CELEBRATING THE 2017 FIBER WINNERS

Broadband Communities

BUILDING A FIBER-CONNECTED WORLD

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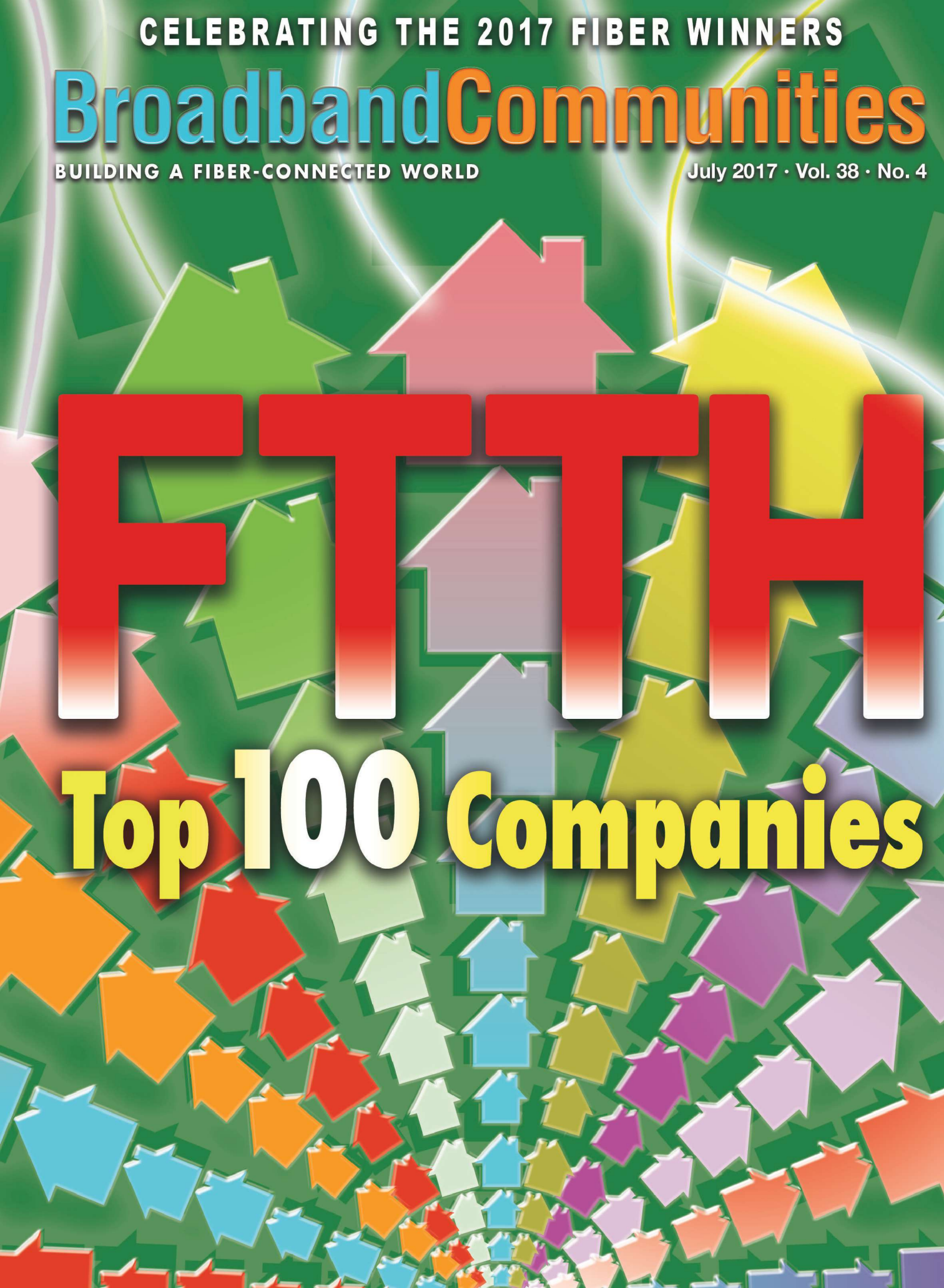
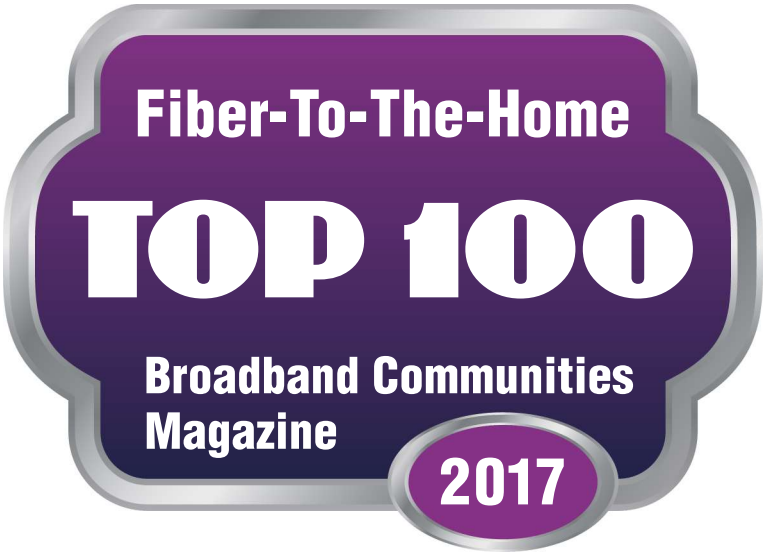


FTTH

Top 100 Companies



Fiber-to-the-home leaders and innovators for 2017

A BBC Staff Report

"Building a Fiber-Connected World" is the tagline of **Broadband Communities** magazine, and each year the FTTH Top 100 list recognizes organizations that are leading the way in this arena.

When the Top 100 list was started, more than a decade ago, the fiber-to-the-home industry was new. The list included nearly every broadband-related company that was even thinking about fiber, some that planned to start thinking about it soon, and some that specialized in other broadband technologies entirely. Over the years, the list became increasingly focused on fiber broadband. Even as FTTH electronics became commoditized and the number of companies making this equipment dwindled (see this issue's Bandwidth Hawk column), the FTTH ecosystem became more complex, and the industry as a whole grew rapidly.

The 2017 FTTH Top 100 list represents many niches in this ecosystem. Optical fiber and fiber cables; passive equipment for connecting, protecting and managing fiber; and active equipment for sending and receiving signals over fiber are the most basic components of an FTTH network, along with software for planning, setting up and managing networks and for provisioning and billing fiber services. The list contains many companies that design, manufacture and distribute these essential products.

To put these pieces together requires firms that finance, plan, design, engineer, construct and install fiber optic networks as well as equipment for digging, pushing, pulling and attaching fiber. These, too, are represented. The list also includes a variety of organizations that advocate for high-performance broadband or create the conditions that make FTTH more profitable.

ORGANIZATIONS ADDED TO THE 2017 FTTH TOP 100 LIST

ACRS	www.acrsokc.com
Actavo	www.actavo.com
Alianza	www.alianza.com
Altice USA	www.alticeusa.com
Charter Communications / Spectrum Community Solutions	www.charter.com; www.charter.com/mdu
City of Ammon, Idaho, Fiber Optic Department	http://ammonfiber.info
Comsof / FiberPlanIT	www.comsof.com; www.fiberplanit.com
Danella Companies	www.danella.com
EntryPoint Networks	www.entpnt.com
eX^2 Technology	www.ex2technology.com
NBT Solutions / VETRO FiberMap	www.nbtsolutions.com; www.vetrofibermap.com
SmartRG	www.smartrg.com
The Broadband Group / TBG Network Services	www.broadbandgroup.com

TOP 100 AT A GLANCE

Finally, there wouldn't be any fiber to the home if not for the owners – large and small, private and public, incumbent and competitive – that invest in networks, decide what and where to build, operate networks and deliver services.

Companies newly added to the list represent several ecosystem niches. Altice and Charter are traditional cable companies adding FTTH to their infrastructure. Ammon, Idaho, is a municipality building an open-access fiber network. ACRS, Actavo, Danella Companies, eX^2 Technology and The Broadband Group are involved in many aspects of planning, design, engineering, construction and operational support for FTTH networks. Comsof and NBT supply software for planning and designing fiber networks. SmartRG, EntryPoint Networks and Alianza supply software that helps operators monetize their networks – SmartRG by automating home network support, EntryPoint Networks by moving control of the broadband access network to the subscriber edge, and Alianza by providing cloud-based VoIP services.

SELECTION CRITERIA

In selecting the FTTH Top 100, the editors looked for organizations that advance the cause of fiber-based broadband by

- Deploying networks that are large or ambitious, have innovative business plans or are intended to transform local economies or improve communities' quality of life
- Supplying key hardware, software or services to deployers
- Introducing innovative technologies with game-changing potential, even if they have not yet been commercially deployed
- Providing key conditions for fiber builds, such as early-stage support or demand aggregation.

To be listed among the FTTH Top 100, an organization may be based anywhere in the world but must do business in North America. Except for broadband service providers, which are inherently local, we give preference to organizations that serve national rather than local markets. Overall size is unimportant, as is corporate form – in addition to for-profit companies, the list includes municipal providers, a telephone cooperative and several nonprofits.

Although some organizations on the list focus entirely on fiber to the premises or other fiber-based broadband technologies, most deliver or support a mix of broadband technologies. For some, broadband represents only a small part of their business. In making these selections, the editors considered how important the organizations are to advancing fiber broadband rather than how important broadband is to them.

The FTTH Top 100 list was researched by Marianne Cotter, Rachel Ellner and Kassandra Kania and overseen by editor-in-chief Masha Zager, with recommendations and advice from editor-at-large Steve Ross. To nominate a company for next year's FTTH Top 100, email masha@bbcmag.com.

"Rural leaders know that to have strong economies, quality education and health care, and lifestyle options, broadband is necessary. After years of hard work, Minnesota is seeing the impact of partnerships among community leaders, state funders and community-minded providers. This winning combination is the way forward to connected communities that work for all."

– Kathleen Annette, President and CEO, Blandin Foundation

FIBER-TO-THE-HOME TOP 100 LIST

COMPANY	WEBSITE	PHONE	KEY PRODUCTS AND SERVICES
3-GIS	www.3-GIS.com	256-560-0744	Fiber network design and mapping software
3M Communications	www.3M.com/telecom	800-426-8688	Interconnection, connection protection, fiber management, fiber pathways for broadband networks
ACRS	www.acrsokc.com	405-843-9966	Broadband engineering and consulting; construction management
Actavo	www.actavo.com	706-654-2298	Network design, engineering, construction and operation
ADTRAN	www.adtran.com	256-963-8000	Solutions for FTTH, Carrier Ethernet, packet optical transport, mobile backhaul, service migration and service management
Advanced Media Technologies	www.amt.com	954-427-5711; 888-293-5856	Distributor of fiber optic transmission equipment, headends, IP and QAM set-top boxes, cable modems
AFL	www.AFLglobal.com	864-433-0333; 800-235-3423	Fiber optic cable, fiber and copper interconnect products, optical connectivity, outside-plant hardware, fusion splicers, test equipment, training, design, engineering, integration
Alianza	www.alianza.com	801-802-6400	Cloud-based VoIP platform
Alpha Technologies	www.alpha.com	800-322-5742; 360-647-2360	Power systems for broadband communications
Altice USA	www.alticeusa.com		Internet, video and voice services
American Polywater Corporation	www.polywater.com	800-328-9384	Cable-pulling lubes, cleaners and sealants
AT&T / AT&T Connected Communities	www.att.com/communities		Broadband internet, TV and voice services
Atlantic Engineering Group	www.aeg.cc; www.atlanticfibernetworks.com	706-654-2298	Design and field engineering, aerial and underground construction and professional services for FTTH and smart-grid networks
Baller Stokes and Lide	www.baller.com	202-833-5300	Legal services, public policy advocacy
Bechtel	www.bechtel.com	415-768-1234	Engineering, procurement, construction and project management
BHC RHODES	www.ibhc.com	913-663-1900	Planning, design and construction of FTTx projects
Biarri Networks	www.biarrinetworks.com	877-730-1999	Fiber optic network design software and services
Black & Veatch	www.bv.com	913-458-2000	Consulting, engineering, construction, operations and program management services
Blandin Foundation	www.blandinfoundation.org	877-882-2257	Grant making, community leadership development and public policy programs
C Spire / C Spire Fiber	www.cspire.com/home-services/	855-277-4734	Voice, video and internet access delivered over a fiber-to-the-home network
Calix	www.calix.com	707-766-3000; 877-766-3500	Fiber access solutions for residential and business services, network and services management software, value-added software as a service
CCG Consulting	www.ccgcomm.com	202-255-7689	Regulatory, engineering, marketing, and strategy and planning services
CenturyLink	www.centurylink.com	318-388-9000	Data, voice, video, managed services, cloud and hosted IT solutions
Charles Industries	www.charlesindustries.com	847-806-6300	Fiber optic distribution enclosures and cabinets, fiber aggregation and demarcation interconnects and hubs, fiber cross-connects
Charter Communications / Spectrum Community Solutions	www.charter.com; www.charter.com/mdu		Internet, video, voice and managed Wi-Fi services
CHR Solutions	www.chrsolutions.com	713-351-5111	Communications network and outside-plant engineering; network planning; managed NOC and managed IT services; telecom billing software
Cincinnati Bell	www.cincinnatibell.com; www.cincinnatibell.com/Fioptics	513-397-9900	Telephone, data, video, wireless and information technology solutions

*** FEATURED COMPANIES APPEAR IN PURPLE ***

COMPANY	WEBSITE	PHONE	KEY PRODUCTS AND SERVICES
City of Ammon, Idaho, Fiber Optic Department	http://ammonfiber.info	208-612-4054	Gigabit internet access
Clearfield	www.seeclearfield.com	763-476-6866; 800-422-2537	Fiber distribution and protection systems for inside plant, outside plant and access networks
Comcast Cable / XFINITY Communities	www.comcast.com; www.xfinity.com/xfinitycommunities		High-speed internet, video and voice services over cable and FTTH networks
CommScope	www.commscope.com	828-324-2200; 800-982-1708	FTTH electronics, cable and connectivity products
Comsof / FiberPlanIT	www.comsof.com; www.fiberplanit.com	416-594-9777	Software for FTTx network planning and design
Corning Optical Communications	www.corning.com	828-901-5000	Optical fiber, optical fiber cable, fiber cabinets and splitters, fiber connectors, terminals, MDU products
COS Systems	www.cossystems.com	800-562-1730	Demand aggregation software, BSS/OSS for managing open-access fiber networks
Cox Communications	www.cox.com		High-speed internet, video, voice and home security services
CTC Technology & Energy	www.ctcnet.us	301-933-1488	Fiber and wireless broadband network design, engineering, assessment and implementation
Danella Companies	www.danella.com	610-828-6200	FTTH network design, engineering, construction and testing
DASAN Zhone Solutions	www.dasanzhone.com	877-946-6320	Network access equipment, passive optical LAN, Ethernet switching, mobile backhaul
Design Nine / WideOpen Networks	www.designnine.com; www.wideopennetworks.us	540-951-4400	Broadband planning, design and project management; network operations
Ditch Witch	www.ditchwitch.com	800-654-6481	Construction equipment for laying fiber
Dura-Line	www.duraline.com	800-847-7661	Conduit, cable-in-conduit, microducts and accessories
Dycom Industries	www.dycomind.com	561-627-7171	Engineering, construction, maintenance and installation services for telecommunications providers
EntryPoint Networks	www.entpnt.com	801-518-7333	Automated open-access platform
EPB Fiber Optics	www.epbfi.com	423-648-1372	Voice, video, data and smart-grid services provided over a fiber optic network
ETI Software Solutions	www.etisoftware.com	770-242-3620; 800-332-1078	Software products that manage broadband service fulfillment, activation and revenue assurance
eX^2 Technology	www.ex2technology.com	402-817-7970	Project finance, design, installation, right-of-way development and maintenance
EXFO	www.exfo.com	418-683-0211; 800-663-3936	Telecom test and service assurance solutions
Fiberdyne Labs	www.fiberdyne.com	315-895-8470	Optical passive devices, fiber optic cable assemblies, termination boxes, MPO cables and cassettes
Finley Engineering	www.finleyusa.com	417-682-5531	Network design and engineering services
Fujitsu Network Communications	http://us.fujitsu.com/telecom	888-362-7763	Multivendor core, access and wireless network equipment; network management software solutions; end-to-end multivendor network project integration; other professional services
GigabitNow	www.gigabitnow.com	866-748-8066	Planning, design, construction, operation and support of gigabit fiber-to-the-home networks
GLDS	www.glds.com	800-882-7950	Subscriber management, billing, provisioning and workforce management software
Google Fiber	fiber.google.com		Voice, video and gigabit internet services delivered over FTTH networks

