

JUNIPER NETWORKS ADVANCED MOBILE BACKHAUL SOLUTION FOR CABLE OPERATORS

Creating Incremental Revenue Streams by Offering Profitable Mobile Backhaul Services to Wireless Service Providers

Challenge

Mobile operators don't have access to adequate bandwidth to cost-effectively backhaul cell tower voice and data traffic. This creates an opportunity for cable operators to offer mobile operators wholesale commercial services that backhaul voice and data traffic from cell towers.

Solution

Juniper's solution provides a mobile backhaul network that can transport multiple types of traffic from a single chassis at the cell tower. This enables the coexistence and leveraging of legacy, current, and future technologies to decrease costs while supporting flexible transport.

Benefits

Cable operators can create new revenue streams by offering a compelling, low cost value proposition to mobile operators that addresses the traditional legacy backhaul capacity bottleneck by delivering the synchronization to support mobile services, and by allowing mobile operators to future-proof their ability to backhaul increasing volumes of mobile traffic.

Mobile operators don't have access to adequate bandwidth to cost-effectively backhaul cell tower voice and data traffic. This creates an opportunity for cable operators to offer mobile operators wholesale commercial services that backhaul voice and data traffic from cell towers. The Juniper Networks® Advanced Mobile Backhaul Solution for Cable Operators provides a mobile backhaul network that can transport multiple types of traffic from a single chassis at the cell tower. This enables the coexistence and leveraging of legacy, current, and future technologies to decrease costs while supporting flexible transport.

The Challenge

To counter increasing competition, mobile operators are looking for ways to reduce OpEx and increase bandwidth for mobile voice and data traffic through new technologies and solutions. Most mobile operators today use expensive, leased T1/E1 or T3/E3 lines from carriers for mobile backhaul. Deployment of 2.5G and 3G services means that base stations that previously required one or two T1/E1 lines for backhaul now need four to six lines. Existing backhaul solutions are expensive, inflexible, and do not scale to support emerging requirements.

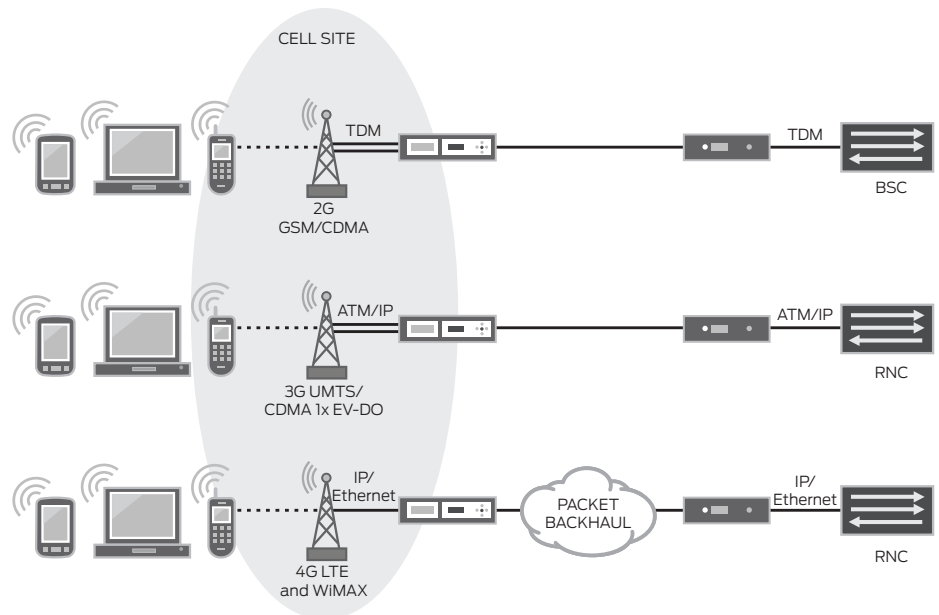


Figure 1: Existing backhaul challenges—expensive, inflexible, and do not scale

The result has been a 200 to 400 percent increase in required backhaul capacity and an associated increase in OpEx costs, creating exciting new opportunities for cable operators who offer a more cost-effective and scalable solution. And, while mobile operators need to roll out new IP-based services in order to survive and thrive, they must still provide and protect legacy non-IP-based services that will continue to comprise a significant share of their revenue streams for many years to come.

