

MESH WIDE AREA NETWORKS



BUILDING BETTER WIRELESS CONNECTIVITY OUTDOORS



A night-time photograph of a city skyline, likely Chicago, featuring several illuminated skyscrapers and a river in the foreground. The buildings are lit up, and the sky is dark. A white boat is visible on the river in the lower left corner. The overall scene is a vibrant urban landscape at dusk or night.

MUNICIPAL ACCESS

CREATING SMARTER CITIES

You want your city to run smarter. Thanks to 802.11n mesh technology, wireless solutions offer faster, more reliable bandwidth and can support a dizzying array of voice, video and data applications. To unlock the full potential of wireless network capabilities, you need to plan, invest and manage wisely as the agencies, businesses, residents and visitors who benefit from its access will ultimately determine just how “smart” your city is.

UNLOCK YOUR ORGANIZATION'S WIRELESS POTENTIAL

With many types of devices to support and worker mobility demands growing exponentially, chances are your wireless needs are surpassing the capabilities of your current network infrastructure. Advanced voice, video and data applications require reliable bandwidth, particularly outdoors with the many potential sources of interference. Extending your wired network to accommodate coverage and capacity needs requires significant time and investment. Wireless solutions, like Mesh Wide Area Networks (MWAN), deliver the reliable connectivity you need quickly at a fraction of the cost of alternatives.

What could you do with more wireless network bandwidth? Plenty. Consider the business impact of providing broader role-based access to critical applications; enhancing situational awareness tools to public safety or security officers by bringing streaming mobile video to handheld or mobile devices to respond quickly and appropriately to incidents. Or use it to establish profitable new revenue streams from the growing demand for voice and video services. The possibilities are indeed, endless.

INDUSTRY USES					
Applications	Municipality	Public Safety	Enterprise	Higher Education	Transportation
Fixed Camera Connectivity	●	●	●	●	●
Campus Surveillance			●	●	
Mobile Office	●	●	●	●	●
Field Reporting	●	●	●		●
Database Access	●	●	●		●
Tele-medicine / Remote biometrics			●		
Remote Facility Security			●		
Fleet / Asset Management	●		●		
Public Transit Surveillance					●
Red Light Cameras		●			
Incident / Event Management		●	●	●	
eCitations / eTicketing		●			
License Plate Recognition		●			
Criminal Database Access		●			
AMR	●				
Smart Parking	●			●	
Traffic Optimization	●				●
Waste Water Treatment	●				
Public and Private Use WiFi	●				
River / Stream Pollution Monitoring	●				
Water Main Leak Detection	●				
Water Tower and Lift Station Monitoring	●				
VoIP (Voice over IP)	●		●	●	●
Facility Management			●	●	
Residential and Visitor Carrier Offload	●				



MOBILE ACCESS

ENABLE GREATER SITUATIONAL AWARENESS

An officer races to the scene of a crime. While in route, he accesses video from wireless cameras in the area to get a look at the scene he is approaching. He also searches the criminal database on his mobile computer to get information on prior incidents at the address. His situational awareness – and the public's safety – is enhanced by reliable wireless connectivity powered by our MWAN solutions.

