OPALCO Broadband Study

Summary Findings

January 18, 2013

ORCAS POWER & LIGHT COOPERATIVE

A Touchstone Energy Co-op

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Dear Co-op Member-Owners:

Thank you for taking the time to review the *Findings Document* that details OPALCO's comprehensive study of a potential telecommunications infrastructure expansion. For most of you, that means better broadband. For the entire community, it means improved electrical system reliability, better communication in the field for first responders and a robust fiber backbone to support future growth and development – including the hope of better cell phone coverage.

Today, OPALCO operates an electric system, and our members own the physical plant (equipment) that provides those services. The building of the proposed telecommunication system would be an expansion of OPALCO's plant to allow us to also provide telecommunication services. The resulting system would be owned by the membership just as the membership owns the electrical system, thus all members would contribute to building what we will all own. The monthly broadband subscription fees would cover the cost of operating the system and thus would be borne only by those that use it.

For that reason, we are leaving the decision about whether or not to build the system to our members. In this document, you will learn the details of a proposed plan and the thinking behind it. In the coming months, a lengthy (6-9 months) member engagement effort will be launched to give you ample opportunity to ask questions and give feedback. At the end of the day, if about half of our members show their support for the plan, we expect to move forward. If not, the community will have to look for other ways to meet our communication needs now and into the future.

This is a really big, expensive and important project. Thank you for exercising your rights and responsibilities as co-op member-owners to carefully review the information, ask good questions and let us know what you think.

Please stay tuned for more details on the member engagement effort, soon to be announced in the papers and online at www.opalco.com.

Sincerely,

Foster Hildreth, Assistant General Manager

Background

History

In the 21st Century, high-speed data networking plays an increasingly large role in all aspects of life. San Juan County's telecommunications infrastructure is limited, and in many cases cannot meet the needs of a modern society in areas such as education, health care, public safety, and economic development. In 2009, The San Juan Island Community Foundation's Critical Needs Task Force identified improved broadband access as one of the most important issues in the county. The Community Foundation joined with the San Juan County Economic Development Council to explore possible solutions.

San Juan County is difficult for a telecommunications provider to serve profitably. The population is small (about 15,000), the population density is low, and the terrain is rocky and forested, making it difficult to cost-effectively install infrastructure. As a result, for-profit companies such as CenturyLink have been unable to implement a county-wide solution. Orcas Power & Light Cooperative (OPALCO) was approached in 2011 to explore possible solutions; OPALCO is well positioned to help, having installed its own high-speed data network to serve the communication needs of the electric co-op.

As the 20th Century drew to a close, data communication had become an integral part of the business of running an electric utility company. Since 1999, OPALCO has made a major investment in building a fiber-optic network to ensure that its membership has access to the most reliable power at the lowest possible cost. OPALCO's first fiber-optic cable was run from Anacortes to the San Juans in 2001, and over the next few years, OPALCO built out a communications network to allow monitoring and control of its electrical system. Following cooperative principles for assisting with community needs, in 2004, OPALCO expanded access to this network to public entities such as the County administration offices, Sheriff and Fire departments, Washington State Ferry terminals, schools, libraries, medical centers and Internet Service Providers (ISPs), through a subsidiary called Island Network.

Where prudent, OPALCO has continued to expand its high-speed data infrastructure to improve electric system reliability, safety and efficiency, and to help keep costs down for its members. Looking forward to the next 75 years of co-op service, it is clear that communication is central to everything we do, we must make best use of our finite resources and, like in the past 75 years, cooperation will lead the change. OPALCO's Board of Directors commissioned this Broadband Study to examine how this infrastructure might be used as part of a strategy to deliver broadband service to the community at large.

Mission

A group of OPALCO employees, board members and consultants was assembled and asked to identify the goals and requirements of the community and then to propose a communication network plan to address those needs in a way that would be acceptable to the citizens of San Juan County.

