Cambium Networks™

SOLUTION PAPER

Building a Highly Available Network with cnWave 60 GHz

OVERVIEW

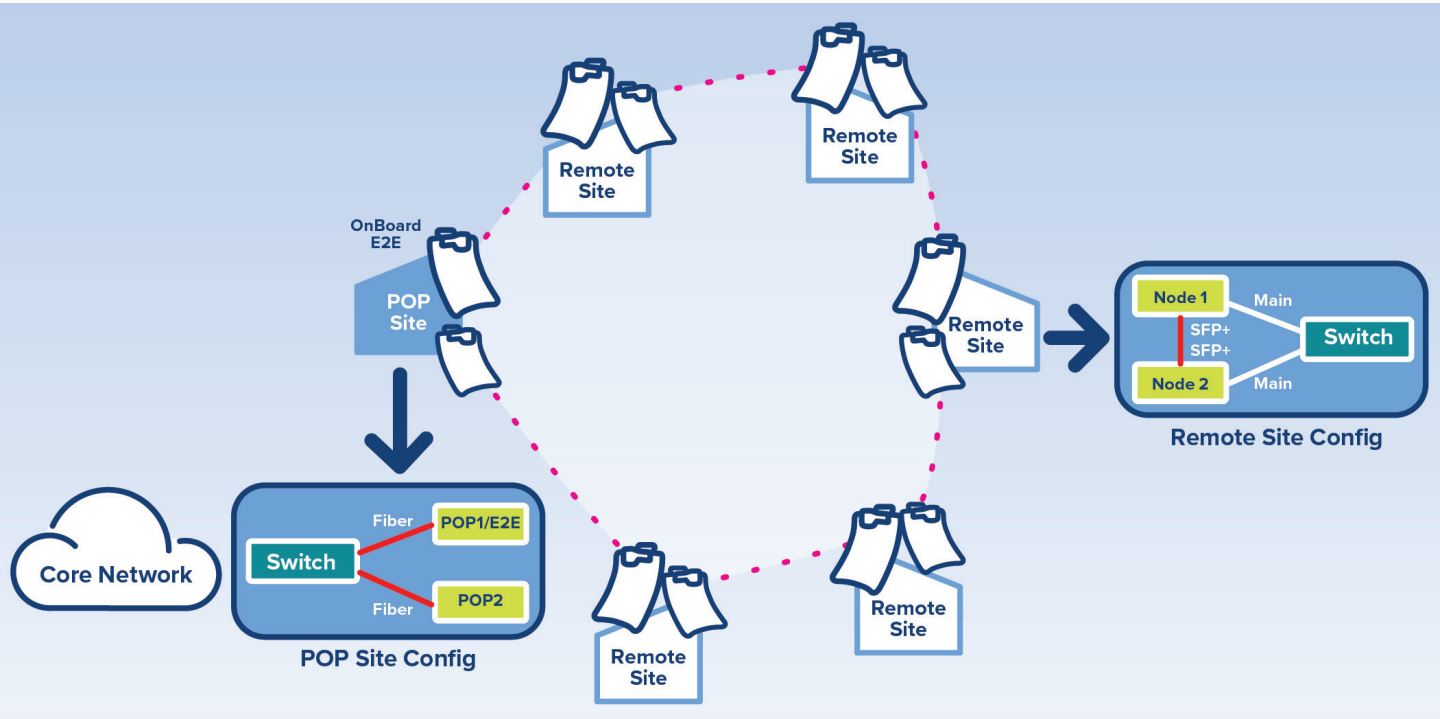
Utilizing distributed networking, the Cambium cnWave 60 GHz fixed wireless broadband technology offers a robust network solution with redundant routing paths, catering to the needs of mission-critical applications.

Customers, including public safety and utility operators, often seek beyond basic routing path redundancy. They require radio hardware redundancy at every deployment site to eliminate any single point of failure.

This document details a reference design to demonstrate how to meet such network design requirements.

Reference Design

The following figure shows a cnWave network design, which provides full routing redundancy via a ring topology using cnWave 60 GHz V3000 modules deployed as distribution nodes (DN). Hardware redundancy is achieved with redundant radios at each location.