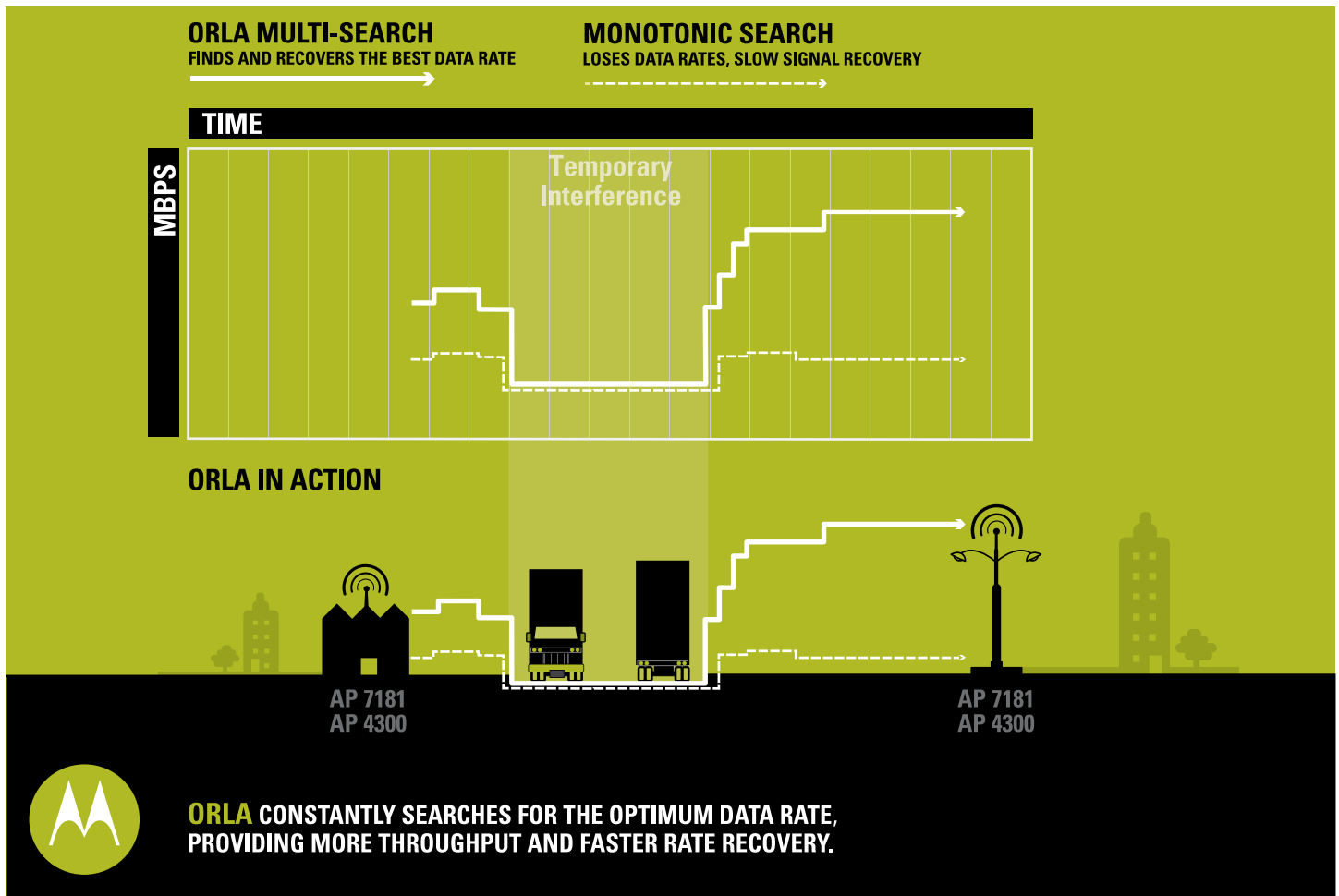
DESIGNED FOR SUPERIOR PERFORMANCE

Our solutions are designed to meet the outdoor network needs of municipal agencies, transit systems, public safety and enterprises serving a wide variety of industries and markets. Solution components deliver:

- **Robust connectivity** even in dynamic outdoor environments due to our unique routing engine, MeshConnex™, and a key enhancement called ORLA (Opportunistic Radio Link Adaptation), which ensures the highest possible data rates are maintained at all times.
- **High capacity networks** that deliver data rates of 300 Mbps at the mesh layer for added capacity that is easily shared by multiple departments for high bandwidth applications such as video surveillance.
- **Mobile connectivity** for vehicle mounted modems, delivering reliable wireless communications at speeds of 200+ mph.

Portfolio solutions support two key protocols: standards-based Wi-Fi technology for public access and our unique Mobility Enabled Access (MEA) technology for proprietary deployments. As a whole, MWAN solutions deliver reliable wireless connectivity and access to mission critical and business applications seamlessly – from virtually any device in any location.

OPPORTUNISTIC RADIO LINK ADAPTATION



FIELD PROVEN PERFORMANCE



TEMPORARY VENUES



EDUCATIONAL INSTITUTIONS



HARSH INDUSTRIAL ENVIRONMENTS



TRANSPORTATION AGENCIES



PUBLIC SAFETY AND MUNICIPAL AGENCIES

THE MESHCONNEX ADVANTAGE

Pervasive, uninterrupted access. That's the differentiated advantage of our MeshConnex™ technology. The high-performance routing engine is successfully deployed today in mesh networks around the world. Its power lies in the scalable, optimized Wi-Fi access it brings to users across a campus, neighborhood or entire city.