Specifically, the goal is to design a countywide multi-use, joint-access communication network to:

- meet OPALCO's data communications needs for operating the electrical system
- address the unmet communication needs of first responder/emergency services such as Sheriff, Fire, EMS, and OPALCO field crews
- provide 90% of the County with high-speed Internet access; and
- offer co-location facilities to wireless (cell phone) carriers, thus encouraging them to expand service in our area

Situation Analysis

Technologies

The vast majority of San Juan County residents and businesses rely on Digital Subscriber Line (DSL) technology for Internet access because the traditional copper telephone wire used for DSL is the only Internet-capable infrastructure available to most of our community. This kind of wire was designed to carry analog voice signals, but is not as good at carrying digital data as are other technologies, including coaxial cable, wireless or fiber-optic cable. But DSL is all we currently have in most of the county. There are a few hundred customers that can receive wireless Internet service or Internet service provided over cable TV, but about 90% of the populace relies on DSL. This DSL service is delivered by CenturyLink, the local phone company that owns the copper wire infrastructure, and also by local companies that use CenturyLink's phone system: Rock Island Communications, Orcas Online and The Computer Place. CenturyLink has the most customers, estimated at about 60% of our membership.

In ideal conditions, DSL is capable of speeds up to about 10 Megabits per second (Mbps), which today is considered moderately good. However, DSL performance declines rapidly the farther the customer is from the closest DSL access multiplexer (DSLAM). Customers who are in the population centers or who happen to be close to a DSLAM can get about 10 Mbps performance from DSL. But, because our population is spread out over a large area, most residents are subject to the dramatic falloff in performance inherent in DSL technology. This is why most of

our county suffers from such poor Internet performance today. DSL performance can also vary as it is affected by increased load; Internet connectivity via DSL is often marketed using terms like "*up to* 10 Mbps," but users frequently experience performance well below the "up to" speed.

Even those with access to 10 Mbps DSL will not be well served in the near future. Internet use is growing rapidly, and DSL will not be able to accommodate future demands. During our research over the past year, our members have been transitioning from one-computer households to households having multiple wireless devices, including computers, smart phones, tablets, game systems and now smart televisions. Concurrently, the amount of data moved to a typical user over an Internet connection is increasing dramatically as video and animation have become commonplace on web pages. New educational opportunities, increased telecommuting, and advances in telemedicine will all add to the demands made on an average household's Internet capabilities. At some point in the not-too-distant future, DSL simply will not be able to support the community's needs. To provide a forward-looking communication system, we have no choice but to look at using a better technology.

Products

CenturyLink usually sells DSL Internet service as part of a "bundle" that includes both Internet service and telephone service. Its advertising seems to offer very low prices, but these ads can be misleading with regard to the cost of the phone service and additional taxes and fees that are in the actual monthly bill. We analyzed numerous actual bills from CenturyLink customers in San Juan County and the data showed that the average price paid by a customer for a bundle of DSL and phone service is about $85/mo.

The local providers that resell CenturyLink DSL (e.g., Rock Island) do not offer phone service and so do not offer a bundle, but their customers must have telephone lines because that is how DSL is delivered. So, to most county residents, Internet service and telephone service are related, and getting customers to change to a new form of Internet service will likely require providing next generation telephone service as well.

Today, this is easily done. Digital telephone service has become very reliable and inexpensive using Voice over Internet Protocol (VoIP). Customers can use the same phones they use today and can keep the same phone number.

Technology Options

OPALCO has studied available technology options to meet the community's communication needs now and into the future. Our research included reviews of specific proposals from three major providers of telecommunications equipment and services. Below is a summary of our conclusions.

DSL

As noted above, performance of DSL is inherently limited and, as Internet usage continues to increase, will reach the end of its useful life. OPALCO has concluded that an investment in DSL technology would not be advisable.

DOCSIS

Data over Cable Service Interface Specification is the way that cable TV companies deliver Internet connections over their cable networks. It works well, and can deliver speeds much faster than DSL. But it requires coaxial cable that is installed in only in a few places on our islands. Extending this cable to reach 90% of the county would be prohibitively expensive.

Broadband over Power Line (BPL)

Broadband over Power Line is a way of moving digital data over electrical power lines. BPL has been tried in several locations in the United States, but currently there are no known commercial success stories utilizing this technology to deliver high-speed Internet access. The few attempts to use BPL could only deliver a maximum of 3Mbps, with no foreseeable way to increase that rate in the future. Propagating a useful signal through the many different devices in the grid proved difficult. BPL can be useful for applications with relatively low information content, and OPALCO uses this technology today to acquire data from some power meters, but its capacity is limited.

