# Broadband Case Study: Orcas Power and Light Cooperative & Rock Island Communications

## Cooperative Profile

Orcas Power and Light Cooperative (OPALCO) provides electric service to approximately 12,000 members living and working in San Juan County, an area comprised of twenty islands off the coast of northwestern Washington State. Residents rely on island ferries for transportation. The cooperative buys power from Pacific Northwest Generating Cooperative, mainly supplied by Bonneville Power Administration, and delivers it via submarine cables connecting the islands. Given their unique topography, it is not surprising that these island communities face unique challenges with the delivery of electric power; however, access to reliable, high-speed telecommunications has proven to be even more problematic. A major wake-up call came in 2013 when a break in the islands' sole telecom provider's undersea fiber cable interrupted landline, data and cellular telephone communications, including 911 emergency service, for ten days.

To address these challenges and at the same time enhance its electric operations, OPALCO established a wholly-owned, for-profit subsidiary, Rock Island Communications, to build a broadband communications network that integrates fiber-optic and LTE wireless technology.[1] The network is designed to address public safety needs, support electric system operations, manage outage risks and help the island communities of San Juan County overcome their physical separation from the rest of the state, and their virtual separation from the rest of the world, with scalable, high-speed connectivity. The financial model and deployment methods successfully developed by Rock Island are unique enough (rural isolation, limited broadband service, and seasonal component) that other electric cooperatives with similar characteristics should consider trying to replicate them to raise their odds of success.

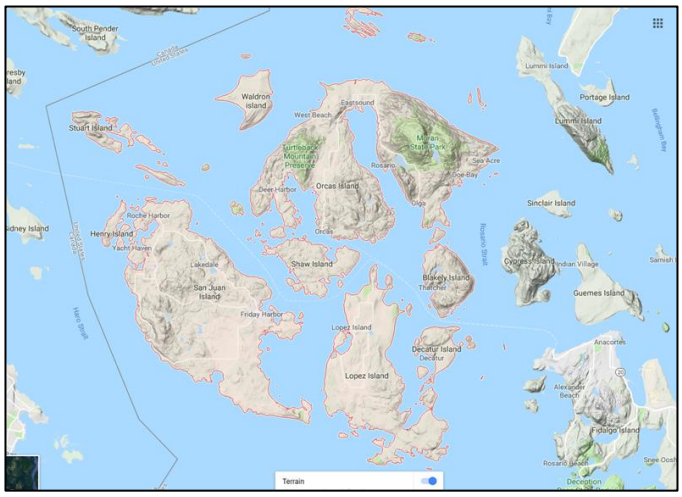


**Figure 1. The islands of San Juan County, WA.**
Map data ©2018 Google

## Business Drivers of Broadband Investment

OPALCO's need to better communicate with its crews, electrical substations and submarine terminals was the main driver behind its investment in an expanded broadband telecommunications infrastructure. According to General Manager Foster Hildreth, the cooperative sees the world before and after the submarine cable break as two distinctly different eras. Management's perception after the catastrophic 2013

[1] LTE is short for Long Term Evolution, a technology standard and upgrade path that enables higher wireless broadband speeds and capacity to keep pace with increasing demands.

communications cable failure was that they could no longer rely on others to "deliver critical infrastructure and satisfy cooperative safety, quality, and service levels."

System operations and maintenance were not the only motivating factors, however. Another serious incident that had occurred a few months earlier lent support to OPALCO's decision to enhance communication coverage across the communities it serves. One of the co-op's linemen came into electrical contact with a high-voltage line while working in the field and was seriously burned. Fortunately, the crew was working in an area with just enough cellular coverage that the accident did not result in a fatality. The possibility of a less fortunate outcome in future incidents where communications coverage might be weak or nonexistent was not lost on the cooperative, for which safety is the highest priority.

**Figure 2. Ferry serving San Juan Islands, WA.**
Photo courtesy of ORCAS Power and Light Cooperative.

## Project Overview and Deployment Approach

OPALCO was an early adopter of fiber as a utility solution to connect its offices and substations. In the early 2000s, OPALCO began providing access to its fiber network to public safety agencies, government entities, schools, and public libraries to help meet their connectivity needs. After the cable failure, studies focused on improving communications were performed to both enhance internal operations and provide more reliable, high-speed communications to the broader community. These culminated in a 2014 action plan that became the basis for the cooperative's broadband initiative. A key factor in moving forward was the co-op's approach to managing the financial risk of the project. OPALCO acquired Rock Island, the then-largest independent Internet Service Provider (ISP) operating in San Juan County, in an effort to expand

customer base, "get closer to subscriber break-even targets right from the beginning," and provide start-up cash flow.[2] Rock Island Communications became the new "Rock Island."



