.79
2017-07-12T23:35:48	223.87	18.19	18.96	258.52
2017-07-12T23:40:48	222.46	18.54	19.41	259.09
2017-07-12T23:45:48	227.96	18.29	19.12	264.60

Related: [show pkteng statistics](#)

Commands: [show statistics](#)

[statistics flush](#)

show statistics latency

Syntax: show statistics latency [full] [lines number]

Description: Show round-trip time (RTT) statistics for each interface side.

[Table 8](#) lists and describes the fields shown by this command.

Table 8: Latency statistics fields

Field	Description
TIME	Time of generation in format YYYY-MM-DDTHH:mm:SS.
RTT-MIN-DN	Minimum access delay in milliseconds (Round Trip Time towards clients).
RTT-MEAN-DN	Average access delay in milliseconds.
RTT-MEAN-DN	Maximum access delay in milliseconds.
RTT-MIN-UP	Minimum Internet delay in milliseconds (Round Trip Time towards Internet services).
RTT-MEAN-UP	Average Internet delay in milliseconds.
RTT-MEAN-UP	Maximum Internet delay in milliseconds.

If the optional full parameter is passed, then the command shows more detailed information. If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn0# show statistics latency
```

TIME	RTT-MIN-DN	RTT-MEAN-DN	RTT-MAX-DN	RTT-MIN-UP	RTT-MEAN-UP	RTT-MAX-UP
2020-01-17T12:41:14	6.935	27.145	332.354	24.050	25.073	37.302
2020-01-17T12:46:14	6.936	27.156	332.241	24.085	25.104	37.376
2020-01-17T12:51:14	6.890	26.944	329.698	24.093	25.103	37.551

Related: [show pkteng statistics](#)

Commands: [show statistics bta](#)

[statistics flush](#)

show statistics memory

Syntax: show statistics memory [lines number]

Description: Show memory usage.

The fields shown are as follows:

- TIME: Time of the statistics entry.
- SYS-MB: System memory usage in MBytes.
- MPOOL-MB: Usage of memory pool in MBytes.
- DPDK0-MB: Usage of DPDK memory pool in MBytes for NUMA 0.
- DPDK1-MB: If the server has a second processor, usage of DPDK memory pool in MBytes for NUMA 1.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples:

```
admin@bqn0# show statistics memory lines 10
```

TIME	SYS-MB	MPOOL-MB	DPDK0-MB	DPDK1-MB
2021-08-18T10:22:35	108997.637	13102.783	4962.025	4634.950
2021-08-18T10:27:35	108998.023	13265.344	5025.425	4822.493
2021-08-18T10:32:35	108996.691	13603.544	5195.034	5577.798
2021-08-18T10:37:35	108996.355	13208.755	4511.225	5274.937
2021-08-18T10:42:35	108996.008	13200.029	4868.555	4973.505
2021-08-18T10:47:35	108997.316	13260.652	5257.664	4700.916
2021-08-18T10:52:35	108996.203	13170.010	4861.805	4844.680
2021-08-18T10:57:35	108995.234	13481.843	5178.328	5201.218
2021-08-18T11:02:35	108992.992	13394.047	5186.980	5063.946
2021-08-18T11:07:35	108997.816	13523.759	5177.641	5020.883

Related: [show system memory](#)

Commands: [show hardware memory](#)

[statistics flush](#)

show statistics policy flow

Syntax: show statistics policy flow [speed] [lines number]

Description: Show traffic volume per flow policy, unless the speed flag is used, in which case speeds are provided.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

For each flow policy, the following parameters are shown:

- TIME: Time when the record was created.
- GB-RX-DOWN: Volume processed on the downlink direction in GBytes.
- GB-RX-UP: Volume processed on the uplink direction in GBytes.
- FLOWS: Flows matching this policy at the time of record generation.
- MBPS-RX-DOWN: Throughput processed on the downlink direction in Mbps. Shown if speed used.
- MBPS-RX-UP: Throughput processed on the uplink direction in Mbps. Shown if speed used.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows flow policy stats in volume and then in throughput.

```
admin@bqn0# show statistics policy flow lines 10
```

TIME	flow-default		shape-2Mbps		
	GB-RX-UP	FLOWS	GB-RX-DOWN	GB-RX-UP	FLOWS
2021-08-18T12:29:26	5.548	104386	2.100	0.049	2120
2021-08-18T12:34:26	4.898	103346	2.352	0.056	2345
2021-08-18T12:39:26	4.787	107317	2.316	0.055	2326
2021-08-18T12:44:26	5.032	107752	2.184	0.052	2331
2021-08-18T12:49:26	4.299	108076	2.111	0.050	2263
2021-08-18T12:54:26	3.134	105524	2.313	0.054	2519
2021-08-18T12:59:26	3.339	107869	2.452	0.058	2680
2021-08-18T13:04:26	3.523	104212	2.630	0.070	2867
2021-08-18T13:09:26	3.658	107687	2.505	0.066	2877
2021-08-18T13:14:26	3.775	103753	2.616	0.068	2873

```
admin@bqn0# show statistics policy flow speed lines 10
```

TIME	flow-default			shape-2Mbps		
	MBPS-RX-DOWN	MBPS-RX-UP	FLOWS	MBPS-RX-DOWN	MBPS-RX-UP	FLOWS
2021-08-18T12:34:26	1124.683	130.620	103346	62.725	1.501	2345
2021-08-18T12:39:26	1206.264	127.653	107317	61.756	1.461	2326
2021-08-18T12:44:26	1190.134	134.179	107752	58.239	1.385	2331

2021-08-18T12:49:26	1206.422	114.643	108076	56.304	1.322	2263
2021-08-18T12:54:26	1197.177	83.570	105524	61.672	1.435	2519
2021-08-18T12:59:26	1253.497	89.051	107869	65.386	1.549	2680
2021-08-18T13:04:26	1059.173	93.945	104212	70.143	1.871	2867
2021-08-18T13:09:26	1060.591	97.554	107687	66.810	1.773	2877
2021-08-18T13:14:26	1086.732	100.670	103753	69.750	1.823	2873
2021-08-18T13:19:26	1105.523	97.742	109314	74.335	1.922	3046

Related: [show interface pkteng bandwidth](#)

Commands: [show policy flow](#)

[show statistics policy monitor](#)

[show statistics policy rate](#)

[statistics flush](#)

show statistics policy monitor

Syntax: show statistics policy monitor [speed] [lines number]

Description: Show traffic volume per monitor policy, unless the speed flag is used, in which case speeds are provided.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

For each monitor policy, the following parameters are shown:

- TIME: Time when the record was created.
- GB-RX-DOWN: Volume processed on the downlink direction in GBytes.
- GB-RX-UP: Volume processed on the uplink direction in GBytes.
- SUBSCRIB: Active subscribers matching this policy at the time of record generation.
- MBPS-RX-DOWN: Throughput processed on the downlink direction in Mbps. Shown if speed used.
- MBPS-RX-UP: Throughput processed on the uplink direction in Mbps. Shown if speed used.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows monitor policy stats in volume and then in throughput.

```
admin@bqn0# show statistics policy monitor lines 10
```

```
monitor-default
TIME                GB-RX-DOWN  GB-RX-UP  SUBSCRIB
2021-08-18T12:44:26 76.906     5.690     3847
2021-08-18T12:49:26 78.817     4.985     3848
2021-08-18T12:54:26 78.847     3.816     3847
2021-08-18T12:59:26 81.115     4.027     3849
2021-08-18T13:04:26 73.284     4.264     3849
2021-08-18T13:09:26 73.175     4.407     3849
2021-08-18T13:14:26 74.664     4.520     3849
2021-08-18T13:19:26 74.814     4.399     3850
2021-08-18T13:24:26 75.495     4.331     3849
2021-08-18T13:29:26 76.196     4.268     3850
```

```
admin@bqn0# show statistics policy monitor speed lines 10
```

```
monitor-default
TIME                MBPS-RX-DOWN  MBPS-RX-UP  SUBSCRIB
2021-08-18T12:44:26 2050.837     151.727     3847
2021-08-18T12:49:26 2101.791     132.944     3848
2021-08-18T12:54:26 2102.590     101.768     3847
2021-08-18T12:59:26 2163.072     107.378     3849
2021-08-18T13:04:26 1954.252     113.714     3849
2021-08-18T13:09:26 1951.321     117.520     3849
2021-08-18T13:14:26 1991.044     120.537     3849
2021-08-18T13:19:26 1995.044     117.295     3850
2021-08-18T13:24:26 2013.188     115.484     3849
2021-08-18T13:29:26 2031.892     113.809     3850
```

Related: [show interface pkteng bandwidth](#)

Commands: [show policy flow](#)

[show statistics policy flow](#)

[show statistics policy rate](#)

[statistics flush](#)

show statistics policy rate

Syntax: show statistics policy rate [speed] [lines number]

Description: Show traffic volume per rate policy, unless the speed flag is used, in which case speeds are provided.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

For each rate policy, the following parameters are shown:

- TIME: Time when the record was created.
- GB-RX-DOWN: Volume processed on the downlink direction in GBytes.
- GB-RX-UP: Volume processed on the uplink direction in GBytes.
- SUBSCRIB: Active subscribers matching this policy at the time of record generation.
- MBPS-RX-DOWN: Throughput processed on the downlink direction in Mbps. Shown if speed used.
- MBPS-RX-UP: Throughput processed on the uplink direction in Mbps. Shown if speed used.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows rate policy stats in volume and then in throughput.

```
admin@bqn0# show statistics policy rate lines 10

                                rate-default
TIME                               GB-RX-DOWN  GB-RX-UP  SUBSCRIB
2021-08-18T12:49:26  78.817      4.985     3848
2021-08-18T12:54:26  78.847      3.816     3847
2021-08-18T12:59:26  81.115      4.027     3849
2021-08-18T13:04:26  73.284      4.264     3849
2021-08-18T13:09:26  73.175      4.407     3849
2021-08-18T13:14:26  74.664      4.520     3849
2021-08-18T13:19:26  74.814      4.399     3850
2021-08-18T13:24:26  75.495      4.331     3849
2021-08-18T13:29:26  76.196      4.268     3850
2021-08-18T13:34:26  77.787      4.578     3852

admin@bqn0# show statistics policy rate speed lines 10

                                rate-default
TIME                               MBPS-RX-DOWN  MBPS-RX-UP  SUBSCRIB
2021-08-18T12:49:26  2101.791      132.944     3848
```

2021-08-18T12:54:26	2102.590	101.768	3847
2021-08-18T12:59:26	2163.072	107.378	3849
2021-08-18T13:04:26	1954.252	113.714	3849
2021-08-18T13:09:26	1951.321	117.520	3849
2021-08-18T13:14:26	1991.044	120.537	3849
2021-08-18T13:19:26	1995.044	117.295	3850
2021-08-18T13:24:26	2013.188	115.484	3849
2021-08-18T13:29:26	2031.892	113.809	3850
2021-08-18T13:34:26	2074.321	122.086	3852

Related: [show interface pkteng bandwidth](#)

Commands: [show policy flow](#)

[show statistics policy flow](#)

[show statistics policy monitor](#)

[statistics flush](#)

show statistics sensors

Syntax: show statistics sensors [lines number]

Description: Show the current temperature value for each system sensor from the system statistics. The temperature values are indicated using the Celsius scale.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the sensors temperature over time.

```
admin@bqn0# show statistics sensors
```

TIME	Core1	PackageId0	Core2	Core0	Core3
2019-01-16T15:05:09	41.0	41.0	41.0	41.0	41.0
2019-01-16T15:10:09	41.0	41.0	41.0	41.0	41.0
2019-01-16T15:15:09	41.0	41.0	41.0	41.0	41.0

Related: [show statistics](#)

Commands: [show statistics cpu frequency](#)

[show system sensors](#)

[statistics flush](#)

show statistics shaping

Syntax: show statistics shaping [lines number]

Description: Show statistics of traffic being rate-limited by flow or rate policies.

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

The parameters are as follows (throughput is provided in Mbps):

- TIME: Time when the record was generated.
- TCP-RCV: TCP traffic throughput received.
- TCP-POLICY: TCP traffic throughput subject to shaping policies.
- TCP-SHAPED: TCP traffic throughput being shaped.
- UDP-RCV: UDP traffic throughput received.
- UDP-POLICY: UDP traffic throughput subject to shaping policies.
- UDP-SHAPED: UDP traffic throughput being shaped.
- IPOTHER-RCV: IP other traffic throughput received.
- IPOTHER-POLICY: IP other traffic throughput subject to shaping policies.
- IPOTHER-SHAPED: IP other traffic throughput being shaped.

Mode: Operation mode.

Profile: Operator.

Examples: Show shaping statistics.

```
admin@bqn0# show statistics shaping lines 10
```

TIME	TCP-RCV	TCP-POLICY	TCP-SHAPED	UDP-RCV	UDP-POLICY	UDP-SHAPED
2021-08-18T12:59:26	1559.0	730.2	592.0	709.8	146.6	141.4
2021-08-18T13:04:26	1268.7	722.4	567.7	797.5	154.9	145.4
2021-08-18T13:09:26	1257.2	721.0	567.8	809.9	153.4	143.7
2021-08-18T13:14:26	1306.0	742.7	585.1	803.7	144.5	136.0
2021-08-18T13:19:26	1293.0	721.1	565.2	817.4	151.2	141.3
2021-08-18T13:24:26	1285.8	717.6	560.2	840.9	151.9	140.1

2021-08-18T13:29:26	1292.0	719.9	562.1	851.6	170.6	159.6
2021-08-18T13:34:26	1303.9	722.1	561.1	890.4	170.1	159.3
2021-08-18T13:39:26	1292.8	709.2	546.2	843.6	167.1	155.8
2021-08-18T13:44:26	1297.6	689.5	529.4	858.5	171.9	160.6

Related: [show statistics policy flow](#)

Commands: [show statistics policy rate](#)
[statistics flush](#)

show statistics speed acceleration

Syntax: show statistics speed acceleration {downlink|uplink} {rtta-small|rtta-large} [lines number]

Description: Show statistics of TCP acceleration percentage (percentage of speed increase).

Metrics can be from either downlink or uplink direction and for either small or large RTT_a (latencies on the access side).

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

The parameters are as follows (in percentages, n/a if not available):

- TIME: Time when the record was generated.
- SMALL-RTT_i: Metrics for samples with small RTT_i (latency on the internet side).
- MEDIUM-RTT_i: Metrics for samples with medium RTT_i (latency on the internet side).
- LARGE-RTT_i: Metrics for samples with large RTT_i (latency on the internet side).
- SMASZ: Metrics for samples with small size.
- MIDSZ: Metrics for samples with medium size.
- LRGSZ: Metrics for samples with large size.

Mode: Operation mode.

Profile: Operator.

Examples: Show downlink speed acceleration statistics.

```
admin@bqn0# show statistics speed acceleration downlink rtta-large lines 10
```

TIME	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-08-19T01:02:22	n/a	n/a	165.6	n/a	n/a	175.8	n/a	n/a	n/a

2021-08-19T01:07:22	n/a	n/a	165.6	n/a	n/a	176.7	n/a	n/a	n/a
2021-08-19T01:12:22	n/a	n/a	165.6	n/a	n/a	176.7	n/a	n/a	n/a
2021-08-19T01:17:22	n/a	n/a	165.6	n/a	n/a	176.7	n/a	n/a	n/a
2021-08-19T01:22:22	n/a	n/a	165.6	n/a	n/a	176.6	n/a	n/a	n/a
2021-08-19T01:27:22	n/a	n/a	165.6	n/a	n/a	176.5	n/a	n/a	n/a
2021-08-19T01:32:22	n/a	n/a	165.7	n/a	n/a	176.5	n/a	n/a	n/a
2021-08-19T01:37:22	n/a	n/a	165.7	n/a	n/a	176.5	n/a	n/a	n/a
2021-08-19T01:42:22	n/a	n/a	165.7	n/a	n/a	176.5	n/a	n/a	n/a
2021-08-19T01:47:22	n/a	n/a	165.7	n/a	n/a	177.9	n/a	n/a	n/a

Related: [show statistics speed optimized](#)

Commands: [show statistics speed tracked](#)
[statistics flush](#)

show statistics speed optimized

Syntax: show statistics speed optimized {downlink|uplink} {rtta-small|rtta-large} [lines number]

Description: Show statistics of average speed of accelerated TCP flows.

Metrics can be from either downlink or uplink direction and for either small or large RTT_a (latencies on the access side).

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

The parameters are as follows (in Mbps, n/a if not available):

- TIME: time when the record was generated.
- SMALL-RTTi: metrics for samples with small RTTi (latency on the internet side).
- MEDIUM-RTTi: metrics for samples with medium RTTi (latency on the internet side).
- LARGE-RTTi: metrics for samples with large RTTi (latency on the internet side).
- SMASZ: metrics for samples with small size.
- MIDSZ: metrics for samples with medium size.
- LRGSZ: metrics for samples with large size.

Mode: Operation mode.

Profile: Operator.

Examples: Show optimized downlink speed statistics.

```
admin@bqn0# show statistics speed optimized downlink rtta-large lines 10
```

TIME	SMALL-RTTi			MEDIUM-RTTi			LARGE-RTTi		
	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-08-19T01:02:22	2.01	3.13	3.15	1.06	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:07:22	2.00	3.13	3.15	1.07	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:12:22	2.00	3.13	3.15	1.07	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:17:22	2.00	3.13	3.15	1.06	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:22:22	2.00	3.13	3.15	1.04	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:27:22	2.01	3.13	3.15	1.04	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:32:22	2.01	3.13	3.15	1.04	1.54	2.34	0.46	0.62	1.22
2021-08-19T01:37:22	2.01	3.13	3.15	1.04	1.53	2.34	0.46	0.62	1.22
2021-08-19T01:42:22	2.01	3.13	3.15	1.04	1.52	2.34	0.46	0.62	1.22
2021-08-19T01:47:22	2.01	3.13	3.15	1.02	1.52	2.35	0.46	0.62	1.22

Related: [show statistics speed optimized](#)

Commands: [show statistics speed tracked](#)
[statistics flush](#)

show statistics speed tracked

Syntax: show statistics speed tracked {downlink|uplink} {rtta-small|rtta-large} [lines number]

Description: Show statistics of average speed of not accelerated TCP flows.

Metrics can be from either downlink or uplink direction and for either small or large RTT_a (latencies on the access side).

If the lines optional parameter is used, then the command analyzes the last number of lines available in the statistics file (24 by default).

The parameters are as follows (in Mbps, n/a if not available):

- TIME: Time when the record was generated.
- SMALL-RTTi: Metrics for samples with small RTTi (latency on the internet side).

- MEDIUM-RTTi: Metrics for samples with medium RTTi (latency on the internet side).
- LARGE-RTTi: Metrics for samples with large RTTi (latency on the internet side).
- SMASZ: Metrics for samples with small size.
- MIDSZ: Metrics for samples with medium size.
- LRGSZ: Metrics for samples with large size.

Mode: Operation mode.

Profile: Operator.

Examples: Show downlink tracked speed statistics.

