CCF DIGITAL EQUITY INITIATIVE: GLOSSARY OF TERMS

The highly technical, jargon-infused language surrounding broadband is a barrier to strong community and consumer advocacy for fast, reliable, and affordable internet. This glossary is a living document to help break down that barrier and further empower communities to engage on this critical equity issue.

Section 1: Data & Metrics Terms

- Bandwidth: The rate at which the network can transmit information. Higher bandwidth generally means faster, more reliable, and more scalable (i.e. more devices can effectively connect) internet. I.e. available bandwidth can determine whether you can download a photo in 2 seconds or 2 minutes.[1]

- Bits: The base unit of measuring network speeds. Network speeds tend to be measured by bits per second -(bps) using kilo (1,000), mega (1,000,000), and giga (1,000,000,000). Bit is generally abbreviated with a lower-case b.[2] The federal definition of "broadband" is minimum pf 25Mbps download speed and 3Mbps upload speed. A Zoom meeting requires a minimum bandwidth of 1Mbps upload and 600kbps download per device (so one child doing remote school and one adult doing remote work at the same time would require bandwidth of 2Mbps download and 1.2Mbps upload.)[3]

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[1] Community Networks, Institute for Local Self Reliance, Glossary.
[2] Community Networks, Institute for Local Self Reliance, Glossary.
[3] https://support.zoom.us/hc/en-us/articles/201362023-System-Requirements-for-PC-Mac-and-Linux

- ○ <u>Download Speed</u>: Also referred to as downstream internet connection, download speed refers to the rate at which the user's device can receive data from the internet.[4]

- ○ <u>Upload Speed</u>: Also referred to as upstream internet connection, upload speed refers to the rate at which the user's computer can send data to the Internet.[5]

- <u>Byte</u>: The base unit for file storage. Bytes generally refer to the size of storage whereas bits are used frequently when discussing how rapidly files may be moved. Byte is generally abbreviated with a capital B.[6] A 5-page Word document is 30KB (kilobits or thousand bytes). A 3-minute audio file is 3-5MB (megabits, or million bytes) and a two-hour HD streaming movie is 2GB (gigabits, or billion bytes).[7]

- <u>Internet Speed</u>: Shorthand for bandwidth.

- <u>Symmetrical/Asymmetrical</u>: Internet speeds have two components - downstream and upstream. When the two speeds are not the same, the connection is asymmetrical. When upload and download speeds are the same, the connection is symmetrical. Typically, phone and cable companies offer much slower upload speeds than download, in part because the Internet tended to be a download-centric system in the 90's and early 00's. However, users increasingly need faster upstream connections to take full advantage of modern applications, like video for remote school, work, and health applications.[8]

- <u>Take Rate</u>: The number of subscribers to a service - typically expressed in a percentage of subscribers divided by the total number of people technically eligible to subscribe . If a community fiber network could serve 10,000 people and has 6,000 subscribers, it has a take rate of 60%.

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[4] Community Networks, Institute for Local Self Reliance, <u>Glossary</u>.
[5] Community Networks, Institute for Local Self Reliance, <u>Glossary</u>.
[6] Community Networks, Institute for Local Self Reliance, <u>Glossary</u>.
[7] https://www.techtarget.com/searchstorage/definition/How-many-bytes-for
[8] Community Networks, Institute for Local Self Reliance, <u>Glossary</u>.

Networks are built to be profitable at or above a certain take rate. Generally, networks require a few years to achieve projected take rates.[9]

Section 2: Network, Service & Technology Terms

- Anchor Institutions: Sometimes also referred to as Community Anchor Institutions (CAIs), anchor institutions are defined by the FCC as "schools, libraries, medical and healthcare providers, public safety entities, community colleges, and other institutions of higher education, and other community support organizations and agencies" that provide outreach, access, equipment, and support services to facilitate greater use of broadband service by vulnerable populations, including low-income, the unemployed, and the aged."

