

## 6.8.2 Internet Connection Facts

Regardless of the method, internet connections are made from the subscriber location to an Internet Service Provider (ISP). The ISP might be the cable TV company, the phone company, or another company offering internet access. Internet requests are sent to the ISP, who then forwards the request to the internet.

Most wireless networks are local area networks that are connected to the internet using a wired method (such as DSL or another broadband solution). Some metropolitan areas provide free, city-wide wireless or wired internet connectivity. This type of network is known as a metropolitan area network (MAN). Because many internet service providers also provide other services (such as cable TV or telephone), you can often combine services to get internet access with other services.

The following table lists various services you can use to connect to the internet:

Method	Description
Dial-Up	<p>A dial-up connection uses a modem connected to the phone line to connect to the internet.</p> <ul style="list-style-type: none"><li>▪ Dial-up connections use the public switched telephone network (PSTN). Phone lines are sometimes referred to as POTS (plain old telephone service).</li><li>▪ Multiple standards define how to send digital data over the analog phone lines at various speeds and compression ratios.</li><li>▪ Dial-up connections are available anywhere a telephone line exists.</li><li>▪ Data transfer rates include 28.8 Kbps, 33.3 Kbps, and 56 Kbps.</li><li>▪ Dial-up connections cannot be used for both voice (phone calls) and data at the same time.</li></ul>
Digital Subscriber Line (DSL)	<p>DSL provides broadband digital data transmission over existing telephone lines.</p> <ul style="list-style-type: none"><li>▪ DSL divides the telephone line into multiple channels. One channel is used for analog voice, while the remaining channels are used for digital data.</li><li>▪ Filters are used to separate the analog voice data from digital data.</li><li>▪ Several DSL standards exist, including ADSL, SDSL, and HDSL (collectively referred to as xDSL).</li><li>▪ Depending on the type of DSL used, you can use the same line for simultaneous voice and data.</li><li>▪ DSL is not available in all areas; the service location must be within a fixed distance of telephone switching equipment.</li></ul>
Integrated Services Digital Network (ISDN)	<p>ISDN is a digital service, running over a switched network.</p> <ul style="list-style-type: none"><li>▪ There are two versions of ISDN:<ul style="list-style-type: none"><li>▪ ISDN BRI divides the regular copper telephone line into three channels:<ul style="list-style-type: none"><li>▪ 2 64-Kbps bearer (B) channels can transfer data up to 128 Kbps (data compression increases the data transfer rate). Only one B channel is used during phone use reducing maximum speed to 64 Kbps.</li><li>▪ 1 16-Kbps delta (D) channel for connection control.</li></ul></li><li>▪ ISDN PRI requires different cables to be installed rather than the regular phone lines. The cable is divided into 24 channels:<ul style="list-style-type: none"><li>▪ 23 B channels (each at 64 Kbps) for data transmission.</li><li>▪ 1 D channel (at 64 Kbps) for connection control.</li></ul></li></ul></li></ul>