To achieve their goals, mobile operators recognize that they must upgrade their legacy backhaul networks—which today are largely provided by carriers—because they lack the flexibility or scalability to cost-effectively support coexisting services on the same network. Mobile operators that spend more than 30 percent of their OpEx budgets on mobile backhaul are looking for solutions to increase backhaul capacity while controlling costs. Traditional backhaul services offered by carriers do not provide the ease of provisioning, planning, or network management so vital to helping mobile providers manage expenses at a time when demand is steadily increasing. Cable operators are now uniquely positioned to capture new revenue streams by offering robust mobile backhaul services that attract mobile operators to the economic and technical advantages of transporting traffic from their cell towers over cable infrastructure.

The Juniper Networks Mobile Backhaul Solution for Cable Operators

IP/MPLS is the ideal next-generation mobile backhaul solution because it enables mobile operators to optimize their networks for the transport of all of their revenue-generating services—both voice and data. Juniper's comprehensive mobile backhaul solution offers cable operators a compelling value proposition that attracts mobile operators to wholesale backhaul services over cable networks.

Mobile operators need a common mobile backhaul network that can support multiple types of transport including time-division multiplexing (TDM), ATM, and Ethernet in a single chassis. This allows for the coexistence and leveraging of legacy, current, and future generations of mobile network services. The Juniper Networks BX7000 Multi-Access Gateway addresses these demands for increased flexibility and scalability. Cable operators can leverage their existing network footprint to provide an alternative to traditional mobile backhaul solutions offered by incumbent carriers, and they can deploy a single platform in a cell tower to offer backhaul services to multiple mobile providers.

Existing backhaul solutions offered by carriers are expensive, impacting profitability for mobile operators. As the demand for bandwidth—especially data services—grows, mobile service providers need a scalable solution that protects their investment at the cell site and gives them the flexibility to add next-generation technologies quickly and cost effectively. Juniper's solution leverages IP/MPLS technology that is already in use in many mobile packet cores across the entire mobile infrastructure. Unlike piecemeal approaches that mix and match components, Juniper's mobile backhaul solution is a fully integrated, high-performance architecture addressing the needs of the cell site, metro backhaul, and aggregation. It also includes a comprehensive network management component to increase operational efficiency and minimize OpEx, allowing cable operators to offer compelling mobile backhaul services that drive revenue growth.

BX7000 Multi-Access Gateway

Juniper Networks BX7000 Multi-Access Gateway effectively addresses the backhaul evolution challenge for mobile operators with the most operationally efficient approach, allowing cable operators to offer compelling mobile backhaul services. Traditional cell site gateways offered by carriers make the evolution to next-generation mobile infrastructure challenging because they lack the necessary scalability, density, flexibility, and reliability, and are based on older, expensive legacy technologies. Leveraging Juniper's industry-leading IP/MPLS and circuit emulation expertise, the BX7000 reliably transports TDM, ATM, and packet traffic over IP/MPLS using pseudowire technology. Designed for the space and environmental constraints of the cell site, the BX7000 features common uplink types to support both 2G and 3G as well as emerging 4G mobile technologies.

The BX7000 includes a replaceable interface module that supports higher density at the cell site while minimizing equipment variety. It supports a range of timing synchronization options with future-proofing provided by a slot for field-replaceable timing modules. The BX7000 supports today's technologies as well as emerging standards such as WiMAX and Third-Generation Partnership Project (3GPP) Long Term Evolution (LTE). By deploying the BX7000 Multi-Access Gateway, mobile operators can retain their existing investment in 2G and 3G cell sites while reaping the benefits of IP/MPLS-based transport over cable infrastructure. This allows cable operators to offer enticing mobile backhaul services that help mobile service providers cost-effectively deploy new services while reducing the cost of backhauling voice and data traffic. It is a compact platform that enables ease of deployment in a cell site cabinet where rack space is limited. Additionally, it is available in an environmentally-hardened form factor for deployment scenarios where cabinets are exposed to natural elements.

