Broadband 101

A handy guide to the **basics of broadband terminology** and **technology for policymakers and concerned citizens.**

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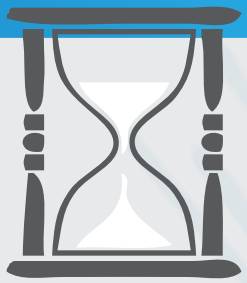
Basic Terminology

- **Bits** are the base unit of information in computing. Network speeds are usually measured in "bits per second"
  - 1 **Kilobit** (Kbps) = 1,000 bits transferred per second (bps) Dial-up connections are 56 Kbps
  - 1 **Megabit** (Mbps) = 1,000,000 bps; about 30 seconds to download an MP3 song
  - 1 **Gigabit** (Gbps) = 1,000,000,000 bps; about 10 seconds to download an HD movie
- **Bytes** are the base unit for file size and used in computing monthly caps
- FCC Definition of "**broadband**" is minimum speeds of 25 Mbps downstream and 3 Mbps upstream; many uses of connectivity require faster speeds than the minimum of 25/3
- **"Download"** is the speed, measured in bits, that your computer receives data
- **"Upload"** is the speed that your computer sends data
- **"Symmetric"** connections are comparable in upload and download speeds. DSL and cable often has upload speeds 5-10x slower than downstream. Businesses increasingly need symmetric connections to maximize productivity

Traditional Technology



- **DSL** uses the copper telephone lines to deliver access to the Internet. Common DSL downstream speeds are .5 to 6 Mbps, though they can get up to 40 for people living very close to the equipment that generates the signal. Upstream speeds are often below 1.5 Mbps and rarely exceed 4.
- **Cable,** fittingly enough, uses a cable network to deliver services. Speeds commonly vary from 6-30 Mbps download and 1-3 Mbps upload on standard tiers. Some cable companies offer 100 Mbps down and 10 Mbps up for a hefty premium. However, **cable networks are shared**, meaning you may not achieve the advertised speeds during periods of peak usage due to congestion from your neighbors.
- **Wireless** Internet access is a complement to wired connections, not a substitute. Many 4G networks have **caps that strictly limit usage**. For more on wireless, see our Wireless Fact Sheet.

http://muninetworks.org/content/wireless-internet-access-fact-sheet

Common Broadband Goals

- Faster speeds now
- Affordable service
- Reliable performance
- Universal access
- Scalable Networks (often fiber-optic) that allow capacity to grow as a rapidly as demand

Fiber Optics

- The Gold Standard.
- Basic idea: Lasers shoot pulses of light across very thin strands of glass.
- Fiber optic networks are **reliable**, **resilient**, and use technology that offers nearly **unlimited** expansion. They have fewer points of failure than copper and cable networks.
- Fiber strands last for **decades** and capacity can be increased by upgrading the lasers on each end without having to lay new fiber.
- The high cost of new fiber networks is mostly the labor to put the cables in place on poles or in conduit underground; operating costs are lower than for cable, DSL, or wireless networks.

Cable and DSL Are Inadequate

- 21st Century businesses require faster connections – "basic broadband" is not sufficient
- DSL/Cable technology is unreliable: Interrupted Service = Lost Revenue
- Cable and DSL advertise "up to" speeds – actually reaching those speeds is rare

"All the Internet-connected, data-hungry gadgets that are coming to market sent a strikingly clear message: we're going to need faster broadband networks."

FCC Chairman Genochowski, 2013

COMPETITION

- In many industries, market competition ensures good outcomes. Unfortunately, cable and Internet networks are, and will remain, largely uncompetitive.
- Most of us have two options at home for Internet access. DSL is the slow, less expensive option and cable a more expensive, faster option.
- Wired telecommunications networks are a **natural monopoly** - they have very high upfront capital costs and declining marginal costs. This makes **robust competition all but impossible**... and Wall Street knows it.

"We're big fans of [Comcast's] Video and High-Speed Internet businesses because both are either monopolies or duopolies in their respective markets."

SeekingAlpha.com, 2012

Learn More – Increase Your Understanding – Impress Your Friends, Neighbors, and In-Laws!

To learn more about broadband and the Internet, check out our other fact sheets, case studies, reports, podcasts, and more on **MuniNetworks.org**

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