At the Point of Presence (POP) site, which links to the core network, redundant POPs are employed (each POP should have a logical site established). So that failure of either one of the POPs will not prevent the network from continuing to provide services. Although one of the POP (POP1) is configured as onboard E2E, its failure will not prevent user traffic from routing properly to the core network.

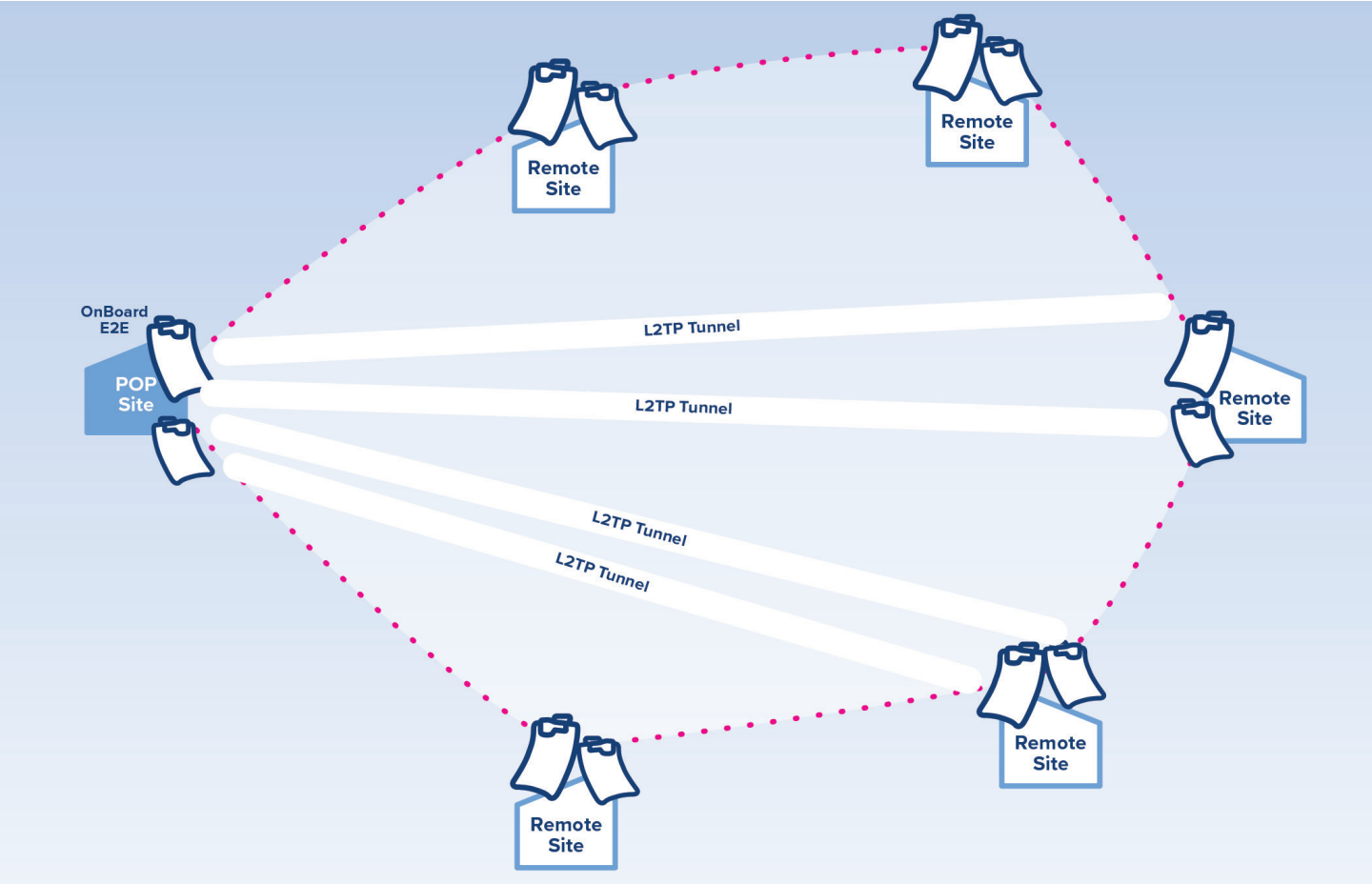
At the remote sites where DNs are installed, the redundant DNs will be connected back-to-back with each other using an Ethernet or Fiber cable. The back-to-back ports will be configured as a “Relay port”, and the connection will allow passing OpenR routing traffic, as well as tunneled user traffic.