FIBER-TO-THE-HOME TOP 100 LIST

COMPANY	WEBSITE	PHONE	KEY PRODUCTS AND SERVICES
Graybar	www.graybar.com	800-GRAYBAR (472-9227)	Distributor of PON electronics; optical transport; fiber cabinets, enclosures and pedestals; fiber optic cable and drop cable; DC power; outdoor fiber terminals; hardened MSTs
GVTC Communications	www.gvtc.com	800-367-4882	Video, high-speed internet with 1 Gbps availability, security monitoring, local and long-distance telephone, advanced data services, Wi-Fi, Ethernet backhaul
Henkels & McCoy Group	www.henkelsgroup.com	1-888-HENKELS (436-5357)	Planning, design, engineering, project management, construction and installation of wireline and wireless communications networks
Hiawatha Broadband Communications	www.hbci.com	888-474-9995	Voice, video, data and wireless services over high-speed networks
Hotwire Communications	www.hotwirecommunications.com	800-409-4733	Data, voice and video services delivered over fiber-to-the-home networks
InfiniSys	www.electronicarchitect.com	386-236-1500	Telecommunications network design for multifamily buildings, technology amenity engineering
Institute for Local Self-Reliance	www.ilsr.org; www.MuniNetworks.org	612-276-3456	Broadband policy research and municipal broadband advocacy
Inteleconnect	www.inteleconnect.com	734-604-1563	Telecommunications strategies for municipalities, campuses, developments and businesses
iPhotonix	www.iphotonix.com	214-575-9300	Optical network terminals, residential gateways, NFV software
KGPCo	www.kgpco.com	800-755-1950	Distributor of products for FTTH, including outside plant, central office, DAS, transmission and customer premises; supply-chain and distribution services
Ledcor Technical Services	www.ledcor.com/	512-275-3500	Design, engineering, sales, construction and maintenance of wireless and wireline networks
Leviton Manufacturing	www.leviton.com	800-323-8920	Premises wiring, outside plant, central-office solutions and home automation products
Magellan Advisors	www.magellan-advisors.com	888-488-1767	Broadband and telecom planning, deployment and management services
Mapcom Systems	www.mapcom.com	804-743-1860	Visual operations system software, database administration, workforce management tools, training and consulting
MasTec North America	www.mastec.com	888-785-2171	FTTx deployment, outside-plant cabling, inside-plant construction and installation, splicing, testing, systems integration, maintenance
Michels Corporation	www.michels.us	920-583-3132	Fiber optic network construction, including outside-plant construction, structured cabling and fiber splicing and testing
Mid-State Consultants	www.mscon.com	435-623-8601	Communications engineering services
Multilink	www.gomultilink.com	440-366-6966	Fiber distribution and cable management solutions; network power supplies, enclosures and cabinets; MDU enclosures; raceways and pathways
NBT Solutions / VETRO FiberMap	www.nbtsolutions.com; www.vetrofibermap.com	207-221-6627	Fiber mapping software
NEO Connect	www.NEOconnect.us	970-309-3500	Consulting, design and engineering for middle-mile and FTTH networks
Nokia / Nokia Networks	www.nokia.com	908-582-3000	Equipment for fixed and mobile broadband access; software and services for network management
OFS	www.ofsoptics.com	770-798-5555; 888-342-3743	Optical fiber; optical cable; fiber management and connectivity products for homes, businesses and MDUs; splicers; network design services
On Trac	www.ontracinc.net	423-317-0009	FTTx consulting, design, installation and splicing services

COMPANY	WEBSITE	PHONE	KEY PRODUCTS AND SERVICES
Pacific Broadband Networks	www.pbnglobal.com/	888-339-8805	FTTH electronics, software for network management and provisioning
Pavlov Media	www.pavlovmedia.com	800-677-6812	Internet, video and voice services; secure home networking for apartment units
Power & Tel	www.ptsupply.com	800-238-7514	Distributor of fiber optic products and cable, optical networking electronics, test gear, IPTV, home networking solutions
PPC Broadband Fiber	www.ppc-online.com	315-431-7200	Armored polymer microduct and fiber cables for FTTH and MDU markets
Preformed Line Products	www.preformed.com	440-461-5200	Cable anchoring and control hardware and systems, fiber optic and copper splice closures, high-speed cross-connect devices
Prysmian Group	www.prysmiangroup.com	803-951-4800; 800-713-5312	Optical fiber and telecommunications cables
Pulse Broadband	www.pulsebroadband.net	314-324-7347	Fiber network and FTTH planning, design, construction management, provisioning, billing, customer care, video programming services and operations management
Rocket Fiber	www.rocketfiber.com	844-847-6253	Gigabit internet access
SDT	www.sdt-1.com	601-823-9440	Telecommunications infrastructure services, including structured cabling; engineer, furnish and install services; design and engineering
SmartRG	www.smartrg.com	877-486-6210	Solutions for FTTH, carrier-grade customer premises equipment; open-services platform for managing networked in-home devices; service provider tools for network optimization, insight, security
Smithville Communications / Smithville Telecom / Smithville Fiber	www.smithville.com	812-876-2211; 800-742-4084	High-speed internet, IPTV, voice, managed services, cellular, home automation and security services, cloud services, big data support, videoconferencing, consulting services
Sonic	www.sonic.net	888-766-4233	Gigabit fiber and DSL internet access, residential and business voice service, co-location, business networking
Superior Essex	www.SuperiorEssex.com	770-657-6000	Premises and outside-plant fiber and copper cable products, FTTH closures
Team Fishel	www.teamfishel.com	614-274-8100; 800-347-4351	Network design, engineering, construction, installation and maintenance services
Telect	www.telect.com	509-926-6000	Fiber optic and copper connectivity solutions, network power management, equipment racks and cabinets, cable management systems
The Broadband Group / TBG Network Services	www.broadbandgroup.com	702-405-7000	Telecommunications master planning, network design and engineering, financial modeling, construction management
Tucows / Ting	www.ting.com/internet	855-846-4389	Gigabit internet access
TVC	www.tvcinc.com; www.maxcellinnerduct.com	888-644-6075	Broadband electronics, connectivity products, outside-plant hardware, test equipment, fabric innerduct, conduit technology
Vantage Point Solutions	www.vantagepnt.com	605-995-1777	Telecom engineering and consulting services
Verizon Communications / Verizon Enhanced Communities	www.verizon.com; www.verizon.com/communities		Internet, TV and digital voice services
Vermeer Corporation	www.vermeer.com	641-628-3141; 888-837-6337	Horizontal directional drilling equipment, utility and pedestrian trenchers and plows
Viavi Solutions	www.viavisolutions.com	408-404-3600	Fiber optic communications components, network optimization and test equipment
Walker and Associates	www.walkerfirst.com	800-925-5371	Distributor of communications networks products and services
Zyxel Communications	www.zyxel.com/us	714-632-0882; 800-255-4101	Customer-premises equipment and Ethernet switches for FTTH and FTTN networks

Ultimately, communities are limited by imagination and grit, not by opportunity.

– Christopher Mitchell, Director of the Community Broadband Networks Initiative, Institute for Local Self-Reliance

3-GIS

www.3-GIS.com
256-560-0744

Key Products: Web-based tools and services for mapping, network design and management

Summary: 3-GIS Fiber Network Solutions is a browser-based, GIS fiber design and asset management system – a single-platform solution for fiber network design, construction output and tracking, and fiber asset management. Built on Esri's powerful ArcGIS Server platform, 3-GIS Fiber Network Solutions offers desktop and mobile tools for designing and documenting network assets during all phases of a network life cycle, including planning, design, construction and network management. Data can be stored in the cloud or on an organization's server.The company recently introduced Web JS, which supports multiple network views and Google Street View. The web-based architecture allows designers, field crew, project management staff and other stakeholders to access accurate, real-time network information. 3-GIS Design Services provides consulting services to municipalities and network builders considering and deploying FTTH networks. 3-GIS is headquartered in Decatur, Alabama.

FIBER AND FIBER CABLE

These firms supply optical fiber for fiber access deployments.

In this and subsequent tables, FTTH Top 100 companies are in bold.

COMPANY NAME	WEB ADDRESS
AFL	**www.aflglobal.com**
Clearfield	**www.seeclearfield.com**
CommScope	**www.commscope.com**
Corning Optical Communications	**www.corning.com**
General Cable	www.generalcable.com
Hexatronic	www.hexatronic.com
Lite Access Technologies	www.liteaccess.com
Nexans	www.nexans.us
OFS	**www.ofsoptics.com**
PPC Broadband Fiber	**www.ppc-online.com**
ProLabs	www.prolabs.com
Prysmian Group	**www.prysmiangroup.com**
Sumitomo Electric Lightwave	www.sumitomoelectric.com
Superior Essex	**www.superioressex.com**
Telect	**www.telect.com**
TeraSpan	www.teraspan.com
Timbercon	www.timbercon.com
Tinifiber	www.tinifiber.com/

3M Communications

www.3M.com/telecom
800-426-8688

Key Products: Interconnection, connection protection, fiber management, fiber pathways for broadband networks

Summary: The telecommunications industry has relied on 3M products for more than 50 years. 3M offers a full-fiber MDU broadband solution that makes deploying fiber quick and simple with minimal disruption to residents. 3M fiber pathways can be used in many applications – from inside single-family homes to apartment building hallways – and they work seamlessly with field-installable 3M fiber connectors. The new 3M Clear Track Fiber Pathway is virtually invisible, so customers hardly know it's there. From enterprise to access to wireless, 3M draws on more than 45 technology platforms to create solutions for communications networks worldwide. 3M's Electronics and Energy segment, to which the Communication Markets division belongs, posted net sales of $4.8 billion in 2016.

ACRS

www.acrsokc.com
405-843-9966

Key Products: Broadband engineering and consulting, construction management

Summary: Established in 1987, ACRS provides turnkey engineering and consulting to rural telcos, cable TV operators, wireless ISPs, competitive providers, electric co-ops,

municipalities, Native American tribes and large carriers across the United States. Services include feasibility studies, financing acquisition, regulatory consulting (FCC licensing, CLEC and ETC filings and state corporation commission filings and testimony), detailed engineering, construction management and acceptance testing. The company has extensive successful experience in acquiring RUS broadband loans and grants and competitive Connect America Fund awards for its clients. ACRS engineered the first full-motion distance learning network in the United States and the first FTTH system in Oklahoma. Recent projects include several FTTH networks for electric co-ops, including Northeast Rural Services (Bolt Fiber Optic) and Valley Electric Association, winner of a **Broadband Communities** Cornerstone Award. ACRS is headquartered in Oklahoma City, Oklahoma, and has about 50 employees.

Actavo

www.actavo.com
706-654-2298

Key Products: Network design, engineering, construction and operation

Summary: Actavo, formerly SiteServ, is an Ireland-based engineering company with expertise in telecom, water, power and building solutions. Actavo's Network Solutions group surveys, designs, builds, upgrades and maintains fiber networks for Digicel, Liberty Global, SIRO, Virgin Media and Vodafone. Its recent expansion into North America, after buying part of Atlantic Engineering Group in 2015, added AEG's 120 network design engineers, who work globally. Actavo has 13 offices worldwide, including five in the United States: Atlanta; Austin, Texas; Braselton, Georgia; Denver; and Kansas City, Missouri. Its global workforce totals 6,000.

ADTRAN

www.adtran.com
256-963-8000

Key Products: Solutions for FTTH, Carrier Ethernet, packet optical transport, mobile backhaul, service migration and service management

Summary: ADTRAN is one of the fastest-growing FTTH vendors globally. Its solutions enable broadband expansion, IPTV video deployment, business Ethernet service delivery, cell site and small-cell backhaul and converged network services. The company's flagship Total Access 5000 platform delivers fiber and copper access services across a pure Ethernet core, allowing mixed deployments of GPON (including NG-PON2), active Ethernet, vectored VDSL2 and traditional T1 services. For services that require strict service-level agreements, the Total Access 5000 also provides MEF-based Carrier Ethernet services over wavelength, OTN, fiber, copper and TDM. In May 2015, ADTRAN announced a breakthrough in the economics of delivering FTTP service based on NG-PON2 architecture. ADTRAN's implementation of this 10 Gbps symmetrical, standards-based technology allows for simultaneous delivery of residential, business and backhaul applications on the same infrastructure using different optical transceivers. Last year, ADTRAN began XGS-PON trials with several 10 Gbps broadband customers. ADTRAN is based in Huntsville, Alabama, and had 2016 sales of approximately $637 million.

FiberBroadband ASSOCIATION

Advanced Media Technologies

www.amt.com
954-427-5711; 888-293-5856

Key Products: Fiber optic transmission equipment, cable modem termination systems, headends, IP and QAM set-top boxes, cable modems

Summary: Advanced Media Technologies (AMT), a value-added reseller of high-performance broadband products, offers a complete line of DOCSIS, FTTH, IPTV and CATV products. AMT specializes in data solutions for private cable operators. It offers products from such leading manufacturers as Nokia, Amino, ARRIS, ATX Networks, Actiontec, Blonder Tongue, Casa Networks, Harmonic, Olson Technology, Imagine Communications and ZeeVee. Customers include major cable companies in the United States and Latin America, telcos, private cable operators and entertainment and multimedia content delivery companies around the world. Located in Deerfield Beach, Florida, AMT was originally founded as DX Communications in 2003. The company keeps an extensive inventory in its 32,000-square-foot warehouse and employs more than 70 people.

"As electric power systems did in the last century, advanced communications networks are now increasingly driving and supporting simultaneous progress in just about everything that matters to communities."

– Jim Baller, President, Baller Stokes & Lide

"The next 12 months are going to be the most important in the history of fiber as next-gen technologies not only increase connection speeds by an order of magnitude but play a leading role in network convergence. For many service providers, these same next-gen technologies will be the catalyst for the transformation to software-defined access, with a combined potential to drive 80 percent of costs out of the network."

– Geoff Burke, Senior Director of Corporate Marketing, Calix

AFL

www.AFLglobal.com
864-433-0333; 800-235-3423

Key Products: Fiber optic cable, fiber and copper interconnect products, outside-plant hardware, fusion splicers, test equipment, training, design, engineering, integration

Summary: AFL products, services and engineering expertise help broadband providers improve their infrastructures and enable delivery of voice, video and high-speed data communications. AFL's product line includes fiber optic cable, connectivity, fiber management, outside-plant closures, demarcation devices, fusion splicers, test equipment and Light Brigade training and education. AFL plans, designs, implements and maintains communications networks, offering solutions for MDU and master-planned community networks as well as for telephone, cable TV and wireless providers; utilities; hospitality companies; and enterprises. Last year, AFL expanded its FTTx portfolio with the release of its MDU product set. The new MDU products offer preconnectorized and splicing solutions to reduce the physical size of indoor splitter cabinets and terminals and to reduce overall installed cost. Founded in 1984, AFL is headquartered in Spartanburg, South Carolina, and is a division of Fujikura Ltd. The company has more than 4,300 associates around the world and has operations in the United States, Mexico, Europe, Asia and Australia.

FiberBroadband ASSOCIATION

Alianza

www.alianza.com
801-802-6400

Key Products: Cloud-based VoIP platform

Summary: Though the early fiber-to-the-home deployers were mainly telephone companies, many of today's new entrants to the FTTH field have no history of providing voice services. For a broadband operator without telephone equipment or expertise, using a cloud-based system is the simplest, most economical way to add a voice offering – typically a high-margin service. Alianza's Cloud Voice Platform, a web-scale voice solution built for broadband providers, provides the functions required to deliver and support VoIP-based residential and business phone services. The platform does not require capital expenditure or the installation of complex equipment, and Alianza alleviates most of the operational and regulatory burdens associated with phone services. Since announcing a solution specifically for FTTH providers in February 2017, Alianza has made inroads with electric cooperatives and small municipalities installing fiber to the home in rural areas of the United States. Founded in 2009 and headquartered in Lindon, Utah, Alianza has more than 50 employees.

FiberBroadband ASSOCIATION

Alpha Technologies

www.alpha.com
800-322-5742; 360-647-2360

Key Products: Standby, non-standby and uninterruptible power supplies; surge suppressors; enclosures and batteries; installation and construction services

Summary: Founded in 1976, Alpha Technologies is a major player in power systems for the broadband communications industry worldwide. Alpha products provide critical power conditioning and emergency backup for video, data and voice networks. Alpha's installation and construction services include structure engineering, right-of-way and easement procurement, site preparation, equipment installation, system turnup and system testing. Customers in 50 countries include major cable television system operators, telecommunications service providers and full-service communications providers. Alpha Technologies' portfolio of FTTH powering options

includes the FlexPoint line of 12Vdc single-family solutions and the FlexNet line of 48Vdc multiple-dwelling-unit and small office–home office power supplies. In early 2017, to streamline fiber management at the headend, the company launched the Alpha Ultra High Density Fiber Panel, which combines ultra-high-density fiber capacity with connector access and a unique cable management system. Alpha, with more than 1,000 employees, has sales and service centers in the United States, Canada, Europe, the Middle East, China and Australia. It is a member of the Alpha Group, a global alliance of independent companies that share a common philosophy: to create powering solutions for communications, commercial, industrial and renewable energy markets.

NETWORK PLANNING, SYSTEMS INTEGRATION, DESIGN, ENGINEERING, CONSTRUCTION, INSTALLATION

(Excludes companies that provide these services only for networks they will own or manage.)

COMPANY NAME	WEB ADDRESS
ACRS	**www.acrsokc.com**
Actavo	**www.actavo.com/**
AFL	**www.AFLglobal.com**
Allied Telesis	www.alliedtelesis.com
Alpha Technologies	**www.alpha.com**
Ansco & Associates	anscoinc.com
Atlantic Engineering Group	**www.aeg.cc**
Bear Communications	www.bearcommunications.net
Bechtel	**www.bechtel.com**
BHC RHODES	**www.ibhc.com/**
Biarri Networks	**www.biarrinetworks.com**
Black and Veatch	**www.bv.com**
CCG Consulting	**www.ccgcomm.com/**
CCI Systems	www.ccisystems.com/
CHR Solutions	**www.chrsolutions.com**
Communications Test Design Inc. (CTDI)	www.ctdi.com
Corning Optical Communications	**www.corning.com**
Conexon	www.conexon.us
CTC Technology and Energy	**www.ctcnet.us**
Cyient	www.cyient.com
Danella Companies	**www.danella.com**
Design Nine	**www.designnine.com**
Deep Fiber Solutions	www.deepfibersolutions.com
Dycom	**www.dycomind.com**
enfoPoint Solutions	www.enfopoint.com
eX² Technology	**www.ex2technology.com**
Fiber-Tel Contractors	www.fibertelcontractors.com
Finley Engineering	**www.finleyusa.com**
Fujitsu Network Communications	**http://us.fujitsu.com/telecom**
G4S Secure Integration	www.g4s.us
GTS	www.gts-yes.com
Henkels & McCoy Group	**www.henkelsgroup.com**
HunTel Engineering	www.htleng.com
InfiniSys	**www.electronicarchitect.com**
Inteleconnect	**www.inteleconnect.com**
J&R Underground	www.jrundergroundllc.com
Knet	www.e-knet.com
KGPCo	**www.kgpco.com**

COMPANY NAME	WEB ADDRESS
Ledcor Technical Services	**www.ledcor.com**
Lite Access Technologies	www.liteaccess.com
Magellan Advisors	**www.magellan-advisors.com**
MasTec North America	**www.mastec.com**
Mesh Networks	www.themeshnetworks.com
Michels Communications	**www.michels.us**
Mid-State Consultants	**www.mscon.com**
Millennium Communications Group	www.millenniuminc.com
MP Nexlevel	www.mpnexlevel.com
Multicom	www.multicominc.com
Network Design Decisions Inc.	www.nocplan.com
NEO Connect	**www.NEOconnect.us**
Netcon	www.netconamericas.com
New Age Communications Construction	www.nacc-llc.com
Nokia / Nokia Networks	**www.nokia.com**
OFS	**www.ofsoptics.com**
On Trac	**www.ontracinc.net**
ONUG Communications	www.onugsolutions.com
Pace Engineers	www.paceengrs.com
Palmetto Engineering	www.palmettoeng.com
Pinpoint Services	www.pinpointservices.com/
Pulse Broadband	**www.pulsebroadband.net**
Quanta Telecom Services	www.quantaservices.com
QYPSYS	www.qypsys.com
S&N Communications	www.sncomm.com/
SDT	**www.sdt-1.com**
Spectrum Engineering Corp.	www.spectrumeng.com
Stirling Lloyd	www.stirlinglloyd.com
Team Fishel	**www.teamfishel.com**
Tellabs	www.tellabs.com
Tellus Venture Associates	www.tellusventure.com
TeraSpan	www.teraspan.com
Tilson	www.tilsontech.com
Turnkey Network Solutions	www.tkns.net
Uptown Services	www.uptownservices.com
Utilis	www.utilisdesign.com
Vantage Point Solutions	**www.vantagepnt.com**
Walker and Associates	**www.walkerfirst.com**

"We design networks for applications that haven't been invented yet because we believe better broadband means better lives."