```
admin@bqn0# show statistics speed tracked downlink rtt-large lines 10
```

TIME	SMALL-RTTi			MEDIUM-RTTi			LARGE-RTTi		
	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ	SMASZ	MIDSZ	LRGSZ
2021-08-19T01:02:22	1.86	2.80	1.18	0.88	0.98	0.85	0.38	0.41	0.46
2021-08-19T01:07:22	1.86	2.82	1.18	0.89	0.99	0.85	0.38	0.41	0.46
2021-08-19T01:12:22	1.86	2.79	1.18	0.88	0.99	0.85	0.38	0.41	0.46
2021-08-19T01:17:22	1.86	2.79	1.18	0.89	0.99	0.85	0.38	0.41	0.46
2021-08-19T01:22:22	1.85	2.79	1.18	0.88	0.98	0.85	0.38	0.41	0.46
2021-08-19T01:27:22	1.85	2.79	1.18	0.88	0.98	0.85	0.38	0.41	0.46
2021-08-19T01:32:22	1.85	2.80	1.18	0.86	0.97	0.85	0.38	0.41	0.46
2021-08-19T01:37:22	1.85	2.82	1.18	0.88	0.97	0.85	0.38	0.41	0.46
2021-08-19T01:42:22	1.85	2.82	1.18	0.89	0.99	0.85	0.38	0.41	0.46
2021-08-19T01:47:22	1.85	2.82	1.18	0.89	0.98	0.85	0.38	0.41	0.46

Related: [show statistics speed acceleration](#)

Commands: [show statistics speed optimized](#)

[statistics flush](#)

show statistics subscribers

Syntax: show statistics subscribers [hours num-hours] [categories num-cat] [direction dir]

Description: Show statistics of traffic consumption per subscriber. Subscribers are identified by their IP addresses. It shows subscribers starting with those with the highest traffic usage.

The command parameters are as follows:

- num-hours: period to cover in the statistics, in hours. By default, 24 hours.
- num-cat: number of subscribers to show (each is a traffic category). By default, 20 subscribers.
- dir: traffic direction to show. Valid values: all, downlink, uplink. By default, all. The parameters shown by the command are as follows:
- TIME: when the record was generated.
- GIGABYTES: volume consumed by the subscriber over that period in GBytes.
- ip-address: percentage of this subscriber of the total shown.
- REST: percentage of rest of subscribers of the total shown. The last line is a sum of all the volume over the period shown.

Mode: Operation mode.

Profile: Operator.

Examples: Show the three biggest traffic consumers in the last day:

```
admin@bqn0# show statistics subscribers categories 3
```

TIME	GIGABYTES	10.10.10.5	10.10.10.27	10.10.10.131	REST
2020-01-22T05:00:00	114.3743	4.2039%	3.9420%	4.5000%	87.3542%
2020-01-22T06:00:00	174.0583	2.7343%	2.5626%	2.8699%	91.8333%
2020-01-22T07:00:00	197.8311	2.3575%	2.2193%	2.0267%	93.3965%
2020-01-22T08:00:00	190.4528	2.5052%	1.1369%	0.0082%	96.3497%
2020-01-22T09:00:00	217.6840	2.1442%	1.3327%	0.0149%	96.5082%
2020-01-22T10:00:00	230.6669	2.0335%	1.3259%	0.0097%	96.6309%
2020-01-22T11:00:00	224.1955	2.2162%	1.8054%	0.0185%	95.9599%
2020-01-23T00:00:00	364.4607	1.3509%	0.9943%	1.5647%	96.0901%
2020-01-23T01:00:00	302.2101	1.6003%	1.2379%	1.8736%	95.2882%
2020-01-23T02:00:00	237.8194	2.0394%	1.6900%	2.3318%	93.9389%
2020-01-23T03:00:00	175.6296	2.7396%	1.9489%	3.2669%	92.0446%

2020-01-23T04:00:00	81.1516	3.0112%	1.8312%	3.5419%	91.6157%
2020-01-23T05:00:00	162.5668	2.9948%	2.2355%	3.5188%	91.2509%
	7561.3353	1.3269%	1.2292%	1.1997%	96.2443%

Each row shows the volume totals in GB per hour and the percentages of that total that represents each subscriber. Results for the whole period are shown in the last row.

To show the biggest traffic consumer in the downlink direction in the last hour:

```
admin@bqn0# show statistics subscribers hours 1 categories 1 direction
downlink
```

TIME	GIGABYTES	10.10.10.27	REST
2020-01-23T04:00:00	75.2523	3.4134%	96.5866%
2020-01-23T05:00:00	148.3332	3.4860%	96.5140%
	223.5855	3.4616%	96.5384%

Related: [show statistics dpi](#)

Commands: [show statistics subscribers ip-address](#)

[statistics flush](#)

show statistics subscribers flows

Syntax: show statistics subscribers flows *ip* [*hours num-hours* [*interval interval*]]

Description: Show statistics of one subscriber flows. Subscribers are identified by their IP addresses. Flows are TCP connections, UDP flows or flows or any other IP protocol.

The command parameters are as follows:

- *ip*: subscriber IP address.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *FL-CREATED*: flows created during the period.
- *FL-ACTIVE*: maximum number of flows active (with traffic) during the period.

Mode: Operation mode.

Profile: Operator.

Examples: Show the flow counters of a subscriber during the last three hours every 15 minutes:

```
bqnam@bqn0# show statistics subscribers flows 10.1.0.2 hours 3 interval 15
```

TIME	FL-CREATED	FL-ACTIVE
2021-12-30T15:00:00	50	150
2021-12-30T15:15:00	55	200
2021-12-30T15:30:00	50	250
2021-12-30T15:45:00	40	250
2021-12-30T16:00:00	40	250
2021-12-30T16:15:00	45	150
2021-12-30T16:30:00	45	250
2021-12-30T16:45:00	55	250
2021-12-30T17:00:00	35	250
2021-12-30T17:15:00	40	200
2021-12-30T17:30:00	40	100
2021-12-30T17:45:00	55	250
2021-12-30T18:00:00	50	200

Related: [show statistics dpi](#)

Commands: [show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show statistics subscribers latency

Syntax: show statistics subscribers latency *ip* [*hours num-hours* [*interval interval*]]

Description: Show statistics of one subscriber flows. Subscribers are identified by their IP addresses.

The command parameters are as follows:

- *ip*: subscriber IP address.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *DOWN-SUBS-RTT-MS*: latency in downlink direction, between the QoE server and the subscribers (access RTT). In milliseconds.

- *DOWN-NETWORK-RTT-MS*: average latency in downlink direction, for all subscribers in the network (in milliseconds).

Mode: Operation mode.

Profile: Operator.

Examples: Show the latencies of a subscriber during last 24 hours:

```
bqnam@bqn0# show statistics subscribers latency 10.1.0.2
```

TIME	DOWN-SUBS-RTT-MS	DOWN-NETWORK-RTT-MS
2022-02-01T07:00:00	11.056	n/a
2022-02-01T08:00:00	11.587	29.733
2022-02-01T09:00:00	10.577	27.550
2022-02-01T10:00:00	10.129	25.866
2022-02-01T11:00:00	10.069	30.547
2022-02-01T12:00:00	10.790	27.527
2022-02-01T13:00:00	10.918	23.357
2022-02-01T14:00:00	11.190	20.456
2022-02-01T15:00:00	11.121	20.964
2022-02-01T16:00:00	12.088	25.264
2022-02-01T17:00:00	11.591	21.511

Related: [show statistics dpi](#)

Commands: [show statistics subscribers flows](#)

```
show statistics subscribers max-speed
show statistics subscribers retransmission
show statistics subscribers top
show statistics subscribers volume
statistics flush
```

show statistics subscribers max-speed

Syntax: show statistics subscribers max-speed *ip* [hours num-hours [interval *interval*]]

Description: Show statistics of one subscriber maximum speeds. Subscribers are identified by their IP addresses.

The command parameters are as follows:

- *ip*: subscriber IP address.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *DOWN-MBPS*: maximum downlink speed during the period, in Mbps.
- *UP-MBPS*: maximum uplink speed during the period, in Mbps.

Mode: Operation mode.

Profile: Operator.

Examples: Show the maximum speeds of a subscriber during last three hours in 15 minutes intervals:

```
bqnam@bqn0# show statistics subscribers max-speed hours 3 interval 15
```

TIME	DOWN-MBPS	UP-MBPS
2021-12-30T15:00:00	3.0000	5.0000
2021-12-30T15:15:00	5.0000	1.5000
2021-12-30T15:30:00	5.0000	2.0000
2021-12-30T15:45:00	5.0000	5.0000
2021-12-30T16:00:00	5.0000	2.0000
2021-12-30T16:15:00	5.0000	1.0000
2021-12-30T16:30:00	5.0000	1.0000
2021-12-30T16:45:00	4.0000	5.0000
2021-12-30T17:00:00	4.0000	5.0000
2021-12-30T17:15:00	5.0000	1.5000
2021-12-30T17:30:00	5.0000	2.0000
2021-12-30T17:45:00	5.0000	5.0000
2021-12-30T18:00:00	5.0000	5.0000
2021-12-30T18:15:00	5.0000	5.0000

Related: [show statistics dpi](#)

Commands: [show statistics subscribers flows](#)

[show statistics subscribers latency](#)

show statistics subscribers retransmission

show statistics subscribers top

show statistics subscribers volume

[statistics flush](#)

show statistics subscribers retransmission

Syntax: show statistics subscribers retransmission ip [hours *num-hours* [interval *interval*]]

Description: Show statistics of one subscriber retransmissions. Subscribers are identified by their IP addresses.

The command parameters are as follows:

- *ip*: subscriber IP address.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *DOWN-SUBS-RTX-%*: average TCP retransmission during that period in the downlink direction, as a percentage.
- *DOWN-NETWORK-RTX-%*: average TCP retransmission in the downlink direction for all subscribers in the network.

Mode: Operation mode.

Profile: Operator.

Examples Show the retransmissions of a subscriber during last hours in 10 minutes intervals:

```
bqnamd@bqn0# show statistics subscribers retransmissions 10.10.10.5
```

TIME	DOWN-SUBS-RTX-%	DOWN-NETWORK-RTX-%
2022-02-01T07:00:00	0.45	0.000
2022-02-01T08:00:00	1.66	0.989
2022-02-01T09:00:00	1.39	1.061
2022-02-01T10:00:00	1.78	1.259
2022-02-01T11:00:00	0.54	1.229

Related: [show statistics dpi](#)

Commands: [show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show statistics subscribers top

Syntax: `show statistics subscribers top all|ip [direction dir [categories num-cat [hours num-hours [interval interval]]]]`

Description: Show statistics of subscriber traffic consumption. Subscribers are identified by their IP addresses. It shows subscribers starting by those with the highest traffic usage.

The command parameters are as follows:

- *ip*: subscriber IP address or address range. If *all* (default), the command returns subscribers with biggest usage. If an IP range is specified, the biggest users within the range will be shown.
- *dir*: traffic direction to show. Valid values: *all*, *downlink*, *uplink*. By default, *all*.
- *num-cat*: number of subscribers to show (each is a traffic category). By default, 20 subscribers.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *GIGABYTES*: volume consumed by the subscriber over that period in gigabytes.
- *ip-address*: percentage of this subscriber of total shown.
- *REST*: percentage of rest of subscribers of total shown.

The last line is a sum of all the volume over the period shown.

Mode: Operation mode.

Profile: Operator.

Examples Show the three biggest traffic consumers in the last day:

```
bqnam@bqn0# show statistics subscribers top all direction all categories 3
```

TIME	GIGABYTES	10.10.10.5	10.10.10.27	10.10.10.131	REST
2020-01-22T05:00:00	114.3743	4.2039%	3.9420%	4.5000%	87.3542%
2020-01-22T06:00:00	174.0583	2.7343%	2.5626%	2.8699%	91.8333%
2020-01-22T07:00:00	197.8311	2.3575%	2.2193%	2.0267%	93.3965%
2020-01-22T08:00:00	190.4528	2.5052%	1.1369%	0.0082%	96.3497%
2020-01-22T09:00:00	217.6840	2.1442%	1.3327%	0.0149%	96.5082%
2020-01-22T10:00:00	230.6669	2.0335%	1.3259%	0.0097%	96.6309%
2020-01-22T11:00:00	224.1955	2.2162%	1.8054%	0.0185%	95.9599%
. . .					
2020-01-23T00:00:00	364.4607	1.3509%	0.9943%	1.5647%	96.0901%

2020-01-23T01:00:00	302.2101	1.6003%	1.2379%	1.8736%	95.2882%
2020-01-23T02:00:00	237.8194	2.0394%	1.6900%	2.3318%	93.9389%
2020-01-23T03:00:00	175.6296	2.7396%	1.9489%	3.2669%	92.0446%
2020-01-23T04:00:00	81.1516	3.0112%	1.8312%	3.5419%	91.6157%
2020-01-23T05:00:00	162.5668	2.9948%	2.2355%	3.5188%	91.2509%
	7561.3353	1.3269%	1.2292%	1.1997%	96.2443%

Each row shows the volume totals of each period in GB, and the percentages of that total that each subscriber represents. Results for the whole period are shown in the last row.

To show the biggest traffic consumer in the downlink direction in the last hour:

```
bqnam@bqn0# show statistics subscribers top all direction downlink categories 1 hours 1
```

TIME	GIGABYTES	10.10.10.27	REST
2020-01-23T04:00:00	75.2523	3.4134%	96.5866%
2020-01-23T05:00:00	148.3332	3.4860%	96.5140%
	223.5855	3.4616%	96.5384%

Show the traffic consumed by one specific subscriber during the last three hours in downlink direction:

```
bqnam@bqn0# show statistics subscribers top 10.1.0.2 direction downlink categories 1 hours 3
```

TIME	GIGABYTES	10.1.0.2	REST
2021-12-30T14:00:00	0.2700	100.0000%	0.0000%
2021-12-30T15:00:00	0.2500	100.0000%	0.0000%
2021-12-30T16:00:00	0.2400	100.0000%	0.0000%
2021-12-30T17:00:00	0.2800	100.0000%	0.0000%
	1.2900	100.0000%	0.0000%
	0.1491	100.0000%	0.0000%

Show the three biggest traffic consumers in the 10.1.0.0/16 range during the last hour:

```
bqnam@bqn0# show statistics subscribers top 10.1.0.0/16 direction all categories 3 hours 1
```

TIME	GIGABYTES	10.1.0.2	10.1.0.1	10.1.0.3	REST
2021-12-30T16:00:00	0.7172	60.6525%	19.5622%	19.7853%	0.0000%
2021-12-30T17:00:00	0.7953	65.6356%	17.2011%	17.1633%	0.0000%
	2.2858	62.1664%	19.1618%	18.6718%	0.0000%

Related: [show statistics dpi](#)

Commands: [show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

show statistics subscribers volume

[statistics flush](#)

show statistics subscribers volume

Syntax: show statistics subscribers volume *ip* [*hours num-hours* [*interval interval*]]

Description: Show statistics of one subscriber traffic consumption. Subscribers are identified by their IP addresses.

The command parameters are as follows:

- *ip*: IP address of the subscriber.
- *num-hours*: period to cover in the statistics, in hours. By default, 24 hours.
- *interval*: period of each statistics entry, in minutes. By default, 60 minutes.

The parameters shown by the command are as follows:

- *TIME*: end of the period reported.
- *DOWN-MBYTES*: volume consumed by the subscriber over that period in MBytes in the downlink direction.
- *UP-MBYTES*: volume consumed by the subscriber over that period in MBytes in the uplink direction.

Mode: Operation mode.

Profile: Operator.

Examples Show the volume usage of a subscriber during the last four hours:

```
bqnam@bqn0# show statistics subscribers volume 10.1.0.2 hours 4
```

TIME	DOWN-MBYTES	UP-MBYTES
2021-12-30T14:00:00	270.0032	146.0033
2021-12-30T15:00:00	250.0000	204.0000
2021-12-30T16:00:00	240.0000	195.0000
2021-12-30T17:00:00	280.0000	242.0000
2021-12-30T18:00:00	250.0000	214.0000

Related: [show statistics dpi](#)

Commands: [show statistics subscribers flows](#)

[show statistics subscribers latency](#)

[show statistics subscribers max-speed](#)

[show statistics subscribers retransmission](#)

[show statistics subscribers top](#)

[show statistics subscribers volume](#)

[statistics flush](#)

show system alarms

Syntax: show system alarms

Description: Show the list of system alarms and their status. Note that some system alarms may generate SNMP notifications if configured. The alarm types are as follows:

- bqnmgr: Not normal if remote controller cannot be contacted.
- cpu: Not normal if CPU load too high.
- disk: Not normal if disk usage too high.
- license-available: Not normal if license does not exist or is invalid.
- license-expiration: Not normal if license expiration date has passed.
- license-usage: Not normal if node throughput is above the license capacity.
- memory-dpdk: Not normal if DPDK pool usage is too high.
- memory-pool: Not normal if memory pool usage is too high.
- process: Not normal if mandatory processes are not running.
- time: Not normal if NTP services are not synchronized.
- traffic-uplink: Not normal if there is no traffic in uplink direction.
- traffic-downlink: Not normal if there is no traffic in downlink direction.
- traffic-low: Not normal if traffic throughput is too low.
- traffic-inverted: Not normal if traffic is reversed (more uplink than downlink traffic).
- wire: Not normal if no wire configured or none with both links up. The command shows the following fields:
 - TYPE: The alarm time (see previous list).
 - STATUS: The alarm state. Values are: normal (OK), notice, warning and critical.
 - UPDATES: Number of state changes of this alarm.
 - TIME: Time of last alarm state change.

Mode: Operation mode.

Profile: Operator.

Examples: In the following example, the node is OK, except for lack of synchronization of the NTP service.