The MeshConnex routing engine provides efficient routing, low hop latency, low routing overhead, high-speed handoffs and proven scalability. The Opportunistic Radio Link Adaptation (ORLA) is a key decision-making element within MeshConnex™, which helps Mesh Wide Area Network users enjoy consistent, reliable and uninterrupted access to high-bandwidth applications and content.

PERVASIVE SECURITY

No matter your network size or type – residential, small business, municipal Wi-Fi or campus-wide enterprise – security remains a critical concern and one we've addressed in every aspect of the MWAN portfolio. Our latest mesh solutions provide complete end-to-end security with WPA, WPA2-PSK, WEP, 802.11i, RADIUS, 802.1X (includes EAP-TLS, EAP-TTLS) on the client side.

Motorola's Secure Mesh technology ensures the highest data security between meshed Wi-Fi network nodes.

SMART, INTEGRATED NETWORK MANAGEMENT

We make managing all the moving and often disparate pieces of your network easier, with our One Point Wireless software-based network design, deployment and management tools. A comprehensive, integrated network view helps you protect your network investments by ensuring you have the right equipment and quantity deployed, achieving the strongest links and identifying and resolving issues as they occur.

- BroadbandPlanner – with advanced RF modeling, Google Maps and measurement and verification capabilities – ensure your network delivers optimal performance and capacity over the long run.
- Wireless Manager provides a holistic view of your entire outdoor network and provides quick launch access to indoor WLAN sites, allowing you to quickly respond to issues. An ultra-light thin client allows you to track any alarms and link performance data in real-time via an HTML page accessed from your Smartphone.

A large container ship is docked at a port. A gantry crane is positioned over the ship, and a truck is visible in the foreground. The scene is set against a clear blue sky.

PORT CONNECTIVITY

TRANSFORM OPERATIONS WITH RELIABLE CONNECTIVITY

Global seaports, like other industries, need to innovate to stay competitive. Improving operational efficiencies directly impacts financial strength and viability. New innovative applications – driverless vehicles, remote cargo monitoring, video surveillance, GPS, RFID – provide the platform to transform how you do business, but require a reliable and robust network infrastructure to work as designed. Mesh Wide Area Network solutions are increasingly providing the needed bandwidth to help achieve network objectives in one of the most difficult RF environments in the world.

MWAN 4300 SERIES

The MWAN 4300 product series brings flexibility to a whole new level with fixed and mobile solutions. The 4300 products are available either in a single radio configuration with a 2.4 GHz Wi-Fi radio (802.11 b/g) or in a two radio configuration with an additional 5.8, 5.4 or 4.9 GHz (802.11a) radio. In a single radio configuration, the 2.4 GHz radio is used for both client access and node-to-node mesh links. In the two radio configuration, the 5.8 or 5.4 GHz radio is dedicated for node-to-node mesh traffic, while the 2.4 GHz radio is used for client access.

Sophisticated fixed and nomadic video surveillance applications, as well as high-quality VoIP services are a

snap with this two-radio system which supports both 802.11e and 802.1p QoS standards. The Vehicle Mounted Modem (VMM) 4300 enables any vehicle, train or bus to offer secure and reliable wireless broadband connectivity at highway speeds. The high-performance 4300 solution will help you meet strict cost per square mile and ROI (Return on Investment) targets.

Weighing less than five pounds, the compact MWAN AP 4300 can be mounted virtually anywhere, including light and utility poles, traffic signals, buildings and more. Its slim, aesthetically pleasing design and low profile also are readily accepted by communities.



MWAN 6300 SERIES

The MWAN 6300 series is a single radio meshed wireless network designed to support critical mobile applications with breakthrough MEA (Mobility Enabled Access) technology that provides secure, high-speed mobile handoffs. Operating in the 2.4 GHz frequency band, MWAN 6300 solutions deliver a wide range of productivity benefits and optimize crucial data, voice and video communications in some of the world's most challenging RF environments. Flexible and scalable, the 6300 series is highly tolerant to interference. The MWAN 6300 series includes vehicle mounted modems, mesh wireless routers, wireless modem cards, and wireless serial modems.

Proven Performance in the Harshest Conditions

Our mesh 6300 wireless networks earned their stripes on the battlefield. Using technology originally developed for the U.S. Department of Defense, Defense Advanced Research Projects Agency (DARPA), Leveraging MEA, MWAN 6300 radios are designed to provide reliable, high-speed, mobile communications in the harshest conditions around the world. These networks have been battle tested, providing data links between troops, tanks and air support for the secure communication of critical information.

