



RURAL ELECTRIC COOPERATIVES

Axis of Community Development

Executive Brief

Rural Electric Cooperatives face two fundamental challenges that Juniper Networks continues to help solve with a proven success model. Aging telecommunications networks assembled over time will not support next generation applications that increase grid performance, lower operating costs, and increase high available connectivity to energy producers and providers. The lack of high value broadband availability within the cooperative service area continues to instigate member attrition, weakening the ecosystem of rural communities, disrupting anchor member growth, and shrinking membership. This executive brief provides insight into a success model that addresses both of these critical challenges simultaneously and what steps Electric Cooperatives can take now to get started.

Grid Network

Emerging power grid dynamics such as distributed energy resources (DERs), smart grid initiatives, and the delivery of new services will have a profound effect on the way Electric Cooperative networks operate. These dynamics will require a transformation to a high availability, service provider network that supports future grid applications, seamlessly interconnects to energy producers and transmission grids, enables advanced power services to members. A modernized network will help Electric Cooperatives reduce costs, increase security, improve agility, and meet NERC compliance. A modernized grid network of the future needs bandwidth.

Service Area Broadband

Across the U.S. the best and brightest from the member base continue to relocate due to a lack of applications and services enabled by high value broadband, drawn to metro areas or communities that offer advanced broadband services. Member exportation not only has a negative impact on the electric cooperative, but also their anchor members, such as education entities, healthcare providers, government, public safety and businesses. According to an FCC Report in February 2015, 53% of rural Americans (22 million people) lack access to 25 Mbps/3 Mbps. Furthermore, anchor members need big pipes, gigabits per second, delivered at fair value to successfully operate, compete, grow, and deliver services to residential members. The service area needs bandwidth.

Vision and Strategy

Juniper Networks has teamed with industry professionals and partners with over 20 years of knowledge to develop this proven success model. The primary objective is to help rural electric cooperatives understand the financial feasibility and develop a deployment strategy for a fiber optical cable plant to support their grid network, while also creating an asset that connects anchor members in an optimized priority. The eventual benefits for the communities in the service area are economic development activities, such as job attraction, creation, training, placement and overall community development.

Electric Cooperates that begin with Fiber to the Home (FTTH) projects for residential members is an alternative approach. While some of these deployments have been successful, this starting point injects a higher risk, negates potential funding options, and misses engineering economies of scale. This approach can also disquiet residential members due to implementation priority and typically misses benefit yields captured when the entire cooperative service area and anchor members are considered.

Juniper Networks believes a better approach exists using 6 success principles to develop a broadband strategy that offers electric cooperatives a systematic approach that simultaneously addresses the network challenges of the power grid, and lays the foundation for broadband throughout the service area, with lower risk and a higher value to cost ratio. A focus on enabling advanced services to anchor members initially, followed by a systematic approach to extend broadband capability into residential areas. An optical cable plant engineered with consideration to anchor members will create an axis for community and economic development.

Success Principles

1. Microwave to Fiber Connectivity

A fiber optic cable plant that is engineered properly for the cooperative service area will create an investment asset for the electric cooperative with business model flexibility. Benefits like improved grid reliability, lower operational costs, increased cybersecurity, advanced interconnection to power providers, and a host of next generation services for anchor members immediately. More importantly, the Electric Cooperative should

have a choice on the business model that best services their members. Existing wireless systems in operation, such as point to point terrestrial microwave, that support lower bandwidth applications can be repurposed.

2. Potential for Services

Electric Cooperative: Accommodate any future IT (Business) and OT (Grid) application, including AMI, DMS, OMS, EMS, teleprotection, Substation Video Surveillance, Facilities Management, Smart Grid, SCADA, IIoT, simplify NERC compliance, and industrial cloud applications.

Anchor Member Groups

Education (K-12): Support 24x7 learning, digital learning, digital curriculum, online assessment, digital equality, SETDA broadband imperatives, distance learning, homebound students, remote education during inclement weather, and interconnection between State run education service centers. Typically represents the highest concentration of facilities in the service area.

Healthcare: Enable telemedicine for vital services in areas with limited or no access to doctors and skilled specialists. Examples are telepsychiatry, tele-stroke, electronic intensive care unit, pre-natal care to women with at-risk pregnancies, expedited X-ray readings, and the exchange of EHRs (Electronic Health Records). The FCC estimates by 2030 that 71 million Americans will be 65 or older.

Public Safety: Create an interoperable, two-way mission critical voice and broadband network for increased collaboration between members to quicken emergency demand response, such as next generation 911 services, cybersecurity awareness, and other alerts for incident response and severe weather.

Local Government: Increase transparency with constituents and civil engagement, efficient digital government with digital services, and access advanced subscriber services such as VoIP.

Business: Leverage advanced video conferencing, cloud services, telework, disaster recovery of mission critical data, subscriber services, advanced connectivity to HQ locations outside of service area.

Residential Group

Consumer: High value access to broadband internet, smart meter services, subscriber services (VoIP, streaming video), smart home applications, and all anchor member services, such as Education (K-12), Healthcare and Public Safety.

3. Connectivity Hub for “On-Ramp”

A central access point for optical plant within the service provides a necessary on-ramp to applications that fill fiber optics with value-added services. This is an essential part of the fiber engineering plan that drives down access cost for members and creates an efficient on-ramp to the internet highway and a seamless, secure access point for subscriber based service providers and access to cloud applications. This is part of the assessment, design, and build phases that emerges as a data center for cooperative service area, which can also be utilized for cost effective disaster recovery between adjacent electric cooperatives that adopt this model.

4. Member Groups for Funding

Several funding vehicles exist to accelerate the fiber optic cable plant delivery when anchor member groups are identified and considered, specifically Education and Healthcare. The process to gain access to funding is integral part of the assessment and design phases. All funding vehicles are considered including Category 1, E-Rate associated with Education (K-12). Part of the initial assessment phase is understanding how to leverage funding.

5. Options for Service Delivery

Implementing an optical cable plant and an on-ramp hub are foundational. Understanding a services delivery strategy that balances the long-term goals of the cooperative, maximizes partnerships, and leverages local providers will yield the highest value for the electric cooperative, their residential and anchor members.

6. Strategy for the Service Area

- a. Baseline Assessment
- b. Optimized Fiber Optic Plant Design, On-Ramp Hub Location, and Broadband Peering Options
- c. Facilitation of Anchor Member Discussions
- d. Services Delivery and Operations Strategy Development
- e. Project Implementation and Services Delivery Development

Next Steps

Please send your request to electric-cooperative@juniper.net. Juniper Networks and our value-added partners can help, from initial assessment to solution support. The baseline assessment is a no-risk, no-cost engagement.

For more information about solutions for electric cooperatives, please visit: <http://www.juniper.net/us/en/solutions/energy/> or contact your Juniper Networks representative.

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