```
admin@bqn# show system alarms
```

TYPE	STATUS	UPDATES	TIME
bqnmgr	normal	1	2021-08-05T01:11:22-0600
cpu	normal	7	2021-08-18T20:13:21-0600
disk	normal	1	2021-08-05T01:11:17-0600
license-available	normal	1	2021-08-05T01:11:17-0600
license-expiration	normal	1	2021-08-05T01:11:17-0600
license-usage	normal	1	2021-08-05T01:11:17-0600
memory-dpdk	normal	1	2021-08-05T01:11:17-0600
memory-pool	normal	1	2021-08-05T01:11:17-0600
process	normal	3	2021-08-16T05:57:22-0600
time	notice	2	2021-08-16T14:50:42-0600
traffic-uplink	normal	4	2021-08-16T05:58:08-0600
traffic-downlink	normal	4	2021-08-16T07:49:08-0600
traffic-low	normal	2	2021-08-16T07:49:38-0600
traffic-inverted	normal	2	2021-08-16T07:49:38-0600
wire	normal	5	2021-08-16T07:48:50-0600

Related: [show snmp alarm](#)

Commands: [show system status](#)

show system cpu

Syntax: show system cpu [level]

Description: Show CPU usage. The command shows a combined usage for all the CPUs present in the system (identified as all), and then the usage for each CPU core.

If the level parameter is used, the command prints the CPU usage level of each CPU core.

Mode: Operation mode.

Profile: Operator.

Examples: Show the CPU usage.

```
admin@bqn# show system cpu
```

CPU	USER	NICE	SYS	IO-WA	IRQ	SOFT	STEAL	GUEST	IDLE
all	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.66
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00

2	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.65
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00

Related: [show hardware cpu](#)

Commands: [show statistics cpu](#)

[show system cpu frequency](#)

[show system cpu governor](#)

[show system date](#)

[show system process top](#)

[show system status](#)

show system cpu level alarm

Syntax: show system cpu level alarm

Description: Shows the core threshold used to decide the level of CPU system alarms. The thresholds are given in the number of cores with excessive load. The thresholds are as follows:

- Notice threshold: If exceeded, CPU level goes to Notice.
- Warning threshold: If exceeded, CPU level goes to Warning.
- Critical threshold: If exceeded, CPU level goes to Critical.

Mode: Operation mode.

Profile: Operator.

Examples: Show the system CPU levels.

```
admin@bqn# show system cpu level alarm
Notice threshold: 1
Warning threshold: 2
Critical threshold: 3
```

Related: [cpu level alarm](#)

Commands: [show system alarms](#)

show system cpu level threshold

Syntax: show system cpu level threshold

Description: Shows the CPU load threshold used to decide the level of CPU system alarms. The thresholds are given in CPU usage percentage. The thresholds are as follows:

- Threshold warning: If exceeded, CPU usage level goes to Warning.
- Threshold high: If exceeded, CPU usage level goes to High.
- CPU level nice: No if nice work load is not included in usage percentage calculations.

Mode: Operation mode.

Profile: Operator.

Examples: Show the system CPU level thresholds.

```
admin@bqn# show system cpu level threshold
Threshold warning: 80
Threshold high: 90
CPU level nice: no
```

Related: [cpu level threshold](#)

Commands: [show system alarms](#)

show system cpu frequency

Syntax: show system cpu frequency

Description: Show frequency information for each CPU core in MHz. The current running frequency, the maximum and the minimum frequencies are displayed.



Note

The current CPU frequency should be between the minimum and maximum threshold; otherwise, there might be a problem with the power supply or the server.

Mode: Operation mode.

Profile: Operator.

Examples: Show the CPU frequency.

```
admin@bqn# show system cpu frequency

CPU    CURRENT  MINIMUM  MAXIMUM
0      945      800      2200
1      801      800      2200
2      987      800      2200
3      800      800      2200
4      1647     800      2200
5      984      800      2200
6      1028     800      2200
7      1287     800      2200
```

Related: [show hardware cpu](#)

Commands: [show statistics cpu frequency](#)

[show system cpu governor](#)

[show system date](#)

[show system process top](#)

[show system sensors](#)

[show system status](#)

show system cpu governor

Syntax: show system cpu governor [full]

Description: Show the CPU frequency governor. By default, the global CPU governor is displayed unless the full parameter is used, in which case the governor for each CPU core is shown.



Note

Some CPUs do not support CPU frequency scaling. In addition, each CPU core may have its own governor value, and if there are different governors for all the CPU cores, then the global governor value is indicated as mixed.

Mode: Operation mode.

Profile: Operator.

Examples: Show the CPU governor.

```
admin@bqn# show system cpu governor performance
admin@bqn# show system cpu governor full

CPU GOVERNOR

0 performance
1 performance
2 performance
3 performance
```

Related: [cpu governor](#)

Commands: [show hardware cpu](#)

[show system cpu](#)

[show system cpu frequency](#)

show system date

Syntax: show system date [full]

Description: Show the system time and date. By default, the time is printed using the format specified in RFC 2822.

If the full parameter is used, the command prints detailed information about the system clock and some of its settings.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the output after executing the command.

```
admin@bqn# show system date
Mon, 20 Jan 2020 14:08:40 +0100
admin@bqn# show system date full
Local time: Mon 2020-01-20 14:09:10 CET
Universal time: Mon 2020-01-20 13:09:10 UTC
RTC time: Mon 2020-01-20 13:09:04
Timezone: Europe/Madrid (CET, +0100)
NTP enabled: n/a
NTP synchronized: no
RTC in local TZ: no
```

Related: [service ntp](#)

Commands: [show system date timezone](#)

[system date local](#)

[system date time zone](#)

show system date timezone

Syntax: show system date timezone [pattern]

Description: Show a list of supported timezones used by the command system date timezone. If the optional parameter pattern is provided, the command only prints the timezones that match the pattern.

In addition to the timezone, the command also shows the ISO 3166 2-character country code and a comment (only if the country has multiple timezones).

Mode: Operation mode.

Profile: Operator.

Examples: This example shows all the timezones that match the pattern "Lo".

```
admin@bqn# show system date timezone Lo

COUNTRY    TIMEZONE                                COMMENT
AU          Australia/Lord_Howe                    Lord Howe Island GB
GB          Europe/London
SJ          Arctic/Longyearbyen
SX          America/Lower_Princes
TG          Africa/Lome
US          America/Kentucky/Louisville            Eastern Time - Kentucky -
                                                Louisville area US
US          America/Los_Angeles                    Pacific Time
```

Related: [show system date](#)

Commands: [system date timezone](#)

show system filesystem

Syntax: show system file system [full]

Description: Show file systems data usage and properties. Use the full optional parameter to show more detailed information. Note that only the mounted file systems are displayed.

Mode: Operation mode.

Profile: Operator.

Examples: Show list of file systems.

```
admin@bqn0# show system filesystem
```

File system	Size	Used	Avail	Use%	Mounted on
devtmpfs	3.9G	96K	3.9G	1%	/dev
tmpfs	3.9G	0	3.9G	0%	/dev/shm
tmpfs	3.9G	410M	3.5G	11%	/run
/dev/sda2	22G	1016M	20G	5%	/
/dev/loop0	1.3M	1.3M	0	100%	/bqn/img/bqnos
/dev/loop1	232M	232M	0	100%	/bqn/img/linux
/dev/loop2	14M	14M	0	100%	/bqn/img/bqnkernel
/dev/loop3	149M	149M	0	100%	/bqn/img/kernel
/dev/loop4	1.8M	1.8M	0	100%	/bqn/img/gui
tmpfs	3.9G	0	3.9G	0%	/sys/fs/cgroup
tmpfs	3.9G	410M	3.5G	11%	/var/run
/dev/loop5	18M	18M	0	100%	/bqn/img/bqn

Related: [show hardware disk](#)

Commands: [show system file system](#)

[show system partition](#)

[system partition mount](#)

[system partition amount](#)

show system functionality

Syntax: show system functionality

Description: Show a list of functionalities and whether they are enabled or disabled.

The functionality types are as follows:

- **compression:** HTTP and image compression.
- **dpi:** Deep Packet Inspection.

- **dpi-per-user:** Provide per-user DPI information.
- **rate-limit:** Rate-limit availability

Mode: Operation mode.

Profile: Operator.

Examples: Show the current supported functionality

```
admin@bqn0# show system functionality

compression:  disabled
dpi:          enabled
dpi-per-user: enabled
rate-limit:   enabled
```

Related: [show license](#)

Commands: [show system alarms](#)

show system hostname

Syntax: show system hostname

Description: Show the system hostname.

Mode: Operation mode.

Profile: Operator.

Examples: Show the hostname.

```
admin@bqn0# show system hostname

bqn0
```

Related: [system hostname](#)

Commands

show system interrupts

Syntax: show system interrupts

Description: Show the number of interrupts per CPU per IO device.

Mode: Operation mode.

Profile: Operator.

Examples: Show system interrupts.

```
admin@bqn0# show system interrupts

          CPU0      CPU1      CPU2      CPU3
0:      51         0         0         0      IO-APIC-edge  timer
```

1:	66	0	0	0	IO-APIC-edge	i8042
8:	1	0	0	0	IO-APIC-edge	rtc0
9:	0	0	0	0	IO-APIC-fasteoi	acpi
12:	149	0	0	0	IO-APIC-edge	i8042
14:	0	0	0	0	IO-APIC-edge	ata_piix
15:	20597	0	0	0	IO-APIC-edge	ata_piix
16:	14037	0	0	0	IO-APIC 16-fasteoi	enp0s8
17:	39132	0	0	0	IO-APIC 17-fasteoi	enp0s17, enp0s9
18:	25448	0	0	0	IO-APIC 18-fasteoi	enp0s10
23:	25	0	0	0	IO-APIC 23-fasteoi	ohci_ hcd:usb1
24:	4106	0	0	0	PCI-MSI-edge	0000:00:1f.2
NMI:	0	0	0	0	Non-maskable interrupts	
LOC:	171941	146118	82820	85733	Local timer interrupts	
SPU:	0	0	0	0	Spurious interrupts	
PMI:	0	0	0	0	Performance monitoring interrupts	
IWI:	0	0	0	0	IRQ work interrupts	
RTR:	0	0	0	0	APIC ICR read retries	
RES:	42401	52179	36179	36542	Rescheduling interrupts	
CAL:	738	688	567	655	Function call interrupts	
TLB:	1330	1292	1141	1151	TLB shutdowns	
TRM:	0	0	0	0	Thermal event interrupts	
THR:	0	0	0	0	Threshold APIC interrupts	
MCE:	0	0	0	0	Machine check exceptions	
MCP:	70	70	70	70	Machine check polls	
HYP:	0	0	0	0	Hypervisor callback interrupts	
ERR:	0					
MIS:	0					

Related: [show hardware cpu](#)

Commands

show system ipmi fru

Syntax: show system ipmi fru

Description: Shows IPMI FRU device information.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi fru
FRU Device Description: Builtin FRU Device (ID 0)
Chassis Type: Other
Chassis Part Number: CSE-815TS-R500CBP
Chassis Serial: YFE73HFHJFAJSF7
Board Mfg Date: Sun Dec 31 18:00:00 1995
Board Mfg: Supermicro
Board Serial: 6G4YRFYRGFHF
Board Part Number: TEGS23-GD-63723
Product Manufacturer: Supermicro
Product Part Number: PIO-518D-N6TRF-ST031
Product Serial: HGSDFHGDSFHGJDSF
```

Related: [show system ipmi lan](#)

Commands: [show system ipmi mc](#)

[show system ipmi sdr](#)

[show system ipmi sel](#)

[show system ipmi sensor](#)

[show system ipmi user](#)

show system ipmi lan

Syntax: show system ipmi lan

Description: Shows IPMI network configuration.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi lan
Set in Progress: Set Complete
Auth Type Support: NONE MD2 MD5 PASSWORD
Auth Type Enable: Callback : MD2 MD5 PASSWORD
                  : User      : MD2 MD5 PASSWORD
```

```

: Operator : MD2 MD5 PASSWORD
: Admin    : MD2 MD5 PASSWORD
: OEM      :

IP Address Source: Static Address
IP Address: 10.10.10.10
Subnet Mask: 255.0.0.0
MAC Address: 00:02:6a:4b:3d:c1
SNMP Community String: public
IP Header: TTL=0x40 Flags=0x40 Precedence=0x00 TOS=0x10
BMC ARP Control: ARP Responses Enabled, Gratuitous ARP Disabled
Default Gateway IP: 10.10.10.1
Default Gateway MAC : 00:00:00:00:00:00
Backup Gateway IP: 0.0.0.0
Backup Gateway MAC: 00:00:00:00:00:00 802.1q
VLAN ID: Disabled
802.1q VLAN Priority: 0
RMCP+ Cipher Suites: 1,2,3,6,7,8,11,12
Cipher Suite Priv Max: XaaaXXaaaXXaaXX
: X=Cipher Suite Unused
: c=CALLBACK
: u=USER
: o=OPERATOR
: a=ADMIN
: O=OEM

```

Related: [show system ipmi fru](#)

Commands: [show system ipmi mc](#)

[show system ipmi sdr](#)

[show system ipmi sel](#)

[show system ipmi sensor](#)

[show system ipmi user](#)

show system ipmi mc

Syntax: show system ipmi mc

Description: Shows IPMI information about board management controller.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi mc
Device ID: 32
Device Revision: 1
Firmware Revision: 3.86
IPMI Version: 2.0
Manufacturer ID: 10876
Manufacturer Name: Supermicro
Product ID: 2114 (0x0842)
Product Name: Unknown (0x842)
Device Available: yes
Provides Device SDR: no
Additional Device Support:
    Sensor Device
    SDR Repository Device
    SEL Device
    FRU Inventory Device
    IPMB Event Receiver
    IPMB Event Generator
    Chassis Device
Aux Firmware Rev Info:
    0x00
    0x00
    0x00
    0x00
```

Related: [show system ipmi fru](#)

Commands: [show system ipmi lan](#)

[show system ipmi sdr](#)

[show system ipmi sel](#)

[show system ipmi sensor](#)

[show system ipmi user](#)

show system ipmi sdr

Syntax: show system ipmi sdr

Description: Shows IPMI information about the sensor data records.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi sdr

CPU Temp          51 degrees C ok
PCH Temp          47 degrees C ok
System Temp       30 degrees C ok
Peripheral Temp   43 degrees C ok
MB_10G Temp1     54 degrees C ok
MB_10G Temp2     60 degrees C ok
MB_10G Temp3     54 degrees C ok
VRM Temp         38 degrees C ok
DIMMA1 Temp      no degrees  ns
DIMMA2 Temp      no degrees  ns
DIMMB1 Temp      40 degrees C ok
DIMMB2 Temp      38 degrees C ok
FAN1             no degrees  ns
FAN2             2900 RPM    ok
FAN3             no reading  ns
FAN4             no reading  ns
FANA             no reading  ns
Vcpu             1.81 Volts  ok
VDIMM            1.45 Volts  ok
12V              12.26 Volts ok
5VCC             4.84 Volts  ok
3.3VCC           3.33 Volts  ok
VBAT             3.08 Volts  ok
AVCC             3.33 Volts  ok
VSB              3.27 Volts  ok
Chassis Intru    0x01        ok
```

Related: [show system ipmi fru](#)

Commands: [show system ipmi lan](#)

[show system ipmi mc](#)

[show system ipmi sel](#)

[show system ipmi sensor](#)

[show system ipmi user](#)

show system ipmi sel

Syntax: show system ipmi sel

Description: Shows IPMI information about log of system events.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi sel

1 | 05/14/2018 | 16:00:32 | Physical Security #0xaa | General Chassis
intrusion | Asserted
```

Related: [show system ipmi fru](#)

Commands: [show system ipmi lan](#)

[show system ipmi mc](#)

[show system ipmi sdr](#)

[show system ipmi sensor](#)

[show system ipmi user](#)

show system ipmi sensor

Syntax: show system ipmi sensor

Description: Shows IPMI information about the status of the sensors.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi sensor

CPU Temp          51.000    degrees C ok    0.000
PCH Temp          47.000    degrees C ok    0.000
System Temp       30.000    degrees C ok   -10.000
Peripheral Temp   43.000    degrees C ok   -10.000
MB_10G Temp1     54.000    degrees C ok    -5.000
```

MB_10G Temp2	60.000	degrees C	ok	-5.000
MB_10G Temp3	55.000	degrees C	ok	-5.000
VRM Temp	38.000	degrees C	ok	-9.000
DIMMA1 Temp	na		na	na
DIMMA2 Temp	na		na	na
DIMMB1 Temp	40.000	degrees C	ok	-5.000
DIMMB2 Temp	38.000	degrees C	ok	-5.000
FAN1	na		na	na
FAN2	2900.000	RPM	ok	300.000
FAN3	na		na	na
FAN4	na		na	na
FANA	na		na	na
Vcpu	1.809	Volts	ok	1.242
VDIMM	1.453	Volts	ok	1.096
12V	12.204	Volts	ok	10.164
5VCC	4.845	Volts	ok	4.225
3.3VCC	3.329	Volts	ok	2.804
VBAT	3.080	Volts	ok	2.450
AVCC	3.329	Volts	ok	2.399
VSB	3.269	Volts	ok	2.399

Related: [show system ipmi fru](#)

Commands: [show system ipmi lan](#)

[show system ipmi mc](#)

[show system ipmi sdr](#)

[show system ipmi sel](#)

[show system ipmi user](#)

show system ipmi user

Syntax: show system ipmi user

Description: Shows the list of IPMI users.

This command works only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Operator.

Examples: Show IPMI information.

