

**Community
Broadband Matrix / Status**

WIRED

Identified Solutions	Who served	Technology Fund	Potential Funding Resources	Infrastructure Readiness/Cost	Legal	Master Plan/ Regulations	Feasibility	Community Support

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Wireless / Fixed

Identified Solutions	Who served	Technology Fund	Funding Resources	Infrastructure Readiness/Cost	Legal	Master Plan/ Regulations	Feasibility	Community Support

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Wireless / Cell

Identified Solutions	Who served	Technology Fund	Funding Resources	Infrastructure Readiness/Cost	Legal	Master Plan/ Regulations	Feasibility	Community Support

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Wireless / Satellite

Identified Solutions	Who served	Technology Fund	Funding Resources	Infrastructure Readiness/Cost	Legal	Master Plan/ Regulations	Feasibility	Community Support

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Other Providers

Identified Solutions	Who served	Technology Fund	Funding Resources	Infrastructure Readiness/Cost	Legal	Master Plan/ Regulations	Feasibility	Community Support

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Definitions

TERM DEFINED	Technology / Topology
Wired	The data SP (Service Provider) utilizes one, or a combination of, physical media to deliver services. Some service providers use high speed fiber to get data services into a neighborhood, then use telephony twisted pair or cable to the subscriber for the "last mile" connection through a local 'pedestal' equipment rack. The only RF (Radio Frequency) in the delivery of wired services may be installed by the subscriber in the form of a WIFI modem between their wired modem and their WIFI enabled device.
Wired - Cable	Cable - The data service is provided by a 2-way uplink/downlink split-frequency protocol on a single 75-ohm coax wire system. The data service uses a different RF-band from the RF-band used to deliver broadcast and streaming cable-TV service. The subscriber has residential cable modem 'tuned' to the data-service RF 'channel'. The coax cable enters the residence from a coax cable splitter in the street. The residence may also have a frequency splitter to separate out the data- service from the TV-service. The head end houses the CMTS (cable modem termination system) which services subscribers from a bank of cable modems which can provide a fixed speed profile to a specific provider. The bandwidth available for all subscribers is limited by the CMTS feed speeds, meaning that it is possible for a CMTS modem to reduce bandwidth speeds from the subscribers' maximum (up-to) speed contract. CMTS installations are typically serviced by high speed regional fiber loops running SONET (Synchronous) Optical NETWORK packets which contain the IP (internet protocol) packets.
Wired- DSL	Digital Subscriber Loop - This service uses the conditioned telephone twisted-copper pair wiring infrastructure and QAM (Quadrature Amplitude Modulation) modems to deliver data services. Twisted pair lines were initially installed to provide POTS (Plain Old Telephone Service) starting over 100 years ago! DSL data speeds are negotiated at connection time to determine the maximum speed possible based on the twisted pair phase and amplitude noise levels. DSL modems have advanced in technology to provide speed increases over longer lines (amplitude attenuation) with more amplitude noise or phase-shift noise. The head -end houses the DSLAM (Digital Subscriber Loop Access Multiplexer) cards which support individual subscriber modems. Modern DSL modems can be downloaded with new software to provide enhanced speeds without the subscriber having to swap out their modem. There are two basic types of DSL modems: ADSL (Asymmetric DSL) and SDSL (Symmetric DSL) modems. Today, most SP's provide ADSL modem service. ADSL modems use a splitter on the wire pair to enhance DSL speeds. There are currently 12 ITU standards for ADSL modems, offering downstream/upstream speeds which vary from : 8.0/1.0Mbps (1998 standard) to 24.0/3.3Mbps (ADSL2+M; 2008 standard) to 52.0/5.0 Mbps(ADSL4 which is in development). Speed improvements are also being made with data compression algorithms and error correction protocols.
Wired- Fiber Optics	FTTC Fiber to the Curb - The service provider brings high speed data comms to the neighborhood using fiber optics technology. The final connection to the home is frequently via the twisted pair using a short-distance, high speed,DSL modem. Using existing twisted pair wires saves the service provider the added 'home run' expense. Neighborhood subscribers share the available optical fiber bandwidth. FTTH Fiber to the Home - The subscriber has a physical fiber wire pair coming into the residence. Since this requires significant labor to install the new optical cables, this is an expensive solution for the service provider. Verizon's FTTH service is called FIOS. The available bandwidth from the street is not shared by other subscribers from a fiber multiplexer. another term for FTTH is FTTP (Fiber to the Premise) .
Wireless- Fixed	Service provider who uses a single digital RF transceiver to serve a local area. Subscriber has an RF modem with a tuned antenna. Bandwidth is shared among all subscribers, meaning that total bandwidth at any point in time may cause congestion, experienced by subscriber as 'slow' service.
Wireless- Cell	This service is offered by cell telephone providers as an adjunct to their mobile (cell phone) voice services. The connection to the subscriber is via the cell-tower RF infrastructure, providing coast-to-coast mobility for the service. RF modems built into the cell-site radios and subscriber cell--phones and tablets and hot-spot devices have been upgraded over time to provide higher speeds and higher bandwidths to the subscriber. Total bandwidth to subscribers homed to a cell-site is limited by the cell site's bandwidth connection which is typically a fiber loop.

