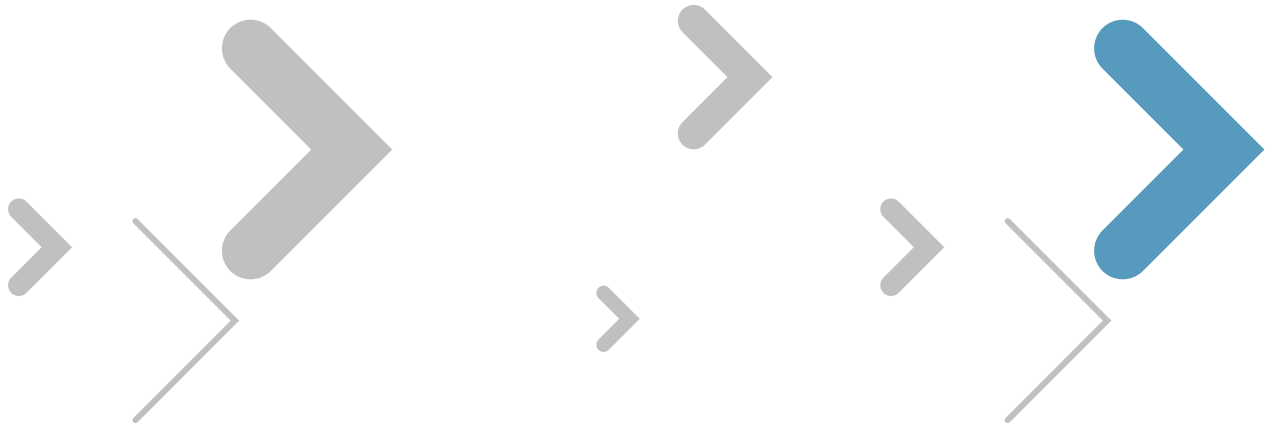




Deploying Pre-Integrated End-to-End Ultra-Broadband Solutions from Motorola and Juniper Networks



Motorola and Juniper Networks are collaborating to bring to market a network solution that tightly couples access network and edge routing technologies into a pre-packaged solution that assists service providers and cable operators (together referred to as "operators") in quickly rolling out Ultra-Broadband (>50 Mbps/subscriber) to support video, broadband, and voice solutions over fiber-to-the-premises (FTTP) architectures.

The integration of Motorola access solutions with IP routing solutions from Juniper Networks allows operators to economically scale today's networks to support increasing demands for higher-speed access for residential and commercial subscribers. Network operators can rely on established solutions that have already been deployed and have been extensively tested in multiple networks in multiple environments.

By selecting pre-integrated solutions that leverage Juniper's IP routing expertise and Motorola's expertise in video, broadband, and voice networking over FTTP, operators can avoid the time, cost, and risk associated with integrating unproven products from inexperienced vendors. By selecting established solutions that have already been extensively tested in customer environments, operators will benefit from the proven design and deployment of complex access and edge routing networks solutions that support ever-increasing consumer bandwidth requirements.

Moving to Ultra-Broadband Networks

While many operators have already deployed infrastructure to support video and other high-speed services, other carriers, municipalities, and utilities are well positioned to compete by offering compelling, high-performance services. These new entrants face the challenge of building access and IP networks that allow them to swiftly introduce Ultra-Broadband services.

Few operators have the internal resources to efficiently integrate access and edge solutions to enable the rapid delivery of new Ultra-Broadband services that deliver in excess of 50 Mbps of broadband to consumers. The delivery of high-performance ser-

vices allows network operators that offer innovative bundles of services to effectively compete with existing video and high-speed data providers. Successfully competing with established operators requires the ability to clear the bar over the existing offerings. The challenge is not to merely deliver television services, but enable multiplay services that attract new subscribers, reduce churn, and increase revenues and profits to achieve parity plus.

Consumers have a great many options to consider when choosing between available operators. Those network operators that can meet today's needs while offering the promise of even greater bandwidth to support high-quality video and robust interactive programming will capture subscribers from those operators that cannot achieve parity plus. Subscribers demand increased access bandwidth, and existing access networks are strained by the need to provide more:

- Downstream bandwidth to support the growing number of High-Definition (HD) TV channels.
- Narrowcast bandwidth to support a significant shift toward unicast, due to services such as Video On Demand (VOD), HD VOD, and time-shifted TV.
- Upstream and downstream bandwidth to support commercial services and interactive consumer services found in the realm of Internet 2.0.