```
admin@bqn0# show system ipmi user
```

ID	Name	Callin	LinkAuth	IPMImsg	ChannelPrivLimit
2	myadmin	true	true	true	ADMINISTRATOR
3	myoper	true	true	true	OPERATOR

Related: [show system ipmi fru](#)

Commands: [show system ipmi lan](#)

[show system ipmi mc](#)

[show system ipmi sdr](#)

[show system ipmi sel](#)

[show system ipmi sensor](#)

show system memory

Syntax: show system memory [full]

Description: Show RAM memory usage information. Use the full optional parameter to show more detailed information.

Mode: Operation mode.

Profile: Operator.

Examples: Show memory usage.

```
admin@bqn0# show system memory

total          used      free      shared  buffers  cached
Mem: 16379256  7457368  8921888  894176  78028   3080856
-/+ buffers/cache: 4298484 12080772
Swap:   16777212  0        16777212
```

Related: [show hardware memory](#)

Commands

show system ntp

Syntax: show system ntp

Description: Show the status of the configured NTP peers/servers.

The following fields are displayed by the command:

- REMOTE: Server and peer entries listed in the configuration file.
- REFID: Current source of synchronization.
- ST: Stratum.

- T: Type, Where U means unicast, M multicast and L local. An unknown type is indicated with the '-' character.
- POLL: The poll interval in seconds.
- WHEN: Time since the peer was last heard in seconds.
- REACH: Status of the reachability register (see RFC-1305) in octal.
- DELAY: Latest delay.
- OFFSET: Time offset in milliseconds.
- JITTER: Jitter in milliseconds.

According to the NTP specification RFC-1305, when the stratum is between 0 and 15 for an NTP server, the REFID field shows the server DNS name or, if not found, the IP address in dotted-quad. When the stratum is any value for a reference clock, this field shows the identification string assigned to the clock. However, until the client has synchronized to a server, or when the stratum for an NTP server is 0 (appears as 16 on the billboards), the status cannot be determined. As a help in debugging, the refid field is set to a four-character string called the kiss code.

The symbol at the left margin shows the synchronization status of each peer. The currently selected peer is marked with '**', while additional peers designated acceptable for synchronization are marked with '+'. Peers marked with '**' and '+' are included in the weighted average computation to set the local clock.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows the status of the configured NTP servers (74.123.28.4 and 163.117.202.33).

```
admin@bqn# show system ntp
```

REMOTE	REFID	ST	T	WHEN	POLL	REACH	DELAY	OFFSE T	JITTE R
+74.123.28.4	216.218.254.2 02	2	U	9	64	377	198.97 6	0.214	0.521
*163.117.202. 33	140.7.62.122	2	U	12	64	377	33.519	0.025	0.401

Related: [server](#)

Commands: [service ntp](#)

[show system date](#)

show system partition

Syntax: show system partition

Description: Show a list of available partitions. The list includes all the block devices currently available in the QoE. The size of the partition is also displayed in MB (1048576 bytes).

Mode: Operation mode.

Profile: Operator.

Examples: Show list of available partitions.

```
admin@bqn0# show system partition

bqn  PARTITION      SIZE
0     /dev/sda1        7898 MB
0     /dev/sda2        22634 MB
```

Related: [show hardware disk](#)

Commands: [show system file system](#)

[show system partition](#)

[system partition mount](#)

show system process top

Syntax: show system process top

Description: Show the operating system CPU usage.

The command executes the top program, which provides an interactive interface with multiple options. Press the h key to get more information about the program and press the q key to exit it and go back to the bqns.

Mode: Operation mode.

Profile: Operator.

Examples: Show the CPU usage.

```
admin@bqn# show system process top

top - 22:08:43 up 1:21, 2 users, load average: 0.00, 0.00, 0.00
Tasks: 135 total, 1 running, 134 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.3 us, 3.6 sy, 0.0 ni, 95.9 id, 0.0 wa, 0.0 hi, 0.3 si,
0.0 st

KiB Mem: 4046244 total, 681928 used, 3364316 free, 29804 buffers
KiB Swap: 2097148 total, 0 used, 2097148 free, 216104 cached

PID  USER  PR  NI  VIRT  RES  SHR  S  %CPU  %MEM  TIME+  COMMAND
672  root   20  0   188792 16016 14885 S  14.8  3.95  0:03.7  pkteng
3    0      8    2    5    8    4
674  root   20  0    0      0      0  S  0.99  0.00  0:00.5  kworker/1:
9    5    0    5    3
677  bqnad  20  0   22052  2632  2088 R  0.99  0.06  0:00.0  top
7    m     5    5
1    root   20  0   37208  5268  3568 S  0.00  0.13  0:01.0  systemd
0    0      0    7
```

2	root	20	0	0	0	0	S	0.00	0.00	0:00.0	kthreadd
		0	-	0	0	0	S	0.00	0.00	0:00.0	kworker/0:
		20						0	0	0	0H
6	root	20	0	0	0	0	S	0.00	0.00	0:00.0	ksoftirqd/
								0	0	2	0
7	root	20	0	0	0	0	S	0.00	0.00	0:00.1	rcu_
								0	0	2	preempt
8	root	20	0	0	0	0	S	0.00	0.00	0:00.0	rcu_sched
								0	0	0	
9	root	20	0	0	0	0	S	0.00	0.00	0:00.0	rcu_bh
								0	0	0	
10	root	rt	0	0	0	0	S	0.00	0.00	0:00.0	migration/
								0	0	4	0
11	root	0	-	0	0	0	S	0.00	0.00	0:00.0	lru-add-
		20						0	0	0	drain
12	root	rt	0	0	0	0	S	0.00	0.00	0:00.0	watchdog/0
								0	0	1	
13	root	20	0	0	0	0	S	0.00	0.00	0:00.0	cpuhp/0
								0	0	0	
14	root	20	0	0	0	0	S	0.00	0.00	0:00.0	cpuhp/1
								0	0	0	

Related: [show process all](#)

Commands: [show statistics cpu](#)

[show system cpu](#)

[show system status](#)

show system sensors

Syntax: show system sensors

Description: Show system sensors information, which currently includes the temperature of the different sensors inside the system, such as the CPU core.



Note

The CPU usage load and external environment temperature may have an effect on the current temperature of a sensor. The temperature values are indicated using the Celsius scale.

Mode: Operation mode.

Profile: Operator.

Examples: Show the current sensors.

```
admin@bqn# show system sensors
```

SENSOR	CURRENT	MAXIMUM	CRITICAL
Core1	43.0	82.0	104.0
PackageId0	43.0	82.0	104.0
Core2	43.0	82.0	104.0
Core0	43.0	82.0	104.0
Core3	43.0	82.0	104.0

Related: [show hardware cpu](#)

Commands: [show statistics sensors](#)
[show system cpu frequency](#)

show system software

Syntax: show system software [full]

Description: Show the QoE packages (BPKG) installed. A BPKG is identified with a unique name and version number.

The active attribute indicates if the BPKG is currently active (i.e. being used). The boot attribute indicates whether the BPKG will be loaded in the next reboot.

The reload attribute indicates whether the BPKG can be reloaded and restarted using the [system software reload](#) command; otherwise, a system reboot is required to activate the BPKG. Use the optional full form to show more detailed information about the installed BPKGs.

Mode: Operation mode.

Profile: Operator.

Examples: Show the list of BPKGs installed at the system.

```
admin@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.16	yes	yes	yes

Related: [system software install](#)

Commands:

show system status

Syntax: show system status

Description: Show the global status of the QoE.

The following information is displayed:

- CPU usage: Shows the highest CPU level of all the CPU cores.
- Disk usage: Shows the status of the / filesystem partition.
- Network interfaces: Shows the global link state of the configured network interfaces.
- PKTENG status: Shows whether the packet engine is configured properly.
- BTA status: Shows whether the BTA feature is configured properly.
- BTC status: Shows whether the BTC feature is configured properly.
- Services: Shows whether different services are configured and running properly.

Mode: Operation mode.

Profile: Operator.

Examples: Show QoE status.

```
admin@bqn0# show system partition
CPU usage: normal
Disk usage: normal
Network interfaces: up
PKTENG status: ready
BTA status: ready
BTC status: ready
SSH service status: ready
WEB service status: ready
NTP service status: ready
```

Related: [show system alarms](#)

Commands: [show snmp alarm](#)
[show service](#)

show system users

Syntax: show system users [user-name]

Description: Show information about all users available in the system. If the parameter user-name is provided, then detailed information about the user is shown.

Mode: Operation mode.

Profile: Operator.

Examples: This example shows information about all the users and then about the user bqnadm.

```
root@bqn# show system users

USER      PROFILE      NAME
root      administrator root
bqnadm    administrator QoE Administrator
bqnop     operator      QoE Operator

root@bqn# show system users bqnadm

User: bqnadm
Name: QoE Administrator
UID: 1000
Profile: administrator
Groups: users bqadmin
```

Related: [show users](#)

Commands

show users

Syntax: show users

Description: Show information about the users currently logged in.

Mode: Operation mode.

Profile: Operator.

Examples: The following example shows the currently logged in users.

```
root@bqn# show users

USER      PROFILE      bqnTTY  LOGIN          IDLE
root      administrator 0 pts/0   2013-10-18 22:07 0:00:00
bqnop     operator      0 pts/1   2013-10-18 22:08 0:00:18
```

Related: [show system users](#)

Commands

size-max

Syntax: size-max limit

```
no size-max limit
```

Description: Set the maximum size of the file generated for a specific statistics feature. The limit value is expressed in MBytes (1,000,000 bytes). That once the file reaches this value the file is rotated.

Use the no command form to reset the file size to its default value.

Mode: Statistics feature mode.

Profile: Administrator.

Examples: Set the bta feature maximum size to 10MB.

```
admin@bqn0# show statistics feature pkteng
```

```
Feature:      pkteng
bqn:          0
File size:    10293
File size max: 20000000
Total size max: 375285350
Clients:      2
Update interval: 300
Update next:  0:02:06
```

```
File name: /opt/bqn/var/stats/pkteng
```

```
CLIENT      LAST-ACTIVITY
st015640    0:02:53.066282
st015950    0:02:53.066246
```

```
admin@bqn0# configure
```

```
admin@bqn0(config)# statistics feature pkteng
```

```
admin@bqn0(config-statfeat)# size-max 10
```

```
admin@bqn0(config-statfeat)# commit
```

```
admin@bqn0(config-statfeat)# op show statistics feature pkteng
```

```
Feature:      pkteng
bqn:          0
File size:    10293
File size max: 10000000
Total size max: 375285350
Clients:      2
Update interval: 300
Update next:  0:02:06
```

```
File name: /opt/bqn/var/stats/pkteng
```

```
CLIENT      LAST-ACTIVITY
st015640    0:02:53.066282
st015950    0:02:53.066246
```

Related: [show statistics](#)

Commands: [show statistics feature](#)

[statistics feature](#)

size-max-total

Syntax: size-max-total limit

no size-max-total limit

Description: Set the total maximum size of all the files generated for a specific statistics feature. The limit value is expressed in MBytes (1,000,000 bytes). The logrotate process is responsible for removing the oldest statistics files that pass the limit value.

Use the no command form to reset the total size to its default value.

Mode: Statistics feature mode.

Profile: Administrator.

Examples: Set the bta feature total maximum size to 50MB.

```
admin@bqn0# show statistics feature pkteng
```

```
Feature:          pkteng
bqn:              0
File size:        752
File size max:    20000000
Total size max:   1000000000
Clients:          4
Update interval: 300
Update next:      0:04:54
```

File name: /opt/bqn/var/stats/pkteng

```
CLIENT      LAST-ACTIVITY
st054430    0:00:05.412560
st054630    0:00:05.399655
st054640    0:00:05.400646
st054650    0:00:05.399867
```

```
admin@bqn0# configure
```

```
admin@bqn0(config)# statistics feature pkteng
```

```
admin@bqn0(config-statfeat)# size-max-total 50
```

```
admin@bqn0(config-statfeat)# commit
```

```
admin@bqn0(config-statfeat)# op show statistics feature pkteng
```

```
Feature:          pkteng
bqn:              0
File size:        752
File size max:    20000000
Total size max:   50000000
Clients:          4
Update interval:  300
Update next:      0:04:02
```

File name: /opt/bqn/var/stats/pkteng

```
CLIENT      LAST-ACTIVITY
st054430    0:00:57.963593
st054630    0:00:57.950688
st054640    0:00:57.951679
st054650    0:00:57.950900
```

Related: [show statistics](#)

Commands: [show statistics feature](#)
[statistics feature](#)

snmp

Syntax: snmp

no snmp

Description: Enter SNMP configuration mode, where the SNMP service may be configured.



Note

The CLI session prompt changes when entering and leaving SNMP mode.

Use the no command form to remove all SNMP configuration and to stop the SNMP service.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters SNMP mode.

```
admin@bqn# configure
admin@bqn(config)# snmp
admin@bqn(config-snmp)#
```

Related: [show snmp state](#)

Commands: [community](#)

[show service snmp](#)

[sys contact](#)

[sys description](#)

[sys location](#)

[sys name](#)

[trap-v1](#)

[trap-v2c](#)

speed

Syntax: speed confidence-interval value

speed expiry value

speed expiry-inactivity value

speed max-samples value

speed median

speed min-samples-no-expiry value

speed mixing value

speed rtt value

speed rtti-large value

speed rtti-small value

speed samples-minimum value

speed samples-rate-maximum value

speed shift value

speed size-large value

speed size-small value

Description: Sets parameters of how the TCP acceleration metrics are calculated from TCP samples. The parameters are related to each of the sample groups defined based on accelerated/non-accelerated, latencies, sizes, and traffic direction. For example, a minimum sample size of 100 means that any sample group must reach that number of samples.

The parameters are as follows:

- confidence-interval: Confidence interval in statistical analysis, as a percentage. Default is 99.99 %.
- expiry: Age in seconds that invalidates a sample, unless it is needed to keep min-samples- no-expiry. Default is 43200 seconds (12 hours).
- expiry-inactivity: Age in seconds that invalidates a sample. Default is 86400 seconds (1 day).

- **max-samples:** Maximum number of samples to keep in the group. If the maximum is reached, newer samples will replace older ones. Default is 1000.
- **median:** Use median as average metric. It is the default. To use means, use no median command.
- **min-samples-no-expiry:** Minimum number of samples to keep before getting rid of some of them because of expiry. Default is 200.
- **mixing:** Degree of mixing in speed statistics. Default is 3.
- **rta:** Threshold between small and large access latency (RTTa). Default is 0 seconds (no small RTTa used).
- **rtti-large:** Threshold of large Internet latency (RTTi). Default is 0.06 seconds (60ms).
- **rtti-small:** Threshold of small Internet latency (RTTi). Default is 0.01 seconds (10ms).
- **samples-minimum:** Minimum number of samples needed to perform calculations of TCP acceleration. Default is 100.
- **samples-rate-maximum:** Maximum rate of sample acquisition. Default is 5 samples per second.
- **shift:** Maximum shift value. Default is 9.
- **size-large:** Threshold of large downloads. Default is 1000000 bytes (1 MB).
- **size-small:** Threshold of small downloads. Default is 100000 bytes (100 KB).

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Configure different TCP acceleration metrics.

```
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# op show pkteng parameters | match speed

Speed mixing: 3
Speed median: yes
Speed RTTA: 0.000000
Speed RTTI small: 0.010000
Speed RTTI large: 0.060000
Speed samples expiry: 43200
Speed samples inactivity expiry: 86400
Speed samples maximum: 1000
Speed samples minimum without expiry: 200
Speed samples minimum for calculations: 100
Speed samples rate maximum: 5
Speed Acceleration Confidence Interval: 99.990
```

```
Speed shift: 9
Speed size small: 100000
Speed size large: 1000000
admin@bqn0(config-pkteng)# speed rtti-large 0.1
admin@bqn0(config-pkteng)# speed rtti-small 0.04
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng parameters | match speed
Speed mixing: 3
Speed median: yes
Speed RTTA: 0.000000
Speed RTTI small: 0.040000
Speed RTTI large: 0.100000
Speed samples expiry: 43200
Speed samples inactivity expiry: 86400
Speed samples maximum: 1000
Speed samples minimum without expiry: 200
Speed samples minimum for calculations: 100
Speed samples rate maximum: 5
Speed Acceleration Confidence Interval: 99.990
Speed shift: 9
Speed size small: 100000
Speed size large: 1000000
```

Related: [set pkteng rtt](#)

Commands: [set pkteng rtti](#)

[show statistics speed acceleration](#)

[show statistics speed optimized](#)

[show statistics speed tracked](#)

[show pkteng speed](#)

statistics feature

Syntax: statistics feature name

no statistics feature name

Description: Enter the statistics feature mode and allow setting some parameters used by the name statistics feature.



Note

The CLI session prompt changes when entering and leaving statistics feature mode.

Use the no command form to clear the feature's configured parameters and use the default values.

Mode: Top configuration mode.

Profile: Administrator.

Examples: Enter the statistics feature mode to configure the pkteng feature.

```
admin@bqn0# configure
admin@bqn0(config)# statistics feature pkteng
admin@bqn0(config-statfeat)#
```

Related: [show statistics](#)

Commands: [show statistics feature](#)

[size-max](#)

[size-max-total](#)

statistics flush

Syntax: statistics flush feature-name

Description: Request the processes subscribed to feature-name to generate statistics at the moment the command is entered.

Mode: Operation mode.

Profile: Administrator.

Examples: Update statistics for the pkteng feature.

```
admin@bqn# statistics flush pkteng
```

Related: [show statistics](#)

Commands: [show statistics feature](#)

[statistics rotate](#)

statistics reset

Syntax: statistics reset {latency | speed}

Description: Resets statistics calculations for either latency or speed.

Mode: Operation mode.

Profile: Administrator.

Examples: Reset the latency and speed statistics.

```
admin@bqn# statistics reset latency
admin@bqn# statistics reset speed
```

Related: [show statistics](#)

Commands: [show statistics feature](#)

[statistics rotate](#)

statistics rotate

Syntax: statistics rotate feature-name

Description: Request the STATMGR process to rotate the statistics file used by the feature-name indicated.