THE 'N' GENERATION: AP 7181

The AP 7181 is a high performance, multi-radio 802.11n access point featuring our exclusive intelligent ADEPT (ADvanced Element Panel Technology) antenna system. The ADEPT system allows the AP 7181 to achieve and maintain maximum data rates by delivering a reliable dual data stream in an outdoor environment. Leveraging multiple transmit and receive RF chains, and dual polarized antennas, the AP 7181 ensures outstanding mesh throughput throughout a coverage area. ADEPT is designed to work with 802.11n MIMO (Multiple In, Multiple Out) to deliver enhanced coverage, capacity and lower TCO (total cost of ownership).

Fully integrated antennas surround the AP 7181 node, eliminating the self-shadowing interference and coverage challenges that often come with stick antenna designs. A software controlled down-tilt feature allows coverage to be modified as needed by electronically widening and tilting the beam pattern. Managed remotely from the AP 7181 web console, this capability saves the time and expense required to adjust fixed antenna beam patterns, and secure bucket trucks and a technician's time to replace an antenna. This access point brings design to an entirely new level.



MWAN 7300 SERIES

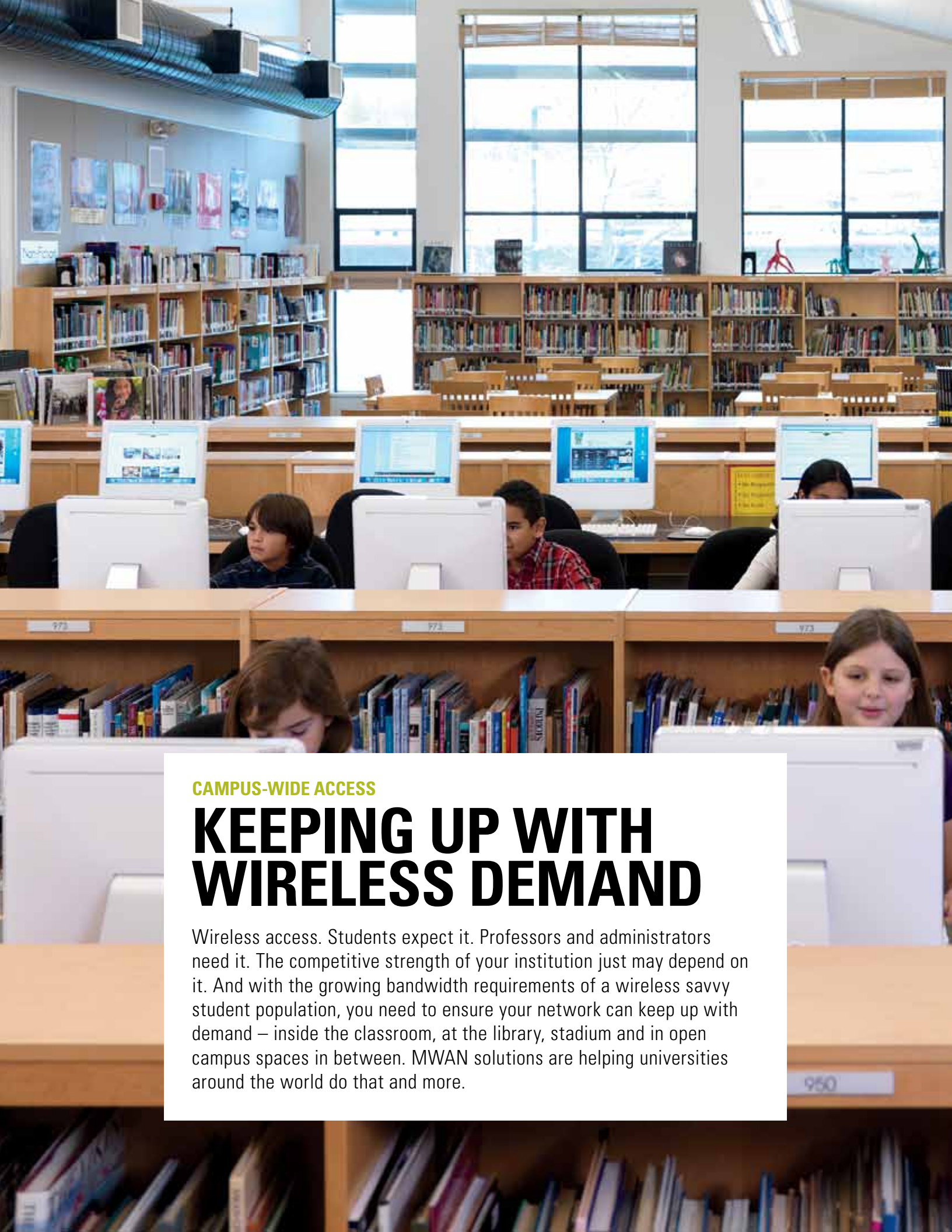
Our MWAN 7300 products offer both standard Wi-Fi for public access as well as MEA technology to meet the mission critical needs of public safety agencies as well as the business critical needs of global enterprises. The AP 7300 provides a powerful bridge between the wired world and a wireless mesh network. It contains two 802.11 (Wi-Fi) radios and two of our unique MEA radios. One set of Wi-Fi and MEA radios operates in the unlicensed 2.4