  With this designation, anchor institutions are often connected to high speed internet through designated networks. They often get this service through the federal "e-rate" program, which provides for deep discounts but comes with strict limits around how they can extend the service.[10]

- Broadband: Broadband is shorthand for the physical infrastructure of the internet. Like other utilities (water and electricity) there are several layers of infrastructure required to deliver service to households and businesses. Flicking a light switch or turning a faucet relies on wires and pipes stretching from inside the house, through the neighborhood, city, County, and well beyond. In the same way, connecting to the internet - whether on a computer, a cell phone, or through any of a growing number of connected devices like smart thermostats - broadband infrastructure stretches from inside the home to across the country, and around the world.[11] Types of broadband infrastructure include:

  - Long Haul/Backbone - Massive networks with national and major regional reach. The networks run to buildings that act as exchange points, where data is passed between and across regional and local

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[9] Community Networks, Institute for Local Self Reliance, Glossary.
[10] https://www.usac.org/e-rate/applicant-process/before-you-begin/eligible-services-overview
[11] California Community Foundation Digital Equity Initiative, Broadband 101: The Basics of Broadband Infrastructure.

networks and providers.[12] These are typically located in the larger metropolitan areas, including One Wilshire in downtown Los Angeles. Long Haul or backbone networks are analogous to interstate highways.

- ○ Middle Mile: High-capacity fiber-optic cables that traverse long distances (e.g., 10s-100s of miles) to connect communities to the Internet backbone. These high-capacity lines are analogous to transmission lines for electric utilities, aqueducts and rivers for water utilities, or state highways and regional thoroughfares.[13]

- ○ Last Mile: Cables or wireless bandwidth that connect individual addresses to the nearest utility poles or towers which connect communities to the middle mile.[14] Last mile is analogous to local roadways or driveways.

- Dark Fiber: Unused fiber infrastructure that has not been "lit" with Internet service. When someone is building a fiber network, the cost of adding more fiber than immediately required is negligible and the cost of having to add more fiber later is very high. Therefore, many include dark fiber in projects – fibers that can be leased to others or held in reserve for a future need.[15]

- Fiber or Fiber-Optic: Fiber is the gold standard of residential internet connections, the newest, best, and most "future proof" form of broadband infrastructure. The biggest benefit of fiber is that it can offer much faster speeds over much longer distances than traditional copper-based technologies like DSL and cable, and has nearly infinite bandwidth to meet growing needs.

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[12] Benton, If We Build It, Will They Come? Lessons from Open-Access, Middle-Mile Networks.
[13] Benton, If We Build It, Will They Come? Lessons from Open-Access, Middle-Mile Networks.
[14] Benton, If We Build It, Will They Come? Lessons from Open-Access, Middle-Mile Networks.
[15] Community Networks, Institute for Local Self Reliance, Glossary.

DSL and cable utilize existing phone and TV infrastructure to transmit data as frequency "vibrations" over copper wires, fiber networks transmit data using light over specialized cables packed with glass fibers about the width of a human hair. Light moves very fast, enabling speeds up to 1,000 Megabits (one Gigabit) per second on fiber-optic networks.

While fiber infrastructure seems new, the "backbone" network connecting cities and countries has been built with fiber-optic cables since the dawn of the Internet. The first submarine fiber-optic cable connected the US to France and Britain back in 1988, and hundreds currently crisscross the ocean floor all around the world. What is new is extending this technology to consumers.[16]

- Fiber-to-the-Home (FTTH): As most telecommunications networks use fiber in some part of it, FTTH is used to specify those that use fiber to connect the subscriber. [17]

- Internet Service Providers (ISPs): An entity that provides broadband services to subscribers/consumers.[18]

- Lit Fiber: Fiber infrastructure that is actively/currently being used to provide internet service. (Fiber that literally has light pulsing through it, carrying data.)[19]

- Municipal Network: A broadband network owned by a local government, or municipality. These networks take many forms, from modest networks serving a few businesses to networks that are available at every address across a community. Some are run by the municipality and others are managed by an ISP under contract, called a "managed service provider" (MSP).[20]

- "Open-Access" Network: An arrangement in which broadband infrastructure (middle mile and/or last mile) is available for use by service

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[16] https://broadbandnow.com/Fiber
[17] Community Networks, Institute for Local Self Reliance, Glossary.
[18] Legal Information Institute, Cornell Law School, Legal Encyclopedia.
[19] Community Networks, Institute for Local Self Reliance, Glossary.
[20] Community Networks, Institute for Local Self Reliance, Glossary.

providers who do not own it, enabling multiple providers to offer connections to consumers.[21]

- Underserved Household: A household that is not currently served by a "wired" or "wireline" connection (versus a mobile/cellular or "fixed wireless" connection) that reliably delivers at least 25 Mbps download speed and 3 Mbps of upload speed, the FCC's minimum threshold to be considered broadband-level service.[22]