The rotated file is located in the same directory where the statistics are saved, and the format of the file is the following:

feature-YYYYMMDDHHMMSS[-N[N]]

where YYYY is the year, MM the month, DD the date, HH the hour, MM the minutes, SS the seconds, and N is an optional incremental number used in case several files are rotated at the same point in time. The date and time used in the file name is the local time when the rotation occurred.

Mode: Operation mode.

Profile: Administrator.

Examples: Rotate the statistics for the pkteng feature. Note that the contents of the statistics directory is listed before and after the rotation.

```
admin@bqn0# file ls -l /opt/bqn/var/stats/
network
pkteng
system
udr
admin@bqn0# statistics rotate pkteng
admin@bqn0# file ls -l /opt/bqn/var/stats/
network
pkteng
pkteng-20170323144407
system
udr
```

Related: [show statistics](#)

Commands: [show statistics feature](#)

[statistics rotate](#)

strict-rx-cksum-offload

Syntax: strict-rx-cksum-offload

no strict-rx-cksum-offload

Description: When the PKTENG receives packets, this command controls whether the hardware RX checksum offload tag is used to validate the integrity of packets. If the strict behavior is enabled, then packets that are not validated are directly forwarded; otherwise, the checksum of packets is calculated to validate them.

The default behaviour is strict RX checksum offload disabled. Only enable it if indicated by Cambium Networks engineers.

Use the no command form to disable strict RX checksum offload functionality.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Enable strict RX checksum offloading on a network interface.

```
admin@bqn0# show interface pkteng detail
en0s1f0:
    Instance: 0
    State: ready
    MSS maximum: 1460 (default)
    Strict RX cksum offload: no
    QDISC bypass: yes
    BPF filter: inbound and (not ether host 68:05:ca:30:65:d4)
    PCAP rcv frames allocated: 12800
    PCAP rcv frame size: 1600

admin@bqn0# configure
admin@bqn0(config)# interface en0s1f0
admin@bqn0(config-iface)# strict-rx-cksum-offload
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# op show interface pkteng detail
en0s1f0:
    Instance: 0 State: ready
    MSS maximum: 1460 (default)
    Strict RX cksum offload: yes
    QDISC bypass: yes
    BPF filter: inbound and (not ether host 68:05:ca:30:65:d4)
    PCAP rcv frames allocated: 12800
    PCAP rcv frame size: 1600
```

Related: [interface](#)

Commands: [rx-cksum-offload](#)

[show interface](#)

subscriber ipv6-prefix

Syntax: subscriber ipv6-prefix prefix

no subscriber ipv6-prefix prefix

Description: For IPv6 traffic, subscribers are identified as all coming from a range of IPv6 addresses. The range is defined by a prefix, that can be modified by this command.

The default value is 64. Use the no command form to get back to that default.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Change the IPv6 subscriber prefix.

```
admin@bqn0 (config) # pktenf
admin@bqn0 (config-pkteng) # subscriber ipv6-prefix 64
admin@bqn0 (config-pkteng) # commit
```

Related: [show subscriber](#)

Commands

sys contact

Syntax: sys contact string

no sys contact string

Description: Set the system contact (sysContact.0 object in SNMPv2-MIB) for the SNMP agent. Note that if the string has more than one word, the string must be enclosed within double-quotes.

Use the no command form to clear the system contact entry.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the system contact.

```
admin@bqn0# configure
admin@bqn0 (config) # snmp
admin@bqn0 (config-snmp) # sys contact "Example contact"
admin@bqn0 (config-snmp) # commit
```

From a NMS get the sysContact.0 object.

```
% snmpget -v2c -OS -c public 192.168.1.95 SNMPv2-MIB::sysContact.0
SNMPv2-MIB::sysContact.0 = STRING: Example contact
```

Related: [show service snmp](#)

Commands: [snmp](#)

sys description

Syntax: sys description string

no sys description string

Description: Set the system description (sysDescr.0 object in SNMPv2-MIB) for the SNMP agent. Note that if the string has more than one word, the string must be enclosed within double-quotes.

Use the no command form to clear the system description entry.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the system description.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# sys description "Example description"
admin@bqn0(config-snmp)# commit
```

From a NMS get the sysDescr.0 object.

```
% snmpget -v2c -OS -c public 192.168.1.95 SNMPv2-MIB::sysDescr.0
SNMPv2-MIB::sysDescr.0 = STRING: Example description
```

Related: [show service snmp](#)

Commands: [snmp](#)

sys location

Syntax: sys location string

no sys location string

Description: Set the system location (sysLocation.0 object in SNMPv2-MIB) for the SNMP agent. Note that if the string has more than one word, the string must be enclosed within double-quotes.

Use the no command form to clear the system location entry.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the system location.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# sys location "Example location"
admin@bqn0(config-snmp)# commit
```

From a NMS get the sysLocation.0 object.

```
% snmpget -v2c -OS -c public 192.168.1.95 SNMPv2-
MIB::sysLocation.0

SNMPv2-MIB::sysLocation.0 = STRING: Example location
```

Related: [show service snmp](#)

Commands: [snmp](#)

sys name

Syntax: sys name string

no sys name string

Description: Set the system name (sysName.0 object in SNMPv2-MIB) for the SNMP agent.



Note

If the string has more than one word, the string must be enclosed within double quotes. Use the no command form to clear the system name entry.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the system name.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# sys name "Example name"
admin@bqn0(config-snmp)# commit
```

From a NMS get the sysName.0 object.

```
% snmpget -v2c -OS -c public 192.168.1.95 SNMPv2-MIB::sysName.0

SNMPv2-MIB::sysName.0 = STRING: Example name
```

Related: [show service snmp](#)

Commands: [snmp](#)

system

Syntax: system

no system

Description: Enter the system configuration mode.



Note

The CLI session prompt changes when entering and leaving system mode. Use the no command form to remove all system configuration.

Mode: Top configuration mode.

Profile: Administrator.

Examples: In this example the user enters system mode.

```
admin@bqn# configure
admin@bqn(config)# system
admin@bqn(config-system)#
```

Related: [cpu governor](#)

Commands: [show system cpu governor](#)

system date local

Syntax: system date local date time

Description: Set the current local time and date.

The parameter date may use one of the following formats:

YYYYMMDD Date without separators.

YYYY-MM-DD ISO 8601 date format.

The parameter time may use one of the following formats:

HHMMSS Time in 24h format without separators.

HH:MM:SS Time in 24h format separated with a colon.



Note

The hardware clock is also updated to the indicated time and date and is kept in Coordinated Universal Time.



Warning

Changing the time and date while the service is running may incur unexpected behavior. Therefore, it should only be used during the system installation process. The NTP service should be used to maintain the system's time and date synchronized with a time server.

Mode: Operation mode.

Profile: Administrator.

Examples: Set the local date to 2016-11-05 and the time to 14:20:00.

```
admin@bqn# show system date
Tue, 05 Nov 2013 14:02:53 +0100
admin@bqn# system date local 2016-11-05 14:20:00
admin@bqn# show system date full
Local time: Sat 2016-11-05 14:20:03 CET
Universal time: Sat 2016-11-05 13:20:03 UTC
```

```
RTC time: Sat 2016-11-05 13:20:03
Timezone: Europe/Madrid (CET, +0100)
NTP enabled: n/a
NTP synchronized: no
RTC in local TZ: no
```

Related: [service ntp](#)

Commands: [show system date](#)

system date timezone

Syntax: system date timezone zone

Description: Set the system timezone.

The parameter zone is usually composed of a region and the name of a city separated by the "/" character (e.g. Europe/London, America/Chicago, Asia/Singapore). Use the [show system date timezone](#) command to print the timezones available.



Warning

Changing the timezone while the service is running may incur unexpected behavior. Therefore, it should only be used during the system installation process. A system reboot is required after the timezone has been set.

Mode: Operation mode.

Profile: Administrator.

Examples: Change the timezone from Brussels to Hong Kong.

```
admin@bqn# show system date full
Local time: Tue, 2013-11-05 20:06:45 CET
Universal time: Tue, 2013-11-05 19:06:45 UTC
RTC time: Tue, 2013-11-05 19:06:44
Timezone: Europe/Brussels
NTP enabled: no
NTP synchronized: no
RTC in local TZ: no
admin@bqn# system date timezone Asia/Hong_Kong
admin@bqn# system reboot now
Confirm? (yes/no): yes
```

After the system boots, verify that the timezone has been changed.

```
admin@bqn# show system date full
Local time: Wed, 2013-11-06 03:10:14 HKT
Universal time: Tue, 2013-11-05 19:10:14 UTC
```



```
RTC time: Tue, 2013-11-05 19:10:14
Timezone: Asia/Hong_Kong
NTP enabled: no
NTP synchronized: no
RTC in local TZ: no
```

Related: [show system date](#)

Commands: [show system date timezone](#)

system diagnostic

Syntax: system diagnostic [brief | full level] [capture] [trace]

Description: Generate a diagnostic containing the status of the QoE.

A diagnostic file will be generated locally in the home directory of the user executing the command.

The brief command form generates a small diagnostic file size that only contains the essential information about the QoE. The full command form generates a diagnostic that contains a lot of information about the QoE, but may also occupy a lot of disk space. Depending on the level of information included in the diagnostic, the level parameter indicates how much extra detail should be included in the diagnostic. The valid level values are from 1 to 10, where 1 indicates less detail and 10 full detail.

The optional capture parameter indicates that the network interface captures should be included in the diagnostic file.

The optional trace parameter indicates that the BTA trace files should be included in the diagnostic file.

Use this command to generate a diagnostic when requested by Cambium Networks staff. Diagnostics will help analyze system malfunctions.

Mode: Operation mode.

Profile: Administrator.

Examples: Generate a normal diagnostic.

```
admin@bqn0# system diagnostic
Get OS information...done
Get system information...done
Get network information...done
Get bqn information...done
Get BTA information...done
Get files...done
Created diagnostic file: /home/bqnadm/diagnostic-20150305100901
admin@bqn0# file ls -l
total 712
```

-rw-r--r-- 1 bqnamd users 728597 Mar 5 10:09 diagnostic-20150305100901

Related: [capture](#)

Commands: [system shell](#)

system hostname

Syntax: system hostname value

Description: Set the system hostname to value.

A system reboot will be required so that all the running services get the new hostname value.

Mode: Operation mode.

Profile: Administrator.

Examples: Change the hostname.

```
admin@bqn0# show system hostname
bqn0
admin@bqn0# system hostname myhostname
admin@bqn0# system reboot now
Confirm? (yes/no): yes
Connection to 192.168.0.121 closed by remote host.
Connection to 192.168.0.121 closed.
# ssh admin@192.168.0.121
admin@myhostname#
```

Related: [show system hostname](#)

Commands: [system reboot](#)

system interface capture

Syntax: system interface iface-name capture [filter filter] {[inbound | outbound]

{full | detail} [max-packets]} | {file file-name [max-size [rotation]]}]}

Description: Captures data packets from network interface iface-name.

By default, all traffic is captured, both ingress and egress packets. Traffic may be restricted using the optional filter parameter. Note that if the filter contains multiple words, the filter must be enclosed within double-quotes. The filter parameter uses the PCAP filter syntax, as described on the <http://www.tcpdump.org/manpages/pcap-filter.7.html> web page.

By default, captured files are shown in the shell terminal. It is possible to obtain more information using the full option and to get a packet dump in hexadecimal with the detail option.

The option max-packets defines the maximum number of packets to capture. When the limit is reached, the capture is terminated. By default, the capture continues until a <Ctrl>c

is entered. It is also possible to capture only traffic coming into the node or going out of it using inbound and outbound respectively.

Alternatively, to display captures in the shell terminal, traffic can be stored into a file of name file-name. By default, the capture continues until stopped with a <Ctrl>c, but it can be limited to a file size max-size in MBytes, so the capture ends when the file grows to that size. It is also possible to specify how many files of that maximum size to use in rotation (no rotation by default).

The files are created relative to the user's home directory. They can be retrieved using an SCP client. See [Software Updates](#) for choices of SCP clients.



Note

The traffic capture mechanism may degrade the performance of the system. In the case of using the file option, verify that there is enough disk space to store the packets captured. Therefore, this command should only be configured if requested by Cambium Networks staff.

Mode: Operation mode.

Profile: Administrator.

Examples: Obtain four packets of simple traces:

```
admin@bqn0# system interface en0p3s0 capture 4
18:29:54.623 IN FrameLen:60 IPv4 10.132.34.52:80 10.132.40.5:57014 IpLen:40
Frag:s:0x0000
Proto:TCP Flags:FA Seq:1724240622 Ack:2469803696 Len:6
18:29:54.623 IN FrameLen:60 IPv4 10.132.34.52:80 10.132.40.5:57014 IpLen:40
Frag:s:0x0000
Proto:TCP Flags:FA Seq:1724240622 Ack:2469803696 Len:6
18:29:54.623 OUT FrameLen:54 IPv4 172.27.2.15:57014 10.132.40.52:80
IpLen:40 Frag:s:0x0000
Proto:TCP Flags:A Seq:2469803696 Ack:1724240623 Len:0
18:29:54.623 OUT FrameLen:54 IPv4 172.27.2.15:57014 10.132.40.52:80
IpLen:40 Frag:s:0x0000
Proto:TCP Flags:A Seq:2469803696 Ack:1724240623 Len:0
admin@bqn0#
```

Obtain four packets of detail traces:

```
admin@bqn0# system interface en0p3s0 capture 4 detail
18:32:23.643 IN ac:76:21:58:3c:7f 1c:76:15:21:92:29 EthHdrLen:14
FrameLen:60
IPv4 10.132.34.3:61952 122.150.13.85:443 IpLen:41 Frag:s:0x4000 Id:52763
Proto:TCP Flags:A Seq:4238670241 Ack:1013872195 Len:6 Win:511
Offset:5
18:32:23.643 OUT 1c:76:15:21:92:29 ac:76:21:58:3c:7f EthHdrLen:14
FrameLen:54
IPv4 10.132.34.95:443 122.26.2.23:61952 IpLen:40 Frag:s:0x0000 Id:4644
```

```

        Proto:TCP Flags:A Seq:1013872195 Ack:4238670242 Len:0 Win:1863
        Offset:5

18:32:23.960 IN ac:76:21:58:3c:7f lc:76:15:21:92:29 EthHdrLen:14
FrameLen:504

IPv4 10.132.34.3:62296 116.28.201.234:443 IpLen:490 Frags:0x4000 Id:28607

        Proto:TCP Flags:PA Seq:4010986232 Ack:2919697546 Len:450 Win:507
        Offset:5

18:32:23.960 IN ac:76:21:58:3c:7f lc:76:15:21:92:29 EthHdrLen:14
FrameLen:651

IPv4 10.132.34.3:62296 116.58.201.234:443 IpLen:637 Frags:0x4000 Id:28608

        Proto:TCP Flags:PA Seq:4010986682 Ack:2919697546 Len:597 Win:507
        Offset:5

admin@bqn0#

```

Obtain one packet with full details from inbound:

```

admin@bqn0# system interface en0p3s0 capture inbound full 1

18:41:53.840 IN ac:76:21:58:3c:7f lc:76:15:21:92:29 EthHdrLen:14
FrameLen:60 IPv4

10.132.34.52:80 10.132.40.5:57249 IpLen:40 Frags:0x0000 Id:5039

        Proto: TCP Flags:FA Seq:2262827246 Ack:1746184683 Len:6
        Win:11520 Offset:5

        0000: 1C76 1521 9229 AC76 2158 3C7F 0800 4500
        00016: 0028 13AF 0000 4006 09E0 AC1B 02FC AC1B
        00032: 020F 0050 DFA1 86E0 00EE 6814 AFD0 4581

00048: AFD0 54C1 0000 0000 0000 0000

admin@bqn0#

```

Capture to a file called mycapture.pcap of 1 MB of maximum size

```

admin@bqn0# system interface en0p3s0 capture file mycapture.pcap 1
admin@bqn0# file ls -al mycapture.pcap
-rw-r--r-- 1 bqnadm users 1001369 Jan 24 18:21 mycapture.pcap

admin@bqn0#

```

Capture to a file called mycapture.pcap of 1 MB of maximum size in a subdirectory called captures and rotate between two files.

```

admin@bqn0# file mkdir captures
admin@bqn0# system interface en0p3s0 capture file mycapture.pcap 1 2

```

Press <Ctrl>c when done:

```

admin@bqn0# file ls -al captures
total 1088
drwxr-xr-x 2 bqnadm users 4096 Jan 24 19:01 .

```

```
drwxr-xr-x 8 bqnamd users 4096 Jan 24 19:00 ..
-rw-r--r-- 1 bqnamd users 1001383 Jan 24 19:02 mycapture.pcap-000
-rw-r--r-- 1 bqnamd users 102400 Jan 24 19:02 mycapture.pcap-001
admin@bqn0#
```

To obtain five packets involving IP address 10.10.10.23:

```
admin@bqn0# system interface en0p3s0 capture filter "host 172.27.2.32" 5
15:29:29.909 IN FrameLen:69 IPv4 10.10.10.23:41558 30.12.80.31:5222
IpLen:55 Frags:0x4000
Proto:TCP Flags:PA Seq:641842589 Ack:2177526982 Len:3
15:29:29.909 OUT FrameLen:66 IPv4 30.12.80.31:5222 10.10.10.23:41558
IpLen:52 Frags:0x0000
Proto:TCP Flags:A Seq:2177526982 Ack:641842592 Len:0
15:29:29.915 IN FrameLen:185 IPv4 10.10.10.23:41558 30.12.80.31:5222
IpLen:171 Frags:0x4000
Proto:TCP Flags:PA Seq:641842592 Ack:2177526982 Len:119
15:29:29.915 OUT FrameLen:66 IPv4 30.12.80.31:5222 10.10.10.23:41558
IpLen:52 Frags:0x0000
Proto:TCP Flags:A Seq:2177526982 Ack:641842711 Len:0
15:29:29.998 OUT FrameLen:106 IPv4 30.12.80.31:5222 10.10.10.23:41558
IpLen:92 Frags:0x4000
Proto:TCP Flags:PA Seq:2177526982 Ack:641842711 Len:40
admin@bqn0#
```

Related: [capture](#)

Commands: [show interface](#)

[show interface capture](#)

system interface sfp-qualification

Syntax: system interface iface-name sfp-qualification {disable | enable}

Description: Some network interfaces, such as the Intel Ethernet Controller X710, have an SFP+ module qualification mechanism that verifies if the module is supported by the vendor. This setting prevents some common or unsupported SFP+ modules from running. This command allows changing the status of the SFP+ qualification setting to accept all modules.

The interface must be in the PCAP node or not configured in a wire to run this command.
Note that a system reboot is required for the changes to take effect.

Mode: Operation mode.

Profile: Administrator.

Examples: Disable the SFP+ qualification of an interface.