GHz band and one set operates in the licensed 4.9 GHz public safety band. The multi-radio AP 7300 provides dedicated connectivity for public safety, public works and public access needs. For added security for public safety users, the AP 7300 provides a separate backhaul network from the one used for public access to protect data and voice traffic. In addition to the AP 7300, the portfolio includes wireless routers, vehicle mounted modems, and wireless modem cards.

THE MWAN PORTFOLIO AT A GLANCE

	4300 SERIES	6300 SERIES	7181	7300 SERIES
Radio Frequencies	<ul style="list-style-type: none"> • 2.4 GHz, (802.11b/g) • 4.9, 5.4, 5.8 GHz (802.11a) 	<ul style="list-style-type: none"> • 2.4 GHz 2nd ISM Band 	<ul style="list-style-type: none"> • 802.11b/g/n – 2.4 GHz and 802.11 a/n – 5.4, 5.8 GHz 	<ul style="list-style-type: none"> • 2.4 GHz or 4.9 GHz
Channel Width	<ul style="list-style-type: none"> • 10 MHz and 20 MHz 	<ul style="list-style-type: none"> • 20 MHz 	<ul style="list-style-type: none"> • 20 MHz and 40MHz 	<ul style="list-style-type: none"> • 20 MHz
Mobility	<ul style="list-style-type: none"> • Up to 70 mph (110 kmh) 	<ul style="list-style-type: none"> • 200+ mph (320 kmh) 	<ul style="list-style-type: none"> • Up to 70 mph (110 kmh)* 	<ul style="list-style-type: none"> • 200+ mph (320 kmh)
Throughput (Burst Data Ratio)	<ul style="list-style-type: none"> • 54 Mbps 	<ul style="list-style-type: none"> • 6 Mbps 	<ul style="list-style-type: none"> • 300 Mbps 	<ul style="list-style-type: none"> • 6 Mbps (MEA) • 54 Mbps (802.11b/g)
Routing Protocol	<ul style="list-style-type: none"> • MeshConnex patented Layer 2 hybrid proactive/reactive routing with Layer 1 situational-awareness 	<ul style="list-style-type: none"> • MeshConnex patented Layer 2 hybrid proactive/reactive routing with Layer 1 situational-awareness 	<ul style="list-style-type: none"> • MeshConnex patented Layer 2 hybrid proactive/reactive routing or Spanning Tree situational-awareness 	<ul style="list-style-type: none"> • MeshConnex patented Layer 2 hybrid proactive/reactive routing with Layer 1 situational-awareness
Quality of Service	<ul style="list-style-type: none"> • 802.11e 	<ul style="list-style-type: none"> • 802.1p 	<ul style="list-style-type: none"> • 802.1p/q with 8 queues per VLAN • 802.11e WiFi Multimedia Extensions 	<ul style="list-style-type: none"> • 802.11e • MEA-802.1p
Client Encryption Support	<ul style="list-style-type: none"> • For 802.11b/g: WEP, AES, TKIP, WPA and WPA2 (802.11i) 	<ul style="list-style-type: none"> • WEP, AES, WPA (TKIP) and WPA2 (802.11i) 	<ul style="list-style-type: none"> • Open WEP, AES-CCM, TKIP 	<ul style="list-style-type: none"> • For 802.11b/g: WEP, AES, WPA2 (802.11i)
Intra-Mesh Encryption	<ul style="list-style-type: none"> • SecureMesh / AES 	<ul style="list-style-type: none"> • SecureMesh / AES 	<ul style="list-style-type: none"> • SecureMesh / AES 	<ul style="list-style-type: none"> • SecureMesh / AES
Authentication	<ul style="list-style-type: none"> • 802.1x (infrastructure / client) • MAC Authentication 	<ul style="list-style-type: none"> • RADIUS, 802.1x, EAP-TTLS or EAP-PEAP 	<ul style="list-style-type: none"> • WPA, WPA2-PSK, WEP, 802.11i, RADIUS, 802.1x (includes EAPTLS, EAP-TTLS) • 802.1x (infrastructure / client) and MAC address hardware authentication 	<ul style="list-style-type: none"> • MEA-Hardware device authentication and EAP/802.1x mutual • 802.11b/g-RADIUS 802.1x with EAP-TTLS (or EPP/PEAP)
Product Options	<ul style="list-style-type: none"> • Access Point • Vehicle Mounted Modem 	<ul style="list-style-type: none"> • Access Point • Mesh Wireless Router • Wireless Serial Modem • Wireless Modem Card • Vehicle Mounted Modem 	<ul style="list-style-type: none"> • Access Point 	<ul style="list-style-type: none"> • Access Point • Mesh Wireless Router • Wireless Serial Modem • Wireless Modem Card • Vehicle Mounted Modem
Temperature Range	<ul style="list-style-type: none"> • -22 to 140°F (-30 to 60°C) 	<ul style="list-style-type: none"> • -22 to 140°F (-30 to 60°C) 	<ul style="list-style-type: none"> • Operating: -40 to 131°F (-40 to +55°C) and Storage: -40 to 185°F (-40 to +85°C) 	<ul style="list-style-type: none"> • -31 to 131°F (-35 to +55°C)

