The PoliceChief
The Professional Voice of Law Enforcement

send to a friend

Wireless Standards to Enable Broadband

By Michael Webb, Director and Founder, ICTconsult Ltd., Vancouver, British Columbia, Canada

Law enforcement has relied heavily on wireless systems for decades. Most wireless solutions in use today are either private, purpose-built land-mobile networks providing mainly voice services, or commercial service provider networks, providing mainly narrowband mobile data. Both types of network have served law enforcement well, but economic and performance limitations are forcing some agencies to seek new solutions.

Commercial mobile data solutions such as CDPD, 1XRTT, or GPRS differ from voice radio in that they are standards based, with interoperable and relatively inexpensive user equipment. Because they are narrowband, they carry data at rates roughly equal to dial-up modem speeds. These rates are sufficient to support text-based dispatch messaging, database access, and field reporting.

Newer wideband technologies such as 1XEV-DO and EDGE promise to deliver data at speeds sufficient to support a minimal set of IP-based data applications, including e-mail, transfer of low-resolution images, and some Internet and intranet access. But low data rates still limit the value of these applications.

To replicate the office environment in the field requires broadband rates in excess of one megabyte per second. This speed allows an officer to access information quickly and do all paperwork in the patrol car. Broadband also enables voice and real-time video to be streamed to and from the patrol car. Officers can pull up feeds from fixed cameras and see real-time video while supervisors or dispatchers can see and hear what is happening in the vicinity of other units.

Advantages of Broadband Standards

Although many proprietary solutions exist, broadband wireless standards are now emerging that will help create a mobile office and provide other high-value applications to law enforcement users. There are three primary benefits to using standards-based solutions:

Standards enable interoperability. User devices conforming to a standard can interoperate, even if different manufacturers made them. Software applications running on disparate devices can also interoperate through the use of wireless networking standards.

Standards reduce equipment costs. Standards allow production volumes to be

aggregated on a global scale, enabling investment by manufacturers in hardware integration, greatly reducing costs. For example, a particular set of computer chips that cost $40 in 2000 today cost $5 as a result of an increase in annual production from 1 million to 15 million units.

Standards enable competition and improve functionality. Standards prevent connectivity from being a barrier to market entry for new equipment and application vendors. The result is a wider range of products and a richer set of applications available from a variety of vendors, large and small.

Types of Wireless Standards
Wireless standards generally fall into one of three categories: local area networks, metropolitan area networks, and wide area networks. The range, data rate, and mobility rating for each type are identified in the table below. As one moves from short-range to longer-range technologies, throughput rates decrease while the ability to support user mobility increases.

What Are the Standards?
Some of the key standards and standards-making bodies are described below.

IMT-2000: The International Telecommunications Union (ITU) has defined a set of global standards for third-generation mobile telecom services and equipment, known as IMT-2000. These standards specify wide area networks (WANs) that provide wideband and broadband access up to two megabytes per second, enabling mobile multimedia services. Services based on these technologies are now available in North America, but so far they have fallen far short of their two-megabyte-per-second objective.

IEEE 802 LAN/MAN Standards: IEEE 802 standardizes local and metropolitan area network technologies. The 802 standards most relevant to law enforcement users are 802.11 (wireless LANs) and 802.16 (broadband wireless MANs). Devices that comply with 802.11 standards (called Wi-Fi) are known for their low-mobility connectivity, short range, and high rates of data transfer, and they operate on unlicensed spectrum. Devices that comply with 802.16 (called WiMAX) offer fixed, portable, and mobile broadband wireless access, longer range, and slower data rates, and they operate on licensed and unlicensed spectrum.

Standard 802.11 has been a commercial success; manufacturers ship nearly 100 million WiFi devices each year. Much of this success is attributable to the Wi-Fi Alliance, whose goal is enhancement of the user experience through product interoperability testing and certification. Public safety users have begun to build 802.11/Wi-Fi networks of their own, attracted by the low cost and high data rates the technology can provide. Range is the main limitation of 802.11.

The 802.16 standards are less mature than 802.11 and significant development work is still under way. A current focus of standards development is delivery of broadband services to portable and mobile users. Like the Wi-Fi Alliance before it, the WiMAX Forum is responsible for certifying interoperability of 802.16-based systems. Initial WiMAX-certified products supporting fixed users are expected to be in the marketplace in early 2005, with portable and mobile products expected to follow in 2006. Major service providers such as Sprint and Nextel, along with technology suppliers such as Intel have recently announced support for WiMAX.

Network Type	Range	Data Rate	Mobility

Local area network (LAN)	Less than one kilometer	More than 10 megabytes per second	Low
Metropolitan area networks (MAN)	One to 10 kilometers	One to 10 megabytes per second	Medium
Wide area networks (WAN)	One to 50 kilometers	Less than one megabyte per second	High

Project Mesa: Project Mesa (Mobility for Emergency and Safety Applications) is a joint activity of the European Telecommunications Standards Institute and the North American Telecommunications Industry Association. The public safety community is driving Mesa, supported by equipment manufacturers and application developers. Mesa's primary objective is to harmonize specifications for broadband mobility applications and services, considering common public safety usage scenarios and spectrum allocations.

Project Mesa specifications will be used to implement ad hoc self-healing networks supporting data transmission rates in excess of two megabytes per second. Mesa systems will be deployed as moving hot spots, supporting the following high-data-rate applications and others:

- High-resolution image transfer
- Tracking of personnel and equipment
- Remote patient monitoring and response worker biotelemetry
- Full-motion mobile incident video surveillance
- Voice over Internet Protocol (VoIP)
- Robotic remote control with audio and video
- Satellite connectivity to disaster locations

Project Mesa intends to leverage existing wireless standards such as the IMT-2000 and IEEE standards to allow commercial products to be used with minimal modifications. That flexibility should make procurement more competitive and yield high performance at low cost.

More information on the standards activities mentioned above can be found at the following Web sites:

- **ITU:** www.itu.org
- **802.11:** http://ieee802.org/11
- **802.16:** www.wirelessman.org
- **Wi-Fi Alliance:** www.wi-fi.org
- **WiMAX Forum:** www.wimaxforum.org
- **Project Mesa:** www.projectmesa.org

Top

Return to Article