```
admin@bqn0# configure
```

```

admin@bqn0(config)# interface en0slf1
admin@bqn0(config-iface)# nic pcap
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# end
admin@bqn0# show interface en0slf1 device Driver: i40e
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
PCI device ID: 0x1572 : Ethernet Controller X710 for 10GbE SFP+
PCI sub-vendor ID: 0x8086 : Intel Corporation
PCI sub-device ID: 0x0000 PCI slot: 0000:08:00.1
X710 SFP+ qualification: yes
X710 SFP+ support: full
admin@bqn0# system interface en0slf1 sfp-qualification disable
admin@bqn0# show interface en0slf1 device
Driver: i40e
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
PCI device ID: 0x1572 : Ethernet Controller X710 for 10GbE SFP+
PCI sub-vendor ID: 0x8086 : Intel Corporation
PCI sub-device ID: 0x0000 PCI slot: 0000:08:00.1
X710 SFP+ qualification: no X710 SFP+ support: full
admin@bqn0# configure
admin@bqn0(config)# interface en0slf1
admin@bqn0(config-iface)# no nic pcap
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# end

```

Related: [show interface](#)

Commands: [system interface sfp-support](#)

system interface sfp-support

Syntax: system interface iface-name sfp-support

Description: Some network interfaces, such as the Intel Ethernet Controller X710, in some cases, may not have all the SFP physical types enabled. If not all the SFP types are enabled, then the interface may not support the SFP module type used by that port.

The interface must be in the PCAP node or not configured in a wire to run this command.
 Note that a system reboot is required for the changes to take effect.

Mode: Operation mode.

Profile: Administrator.

Examples: Enable all SFP+ type modules for an interface.



Note
The 10GBASE-LR type is not initially enabled.

```
admin@bqn0# show interface en0s1f1 device
Driver: i40e
PCI class: 0x20000
PCI vendor ID: 0x8086: Intel Corporation
PCI device ID: 0x1572: Ethernet Controller X710 for 10GbE SFP+
PCI sub-vendor ID: 0x8086 : Intel Corporation
PCI sub-device ID: 0x0000
PCI slot: 0000:08:00.1
X710 SFP+ qualification: no
X710 SFP+ support: 1000BASE-T-SFP 10GBASE-SR 10GBASE-SFP+
admin@bqn0# configure
admin@bqn0(config)# interface en0s1f1
admin@bqn0(config-iface)# nic pcap
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# end
admin@bqn0# show interface en0s1f1 device
admin@bqn0# system interface en0s1f1 sfp-support
admin@bqn0# show interface en0s1f1 device Driver: i40e
PCI class: 0x20000
PCI vendor ID: 0x8086 : Intel Corporation
PCI device ID: 0x1572 : Ethernet Controller X710 for 10GbE SFP+
PCI sub-vendor ID: 0x8086 : Intel Corporation
PCI sub-device ID: 0x0000 PCI slot: 0000:08:00.1
X710 SFP+ qualification: no
X710 SFP+ support: full
admin@bqn0# configure
admin@bqn0(config)# interface en0s1f1
admin@bqn0(config-iface)# no nic pcap
admin@bqn0(config-iface)# commit
admin@bqn0(config-iface)# end
```

Related: [show interface](#)

Commands: [system interface sfp-qualification](#)

system ipmi lan

Syntax: system ipmi lan {dhcp | static | ip-address ip-gw}

Description: Sets the IPMI controller IP address.

If dhcp, the IP address and gateway will be assigned dynamically. We recommend setting a static address ip-address with default gateway ip-gw.

This command works only on servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Administrator.

Examples: This example sets the IPMI address to a static IP 192.168.0.121/24 with default gateway 192.168.0.1.

```
admin@bqn0# system ipmi lan static
admin@bqn0# system ipmi lan 192.168.0.120/24 192.168.0.1
admin@bqn0#
```

Related: [show system ipmi lan](#)

Commands: [system ipmi reset](#)

[system ipmi user](#)

[system ipmi vlan](#)

system ipmi reset

Syntax: system ipmi reset

Description: Reboots the IPMI controller. use it only if the behaviour of the IPMI controller is unexpected.

Previous IPMI configuration (e.g. user and IP) is preserved by this reboot.

This command works only on servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Administrator.

Examples: Reset the IPMI controller.

```
admin@bqn0# system ipmi reset
```

Related: [system ipmi lan](#)

Commands: [system ipmi user](#)

[system ipmi vlan](#)

system ipmi user

Syntax: system ipmi user {add | delete | disable | enable | passwd} user-name

Description: Manages IPMI users. The parameter user-name is a string with the user name. The following operations are possible:

- add: Creates a user with that name.
- delete: Removes a user with that name.
- disable: The user cannot be used to log into the IPMI, but it is not deleted.
- enable: Undoes a previous disable operation.
- passwd: Sets the password of an added user or changes the password of an existing user. This command will work only in servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Administrator.

Examples: This example creates a new user myuser with password mypassword.

```
admin@bqn0# system ipmi user add mysuser
admin@bqn0# system ipmi user passwd mysuser New password:
Retype new password:
admin@bqn0# system ipmi user enable mysuser
admin@bqn0# show system ipmi user
admin@bqn06# show system ipmi user

ID   Name      Callin  Link Auth  IPMI Msg  Channel Priv Limit
4    myuser    true   true      true      ADMINISTRATOR
```

Related: [show system ipmi user](#)

Commands: [system ipmi lan](#)

[system ipmi reset](#)

[system ipmi vlan](#)

system ipmi vlan

Syntax: system ipmi vlan {off | vlan-tag}

Description: Sets the IPMI controller VLAN.

If off, any previous VLAN tag is removed. If vlan-tag is given, a VLAN with a tag will be configured on the IPMI network interface.

This command works only on servers with an IPMI-compatible lights-out controller.

Mode: Operation mode.

Profile: Administrator.

Examples: This example sets the IPMI address to VLAN 10 and then removes it.

```
admin@bqn0# show system ipmi lan | match "VLAN ID"
```

```

802.1q VLAN ID: Disabled
admin@bqn0# system ipmi vlan 10
admin@bqn0# show system ipmi lan | match "VLAN ID"
802.1q VLAN ID: 10
admin@bqn0# system ipmi vlan off
admin@bqn0# show system ipmi lan | match "VLAN ID"
q VLAN ID: Disabled
admin@bqn0# system ipmi vlan 10 admin@bqn0#

```

Related: [show system ipmi lan](#)

Commands: [system ipmi lan](#)

[system ipmi reset](#)

[system ipmi user](#)

system partition mount

Syntax: system partition mount device mount-point

Description: Mount a partition into a directory.

This command should only be used when instructed by Cambium Networks staff. Use the [show system partition](#) command to show the available partitions. If a partition is mounted for a limited time, use the [system partition unmount](#) command to unmount it after it has been used.



Note

The mount-point parameter should be an existing unused directory, such as /mnt.

Mode: Operation mode.

Profile: Administrator.

Examples: Mount a partition.

```

admin@bqn0# show system partition

bqn  PARTITION  SIZE
0     /dev/sda1   2048MB
0     /dev/sda2   8192MB
0     /dev/sda3   6143MB

admin@bqn0# system partition mount /dev/sda3 /mnt
admin@bqn0# show system filesystem

Filesystem  Size  Used  Avail  Use%  Mounted on

```

devtmpfs	2.0G	56K	2.0G	1%	/dev
tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	2.0G	3.3M	2.0G	1%	/run
/dev/sda2	8.0G	969M	7.1G	12%	/
/dev/loop0	1.3M	1.3M	0	100%	/bqn/img/bqnos
/dev/loop1	234M	234M	0	100%	/bqn/img/linux
/dev/loop2	384K	384K	0	100%	/bqn/img/bqnkernel
/dev/loop3	106M	106M	0	100%	/bqn/img/kernel
/dev/loop4	9.7M	9.7M	0	100%	/bqn/img/bqn
tmpfs	2.0G	0	2.0G	0%	/sys/fs/cgroup
tmpfs	2.0G	3.3M	2.0G	1%	/var/run
/dev/sda3	6.0G	407M	5.6G	7%	/mnt

Related: [show hardware disk](#)

Commands: [show system file system](#)

[show system partition](#)

[system partition umount](#)

system partition umount

Syntax: system partition umount mount-point

Description: Unmount a previously mounted partition.

This command should only be used when instructed by Cambium Networks staff. Use the [show system filesystem](#) command to show the mounted partitions. Only partitions previously mounted with the [system partition mount](#) command should be unmounted.



Note

The mount-point parameter may be the device mounted.

Mode: Operation mode.

Profile: Administrator.

Examples: Unmount the /mnt partition.

```
admin@bqn0# show system filesystem
```

File system	Size	Used	Avail	Use%	Mounted on
devtmpfs	2.0G	56K	2.0G	1%	/dev
tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	2.0G	3.3M	2.0G	1%	/run
/dev/sda2	8.0G	969M	7.1G	12%	/

```

/dev/loop0 1.3M 1.3M 0 100% /bqn/img/bqnos
/dev/loop1 234M 234M 0 100% /bqn/img/linux
/dev/loop2 384K 384K 0 100% /bqn/img/bqnkernel
/dev/loop3 106M 106M 0 100% /bqn/img/kernel
/dev/loop4 9.7M 9.7M 0 100% /bqn/img/bqn
tmpfs 2.0G 0 2.0G 0% /sys/fs/cgroup
tmpfs 2.0G 3.3M 2.0G 1% /var/run
/dev/sda3 6.0G 407M 5.6G 7% /mnt

```

```
admin@bqn0# system partition umount /mnt
```

```
admin@bqn0# show system filesystem
```

```

Filesystem Size Used Avail Use% Mounted on
devtmpfs 2.0G 56K 2.0G 1% /dev
tmpfs 2.0G 0 2.0G 0% /dev/shm
tmpfs 2.0G 3.3M 2.0G 1% /run
/dev/sda2 8.0G 969M 7.1G 12% /
/dev/loop0 1.3M 1.3M 0 100% /bqn/img/bqnos
/dev/loop1 234M 234M 0 100% /bqn/img/linux
/dev/loop2 384K 384K 0 100% /bqn/img/bqnkernel
/dev/loop3 106M 106M 0 100% /bqn/img/kernel
/dev/loop4 9.7M 9.7M 0 100% /bqn/img/bqn
tmpfs 2.0G 0 2.0G 0% /sys/fs/cgroup
tmpfs 2.0G 3.3M 2.0G 1% /var/run

```

Related: [show system file system](#)

Commands: [show system partition](#)

[system partition umount](#)

system reboot

Syntax: system reboot at time system reboot cancel system reboot now

Description: This command is used to reboot the QoE.

When the parameter at is present, a time string will indicate when the reboot will occur. The time formats accepted are:

+MINUTES Number of minutes from now.

HH:MM Hour/minutes in 24h format.

When the parameter `now` is present, the system will reboot immediately. When the parameter `cancel` is present, the pending reboot is canceled. Before rebooting the system, the user will be prompted for confirmation.

Mode: Operation mode.

Profile: Administrator.

Examples: Reboot the system in 10 minutes from now.

```
root@bqn# system reboot at +10
Confirm? (yes/no): yes

Shutdown scheduled for Mon, 2013-10-21 22:42:10 CEST, use 'shutdown -c' to
cancel.

Broadcast message from root@bqn (Mon, 2013-10-21 22:42:10 CEST):

The system is going down for reboot at Mon, 2013-10-21 22:52:10 CEST!

Cancel the scheduled reboot.

root@bqn# system reboot cancel

Broadcast message from root@bqn (Mon, 2013-10-21 22:42:23 CEST):

The system shutdown has been cancelled at Mon, 2013-10-21 22:43:23 CEST!
```

Related: [system shutdown](#)

Commands

system remctr

Syntax: `system remctr {connect | disconnect | reset}`

Description: This command connects to the bqnMGR server, disconnects from it, or resets the control.

Mode: Operation mode.

Profile: Administrator.

Examples: Disconnect and then reconnect with the bqnMGR server.

```
admin@bqn# show remctr status
State: connected
bqnMGR reachable: yes
bqnMGR address: 192.168.0.121:13152
Scheduled disconnect: 00:09:57.992
Session ID: 31c37d17203d790a
admin@bqn# system remctr disconnect
admin@bqn# show remctr status
State: idle
bqnMGR reachable: yes
bqnMGR last connected: 00:00:02.628 (192.168.0.121:13152)
```

```
Scheduled connect: 00:59:57.371
Session ID: 31c37d17203d790a
admin@bqn# system remctr connect
admin@bqn# show remctr status
State: connected
bqnMGR reachable: yes
bqnMGR address: 192.168.0.121:13152
Scheduled disconnect: 00:09:58.415
Session ID: 0a47eec82f7e16b0
```

Related: [show remctr license](#)

Commands: [show remctr status](#)

system shell

Syntax: system shell

Description: Start the bash shell.

To return to the bqns, exit the bash shell.

Mode: Operation mode.

Profile: Operator.

Examples: Start the shell.

```
root@bqn# system shell
Enter the command "exit" to return to the QoE shell
Starting shell...
bqn:/# ls /

bin    bqn    ehome  home   lib64  mnt    proc   run    selinux  sys    usr
boot  dev    etc     lib    media  opt    root   sbin   srv      tmp    var

bqn:/# exit
exit
root@bqn#
```

Related: [show users](#)

Commands

system shutdown

Syntax: system shutdown at time system shutdown cancel system shutdown now

Description: This command is used to halt the QoE.

When the parameter `at` is present, a time string will indicate when the shutdown will occur. The time formats accepted are:

`+MINUTES` Number of minutes from now.

`HH:MM` Hour/minutes in 24h format.

When the parameter `now` is present, the shutdown will occur immediately. When the parameter `cancel` is present, the pending shutdown is canceled. Before shutting down the system, the user will be prompted for confirmation.

Mode: Operation mode.

Profile: Administrator.

Examples: Halt the system in 10 minutes from now.

```
root@bqn# system shutdown at +10
Confirm? (yes/no): yes
Shutdown scheduled for Mon, 2013-10-21 22:53:34 CEST, use 'shutdown -c' to
cancel.
Broadcast message from root@bqn (Mon, 2013-10-21 22:43:34 CEST):
The system is going down for power-off at Mon, 2013-10-21 22:53:34 CEST!
Cancel the scheduled shutdown.
root@bqn# system shutdown cancel
Broadcast message from root@bqn (Mon, 2013-10-21 22:43:46 CEST):
The system shutdown has been cancelled at Mon, 2013-10-21 22:44:46 CEST!
```

Related: [system reboot](#)

Commands

system software boot

Syntax: `system software boot {off | on} name version`

Description: Enable or disable the boot flag of a BPKG. The boot flag controls whether a BPKG is loaded at boot time. Note that only one BPKG with the same name can be enabled.

The name parameter indicates the BPKG name, and the version parameter indicates the BPKG version.

Enabling the boot flag for a specific version automatically disables the boot flag of any other BPKG with the same name.

Enabling the boot flag of a BPKG may require some processing. For example, the kernel package creates a boot image file (`initrd`) when it is enabled.

Mode: Operation mode.

Profile: Administrator.

Examples: Show the existing installed BPKGs.

```
admin@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	yes	yes	yes
bqn	R3.1.16	no	no	yes

Change the QoE BPKG to boot from the R3.1.15 to the R3.1.16 version.

```
admin@bqn# system software boot on bqn 3.1.16
```

```
admin@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	yes	no	yes
bqn	R3.1.16	no	yes	yes

Related: [show system software](#)

Commands: [system software install](#)

system software install

Syntax: system software install uri-package [nboot]

Description: Install a QoE package indicated by the URI uri-package.

The following schemes are supported in the URI:

- file: The package is located in the local filesystem.
- ftp: The package is retrieved using the FTP protocol.
- http: The package is retrieved using the HTTP protocol.
- https: The package is retrieved using the HTTPs protocol.

- scp: The package is accessed using the scp program.
- sftp: The package is accessed using the sftp program.

If none of these protocols are remotely supported, the BPKG may be pushed into the QoE using the SCP (secure copy) protocol provided by the ssh service in the management interface. For a list of clients that provide SCP functionality under Windows, look in the [Software updates](#) section. Once the BPKG is available in QoE, the file scheme can be used to install it.

By default, the boot flag is set once a package has successfully been installed, and the new package will become active the next time the system boots. To avoid setting the boot flag for the new package, execute the command with the option noboot. The boot flag can also be modified at any time using the system software boot command.

Some packages may require a system reboot to become active, while others only need to reload and restart the software included in the package. Use the show system software command to view which packages require a reboot or a restart. If the field under the column RESTART indicates yes, then the package may be reloaded and restarted using the system software reload command; otherwise, a reboot is needed to activate the software.

Mode: Operation mode.

Profile: Administrator.

Examples: Below is the software installed at the system.

```
admin@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	yes	yes	yes

The new package QoE will be installed using scp from system 192.168.1.15, which in this example requires the user to enter the login password when prompted.

```
admin@bqn# system software install scp://admin@192.168.1.15:/bqn-
R3.1.16.bpkg
Password:
bqn-R3.1.16.bpkg 100% 3076KB    3.0MB/s    00:00
Name: bqn
Version: R3.1.16
Priority: 50
Size: 7835561
Restart: 1
```

Files: 2

Install package "bqn-R3.1.16"

Enable boot flag

```
admin@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	yes	no	yes
bqn	R3.1.16	no	yes	yes

The package has been installed successfully and the boot flag has been enabled, but note that it is not active. However, in this example, the new package QoE may be restarted and does not require a system reboot to activate it.

Another possibility is to transfer the BPKG using scp and install from the local file:

```
$ scp ./bqn-R3.1.16.bpkg admin@192.168.1.15:
```

Password:

```
bqn-R3.1.16.bpkg 100% 3076KB 3.0MB/s 00:00
```

```
$ ssh admin@192.168.1.15
```

Password:

```
admin@bqn# system software install /home/admin/bqn-R3.1.16.bpkg
```

Related: [show system software](#)

Commands: [system software boot](#)

[system software reload](#)

system software reload

Syntax: system software reload name version

Description: Restart an installed BPKG.

Only BPKGs that have the restart attribute may be reloaded. Reloading a BPKG implies stopping and starting the service that it provides. Notice that the boot flag is not modified when reloading a specific BPKG.

Mode: Operation mode.

Profile: Administrator.

Examples: Show the existing installed BPKGs.