*Compatible with VMM 4300



CAMPUS-WIDE ACCESS

KEEPING UP WITH WIRELESS DEMAND

Wireless access. Students expect it. Professors and administrators need it. The competitive strength of your institution just may depend on it. And with the growing bandwidth requirements of a wireless savvy student population, you need to ensure your network can keep up with demand – inside the classroom, at the library, stadium and in open campus spaces in between. MWAN solutions are helping universities around the world do that and more.



MESH VIDEO SOLUTIONS

Whether the need is temporary or permanent, mesh video solutions can be quickly deployed and situational awareness immediately improved in order to initiate the proper incident response. And at a substantial cost savings to wired alternatives, the value of mesh video solutions is hard to beat. Available solutions include our mesh and Wi-Fi enabled wireless security camera video system, a portable on demand (POD) option for use at incident scenes or special events and a Personal Video Encoder (PVE) device that provides real-time video surveillance in an instantly deployable, mobile video network. Utilizing either licensed 4.9 GHz or unlicensed 2.4 GHz frequencies, the Mesh Wireless Video Solutions can be part of a larger Mesh Wide Area Network, or act as a standalone video solution. Users can wirelessly access high-quality video feeds – even while traveling at highway speeds.

WHY MOTOROLA MESH WIDE AREA NETWORKS?

Successful mesh deployments require an in-depth understanding of the outdoor wireless space and advanced RF design and management tools to ensure long-term network performance, reliability and ROI. We pioneered Wi-Fi wide area mesh networks for outdoor network deployments, acquiring the knowledge and expertise to enhance the technology required to dramatically improve capacity, reliability and performance.

With more than one million wireless nodes deployed globally, we know how to deliver mobility and agility inside and outside the enterprise and out to end-user devices. Let us help unlock the full potential of your wireless network and transform how you do business today and tomorrow.



Personal Video Encoder (PVE)



Portable on demand (POD) option

ABOUT WIRELESS NETWORK SOLUTIONS

We deliver the seamless connectivity that puts real-time information in customers' hands and the agility needed to grow business or better protect and serve the public. Integrated with world-class devices, our solution portfolio includes indoor WLAN, outdoor wireless mesh, point-to-multipoint, point-to-point networks and voice over WLAN solutions. Combined with powerful software for wireless network design, security, management and troubleshooting, wireless network solutions deliver trusted networking and anywhere access to organizations across the globe.

For more information on how you can build reliable wireless connectivity outdoors, please visit us on the web at: www.motorola.com/mesh

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