– Larry Thompson, CEO, Vantage Point Solutions

Altice USA

www.alticeusa.com

Key Products: Internet, video and voice services

Summary: After Netherlands-based telecommunications corporation Altice acquired U.S. cable companies Suddenlink Communications in 2015 and Cablevision/Optimum in 2016 to form Altice USA, the company quickly positioned itself as a leader in the delivery of high-speed internet services in the United States. Within four months of its Cablevision/Optimum acquisition, Altice USA nearly tripled the fastest internet speed for Optimum customers, and the company has continued to expand its 1 Gbps broadband offering in Suddenlink regions. In December 2016, Altice USA announced its five-year Generation GigaSpeed plan to build a next-generation fiber-to-the-home network capable of delivering broadband speeds of up to 10 Gbps across the entire Optimum footprint and part of its Suddenlink footprint. Altice had already taken this route in Europe – its FTTH deployments in France and Portugal are on track to reach 22 million homes passed by 2022 and 5.3 million homes passed by 2020, respectively. As of May 2017, the network upgrade in the United States was already underway. Altice USA has been operating under the Optimum and Suddenlink brands in the United States but recently announced it would transition to a unified Altice brand by the end of 2018. Altice was founded in 2001 by French entrepreneur Patrick Drahi and now operates in France, Portugal, Switzerland, the Netherlands, the Dominican Republic and the United States. Altice USA, which serves approximately 4.9 million residential and business customers across 21 states, closed its initial public offering in June 2017 with a market valuation greater than $23 billion.

American Polywater Corporation

www.polywater.com
800-328-9384

Key Products: Cable-pulling lubes, cleaners and sealants

Summary: In 1973, Nelson Jonnes, a Minnesota research chemist, threw together some slippery ingredients in his basement and began selling the mixture as a SCUBA-diving suit lubricant. It was well received, but the potential income from that alone could not support his family of six. After a quick change in market focus, the company began selling the same technology to the telecom and power utility markets for use as a water-based cable-pulling lubricant. It revolutionized the industry, which until then had used mud, wax and grease as lubricants. Today, American Polywater sells more than 20 formulations of pulling lubes for every type of wire and cable imaginable – even special cable-blowing lubricants for air-assisted installation of fiber optic cables. It also sells cleaners and other specialty chemicals, worker protection products, cable-pulling software, training videos, adhesives and duct sealants. A new foam sealant product was released last year, and a new water-based fiber-end cleaner came out this year. American Polywater is based in Stillwater, Minnesota, and sells its products in more than 50 countries.

AT&T / AT&T Connected Communities

www.att.com/communities

Key Products: High-speed internet, next-generation TV, advanced mobile services, smart solutions for people and businesses

Summary: AT&T is investing to be a global leader in the telecommunications, media and technology industry. Between 2012 and 2016, AT&T's total investment in the United States, including capital investment and acquisitions of spectrum and wireless operations, was nearly $135 billion – more than any other public company. In the last two years, it has undertaken a massive FTTH deployment and now markets FTTH services to more than 5 million customer locations across 54 metropolitan areas. It plans to add 2 million locations in 2017 and reach at least 12.5 million locations with fiber by mid-2019. As the largest U.S. provider of pay TV, AT&T offers video entertainment through its DIRECTV (satellite) and U-verse (IPTV) services. AT&T revenue for 2016 was $163.8 billion, and the company employs more than 200,000 people in the United States alone. AT&T Connected Communities works with multifamily and single-family builders, developers, management groups and homeowner associations to provide next-generation communications and entertainment services.

Atlantic Engineering Group

www.aeg.cc; www.atlanticfibernetworks.com
706-654-2298

Key Products: Design and field engineering, aerial and underground construction, professional services for FTTH networks

Summary: Atlantic Engineering Group (AEG), a pioneer in fiber-to-the-home network deployment, helps lead the drive to combine FTTH and smart-grid technologies into a single business plan for municipalities and rural electric cooperatives. The company, founded in 1996, specializes in the design and construction of fiber communications networks. Though this

outside-plant specialist is headquartered in Braselton, Georgia, it deploys in-house personnel and on-site project managers globally. AEG performs project management, business modeling, service planning, engineering, underground and aerial construction, splicing, premises installation, headend activation, testing and many other professional and technical services. It has completed design or build commissions for more than 100 networks, including 42 FTTH projects that total more than 2 million homes passed. Clients include municipalities, electric utilities, telephone companies, new market entrants and government agencies. To expand its E-Rate business, AEG established Atlantic Fiber Networks, which owns, designs, builds, manages and maintains educational wide area networks tailored to meet the needs of educational institutions. In 2016, Actavo, an international engineering firm, acquired the division of AEG that specializes in design engineering, field services, GIS services and permitting. Both parties continue to collaborate on projects.

Baller Stokes & Lide, PC

www.baller.com
202-833-5300

Key Products: Legal services, public policy advocacy

Summary: This telecom law firm has a long, consistent record of supporting the use of advanced broadband infrastructure to drive the development of economically strong local communities. The firm represents public and private entities on a broad range of communications matters, both nationally and in more than 35 states. It is best known for its work in opposing state barriers to local internet choice. The firm has worked on many of the leading public communications projects in the United States and was a consultant to Google on its Fiber for Communities initiative. As founder and president of the US Broadband Coalition, the firm's president, Jim Baller, played a leading role in forging a national consensus on the need for a national broadband strategy and on the framework for such a strategy. He is co-founder and president of the nearly 500-member Coalition for Local Internet Choice, which works to preserve and protect the right of local governments to make the critical broadband infrastructure decisions that will affect their communities for decades to come. Founded in 1983, Baller Stokes & Lide is based in Washington, D.C. It has four full-time attorneys and a network of part-time local and regional counsel across the United States.

FiberBroadband ASSOCIATION

Bechtel

www.bechtel.com
415-768-1234

Key Products: Engineering, procurement, construction and project management

Summary: A global engineering, construction and project management company founded in 1898, Bechtel has completed more than 25,000 projects across 160 countries on all seven continents. For the Verizon Fios network, Bechtel engineered fiber routes and hub locations in the Western and Mid-Atlantic states. Currently, Bechtel is working with Google Fiber to build fiber to the premises and provide high-speed television and internet service. Bechtel's work for Google Fiber involves designing and installing more than 15,000 miles of fiber in cities across the Southeast, including Charlotte and Raleigh-Durham, North Carolina; Nashville, Tennessee; and Atlanta, Georgia. The company has 53,000 employees and operates four global businesses: infrastructure; nuclear, security and environmental; oil, gas and chemicals; and mining and metals.

FiberBroadband ASSOCIATION

NETWORK TESTING, MONITORING AND MANAGEMENT SERVICES

COMPANY NAME	WEB ADDRESS
AFL	**www.AFLglobal.com**
Allied Telesis	www.alliedtelesis.com
Atlantic Engineering Group	**www.aeg.cc**
Blue Rim Networks	www.bluerim.net
CHR Solutions	**www.chrsolutions.com**
Design Nine / Wide Open Networks	**www.designnine.com; www.wideopennetworks.us**
Ericsson	www.ericsson.com
Fiberdyne Labs	**www.fiberdyne.com**
GigabitNow	**www.gigabitnow.com**
iGLASS	www.iglass.net
INOC	www.inoc.com
Korcett Holdings	www.korcett.com
Mesh Networks	www.themeshnetworks.com
Michels Communications	**www.michels.us**
Momentum Telecom	www.momentumtelecom.com
Nokia / Nokia Networks	**www.nokia.com**
NovaONE Networks	www.novaonenetworks.com
Pulse Broadband	**www.pulsebroadbandinc.com**
Satellite Management Services	www.smstv.com
Sifi Networks	www.sifinetworks.com
Viavi Solutions	**www.viavisolutions.com**

"Broadband demand (in terms of both desired speed and total monthly download) continues to triple about every three years, and this is putting huge pressure on traditional networks. Many networks are really feeling the pinch, and any older technologies, such as older DSL or older cable modem networks, are falling massively behind the demand curve. I foresee that anybody operating older networks is going to start feeling competitive pressure."

– Doug Dawson, President, CCG Consulting

BHC RHODES

www.ibhc.com
913-663-1900

Key Products: Planning, design and construction of FTTx projects

Summary: BHC RHODES provides civil engineering services to telecom firms that build and maintain fiber networks across the United States. It has designed and managed thousands of miles of telecom network infrastructure for clients that range from small communities and telcos to large international service providers. Its FTTx services include feasibility studies, cost estimating and budgeting; planning, layout and network architecture; GIS and AutoCAD mapping; hut site development and construction; outside-plant design; site surveys; right-of-way permitting and asset management. BHC RHODES customers include AT&T, Verizon, Level 3 Communications, Cox Communications, C Spire, Unite Private Networks and numerous municipalities. Based in Overland Park, Kansas, with $20.6 million in 2016 revenue, BHC Rhodes is celebrating 25 years in business and has more than 150 employees.

FiberBroadband ASSOCIATION

Biarri Networks

www.biarrinetworks.com
877-730-1999

Key Products: Software for fiber optic network design

Summary: Over eight years, Biarri Networks has developed a simplified, web-based approach to fiber optic network planning and engineering. Its software platform, FOND, uses advanced technology, automation and optimization techniques, based on a patented algorithm, to remove the complexity of FTTx network planning and design. Founded in 2009 in Australia, Biarri Networks got its start developing software to design the 11-million-home Australian National Broadband Network and the 5-million-home Chorus New Zealand network. Over the last five years, Biarri software has been used to deliver successful networks across the United States, Asia and Europe. Biarri's U.S. clients include Tier-1 telecommunications providers, design and engineering firms such as ONUG Solutions, infrastructure data firms such as QC Data, fiber overbuilders such as Allo Communications, municipalities and public-private partnerships.

FiberBroadband ASSOCIATION

Black & Veatch

www.bv.com
913-458-2000

Key Products: Consulting, engineering, construction, operations, program management services

Summary: Founded in 1915, Black & Veatch is a global engineering, consulting and construction company that specializes in telecommunications, energy, water and government services. An employee-owned company, Black & Veatch has approximately 10,000 professionals working in more than 110 offices worldwide and has completed projects in more than 100 countries. Services include engineering, procurement, construction, design, management consulting, asset management, environmental consulting and security. Black & Veatch has deployed more than 30,000 miles of fiber for commercial carriers, cities and utilities and was selected by the Commonwealth of Kentucky as part of a consortium that is building a statewide fiber backbone. Revenue in 2016 was $3.2 billion.

Blandin Foundation
www.blandinfoundation.org
877-882-2257

Key Products: Grant making, community leadership development and public policy programs

Summary: Since 1941, the Blandin Foundation, a private foundation based in Grand Rapids, Minnesota, has been dedicated to strengthening rural Minnesota communities. Its Broadband Initiative, launched in 2003, helps communities educate citizens about the need for ultra-high-speed broadband and plan and execute broadband projects. The foundation has published informational guides, sponsored conferences and educational events, and supported many feasibility studies for the development of robust, high-speed broadband networks. It has supported implementation of broadband applications in schools, health care facilities and other institutions and for home-based users and has promoted broadband adoption in rural communities. Last year, Blandin selected six northeastern Minnesota communities for two-year partnerships with the foundation to advance local broadband initiatives.

C Spire / C Spire Fiber
www.cspire.com/home-services
855-277-4734

Key Products: Voice, video and internet access delivered over a fiber-to-the-home network

Summary: C Spire is building a 1 Gbps, ultra-high-speed network in Mississippi to attract investment and economic growth and pave the way for improvements in health care, education, civic life and municipal services. Using a crowdsourcing model, the company began preregistration in December 2013 and started offering services in multiple cities in fall 2014. C Spire's FTTH deployment in Mississippi is supported by its existing fiber optic infrastructure, which was built to support the company's LTE network and business services and includes more than 5,500 miles of fiber cable. In 2016, C Spire launched two hurricane-ready "super switches" to provide protection and service for customers in hurricane-prone areas. Recently, Madison County, Mississippi, signed a franchise agreement to bring C Spire Fiber to residents in some of its unincorporated areas, and C Spire's Business Solutions division announced it is building fiber optic infrastructure near 18 key business developments and industrial sites in DeSoto County, Mississippi. In the last

"In three years, many apartments will be 'smart,' with the adoption of IoT [becoming] commonplace. The success of this adoption will require the deployment of a well-designed wired and wireless managed infrastructure and the use of technology-adept service providers capable of meeting owner and resident expectations."

– Richard Holtz, CEO, InfiniSys

year, C Spire also launched C Spire TV, a streaming app that includes cloud DVR, eliminating the need for a set-top box. Based in Ridgeland, Mississippi, C Spire is privately owned and employs 1,425 people.

Calix

www.calix.com
707-766-3000; 877-766-3500

Key Products: Fiber access solutions for residential and business services, network and services management software, value-added software as a service

Summary: Calix serves more North American FTTx providers than all other equipment vendors combined. It also serves several international markets with fiber and copper access solutions. Calix intelligent access solutions leverage its Calix Cloud software solutions. Calix Cloud is complemented by the GigaFamily premises devices, including the GigaCenter. In 2015, Calix introduced the Access eXtensible Operating System (AXOS), which allows software functions in the access network to run independently of the underlying hardware. This brings SDN/NFV functionality to the access network. The number of applications using AXOS has expanded enormously in the past year – there now are at least 600 modules that plug into AXOS. Calix has shipped 23 million ports of fiber and copper access lines to providers that have more than 100 million subscriber lines. Headquartered in Petaluma, California, Calix had 2016 revenue of $459 million and spent $100 million on research and development. It has 1,100 employees.

CCG Consulting

www.ccgcomm.com
202-255-7689

Key Products: Regulatory, engineering, marketing, strategy and planning services; raising money for broadband projects

Summary: In business since 1997, CCG is a full-service consultant for small communications carriers. The company specializes in launching new broadband ventures and making existing businesses more profitable. CCG offers a wide range of regulatory, engineering, strategy and planning, operations, budgeting and billing services. CCG helps clients design, upgrade and maximize fiber, coaxial, copper and wireless networks. CCG also offers direct operational assistance in areas such as number portability, new product development, cable programming, carrier disputes and billing audits. It is active in helping companies create workable public-private partnerships. CCG is currently engaged in broadband studies for 13 municipal entities and expects to conduct about 20 such studies for the year. The company is also working with half a dozen electric co-ops that are considering entering the fiber business.

CenturyLink

www.centurylink.com
318-388-9000

Key Products: Data, voice, video, managed security services, hosting, cloud and IT consulting services

Summary: A global communications and IT services company focused on connecting its customers to the power of the digital world, CenturyLink launched its 1 Gbps FTTH service in Omaha, Nebraska, in 2013. Today, CenturyLink passes more than 1.5 million homes with 1 Gbps service and continues to expand the service. CenturyLink also offers Prism TV, an interactive IPTV service, in 19 markets, passing 3.3 million homes. CenturyLink offers network and data systems management, big data analytics, managed security services, hosting, and cloud and IT consulting services. The company provides broadband, voice, video, advanced data and managed network services over a robust, 265,000-route-mile U.S. fiber

network and a 360,000-route-mile international transport network. Headquartered in Monroe, Louisiana, CenturyLink is an S&P 500 company and is included on the Fortune 500 list of the largest U.S. corporations. With approximately 43,000 employees, CenturyLink posted operating revenue of $17.5 billion in 2016.

Charles Industries

www.charlesindustries.com
847-806-6300

Key Products: Fiber optic distribution enclosures and cabinets, fiber aggregation and demarcation interconnects and hubs, fiber cross-connects

Summary: Charles Industries designs and manufactures buried distribution pedestals; indoor and outdoor power, battery and equipment cabinets; building terminals for both fiber and copper distribution; and below-grade handholes. The company serves telecommunications, wireless, broadband cable, municipal, utility and government service providers with end-to-end solutions tailored for both rural and metro deployments. Charles focuses on creating solutions that lower the cost of deploying FTTP, shorten installation time frames and provide flexibility and reliability to fiber networks. Charles Fiber Pedestals, CUBE Cabinets, CFIT and CFBT Building Terminals and TRUE Below-Grade Enclosures are compact and lightweight yet provide excellent technician access and user experience. In 2017, Charles expanded its small-scale MDU enclosure offerings, introducing new building entrance housings and fiber hubs suited to apartment buildings, strip malls, shopping centers and campus buildings. New four-port and eight-port fiber transition terminals serve as demarcation points for fiber entering customer premises. Charles also expanded its offerings to include splice and splitter trays, splitter modules, optical taps, adapters, patch plates, attenuators, fan-out cables, jumpers and pigtails. Founded in 1968, Charles Industries is privately held and headquartered in Rolling Meadows, Illinois, with U.S-based engineering and manufacturing facilities.