Wireless Options

There are many different wireless technologies used to transmit digital data today. Wi-Fi, WiMAX, Canopy and a variety of Federal Communications Commission (FCC-) -licensed and unlicensed frequencies are utilized in San Juan County. A wireless solution is attractive because it does not require running and connecting physical lines, but there are also challenges with wireless. Wireless connections can be hampered by trees, buildings and even weather. Some require a clear line of sight between antennas, and some wireless systems are subject to interference problems from everything from cordless phones to baby monitors. Wireless systems must be carefully engineered to provide adequate capacity, or else performance will degrade in proportion to the number of users that attach at any given time. OPALCO has studied these factors and determined that an appropriate wireless implementation for our

community would be to use the LTE (Long Term Evolution) standard to transport digital data over frequencies licensed from the FCC. This technology, implemented in a properly engineered system, can provide reliable high-speed connectivity to the majority of San Juan County.

Fiber Optics

Fiber is the gold standard for delivery of digital data. By sending pulses of light through optical fiber, this technology is capable of extremely high speeds – more than 100 Mbps, even 1 Gigabit per second (100,000 times faster than our fastest DSL connections). Fiber optics are used for the backbone of most telecommunications systems today. It is possible to implement fiber-optic connections directly to the home or business, known as Fiber to the Premise, or FTTP. Although it is desirable to serve everyone with fiber, there are considerable associated costs, including the fiber, equipment needed at the premises, and the cost of running the cable, which can be very expensive where it needs to be buried. Given the sparse population and rocky terrain of San Juan County, delivering fiber county-wide is not feasible at this time. OPALCO has studied existing implementations and worked with industry experts to develop a detailed estimate, which indicates that the cost of such a project would be well over $70 million. However, there are areas, such as downtown Friday Harbor, where higher population density and proximity to existing fiber lines make delivering fiber-optic connections to homes and businesses feasible.

Community Concerns

During this research period, OPALCO invited comments from our membership. We heard from our members via email, phone and in person. OPALCO has listened carefully to these comments, researched a number of concerns, and developed plans that we believe address these concerns appropriately. Among the concerns raised were the following:

Protection of Island Aesthetics

In order to create a system that will address the community's needs, some wireless facilities will need to be built. In building such facilities, OPALCO will continue its 75-year tradition of providing services in a way that minimizes environmental impact on our islands and working in a cooperative fashion with our members when their neighborhoods or businesses would be affected by a construction project.

OPALCO worked with San Juan County government to craft the new county wireless ordinance in a way that prevents major visual impacts while providing for the creation of joint use wireless facilities to meet the need for improved public safety and communications. The maximum

allowable pole height is established at 150', the colors and finishes of wireless facilities must blend with their surroundings and wireless facilities cannot interrupt ridgelines.

In conjunction with industry experts, we conducted four studies of potential antenna placement (known as radio frequency or RF studies) to develop and refine a technology plan that would keep the majority of the pole heights to no more than 65'.

Protection of Health and Safety

Safety is an essential priority in everything we do at OPALCO. We are confident that the system we are designing does not pose a health risk to our community. LTE wireless facilities are in place throughout the world and health-related risks are researched and monitored by many government agencies as well as researchers from academia and nonprofit agencies.

The Federal Communications Commission addresses these issues:
http://www.fcc.gov/guides/wireless-devices-and-health-concerns

The government of Canada has a site with detailed questions and answers on related issues:
http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html

Credible scientific studies in countries around the world have concluded that the type of system that OPALCO contemplates will pose no health risk to our membership or to our environment. The World Health Organization states that it has researched this topic more than perhaps any other organization and concludes: "...there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects." [1]

OPALCO is committed to providing our membership with safe and reliable services.

Financial Burden on OPALCO

The implementation of this system would require a major commitment of capital by OPALCO. Prudent financial management dictates that we must have confidence that this capital expenditure can be recovered. OPALCO's Board of Directors has decided that the system can only be built after a sufficient portion of our membership has agreed to fund its construction and subscribe to the service. The details of this plan to manage financial risk are described in the Conclusion section below.