  Many digital equity advocates argue this threshold is far too low. According to Broadband Now, "Internet speeds in the 100–200 Mbps range are ideal for most households since they can handle common uses like streaming and video chat for 2–5 users at once."[23]

- Unserved Household: A household that is not offered any non-cellular broadband service at speeds of at least 6 Mbps downstream and 1 Mbps upstream.[24]

- Wired Broadband Connectivity Models:

  - Digital Subscriber Line (DSL): Internet access offered over phone lines. DSL uses frequencies not used by human voices, so the internet and land-line phone service can be used at the same time.[25]

  - Cable: Cable modem service enables cable operators to provide broadband using the same copper coaxial cables that provide television service. This type of connectivity model is very common across the United States.[26]

  - Fiber Optic: Fiber optic - or fiber - technology converts electrical signals carrying data to light and sends the light through

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[21] Community Networks, Institute for Local Self Reliance, Glossary.
[22] U.S. Department of Treasury, Coronavirus State and Local Fiscal Recovery Funds Interim Final Rule: Frequently Asked Questions.
[23] Broadband Now, What is a Good Internet Speed? A Guide to How Much You Need.
[24] State of California, Public Utilities Code Section 281.
[25] Community Networks, Institute for Local Self Reliance, Glossary.
[26] Federal Communications Commission, Types of Broadband.

transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps.[27] This type of connectivity model is the newest, most reliable, and offers the highest capacity.

- Wireless Broadband Connectivity Models:

    - Fixed: Similar to DSL and cable Internet, fixed wireless is a "last mile" technology that bridges the relatively short gap between the mainstream Internet "backbone" and homes or businesses. While DSL and cable bridge this gap using wired phone and television connections, fixed wireless accomplishes the same outcome by broadcasting the connection via radio waves from a "fixed" or stationary transmitter to "fixed" receivers on homes and buildings.[28]

Internet Backbone
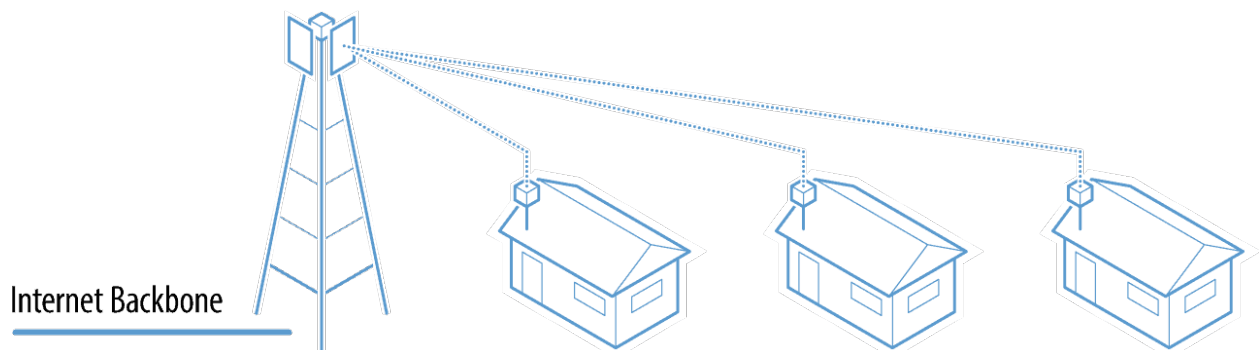
    - Mobile: Also called cellular, mobile wireless delivers connectivity by using a router or hotspot to connect to a cellular network, just like your cell phones. Speed depends on proximity to a cell tower, network congestion, and more. Mobile/cellular wireless speeds are significantly slower than fiber, cable, or fixed wireless connections.[29]

    - Satellite: Satellite internet works similarly to satellite TV, relying on the combination of a signal routed through a satellite in low- or high-Earth orbit and a receiver dish that receives that signal. The

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[27] Federal Communications Commission, Types of Broadband.
[28] https://broadbandnow.com/Fixed-Wireless
[29] https://www.cnet.com/home/internet/cellular-home-internet-overview/

receiver can be an individual home or business or central tower that in turn broadcasts the signal to individual addresses. Satellite connections are more expensive and slower than wired or fixed wireless connections, and generally will not be able to serve large urban populations due to bandwidth limitations.[30]

Section 3: Advocacy Terms

- Access: If a household or business is technically connected to broadband infrastructure (i.e. there is a cable from the house to the utility pole), whether or not that address is actually connected through an ISP, that household is said to have access.

