

# Western Massachusetts Sprints into the Digital Age with Massive High-Speed Network

## Summary

### Customer:

Massachusetts Broadband Institute (MBI)

### Industry:

Government

### Business Challenge:

Build a network that is the core foundation for Massachusetts' "Last Mile" expansion projects.

### Technology Solution:

- MX480 3D Universal Edge Router
- EX4200 and EX2200 Ethernet Switches
- Junos Space Network Management Platform

### Business Results:

- Increased bandwidth to libraries so that residents can search for jobs and achieve digital literacy
- Strengthened public safety with enhanced access to national criminal justice database
- Enhanced public education by enabling virtual field trips and digital learning opportunities
- Created a network that is the core foundation for Massachusetts' "Last Mile" expansion projects

In the Boston area, residents who visit the local library, town hall, or their children's public school are probably used to seeing people surfing the Internet, whether checking the news, doing research for homework, watching online videos, or looking for a job. Very recently, if you traveled into more rural parts of Central and Western Massachusetts, you would have found large sections of the region where those tasks weren't possible, as many public buildings in these small towns were broadband dead zones, relying on slow dial-up or satellite connections. The Internet connectivity and broadband access that most of the United States takes for granted were scarce to nonexistent in a decent swath of these regions, including a large portion of The Berkshires—that is, until the *MassBroadband 123* network was constructed in the region.

The Massachusetts Broadband Institute (MBI) at MassTech, a public agency, led a multifaceted, four-year effort to deliver a broadband Internet backbone for the region, connecting local government offices, schools, libraries, and police departments across Western Massachusetts, and helping increase citizens' access to 21st century digital resources. *MassBroadband 123* connected more than 1,100 public facilities in 120+ communities via a 1,200-mile fiber-optic network, an effort funded via a mix of federal and state funding.

Bringing broadband access to schools, libraries, medical facilities, city governments, and local business is fostering economic growth through increased training opportunities at community colleges, libraries, and schools; enhancing healthcare through increased connections to statewide health information databases and telehealth pilot programs; and strengthening public safety by delivering new linkages to critical national databases, such as the Criminal Justice Information Service (CJIS).

## Business Challenge

Western Massachusetts is beloved by tourists wanting a break from their fast-paced urban lifestyle. Mountains, lakes, and small-town life have infinite appeal; however, being cut off from the rest of the digital world was limiting the region's economic opportunities and residents' quality of life. Businesses, schools, city government, and hospitals were not keeping pace with their peers in other parts of the state.

Due to the region's hilly terrain and low population density, private telecommunications companies had not built out broadband connectivity to a large part of the region. Forty-five towns were completely unserved by broadband providers and portions of many other towns were only partially covered. DSL, dial-up, and satellite service were frequently used to fill the gap, but they provided inadequate service at a high cost

in some cases. Few residents had fast, easy access to the Internet. To help close the digital divide, the Commonwealth of Massachusetts and the federal government, through the National Telecommunications & Information Administration's Broadband Technologies Opportunity Program, provided roughly \$90 million to the MBI to build a comprehensive, service-rich fiber network to connect public institutions to 21st century Internet and to create a fiber backbone across Western and North-Central Massachusetts.

The request-for-proposal (RFP) and bidding process for the network were complex, including both aerial and underground systems, electrical systems, as well as network equipment design and implementation. Network openness and compatibility, superior performance, and ease of management were the top priorities for the middle-mile fiber network. Multiple carriers needed to interconnect with *MassBroadband 123*, so all aspects of this "open access" network demanded carrier-grade features, performance, and interoperability.

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**Dave Charbonneau**, Technical director, MBI

The RFP emphasized reliable and survivable network services incorporating overlapping, geographically diverse backbone rings with wide access coverage and redundancy. The network needed to support new and legacy network applications, services, and users, and it needed to integrate easily with carrier services, including carrier Ethernet, dense wavelength-division multiplexing (DWDM) and time-division multiplexing (TDM) transport services, delivering transmission rates of 1 Gbps, 2.5 Gbps, and 10 Gbps. To future-proof the network, it also needed to be scalable to 40 Gbps.