Aggregation Site Gateway—M Series Routers with Circuit Emulation PICs

Juniper Networks M Series Multiservice Edge Routers act as an aggregation site gateway to terminate pseudowires, sending TDM traffic to the base station controller, and ATM and IP traffic to the radio network controller. Based on the M Series router, Juniper's gateway features two new Circuit Emulation PICs designed specifically for mobile backhaul applications:

- 12-port TI/E1 Circuit Emulation PIC
- 4-port ChOC3/STM1 Circuit Emulation PIC

MX Series 3D Universal Edge Routers for Metro Backhaul Transport

Juniper Networks MX Series 3D Universal Edge Routers are ideal for IP/MPLS-based metro backhaul transport. They offer all of the benefits of IP/MPLS—fast reroute, resiliency, and reliability, as well as support for Operation, Administration, and Management (OAM), and the MX Series implements both Layer 2 and Layer 3 VPNs. While the Juniper solution is fully interoperable with a wide range of metro aggregation architectures and components, there are a number of advantages to using MX Series routers, including their support of pseudowire-VPLS interworking. With MX Series pseudowire interworking with VPLS, an access pseudowire from the BX7000 Multi-Access Gateway is cross-connected with a point-to-point VPLS instance in the metro backhaul network. This feature allows mobile operators to address a number of technical requirements, including multihoming, control plane scaling, and multicasting, as well as segmentation issues that can arise when backhaul components reside in different administrative domains.

Junos Scope IP Service Manager with Extensions for Mobile Backhaul

Juniper Networks Junos Scope offers IP Service Manager network management software as an integral part of Juniper's mobile backhaul solution portfolio. IP Service Manager consists of a comprehensive set of interconnected components such as powerful device instrumentation (NETCONF/XML, SNMP, command-line interface), rapid deployment support, complete remote management including remote software upgrade, service provisioning, monitoring, and diagnostics tools. Junos Scope supports transport (graceful routing encapsulation, MPLS, traffic engineering) and service provisioning of pseudowires. It also offers monitoring and diagnostics of provisioned services, device configuration management, and remote software upgrade.

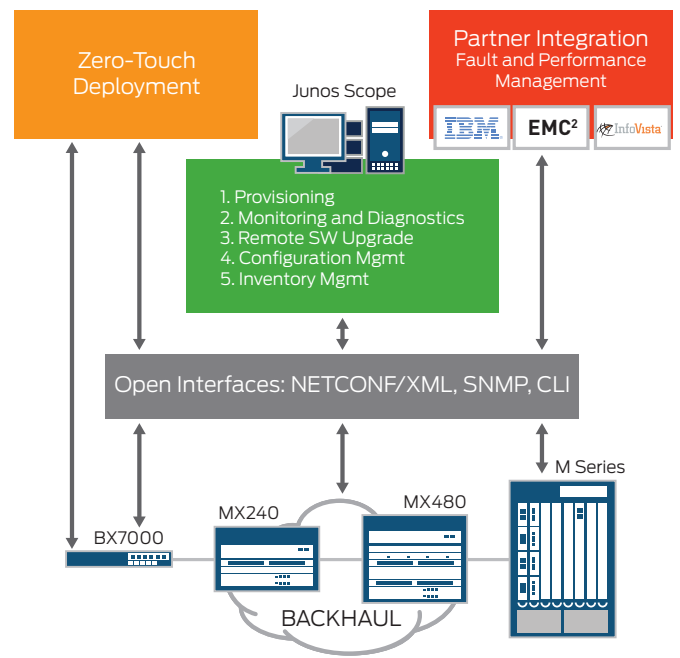


Figure 2: Comprehensive backhaul network management

Features and Benefits

Comprehensive Backhaul Network Management

Junos Scope is a suite of comprehensive Web-based tools for operational management and administration of Juniper Networks routers, including the BX7000, M Series, and MX Series. Juniper has extended Junos Scope with powerful new features designed to address the demanding requirements of mobile backhaul. Using Junos Scope, network managers can provision services, manage device configurations, track inventory, diagnose faults, and monitor the backhaul infrastructure from a central location. Junos Scope can push software upgrades to all components in Juniper's mobile backhaul solution, minimizing the need for costly site visits. As a result, Junos Scope reduces operating costs and improves the operational efficiency of mobile backhaul services delivered over cable infrastructure.