For General Manager Hildreth, one central challenge stood in the way and had to be overcome. "Fiber network builds are very capital intensive and no matter how much demand for broadband services exists, they are inherently too slow to market. Add in the necessary, operational cash-burn for on-boarding and technical support efforts, and you have a recipe to get upside-down on your investment very quickly."

Rock Island took an approach to the upfront investment that centered on sharing the deployment risk with the communities to be served. The company devised a very fast method to map, design, and estimate the cost of fiber to every home in the county, with the ability to group homes into "fiber-hoods." This enabled organized groups such as homeowners' associations to understand the cost breakdown and how they could share middle-mile construction, while also seeing fiber-connection costs to each home. Rock Island offers an incentive of $1,500 toward Last Mile construction with the balance payable by each subscriber. The more individuals a fiber-hood recruited to get onboard, the less each would need to pay, and this created a community-wide effort to engage and encourage higher levels of participation.

This fiber approach, along with the deployment of LTE fixed wireless in partnership with T-Mobile, delivered immediate cash-flow to the new Rock Island entity. The LTE network enabled a broader reach into the community, delivering faster speeds and better service levels than incumbent providers, which in turn allowed Rock Island to convert the customer base very quickly. It also provided a much-needed communication network for the first responder community — both voice and data.

**Rock Island Communications by the Numbers**

- 382 miles of fiber
  - 27.4 miles of overhead distribution fiber.
  - 142.4 miles of underground distribution fiber.
  - 212 Miles of Transport/Backbone
- 38 LTE Sites online/5 under construction
- 7 major fiber submarine crossings.
- 6 redundant long-range peer-to-peer (P2P) radio connections.
- 4,700 customers and growing (40% market share).
- 40 full-time employees
- 20 islands served
- 2 retail locations on two islands

Rock Island is now in its third year of building what it envisions to be a world-class, fiber-based hybrid (fiber to the home and LTE wireless) communications network encompassing San Juan County.

[2] Rock Island had been operating in the area since 1996 with a robust customer base and cash flow, but primarily as a reseller of CenturyLink DSL. With its acquisition by OPALCO it became the core of the new Rock Island Communications.

## Broadband Business Case



It is difficult to fully quantify the internal and community-wide personal and business benefits of a reliable, high-speed system like Rock Island's. For the cooperative itself, expansion of fiber and the addition of 38 new LTE wireless sites throughout the service territory have improved safety and communication for crews in the field. The expanded network has also enabled greater automation of the electrical system through the use of intelligent devices that can now be monitored and controlled remotely. Hildreth states that the most practical means for judging Rock Island's investment in broadband is positive cash flow, which is expected to occur by mid-2018. He expects enhanced returns on the investment down the road, noting:

> *"It has given us a leap forward in preparing our grid to be able to incorporate more distributed energy resources and member devices on our system. One of the biggest challenges utilities will face in embracing more and more member renewables and devices will be the need for real-time, high-speed, two-way communications. OPALCO now has the ability to dynamically balance energy and voltage fluctuations as energy usage, intermittent generation and storage patterns evolve. This project provides us with the perfect platform to meet our current and future needs."*

The capital cost of the Rock Island broadband initiative was on the order of $25 million, with projected annual operating costs of $3 to $6 million by 2022. The project has been funded by operating revenue from customer subscriptions to the service, a loan/line of credit from CoBank and direct investment in construction build-out by subscribers. Annual revenue was $3.6 million in December 2017 with a target to generate $8.7 million by 2022.

Rock Island has also been significantly aided by a parallel investment of equipment and expertise by T-Mobile. Gerry Lawlor, Executive Vice President of Rock Island, explains that OPALCO also looked into grant opportunities. However, he says the broadband buildout was "slightly late for Obama-era grants, given they were looking for shovel-ready projects." Rock Island has fully repaid its initial borrowings from parent OPALCO and now funds itself directly via revenue and its line of credit with CoBank. Lawlor estimates that a conservative target for market penetration is 60 percent of San Juan County.

