

The Time is Right for Rural Broadband

Use Government Funding and Ribbon Solutions to Expand Opportunities



Grow Revenues with Tiered High-Speed Internet Services

The U.S. Government is investing billions to close the digital divide and extend ultra-broadband services to rural America. The FCC Rural Digital Opportunity Fund (RDOF), the 5G Fund for Rural America, and the USDA Rural Development Broadband ReConnect Program provide over \$40 billion in funding to deliver rural communities the broadband connectivity they expect and deserve. Whether working or learning from home, streaming 4K television, or playing the latest online video games, rural subscribers need dependable, high-speed internet access to participate and thrive in the digital world.

Forward-looking service providers are taking advantage of generous government funding programs to expand network capacity and transform their communities. Next-generation rural broadband networks will help service providers grow revenues by extending service reach and diversity, and by satisfying the massive pent-up demand for high-speed internet connectivity. Next-gen broadband networks will also enable new offerings like fixed-wireless access services, while laying the foundation for future revenue opportunities like 5G backhaul transport services.

Applications Driving High-Speed Residential Broadband Demand

- Work-from-home & SaaS (Teams, Zoom, Slack, etc.)
- Video streaming (Netflix, Hulu, Amazon Prime, etc.)
- Cloud gaming (GeForce, Shadow, Vortex, etc.)
- Distance learning (Google Classroom, Blackboard, etc.)
- Telemedicine (MDLIVE, Lemonaid, LiveHealth, etc.)
- IoT (Smart homes and connected devices)

Making Rural Broadband a Reality

High-bandwidth access networks are just a starting point on the road to high-speed broadband. A new backbone network is needed to complete the journey and make rural broadband a reality. Next-generation backbone networks must:

- Scale to capacities of 100G, 200G and beyond to support high-speed access services of up to 1 Gbps
- Meet extended distance requirements (100+ km) to reach far-off subscribers and distant PoPs
- Ensure superior user experiences for diverse applications with distinct QoS requirements
- Make optimal use of network capacity to maximize investment returns
- Be easy to provision and operate, and require no special training or expertise
- Be 5G-ready to support future backhaul transport services

Next-generation backbone networks pose a variety of design, traffic engineering, and operational challenges for network planners and architects. Tomorrow's rural broadband networks will support a variety of applications with distinct characteristics and service level requirements. Some applications will be latency-sensitive. And other will have strict availability requirements. Traditional best-effort connectivity services aren't well suited for the digital age. To monetize the next wave of services, providers must deliver the right SLAs, for the right applications, at the right time. By satisfying stringent scalability, service quality and performance demands, and streamlining operations, next-generation backbones will help service providers increase revenues, boost margins, and accelerate investment returns.

Tap into the Massive 5G Market with Backhaul Transport Services

5G backhaul transport services are a huge potential revenue source for rural service providers. Mobile Network Operators are leveraging the \$9B 5G Fund for Rural America and other incentives to extend 5G services to rural areas. MNOs need fast, secure, and reliable connectivity to far-flung 5G base stations.

Rural service providers can take advantage of 5G network slicing functionality to cost-effectively support multiple MNOs and service types over common backhaul transport infrastructure. With network slicing, a 5G network is partitioned into distinct logical networks with discrete service level assurances (i.e., unique data speed, latency, and reliability commitments) to support differentiated services and multitenancy. For example, an MNO might create an ultra-low-latency, high reliability slice to support delay-sensitive, safety-critical autonomous vehicle data, and a best-effort slice to support lower-priority, non-critical IoT traffic.

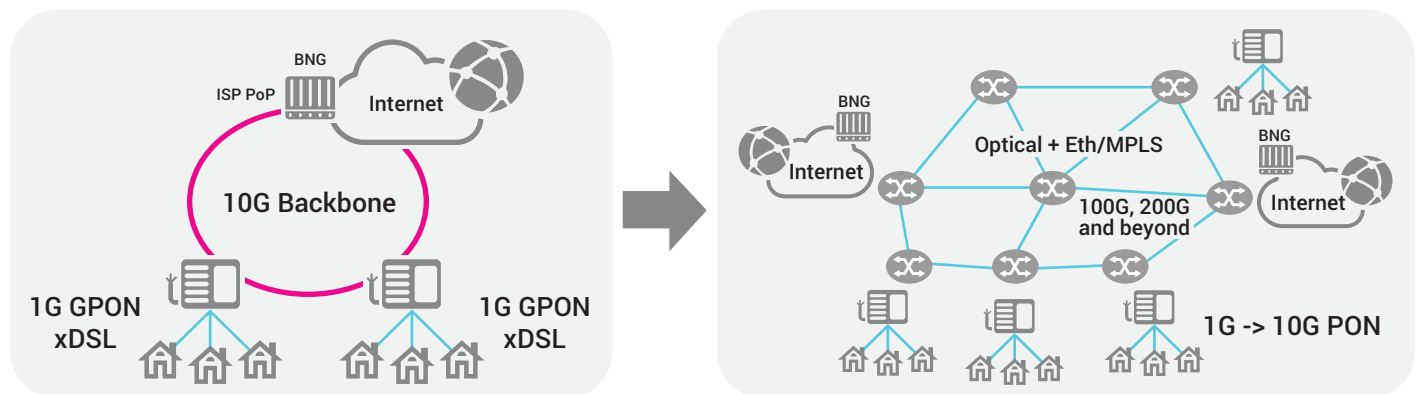
Network slicing lets rural service providers isolate traffic and predictably transport a variety of differentiated 5G data services for a number of MNOs.