[1] http://www.who.int/mediacentre/factsheets/fs304/en/index.html

Cooperation with Local ISPs

OPALCO is a not-for-profit, member-owned cooperative, founded to provide electrical power to the San Juan Islands because for-profit companies found it financially unattractive to serve our rural, remote community. It is that same concern for serving the unmet needs of our community that has encouraged OPALCO to investigate providing broadband services. Local ISPs such as Rock Island, Orcas Online and The Computer Place do not have the resources to address these issues for our entire community countywide.

We examined the possibility of providing wholesale bandwidth to these local companies in much the same way that CenturyLink provides them with DSL that they re-sell. After thorough financial analysis we concluded that there is not enough cash flow to allow these companies to operate a sustainable business. As a cooperative, OPALCO will provide all services at cost, but the cost of building and operating this network is such that OPALCO must provide the services directly in order to bring the products to market at a reasonable price.

This new infrastructure requires a new business model. Our proposal requires that OPALCO becomes the provider of Internet connections to its members, while working cooperatively with local ISPs to meet the needs of the community and evolve a new business model to address the new opportunities that will be created. All member services will be provided at the same high level of quality and care that members have come to expect from OPALCO on the electric side.

Legal and Regulatory Issues

OPALCO was founded to provide electrical power, and the operation of a 21st century power company relies upon high-speed data networking. OPALCO's bylaws explicitly allow the co-op to provide service that includes "high-speed data transmission via wireless and fiber-optic telecommunications infrastructure."

In June, 2012, the San Juan County Council unanimously passed Ordinance No. 10-2012 amending the County Code in the area of wireless facilities. This ordinance authorizes the creation of "joint use wireless facilities" within utility areas such as county rights of way and OPALCO utility easements.

OPALCO's legal representatives, Anderson Hunter, were consulted in the course of our due diligence. They determined that, since this hybrid fiber-wireless system would be designed significantly to benefit the electrical system, OPALCO has the legal right to use current property access rights based on the electrical system, including easements, rights of way and franchise agreements.

Proposal

After considerable research, OPALCO has developed the following plan, comprised of both a system design and a business plan to build and operate the system. This plan is designed to meet these critical needs:

- meet OPALCO's data communications needs for operating its electrical system.
- help address the unmet communication needs of first responder/emergency services.
- provide 90% of the County with reliable high-speed Internet access.
- offer co-location facilities to wireless carriers.

Proposed System Design

The proposed approach creates a "hybrid" system combining fiber optics and wireless. OPALCO's current fiber-optic network would be expanded and a wireless component added, because running fiber-optic cable throughout the county would be prohibitively expensive. Our choice for wireless technology is LTE, which can provide good speeds today and is designed to evolve to allow much higher performance in the future. We investigated the wireless spectrum that could be used, and determined that the 700 MHz band was best as a foundation, with additional Advanced Wireless System (AWS) spectrum (1.8-2.1 GHz) to augment capacity in higher-density areas. OPALCO is currently in detailed negotiations with infrastructure providers required to implement the system. Once these discussions are finalized, the important details of equipment specification and pricing can be determined and the full plan will be published and discussed with the co-op membership.

This hybrid network design (fiber optic plus LTE wireless) would cover 90% of the county by combining extensions of the existing fiber-optic infrastructure with installation of LTE antennas on new or existing utility poles located within OPALCO's existing easements and rights of way. These poles could also accommodate antennas for emergency services and cell phone providers. The height of the tallest poles would not exceed 150', and the majority of the poles would be much lower than that. The number of poles and actual placement will be determined through more detailed radio frequency studies. In accordance with the county's wireless ordinance, the antennas and equipment would be painted so as to blend visually with the pole itself.

Wireless Facilities

These wireless facilities would be mounted only on monopoles, not lattice towers (see example photos, below). Related equipment would be enclosed in a cabinet high on the side of the pole. We would not erect air-conditioned, ground-mounted equipment cabinets surrounded by chain link fencing, as is used with older types of equipment.