Zero-Touch Deployment

The costs associated with managing a large number of cell site gateways can significantly drain profits. Recognizing this fact, Juniper has designed the BX7000 for zero-touch deployment, meaning that it can self-configure with no human intervention. This powerful feature streamlines the deployment process, shortens the time to service delivery, and reduces training requirements for cell site support staff. Junoscope's zero-touch facility allows the BX7000 Multi-Access Gateway to configure itself out-of-the-box—with no manual intervention required—using the configuration available either on the network, using a local USB removable media, or using a combination of both. As a result, the BX7000 Multi-Access Gateway can be sent directly from the warehouse to the cell site without requiring any pre-configuration steps. Because the device knows how to collect its proper configuration information and make itself available on the network for remote management, no tech-savvy personnel are needed at the deployment site, which allows rapid mass deployment of a large number of these devices.

Clock Synchronization

Timing and synchronization are critical elements in radio access networks to maintain good voice quality, reduce interference, and manage call handovers between base stations. In a typical TDM network, the various entities are synchronized on a common Primary Reference Source. As the industry moves to packet-based transport networks to distribute TDM services, the same level of synchronization is needed to avoid cut outs, lost handovers, blocks, or failed call setup. There are several approaches for achieving this timing synchronization, including Synchronous Ethernet, adaptive clock recovery, IEEE 1588 v2, DSL NTR, and BITS input.

Juniper's solution supports all of these timing synchronization options, meeting strict threshold requirements for jitter and wander. Through the use of a replaceable timing module, Juniper's advanced mobile backhaul solution allows cable operators to mix different synchronization options in the network, optimizing cost and accuracy while minimizing equipment variety. Juniper's aggregation site gateway and BX7000 Multi-Access Gateway can derive timing from multiple sources simultaneously, to ensure that each mobile operator gets timing from its own clock source and maintains accurate clock recovery.

Sophisticated Timing and Synchronization

In mobile access networks, including those with both 2G and 3G base stations, there are stringent timing requirements for handover as mobile stations move from one cell to the other. Some systems require not only frequency synchronization, as in TDM networks, but also phase/time synchronization. International Telecommunication Union (ITU) synchronization standards define aspects in packet networks that include the maximum network limits of jitter and wander that are not to be exceeded. They also define the minimum equipment tolerance to jitter and wander to be provided at the boundary of packet networks at TDM and synchronization interfaces. Juniper's mobile backhaul solution is able to meet these requirements because it supports multiple clock domains within the same chassis. M Series Multiservice Edge Routers and the BX7000 Multi-Access Gateway can derive timing from multiple sources simultaneously to ensure that each mobile operator gets timing from its own clock source and maintains accurate clock recovery. This also offers cable operators the flexibility to deploy a single BX7000 in a single cell tower to provide backhaul services for multiple mobile operators.