The cooperative also believes that the long-term economic development effects of broadband availability in San Juan County, while not easily quantifiable, will be significant. In recent surveys, 35 percent of seasonal residents (second homes account for roughly 40 percent of the total housing stock in San Juan County) reported spending more time and money in the county as a direct result of improved connectivity – and given the seasonal nature of the county's economy, stable and reliable services during the compressed, revenue-generating season are a critical issue.

**Figure 3. Rock Island Communications personnel pull fiber**





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## Network Architecture

The network relies on OPALCO's Power Grid Control Backbone, the fiber network the co-op uses to manage its electrical system, as its core. The transport and distribution network is an active-Ethernet fiber-to-the-premise (FTTP) network supplemented by an LTE fixed wireless network for hard-to-reach locations. As of early this year, about 32 percent of Rock Island's customers are served by FTTP and 53 percent are served via the LTE wireless, with the remaining 15 percent being served by legacy DSL and public wireless. Rock Island is providing its fiber-connected subscribers with 1Gbps (gigabits-per-second) service with the ability to increase to 10Gbps at every location on the fiber network.

The LTE network is a creative, long-term partnership between Rock Island and T-Mobile under which the partners share investment and capability, helping to address serious gaps in mobile voice and data coverage that have existed around the county and to improve public safety operations. The arrangement allows Rock Island to offer its customers a private LTE wireless solution in the home separate from T-Mobile's mobile service, even though the two use essentially the same wireless network. The significant benefit LTE has over other public spectrum Wi-Fi networks is its ability to propagate higher levels of throughput within a challenging topography, while maintaining higher levels of service. This partnership allows Rock Island to utilize low and mid-band spectrum and stay on the forefront of LTE technology as 4G and 5G networks advance. By 2020, Rock Island sites are expected to see 1Gbps-plus speeds over the LTE network as 5G (fifth generation) wireless technology is introduced.

Another aspect that has made broadband deployment successful is that Rock Island has full design/build control over the LTE sites themselves. Introducing LTE sites into an environmentally and aesthetically sensitive area like the islands of San Juan County is not a simple task, so creative site design is critical (see Figure 4). Feedback from the community has been extremely positive as the sites are well incorporated into the natural terrain, while still providing the level of coverage and performance required.

**Figure 4. Sensitive Design of LTE Sites.**

## Broadband Business Model

Access to capital is often a key limiting factor in financing a broadband telecommunications infrastructure. Rock Island has adopted an innovative approach to financing that allows for phased build-out through sharing of middle-mile and last-mile construction costs. In essence, the approach "outsources" these costs to customers. Customer investments in construction under Rock Island's model has reached $2.5 million to date

with a steady stream continuing to support the fiber-build pipeline. Customer investments can be financed on a monthly basis through a local lender. The decision to connect with Rock Island is reinforced once subscribers compare the monthly cost of their legacy-bundled Internet bill with an equivalent Rock Island high-speed service.

According to Hildreth, key elements of Rock Island's business model include:

- Anchoring the network with the electric co-op's existing fiber-optic backbone.
- Fiber-hoods equally sharing the cost for middle-mile build-out.
- Individual customers paying for last-mile connections alongside Rock Island's construction incentive.
- Focusing on public safety; coordination with first-responder agencies county-wide.
- Maintaining a wireless LTE Partnership with an expert technology company (T-Mobile).
- Establishing fast time-to-market and early revenues to minimize the need for start-up loans.

To make its shared-cost model work, the cooperative organizes customer groups and neighborhood associations into fiber-hoods to cover the cost of middle-mile buildout to their area, and then contracts with individual participants to cover the cost of fiber to their homes. Sites that are difficult to reach with fiber are served by the LTE wireless network. The benefit to Rock Island of such an approach is its relatively quick ramp-up in revenues, which enables deployment of the full network incrementally. In the company's view, this shared approach to investment and risk-taking addresses several critical factors for success:

- Determines real demand and priority for fiber.
- Individuals within each fiber-hood become the evangelists.
- Achieves higher take-rates within each fiber-hood (average 70%).
- Enables immediate deployment of service-level increases via the LTE Network.

