

Central Lincoln PUD

Converged IT/OT Network Amps Up Resilience for Central Lincoln People's Utility District



A critical community power provider shares its path to Carrier Ethernet for better resilience

Central Lincoln: Innovating since 1943

The Central Lincoln People's Utility District (PUD) spans 112 miles of the Central Oregon coastline. Its mission is to ensure the communities it covers have access to reliable and affordable energy products and services. The PUD serves 55,000 residents and 5,600 small commercial and industrial businesses through 32 substations.

A fast follower that keeps the lights on

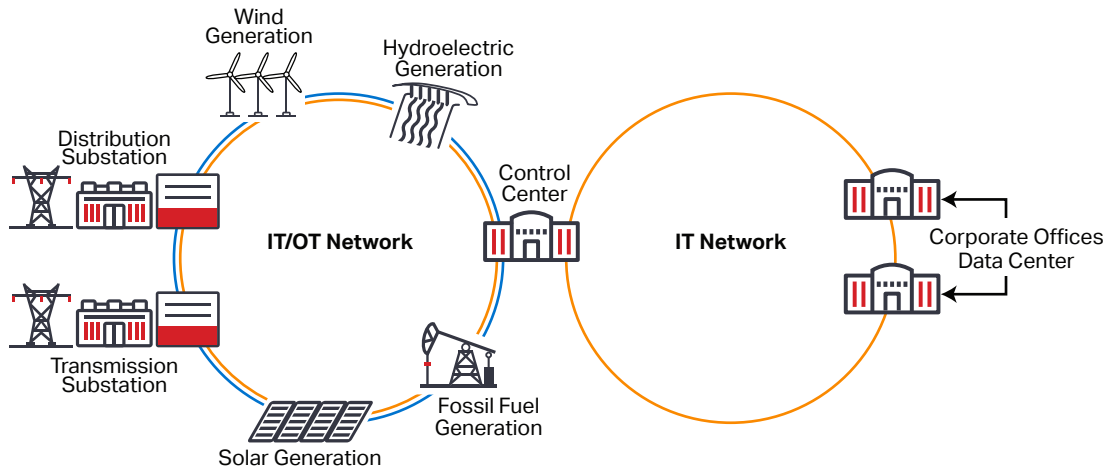
Central Lincoln is a cost-conscious public utility and does not aspire to be an early adopter—but it also does not want to lag behind meeting customer requirements and market opportunities. Central Lincoln is very much a community partner and values the role they play in their service area.

Known as a progressive utility, Central Lincoln tracks and vets innovations. It then allocates the necessary resources to implement the technology that benefits customers without inviting unnecessary risk.

Their delivery of quality services is backed by policies, procedures, and work practices that are customer focused, designed efficiently, and applied consistently.

The future is now: Central Lincoln keeps looking ahead

- Carrier Ethernet as the backbone for adding Operational Technology (OT) and Information Technology (IT) services
- Incentives to customers who install qualified solar, wind, and small hydropower systems
- Rebates to customers who install electric vehicle chargers



Key challenges

Central Lincoln’s commitment to fiber modernization began in 1995 with the initial construction of a fiber optic network to connect key substations. It accelerated with a smart grid investment grant through The American Recovery and Reinvestment Act of 2009. Its latest challenge was how to update its network to scalable packet-based Carrier Ethernet for greater resilience and leverage the full capabilities of their fiber optic investment.

Many obstacles had to be overcome. Like most PUDs, Central Lincoln runs lean. It employs resources from OT and IT who wear many hats to manage a large service area. Pushing office IT services such as email, file access, video surveillance, voice, and basic security into OT environments was difficult at best. When modernizing to packet, network mission critical OT teleprotection traffic needed to be prioritized and could not compete with lower priority traffic. This application needed its own ‘HOV’ lane to be effective.

These problems could not be solved with the existing outdated technology. Central Lincoln was even struggling with basic maintenance of their legacy system due to the scarcity of obsolete parts, the inability to find training for new employees, and the lack of technical support for equipment.