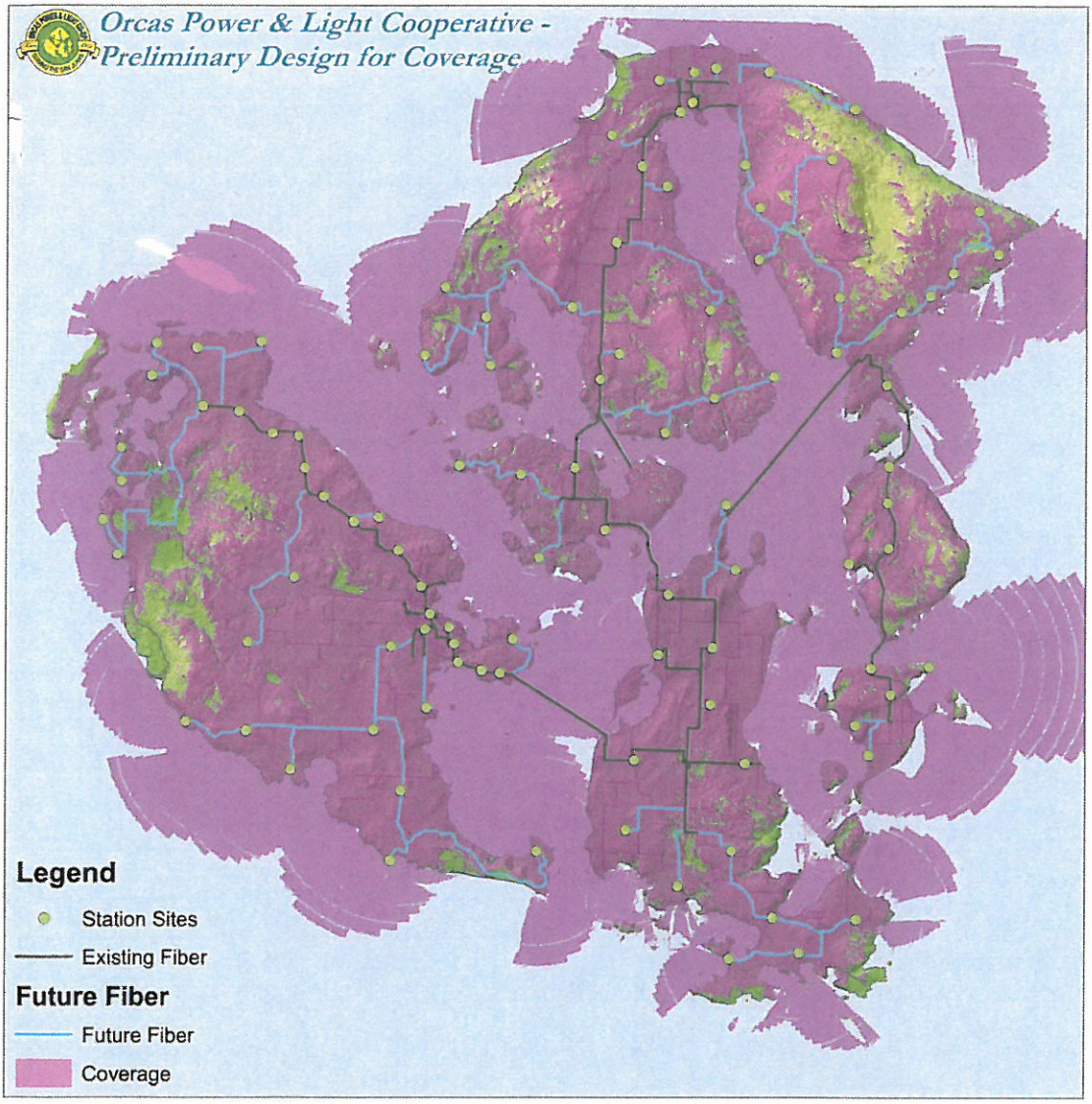
Example of utility poles (or monopoles) on Whidbey Island with broadband antennas installed. OPALCO's equipment would be similar to this installation, but may not be exactly as pictured.

In addition to broadband antennas, these wireless facilities would allow the installation of antennas and equipment to support radio communications by emergency service providers (including OPALCO line crews) and cellular phone providers if they choose to participate. Wi-Fi antennas would be installed in certain more populated areas such as ferry terminals, to allow member subscribers to access high-speed mobile connectivity at no additional charge.