Rock Island has become a full-service, retail telecommunications services provider covering broadband access, voice, co-location services, Internet hosting, email, and IT management. Moreover, the company is working with T-Mobile to begin offering TV service under its partner's Layer3$^{tv}$ brand. The range of services being offered was developed partly as a result of Rock Island management constantly asking the questions, "How can we help the communities we serve?" and "Where can we support our business community?" It helps that Rock Island has an eye also toward the future. Hildreth readily expresses his belief that telemedicine will be key to the well-being of San Juan County residents.

## Network Ownership and Operations

Ownership of the network is split between OPALCO and Rock Island — OPALCO owns the fiber backbone and Rock Island owns and operates all distribution fiber and LTE wireless sites. Rock Island

Communications personnel manage the network for OPALCO up to the point where SCADA (Supervisory Control and Data Acquisition) devices are connected.



## Regulatory Issues

Hildreth reports that no significant regulatory or tax issues have been encountered to date.

## Market Setting

Prior to 2014, no sources of retail broadband communications with fiber speeds were available in San Juan County, according to OPALCO. The primary offering at the time was legacy DSL Internet access, augmented by limited cable and satellite.

CenturyLink is the primary alternative to Rock Island for communications services today. Rock Island is also a wholesale provider to three fairly small ISPs / cable companies operating in the local area.

## Challenges and Surprises

- Rock Island initially experienced challenges implementing its customer-driven deployment strategy, e.g., organizing neighborhoods and groups. Its team has now mastered the routine of continuously processing fiber-hoods in its workflow.

- With 90 percent of the communications network being located underground in rocky terrain, deployment time and cost in the twenty islands that make up San Juan County are significantly higher than national averages. Adopting a shared-cost model for middle-mile and last-mile deployment helps to address this reality.

- OPALCO recognized that entry into a competitive business environmental such as broadband communications through Rock Island would require a new team culture, a different attitude, and a "sales mentality." Rock Island is now staffed by forty dedicated and talented people with a range of skills, reflecting technology, finance, marketing, and retail experience. The company considers its IT team, including its partners at T-Mobile, to be "top-notch."

- One pleasant surprise — continuing demand for the services has exceeded expectations and this has had the side benefit of closing pre-existing gaps in cellular coverage throughout the communities served.

## Why is this Case Important?

The cost-sharing approach Rock Island has adopted, whereby groups or associations are assembled to share the network's middle-mile deployment costs and individual homeowners or business operators pay last-mile costs, has numerous advantages over more conventional infrastructure investment models. In OPALCO's case, it is responsive to the high cost of deploying broadband. Put simply, the more people who share middle-mile costs, the lower the average group member's share becomes. There is something more fundamental going on here though. In Hildreth's words, Rock Island's approach transforms the narrative from "Let us sell you a service" to "Let's build this together." Indeed, customers have already funded about $2.5 million of middle-mile investment to date.

**Fundamental Ingredients for Success According to OPALCO**

- Strong and vocal member support.
- A committed board of directors.
- Cooperative leadership that understands the importance of overlaying the power grid with fiber-optic communications to keep rates low as possible in the future.
- Members willing to help fund their individual broadband connections.
- The broadband entity's ability to generate revenue early from fixed wireless service.

Hildreth and Lawlor have expressed interest in working with other electric cooperatives to replicate their broadband expansion model. In Hildreth's view, the best fit for OPALCO's business model will be found by electric cooperatives that share the following four characteristics:

- There is a commitment to make fiber-optic improvements to the electrical grid.
- Access to commercial broadband is currently limited in the communities served and costs to deploy broadband are above the national average.
- Cooperative leadership has adopted a long-term approach to maintaining low rates and is concerned about public safety.
- Membership is willing and able to share in the cost of broadband deployment.

OPALCO's real-life experience with expansion of broadband access to homes and businesses in the remote areas in which it operates should be of significant interest to other electric cooperatives with similar challenges.

## For additional information, contact:

**Foster Hildreth**
General Manager
Orcas Power and Light Cooperative
ConnectwithFoster@opalco.com
(360) 376-3513

**Paul Breakman**
Sr. Director, Cooperative Systems
Business and Technology Strategies
paul.breakman@nreca.coop
(703) 907-5844

## About the Author

This case was researched and written by Eric Cody, Cody Energy Group: CodyEnergyGroup@gmail.com





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