	<ul style="list-style-type: none"> <li>ISDN is not available in all areas; subscribers are required to be within a certain proximity of telephone company equipment.</li> <li>ISDN is more common in Europe than in the United States.</li> </ul>
Cable	<p>Cable networking uses a cable TV connection to create a wide area connection to the internet.</p> <ul style="list-style-type: none"> <li>A cable modem (router) connects the computer to the cable network for sending networking signals.</li> <li>The same cable line is used to carry networking and cable TV signals, although in some cases a separate line is installed for internet access.</li> <li>Cable networking requires the installation of a cable TV line to your location if one does not exist.</li> </ul>
Cellular	<p>Cellular networking uses the cellular phone infrastructure for internet access.</p> <ul style="list-style-type: none"> <li>Mobile phones with digital data plans use cellular signals to connect to the internet.</li> <li>Devices can connect to a cellular internet connection in a variety of ways:             <ul style="list-style-type: none"> <li>Many smart phones use a technique known as <i>tethering</i> to provide cellular internet to another device. Tethering typically requires the smart phone to be connected via a USB cable.</li> <li>A mobile hotspot is a cellular device that provides internet access by creating a small Wi-Fi network to which multiple devices can connect. Most smart phones have built-in mobile hotspot functionality.</li> <li>Some mobile devices (e.g., notebook computers and tablets) have integrated cellular antennas.</li> <li>USB cellular adapters can be connected to most mobile devices to provide cellular access.</li> </ul> </li> <li>Cellular networking is a truly mobile solution. You can often be moving and still have internet access without manually having to reconnect.</li> <li>Internet access is limited to areas with cell phone coverage. Coverage will be dictated by the service provider's network.</li> </ul> <p>Cellular networks used for voice and data include the following types:</p> <ul style="list-style-type: none"> <li>2G (second generation) networks were the first to offer digital data services. 2G data speeds are slow (14.4 Kbps) and were used mainly for text messaging and not internet connectivity.             <ul style="list-style-type: none"> <li>2.5G was an evolution that supported speeds up to 144 Kbps.</li> <li>EDGE (also called 2.75G) networks are an intermediary between 2G and 3G networks. EDGE is the first cellular technology to be truly internet compatible, with speeds between 400 and 1,000 Kbps.</li> </ul> </li> <li>3G (third generation) offers simultaneous voice and data. The minimum speed for stationary users is quoted at 2 Mbps or higher.</li> <li>4G (fourth generation) offers minimum speeds of around 38 Mbps, with up to 100 Mbps possible.</li> </ul>
Satellite	<p>Satellite networking uses radio signals sent and received from a satellite. Satellite networking is divided into two categories, Geostationary Satellites (GEOs) and Low Earth Orbit Satellites (LEOs). Geostationary Satellite (GEO):</p> <ul style="list-style-type: none"> <li>Uses a transmitter with an antenna (dish) directed skywards to a satellite</li> <li>Requires line-of-sight to the satellite (dish placement is crucial)</li> </ul>

	<ul style="list-style-type: none"> <li>Is affected by mild atmospheric and weather conditions (fog, rain, or snow can disrupt service)</li> <li>May have a long delay time (latency) between requests and downloads</li> <li>Can be a portable solution for cars or trucks with an attached satellite dish</li> <li>Provides nearly 100% global coverage</li> </ul> <p>Low Earth Orbit Satellite (LEO):</p> <ul style="list-style-type: none"> <li>Closer to the Earth than GEOs</li> <li>Orbits at a distance of about 1200 miles above the Earth</li> <li>Simpler and cheaper to make than GEOs</li> <li>Fast, accurate communication and service</li> <li>Coverage area is limited; needs more satellites to cover a bigger area</li> </ul> <p>Some satellite internet access solutions are limited to download only. Another solution, such as dial-up, is required to provide upload capabilities.</p>
Line of Site	<p>Line of site internet access (also called fixed wireless broadband) is similar to satellite internet; however, instead of antennas being directed to a satellite in orbit, they are pointed at a large antenna on land. The antennas use radio signals--typically microwaves--to transmit and receive data. Line of site internet:</p> <ul style="list-style-type: none"> <li>Requires a direct line of site between two fixed antennas. A single, large antenna provides connections for all subscribers in an area</li> <li>Provides internet access without needing to run cables or lines to each subscriber's premise</li> <li>Can provide internet to remote areas by installing a single antenna</li> <li>Is affected by weather conditions, similar to satellite networking</li> <li>Offers speeds of up to 1520 Mbps</li> </ul>
Voice over IP (VoIP)	<p>Voice over IP (VoIP) sends voice phone calls using the TCP/IP protocol over digital data lines.</p> <ul style="list-style-type: none"> <li>With VoIP, phone calls are made through your internet connection, not through a phone line.</li> <li>When you make a phone call, the call is converted into digital data and sent through the internet.</li> <li>VoIP is provided by many ISPs to replace existing analog telephone lines (even using the same phone number).</li> <li>Desktop computers can be used to make VoIP calls by using VoIP software and the computer's microphone and speakers. The most common example of this is the VoIP application Skype.</li> </ul>