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Wireless-Satellite	This service is offered by operators of geosynchronous satellites revolving around the earth at approximately 22,300 miles high. At this altitude, the revolve at the same rate as the earth, appearing to be stationary to the subscriber. The uplink and downlink signals are impacted by weather between the satellite and the subscribers site. A satellite dish is required at the subscribers site, along with an RF modem. The subscriber installs a satellite Router which can route voice/voice/data services. The providers NOC (Network Operations Center) operates services. Roundtrip latency is approximately 500-msec (1/2-seconds). Bandwidth is shared by the service subscribers. Some systems use RF for 2-way communications via space. Some systems only receive from the satellite (downlink), and use dial up modems for up-link. Uplink bandwidth requirements are usually much less than download comms. Some of the newer services can provide downlink/uplink speeds of 'up to' 10-15/1/3 Mbps depending on weather and co-subscriber usage.
Other Providers	Business class service providers. Service customers with major bandwidth requirements such as internet based businesses. They may also provide backhaul capabilities to cell carriers, ISP's, ILEC's and CELEC's.
Municipal	This type of system can refer to a system installed by a city or town to provide service to local residents or businesses. This approach may be taken when there are no service providers in the area. This approach requires a commitment to purchase infrastructure, have available system support personnel, and connect to a backhaul service provider (see 'Other Providers').
SP	Service Provider - A company providing telecommunications such as telephone, internet services, etc.
LEC	Local Exchange Carrier: Provides communication services to a local area.
ISP	Internet Service Provider: - Provides internet access services, typically over the communications network of a LEC (Local Exchange Carrier)
ILEC	Incumbent Local Exchange carrier: This is a telephone company which provides local telephone exchange services prior to the Telecommunications Act of 1996. They subsequently have been upgrading their service offering to include digital data service (ie -internet access). The idea of the act was to encourage competition to ILEC provided services by establishing rules to allow CLEC's to use ILEC facilities (head end buildings, power supplies, wiring, and telephone poles) and provide ever-competitive services for the benefit of subscribers and investors. Many of the RBOC's (Regional Bell Operating Companies) are historical ILEC's.
CLEC	Competitive Local Exchange Carrier - This is a company sanctioned to use the infrastructure of ILECs in order to provide similar or advanced technology to subscribers.

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ELEC	Excepted Local Exchange Carrier - a) an incumbent LEC providing telephone services to 25,000 or more lines or b) An incumbent LEC providing services to less than 25,000 lines that elect to be excepted, upon filing with the commission of a written notice advising of said election. -or-c) Any provider of telecommunications relay services that is not an incumbent LEC.
IXC	Inter-eXchange Carrier - Provides data services between local exchanges.
DLEC	Digital Local Exchange Carrier - This is a CLEC specializing in providing DSL Services from the ILEC, and selling this service to an ISP.
BACKHAUL	An intermediate link between the core network and a small sub network or end network or a peering point. Sometimes called the ' Middle Mile ' between the core network and the Last Mile' network.
OVERLASH	Lashing a new communication cable from pole-to-pole in parallel with existing service cables.
BTOP	Broadband technology Opportunities Program - The Broadband Technology Opportunities Program (BTOP) is an approximately \$ 4 billion grant program administered by NTIA to help bridge the technological divide; create jobs; and improve education, health care, and public safety in communities across the country. Funded by the American Recovery and Reinvestment Act of 2009, BTOP projects are deploying broadband internet infrastructure, enhancing and expanding public computer centers, and encouraging the sustainable adoption of broadband service.
NHOS	New Hampshire Optical Systems - Mission Statement Our mission is to design, build, and implement a broadband fiber optic network that will bring data services to the underserved and un-severed areas in the New Hampshire market. By building this network we enable economic growth and long-term sustainability. Vision Statement: The long-term vision for New Hampshire Optical Systems is to build this network that will in turn stimulate economic growth to outlying areas of NH and provide access to high-speed bandwidth via fiber optic transport. This can be accomplished in several different ways; the first step in this process will be to build a 750-mile network that will span the State of NH and traverse the countryside. Once completed the fiber optic network will provide a myriad of services that commercial, enterprise and public sector entities can utilize at wholesale prices. These services will range from Dark Fiber transport, to lit DWDM transport, to Metro Ethernet services to the end user. We will also look to partner with service providers to offer the full line of services that we know and use today. Some of these last mile services would be voice, video, data, web hosting, cloud services and many more that are offered today in the open technology marketplace.
186 Communications	Who is 186-Comms? Located in Nashua NH, 186 Communications operates and maintains a fiber optic network serving local, national, and global broadband providers and enterprise customers. The core of our 1,000 mile Northeast network is operated from a 30,000 square foot facility and is fed by diverse connections, forming a high-capacity communications corridor designed and built to serve our customers