The switch will be connected to both of the cnWave radios, so if one of the radios fails, the user traffic will go through the other radio which is still connected.

It’s important to note that a radio link failure won’t prompt the switch to select a different radio for traffic, as OpenR enables routing through alternative paths, such as the back-to-back connection in this scenario.

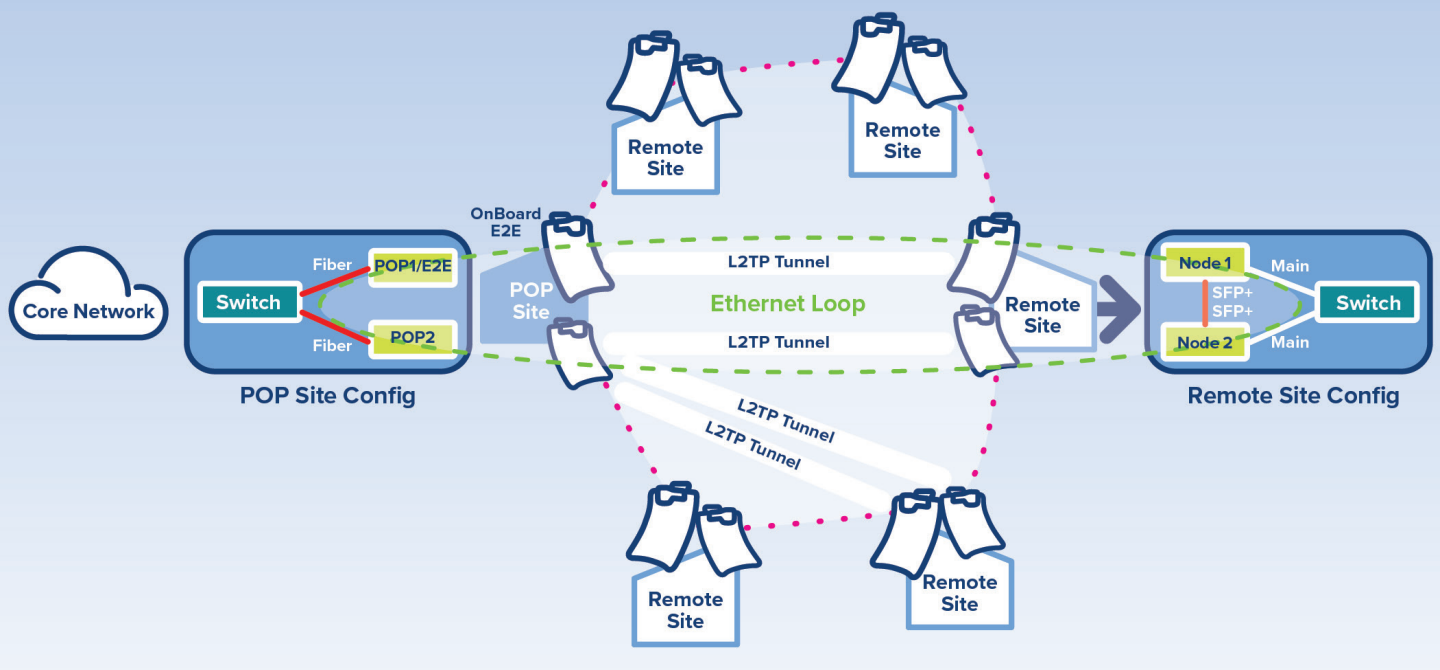
Ethernet Loop Prevention

cnWave OpenR is a Layer3 routing protocol so there is no concern about Ethernet Loop. To pass Layer2 traffic transparently, the system can be configured to provide L2GRE tunneling, using the POPs as tunnel concentrator. This results in a hub and spoke logical topology such as below, so there is no loop either.