Meeting user requirements was essential, as the *MassBroadband 123* network would serve an incredibly broad range of needs. Public safety and emergency communications needed legacy TDM services and backhaul facility for wireless and mobile users. Hospitals wanted high-definition video for telemedicine. Schools wanted high-bandwidth access to Internet and Internet2. With so many different services, the network had to support strict quality-of-service (QoS) requirements for round-trip latency, packet loss, and jitter.

## Technology Solution

"Juniper provided the technical capabilities to support a complex network such as *MassBroadband 123* and allows us to run a superior network on behalf of the Commonwealth of Massachusetts," says Charbonneau, who prior to working at the MBI was a director at Tilson Technologies, which managed the construction of *MassBroadband 123*. "As a public agency, the MBI is required to do thorough reviews of all vendors. Juniper's carrier-class reliability and management platform provided us the best visibility into network activity, which was why they rose to the top in our review process."

The multitiered network has Juniper Networks® MX480 3D Universal Edge Router at each of its points of interconnection, or nodes, where network operators or customers can connect to the network. At just eight rack units, the space- and power-efficient MX480 has 5.12 Tbps of system capacity for high-density Ethernet interface support, as well as legacy SONET/SDH, ATM, and PDH connectivity. The SDN-ready MX480 also supports sophisticated subscriber management and IP VPN services for concurrent residential and business broadband service delivery.

The MX480 routers connect to Juniper Networks EX4200 and EX2200 Ethernet Switches, providing the aggregation and access layers. EX Series switches are highly available, powerful switches that deliver carrier-class reliability. EX2200 switches reside at police stations, schools, libraries, healthcare facilities, and government offices.

The MX Series routers and EX Series switches all run the same Juniper Networks Junos® operating system, Juniper's reliable, high-performance network OS. Using Junos OS automates network operations on a streamlined system, so administrators can focus more time on deploying new applications and services.

Juniper Networks Junos Space Network Management Platform is also used for comprehensive network management, allowing network administrators to easily configure new infrastructure and updates, monitor network activity, and proactively troubleshoot network glitches.

## Business Results

*MassBroadband 123* continues to prove its intrinsic value as more community anchor institutions sign up for network services each month. As the communities join the network, the power of Internet and broadband connectivity is evident.

"*MassBroadband 123* reflects the government's willingness to invest in infrastructure to create economic and educational opportunities for citizens across Massachusetts," says Charbonneau. "*MassBroadband 123* is the foundation for our current work to extend connectivity across the Last Mile, to unserved homes and businesses in these regions. We expect a wealth of long-term benefits from these investments."

*MassBroadband 123* will connect more than 250 schools in the region. The school districts can access online content such as interactive demonstrations, videos, and podcasts, while leveraging learning resources on websites, wikis, and blogs. In libraries, the high-performance network provides staff with the tools they need to help people search for jobs, write resumes, and improve their computer skills.

The communities also are experiencing major advances in public safety. The enhanced connections provided by *MassBroadband 123* allow many small town police agencies to connect to the CJIS database, giving detectives and officers access to real-time information such as alerts, mug shots, and warrant information. Down the road, the increased bandwidth will allow these agencies to consider Enhanced 911 systems, which will expand beyond voice calls to include reports by voice, e-mail, and video. Departments also can choose to add wireless security cameras and store daily video of officers on patrol.

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## Next Steps

*MassBroadband 123* allows private businesses and public institutions not initially connected to link into the network, meaning more points of interconnection will be made in the coming years. A high-performance, carrier-class network infrastructure from Juniper Networks ensures that the network will continue to meet growing user demand.

“Having Internet access and broadband connectivity is causing sweeping changes within the region and helping bring it into the 21st century economy,” says Charbonneau. “We will continue to enhance the network so that businesses and residents in Western Massachusetts can enjoy the same digital opportunities as those in other parts of the state. We have become broadband leaders and we want to continue to bring the best technology and innovation to the entire Commonwealth.”

## For More Information

To find out more about Juniper Networks products and solutions, please visit [www.juniper.net](http://www.juniper.net).

To learn more about MassBroadband 123 and the MBI’s Last Mile efforts, visit <http://broadband.masstech.org/>.

## About Juniper Networks

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