Consumers demand more capacity to support future multiplay applications that require increased bandwidth. At the same time, operators face additional challenges as they struggle to support new services while balancing capital investments in infrastructure with operational expenses and the ongoing challenge of providing new and exciting services.

In response, network operators throughout the world are deploying optical access technologies and high performance packet networks to meet growing consumer demand for high-throughput services and competitive pressures to differentiate their offerings. Fiber-based service delivery offers massive scalability potential, and it reduces the cost of managing and operating the access network by as much as 80% because it eliminates active network components in the outside plant and their associated maintenance costs.

Minimizing the Risk of Deploying Ultra-Broadband Networks

In the past, broadband access and IP routing have been viewed as discrete network elements until operators introduced video and other real-time services requiring a focus on the consumer experience. Even though the telco TV market has shifted from proprietary solutions to standards-based, open systems infrastructure technologies supporting IPTV, ensuring product interoperability and use-case validation across an end-to-end system is still a fundamental requirement. The overhead for evaluating and testing infrastructure products—and testing for interoperability between products from multiple vendors—can be a major burden in time, money and resources.

While larger operators typically have the resources to invest in internal integration and testing, small to mid-size operators often face the challenge of piecing together infrastructure solutions to support Ultra-Broadband services. Municipalities and utilities also face the challenge of building access and edge networks that allow them to swiftly introduce end-to-end Ultra-Broadband services.

Motorola and Juniper offer standards-based solutions. Network operators can select pre-integrated solutions to better ensure interoperability in real-world deployments. Selecting pre-integrated access and edge routing solutions reduces risk and makes economic sense, and it allows municipalities, utilities, and emerging operators to compete with large operators by delivering multiplay services. By selecting pre-integrated solutions for delivering end-to-end services, operators can:

- Minimize deployment risk by selecting proven technologies already jointly deployed in real-world networks.
- Rely on solutions that are tested continuously in laboratory environments to support scaled operator environments.
- Focus internal engineering resources on delivering the services while minimizing the need to allocate their time to interoperability testing.

- Reduce operational cost and risk by avoiding network design surprises and selecting established products that can be efficiently scaled to support higher-speed services in the future.
- Accelerate revenue recognition by minimizing laboratory testing time and delivering revenue-generating services faster.
- Gain market share by offering exciting new multiplay services that leverage increased bandwidth to enrich the consumer experience.
- Implement best practices for network operations and management based on the combined experiences of Motorola and Juniper engineers.

Motorola and Juniper work closely together and have already successfully collaborated on the design and deployment of high-performance networks. We run each other's products in our internal laboratories, and conduct regular testing for interoperability. Motorola and Juniper constantly review and evaluate the details of interoperability in their multiple test laboratories. Engineers from both companies work closely together, so network operators can avoid the finger-pointing that often comes with the forced marriages of products from multiple vendors.

Proven Solutions from Motorola and Juniper

Motorola and Juniper's real-world experience allows operators to swiftly build out access IP infrastructure to deliver FTTP solutions. Operators can rely on established solutions from industry leaders that have already been deployed and extensively tested in multiple networks.

By leveraging Motorola's expertise in Ultra-Broadband video and access infrastructure and Juniper's carrier-class IP routing solutions, operators can deploy end-to-end solutions that leverage IP core networks and powerful video centric fiber access solutions. They can deploy fiber access solutions from Motorola that extend from the customer's home to the edge of the network and IP routing solutions from Juniper that

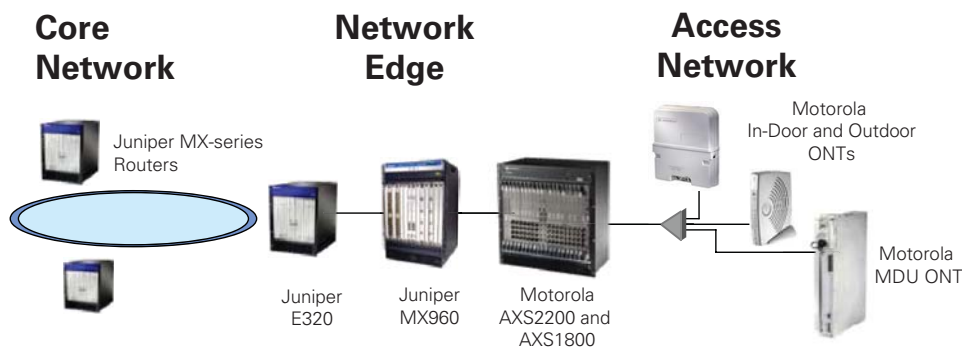


Figure 1: Motorola and Juniper offer a complete multiplay Ultra-Broadband Solution