Charter Communications / Spectrum Community Solutions

www.charter.com; www.charter.com/mdu

Key Products: Managed Wi-Fi services, internet, video and voice

Summary: With the acquisition of Time Warner Cable and Bright House Networks, Charter is now the second-largest cable company in the United States. It sells internet, video, voice and managed Wi-Fi offerings under the Spectrum brand to more than 26 million residential and business customers in 41 states. Headquartered in Stamford, Connecticut, the company has more than 90,000 employees, a network consisting of nearly 700,000 miles of physical infrastructure and annual revenue in excess of $40 billion. Spectrum Community Solutions works with property owners and managers to deliver advanced services that attract residents, increase property values and build on resident loyalty. Charter announced in March 2017 that it plans to invest $25 billion in broadband infrastructure and technology in the next four years. Charter is increasingly bringing fiber to sites for some new builds and multifamily properties. In certain multifamily properties, the Spectrum Fiber WiFi offering delivers gigabit internet speeds to residents.

CHR Solutions

www.chrsolutions.com
713-351-5111

Key Products: Communications network and outside-plant engineering; network planning; managed NOC and managed IT services; telecom billing software

Summary: CHR provides a range of engineering, business and technology solutions to communications service providers. The company offers engineering consulting and design solutions and services to ILEC, CLEC, power and municipal service providers. By the end of 2016, it had designed FTTx networks to pass more than 500,000 premises. Services include preparing applications for loans and grants, broadband planning, performing high-level and detailed designs of outside plant for FTTx networks, permitting, converting GIS/CAD files and implementing outside plant. CHR Engineering specializes in fiber design and has expertise with a variety of communications technologies, including xDSL, PON, active Ethernet, Carrier Ethernet, fixed wireless, microwave and Wi-Fi. CHR's B/OSS solution, Omnia360, has been adopted by a number of independent service providers. Based on Microsoft Dynamics CRM, Omnia360 is a complete, out-of-the-box system available as a fully hosted cloud-based solution or as an on-site license subscription. The company is headquartered in Houston.

Cincinnati Bell

www.cincinnatibell.com; www.cincinnatibell.com/Fioptics
513-397-9900

Key Products: Telephone, data, video, wireless and information technology solutions

Summary: Households and businesses in Greater Cincinnati have access to Cincinnati Bell's integrated communications solutions, which include local, long-distance, data, internet, entertainment, wireless and information technology services. In addition, Cincinnati Bell offers complex information technology solutions, such as managed services and technology staffing. The company's fiber-based services, branded as Fioptics, include advanced high-speed data, digital television and telephone services and are available to 67 percent of Greater Cincinnati. In 2014, the company made gigabit internet speed available to Fioptics customers. It also sold its wireless spectrum

licenses for $194 million so that it could focus its efforts on the efficient deployment of fiber. Last year, Cincinnati Bell extended its relationship with ETI Software Solutions to provide a variety of solutions, including a complex migration of commercial subscribers from T1 copper connections to fiber. Cincinnati Bell's revenue in 2016 was $1.2 billion.

City of Ammon, Idaho, Fiber Optic Department

http://ammonfiber.info
208-612-4054

Key Products: Gigabit internet service

Summary: Although Ammon began lighting its residential FTTH network only six months ago, the project has been one of the most talked-about community fiber networks in the United States for several years. Both its financing model and its technical model are innovative. Like other cities, Ammon first built out the backbone network by connecting anchor institutions and paid for the build largely through cost reduction and cost avoidance. When it came time to connect residences and small businesses, Ammon allowed property owners who wanted fiber services to opt into financing their connections. By joining a broadband improvement district, an owner can pay installation costs up front or amortize the costs in the form of a bond that creates a lien on the property. Ammon's technical approach uses software-defined networking to make creating an open-access network simple and low cost. The Ammon fiber system currently has six service providers; the network is also open to researchers and application developers who want to test new technologies or services. Ammon is committed to using its network to promote economic development and technical innovation.

Clearfield

www.SeeClearfield.com
763-476-6866; 800-422-2537

Key Products: Fiber distribution and protection systems for inside plant, outside plant and access networks

Summary: Headquartered in Minneapolis, Clearfield designs and manufactures fiber distribution and protection systems. Product lines include FieldSmart high-density fiber distribution systems for the inside plant, FieldSmart fiber scalability centers for the outside plant, a fiber delivery point series for access networks, and FieldShield, an optical fiber delivery and protection platform made of microduct and preconnectorized pushable fiber. All product lines integrate with the Clearview Cassette 12-fiber management system to deliver scalable deployment and craft-friendly operation. In the last year, Clearfield introduced a next-generation hardened optical fiber terminal, a test access point enclosure and drop cable options to join the FieldShield fiber protection system. Clearfield, which has more than 200 employees, posted $75 million in revenue for the year ending September 2016.

Comcast Cable / XFINITY Communities

www.comcast.com; www.xfinity.com/xfinitycommunities

Key Products: Internet, video, voice and home security services

Summary: The largest U.S. cable operator, Comcast delivers internet, phone and media services to residential customers under the XFINITY brand and to businesses under the Comcast Business brand. XFINITY Communities works with building and property owners, developers, leasing agents, and homeowners associations to provide services to residents. In 2015, after building a national fiber backbone, Comcast launched Gigabit Pro, a symmetrical, 2 Gbps residential FTTH service. The company began rolling out the service in Atlanta in May 2015 and quickly followed with rollouts in many more markets. In 2016, Comcast began trials of gigabit residential service over its HFC network using DOCSIS 3.1 technology; this service is now available in dozens of markets to residential and business customers. When fully deployed, Comcast expects to be able to deliver gigabit speeds, via FTTH or coax, to almost every customer in its footprint. Over the last year, Comcast completed fiber network expansions in the downtown areas of Hartford and New Haven, Connecticut. Recent residential product launches include the Xfinity Stream app, which allows users to watch their TV line-ups on phones, tablets and laptops, and a digital whole-home networking solution that will be available to 15 million homes by the end of 2017. Comcast Business is now beta testing a new software-defined wide area networking (SD-WAN) solution for mid-market and enterprise customers. Headquartered in Philadelphia, Comcast Cable is a division of Comcast Corporation, which also owns NBCUniversal. Comcast Cable reported 2016 revenue of $50 billion.

CommScope

www.commscope.com
828-324-2200; 800-982-1708

Key Products: Cable and connectivity products

Summary: CommScope's solutions constitute a complete end-to-end FTTH portfolio, offering multiple fiber architectures. With a suite of data center, headend/central

office, outside-plant and end-user solutions, CommScope provides carriers, electric co-ops and other operators with the technology and architecture to meet the needs of residential, MDU, commercial and cellular backhaul applications. Founded in Hickory, North Carolina, CommScope has been involved in the broadband and cable TV industry since 1976 and has played a role in nearly all the world's most advanced telecommunications networks. It is the largest supplier of subscriber-premises connectivity products and rugged conduit products. The acquisition of the TE Connectivity businesses, following earlier acquisitions of Andrew Corporation and SYSTIMAX, made CommScope a leading communications infrastructure provider that offers end-to-end passive network equipment to meet the growing demand for network bandwidth. CommScope's Connectivity Solutions segment, which includes the company's wireline and fiber offerings, comprised about 60 percent of CommScope's overall revenue of nearly $5 billion in 2016.

FiberBroadband ASSOCIATION

Comsof / FiberPlanIT

www.comsof.com; www.fiberplanit.com

416-594-9777

Key Products: Software for FTTx network planning and design

Summary: Comsof was founded in 1998 as a spinoff of the Department of Information Technology of Ghent University in Belgium. Its flagship product, FiberPlanIT, is a software solution for FTTx network planning. FiberPlanIT's automated and optimized design capabilities, based on GIS data, help network operators reduce planning and design time, avoid design errors and lower construction costs. Comsof provides the software on a license basis and offers consultancy services. FiberPlanIT is used in more than 40 countries, and the company recently opened an office in Toronto, Canada, to handle project management and support as well as sales for the Americas.

FiberBroadband ASSOCIATION

Corning Optical Communications

www.corning.com
828-901-5000

Key Products: Optical fiber, optical fiber cable, FTTH cabinets, splitters, terminals, connectors, cable assemblies, MDU products, other telecommunications hardware and equipment, engineering services, training

Summary: Corning is one of the world's leading innovators in materials science. For more than 160 years, it has applied its expertise in specialty glass, ceramics and optical physics to develop products that have created new industries and transformed people's lives. In 1970, Corning developed the first commercial low-loss optical fiber. Corning also developed the first loose-tube cable design, the first plug-and-play solution for fiber to the home, and the first high-density, modular data center solution. Corning's preconnectorized solutions introduced a new way to deploy FTTH networks, and its ultra-bendable ClearCurve product suite opened the way for cost-effective installation of fiber in MDUs and other challenging environments. Corning SMF-28 Ultra Fiber, designed for high performance across the range of long-haul, metro, access and fiber-to-the-home network applications, combines the benefits of low attenuation and improved macrobend performance in one fiber. In June 2017, Corning launched its new multiuse platform, a combination of multifiber and single-fiber connection points that makes it easier for operators to quickly deploy fiber-deep access networks. Corning has a leading position in key passive optical segments and is the world's largest fiber producer. Its fiber operation is a $3 billion business and has grown at twice the industry average over the last five years. The company expects to reach $5 billion in fiber-related revenue by 2020.

FiberBroadband ASSOCIATION

COS Systems

www.cossystems.com
800-562-1730

Key Products: Demand aggregation software, BSS/OSS for managing open-access fiber networks

Summary: COS Systems' cloud-hosted software helps network owners plan, deploy and manage modern broadband networks that deliver services from one or more providers. COS Service Zones is a demand aggregation tool that enables network builders to identify grassroots interest in better broadband, spread awareness of their projects and presell internet connections using a "fiberhood" approach. COS Business Engine is a BSS/OSS suite for managing and operating gigabit fiber networks. It enables network operators to easily market and sell services from multiple providers in an online marketplace. COS clients include private internet service providers and operators, public-private partnerships, municipalities, utilities and cooperatives in North and South America, Europe, Africa and Asia. In the last year, COS Systems expanded its presence in the United States with close to 30 new customers, entered a handful of additional countries and increased the number of open-access networks that its solutions manage. COS also announced industry collaborations with VETRO FiberMap and Marketbroadband.com.

Privately held COS Systems is headquartered in Umea, Sweden, and has its U.S. headquarters in New York City. It has 18 employees, and revenue for 2016 was $2 million.

FiberBroadband ASSOCIATION

Cox Communications

www.cox.com

Key Products: Broadband internet, video, voice and smart home services

Summary: With more than 6 million customers, Cox Communications is the largest privately held telecom company in the United States. It serves residential and business customers with a variety of advanced digital video, high-speed internet and telephone services over its IP network. In 2014, Cox launched residential gigabit internet speeds under the Gigablast brand, now available in 13 states and continuing to expand. Cox Communications joined with US Ignite to help make Phoenix and San Diego among the first "Smart Gigabit Communities" and teamed with the White House and HUD to bridge the digital divide for low-income families with school-age children through its Connect2Compete internet offer. Cox is a subsidiary of Cox Enterprises and headquartered in Atlanta.

CTC Technology & Energy

www.ctcnet.us
301-933-1488

Key Products: Fiber and wireless broadband network design, engineering, financial analysis, strategy, assessment and implementation

Summary: CTC provides independent business and engineering consulting services for public-sector and nonprofit clients. Its expertise includes feasibility analysis, strategic planning, business plan development, market assessment, fiber and wireless network design and engineering, RFP preparation, grant applications and negotiations with private-sector partners. CTC currently provides fiber engineering and network financial planning services to the cities of Atlanta, Boston, Boulder, Lexington, Madison, Palo Alto, Portland (Oregon), San Francisco, Seattle and Washington, D.C. CTC played a key role in helping negotiate broadband public-private partnerships on behalf of the city of Westminster, Maryland; the coalition comprising the cities of Urbana and

> "Despite numerous obstacles, municipalities are now in greater numbers starting to deploy their own fiber infrastructure. I predict that an increasing number will choose an open-access model, which, [because of] the nature of cooperation instead of competition with private providers, will accelerate the pace at which muni networks light up across the nation."
>
> –Isak Finér, Chief Marketing Officer, COS Systems

Champaign and the University of Illinois; and rural Garrett County, Maryland. CTC also provides strategic broadband guidance to the states of Connecticut, Delaware, Kentucky, Massachusetts and New Mexico. Founded in 1983, CTC is headquartered in the Washington, D.C., area and has satellite offices in many other states.

FiberBroadband ASSOCIATION

Danella Companies

www.danella.com
610-828-6200

Key Products: FTTH network design, engineering, construction and testing

Summary: Founded in 1972 and headquartered in Plymouth Meeting, Pennsylvania, Danella Companies has 17 divisions operating from 29 geographically diverse facilities in 12 states. Danella Construction performs approximately $225 million in work per year and is a leading installation contractor for all types of utilities, providing services for the power, gas distribution, water and communications industries. In 2016, Danella Companies had revenue of more than $50 million in FTTH installations alone, with a large portion of this work in the Southeast. Danella continues to expand its services to include fiber to the home for Tier-1 service providers and municipalities alike.

DASAN Zhone Solutions

www.dasanzhone.com
877-946-6320

Key Products: Network access equipment, passive optical LAN, Ethernet switching, mobile backhaul

Summary: DASAN Zhone Solutions offers network access solutions for service provider and enterprise networks. The company provides a wide array of reliable, cost-effective networking technologies, including broadband access, Ethernet switching, passive optical LAN and software-defined networks, to a diverse customer base that includes more than 1,000 network operators worldwide. Northwestel, a telecommunications service provider in northern Canada, recently deployed the MXK platform from DASAN Zhone Solutions to improve internet access in remote communities and simplify delivery of lifeline voice services. DASAN Zhone Solutions is headquartered in Oakland, California, and operates in more than 20 countries. The company was formed in 2016 from a merger of two existing FTTH equipment vendors, Zhone and Dasan Network Solutions.

FiberBroadband ASSOCIATION

HOME ROUTERS, GATEWAYS AND RELATED EQUIPMENT

These companies provide set-top boxes, routers, residential gateways, home networking gear and related equipment.

COMPANY NAME	WEB ADDRESS
Actiontec	www.actiontec.com
Advanced Digital Broadcast	www.adbglobal.com
Amino Communications	www.aminocom.com
ARRIS	www.arris.com
BEC Technologies	www.bectechnologies.net
Cisco Systems	www.cisco.com
Comtrend	www.comtrend.com
D-Link	www.dlink.com
DrayTek	www.draytek.com
Leviton Manufacturing	**www.leviton.com**
NETGEAR	www.netgear.com
Roku	www.roku.com
SmartRG	**www.smartrg.com**
Technicolor	www.technicolor.com
Tilgin	www.tilginsolutions.com
Zyxel Communications	**www.zyxel.com/us**

"With the ever-changing technology and the demand for increased broadband, I cannot think of a more exciting industry to be in."

– Dan Howick, Business Development Manager, Danella Companies

Design Nine / WideOpen Networks

www.designnine.com; www.wideopennetworks.us
540-951-4400

Key Products: Broadband planning and feasibility studies, network business and financial planning, broadband project management, broadband network design, network buildout, network operations

Summary: The broadband planning and network design firm Design Nine is well known for its expertise in – and commitment to – local transport networks and open-access networks. Open-access networks it has planned and designed include Bozeman Fiber in Montana; Palm Coast FiberNET in Florida; nDanville, Rockbridge and Wired Road in Virginia; FastRoads in New Hampshire; AccessEagan in Minnesota; and Charles City County in Virginia. Design Nine's services include fiber and wireless network design, grant-writing assistance, needs assessment, broadband network buildout assistance, financial modeling, business planning, legal and organizational design of community-owned broadband systems and project management. Design Nine's subsidiary, WideOpen Networks, manages community-owned and private-sector networks, providing network monitoring, service provisioning, service provider attraction, asset management, billing and outside-plant management. Headquartered in Blacksburg, Virginia, Design Nine works on projects throughout North America. Current projects include network design, equipment specifications, pricing and financial modeling, network engineering and construction management, and network operations. These include two fiber construction projects for local government clients, a countywide broadband wireless buildout and 11 broadband feasibility and planning studies.

Ditch Witch

www.ditchwitch.com
800-654-6481

Key Products: Construction equipment for laying fiber

Summary: The feasibility of FTTH often depends on digging efficiently through challenging terrain, congested roadways and manicured lawns. Ditch Witch, a Charles Machine Works company, is one of the companies deployers turn to in these situations. It specializes in the design and manufacture of high-quality underground construction equipment for broadband installations globally. Equipment includes trenchers, microtrenchers, vibratory plows, horizontal directional drills, mud recycling and fluid systems, drill pipe, HDD tooling, vacuum excavation systems and mini skid steers. Ditch Witch Financial Services offers a variety of financing and lease options. Recent product launches include the MT16 microtrencher, the VP30 vibratory plow, a new line of mini skid steers and the next-generation HDD drill, the JT40. The Ditch Witch factory is located in Perry, Oklahoma, and the company has more than 1,400 employees. Ditch Witch equipment is distributed through a worldwide dealer organization, which operates in more than 100 countries through more than 170 locations.

FiberBroadband ASSOCIATION

Dura-Line

www.duraline.com
800-847-7661

Key Products: Conduit, cable-in-conduit, microducts and accessories

Summary: Dura-Line develops and manufactures HDPE conduits for protecting fiber optic, electrical and coaxial cables. It supplies fiber optic conduit and related products to telecom, data, cable TV, power and other markets. Customers include leading U.S. and international telephone and cable providers. Dura-Line developed the first ducts for installing and protecting fiber optic cables in 1981, introduced a complete line of fiber optic microduct products in 2001, and followed up in 2003 with FuturePath, a bundled package of microducts that can be installed the same way as traditional conduit. FuturePath allows up to 24 pathways in a single conduit. Dura-Line, which is owned by Mexichem, is based in Knoxville, Tennessee, and has 1,500-plus employees worldwide.