Voice telephone service for residents and businesses would also be provided at no additional charge to members who subscribe to the broadband service. This voice capability would use digital technology (Voice over Internet Protocol) that is transparent to the user. Customers would keep the same phone numbers and use the same phones they use today. All common features such as voicemail and unlimited long distance service are included.

Initial Coverage Area

The map (pictured below) is a preliminary draft based on a radio frequency study to show where broadband coverage would reach (in purple)—achieving coverage for 90% of San Juan County. For the areas that don't currently show broadband coverage (in green), OPALCO will be looking for solutions to serve those members and locations, too, as the project advances.



Map shows estimated broadband coverage and station sites based on an initial radio frequency study. Actual system design, coverage and station sites to be determined with field testing of actual equipment once a frequency is acquired.

Proposed Business Plan

A telecommunication system such as this will be very expensive to build and operate. OPALCO is willing to lead the community through this effort, but the financial stability of the co-op must not be put at risk. Striking this balance is very difficult, but our studies indicate that it can be done using the cooperative model. To generate the revenue required to offset the expenses, a major portion of the membership must subsidize the creation of the system, and a large number of members must subscribe to the broadband service.

Product

The hybrid system uses fiber to the premise (FTTP) in areas close to existing fiber installations, such as downtown areas, and LTE-based wireless delivery in the rest of the county. In the spirit of a cooperative, OPALCO will provide the highest level of service possible, at the cost of the service, which is dependent on the number of subscribers. A subscription to the broadband service will be $75 per month (assuming half the membership subscribes). This will provide the member/customer with

- the fastest broadband connection we can deliver to that location. In areas of wireless coverage, this will be a minimum of 10 Mbps, but speeds will be faster in some places. We expect average wireless connections to be about 15 Mbps[2]. In areas of fiber connectivity, the average speed will be 50–100 Mbps.
- Digital telephone service, including unlimited local and long distance calling.
- Wi-Fi access in downtown areas and ferry terminals.

In areas served by wireless, if homeowners or homeowner associations wish to have fiber optics instead, OPALCO will work to provide that alternative if these members are willing to cover the additional costs to install the fiber optic lines. OPALCO is exploring options to develop special financing programs for such projects.

Financial Plan

The capital cost to build this system is estimated at approximately $34 million. The original estimate of $16 million was revised to $23 million based on a better understanding of the number of pole site locations, the desire to keep pole heights low, and projected equipment and trenching costs. It was then determined that additional fiber infrastructure was needed in downtown areas where higher population density could potentially saturate the wireless

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[2] *These speeds reflect what is possible today, but we expect that they will get faster. LTE technology was designed from the start to evolve, and a next generation, called LTE Advanced, is already being tested. This LTE-A technology is expected to more than double the speeds available via today's LTE technology, and the equipment upgrades required will be minor.*

network. This addition increased the capital cost to $34 million, to be funded by a loan from the U.S. Dept. of Agriculture's Rural Utilities Service (RUS) .

The operating expenses are estimated to be $7 million per year. During the first three to four years, as subscribers are gradually added, revenues would not cover all operating expenses. The shortfall not covered by revenues over that time is projected to total approximately $8 million. This amount will be shown as an operating loss and will result in a reduction in our margin on financial statements. This shortfall would be covered by a line of credit at 4.5%. The line would only be needed until the break-even point, estimated to be 2019.

OPALCO's goal is to create a system that will truly serve the needs of our membership – today and tomorrow. Designing a sustainable business plan for this goal is extremely challenging. The keys to a sustainable financial model are

- *Operational costs paid by subscribers*: We must have enough broadband subscribers to pay for the ongoing operation of the system through monthly subscription fees.
- *Capital costs paid by all members*: We must support the pay off the RUS loan used to build the system through a monthly cooperative infrastructure fee paid by a major portion of all OPALCO members.