enable carrier-class routing from the network edge to the core. Operators, utilities, and municipalities can manage end-to-end delivery of a diverse range of services and develop attractive pricing and bundling models to attract new users. Operators can ensure the quality of experience for all subscribers and services. Figure 2 shows just a few of the products available from Motorola and Juniper that allow network operators to swiftly deploy Ultra-Broadband multiplay services.

Quantifying Pre-Integration

What are the costs involved in integrating access and edge routing equipment internally instead of selecting a pre-integrated, end-to-end solution from Juniper and Motorola? An internal lab trial would require a highly skilled network engineer working on separate and combined validation of technologies for about two months. This would involve simulating network conditions and conducting a broad range of tests to identify any potential risk areas and ensure interoperability. Using a conservative operational cost estimate of \$125 per hour for the engineer's time and a prorated share of the laboratory operational costs, an organization would invest \$40,000 (40 hours per week for eight weeks at \$125 per hour).

The operator would add testing time to the deployment cycle, postponing access to incremental revenue. The operator would also need to consider the related opportunity cost. If interoperability problems or product limitations were identified, the operator would need to work separately with multiple vendors to resolve any issues and validate the solution—leading to additional deployment and time-to-revenue delays. Selecting a pre-integrated end-to-end solution takes the pressure off operators because they can rely on proven technologies that have already been integrated and can accelerate deployments and time-to-revenue, all while minimizing deployment risks.

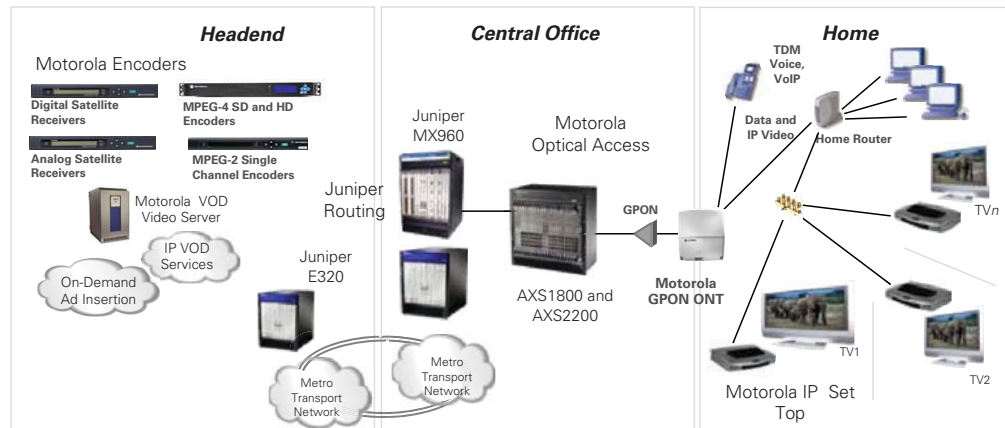


Figure 2: Simplified sample deployment of End-to-End Ultra-Broadband solutions from Motorola and Juniper

Optical Access Infrastructure from Motorola

Motorola's line of access solutions helps carriers, utilities, and municipalities deliver tomorrow's Ultra-Broadband access network today. Motorola's expertise ranges from the consumer premises to the headend or central office. Motorola understands how to optimize networks for the efficient delivery of broadcast and unicast/narrowcast video streams. Motorola designed the broadcast and on-demand video optimized AXS2200 and AXS1800 Optical Line Terminals (OLT) with a 200 Gbps switching and backplane architecture. They deliver a full range of non-blocking high-speed uplinks and enable Passive Optical Networking (PON)-based FTTP access network architectures.

Motorola also offers fiber nodes and a complete family of residential, business, and multi-dwelling unit Optical Network Terminals (ONTs) to help network operators build out their network infrastructure. This suite of single family and multi-dwelling unit ONTs bridges the gap between the optical network and the subscriber's home wiring by incorporating in-home network technologies that allow re-use of existing in-home coaxial networks. Augmented by system features such as flow-through provisioning, auto-discovery, and pre-emptive maintenance procedures, the Motorola ONT becomes a cost-effective all-fiber solution.