Great Broadband Needs a Great Backbone

Tomorrow's rural broadband networks must meet the increased capacity, performance, and price requirements of the digital era. Most service providers are deconstructing next-generation broadband networks into distinct access and backbone segments to optimize scalability and performance, and to improve choice in vendors and technologies. Most newer backbone networks leverage a mesh topology for ultimate performance and resiliency, and employ both packet switching and optical switching to address diverse capacity and distance requirements.

Speeds and Sites Increase

100G, 200G and beyond in the backbone



- 10M -100M Access
- Lower Speed 1G PON
- Single PoP / Single Ring
- 10G "backbone"
- Access platform = small scale backbone

- 25M / 100M – 1Gb/s access
- Higher speed 10G PON
- Multi-PoP / Mesh
- Higher capacity 100G, 200G and beyond
- Backbone / access separation
- Multiservice backbone network

MPLS-TP Guarantees Distinct SLAs for Diverse Applications

Next-generation rural broadband networks will support a wide variety of applications with distinct characteristics and SLA requirements. Some applications like streaming UHD video are bandwidth-intensive, but can tolerate latency. Other applications like cloud gaming and web meeting services are both bandwidth-hungry and delay-sensitive. Service providers must find ways to enforce different SLAs for different types of applications, without overprovisioning bandwidth and squandering expensive network capacity.

MPLS-TP (Transport Profile) provides a simple and predictable way to support differentiated services over cost-effective packet transport networks. MPLS-TP provides deterministic connectivity, allowing network operators to provide distinct QoS assurances for different types of applications. Better still, MPLS-TP adds OAM functionality to MPLS to simplify management, and improve visibility and troubleshooting. Best-of-breed MPLS-TP platforms support point-and-click provisioning to streamline administration and accelerate service velocity.

MPLS-TP lets rural service providers deliver tiered services (e.g., a dedicated cloud gaming package) to increase differentiation, create upsell opportunities, and boost revenues. Providers can also leverage MPLS-TP to enable network slicing for 5G backhaul.

Boost Business Results with Ribbon's IP Wave

Ribbon's IP Wave is a comprehensive, converged set of IP Optical solutions optimized for next-generation backbone networks. The product family helps service providers meet stringent transport network capacity, scalability, availability, and traffic engineering requirements while eliminating operations expense and complexity. The wide-ranging IP Wave solution portfolio includes:

- **IP Routing and Packet Transport** Ribbon's NPT portfolio is ideal for implementing the multiaccess, multiservice high capacity networks required to aggregate all service types to be transported across the network. A full set of IP routing protocols, such as IP/MPLS, MPLS-TP, FlexE, FlexAlgo and Segment Routing ensure the services are transported to meet their service delivery SLAs needs on a service-by-service basis. With support for high-performance optical pluggables, NPT can be used in IPoDWDM and/or integrated multilayer IP Optical architectures.
- **Optical Transport solutions** Ribbon's Apollo portfolio is a modular high-performance cost optimized optical transport system. It delivers 100G/200G/400G everywhere with unconstrained wavelength routing over CDC-F ROADM nodes. All Apollo systems are fully controllable through open and programmable interfaces and deliver future-proof optical networking solutions customizable to business and operational needs.
- **Network Automation and Orchestration** Ribbon's Lightsoft management system delivers multilayer IP Optical operations lifecycle management, helping eliminate manually intensive, error-prone administrative tasks with practical automation. LightSoft supports point-and-click provisioning for ultimate speed and simplicity, eliminating the need for special expertise and training..
- **Fiber Health Management** Ribbon's Fiber Health Management lets central administrators efficiently monitor the health, status, and performance of geographically dispersed fiber networks. The solution helps service providers accelerate problem isolation and resolution, and increase customer satisfaction, while reducing costly and time consuming truck rolls. Ribbon uses vendor-agnostic, distributed OTDR (Optical Time Domain Reflectometry) technology integrated into the Apollo optical backbone to quickly pinpoint fiber breaks and degradations within a few meters, helping dispatch crews save time, avoid guesswork, and improve productivity.

Ultra-Broadband Opportunities Abound for Utility Telcos

Innovative utility companies are launching telecommunications businesses to generate new revenue streams and improve shareholder value. Many are pursuing FCC, USDA, and State funding to deliver high-speed internet access services to rural homes and businesses. Ultra-broadband services are a great way for utilities to monetize assets and move up the value chain.

Summary – Now is the Time for Rural Broadband

Service providers are looking to massive government funding programs to extend and modernize rural broadband networks. Next-generation broadband buildouts will help rural service providers tap into huge pent-up demand for high-speed internet services, while laying the foundation for lucrative 5G backhaul revenues.

IP Wave is ideal for building high-capacity next-generation backbone networks to power tomorrow's highspeed, high-performance, rural internet offerings. The product family helps bridge the gap between the high-bandwidth access pipes and the performance-dependent services these pipes need to transport. The portfolio helps service providers extend service reach, scalability, performance, survivability and security supporting a wide range of applications and services and reducing operations expense and complexity. To learn how IP Wave can help your company build a great rural broadband backbone contact Ribbon today.

About Ribbon

Ribbon Communications (Nasdaq: RBBN) delivers communications software, IP and optical networking solutions to service providers, enterprises and critical infrastructure sectors globally. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge software-centric solutions, cloud-native offers, leading-edge security and analytics tools, along with IP and optical networking solutions for 5G. We maintain a keen focus on our commitments to Environmental, Social and Governance (ESG) matters, offering an annual Sustainability Report to our stakeholders. To learn more about Ribbon visit rbbn.com.

Contact Us

Contact us to learn more about Ribbon solutions.