- Adoption: When a household has a broadband subscription, they have "adopted" or are putting to use their access to broadband. Many disconnected or underconnected communities are identified by low adoption rates - low percentages of households with active broadband subscriptions - in addition to or sometimes regardless of theoretical access to broadband.

- Broadband Equity: Broadband equity is achieved when all people and communities are able to access and use fast, reliable, and affordable reliable internet that meets their needs.[31]

- Digital Divide: The digital divide is the gap between those who have affordable access, skills, and support to effectively engage online and those who do not. As technology constantly evolves, the digital divide prevents equal participation and opportunity in all parts of life, disproportionately affecting people of color, Indigenous peoples, households with low incomes, people with disabilities, people in rural areas, and older adults.[32]

- Digital Equity: Digital equity is a condition in which all individuals and communities have the information technology capacity needed for full participation in our society, democracy and economy. Digital Equity is

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[30] https://broadbandnow.com/Satellite
[31] National Digital Inclusion Alliance, Definitions.
[32] National Digital Inclusion Alliance, Definitions.

necessary for civic and cultural participation, employment, lifelong learning, and access to essential services.[33]

- Digital Inclusion: Digital inclusion refers to the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies (ICTs). This includes 5 elements: 1) affordable, robust broadband internet service; 2) internet-enabled devices that meet the needs of the user; 3) access to digital literacy training; 4) quality technical support; and 5) applications and online content designed to enable and encourage self-sufficiency, participation and collaboration. Digital Inclusion must evolve as technology advances. Digital Inclusion requires intentional strategies and investments to reduce and eliminate historical, institutional and structural barriers to access and use technology.[34]

- Digital Redlining: The Public Advocates Office of the California Public Utilities Commission defines Digital Redlining[35] as practices which:

  ○ Limit investments in the installation, expansion, or upgrading of internet service infrastructure within specific geographic areas.

  ○ Limit broadband availability or adoption in specific areas. For example, redlining could include pricing practices that make broadband less affordable, or marketing practices that under-promote broadband services.

  ○ Limit broadband access, impact service quality, and make broadband services less affordable to specific communities.

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[33] National Digital Inclusion Alliance, Definitions.
[34] National Digital Inclusion Alliance, Definitions.
[35] Reply Comments of the Public Advocates Office on the May 28, 2021 Administration Law Judge Ruling, Rulemaking 20-01-001 of the California Public Utilities Commission, p1

Section 4: Policy & Regulatory Terms

- California Public Utilities Commission (CPUC): The California regulatory agency that regulates privately-owned public utilities that includes telecommunications, or broadband.[36]

- Federal Communications Commission (FCC): The federal agency with the authority in promoting competition, innovation, and investment in broadband services. The FCC defines broadband and determines the metrics for determining whether a household or business has access to sufficient broadband internet. The current metric was set in 2015 as 25 Mbps download speeds and 3 Mbps upload speeds.[37]

- National Telecommunications and Information Administration (NTIA): A division of the U.S. Department of Commerce principally responsible for advising the President on telecommunications and information policy issues.[38]

- Rural and Urban Regional Broadband Consortia: California-based regional associations that aim to accelerate broadband infrastructure deployment to the digitally disadvantaged in their communities. There are 13 consortia across the state and they are funded by California Advanced Services Fund, which is part of the California Public Utilities Commission (CPUC). Consortiums work with CPUC, internet service providers, and community stakeholders to identify project opportunities in their communities and provide technical support in submitting the necessary applications to the CPUC requesting funding to install high-speed internet infrastructure. Los Angeles' regional consortium is the Los Angeles Digital Equity Action League Consortium.[39]

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[36] California Public Utilities Commission, About CPUC.
[37] Federal Communications Commission, About the FCC.
[38] National Telecommunications and Information Administration, Home Page.
[39] Los Angeles County Economic Development Corporation, CPUC awards grant funding to LA Digital Equity Action League as the Regional Broadband Consortium for Los Angeles County.

About the CCF Digital Equity Initiative

The Digital Equity Initiative is a three-year project of the California Community Foundation that will seed a digital equity movement in Los Angeles County with the power and capacity to successfully advocate for systems-change solutions that provide for fast, reliable, and affordable broadband for all Angelenos. While all aspects of digital equity are critical, The CCF Digital Equity Initiative is not at present focused on digital literacy or devices. Our efforts are centered on empowering and building capacity within affected communities to fight for and win equitable access to broadband that will make literacy and devices most useful.

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