```
root@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	yes	no	yes
bqn	R3.1.16	no	yes	yes

Reload the bqn BPKG with R3.1.16 version.

```
root@bqn# system software reload bqn R3.1.16
```

Package "bqn-R3.1.15" must be stopped first. WARNING: Service may be interrupted during the reload

Continue? (yes/no): yes

```
root@bqn0#
```

%ERR-EIO: Process terminated

Verify that the new BPKG is active.

```
# opt/bqn/bin/bqnsh
```

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```
root@bqn# show system software
```

NAME	VERSION	ACTIVE	BOOT	RELOAD
bqnos	R2.0.10	yes	yes	no
linux	R2.0.9-20190213	yes	yes	no
bqnkernel	R2.0.12-4.10.13-1-default	yes	yes	no
bqnkernel	R2.0.7-4.10.13-1-default	no	no	no
kernel	R2.0.10-4.10.13-1-default	yes	yes	no
gui	R2.0.5	yes	yes	no
bqn	R3.1.15	no	no	yes
bqn	R3.1.16	yes	yes	yes

Related: [show system software](#)

Commands: [system software install](#)

system users add

Syntax: system users add user-name description {administrator | operator}

Description: Create a QoE user, either with an administrator or operator profile.

If the description parameter has more than one word, the description must be enclosed within double quotes.

The assigned shell for user-name is the bqns shell.

Mode: Operation mode.

Profile: Administrator.

Examples: Create the admuser administrator user.

```
root@bqn0# system users add admuser "Administrator User" administrator
root@bqn0# show system users admuser
User: admuser
Name: Administrator User
UID: 6202
Profile: administrator
Groups: users bqadmin
```

Related: [show system users](#)

Commands: [system users delete](#)

[system users passwd](#)

system users delete

Syntax: system users delete user-name]

Description: Delete the user indicated by user-name.

Mode: Operation mode.

Profile: Administrator.

Examples: Delete the admuser user.

```
root@bqn0# system users delete admuser
Remove user "admuser"? (yes/no): yes
no crontab for admuser
userdel: admuser mail spool (/var/mail/admuser) not found
```

Related: [show system users](#)

Commands: [system users add](#)

[system users passwd](#)

system users passwd

Syntax: system users passwd [user-name]

Description: Change the password for the current user. If the optional user-name parameter is provided, the user's password is changed.

The user is asked to enter the new password and retype it for validity.

Mode: Operation mode.

Profile: Administrator.

Examples: Change the password for bqnadm user.

```
root@bqn0# system users passwd bqnadm
New password:
Retype new password:
passwd: password updated successfully
```

Related: [show system users](#)

Commands: [system users add](#)

[system users delete](#)

tcp port

Syntax: tcp port number

no tcp port number

Description: As part of an access or Internet profile address entry, it species a TCP port.

Mode: [address](#) configuration mode of access and Internet profiles.

Profile: Administrator.

Examples: This example defines an Internet profile matching all Internet IPv4 addresses at TCP port 443 (we also add UDP port 443).

```
admin@bqn# configure
admin@bqn(config)# profile internet myinter
admin@bqn(config-pfinet)# address 0.0.0.0/0
admin@bqn(config-pfinet-inetaddr)# tcp port 443
admin@bqn(config-pfinet-inetaddr)# udp port 443
admin@bqn(config-pfinet-inetaddr)# root
admin@bqn(config)#
```

Related: [profile access](#)

Commands: [profile internet](#)

[address](#)

[udp port](#)

tcs experimental

Syntax: tcs experimental percentage

no tcs experimental percentage

Description: Uses the latest TCP variant in the TCP proxy. The percentage is normally 100 to apply the variant to all TCP flows. If a lower value is selected, some TCP flows will randomly use the new variant and others the older variant.

Use the no command form to go back to the older TCP variant.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Enable experimental TCP variant.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs experimental 100
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands

tcs high-loss-percent

Syntax: tcs high-loss-percent percentage

no tcs high-loss-percent percentage

Description: Sets a percentage of packet losses used by the QoS TCP implementation to decide when to enter high-loss mode.

The default value is 25 percent. Use the no command form to go back to the value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set a 15% of packet loss.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs high-loss-percent 15
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [tcs high-loss-threshold](#)

tcs high-loss-threshold

Syntax: tcs high-loss-threshold bytes

no tcs high-loss-threshold bytes

Description: Sets a threshold of lost bytes used by the QoS TCP implementation to decide when to enter high-loss mode.

The default value is 3000 bytes. Use the no command to go back to the value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the threshold to 4000 bytes.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs high-loss-threshold 4000
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [tcs high-loss-percent](#)

tcs init-wnd

Syntax: tcs init-wnd number

no tcs init-wnd number

Description: Set the initial window size of a TCP connection in number of packets.

Use the no command form to reset the initial window size to its default value of 10 packets.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the initial window size to 22.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs init-wnd 22
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [tcs no-adaptive-init-wnd](#)

tcs no-adaptive-init-wnd

Syntax: tcs no-adaptive-init-wnd

no tcs no-adaptive-init-wnd

Description: Disable QoE auto-finetuning of initial window values per destination. Use only when this fine-tuning is not possible, such as in the presence of a network sector NAT that hides client IP addresses.

Use the no command form to reset the adaptive initial window value to its default value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable the adaptive initial window value.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs no-adaptive-init-wnd
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [tcs init-wnd](#)

tcs srtt-target-mult

Syntax: tcs srtt-target-mult factor

no tcs srtt-target-mult factor

Description: The TCP stack multiplies the smoothed RTT (srtt) of the connection to estimate the BDP (bandwidth-delay product) and the rate at which it should send packets. The lower the value of the factor, the less aggressive the TCP will behave (the slower it will send all other things equal). It is the primary way to fine-tune the QoE TCP stack to strike a balance between acceleration and delay/losses. Normally it does not need modification.

The default value is 200. Use the no command form to go back to the default.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable the adaptive initial window value.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# tcs srtt-target-mult 150
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [tcs experimental](#)

threshold

Syntax: threshold throughput

Description: As part of a Throughput profile, it defines the throughput threshold that will match when exceeded. The threshold is provided in Kbps.

Mode: DPI profile configuration modes.

Profile: Administrator.

Examples: Set the threshold to 500Mbps.

```
admin@bqn(config)# profile throughput above-500Mbps
admin@bqn(config-pftp)# threshold 500000
```

Related: [profile throughput](#)

Commands

time-activation

Syntax: time-activation time

no time-activation time

Description: Assign an activation time to a license feature.

The license feature activation time is an optional license property that limits the validity of the license feature between the indicated time. The time parameter is defined in the local time of the QoE.



Note

If a property of an existing license is modified, the hash value must be set accordingly to validate the license feature.

Use the no command form to clear the activation time associated with a license feature.

Mode: License configuration mode.

Profile: Administrator.

Examples: Set the activation time of the bta license feature.

```
admin@bqn0(config)# license bta
admin@bqn0(config-license)# time-activation 2014-01-01
admin@bqn0(config-license)#
```

Related: [comment](#)

Commands: [hash](#)

[license](#)

[show license](#)

[time-expiration](#)

[usage](#)

time-expiration

Syntax: time-expiration time

no time-expiration time

Description: Assign an expiration time to a license feature.

The license feature expiration time is an optional license property that limits the validity of the license feature between the indicated time. The time parameter is defined in the local time of the QoE.



Note

If a property of an existing license is modified, the hash value must be set accordingly to validate the license feature.

Use the no command form to clear the expiration time associated with a license feature.

Mode: License configuration mode.

Profile: Administrator.

Examples: Set the expiration time of the bta license feature.

```
admin@bqn0 (config) # license bta
admin@bqn0 (config-license) # time-expiration 2014-12-31
admin@bqn0 (config-license) #
```

Related: [comment](#)

Commands: [hash](#)

[license](#)

[show license](#)

[time-activation](#)

[usage](#)

timeout ack

Syntax: timeout ack number

no timeout ack number

Description: Set the ACK timeout for a TCP flow. The PKTENG process generates TCP ACKs for received sequences when this timeout expires or earlier.

By default the ACK timeout period is set to 0.005 seconds.

Use the no command form to reset the ACK timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the ACK timeout period to 0.01 seconds.

```
admin@bqn0 # configure
admin@bqn0 (config) # bta
admin@bqn0 (config-bta) # timeout ack 0.01
```

```
admin@bqn0 (config-bta) # commit
admin@bqn0 (config-bta) #
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout closing

Syntax: timeout closing number

no timeout closing number

Description: Set the closing timeout period for a TCP flow. Closing is a flow state used for TCP connection clean-up purposes. The closing state is reached after a TCP flow has been established and terminated.

By default, the closing timeout period is set to 3 seconds.

Use the no command form to reset the closing timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the closing timeout period to 5 seconds.

```
admin@bqn0# configure
admin@bqn0 (config) # bta
admin@bqn0 (config-bta) # timeout closing 5
admin@bqn0 (config-bta) # commit
admin@bqn0 (config-bta) #
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout handshake

Syntax: timeout handshake number

no timeout handshake number

Description: Set the handshake timeout period for a TCP flow. This timer is used to limit the amount of time that a peer uses to establish a TCP connection.

By default, the handshake timeout period is set to 8 seconds.

Use the no command form to reset the handshake timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the handshake timeout period to 10 seconds.

```
admin@bqn0# configure
admin@bqn0 (config) # bta
```

```
admin@bqn0 (config-bta) # timeout handshake 10
admin@bqn0 (config-bta) # commit
admin@bqn0 (config-bta) #
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout drop internet

Syntax: timeout drop internet secs

Description: Timeout period at the start of a subscriber session during which flow drop policies regarding UDP and IP-other flows will not be applied. This timeout exists to avoid disturbing legitimate flows caught already initiated at the start of the session. Drops of TCP SYNs happen from the start, as the problem does not exit in that case.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: The default value is 120 seconds. To increase it to 5 minutes:

```
bqnadm@bqn0 (config) # pkteng
bqnadm@bqn0 (config-pkteng) # op show pkteng parameters | match Drop
Drop Internet time protection: 120.000000
bqnadm@bqn0 (config-pkteng) # timeout drop internet 300
bqnadm@bqn0 (config-pkteng) # commit
bqnadm@bqn0 (config-pkteng) # op show pkteng parameters | match Drop
Drop Internet time protection: 300.000000
```

Related: [drop](#)

Commands

timeout inactivity

Syntax: timeout inactivity number

no timeout inactivity number

Description: Set the inactivity timeout period for a flow. This timer closes flows that have not received packets for a number of seconds.

By default, the inactivity timeout period is set to 310 seconds.

Use the no command form to reset the inactivity timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the inactivity timeout period to 250 seconds.

```
admin@bqn0 # configure
```

```
admin@bqn0 (config) # bta
admin@bqn0 (config-bta) # timeout inactivity 250
admin@bqn0 (config-bta) # commit
admin@bqn0 (config-bta) #
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout ip-endpoint inactivity

Syntax: timeout ip-endpoint inactivity {access | internet timeout}

no timeout ip-endpoint inactivity {access | internet timeout}

Description: This command sets the timeout in seconds of inactivity that will free an ip-endpoint in the access or Internet side. An ip-endpoint is an internal data structure holding information common to an IP address. This parameter is normally not changed

The default value is 900 seconds (15 minutes). Use the no command form to go back to the default.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable the adaptive initial window value.

```
admin@bqn0# configure
admin@bqn0 (config) # pkteng
admin@bqn0 (config-pkteng) # timeout ip-endpoint inactivity access 600
admin@bqn0 (config-pkteng) # commit
admin@bqn0 (config-pkteng) #
```

Related: [pkteng](#)

Commands: [timeout ip-endpoint send](#)

timeout ip-endpoint send

Syntax: timeout ip-endpoint send access timeout

no timeout ip-endpoint send access timeout

Description: This command sets the timeout in seconds to send packets. This parameter is normally not changed

The default value is 0.005 seconds (5ms). Use the no command form to go back to the default.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable the adaptive initial window value.

```
admin@bqn0# configure
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# timeout ip-endpoint send access 0.005
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [pkteng](#)

Commands: [timeout ip-endpoint inactivity](#)

timeout pacing

Syntax: timeout pacing number

no timeout pacing number

Description: Set the timeout period for pacing in sending packets. By default the pacing timeout period is set to 1 second.

Use the no command form to reset the timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the pacing timeout period to 1.5 seconds.

```
admin@bqn0# configure
admin@bqn0(config)# bta
admin@bqn0(config-bta)# timeout pacing 1.5
admin@bqn0(config-bta)# commit
admin@bqn0(config-bta)#
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout rto-lifetime

Syntax: timeout rto-lifetime number

no timeout rto-lifetime number

Description: Set the RTO lifetime period for a TCP flow. This value indicates the maximum amount of time during which a TCP flow sends retransmissions of the same segment.

By default, the RTO lifetime period is set to 180 seconds.

Use the no command form to reset the RTO lifetime setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the RTO lifetime period to 60 seconds.

```
admin@bqn0# configure
admin@bqn0(config)# bta
admin@bqn0(config-bta)# timeout rto-lifetime 60
admin@bqn0(config-bta)# commit
admin@bqn0(config-bta)#
```

Related: [bta](#)

Commands: [show bta parameters](#)

timeout rto-min

Syntax: timeout rto-min number

```
no timeout rto-min number
```

Description: Set the RTO minimum timeout period for a TCP flow. This value is the minimum amount of time used for segment retransmissions.

By default, the RTO minimum timeout period is set to 0.200 seconds.

Use the no command form to reset the RTO minimum timeout setting to its default value.

Mode: BTA configuration mode.

Profile: Administrator.

Examples: Set the RTO minimum timeout period to 0.500 seconds.

```
admin@bqn0# configure
admin@bqn0(config)# bta
admin@bqn0(config-bta)# timeout rto-min 0.5
admin@bqn0(config-bta)# commit
admin@bqn0(config-bta)#
```

Related: [bta](#)

Commands: [show bta parameters](#)

trace

Syntax: trace [initial-percentage final-percentage]

```
no trace [initial-percentage final-percentage]
```

Description: Decides the traffic to generate debugging traces. If no percentages are specified, all traffic matching the policy will generate traces. If a range of percentages is specified, flows falling randomly within the range will generate traces. This is used if the target traffic is too broad, to reduce the amount of debugging information.

Mode: Policy monitor configuration mode.

Profile: Administrator.

Examples: This example enables tracing for 1% of the flows.

```
admin@bqn0(config)# policy monitor mypolicy
admin@bqn0(config-polflow)# trace 99 100
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy monitor](#)

Commands: [rule monitor](#)

[show policy](#)

[sdr](#)

[trace level](#)

[trace rotation](#)

[trace size](#)

[udr](#)

trace level

Syntax: trace level value

no trace level value

Description: Set the TCP flow trace level. A value parameter is a hexadecimal number that indicates the level of detail generated for the traced TCP flow.

Use the no command form to restore the default trace level.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the TCP flow trace level to 1.

```
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB Rotation number: 10
admin@bqn0(config-pkteng)# trace level 1
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1 (STATE)
Size maximum: 10 MB
Rotation number: 10
```

Related: [pkteng](#)

Commands: [show pkteng trace](#)

[trace](#)

[trace rotation](#)

[trace size](#)

trace rotation

Syntax: trace rotation number

no trace rotation number

Description: Set the flow trace rotation value. The number parameter indicates the number of rotation files used for flow tracing. The default number value is 10.

Use the no command form to restore the default trace rotation value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the flow trace rotation to 5.

```
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB
Rotation number: 10
admin@bqn0(config-pkteng)# trace rotation 5
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB
Rotation number: 5
```

Related: [policy monitor](#)

Commands: [pkteng](#)

[show pkteng trace](#)

[trace](#)

[trace level](#)

[trace size](#)

trace size

Syntax: trace size number

no trace size number

Description: Set the flow trace file size. The number parameter indicates the maximum file size of flow traced files in MBytes (1,000,000 bytes).

Use the no command form to restore the default trace size value to 10 MB.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the flow trace size to 5 MB.

```
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 10 MB
Rotation number: 10
admin@bqn0(config-pkteng)# trace size 5
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)# op show pkteng trace
PKTENG tracing: enabled
Trace level: 0x1F (STATE VAR PACKET OPTIONS EVENT)
Size maximum: 5 MB
Rotation number: 10
```

Related: [pkteng](#)

Commands: [show pkteng trace](#)

[trace](#)

[trace rotation](#)

[trace level](#)

[policy monitor](#)

tracking

Syntax: tracking [initial-percentage final-percentage]

no tracking [initial-percentage final-percentage]

Description: Decides the TCP flows to be tracked (not optimized, but followed to generate metrics). If no percentages are specified, all traffic matching the policy is tracked. If a range of percentages is specified, flows falling randomly within the range will be tracked. The usual practice is to define a 99-100 % range and have an optimization range covering the rest (0-99 %).

Mode: Policy flow configuration mode.

Profile: Administrator.