Operators can manage the access network via Motorola's AXSvision, a comprehensive Element Management System (EMS) that manages voice, video, and data services in a unified view. Motorola also offers a wide array of encoding solutions, open IP set-tops, and TR-69 compliant residential gateways to support the delivery of managed Ultra-Broadband services to the customer premises. With over 300,000 ONTs and hundreds of OLTs commercially deployed, combined with a deep and proven heritage in both IP and RF video networks and customer premises equipment, Motorola allows network operators to efficiently deploy Ultra-Broadband solutions that provide a competitive advantage and support the development of new services and incremental revenue streams.

Creating quality voice and Ultra-Broadband Internet and video solutions of tomorrow means that operators need knowledge on all of these technologies today, and the Motorola Services Group stands ready to help network operators deploy Ultra-Broadband solutions via FTTP. Motorola not only offers optical access solutions that allow network operators to deliver Ultra-Broadband services; with over two million IP set tops and millions of residential gateways deployed, Motorola also understands the technologies inside the home that will capitalize on the availability of increased bandwidth.

IP Routing from Juniper Networks

Providers of Ultra-Broadband services around the world look to Juniper to help them move from silo, service-specific networks to a converged, next-generation network capable of delivering multiplay services. With

a high-performance network, operators can quickly and cost-effectively roll out new and differentiated services to residential and business customers that drive new sources of revenue and increase customer loyalty.

The top 40 service providers, 93 of the Fortune 100, and large government agencies and institutions are among the many demanding organizations that rely on IP services from Juniper Networks. Juniper is the vendor whose edge routers support the most IPTV subscribers in the world. Juniper's E-series portfolio of Broadband Services Routing platforms is a critical element in the control, delivery, and accounting of services at the network edge. The E-series includes six different models that are designed to efficiently address the widest variety of service provider requirements.

Juniper's MX-series Ethernet Services Routers establish a new industry standard for Carrier Ethernet capacity, density, and performance. The MX960 platform is the industry's largest-capacity Carrier Ethernet platform, with up to 960 gigabits per second (Gbps) of switching and routing capacity. It enables reduced costs, more revenue per platform, and the ability to scale to protect network investments. Offering efficient support of high-density interfaces and high-capacity switching throughput, the MX960 supports a wide range of consumer and commercial services. Juniper's new MX480 and MX240 provide smaller capacity routers for those locations and subscriber densities that require fewer ports.

Juniper's M-series Multi-Service Edge (MSE) routing portfolio uniquely combines best-in-class IP/MPLS capabilities with unmatched reliability, stability, security, and service richness. These multi-service edge routing platforms allow providers to consolidate multiple networks into a single infrastructure while simultaneously generating new revenues with leading-edge services. M-series MSE routing systems use a hardware-based approach combined with highly scalable, secure, and reliable software, which enables multiple services without compromise on a single platform. Providers enjoy maximized revenue and minimized operational and capital costs.

Network operators can also leverage JUNOS™ software. Fundamentally, the advantages of JUNOS software over other network operating systems are the result of authentic differences in how Juniper builds it—one operating system enhanced through one release train and developed from one modular architecture establish the foundations for delivering JUNOS software values. JUNOS software allows network operators to enhance their agility and deliver new services through the open, standards-based philosophy and graceful extensibility of proven software that adapts to new, perhaps unforeseen, needs with minimal cost and risk.

The routers can all be managed by the Juniper Session Resource Control (SRC), a robust, customizable application that makes it possible for service providers to rapidly create and deploy new IP services to hundreds of thousands of subscribers. These IP

services available on SRC include IP television and integrated voice and data.

