



# MuniWireless 101: **A Glossary of Terms**

# Glossary

**2.4 gigahertz:** The portion of the radio spectrum in the United States typically used by service providers for high-speed wireless communications such as wireless networks, cordless phones, surveillance equipment and others.

**3G:** Refers to the third generation of mobile communications. 3G networks are designed to transmit video and data at high speeds across cellular networks.

**4.9 gigahertz:** The portion of the radio spectrum in the United States allocated specifically for use by public safety organizations, such as police, fire and emergency services. Users of the 4.9 gigahertz range must pay license fees.

**802.11:** The family of IEEE wireless local-area networking standards, also known as WiFi. There are several different versions:

**802.11b:** was the first popular implementation in the late 1990s, offering bandwidth at up to 11 megabits per second.

**802.11a:** operates in the 5 gigahertz band, at up to 54 megabits per second.

**802.11g:** operates in the 2.4 gigahertz band, at up to 54 megabits per second.

**802.11n:** is under development as a future standard, intended to provide transmission rates up to 270 megabits per second.

**802.16:** A standard for WiFi mesh networks, currently under development, that will provide topology discovery and path selection, functions that are currently beyond the scope of 802.11 access points.

**Access Point (AP):** A device that connects wireless devices together (notebooks, PDAs, mobile computers, WiFi phones) to create a wireless network. An access

point is typically connected to the Internet, but it can also be linked to other access points to allow signal roaming.

**Aggregator:** A company that resells bandwidth to other wireless service providers.

**Antenna:** Strengthens radio signals by concentrating waves to increase the range of a wireless connection.

**AMR (Automated Meter Reading):** Wireless technology that allows gas, water and electric meters to be read from a distance, rather than requiring utility personnel to visually inspect meters on a customer's premise.

**Backhaul:** A connection that takes Internet Protocol (IP) or voice traffic from a locale and transmits it to the wider Internet. For example, when a WiFi network is connected by fiber cable to a national Internet Service Provider's network, that link is called a backhaul connection.

**Band:** A specific set of radio frequencies. WiFi, for instance, operates in the unlicensed 2.4 GHz band, while the public safety equipment operates in the licensed 4.9 GHz band. (See also Spectrum.)

**Bandwidth:** The potential amount of data that can be transmitted across a particular band at any one time. "High-bandwidth applications" are uses of the Internet, such as video conferencing, that send large amounts of data at one time.

**Bluetooth:** A wireless standard for connecting devices that are within a few meters. Bluetooth is designed as a cable replacement for low-power, short-range connections, including mobile phones, telephone peripherals such as headsets, and wireless mice.

**BPL Broadband over Power Line:** a means of using electrical power lines to provide broadband Internet service to homes and businesses. In a typical BPL network, a device plugged into a wall socket connects a computer to the Internet.

**Bridge:** A device that connects two different networks, typically so that devices on either network are unaware that the networks are separate.

**Broadband:** A rather imprecise term meant to describe data transmission over a wide range of frequencies, allowing for higher-speed networking than traditional dial-up lines. Digital Subscriber Line (DSL), cable modem and satellite data connections are generally categorized as broadband technologies.

**Carriers:** Often short for “common carriers,” telephone companies (“telcos”) or cable operators (“MSOs, or Multiple Service Operators”) that provide communications services to residential and commercial customers. Also referred to as incumbents or service providers.

**Cell:** A geographic area covered by a cellular phone transmitter.

**Channel:** A specific, non-overlapping area of radio spectrum. See band.

**CLEC (Competitive Local Exchange Carrier):** A business providing local telecommunications services, competing with other local service providers.

**Client:** A device or a user on a network. For instance, notebook computers or PDAs on a network are clients of network servers and other shared devices.

**Cloud :** A “wireless cloud” is a geographic area served by interconnected wireless devices, providing local users wireless with Internet access.

**CPE (Customer Premises Equipment):** Communications equipment such as telephones and cable modems used to connect to a service provider’s network.

**Digital Inclusion/Digital Divide Digital Inclusion:** is commonly used to describe the need to connect the unconnected. Digital Divide refers to the lack of accessible technology for underserved communities and groups. “Bridging the Digital Divide” is a popular driving force for municipal wireless projects around the world.