We have examined these issues in depth. Many models have been considered, with different subscriber counts, subscription charges and cooperative infrastructure fees. There are many interdependencies – lower network fees require higher subscriber fees, higher adoption rates would allow lower subscription costs, etc. Ultimately, it is clear that

- It will take about half of our members @ $75/month to pay for operation of the system, and
- A $15/month cooperative infrastructure fee will be paid by all members to support the building of the system and its ongoing maintenance and upgrades.

Subscriber Adoption Expectations

This network has a certain amount of fixed network expenses regardless of whether it has 10 subscribers or 10,000. This means that the more paying subscribers we have, the lower the end-user price can be. We have established the $75 end-user pricing based on the assumption that the network will attract about half of our membership – or 5800 total subscribers.

Cooperative infrastructure fee

Monthly subscription revenue alone will not be adequate to fund building and operating this system. The entire OPALCO membership will be charged a monthly cooperative infrastructure fee of $15 to ensure the long-term financial viability of this effort. The charge will be gradually

applied to the membership as the infrastructure is built out; members will be charged once their location can access the service. This charge would be ongoing (not short-term), since it is needed to support the capital costs over a 25-year loan term and also for future upgrades to the system. The entire community benefits from this fee:

- Expansion of OPALCO's data network will provide cost savings to members and increase the reliability of the electric system through continued Smart Grid automation.
- Improved radio coverage for emergency services increases public safety for all.
- True high-speed Internet will provide economic opportunity and access to education; without this network, the economic future of San Juan County is bleak.
- Opportunities to expand cell phone coverage will enhance quality of life and public safety (911).

We recognize that some members will be either unable or, for their own reasons, unwilling to support this fee. A "Project PAL" type, voluntary, member-supported fund will be established to help those, especially seniors and members with disabilities, who can't afford the fee. There will also be an opt-out option for the cooperative infrastructure fee – and a penalty fee for those who later decide to subscribe to broadband services.

Today, OPALCO operates an electric system, and our members own the physical plant (equipment) that provides those services. The building of the proposed telecommunication system would be an expansion of OPALCO's plant to allow us to also provide telecommunication services. The resulting system would be owned by the membership just as the membership owns the electrical system, thus all members would contribute to building what we will all own.

This effort proposes to accelerate telecommunications improvements that will be made over the next 20 years to improve smart grid technology, remote monitoring and control of power distribution and field crew communications. The cooperative infrastructure fee is not a part of the broadband subscription; it is an investment in OPALCO's infrastructure, which is in fact the community's infrastructure.

Total Cost to the Member

With the monthly subscription charge paid by broadband subscribers at $75 and the cooperative infrastructure fee paid by all OPALCO members at $15, the total cost to a member/subscriber is $90 per month.

Delivering Service to the Member

We have considered both a retail business model, in which OPALCO provides service directly to members, and a wholesale model, in which we would provide back-end technology to other ISPs who would provide the Internet service to customers directly. As noted above, only the retail model is financially viable.

Under this plan, OPALCO would be the internet service provider. OPALCO is working with existing local providers to transition the county to new data communications standards while retaining and incorporating local expertise in support of the new system.

Conclusion

Building a network of this magnitude requires a long term investment and commitment by the OPALCO member community. OPALCO is the only realistic option for building a county-wide broadband network and delivering the associated community benefits; no other company or entity is likely to make it happen. Over time, DSL will fail to meet the increasing demands of the community, and our small population does not provide adequate financial incentive for companies like CenturyLink to address these needs.

The cooperative model is an effective way to address the problem. Cooperatives serve their communities through member participation and democratic control. Co-op members actively participate in setting policies and making decisions. Together, we work toward the sustainable development of our community, and all members benefit.

This is a unique time: interest rates are at historic lows, and OPALCO's ability to secure favorable financing rates provides the fortunate financial climate that can support such a large investment. OPALCO's leadership in building, operating and maintaining a 21st century broadband network will take advantage of these low cost funding mechanisms and build a network that can increase energy efficiency, improve prospects for economic development, and provide San Juan County with better access to essential services.

OPALCO's Board of Directors recognizes these critically important needs in our community and is in favor of proceeding to build and operate a hybrid broadband system—but, will do so only if the membership demonstrates its commitment to supporting it, through both the membership-wide cooperative infrastructure fee and through subscribing to the broadband service.