FiberBroadband ASSOCIATION

Dycom Industries

www.dycomind.com
561-627-7171

Key Products: Program and project management, engineering, construction, maintenance and installation services

Summary: Dycom provides specialty contracting services, including program and project management, engineering, construction, material provisioning, installation and maintenance for telecommunications, CATV and broadband providers throughout the United States. Dycom Industries subsidiaries provide services to construct, install, optimize and maintain communications facilities. The company offers a full complement of turnkey services for wireline and wireless networks, including planning, site identification and acquisition, architectural and engineering services, engineering and design, project management, materials purchasing and distribution, infrastructure construction, tower construction, equipment and antenna installation, cable placement and splicing, central-office EF&I, integration, residential and commercial installations, customer acquisition, locating services and maintenance. In July 2016, Dycom acquired for $107.5 million some assets and related liabilities of Goodman Networks, another infrastructure services firm. Founded in 1969 and headquartered in Palm Beach Gardens, Florida, Dycom has more than 12,000 employees. It posted $2.67 billion in revenue for FY 2016.

FiberBroadband ASSOCIATION

FIBER-TO-THE-HOME ELECTRONICS

These companies provide FTTH electronic equipment for central offices/headends, customer premises or both.

COMPANY NAME	WEB ADDRESS
ADTRAN	**www.adtran.com**
Allied Telesis	www.alliedtelesis.com
BEC Technologies	www.bectechnologies.net
Calix	**www.calix.com**
Casa Systems	www.casa-systems.com
DASAN Zhone Solutions	**www.dasanzhone.com**
D-Link	www.dlink.com
Huawei	www.huawei.com/us
iPhotonix	**www.iphotonix.com**
Nokia / Nokia Networks	**www.nokia.com**
Pacific Broadband Networks	**www.pbnglobal.com**
ReadyLinks	www.ready-links.com
Sumitomo Electric Lightwave	www.sumitomoelectric.com
Tellabs	www.tellabs.com
Tilgin	www.tilgin.com
Virtual Gateway Labs	www.vg-labs.com
ZTE USA	www.zte.com.cn/global
Zyxel Communications	**www.zyxel.com/us**

EntryPoint Networks
www.entpnt.com
801-518-7333

Key Products: Automated open-access platform

Summary: EntryPoint Networks, founded in 2007, provides a network management platform for a cloud world. It works with municipalities interested in redefining the technology and business model for FTTH to enable competition, innovation and fast internet. EntryPoint's premise is that municipalities should own and control infrastructure as a utility and private companies should deliver services from the cloud. A subscriber can switch ISPs in less than 20 seconds using EntryPoint's platform, which combines software-defined networking, network automation and network virtualization. The municipal fiber network in Ammon, Idaho, as well as ATC Communications in Malad, Idaho, implemented the EntryPoint solution in 2016. Privately held EntryPoint Networks is based in Salt Lake City, Utah, and has 10 employees. It has won numerous awards and two research grants from the U.S. Department of Energy.

EPB Fiber Optics
www.epb.com
423-648-1372

Key Products: Voice, video, data and smart-grid services provided over a fiber optic network

Summary: EPB's fiber-to-the-home network is frequently cited as one of the success stories of municipal broadband. It delivers internet, voice and video services and serves as the backbone for Chattanooga's smart grid. In addition to increasing power reliability, reducing outage durations and improving operational efficiency, the smart grid provides detailed usage information for electricity customers. EPB has distributed electric power to the Chattanooga area since 1935 and now serves more than 170,000 homes and businesses in a 600-square-mile area that includes portions of eight counties in Tennessee and Georgia. In 2009, it launched EPB Fiber Optics, which serves more than 90,000 homes and businesses. In 2010, EPB brought 1 Gbps speeds to Chattanooga, and in 2015, it announced NextNet, a new 10 Gbps internet service available anywhere in the EPB service area. The company is partnering with its first 10 Gbps customer, the University of Tennessee at Chattanooga (UTC), to provide internet connectivity throughout the entire campus. In collaboration with such organizations as the Company Lab and the Chattanooga Area Chamber of Commerce, the community launched a summer program, called GIGTANK, aimed at spurring innovation. Now in its seventh year, the program hosts students and entrepreneurs in Chattanooga to develop next-generation apps and disruptive business ideas using the nation's largest municipal gigabit network.

FiberBroadband ASSOCIATION

ETI Software Solutions
www.etisoftware.com
770-242-3620; 800-332-1078

Key Products: Software for managing broadband service assurance

Summary: ETI Software Solutions delivers tools that telecom, broadband, video, utility, OTT and IoT providers need to manage complex systems, reduce operating costs and ensure optimal quality of service. These include software to support activation, billing, workforce management and marketing. Specializing in fiber networks, ETI preintegrates its software with all leading fiber technology vendors. In 2016, the company introduced Vision360, a predictive analytics platform that brings together traditionally siloed data to create a transparent, real-time, business-level solution. Vision360's visualization of subscriber, device and service data yields actionable intelligence for customer service reps, field technicians, and management, marketing and network operations personnel. ETI introduced an IoT device management platform, Beamfly, in 2016 to support connected homes, smart cities and utilities. Founded in 1992 and headquartered in Norcross, Georgia, ETI Software Solutions is 100-percent employee owned.

FiberBroadband ASSOCIATION

eX² Technology
www.ex2technology.com
402-817-7970

Key Products: Project financing, design, installation, right-of-way development and maintenance for broadband, intelligent transportation and critical infrastructure networks

Summary: eX² Technology was formed to be a single-source broadband solution provider for communities, broadband consortiums, government agencies, utilities and carriers. Its public-private partnership offerings include project financing and right-of-way development along with engineering and build services. Recent clients include Mount Washington, one of Massachusetts' smallest towns, for a municipal broadband system; Batavia, Illinois, for various services in support of the city's fiber optic network expansion plan; and Ammon, Idaho, to support the town's development into one of the nation's true open-access connected cities. Based in Omaha, Nebraska, eX² was founded in 2015.

FiberBroadband ASSOCIATION

EXFO
www.exfo.com
1-418-683-0211; 1-800-663-3936

Key Products: Wireless and wireline telecom test, service assurance and analytics solutions

Summary: EXFO has pioneered network test, monitoring and analytics solutions for more than 30 years. The company's test orchestration and performance intelligence solutions help communications service providers smoothly deploy, maintain and manage physical, hybrid, virtual, fixed and mobile networks. EXFO has deep expertise in lab and field testing and provides test orchestration solutions that automate complex FTTH testing and workflows to boost efficiency and subscriber quality of experience. EXFO supports customers as they go through major network evolutions of all kinds. Its FTTH test orchestration portfolio includes fiber inspection solutions; OLTS, OTDR and iOLM, including CWDM and DWDM models; PON power meters, Ethernet protocol testers and advanced, end-to-end monitoring solutions for the physical and service layers. For the last six years, Frost & Sullivan has recognized EXFO as the market leader in portable fiber optic test equipment. More than 2,000 customers use EXFO's test instruments and real-time, 3D analytics solutions. The company has more than 1,500 employees in 25 countries. In fiscal 2016 (ending August 31, 2016), the company reported revenue of $232 million.

FiberBroadband ASSOCIATION

Fiberdyne Labs
www.fiberdyne.com
315-895-8470

Key Products: Optical passive devices, multiplexers, fiber optic cable assemblies, termination boxes, MPO cables and cassettes, contract fabrication

Summary: Fiberdyne Labs Inc., established in 1992, is a manufacturer of fiber optic products, including termination boxes, passive modules (WDM and fiber splitters), fiber jumpers, pigtails and MPO cables and cassettes. New products include wall-mounted, rack-mounted and exterior termination boxes; thin-diameter patch cables; high-capacity light guide cross-connect (LGX) modules in a wide variety of configurations; and improved fiber tap products that use thin-

"IoT devices may use a small amount of bandwidth, but the millions upon millions of devices coming online each day will create an ocean of data that clearly impacts a provider's ability to service customers. Real-time diagnostics, automation and advanced analytics will be critical to ensuring profitability today and in the future."

– Frank Gine, CEO, ETI Software Solutions

film technology. Fiberdyne's new 1RU and 2RU termination boxes with splicing will be available soon. The company also offers fiber characterization testing services nationwide. Headquartered in Frankfort, New York, Fiberdyne has 100 full-time employees.

Finley Engineering

www.finleyusa.com
417-682-5531

Key Products: Network design and engineering services

Summary: Finley Engineering has nearly 65 years of communications and electric power engineering experience and 30 years of experience with fiber communication and data projects. It works with organizations that provide fiber connections to improve quality of life and economic opportunities. Founded in 1953, Finley has more than 250 employees in 10 offices nationwide and is one of the largest communications network design companies in the United States. Specializing in end-to-end engineering consulting, it works with telecom providers, electric cooperatives, municipalities and counties to find the best broadband strategies to fit specific needs. Every project starts with a strategic discussion regarding broadband and includes all stakeholders to gather critical information and perspectives. Then, once a project is underway, Finley provides construction observation and project management. Finley has completed more than 20,000 miles of FTTH projects and passed more than 100,000 homes with fiber.

FiberBroadband ASSOCIATION

Fujitsu Network Communications

http://us.fujitsu.com/telecom
888-362-7763

Key Products: Multivendor core, access and wireless network equipment; network management software solutions; end-to-end multivendor network project integration; other professional services

Summary: Fujitsu Network Communications Inc., based in Richardson, Texas, builds middle-mile and last-mile fiber networks, partnering with states, municipalities and utilities. It works with customers or their consultants to plan, design, build, operate and maintain broadband networks. It delivers custom, end-to-end network integration by combining the best of wireline, wireless and software technology with multivendor services, using a vendor-agnostic approach to provide turnkey solutions for FTTH implementations. Fujitsu Network Communications has served as prime integrator for high-profile telecommunications and enterprise projects that include an ongoing FTTH deployment by Kit Carson Electric Cooperative in Taos, New Mexico, and middle-mile network connectivity for Horizon Telcom in southern and eastern Ohio. Fujtsu powered a 2,000-mile fiber network with broadband speeds up to 100 Gbps for Illinois Century Network, an open-access provider owned and operated by the state of Illinois. Last year, the company was design-build integrator for FairlawnGig, a municipal fiber network in Fairlawn, Ohio, and it operates and maintains the network. Fujitsu Network Communications is a subsidiary of Fujitsu Limited, a global information and communications technology company based in Japan, which offers technology products, solutions and services in more than 100 countries. The company, which has approximately 159,000 employees, reported consolidated revenues of about $39.5 billion for the fiscal year that ended March 31, 2017.

GigabitNow

www.gigabitnow.com
866-748-8066

Key Products: Turnkey solutions for planning, design, construction, operation and support of gigabit fiber-to-the-home networks; co-location and backup services

Summary: GigabitNow offers customized fiber internet solutions for cities, communities, multitenant buildings and businesses. Operator and builder of one of the oldest FTTH networks in the United States, it has had recent success building and operating a network for a community on the California coast and delivering fiber broadband for multifamily communities in the Northwest. A developer

of fiber networks since 2004, GigabitNow consults with each community to determine its best options, then guides the project from design through implementation. Once a network is constructed, GigabitNow performs network management, daily operations, end-user support and billing. GigabitNow operates the Highlands Fiber Network in Issaquah, Washington, one of the first FTTH networks built in the United States. Recent projects include master-planned communities, apartment communities and businesses in Washington state and California. GigabitNow, headquartered in Seattle, Washington, has about 50 employees. It is a division of IsoFusion Inc., one of the largest privately held ISPs in western Washington.

GLDS

www.glds.com
800-882-7950

Key Products: Customer management, billing, provisioning and workforce management software for broadband

Summary: Since 1980, GLDS has helped small operators look big by providing reliable, full-featured billing and management software at affordable prices – including cloud-based services that operators can use with little server investment. Partnering with major equipment suppliers worldwide, GLDS supports FTTH, IPTV, DOCSIS, OTT, LTE, TVE, cloud services, wireless, satellite, mobile payments and legacy delivery systems. This year it announced solutions that work seamlessly with the Calix AXOS cloud-based network operating system. It has installed solutions for more than 800 small to midsize broadband operators, including FTTH, cable, satellite, and wireless operators that range in size from startups to providers with more than 400,000 customers. GLDS has offices in Carlsbad, California; Wisconsin; and Lithuania and operates in 49 U.S. states (all except Delaware) and 47 countries. Key products include BroadHub for customer management and billing and SuperController for multiservice automated provisioning. WinForce tech, a mobile workforce management platform, empowers field techs with tools previously available only to office staff. Available in native Android and browser-based platforms, WinForce tech is fully integrated with BroadHub.

FiberBroadband ASSOCIATION

Google Fiber
fiber.google.com

Key Products: Voice, video and gigabit internet services delivered over a fiber network

Summary: Since being founded by Google in 2010, Google Fiber has become a major competitive overbuilder that catalyzed FTTH deployments nationwide by introducing gigabit speeds at moderate prices in a growing number of cities across the United States. The total number of metropolitan areas in which Google Fiber is building networks now stands at 11. In 2016, Google Fiber began tapping into existing fiber to offer its services. Current projects include Huntsville, Alabama, where Google Fiber is using part of the fiber network that Huntsville Utilities is building, and San Francisco, where Google Fiber will use existing fiber to serve apartments and condos. The company's October 2016 acquisition of Webpass, an ISP that offers gigabit speeds to urban buildings using a hybrid fiber-wireless technology, is part of this effort. Webpass service is currently available in eight cities: Boston, Chicago, Denver, Miami, Oakland, San Diego, San Francisco and Seattle. In October 2015, Google Fiber was separated from Google when both became subsidiaries of the Alphabet umbrella company. Alphabet's Other Bets segment, of which Google Fiber is now a part, posted 2016 revenue of $809 million. Marking a significant change in strategy, in October 2016, Alphabet announced that it would pause plans to roll out fiber in some cities where discussions had already begun or end discussions altogether. The company also announced a 9 percent staff cut in its national Google Fiber division. In 2016, Google Fiber rolled out Fiber Phone, a home phone service being offered to residential customers in its fiber cities. The company also updated its Fiber TV app to play and record TV shows, sports and movies. However, it notes a rise among customers opting for its 1 Gbps internet-only service. In March 2017, Google Fiber released a community impact report summarizing the positive results of its digital inclusion fellowship program, along with other collaborative community efforts.

FiberBroadband ASSOCIATION

Graybar
www.graybar.com
800-GRAYBAR (472-9227)

Key Products: PON electronics, optical transport, fiber cabinets/enclosures, single-mode fiber optic cable, fiber splice closures and pedestals, DC power, outdoor fiber terminals, FTTx drop cable, hardened multiservice terminals

NETWORK MANAGEMENT SOLUTIONS

These companies provide OSS and/or software for network monitoring, optimization, provisioning, service management, subscriber management, billing and related functions.

COMPANY NAME	WEB ADDRESS
ADTRAN	**www.adtran.com**
Advance Fiber Optics	www.ospinsight.com
Allied Telesis	www.alliedtelesis.com
Allot Communications	www.allot.com
Amdocs	www.amdocs.com
Anritsu Company	www.anritsu.com
ARRIS	www.arris.com
Calix	**www.calix.com**
CHR Solutions	**www.chrsolutions.com**
Cisco Systems	www.cisco.com
Commsoft	www.commsoft.net
COS Systems	**www.cossystems.com**
Enghouse Networks	www.enghousenetworks.com
EntryPoint Networks	**www.entpnt.com**
Ericsson	www.ericsson.com
ETI Software Solutions	**www.etisoftware.com**
EXFO	**www.exfo.com**
GLDS	**www.glds.com**
IDI Billing	www.idibilling.com
Incognito Software	www.incognito.com
Ineoquest	www.ineoquest.com/
Innovative Systems	www.innovsys.com
iToolsOnline	www.itoolsonline.com/
Logisense	www.logisense.com
Mapcom Systems	**www.mapcom.com**
National Information Solutions Cooperative	www.nisc.coop
Nokia / Nokia Networks	**www.nokia.com**
Pacific Broadband Networks	**www.pbnglobal.com**
Procera Networks	www.proceranetworks.com
Sandvine	www.sandvine.com
Sigma Systems	www.sigma-systems.com
Tellabs	www.tellabs.com
TraceSpan	www.tracespan.com
Utel Systems	www.utelsystems.com
ZCorum	www.zcorum.com

Summary: Graybar specializes in supply-chain management services – getting the right parts to the right places at the right time so construction moves ahead and inventory doesn't pile up in warehouses. The company is a leading North American distributor of components, equipment and materials for telecommunications and other industries. FTTH and related solutions represent a significant portion of its broadband business. Independent telephone companies, competitive phone companies, municipalities, RUS plow contractors, wireless backhaul providers, central-office contractors and cable companies all depend on Graybar. Founded in 1869 as Gray and Barton, today Graybar sells thousands of items from leading manufacturers; its value-added services include kitting and integrated solutions. A Fortune 500 company with gross sales of $6.4 billion in 2016, Graybar employs 8,500 people at 290 locations throughout the United States, Canada and Puerto Rico. It is one of North America's largest and oldest employee-owned companies.