Examples: Set tracking to 1% and acceleration to 99%.

```
admin@bqn0(config)# policy rate mypolicy
```

```
admin@bqn0(config-polflow)# optimization 0 99
admin@bqn0(config-polflow)# tracking 99 100
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy flow](#)

Commands: [show policy](#)
[optimization](#)

trap-v1

Syntax: trap-v1 nms [community]

```
no trap-v1 nms [community]
```

Description: Define the address of a network management station (NMS) where SNMPv1 traps will be sent. The nms argument is the IP address of the NMS. Multiple NMSs may be configured to receive traps. The optional community parameter indicates the community used to send the notification. If not community is indicated then the most recent net-snmp trap-community string is used.

Use the no command form to remove an NMS from receiving traps.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the address of a NMS where SNMPv1 traps will be sent.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# trap-v1 192.168.1.64 mycommunity
admin@bqn0(config-snmp)# commit

admin@bqn0(config-snmp)# op show snmp trap

NMS          TRAP-TYPE  COMMUNITY
192.168.1.64  SNMPv2c   mycommunity
```

Related: [show service snmp](#)

Commands: [show snmp trap](#)
[snmp](#)
[trap-v2c](#)

trap-v2c

Syntax: trap-v2c nms [community]

```
no trap-v2c nms [community]
```

Description: Define the address of a network management station (NMS) where SNMPv2c traps will be sent. The nms argument is the IP address of the NMS. Multiple NMSs may be configured to receive traps. The optional community parameter indicates the community used to send the notification. If not community is indicated then the most recent net-snmp trap-community string is used.

Use the no command form to remove an NMS from receiving traps.

Mode: SNMP configuration mode.

Profile: Administrator.

Examples: Set the address of a NMS where SNMPv2c traps will be sent.

```
admin@bqn0# configure
admin@bqn0(config)# snmp
admin@bqn0(config-snmp)# trap-v2c 192.168.1.64
admin@bqn0(config-snmp)# commit
admin@bqn0(config-snmp)# op show snmp trap
```

Related: [show service snmp](#)

Commands: [show snmp trap](#)

[snmp](#)

[trap-v1](#)

tso

Syntax: tso

```
no tso
```

Description: Enable or disable the TCP segmentation offload functionality of a network interface. This command is supported in PCAP interface mode only.

When a new interface is configured TSO is disabled by default. Note that the BTA service requires that TSO is disabled.

Use the no command form to disable the TSO functionality.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Enable TSO in a network interface.

```
admin@bqn# configure
admin@bqn(config)# interface en0p0s9
admin@bqn(config-iface)# tso
admin@bqn(config-iface)# commit
admin@bqn(config-iface)# end
admin@bqn# show interface en0p0s9
en0p0s9: UP BROADCAST RUNNING MULTICAST
```

```
Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: on
RxChecksumOffload: on  TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 4096/4096 RingSlotTx: 4096/4096
MTU: 1500
rx_bytes: 0             tx_bytes: 51660
rx_packets: 0           tx_packets: 1230
rx_errors: 0            tx_errors: 0
rx_dropped: 0           tx_dropped: 0
rx_oversize: 0          tx_carrier: 0
rx_multicast: 0         tx_collision: 0
Index: 3
```

Related: [interface](#)

Commands: [nic pcap](#)

[show interface](#)

tx-queue-len

Syntax: tx-queue-len value

no tx-queue-len value

Description: Set the transmit queue length of a network interface. In general, the default value for the interface transmit queue length is set to 1000. This command is supported in PCAP interface mode only.



Note

It is recommended to set the transmit queue length parameter of the PKTENG interfaces to 10000.

Use the no command form to restore the transmit queue length to the original value before the change.

Mode: Interface configuration mode.

Profile: Administrator.

Examples: Set the transmit queue length of a network interface to 10000.

```
admin@bqn# show interface en0p0s9
en0p0s9: UP BROADCAST RUNNING MULTICAST
```

```

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: on
RxChecksumOffload: on  TxQueueLen: 1000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 4096/4096 RingSlotTx: 4096/4096
MTU: 1500
rx_bytes: 0             tx_bytes: 51660
rx_packets: 0           tx_packets: 1230
rx_errors: 0            tx_errors: 0
rx_dropped: 0           tx_dropped: 0
rx_oversize: 0          tx_carrier: 0
rx_multicast: 0         tx_collision: 0
Index: 3

```

```
admin@bqn# configure
```

```
admin@bqn(config)# interface en0p0s9
```

```
admin@bqn(config-iface)# tx-queue-len 10000
```

```
admin@bqn(config-iface)# commit
```

```
admin@bqn(config-iface)# op show interface en0p0s9
```

```
en0p0s9: UP BROADCAST RUNNING MULTICAST
```

```

Link type: ethernet      MAC: 08:00:27:99:c2:3f
Link detected: yes      Auto-negotiation: on
Duplex: Full            Speed: 1000Mbps
GRO: off                GSO: off
LRO: off                TSO: on
RxChecksumOffload: on  TxQueueLen: 10000
ChannelRx: n/a          ChannelTx: n/a
ChannelCombined: n/a   ChannelOther: n/a
RingSlotRx: 4096/4096 RingSlotTx: 4096/4096
MTU: 1500
rx_bytes: 0             tx_bytes: 51660
rx_packets: 0           tx_packets: 1230

```

```
rx_errors: 0          tx_errors: 0
rx_dropped: 0        tx_dropped: 0
rx_overrun: 0        tx_carrier: 0
rx_multicast: 0      tx_collision: 0
Index: 3
```

Related: [interface](#)

Commands: [show interface](#)

udp port

Syntax: udp port number

no udp port number

Description: As part of an access or Internet profile address entry, it species a UDP port.

Mode: [address](#) configuration mode of access and Internet profiles.

Profile: Administrator.

Examples: This example defines an Internet profile matching all Internet IPv4 addresses at UDP port 443 (we also add TCP port 443).

```
admin@bqn# configure
admin@bqn(config)# profile internet myinter
admin@bqn(config-pfinet)# address 0.0.0.0/0
admin@bqn(config-pfinet-inetaddr)# tcp port 443
admin@bqn(config-pfinet-inetaddr)# udp port 443
admin@bqn(config-pfinet-inetaddr)# root
admin@bqn(config)#
```

Related: [address](#)

Commands: [profile access](#)

[profile internet](#)

[tcp port](#)

udr

Syntax: udr [random-percentage]

no udr [random-percentage]

Description: Decides the traffic that will generate UDR records. If no percentage is specified, all traffic matching the policy will generate UDRs. If a random percentage is specified, that percentage of flows taken randomly will generate UDRs. The usual practice is to define a percentage of no more than 2 percent.

Mode: Policy monitor configuration mode.

Profile: Administrator.

Examples: Enable a 2% of UDR generation.

```
admin@bqn0(config)# policy monitor mypolicy
admin@bqn0(config-polflow)# udr 2
admin@bqn0(config-polflow)# root
admin@bqn0(config)#
```

Related: [policy monitor](#)

Commands: [show policy](#)

[sdr](#)

udr min-active-pkt

Syntax: udr min-active-pkt number

```
no udr min-active-pkt number
```

Description: Set the minimum number of packets downloaded to be considered active. By default, this value is set to 16.

Use the no command form to reset the functionality to its default value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the minimum number of packets to 30.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# udr min-active-pkt 30
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [show pkteng parameters](#)

[udr](#)

[udr non-active](#)

udr min-independent-download

Syntax: udr min-independent-download number

```
no udr min-independent-download number
```

Description: Set the minimum interval between consecutive downloads in a TCP connection to consider them as independent downloads for UDR purposes.

The default value is 0.001 seconds.

Use the no command form to reset the functionality to its default value.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set the minimum independent download value to 0.5 seconds.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# udr min-independent-download 0.5
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [show pkteng parameters](#)
[udr](#)

udr mode

Syntax: udr mode {private | public}

```
no udr modei {private | public}
```

Description: Configure if client IP addresses are to be encrypted in UDRs (private mode) or not (public mode).

The default is private mode and it is the mode recommended for preserving clients' privacy. Use the no command form to go back to default mode.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Set UDR public mode.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# udr mode public
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [show pkteng parameters](#)
[udr](#)

udr non-active

Syntax: udr non-active

```
no udr non-inactive
```

Description: Generate UDRs for TCP flow with no active downloads. By default, UDRs will not be generated for non-active TCP flows.

Use the no command form to generate UDRs for non-active TCP flows.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Generate UDRs for non-active TCP flows.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# udr non-active
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [show pkteng parameters](#)

[udr](#)

[udr min-active-pkt](#)

udr partials

Syntax: udr partials

```
no udr partials
```

Description: Control the generation of partial UDRs (UDR records in the middle of a flow). Partial records are enabled by default. Use the no command form to disable partials.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Disable UDR partial generation.

```
admin@bqn# configure
admin@bqn(config)# pkteng
admin@bqn(config-pkteng)# no udr partials
admin@bqn(config-pkteng)# commit
```

Related: [policy monitor](#)

Commands: [show pkteng parameters](#)

[udr](#)

[udr min-active-pkt](#)

[udr non-active](#)

usage

Syntax: usage number

```
no usage number
```

Description: Assign a usage number to a license feature.

The license feature usage is an optional license property, which defines the maximum number of resources available for a license feature. For example, in the bta license, usage indicates the throughput limit in Mbps.



Note

If a property of an existing license is modified, the hash value must be set accordingly to validate the license feature.

Use the no command form to clear the usage number associated with a license feature.

Mode: License configuration mode.

Profile: Administrator.

Examples: Set the usage number of the bta license feature.

```
admin@bqn0(config)# license bta
admin@bqn0(config-license)# usage 2000
admin@bqn0(config-license)#
```

Related: [comment](#)

Commands: [hash](#)

[license](#)

[show license](#)

[time-activation](#)

[time-expiration](#)

vlan

Syntax: vlan tag-id

```
no vlan tag-id
```

Description: As part of VLAN profile, it defines an entry with the given tag-id VLAN tag.

Mode: VLAN profile configuration modes.

Profile: Administrator.

Examples: Configure several VLANs in a profile.

```
admin@bqn(config)# profile vlan myvlan
admin@bqn(config-pfvlan)# vlan 10
admin@bqn(config-pfvlan)# vlan 11
admin@bqn(config-pfvlan)# vlan 12
```

Related: [profile vlan](#)

Commands

wire

Syntax: wire iface-access iface-inet

```
no wire iface-access iface-inet
```

Description: Create a link or wire between two PKTENG interfaces for packet forwarding. All data received from iface-access is forwarded through iface-inet and vice-versa. Several wires may be created concurrently, but a PKTENG interface can only be part of one wire.

Make sure that the access and internet interfaces are identified and set accordingly. Use the no command form to remove a wire between two PKTENG interfaces.

Mode: PKTENG configuration mode.

Profile: Administrator.

Examples: Create a wire between 2 network interfaces which were previously configured.

IFACE	TYPE	MAC	STATE	LINK
lo0	loopback	00:00:00:00:00:00	up	yes
en0p0s1	ethernet	50:62:31:01:6a:12	up	yes
en0p0s3	ethernet	50:62:31:01:61:2b	down	no
en0p0s8	ethernet	50:62:31:01:b0:2a	up	yes
en0p0s9	ethernet	50:62:31:01:b0:28	up	yes

```
admin@bqn(config)# op show interface
admin@bqn0(config)# interface en0p0s8
admin@bqn0(config-iface)# root
admin@bqn0(config)# interface en0p0s9
admin@bqn0(config-iface)# root
admin@bqn0(config)# pkteng
admin@bqn0(config-pkteng)# wire en0p0s8 en0p0s9
admin@bqn0(config-pkteng)# commit
admin@bqn0(config-pkteng)#
```

Related: [bta](#)

Commands: [btc](#)

[pkteng](#)

[show pkteng wire](#)

[show pkteng status](#)

wizard bta

Syntax: wizard bta [interactive]

Description: Perform the initial BTA setup of a QoE. The command carries out the following tasks:

- Create default operator and administrator users and set their passwords.
- Configure the NTP service and set several public NTP servers.

- Configure the management network interface and enable the SSH service.
- Enable the WEB service.
- Create one or more wires (depending on the number of available network interfaces and their physical location).
- Configure the packet engine feature to forward traffic.
- Configure the BTA feature to accelerate 99% of the TCP connections randomly and to measure the acceleration.

If the interactive parameter is passed, the command prompts the user for confirmation of several parameters.

Mode: Operation mode.

Profile: Administrator.

Examples: Setup a QoE.

```
admin@bqn# wizard bta
System vendor: Dell Inc.
System name: PowerEdge R230
System serial: H9JFRP7
System supported: yes
CPU model: Intel(R) Xeon(R) CPU E3-1220 v6 @ 3.00GHz
CPU cores: 4
Management interface: en0o1
Management IP: 192.168.0.121/24
Management gateway: 192.168.0.1
Wire 1: en0p2s0f0-en0p2s0f1
BTA random acceleration: 99%

If the proposed configuration is not valid execute the command wizard bta
interactive to manually enter the configuration. Proceed with
configuration? (yes/no) [yes]:

Set "bqnadm" user password to "A78FRP7"
Set "bqnop" user password to "A78FRP7"
admin@bqn#
```

Related: [bta](#)

Commands: [pkteng](#)

[set bta optimization](#)

Intel Ethernet Controller X710 Firmware Update

This chapter describes how to update the firmware for ethernet network adapters based on the Intel Ethernet Controller X710.

1. Obtain the latest version of the Non-Volatile Memory (NVM) Update Utility for IntelOR Adapters 700 Series for the Linux operating system from the official Intel web page: Ethernet <https://downloadcenter.intel.com/product/82947/Intel-Ethernet-Controller-X710-Series>.

At the time of writing, the latest package version is 7.2.

2. Move the downloaded package to the QoE (if downloaded from a different system) and unpack it as root in the home directory.

```
bqn0:~# tar xvzf 700Series_NVMUpdatePackage_v7_20_Linux.tar.gz
```

and change the current directory into the Linux directory:

```
bqn0:~# cd 700Series/Linux_x64
```

```
bqn0:7700Series/Linux_x64 #
```

3. Before the Intel adapters can be updated, it is important to remove the existing PKTENG configuration so that the Intel update utility can access the ethernet adapters.

```
bqn0:7700Series/Linux_x64 # bqnsn
Copyright (c) 2009-2015 Bequant S.L.
root@bqn0# configure
root@bqn0(config)# no pkteng
root@bqn0(config)# commit
root@bqn0(config)# end
root@bqn0# exit
bqn0:7700Series/Linux_x64 #
```

4. Execute the Intel firmware update utility and after all the available adapters are listed enter the adapter number when prompted (in this example the Intel(R) Ethernet Converged Network Adapter X710-4, which is listed as 02).

```
bqn0:7700Series/Linux_x64 # ./nvmupdate64e
Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.34.22.6
Copyright (C) 2013 - 2019 Intel Corporation.
```



WARNING

To avoid damage to your device, do not stop the update or reboot or power off the system during this Inventory in progress. Please wait [****-....]

Num	Description	Ver. (hex)	DevId	S:B	Status
01	Intel(R) Ethernet Connection X552 10 GbE SFP+	n/a (n/a)	15 AC	00:004	Update not available
02	Intel(R) Ethernet Converged Network Adapter X710-4	4.37 (4.25)	1572	00:006	Update available
03	Intel(R) I350 Gigabit Network Connection	1.99 (1.63)	1521	00:011	Update not available
04	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:007	Access error
05	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:008	Access error

Options: Adapter Index List (comma-separated), [A]ll, e[X]it

Enter selection: 02

Would you like to back up the NVM images? [Y]es/[N]o: Y

Update in progress. This operation may take several minutes.

Num	Description	Ver. (hex)	DevId	S:B	Status
01	Intel(R) Ethernet Connection X552 10 GbE SFP+	n/a (n/a)	15 AC	00:004	Update not available
02	Intel(R) Ethernet Converged Network Adapter X710-4	4.66 (4.42)	1572	00:006	Update successful
03	Intel(R) I350 Gigabit Network Connection	1.99 (1.63)	1521	00:011	Update not available
04	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:007	Access error
05	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:008	Access error

Power Cycle your system now and run the NVM update utility again to complete the update. Failure to Tool execution completed with the following status: The selected adapter (location:[08:00:00]) cannot be up, Update the device driver and reboot the system before running this utility again.

Consult the utility documentation for more information. Press any key to exit.



Note

After executing nvmupdate64e the version has been upgraded from 4.37 to 4.66.



Warning

As indicated by the utility program, the system must be restarted and the update utility must be executed again. Since the update process is incremental until the latest version is installed.

```
bqn0:~/700Series/Linux_x64 # shutdown -r now
```

5. Change the current directory to the location where the update application was unpacked and execute the update utility again until the latest version is installed.

```
bqn0:~# cd 700Series/Linux_x64
bqn0:7700Series/Linux_x64 # ./nvmupdate64e
Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.34.22.6
Copyright (C) 2013 - 2019 Intel Corporation.
```



Warning

To avoid damage to your device, do not stop the update or reboot, or power off the system during this Inventory in progress. Wait for a moment.

Num	Description	Ver.(hex)	DevId	S:B	Status
01	Intel(R) Ethernet Connection X552 10 GbE SFP+	n/a (n/a)	15 AC	00:004	Update not available
02	Intel(R) Ethernet Converged Network Adapter X710-4	4.66(4.42)	1572	00:006	Update available
03	Intel(R) I350 Gigabit Network Connection	1.99(1.63)	1521	00:011	Update not available
04	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:007	Access error
05	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:008	Access error

Options: Adapter Index List (comma-separated), [A]ll, e[X]it

Enter selection: 02

Would you like to back up the NVM images? [Y]es/[N]o: Y

Update in progress. This operation may take several minutes.

Num	Description	Ver. (hex)	DevId	S:B	Status
01	Intel(R) Ethernet Connection X552 10 GbE SFP+	n/a (n/a)	15 AC	00:004	Update not available
02	Intel(R) Ethernet Converged Network Adapter X710-4	7.32 (7.20)	1572	00:006	Update successful
03	Intel(R) I350 Gigabit Network Connection	1.99 (1.63)	1521	00:011	Update not available
04	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:007	Access error
05	Intel(R) I210 Gigabit Network Connection	n/a (n/a)	1533	00:008	Access error

Reboot is required to complete the update process.

Tool execution completed with the following status: The selected adapter (location: [08:00:00]) cannot be up Update the device driver and reboot the system before running this utility again.

Consult the utility documentation for more information.

Press any key to exit.



Note

This time the version has finally updated to 7.32, in this case, a final reboot is required to complete the update process; otherwise, reboot and repeat this step until the latest version is updated.

```
bqn0:7700Series/Linux_x64 # shutdown -r now
```

Cambium Networks

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