**DSL (Digital Subscriber Line):** Technology allowing for the transmission of voice and data simultaneously

over the same telephone line. DSL data transmission rates are significantly faster than traditional dial-up service, but significantly slower than other “broadband” technologies such as cable modems and WiFi.

**Dual-band:** The ability of a wireless network to offer communications across two frequencies. Dual-band municipal networks typically operate on both the 2.4 GHz unlicensed band and the 4.9 GHz licensed band for public safety.

**E911 (Enhanced 911):** An emergency service that sends the caller’s location information to an operator automatically on receiving a trouble call.

**Fiber Optical technology:** that guides light along its length to send digital signals. Fiber is a high-speed cable technology that often is used in concert with wireless networks for backhaul.

**Fixed wireless Wireless devices** that operate in a fixed location, usually because they require access to a fixed power source.

**FTTC (Fiber to the Curb):** Uses fiber optic cables to deliver a high-bandwidth signal close to a customer’s home or business. The link to the home or business is then made from the fiber cable to Ethernet cable or a wireless network.

**FTTH (Fiber to the Home):** Uses fiber optic cables to deliver a high-bandwidth signal directly to a customer’s home or business.

**First mile:** Similar to the concept of “last mile” concerning how information is sent to the final destination, except that it is seen from the viewpoint of the residential or business consumer, especially in rural areas.

**Freenet:** Free software that allows for “uncensored” peer-to-peer communications. Bandwidth is pooled from multiple members’ computers to allow users to access the Internet.

**GPS (Global Positioning System):** A technology that uses satellites to determine the location of a device.

**Handoff:** The act of switching wireless signals from one tower, antenna or base station to another.

**High-gain antenna:** An antenna typically used for long-range communications that is capable of greatly increasing signal strength.

**GSM (Global System for Mobile Communications):** An open standard for mobile phone operators that allows for international roaming between operators.

**Hertz:** One radio wave cycle per second.

**Hot spot:** Typically a wireless network accessible within a limited geography (such as a Starbucks store or an airport). Hot spot access can be free or paid; if paid, access is often sold by an ISP on a per-usage or subscription basis.

**ILEC (or Incumbent) Incumbent Local Exchange Carrier:** an established local telephone company that was doing business in an area before telecommunications were deregulated by the Telecommunications Act of 1996. Also can refer to a wireline or wireless telecommunications carrier, such as AT&T, Sprint and others, typically already providing communications services to individuals, businesses or government organizations.

**Infrastructure:** The technology underpinnings of any computer system or network, usually including computer hardware (servers, client devices and storage), network hardware (access points, switches, cabling) and software (operating system, databases, security and applications packages).

**IP (Internet Protocol):** A standard for transmitting information through the Internet.

**ISP (Internet Service Provider):** Business that provides access to the Internet and other services. Incumbent carriers such as AT&T and Verizon act as ISPs, as do cable operators such as Comcast and Cablevision, as well as dedicated Internet services such as EarthLink and America Online. ISPs allow consumers and businesses to access the Internet using a variety of methods, such as dial-up services, DSL, cable, WiFi, WiMAX, T-1 lines, and satellite.

**kbps:** Kilobits per second.

**Last mile:** The final connection between communications providers and customers.

**Latency:** The length of time between when a data packet is sent and received. Because Internet communications require the receiver to acknowledge that a packet is received, long latency periods can mean that a connection will perform poorly or is dropped completely.

**Line of sight:** A clear line from one antenna to another in a wireless network.

**Long-haul:** The transmission of data over long distances. MAN Metropolitan Area Network.

**Mbps:** Megabits per second.

**Megahertz:** A measure of radio frequency used by wireless devices, indicating one million hertz.

**Mesh networks:** The most prevalent technology foundation of today's outdoor WiFi and related networks. Mesh networks route voice, data and other forms of information between access points by allowing for continuous connections via "hopping" from one access point on the mesh to another, until a backhaul connection to the Internet is found.

**Microcell:** A wireless communications cell covering a small area.

**Mobile IP:** A protocol enabling mobile users to keep a permanent IP address as they move from network to network.

**MSO Multiple System Operator:** typically a cable communications company serving multiple communities.

**Municipality:** A distinct governmental unit serving the needs of a particular group. The most typical U.S. municipality types are states, counties, cities, towns and villages, but they also can include school districts, Indian reservations, utility districts and others.