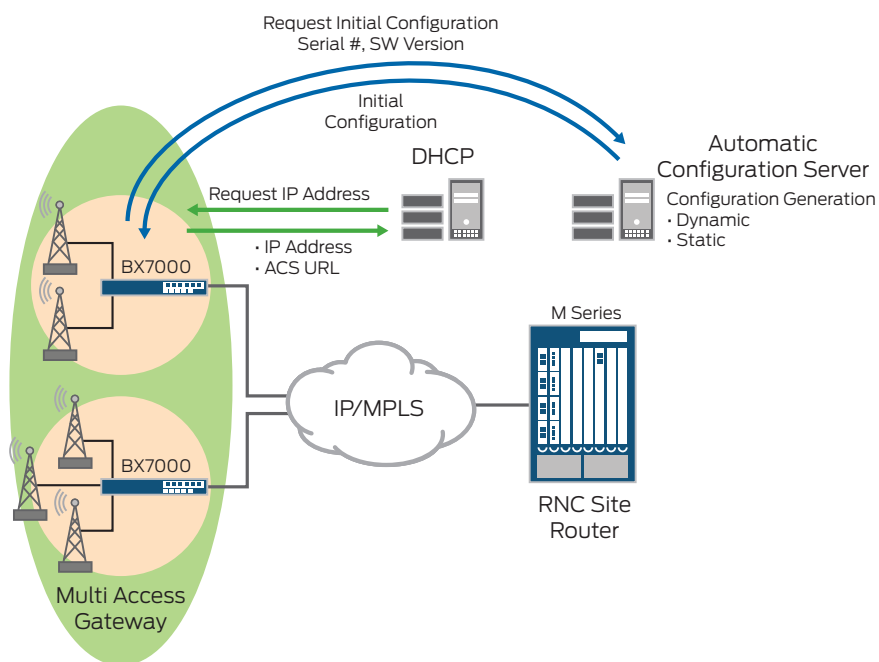


Figure 3: BX7000 zero-touch deployment

Future-Proof Backhaul Services

In addition to providing mobile operators with key requirements such as the flexibility to transport multiple types of traffic across the same network, seamless network management, and accurate timing and synchronization, Juniper's solution also helps cable operators protect their infrastructure investments by allowing them to address the existing requirements of mobile networks while enabling mobile operators to economically prepare to integrate 4G radio access technologies in the future. The BX7000 interfaces with 2G cell sites, making it an easy addition to existing infrastructures. At the same time, Juniper's solution supports 3G and evolving 4G technologies so that cable operators can help mobile service providers future-proof their investments in cell site installations.

Scalability

Juniper's IP/MPLS-based mobile backhaul solution for cable operators scales much more easily than alternative solutions offered by carriers, since mobile operators can purchase incremental bandwidth from the multiple service operator (MSO) as needed. Using packet-based backhaul avoids the problem of unused bandwidth that is common with TDM leased line backhaul. Mobile operators can also consolidate all traffic on a single cost-efficient, high-speed Ethernet uplink as opposed to multiple groups of slow and expensive TDM circuits. In addition, because of Carrier Ethernet's option of fine grained bandwidth, mobile operators can "pay as they grow," dialing up bandwidth as subscriber traffic increases.

Solution Components

Juniper's comprehensive solution allows mobile operators to have a common mobile backhaul network that can support multiple types of transport including TDM, ATM, DSL, and Ethernet in one chassis. Juniper Networks mobile backhaul for cable operators is based on deploying the following solution components:

- Juniper BX7000 Multi-Access Gateway
- Juniper M Series Multiservice Edge Routers with Circuit Emulation PICs
- Juniper MX Series 3D Universal Edge Routers for metro backhaul aggregation
- Junos Scope IP Services Manager with extensions for mobile backhaul

Summary: Creating Incremental Revenue Streams by Offering Mobile Backhaul Services

Juniper offers a flexible, scalable, and reliable mobile backhaul solution that allows cable operators to capture new revenue streams by offering compelling wholesale services to mobile operators via an integrated, high-performance alternative to today's costly approach of leased lines from incumbent carriers. MSOs can swiftly increase revenues by offering mobile backhaul services to cellular network operators over existing cable networks. For more than a decade, Juniper Networks has been helping service providers evolve to secure, converged packet infrastructures. Juniper's advanced mobile backhaul solution features industry-leading IP/MPLS expertise, comprehensive and proven security, authentication and authorization, and open and scalable solutions in the IP/MPLS core. Now Juniper, the clear leader in IP/MPLS technology, brings this expertise to mobile backhaul with an end-to-end solution that allows cable operators to address the current needs of mobile operators via a scalable and flexible solution for future growth. MSOs can now create incremental revenue streams by offering wholesale mobile backhaul services that attract mobile operators to the advantages of cable infrastructure.

Next Steps

Contact your Juniper Networks representative today to discuss how Juniper can help you succeed, or visit us at www.juniper.net/cable.

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

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