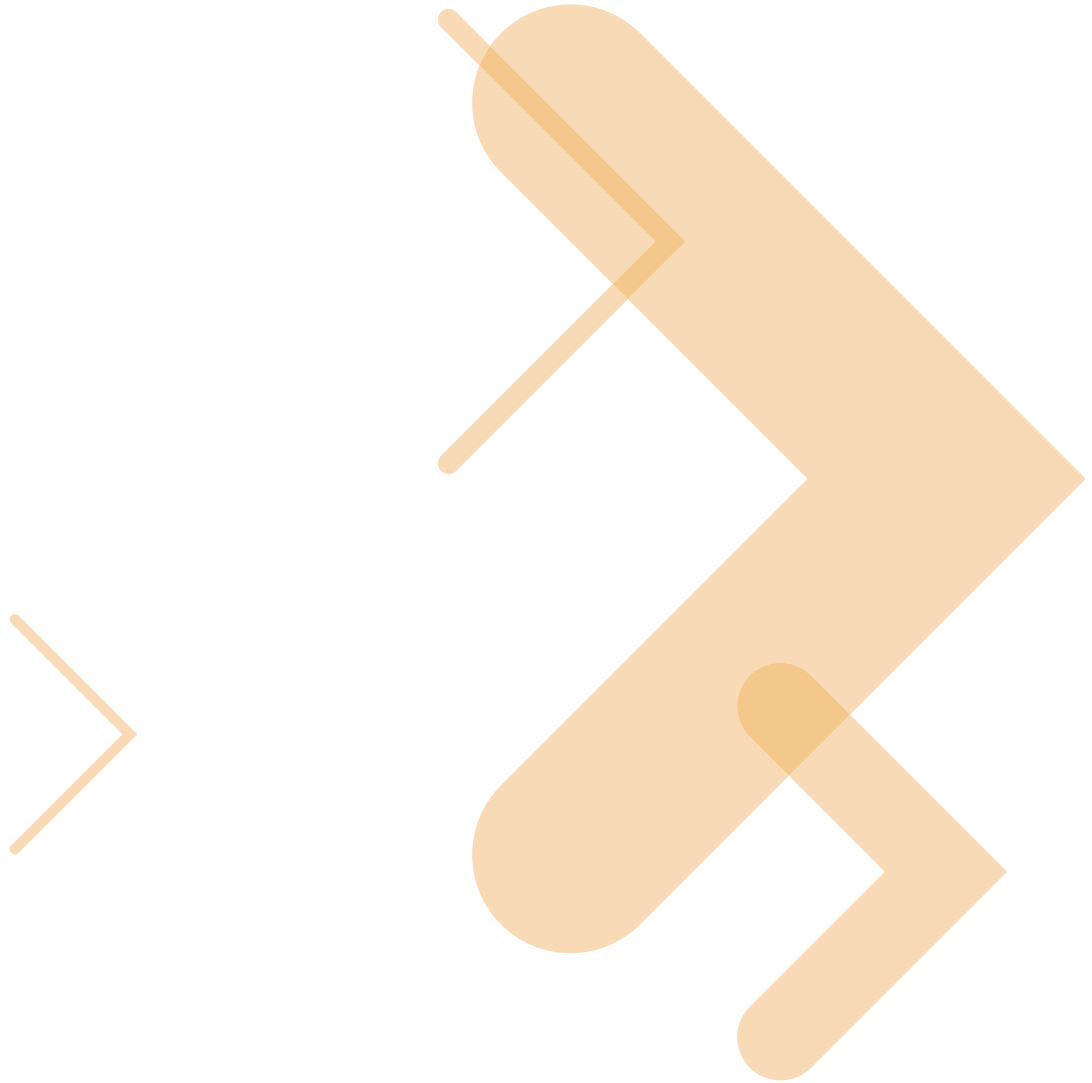
End-to-End Solutions from Motorola and Juniper

The combination of Motorola optical access infrastructure and Juniper routers allows operators to deliver scalable, high-performance services that bind residential and commercial subscribers to the network, reduce churn, and drive the growth of revenues and profits. By leveraging Motorola's expertise in video and access infrastructure and Juniper's carrier-class IP routing solutions, operators, municipalities, and utilities can deploy end-to-end solutions that leverage IP networks and flexible, powerful video-centric fiber access solutions.

Motorola works closely with Juniper Networks to deliver end-to-end solutions that allow network operators to efficiently deliver Ultra-Broadband services to residential and commercial subscribers. Motorola also offers the professional services expertise that helps operators to quickly build out fiber access infrastructure to deliver flexible packages of broadband video, data, and voice services. By selecting a pre-integrated access and edge routing solution from Motorola and Juniper, carriers can:

- Efficiently deliver multiplay video, data, and voice.
- Minimize deployment costs and risks.
- Rely on proven, scalable, and standards-based technologies.
- Accelerate time-to-revenue.

For more information—and to discuss in detail how we can help your organization benefit from pre-integrated end-to-end Ultra-Broadband solutions—contact your Motorola or Juniper account representative. To find out more about the products and technologies highlighted in this whitepaper, visit www.juniper.net and www.motorola.com.



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