**Node:** Any device on a network.

**Open network:** A network that broadcasts its presence to wireless devices within range and, typically, provides access without requiring users to log in.

**Packet:** A discreet chunk of data transmitted over a network.

**Panel antenna:** A type of antenna, typically used in point-to-point communications, that directs communications in a specific direction.

**Point-to-point:** A network connection (often wireless) between two devices.

**Point-to-multipoint:** A wireless network in which one access point or node can communicate with nodes in different directions around it.

**POTS Plain Old Telephone Service:** Typically refers to dial-up. RFID Radio Frequency Identification, a technology used to identify unique objects, such as retail products and shipping containers.

**Provisioning:** Delivering communications services to business or residential customers, from initiating the service to delivering and installing all necessary hardware and software for the communications network on both ends.

**QOS (Quality of Service):** The probability that a voice or data “packet” actually arrives at its intended destination within a reasonable or guaranteed period of time, or in comparison to other traffic on the same network. QOS is important with so-called “isochronous,” or real-time, connections such as voice over IP.

**RF (Radio Frequency):** The portion of the electromagnetic spectrum where radio signals can be sent to a receiver. Senders of RF communications range from TV towers to WiFi access points; receivers of RF communications range from pocket radios and televisions to personal computers and PDAs.

**RFI (Request for Information):** A document that asks respondents to provide general information about an initiative under consideration. RFIs usually ask open-ended questions in an effort to determine the range of possible approaches to solving stated problems. The RFI is often a pre-cursor to an RFP.

**RFP (Request for Proposal):** A formal document that details specific information required by a potential customer to purchase specific products or services. RFPs typically are a mandatory step in the process of evaluating and purchasing municipal wireless networks. These RFPs lay out such requirements as technical specifications, vendor history and capabilities, prior experience with similar projects, reference accounts and pricing models.

**Roaming:** The ability to seamlessly move from one area to another without breaking an Internet or cell phone connection.

**Router:** A networking device that transmits information between networks. Routers are the backbone of the Internet, and wireless routers are at the heart of public wireless networks.

**SCADA (Supervisory Control and Data Acquisition):** Distributed systems that are used to monitor and control a range of chemical or transport processes, such as municipal water systems, power generation, and oil and gas pipelines.

**Sector antenna:** An antenna that radiates in one direction.

**Signal strength:** The strength at which radio waves are communicated on a wireless network.

**SMS Simple Messaging System or Short Message Service:** A way of sending short text messages to cellular or Internet phones. Spectrum The range of electromagnetic radio frequencies used for the transmission of data, sound and video. Spectrum availability and usage is managed by the Federal Communications Commission and the National Telecommunications and Information Administration.

**Telco:** Abbreviation for telecommunications company or service provider, such as AT&T. Throughput The amount of data that can be transmitted across a band, or frequency, at any one time. Throughput is typically expressed as bits per second.

**Topology:** The layout of a network.

**Topography:** The physical contours and makeup of a particular geographic area. Topography is an extremely important issue in the planning and deployment of wireless networks since signals can be impeded by such things as forests, mountainous terrain or tightly packed buildings.

**VoIP (Voice over Internet Protocol):** An important application for municipal wireless, Voice over IP allows voice signals to be transmitted over the Internet or any IP-based network. Municipalities have begun adopting VoIP in order to cut cell-phone subscription costs for employees.

**VPN (Virtual Private Network):** A secure link between two or more Internet-connected computers. A VPN creates a kind of “tunnel” between communicating computers, encrypting data so it cannot be deciphered in transit.

**Walled garden:** A browsing environment that controls the information and Web sites the user is able to access. It also refers to content that wireless

devices such as mobile phones have access to if the content provided by the wireless carrier is limited.

**WAN:** Wide Area Network.

**WiFi:** Popularized label for the IEEE 802.11 wireless networking standard. WiFi is popularly thought to mean “Wireless Fidelity,” but continued disagreement indicates there may be no real meaning.

**WiMAX:** An acronym for “Worldwide Interoperability for Microwave Access.” Defined by the WiMAX Forum in 2001, WiMAX allows for very high-speed networking across much wider geographic distance than is currently provided by 802.11 (WiFi), though the upcoming 802.11n protocol has some similar characteristics. WiMAX is also known as the IEEE 802.16 standard.

**WISP (Wireless ISP)** A communications service provider that enables Internet access over wireless networks and devices.