05072024

An Ethernet Loop would be created when the switch is connected to both tunnels at the same time, and this is exactly what happened in a hardware redundancy setup.



To break the loop, it is recommended that the switches turn on **RSTP** protocol. We also recommend configuring the switch at the POP sites to be root bridge so that the POP's backhaul port will not be the one to be blocked for breaking the loop – we want the switch port that is connected to one of the tunnels at the remote site to be blocked instead.

POP Failover Optimization

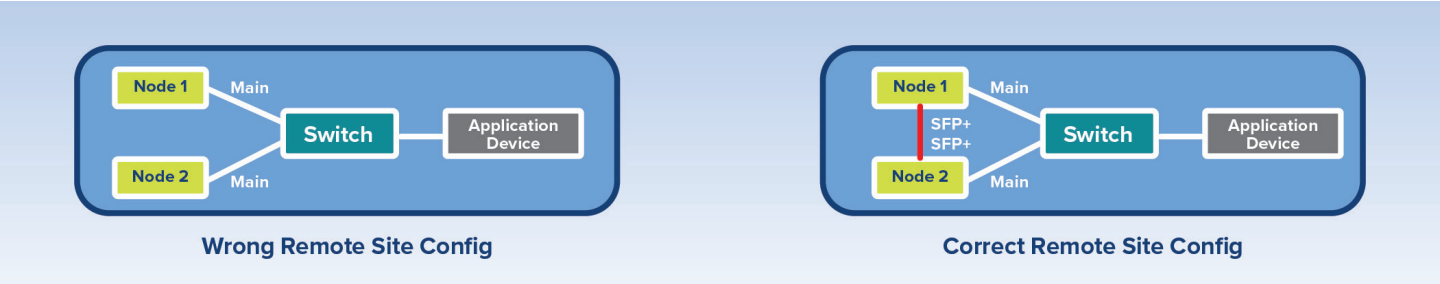
In a multi-POP (at least 2 POPs) network, the L2GRE tunnels concentrators (POPs) are assigned to each tunnel automatically based on the number of the hops that each node is from the POP. The network will use the least number of hops for the tunnel. As a result, it is possible that tunnels from the cnWave nodes at the same site be assigned to the same tunnel concentrator POP. If that POP fails, the tunnels will be temporarily re-assigned to other POP as concentrator and this failover will take more than 10 seconds, which means service down time for more than 10 seconds for the sites affected.

However, with careful engineering, the operator can configure preferred-tunnel-concentrator assignment so that the tunnels at the same site be split into different POPs. As a result, the failover downtime caused by POP failure will be totally dependent on how fast the switch RSTP reconverge. Typically, RSTP reconverges within less than 6 seconds.

2000 Center Drive Suite East A401, Hoffman Estates, Illinois 60192 USA

Common Mistake to Avoid

Some network operators would make the mistake of connecting the switch to the two DNs, without a back-to-back connection (shown in picture below at the left-hand side).



In such a setup, the switch will be used to pass OpenR routing traffic, as well as tunneled user traffic. The application traffic will **NOT** be routed by the cnWave radios because it is not encapsulated in IPv6 L2GRE tunnel, causing the system to fail.

Conclusion

The cnWave 60 GHz fixed wireless solution, with proper configuration, such as by using back-to-back relay on radios and RSTP on switches, can provide a highly available network with complete hardware redundancy and prevent single point of failure.

Cambium Networks™
ONE NETWORK

About Cambium Networks

Cambium Networks enables service providers, enterprises, industrial organizations, and governments to deliver exceptional digital experiences and device connectivity with compelling economics. Our ONE Network platform simplifies management of Cambium Networks' wired and wireless broadband and network edge technologies. Our customers can focus more resources on managing their business rather than the network. We make connectivity that just works.

05072024

2000 Center Drive Suite East A401, Hoffman Estates, Illinois 60192 USA