WHITE PAPER

Fiber and Next-Generation FWA for Electric Cooperatives

Broadband Challenges for Cooperatives

Rural electric cooperatives, historically celebrated for bringing electricity to remote communities, are tackling the next frontier: bridging the digital divide. As these organizations consider how to deliver world-class broadband, they face a critical question: How can they achieve universal access efficiently and affordably? For many, the initial strategy — a pure fiber-to-the-home (FTTH) network — is proving to be impractical in certain contexts.

While FTTH remains the gold standard for broadband performance, its deployment in rural areas has significant, well-known challenges. The high cost of laying fiber in sparsely populated areas, coupled with obstacles, such as rugged terrain and permitting delays, can slow progress and strain budgets. Additionally, rural communities — often underserved or entirely unserved — require solutions that deliver immediate relief without compromising future scalability. "Fiber costs way too much in low density applications," said Matt Haverfield, Network Operations Manager for Illinois Electric Cooperative. "It's just not feasible to deploy at scale without a government subsidy."

There are a number of federal funding programs aimed at helping pay for broadband networks, but these come with requirements that may not be compatible with a pure fiber deployment. The Rural Digital Opportunity Fund (RDOF) is one example and has the following commitments to which each grant winner must adhere:

- Provide service to 100% of the locations in the awarded areas within 6 years of funding authorization.
- Complete deployment to 40% of locations within three years and continue in 20% increments each year thereafter.
- Deliver broadband at the performance tier, e.g., gigabit speeds.
- Offer low-latency services with a round-trip latency of less than or equal to 100 ms.

Cooperatives awarded RDOF funding often begin with a vision of a 100% fiber deployment. However, they quickly realize that, in some cases, there is simply not enough time to deploy fiber everywhere within the six-year timeframe required by RDOF. Delays in fiber deployment risk having a network that is only partially complete and a potential forfeiture of the funds.

One of the main reasons why cooperatives originally select fiber is a belief that other technologies, such as fixed wireless access, cannot deploy gigabit speeds reliably and with low latency. While this was true for legacy FWA solutions, Tarana has designed a next-generation fixed wireless access (ngFWA) solution that delivers true fiber-class broadband that rapidly and cost-effectively meets the requirements of funding programs such as RDOF. Even better, Tarana's ngFWA platform can be deployed either as a full broadband solution or as a complement to fiber.

G1: The Next Generation of FWA

G1's innovative breakthroughs create an entirely new paradigm for building and growing fixed wireless access networks that make gigabit broadband possible where legacy fixed wireless would fail. This includes:

- **Unmatched Interference Cancellation**: G1's interference and noise cancellation ensures reliable, high-speed connectivity even in crowded, noisy RF environments. Features like asynchronous burst interference (ABIC) reduce the impact of bursty interference, such as from nearby Wi-Fi transmitters. Less interference means more reliable, higher-speed connections.

- **Superior Non-Line-of-Sight (NLoS) Performance**: Rugged terrain and trees can block other wireless technologies, making links either unusable or very poorly performing. G1 overcomes this with fine-grain Tx and Rx digital beamforming, distributed massive MIMO at both ends of the link, and perfect multipath integration.

- **Scalability and Speed**: Cooperatives can deploy gigabit broadband at large scale in weeks, not months or years. High-speed connectivity is deployed faster — accelerating service and revenue timelines — bridging the digital divide quickly, efficiently, and affordably.

"The great thing about Tarana is that they do everything: from the subscriber, through the BN on the tower, to the management cloud. It makes operation and troubleshooting so much simpler," said Haverfield.

Cost-Effectively Bridging the Digital Divide

While the desire to bring high-quality broadband to all is an urgent need that must be addressed, cost is still a significant factor. Given that budgets are not unlimited, some constraints are necessary. A comparative digital divide deployment cost study examined the publicly available information for a sample case for a rural county in Idaho. The study compared real-world costs between an all-fiber deployment and one utilizing next-generation fixed wireless to deliver broadband to underserved and unserved communities. Based on this information, the estimated cost to deliver fiber was $24,578 per location compared to next-generation wireless' more practical sum of $2,483 per location — a 10x difference.

It should be noted that this calculation does not consider pole make-ready work, which can be substantial ($2,000 to $15,000 per pole) depending on the poles' condition and ability to accept new fiber overlashings. Even at the low end, a typical rural deployment of 15 poles per mile will add $30,000 per mile of additional costs.

Don't Default on RDOF

Tarana innovations, combined with the ease of deployment of fixed wireless, mean cooperatives can deploy the gigabit broadband required to meet their RDOF obligations and do so well within the program requirements:

- Deliver speeds up to 1 Gbps with ultra-low latency that rivals many fiber-based solutions.
- Eliminate the need for extensive trenching and fiber runs, significantly reducing upfront capital expenditure. This is especially true for locations with challenging terrain.
- Deploy service in weeks rather than months or years, ensuring communities in need of connectivity don't have to wait for broadband.
- Noise cancellation ensures consistent performance even in noisy RF environments, making it a reliable choice for areas with spectrum constraints.
- G1 can be scaled incrementally, enabling cooperatives to expand coverage as demand grows, often serving as a bridge to later fiber deployment.

While this example is specific to RDOF, other programs such as the Broadband, Equity, Access, and Deployment (BEAD) fund benefit equally well from the speed, flexibility, and cost-effectiveness of next-generation fixed wireless deployments.

Summary

Cooperatives can use ngFWA to enhance coverage in hard-to-reach areas, accelerate revenue streams, optimize resource allocation, and provide flexibility, scalability, and cost-effectiveness while meeting the requirements of funding programs such as RDOF.

The future of rural broadband isn't about choosing between fiber and wireless; it's about leveraging the strengths of both to achieve the mission of connecting everyone affordably. Tarana's field-proven ngFWA technology is well-positioned to support a hybrid broadband model that offers the best of both worlds: low latency gigabit broadband that can be quickly deployed anywhere at a reasonable cost and deployment timeframe.

"We're still trying to find the limits of the Tarana solution," said Haverfield. "With Tarana, we can deliver high-speed broadband to our customers that exceeds their expectations."

Interested in learning more about our innovative solutions? Get in touch with us at taranawireless.com/how-to-buy

Tarana's mission is to accelerate the deployment of fast, affordable internet access around the world. Through a decade of R&D and more than $400M of investment, the Tarana team has created a unique next-generation fixed wireless access (ngFWA) technology instantiated in its first commercial platform, Gigabit 1 (G1). It delivers a game-changing advance in broadband economics in both mainstream and underserved markets, using either licensed or unlicensed spectrum. G1 started production in mid-2021 and has been embraced by more than 250 operators in 24 countries and 47 states. Tarana is headquartered in Milpitas, California, with additional research and development in Pune, India.

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