FiberBroadband ASSOCIATION

GVTC Communications

www.gvtc.com
800-367-4882

Key Products: High-speed internet with 1 Gbps availability, video, smart home security monitoring and home automation, local and long-distance telephone, advanced data services, Wi-Fi, Ethernet backhaul

Summary: A large telephone cooperative based outside San Antonio in the Texas Hill Country, GVTC continues to make a name for itself through its aggressive rollout of fiber to the home and close collaboration with the economic development agencies that use its fiber network to recruit and retain businesses. Through GVTC's continual fiber network expansion, approximately 75 percent of rooftops in the company's 2,200-mile service area are eligible for a FTTH connection. All fiber customers can subscribe to gigabit internet speeds or purchase SpeedSync, the only symmetrical broadband service in GVTC's service area, with up to 100 Mbps up-and-down connection. GVTC reports a 93 percent year-over-year sales growth through its SpeedSync product. In addition to its fiber broadband products, the company offers customers cable television with more than 200 channels, voice, security monitoring and a growing lineup of Honeywell Lyric smart home products. GVTC also offers an array of communications solutions to business and enterprise customers. In 2016, the company capitalized on its fiber network expertise to launch its wholesale Ethernet services business. GVTC now sells Ethernet access services, Ethernet transport service and fiber to the tower to customers that require reliable access to metro and remote markets in Central and Southern Texas, Dallas, Houston and Mexico. GVTC leveraged its fiber assets and formed partnerships with regional telephone companies, fiber segment providers and metro fiber providers to create a wholesale network. Revenue for 2016 was approximately $92 million.

FiberBroadband ASSOCIATION

Henkels & McCoy Group, Inc.

www.henkelsgroup.com
888-HENKELS (436-5357)

Key Products: Planning, design, engineering, project management, construction, operations management, and installation of wireline and wireless communications networks, both outside and inside plant

Summary: Henkels & McCoy Group (HMG) is a privately held engineering and construction firm. Through its subsidiaries, it provides critical infrastructure for the communications, power, oil and gas pipeline, and gas distribution markets. HMG was formed in 2016 as the parent company of Henkels & McCoy and the newly formed subsidiary companies, HMI Technical Solutions and HMI Communications. The HMG companies work with carriers, utilities, enterprises and all levels of government to deliver services for the planning, design, construction and installation of wireline and wireless communications networks. HMG has been an FTTH pioneer, performing feasibility studies, project management, construction management, implementation of outside plant and inside plant, and underground and aerial construction. With more than 50 regional, area and project offices, approximately 5,000 employees and more than 6,000 pieces of modern equipment, HMG companies provide end-to-end solutions for customers. HMG's subsidiary Henkels & McCoy (founded in

OPTICAL LAN SOLUTIONS

The following companies sell fiber-to-the-desk solutions for corporate or campus LANs.

COMPANY NAME	WEB ADDRESS
3M Communications	**www.3M.com/telecom**
Corning Optical Communications	**www.corning.com**
CommScope	**www.commscope.com**
DASAN Zhone Solutions	**www.dasanzhone.com**
Huawei	www.huawei.com/us
Nokia / Nokia Networks	**www.nokia.com**
Tellabs	www.tellabs.com

"As internet-connected devices become more and more capable, their bandwidth requirements are creating a sense of crisis in smaller communities that cannot meet business and residential needs for affordable bandwidth."

– Andrew Cohill, Ph.D., President, Design Nine Inc.

1923) consistently ranks in the top 10 of Engineering News-Record's Specialty Contractors and has been recognized with an E. I. DuPont Safety Excellence Award.

FiberBroadband ASSOCIATION

Hiawatha Broadband Communications

www.hbci.com
888-474-9995

Key Products: Voice, video and data services; wholesale data transport

Summary: Competitive provider Hiawatha Broadband Communications (HBC) delivers broadband services to small towns in southeastern Minnesota. Founded in 1997, HBC operates both hybrid fiber-coax and fiber-to-the-home networks – its first two networks were HFC and the last 17 have all been FTTH. It also provides wireless broadband in rural areas. One of its deployments, Red Wing, was selected as a US Ignite city based on HBC's network. HBC is also the operator of the RS Fiber Cooperative gigabit fiber-to-the-farm project in Minnesota. In 2015, HBC activated a 96-wave fiber-optic transport ring in southern Minnesota. Each wave is capable of up to 100 Gbps. The network connects more than 20 southern Minnesota cities to the protected fiber-optic network ring. HBC is currently building an FTTH network in Cannon Falls, Minnesota, and three smaller southeastern Minnesota towns. The company provides a video service selection of more than 300 channels, digital music, pay-per-view and extensive local programming produced by HBC Productions. HBC has more than 120 employees, 19 retail communities, and wholesale, construction, fiber transport, business consulting and technical support divisions. Annual revenue is more than $28 million.

FiberBroadband ASSOCIATION

Hotwire Communications

www.hotwirecommunications.com
800-409-4733

Key Products: Residential and commercial high-speed data, Wi-Fi solutions, security, home automation, digital voice and HD IPTV video services delivered over FTTP networks

Summary: Hotwire Communications is one of the largest and oldest independent providers of fiber-to-the-home communications solutions in the United States. It provides services to private residential communities, condominiums, apartments, hotels, multitenant commercial buildings, government buildings, student housing, and senior and assisted living facilities. Hotwire Communications operates in more than 13 states and owns its fully redundant fiber network. As a competitive local exchange carrier and franchised cable operator, Hotwire Communications designs,

TEST AND MEASUREMENT EQUIPMENT

COMPANY NAME	WEB ADDRESS
AFL	**www.AFLglobal.com**
Anritsu Company	www.anritsu.com
ComSonics	www.comsonics.com
Corning Optical Communications	**www.corning.com**
EXFO	**www.exfo.com**
Fiber Instrument Sales	www.fiberinstrumentsales.com
Fluke Networks	www.flukenetworks.com
GAO Tek	www.gaotek.com
Greenlee Communications	www.greenleecommunications.com
Ideal Networks	www.idealnetworks.net
Multicom	www.multicominc.com
Nokia / Nokia Networks	**www.nokia.com**
Tektronix	www.tek.com
Trilithic	www.trilithic.com
VeEX	www.veexinc.com
Viavi Solutions	**www.viavisolutions.com**
Yokogawa Test & Measurement	http://tmi.yokogawa.com/us/

builds and operates its telecommunications and in-home entertainment services. Residential services include ultra-high-speed data, HD IPTV, VoIP and advanced home automation solutions. Fision Work, the company's business division, offers, in addition to these products, symmetrical metro Ethernet, co-location, hosted PBX, PRI, DAS solutions and other business services. Headquartered in Fort Lauderdale, Florida, Hotwire has used fiber since 2002 and began delivering fiber to the home and IPTV in 2006. In 2014, it became the first residential gigabit internet provider in Florida. Recently it provided a 10 Gbps symmetrical connection to the Fontainebleau Miami Beach – one of the fastest hotel connections in the world.

FiberBroadband ASSOCIATION

InfiniSys Inc.

www.ElectronicArchitect.com
386-236-1500

Key Products: Telecommunications and broadband network design for multiple-dwelling-unit buildings; amenity selection; low-voltage and wireless system engineering; contract negotiation and project management

Summary: To differentiate their communities, MDU owners call on InfiniSys, a leader in multifamily electronic architecture. As an independent technology adviser, InfiniSys creates comprehensive, standards-based amenity solutions that include entertainment, access control, video surveillance, digital signage and messaging, energy management, and leisure-space control systems for new and existing apartments, condominiums, student housing, senior housing, hotels, mixed-use developments and master-planned communities. The thousands of projects InfiniSys has undertaken since its inception in 1990 have garnered many awards for forward-thinking solutions and exceptional customer support. InfiniSys works with electronics and infrastructure manufacturers, software developers, and public and private service providers to create new products and service offerings, including IoT solutions. It developed the trademarked Fiber to the Apartment, Networked Apartment and Smart Apartment brands. Based in Daytona Beach, Florida, the firm represents developers and property owners in negotiations with service providers and low-voltage contractors and oversees projects for financial stakeholders.

FTTH CONSTRUCTION EQUIPMENT

These companies provide equipment for trenching, boring, microtrenching, blowing fiber and other construction tasks.

COMPANY NAME	WEB ADDRESS
Condux	www.condux.com
Ditch Witch	**www.ditchwitch.com**
Fremco	www.fiberblowingmachines.com
General Machine Products	www.gmptools.com
Hexatronic	www.hexatronic.com
Knet	www.e-knet.com
Lite Access	www.liteaccess.com
Rivard	www.rivard-international.com
Sumitomo Electric Lightwave	www.sumitomoelectric.com
Trench'N edge	www.trenchnedge.com
Vermeer	**www.vermeer.com**

Institute for Local Self-Reliance

www.ilsr.org; www.MuniNetworks.org
612-276-3456

Key Products: Broadband policy research and municipal broadband advocacy

Summary: Since 1974, the Institute for Local Self-Reliance (ILSR) has championed local self-reliance based on human-scaled institutions and widely distributed ownership. The nonprofit organization, which has offices in Maine, Minnesota and Washington, D.C., conducts research, advocacy and education that support local control of energy, recycling, financing, broadband and other initiatives. ILSR promotes the intelligent use of advanced technology to achieve locally determined goals. Its Community Broadband Networks Initiative, directed by Christopher Mitchell, is one of the most important sources of information and analysis about municipal fiber-to-the-home projects in the United States. ILSR's publications, including its MuniNetworks.org blog and its weekly podcast, have been instrumental in showing communities that controlling their broadband destinies is feasible and has the potential to improve local economies and quality of life.

Inteleconnect Inc.

www.inteleconnect.com
734-604-1563

Key Products: Service provider negotiations, financial feasibility plans, fiber infrastructure design, and consultation and situation analysis for developers, property management companies, educational institutions, businesses and municipalities

Summary: Founded in 1998, Inteleconnect develops telecommunications strategies for municipalities, college and university campuses, mixed-use developments and small, medium and large businesses. The company designs and manages service provider–neutral networks (it designed, implemented and currently manages the St. Joe Valley

"The needs of businesses for the fastest internet speeds possible are growing exponentially. Virtual and augmented reality training, 3D product modeling, video conferencing and telecommuting give companies a competitive edge and need the strong backbone that we provide."

– Edi Demaj, Co-Founder and COO, Rocket Fiber

Metronet in South Bend, Indiana); negotiates for in-building distributed antenna systems for such institutions as Clemson University, Nemours Children's Hospital and Lake Nona Medical City; and negotiates telecommunications service contracts to enable advanced internet, cable TV and telephone networks. Recent projects include the design and implementation of the statewide research and medical fiber network (SCLR) that connects the three research universities and seven major medical facilities in South Carolina. Other projects include Avalon for North American Properties in Alpharetta, Georgia, and the restructuring of Heather Gardens, an existing 2,400-unit, 55-plus community in Aurora, Colorado.

iPhotonix

www.iphotonix.com
214-575-9300

Key Products: Optical network terminals, residential gateways, network functions virtualization, cloud transformation

Summary: Based in Richardson, Texas, iPhotonix is a key player in the virtualization of optical access that is beginning to occur worldwide. iPhotonix advances open, modular software platforms that simplify network operation, enable multivendor hardware deployments and seamlessly connect physical and virtual network elements. In addition, the company develops and commercializes solutions to help service providers migrate to optical access networks in an easy, fast, affordable way. Its GPON and active Ethernet ONTs interoperate with a wide variety of central-office and customer-premises equipment, including RF video headends and set-top boxes, to provide FTTH services to all market segments. The iVolve optical network termination platform includes more than 50 models of ONTs and gateways, and the iPhotonix Virtual Network (iVN) platform enables communications service providers to create network managed services for a fraction of the cost and time it takes to deploy traditional managed services. The iPhotonix team has a rich history of innovation, R&D experience and delivery of reliable solutions from its origins at Siemens Telecom. The company's solutions are tested and deployed by many communications service providers worldwide.

KGPCo

www.kgpco.com
800-755-1950

Key Products: Products for FTTH, including outside plant, central office, DAS, transmission and customer premises; supply-chain and distribution services

Summary: This year, BlueStream and KGP Logistics joined to form KGPCo, a provider of complete, customized, scalable supply-chain and network transformation solutions for the communications industry. KGPCo combines a comprehensive suite of technical strategy and implementation services with a national logistics network and portfolio of technology partnerships. The company is focused on being a trusted partner for customers and providing a single brand that can deliver a complement of network solutions. KGPCo recently launched the KGPCo Solution Innovation Center to evaluate, design, and engineer cloud and virtualization solutions developed and operationalized in a live network environment.

FiberBroadband ASSOCIATION

Ledcor Technical Services

www.Ledcor.com
512-275-3500

Key Products: Turnkey and multiservice communications solutions, including design, engineering, sales, construction and maintenance of wireless and wireline terrestrial networks, submarine networks, outside and inside plant and FTTx

Summary: Ledcor, in business since 1947, is a diversified construction company that has been building communications networks since 1979. It has built more than 45,000 miles of fiber across North America, including the United States' first full-standard GPON networks and Canada's first transcontinental fiber network. The company employs more than 6,000 people in 30 offices across North America; the communications division alone has more than 1,200 employees. Ledcor has played a major role in two recent large, pioneering, public-private communications

partnerships: the Mackenzie Valley Fiber Link (Northwest Territories of Canada) and the Kentucky Next Generation Information Highway. Ledcor Technical Services is headquartered in Austin, Texas.

Leviton Manufacturing

www.leviton.com
800-323-8920

Key Products: Premises wiring, outside plant, central-office solutions and home automation products

Summary: Leviton Manufacturing supplies secure, high-bandwidth fiber and copper connectivity solutions for enterprise, data center and service provider networks. Residential customers use Leviton's lighting controls, wiring devices and home automation products, which allow homeowners to create smart living environments that deliver energy savings, safety and convenience. The company has more than 20 years of experience developing solutions for high-speed networks and offers a full line of custom-configurable products along with layout and design support services for data centers. The company's online configurator allows users to customize enclosures, copper and fiber cable assemblies, copper patch cords and power distribution units to meet their network needs. Leviton's LightSpace enclosures, designed to meet the requirements of service providers large and small, are used in central-office, outside-plant and fiber-to-the-premises applications. Privately held and based in Melville, New York, Leviton has a portfolio of more than 25,000 products and 600 patents, employs more than 7,000 people and has sales in 80 countries.

Magellan Advisors

www.magellan-advisors.com
888-488-1767

Key Products: Broadband and telecom planning, deployment and management services

Summary: Magellan Advisors is a full-cycle consulting firm that offers services from project inception through implementation and into continuing operations. It provides comprehensive community broadband planning, telecommunications master planning, deployment and management services to governments, municipal utilities, electric cooperatives and private organizations and a suite of public-sector IT solutions to local, state and federal government markets. Magellan helps communities identify, negotiate and forge public-private and public-public

"Elected officials and agencies must truly address bringing 21st-century technology to 46 million Americans in rural areas with transformational fiber-based services. Rural America must have real access to fiber-based critical advances in telemedicine, education, workforce development and other categories. This requires creative ways of funding."

– Darby A. McCarty, Chairman and CEO, Smithville

partnerships. Its projects have led to more than $1 billion of investments in broadband networks that connect more than 1,000 schools, hospitals, libraries and government facilities and pass nearly 1 million homes with fiber. Magellan's portfolio includes more than 250 engagements for city, county, state, federal and private broadband projects. Clients range from the national government of New Zealand to the new master-planned community of Babcock Ranch, Florida. Recent clients include Naperville, Illinois; Sonoma County, California; and Culver City, California. Magellan is headquartered in Denver and has regional offices in Miami and San Diego.

FiberBroadband ASSOCIATION

Mapcom Systems

www.mapcom.com
804-743-1860

Key Products: Visual operations system software, network management, FTTH management, geographic information systems, workforce management tools, systems integration, training and consulting

Summary: Mapcom Systems offers a visualization-based approach to FTTH operations and management. Its M4 Solutions Suite encompasses the entire FTTH life cycle from PON or active network design and feasibility analysis to day-to-day plant/facility assignment and network maintenance and management. It includes both outside and inside plant at physical and logical levels. Providers use the M4 Solutions Suite to model their networks and service areas, integrating and correlating data from billing, accounting, GPS tracking, element management, network monitoring and vehicle-tracking applications in a visual interface. Using the suite in conjunction with M4 Workforce and M4 Process Manager technology, staff can communicate via mobile devices to handle trouble tickets, service orders, field locates and permitting. Headquartered in Richmond, Virginia, with a staff of more than 100, Mapcom has worked since 1971 with independents, cooperatives, fiber communities and campus telecommunications providers across the United States, Canada, Central America, the Caribbean and Africa.

MasTec North America Inc.

www.mastec.com
888-785-2171

Key Products: FTTx deployment, outside-plant cabling, engineering, inside-plant construction and installation, joint trench systems, splicing and testing, systems integration, fulfillment, ongoing maintenance

Summary: MasTec's engineering, design, construction and maintenance services support advanced fiber optic, copper, wireless and satellite networks. Its FTTH network experience includes underground and aerial fiber installation in urban, suburban and rural environments nationwide. It deployed Verizon Fios networks in Virginia, Pennsylvania, Maryland, Rhode Island, Florida, California and Texas and performed outside-plant construction for CenturyLink in Florida and Georgia, and it works with many small telephone companies as well. MasTec, which is headquartered in Coral Gables, Florida, can supply crews and equipment to its customers 24/7. By combining cutting-edge technology, innovative solutions, skilled professionals and a commitment to safety, the company ensures that its customers can meet their customers' communications needs with reliability and quality. MasTec's communications segment generated $2.3 billion in revenue for 2016.

FiberBroadband ASSOCIATION

Michels Corporation

www.michels.us
920-583- 3132

Key Products: Fiber optic network construction, including outside-plant construction, structured cabling, and fiber splicing and testing

Summary: In 1983, Michels, based in Brownsville, Wisconsin, was one of the first companies to construct fiber lines. Today, it builds thousands of miles of fiber optic and broadband networks each year. Its communications personnel serve all sectors of the communications industry – local telephone companies, broadband and cable TV providers, schools and enterprises. The company's construction design and management services include all phases of inside- and outside-plant engineering. Plowing, trenching, splicing, terminating, testing, constructing aerial lines, directional boring, rail plowing, installing cable, conducting site work and providing FTTx solutions are some of the services Michels offers. Last year, the company booked $2.0 billion in new construction to rank 36th on the Engineering News-Record list of top 400 contractors and 18th among telecommunications contractors. It assists clients with growth forecasting, verifying existing facilities, investigating potential migration strategies and estimating costs of numerous deployment options. The firm has more than 5,000 employees in regional offices throughout the United States.