Issues at a glance

- Separate IT/OT networks and resources
- Slow bandwidth speeds
- Obsolete spares
- Redundancies and inefficiencies

Solution

Central Lincoln PUD partnered with Ciena and Schweitzer Engineering Labs (SEL) for collaborative technical expertise, consulting, and solution execution. A Carrier Ethernet solution was engineered to deliver:

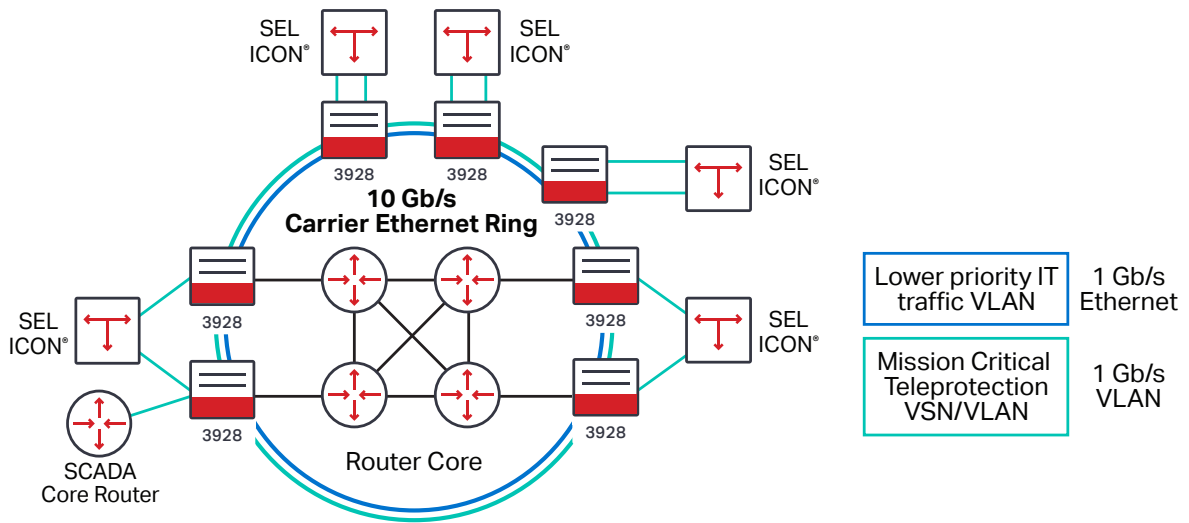
- Converged IT/OT networks into one unified network with one virtual control center
- Technical integration with clear security demarcation between IT and OT
- Integrated security and password management
- Reduced roundtrip latency to less than two milliseconds
- Prioritized mission critical teleprotection traffic
- Full substation IT support, including video and voice
- Retirement of non-essential operational equipment, including DC-DC power converters

Why Carrier Ethernet?

Carrier Ethernet is next-generation packet optical with enhanced operations, administrative, and maintenance capabilities.

- Supports guaranteed performance of teleprotection applications
- Delivers standards-based, predictable, low-latency performance
- Provides reliable, instant failure detection for quick recovery and maximum availability
- Enables scalable data rates over long distances

Fast network for optimal teleprotection



Carrier Ethernet
Gain insights



A close-up view of integrated technical components

- **Ciena's 3928 Platform** for a flexible and scalable switching architecture with multiple data transport options
- **G.8032 Ethernet Ring Protection Switching (ERPS)** for recovery with similar performance to SONET
- **SEL Integrated Communications Optical Network (ICON)** substation multiplexer with Virtual Synchronous Networking (VSN) to provide deterministic Ethernet communication for substation OT circuits
 - Clear demarcation of OT services
 - Set and forget circuit provisioning
 - 1ms latency, 0.05ms asymmetry, <5ms healing
 - Support for all substation interfaces (EIA-232, EIA-422, DS1, 4-wire VF, FXO/FXS)

Ciena's 3928
Learn more



Solution benefits summary

- Unified IT/OT networks across a single substation WAN
- Abundant capacity for future applications through a 10Gb/s backbone
- Low latency through SEL's VSN process
- Prioritization of teleprotection traffic through a dedicated teleprotection VLAN

Results

With its new Carrier Ethernet, Central Lincoln achieved faster network speed, lower latency, and more efficient power consumption.

- **Increased bandwidth speed** for IT applications from 1.5Mb/s to 100Mb/s—more than 60 times faster—enabling optimal technician performance
- **Reduced field-proven, one-way latency** to 1ms, down from an average of 2ms, enabling optimal teleprotection performance
- **Validated in-service line current differential protection circuit stability** against existing SONET network to prove long term asymmetry stability of 0.05ms guaranteeing TDM-equivalent performance
- **Lowered substation battery load** from 500 watts to less than 300 watts for 40 percent savings

Utility network modernization
Gain insights



Summary

The Carrier Ethernet substation WAN solution that Ciena and SEL delivered to Central Lincoln addressed their challenges, modernized their operations, and positioned them for continued evolution. The solution unified the utility's IT/OT network functions while maintaining existing departmental responsibilities for operations and maintenance. It enhanced bandwidth capacity, lowered latency, and prioritized teleprotection—and transformed Central Lincoln from reliance on outdated parts and gave them an efficient, streamlined, secure foundation for future services.



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No