Mid-State Consultants

www.mscon.com
435-623-8601

Key Products: Communications engineering services, facilities management software

Summary: Mid-State Consultants offers a full range of communications engineering services for telephony, data and video networks as well as computerized mapping and conversion and construction supervision. The company has experience working for a broad clientele, including local exchange carriers, RBOCs, interexchange carriers, competitive access providers, ISPs, cellular operators and CATV operators, and it has participated in many FTTH projects. Mid-State assists clients with growth forecasting, verification of existing facilities, investigation of potential migration strategies and cost estimates of numerous deployment options. The company's construction design and management services include all phases of inside- and outside-plant engineering. Mid-State's e-TICS facilities management software facilitates the assignment of inside and outside plant from end to end; for FTTH networks, it can assign fibers and splitter ports to specific locations. Mid-State Consultants is headquartered in Nephi, Utah, and has eight regional offices throughout the United States.

Multilink

www.gomultilink.com
440-366-6966

Key Products: Fiber distribution and cable management solutions, connectors, splice enclosures and cabinets; MDU enclosures; raceway and pathway solutions

Summary: A manufacturer of telecommunications network components, Multilink, founded in 1983, focuses on fiber management solutions. Multilink's customers include independent telcos, RBOCs, utilities, local area network providers and CATV MSOs. Its products are designed to meet the needs of both legacy plant and new technology applications. The company's engineering staff works closely with customers to develop innovative designs and application-oriented products to provide cost-effective solutions. Based in Elyria, Ohio – where it is expanding its facilities – Multilink is privately owned and has 200 employees.

NBT Solutions / VETRO FiberMap

www.nbtsolutions.com; www.vetrofibermap.com
207-221-6627

Key Products: Fiber mapping software

Summary: NBT Solutions has delivered GIS, geodata and mapping services to the telecommunications industry since 2008. In 2016, it launched VETRO FiberMap, a cloud-based mapping product built on an open-source stack. Designed and built to meet the needs of small and midsize fiber ISPs and community fiber networks, VETRO FiberMap helps these organizations compete successfully with larger operators. The software's open application programming interfaces allow integration with market intelligence and with planning, engineering and community infrastructure data. Notable customer wins since the launch of VETRO FiberMap include MetaLink, a midwestern telephone consortium, and Great Works Internet, a competitive provider in Maine, both of which adopted VETRO FiberMap as a core business platform. Other customers include FTTH ISPs; rural telcos; middle-mile networks; consulting, planning and design engineers; and developers. Privately owned NBT Solutions is based in Portland, Maine, and Buffalo, New York, and has a staff of 15.

FiberBroadband ASSOCIATION

NEO Connect

www.NEOconnect.us
970-309-3500

Key Products: Consulting, design and engineering services for middle-mile and FTTH networks

Summary: NEO Connect, founded by telecom and FTTH veteran Diane Kruse, provides strategic consulting services for utilities, municipalities, companies, tribal communities, real estate developers, grant recipients and government agencies that deploy fiber optic, gigabit and fiber-to-the-home networks. Services include consulting, feasibility studies, financial and business planning, financing, contract negotiations, design and engineering services, RFP writing and vendor management, project management, program management and appraisal services. Located in Glenwood Springs, Colorado, the firm has served communities across the United States.

"Long gone are the days of convincing service providers FTTH is the right technology solution. Most of the debate today is on how best to use innovative techniques such as microtrenching or wireless drops to cut costs and disruption and quicken the pace of deployment."

– James H. Salter, Chairman, Atlantic Engineering Group

Nokia / Nokia Networks

www.nokia.com
908-582-3000

Key Products: Wireline and wireless network equipment, software for network management, IoT technology, cloud solutions

Summary: Nokia, headquartered in Espoo, Finland, is a market leader in wireless and wireline networks. It has a global presence with operations in Europe, the Middle East and Africa, Greater China, North America, Asia-Pacific and Latin America. A third of fixed-broadband subscribers worldwide are served by access networks that use Nokia technology, including EPON, GPON, xDSL and G.fast. Ten companies, including EPB Fiber Optics in Chattanooga, have deployed Nokia's universal NG-PON technology to deliver 10 Gbps services. Nokia Bell Labs (descendant of the original Bell Laboratories) recently showed that Nokia's XGS-PON technology, part of the company's NG-PON offering, could support ultra-low-latency fronthaul for 5G mobile traffic, thus paving the way for true integration of wireline and wireless networks. Nokia closed 2016 with net revenue of more than $26 billion in 2016 on sales generated in about 130 countries. Nokia had around 101,000 employees at the end of 2016, with an annual R&D budget of more than $5 billion and R&D facilities in Europe, North America and Asia.

FiberBroadband ASSOCIATION

OFS

www.ofsoptics.com
770-798-5555; 888-342-3743

Key Products: Optical fiber; optical fiber cable; fusion splicers; fiber management and connectivity products for homes, businesses, data centers and MDUs; network design services

Summary: OFS's heritage, which goes back to the original Bell Labs, includes pioneering research and development in fiber optics. Wholly owned by Furukawa Electric of Japan, OFS designs, manufactures and supplies optical fiber, fiber optic cable, specialty photonics and optical connectivity solutions, providing end-to-end fiber optic solutions for outside-plant and inside-plant networks. Products include EZ-Bend ultra-bend-insensitive optical cables and InvisiLight solutions for nearly invisible in-MDU and in-home fiber deployments; AllWave+ ZWP full-spectrum, zero-water-peak, bend-optimized fiber; gel-free Fortex loose tube, AccuRibbon ribbon and PowerGuide ADSS fiber cables; end-to-end fiber connectivity, optical splitter and fiber management solutions; fusion splicers and several MDU deployment solutions. The professional services group helps optimize network designs. Recent product launches include AccuRiser indoor/outdoor ribbon cable and the SlimBox underground terminal for plug-and-play connectorized drop cables. Headquartered near Atlanta, OFS is a global provider with facilities in North America, Europe and the Middle East and sales offices around the world. Furukawa Electric reported revenue of about $1.44 billion for its telecommunications group for the fiscal year ending March 2017.

FiberBroadband ASSOCIATION

On Trac

www.ontracinc.net
423-317-0009

Key Products: FTTH splicing, FTTH residential and commercial installation, mainline fiber splicing, MDU network design and installation, structured cabling, consulting, project management, warehousing, back-office structure

Summary: Based in East Tennessee, On Trac provides telecommunications services and special projects to network operators nationwide. Its core services are FTTH splicing and FTTH installation. Additional services include consulting; project management; training, service and repair; materials management and warehousing; scheduling processes; and back-office structure. Clients include municipal network operators, cooperatives and privately owned operators. On Trac serves ongoing FTTH deployments for Bristol Tennessee Essential Services, Dalton Utilities, GVTC, LUS Fiber, Google Fiber, C Spire and Longmont Power & Communications. To date, On Trac has connected more than

250,000 FTTH installations and performed outside-plant work that includes aerial drops, underground drops, mainline fiber splicing and bidirectional testing.

Pacific Broadband Networks

www.pbnglobal.com
888-339-8805

Key Products: Optical broadband access products and network solutions, including active Ethernet, EPON and RFoG equipment for central offices and customer premises; network management and provisioning software

Summary: Pacific Broadband Networks (PBN) supplies broadband access products and network solutions that help operators bridge the gap between existing and emerging technologies. Its equipment and network management products are suitable for HFC, FTTH, RFoG, Ethernet and DOCSIS applications. For example, the AIMA3000, a 1.2 GHz/DOCSIS 3.1–ready HFC headend platform that enables MSOs to build or upgrade their networks to meet access requirements for today and the future, simplifies MSOs' transitions to IP networks by providing intelligent, interoperable RF and optical modules for HFC, RFoG, PON video overlay and other applications. Recently, PBN introduced netWatch, a platform for monitoring, maintaining and troubleshooting HFC networks and plant quality, and partnered with Technetix to deliver its access platform to Tier-1 MSOs in North America and Europe. Customers include major telcos and MSOs that serve tens of millions of subscribers around the world. Recent U.S. deployments include Arizona State University in Phoenix, NuLink Digital in Georgia, and SuperVision, an affiliate of YukonTel, in Alaska. Headquartered in Almere, the Netherlands, PBN has research and development facilities in Melbourne and Beijing and offices in Australia, China, Europe and the Americas. PBN is also well represented by channel partners globally.

Pavlov Media

www.pavlovmedia.com
800-677-6812

Key Products: Internet, video and voice services; managed services including support for leasing offices

Summary: Pavlov Media is a leading network provider in the multiple-dwelling-unit space and the largest private provider of broadband services to off-campus student housing communities. It builds and runs networks in 43 states and Canada. With more than 156,000 residents using its network, Pavlov Media provides high-speed internet and cable television to hundreds of apartment, condo and student housing sites. Pavlov Media's 10 Gbps national fiber network backbone enables the delivery of internet speeds up to 1 Gbps. Other speed-enhancing innovations include WebSnap – a set of traffic management techniques that enable fast web page loading through superfast blasts of service – and a root domain name server hosted on Pavlov's network to improve latency. Pavlov Media launched its first fiber-to-the-unit service several years ago and now supplies FTTU to thousands of apartments. Founded in 1994, Pavlov Media is headquartered in Champaign, Illinois.

Power & Tel

www.ptsupply.com
800-238-7514

Key Products: Fiber optic and cable products, optical networking electronics, test gear, IPTV and home networking solutions

Summary: The distributor Power & Tel specializes in the procurement, sales and logistics of communications products. By cost-effectively and efficiently managing the supply chain, Power & Tel lets its customers – service providers, contractors and other entities large enough to maintain their own communications networks – focus on building and maintaining fiber networks. The company also provides materials-management services that make use of state-of-the art distribution technology to accommodate the industry's rapidly changing supply needs. Founded in 1963 and privately owned, Power & Tel is headquartered in Memphis, Tennessee, and has locations in the United States, Canada, Mexico and Brazil.

DISTRIBUTORS OF FIBER OPTIC PRODUCTS

COMPANY NAME	WEB ADDRESS
Advanced Media Technologies	**www.amt.com**
Anixter	www.anixter.com
Core Telecom Systems	www.coretelecom.net
Fiber Instrument Sales	www.fiberinstrumentsales.com
FiberOptic.com	www.fiberoptic.com
Graybar	**www.graybar.com**
KGPCo	**www.kgpco.com**
Metrotek	www.metrotek.com
Multicom	www.multicominc.com
Power & Tel	**www.ptsupply.com**
TVC Communications	**www.tvcinc.com**
Walker and Associates	**www.walkerfirst.com**

PPC Broadband Fiber

www.ppc-online.com
315-431-7200

Key Products: Armored polymer microduct and fiber cables for FTTH and MDU markets

Summary: PPC Broadband Fiber's fiber optic cable, microduct and closure solutions are designed to enable cost-effective fiber deployment. The company's Miniflex fiber cable provides protection, flexibility and installation performance and is compatible with industry-standard microducts. Miniflex fiber cable can be pushed by hand more than 400 feet, pulled for 900 feet or blown 2,500 feet. The QuikPush family of preconnectorized pushable fiber solutions and the all-dielectric, self-supporting (ADSS) cable are designed to speed up the last mile of FTTH and FTTC deployments. Preconnectorized QuikDrop cable is a small, ultra-tough, flexible fiber. Easy to ship and handle, it has been proven to reduce installation costs and time. In addition, PPC has several options for closures to house fiber cable slack, ONUs, and RF electronics and passives that provide security for consumers and convenience for technicians. PPC Broadband Fiber has installed more than 100 million feet of fiber cable and microduct in more than 52 countries.

Preformed Line Products

www.preformed.com
440-461-5200

Key Products: Fiber optic and copper splice closures, high-speed cross-connect devices, cable anchoring and control hardware and systems

Summary: Founded in 1947, Preformed Line Products (PLP) is an international designer and manufacturer of products and systems used to construct and maintain overhead and underground networks. The company recently updated its flagship product line of COYOTE fiber closures to make the devices even more durable, more versatile and easier to install. PLP serves telecommunications network operators, cable television and broadband service providers, power utilities, corporations and enterprise networks, government agencies and educational institutions. Headquartered in Cleveland, PLP operates domestic manufacturing centers in Rogers, Arkansas, and Albemarle, North Carolina. The company serves worldwide markets through operations in 18 countries. Net sales for 2016 were $336 million.

FiberBroadband ASSOCIATION

Prysmian Group

www.prysmiangroup.com
803-951-4800; 800-713-5312

Key Products: Optical fiber and telecommunications cables

Summary: Prysmian Group is the world's largest cable solutions provider. The company operates through two global brands: Prysmian and Draka. With 130 years of history, Prysmian Group has subsidiaries in 50 countries, 89 plants, 17 R&D centers and more than 19,000 employees. In North America, operators have deployed more than 80 million fiber miles of Prysmian Group fiber. The company's product portfolio includes optical fiber cable, composite fiber/power cable for wireless sites, FTTx solutions and premises/data cables. Prysmian offers two compact solutions for FTTH. Mini FlexTube cables are optimized for mid-span access with SuperFlexible 1.3 mm tubes that can be removed without tools. LT2.0 cable offers small, flexible conventional buffer tubes, with bend-insensitive fiber as a standard feature. Prysmian Group also offers ADSS and OPGW cables for FTTH and middle-mile builders that have access to electrical utility poles or transmission infrastructure. This year, Prysmian was awarded a supply agreement from Verizon Communications to support the company's U.S. network expansion around a next-generation fiber platform that will speed the deployment of 5G services, while improving 4G LTE and other broadband capacity. In 2016, Prysmian's sales reached more than $7 billion.

FiberBroadband ASSOCIATION

Pulse Broadband

www.pulsebroadband.net
314-324-7347

Key Products: Fiber network and FTTH feasibility studies, planning, design, construction management, provisioning, billing, customer care, video programming services and operations management

Summary: Pulse Broadband was formed in 2008 to bring fiber technology to underserved areas. Last summer, it was acquired by NRTC, a cooperative that serves 1,500 utilities in 48 states; Pulse is operated as an independent subsidiary, and NRTC is available to provide managed network services to Pulse clients. Pulse Broadband specializes in rural fiber broadband, helping electric cooperatives, municipalities and other organizations build and operate gigabit fiber networks to enable next-generation, smart-grid information delivery along with high-speed broadband internet and telecommunications services. Pulse helps clients determine which type of fiber architecture is most financially viable and then works to design networks, manage construction and optionally offer voice, video and data services once FTTH networks are built. Pulse also offers assistance with back-office functions, including billing, customer sales and support, reporting and marketing. It has completed more than 4,000 miles of fiber deployment and $150 million in FTTH projects.

Rocket Fiber
www.rocketfiber.com
844-847-6253

Key Products: Gigabit internet, managed services, voice, IPTV

Summary: Rocket Fiber was founded in 2014 and began rolling out FTTH services to residents and businesses in Detroit's central business district in late 2015. It currently has more than 40 miles of fiber optic cable in Detroit and is preparing to expand east and west of the downtown area along the Detroit River and into midtown. One of the few U.S. providers to offer 10 Gbps residential service, it is preparing to add IPTV video services soon. Rocket Fiber is unusual among private, for-profit ISPs in that it was formed with the explicit goal of contributing to local economic development. Its mission is to develop and implement critical technology infrastructure that will contribute to transforming Detroit into an attractive city for technology and other businesses to locate. The company is at the forefront of Detroit's smart-city movement, leading the development of high-tech assets. It is a part of Detroit businessman Dan Gilbert's portfolio of companies, the best known of which is the financial giant Quicken Loans.

FiberBroadband ASSOCIATION

SDT
www.sdt-1.com
601-823-9440

Key Products: Telecommunications infrastructure services, including structured cabling; engineer, furnish and install services; design and engineering

Summary: Headquartered in Brookhaven, Mississippi, with 200 employees, SDT provides a diversified package of services to telecommunications carriers, developers and integration providers. The company performs planning, design, development, installation, testing, turnup and maintenance on all network environments, from long-haul fiber networks to FTTH, wireless and LAN. Recently, SDT has been involved in numerous projects to deliver fiber to cell sites. With its integrated project delivery strategy, SDT can bundle individual products from its separate business units (outside-plant engineering and construction, inside-plant and wireless services, real estate, right-of-way and managed services) as turnkey solutions. In association with its strategic partner, Clearion Software, SDT pioneered the use of GIS in fiber network design, which greatly reduces the time to engineer and design networks, speeds network buildouts and achieves cost savings for owners. SDT currently serves clients in 35 states and continues to expand its service offerings and national footprint.

SmartRG
www.smartrg.com
877-486-6210

Key Products: Carrier-grade customer-premises equipment; open-services platform for managing networked in-home devices; service provider tools for network optimization, insight and security

Summary: Service providers increasingly must view and manage equipment inside customer premises, and SmartRG is dedicated to providing the hardware and software for them to do that cost-effectively. Headquartered in Vancouver, Washington, SmartRG was spun off from the former ClearAccess when Cisco acquired the software assets of ClearAccess in 2012. One of its flagship products, Smart/OS, uses the emerging technologies of software-defined networking and network functions virtualization to support next-generation FTTH gateways and other in-home networking products Poised to take advantage of the connected-city and internet of things market trends, SmartRG has more than 600 service provider customers – including many fiber-to-the-home providers – with a total of more than 15 million broadband subscribers. Privately held SmartRG has annual revenues of more than $20 million.

Smithville Communications / Smithville Telecom / Smithville Fiber
www.smithville.com
812-876-2211; 800-742-4084

Key Products: High-speed internet, IPTV, voice, managed services, cellular, home automation and security services, internet of things/big data support, cybersecurity measures, videoconferencing, consulting services

Summary: Privately owned Smithville Communications is Indiana's largest independent telecom company, with 204 employees. In the last year, Smithville lifted data caps and speed tiers for all residential customers; completed a $4.5 million network upgrade that will allow it to offer wave-level connectivity from 1 Gbps to 100 Gbps and scale to 200 Gbps in the future; and continued its $90 million FTTP buildout inside and outside its traditional service area. Smithville Fiber – Smithville's brand for all-fiber communities and regions – expanded gigabit service to Jasper (now more than halfway built out) and parts of Bloomington; several more communities are under consideration. Smithville continued to expand its public-partnership platform for FTTH expansion without federal funding and improved rural connectivity with fiber to the cabinet. The company added a direct peering link to reduce latency and improve capacity for large data transmission. Smithville offers commercial services through Smithville Business, providing fiber-based connectivity, enterprise-scale Wi-Fi, data consulting, network management, cybersecurity measures, and managed services for businesses, university campuses, biotechnology companies, health care providers and government offices in central and southern Indiana.

FiberBroadband ASSOCIATION

"A renewed focus in the market is pushing fiber plant farther and faster to the end user than ever before. The increasing organic investment, as well as the welcomed ACAM and CAF funding, is fulfilling the FTTx commitment of the industry."

– Paul Shreve, Director of Technology, Walker and Associates

Sonic

www.sonic.net
888-766-4233

Key Products: Gigabit fiber-to-the-premises, fiber-to-the-node and DSL internet access; residential and business voice service; co-location; business networking

Summary: An internet service provider headquartered in the San Francisco Bay Area, Sonic has delivered internet connectivity for 22 years. Sonic's fiber-to-the-premises projects began with managing Google's beta FTTH network in 2010 at Stanford University. Since then, the company has built residential and business fiber networks in Bay Area cities, including parts of San Francisco. It is now expanding its fiber optic network within San Francisco and into surrounding areas, including Sonoma County, to achieve better economies of scale. In addition to fiber products, Sonic delivers high-speed DSL to homes and businesses throughout California. Sonic's business internet and phone customers include Lagunitas, the Golden State Warriors, Amy's Kitchen and Minted. Sonic's mission is to provide internet freedom to all. The company supports privacy, uncapped bandwidth and affordable pricing for all products – it sells residential gigabit fiber internet with home phone service for $40 per month. Sonic has about 400 employees and serves 100,000 subscribers across California.

FiberBroadband ASSOCIATION

Superior Essex

www.SuperiorEssex.com
770-657-6000

Key Products: Premises and outside-plant fiber and copper cable products, FTTH enclosures

Summary: Superior Essex designs, manufactures and supplies a large selection of premises and outside-plant fiber optic and copper wire and cable products. The company supplies many of the largest telecommunications service providers, and its cable products are installed in thousands of enterprises around the globe. It recently introduced a line of cables for distributed antenna systems; FTTH enclosures, including fiber distribution hubs; and redesigned families of fiber dome closures. Superior Essex has a co-development and marketing alliance with Legrand to create a suite of structured cabling systems, nCompass, which provides solutions to the challenges of technical support, network energy efficiency, reliability and flexibility. The company recently launched PowerWise Category 5e cable, a 22-gauge communications data cable specifically designed for internet-connected devices that utilize Power over Ethernet. Also introduced recently is EnduraLite indoor/outdoor loose-tube optical fiber cable. Superior Essex is headquartered in Atlanta and has more than 3,000 employees. Its state-of-the-art product development center is in Kennesaw, Georgia, and it has manufacturing facilities in Brownwood, Texas; Tarboro, North Carolina; and Hoisington, Kansas.

Team Fishel

www.teamfishel.com
614-274-8100; 800-347-4351

Key Products: Network design, engineering, construction, installation and maintenance services

Summary: Established in 1936, Team Fishel has 2,200 "teammates" and 30-plus offices in 13 states across the United States. The company specializes in designing and constructing last-mile fiber optic networks for broadband service providers. Its fiber specialists have more than 35 years of experience building fiber to the home and business. Team Fishel has the technical resources to design broadband network infrastructures from initial planning stages through engineering, design, construction, installation, fiber splicing and system maintenance. Among its long-term projects, Team Fishel is working closely with SEI Communications to bring FTTH service to rural residents in southeastern Indiana. Team Fishel also serves the electric, gas and low-voltage cabling markets.

Telect

www.telect.com
509-926-6000

Key Products: Fiber optic and copper connectivity solutions, network power management, equipment racks and cabinets, cable management systems

Summary: Since 1982, Telect has designed and manufactured products that link networks and protect customers' fiber investments. Its products and solutions are

found in communications service provider networks, data centers and utility networks around the globe. The company designs and manufactures high-density fiber distribution solutions, including frames, chassis and rack-mount bulkhead panels. As a privately held company, Telect aims to respond to customers with innovative solutions tailored to their needs. The LTX series of fiber distribution panels, recently announced, was designed to maximize port density in a small footprint. Several other products the company is launching this year are designed to solve challenges many network engineers face with capex, opex, footprint and fiber cable protection. Telect pays particular attention to bend-radius standards, cable routing and protection, connector access and modular flexibility. The company is headquartered in Liberty Lake, Washington, with manufacturing operations in Liberty Lake and Guadalajara, Mexico.

The Broadband Group / TBG Network Services
www.broadbandgroup.com
702-405-7000

Key Products: Telecommunications master planning, network design and engineering, financial modeling, construction management

Summary: The Broadband Group (TBG), a technology and telecommunications consulting firm, develops business plans, network specifications, engineering designs, financial models and deployment strategies for utilities, master-planned communities, municipalities and service providers seeking to facilitate or deliver next-generation broadband services. Recently, TBG performed a feasibility study and implementation plan for Huntsville (Alabama) Utilities. TBG's wholly owned subsidiary, TBG Network Services, now oversees the construction management process as Huntsville Utilities builds out its 966-mile, citywide fiber broadband network, which is currently leasing facilities to Google Fiber. TBG advises numerous development interests in creating broadband connected communities. For Metro Development Group, TBG facilitated a partnership agreement between Metro and Bright House Networks that created Florida's first residential gigabit communities. Other notable clients include Nexton (MeadWestvaco – Charleston, South Carolina), Generation Park (McCord Development – Houston, Texas) and Ten Trails (Oakpointe Communities – Black Diamond, Washington). TBG defined, managed, and implemented comprehensive technology master plans for each of those communities. Based in Las Vegas, with additional offices in Huntsville, Alabama, TBG was founded in 1995 and has 16 employees and contracted associates.

"Taking fiber to the home has been a rewarding challenge. With an average 70 percent take rate in Ammon neighborhoods, it is obvious that consumers understand the value of fiber optic infrastructure when combined with true user choice and control."

– Dana Kirkham, Mayor of Ammon, Idaho

Tucows / Ting

www.ting.com/internet
855-846-4389

Key Products: Gigabit internet access

Summary: Ting, a subsidiary of Tucows – a domain-management service company that ventured into the MVNO business in 2012 – launched its FTTH business with a bang in December 2014 when it acquired Blue Ridge InternetWorks, a competitive fiber provider in Charlottesville, Virginia. Today, Ting provides fiber services across Charlottesville and continues to expand to new areas. Shortly after the Charlottesville announcement, the city of Westminster, Maryland, chose Ting to be the network operator and first service provider on its city-owned fiber optic network, which was lit in July 2015. Ting is also building a fiber network in Holly Springs, North Carolina, and began servicing customers there in January 2017. Ting announced that it will be going to Centennial, Colorado, and the Greater Sandpoint area of Idaho. Ting has ambitions to provide FTTH services in other small markets; the company is evaluating opportunities to invest in or partner with additional network operators, and its website invites consumers to "Put your town or city's name on our watch list." Tucows is headquartered in Toronto, Canada, with offices in Kirkland, Washington; Starkville, Mississippi; Amsterdam; Bonn and Singapore. With 350 employees, it reported $190 million in revenue in 2016.

NETWORK PLANNING AND DESIGN SOLUTIONS

These companies provide software used to plan and design FTTH networks.

COMPANY NAME	WEB ADDRESS
3-GIS	**www.3-GIS.com**
Advance Fiber Optics	www.ospinsight.com
Biarri Networks	**www.biarrinetworks.com**
Clearion Software	www.clearion.com
Comsof / FiberPlanIT	**www.comsof.com**
COS Systems	**www.cossystems.com**
CrescentLink Solutions	www.crescentlink.com
CrowdFiber	www.crowdfiber.com
Esri	www.esri.com
ETI Software Solutions	**www.etisoftware.com**
Lode Data Corporation	www.lodedata.com
Mapcom Systems	**www.mapcom.com**
Mid-State Consultants	**www.mscon.com**
NBT / VETRO FiberMap	**www.vetrofibermap.com**
Netcon	www.netconamericas.com

FiberBroadband ASSOCIATION

TVC Communications

www.tvcinc.com; www.maxcellinnerduct.com
888-644-6075

Key Products: Broadband electronics, connectivity products, outside-plant hardware, test equipment, fabric innerduct, conduit technology

Summary: TVC Communications, a division of WESCO Distribution Inc., is a value-added distributor that stocks and same-day ships FTTH products and facilitates the planning, launching and turn-on of fiber networks in broadband, telephony and utility markets. TVC provides a number of services for FTTx networks – such as system design, project planning and custom cutting of fiber optic cable – in addition to any customized solutions a project requires. The company's brands include MaxCell, a flexible, multicelled fabric innerduct system designed for the network construction industry. Compared with rigid innerduct, the MaxCell solution enables network owners and builders to increase cable density by as much as 300 percent. This increases space, reduces costs and allows overlay without breaking new ground. MaxSpace is a no-dig conduit space recovery solution designed to safely remove rigid innerduct from around active fiber cables with little to no load on the cable and no interruption of service.

Vantage Point Solutions

www.vantagepnt.com
605-995-1777

Key Products: Broadband engineering and consulting services, including network design, field services, financial and operational optimization, and outside-plant expertise.

Summary: Vantage Point Solutions (VPS), based in Mitchell, South Dakota, provides engineering and consulting services to broadband wireless and wireline providers. The company combines professional engineering, technical expertise and extensive regulatory knowledge to design technically advanced, economically viable solutions customized for each client. With more than 200 employees and 400 clients worldwide, VPS has enormous depth and expertise in broadband engineering, financial analysis and regulatory services. Services include professional engineering, outside-plant engineering, strategic planning, technology evaluation, network architecture design, and regulatory and feasibility studies.

Verizon Communications / Verizon Enhanced Communities

www.verizon.com; www.verizon.com/communities

Key Products: Internet, video and digital voice services over a fiber optic network

Summary: Verizon delivers broadband and other communications services to consumer, business, government and wholesale customers. Headquartered in Basking Ridge, New Jersey, and the largest FTTH provider in the United States, it provides converged communications, information and entertainment services in the United States and integrated business solutions in more than 150 countries. As of the end of 2016, Verizon's FTTH network, Fios, had 5.7 million internet subscribers and 4.7 million video subscribers, and it continues to add new customers in its existing footprint. It is also building out Fios in Boston for the first time. In 2016, Fios revenue grew 4.6 percent to almost $16 billion. Fios Gigabit Connection, the company's flagship broadband service, offers download speeds up to 940 Mbps and upload speeds up to 880 Mbps, and Fios Quantum TV offers the ability to record up to 12 shows at the same time and up to 200 hours of HD recording capacity. Verizon Enhanced Communities works with property owners, property managers and businesses to serve multifamily residential, multitenant commercial and mixed-use communities with high-bandwidth internet, TV and phone services. In June 2017, Verizon closed its purchase of Yahoo. A Dow 30 company with almost $126 billion in 2016 revenues, Verizon employs 161,000 people worldwide.

FiberBroadband ASSOCIATION

"The demand for gigabit broadband is off the charts. A growing number of new ISPs – electric co-ops, munis, utilities and new overbuilders – are entering the market with FTTH broadband that create strong economic growth opportunities for their businesses and the communities they serve. These ISPs also have a great opportunity to partner with cloud providers to deliver additional services that enhance the overall broadband customer experience and improve their FTTH business case."

– Kevin Mitchell, Vice President of Marketing, Alianza

Vermeer
www.vermeer.com
641-628-3141; 888-837-6337

Key Products: Horizontal directional drilling equipment; utility and pedestrian trenchers and plows

Summary: Headquartered in Pella, Iowa, and selling worldwide, Vermeer manufactures underground installation equipment. Its involvement in fiber optic installation began in 1991 with the launch of its Navigator horizontal directional-drill product line. Navigator products can install communications lines underground without excavating or trenching, minimizing environmental disruption and helping reduce labor costs in fiber deployments. In 2010, Vermeer introduced a microtrenching system that allows installation of fiber lines into a roadway in one quick, efficient pass. Recent introductions include the S3 generation of directional drills in which speed, simplicity and quietness are trademarks

PASSIVE COMPONENTS FOR FTTH NETWORKS (OUTSIDE PLANT AND INSIDE PLANT)

These companies provide fiber management solutions, splitters, enclosures, cabinets, connectors, ducts, conduits and related equipment for fiber access networks.

COMPANY NAME	WEB ADDRESS
3M Communications	**www.3M.com/telecom**
AFL	**www.aflglobal.com**
Alpha Technologies	**www.alpha.com**
American Products	www.amprod.us
Century Fiber Optics	www.centuryfiberoptics.com
Channell Commercial Corporation	www.channell.com
Charles Industries Ltd.	**www.charlesindustries.com**
Clearfield	**www.seeclearfield.com**
CommScope	**www.commscope.com**
Corning Optical Communications	**www.corning.com**
Crownduit	www.crownduit.com
Dura-Line	**www.duraline.com**
Fiberdyne Labs	**www.fiberdyne.com**
GoFoton	www.gofoton.com
Hexatronic	www.hexatronic.com
Knet	www.e-knet.com
Leviton Manufacturing	**www.leviton.com**
Lite Access Technologies	www.liteaccess.com
Maxcell (TVC)	**www.maxcellinnerduct.com/**
Montclair Fiber Optics	www.montclairfiber.com

COMPANY NAME	WEB ADDRESS
Multicom	www.multicominc.com
Multilink	**www.multilinkone.com**
OFS	**www.ofsoptics.com**
Opterna	www.opterna.com
Opti-Com Manufacturing Network	www.opti-com.info/
Pencell Plastics	www.pencell.com
PPC Broadband Fiber	**www.ppc-online.com**
Preformed Line Products	**www.preformed.com**
Primex Manufacturing	www.primexfits.com
Prysmian Group	**www.prysmiangroup.com**
Radiant Communications	www.rccfiber.com
SENKO Advanced Components	www.senko.com
Sumitomo Electric Lightwave	www.sumitomoelectric.com
Superior Essex	**www.SuperiorEssex.com**
Suttle	www.suttlesolutions.com/
Telect	**www.telect.com**
Tellabs	www.tellabs.com
TeraSpan	www.teraspan.com
Thermo Bond	www.thermobond.com
Westell	www.westell.com

of the product line. Each S3 model was redesigned based on customer input to achieve sound reductions, enhanced speed and a simplified design. Privately owned, Vermeer was founded in 1948.

Viavi Solutions

www.viavisolutions.com
408-404-3600

Key Products: Field and lab broadband test equipment, network monitoring systems, network performance monitoring and diagnostic services

Summary: Formed in 2015 when JDSU split into two companies, Viavi Solutions has nearly 100 years of experience in network test and assurance. Viavi provides test, assurance and optimization solutions for broadband communications service providers, cable operators, mobile-service providers, network equipment manufacturers, contractors and enterprises. The company's network optimization and communications test tools for fiber, wireless, virtual and wireline networks are designed to optimize connectivity, quality of experience and profitability.

Viavi offers installation and service meters for all gigabit internet technologies, including GPON, DOCSIS 3.1, HFC, G.fast and Wi-Fi. The company claims numerous firsts in this category, such as the industry's first 400G test platform, and it works with the world's top broadband service providers. This year, Viavi was recognized as the global market leader in fiber optic test equipment by Frost & Sullivan for the sixth consecutive year and was named Outstanding Test and Measurement Vendor at the Leading Lights Awards. For fiscal 2016, which ended July 2, 2016, Viavi reported net revenue of $906.3 million. Viavi is based in Milpitas, California.

Walker and Associates

www.walkerfirst.com
800-925-5371

Key Products: Products and services for deploying communications networks

Summary: Walker and Associates is a national distributor of network products for broadband providers, including wireline, wireless, CATV, government and enterprise network operators. Its range of products from more than 300 suppliers facilitates carriers' delivery of high-speed internet, video, data and voice services to residential, business and mobile users. Walker supports technologies such as switching, routing, Wi-Fi, microwave, NFV, Carrier Ethernet, VoIP, WDM, ROADM, packet optical networking, SDN, GPON, active Ethernet, fixed wireless, DSL and more. Products include fiber and copper connectivity, power systems, indoor and outdoor enclosures and outside-plant products. Walker's certified product engineering, kitting, testing, installation, systems integration and managed services simplify network deployment, and the company helps network designers make product selection decisions for optimum network performance, scale and operating cost. It also performs promotional, logistical and technical support services for manufacturers, reaching 10 telecommunications submarkets and more than 1,200 domestic customers. Last fall, Walker added a West Coast distribution center and expanded its NFV Lab in the North Carolina distribution center. Based in Welcome, North Carolina, with 155 employees, Walker is ISO 9001/2015 quality certified and is a certified Women Owned corporation.

Zyxel Communications Inc.

www.zyxel.com/us
714-632-0882; 800-255-4101

Key Products: Customer-premises equipment and Ethernet switches for FTTH and FTTN networks

Summary: In operation since 1989, Zyxel offers a portfolio of fiber and DSL broadband gateways, home connectivity, entertainment solutions and smart-home devices. Service providers deliver FTTH and FTTN services to homes, buildings and campuses with Zyxel products that include broadband gateways, Wi-Fi routers and media streamers, power line and HPNA adapters, indoor and outdoor WLAN access points, gigabit and 10G Ethernet switches, next-generation UTM security gateways, Wi-Fi hotspots and internet service gateways. Recent product introductions include a gigabit Ethernet wireless gateway, an 11ac access points product line, a family of Layer-2+ gigabit access switches, and cloud managed solutions for business broadband. Zyxel's clients include major service providers and more than 100 independent operating companies throughout North America. Zyxel's worldwide headquarters is in Hsinchu, Taiwan, and its North American headquarters is in Anaheim, California. With 90 employees, Zyxel offers logistical, sales and technical support in the North American market through a local team of professionals. ❖

To nominate an organization for next year's FTTH Top 100, email masha@bbcmag.com.