

Building Fiber-to-the-Home Communities Together



TAP INTO THE MOST VALUABLE BROADBAND RESOURCE AVAILABLE

Fiber-to-the-Home: Basic Questions and Answers

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Q. What is fiber-to-the-home?

- A. Fiber-to-the-home (FTTH) is the delivery of a communications signal over optical fiber from the operator's switching equipment all the way to a home or business, thereby replacing existing copper infrastructure such as telephone wires and coaxial cable. Fiber-to-the-home is a relatively new and fast-growing method of providing vastly higher bandwidth to consumers, and thereby enabling more robust video, internet and voice services.

Q. What is the Fiber-to-the-Home Council?

- A. The Fiber-to-the-Home Council is a non-profit organization consisting of companies, organizations and municipalities engaged in advancing FTTH solutions. Our members are manufacturers who build equipment used in FTTH deployments, residential developers that install fiber in their housing developments, public utilities and local governments that have built their own FTTH systems, and independent and rural telephone carriers who have gotten into the business of providing fiber-to-the-home. Among the Council's activities are providing ways for our members to share their knowledge and build industry consensus on fiber-to-the-home.

Q. What is optical fiber?

- A. Optical fiber uses light instead of electricity to carry a signal. It is unique because it can carry high bandwidth signals over long distances without degradation. Copper can also carry high bandwidth, but only for a few hundred yards – after which the signal begins to degrade and bandwidth narrows. Optical fiber has been used in communications networks for more than 30 years, mostly to carry traffic from city to city or country to country.



FIBER-TO-THE-HOME: BASIC QUESTIONS AND ANSWERS

Q. Why is fiber optic cable now being connected directly to homes?

A. Connecting homes directly to fiber optic cable enables enormous improvements in the bandwidth that can be provided to consumers. While DSL and cable modems generally provide transmission speeds of up to five megabits per second on the download (and are generally slower when uploading), current fiber optic technology can provide two-way transmission speeds of up to 100 megabits per second. Further, while cable and DSL providers are struggling to squeeze small increments of higher bandwidth out of their technologies, ongoing improvements in fiber optic equipment are constantly increasing available bandwidth without having to change the fiber. That's why fiber networks are said to be "future proof."

Q. Why do we need all that bandwidth? Aren't cable and DSL systems good enough for what most people want to do?

A. If all you want to do is surf web pages, download a few songs, send and receive some photographs, or watch streaming video at current picture quality levels, then the bandwidth provided by today's cable modems and DSL lines is probably good enough. But the world is moving toward vastly higher bandwidth applications. Companies like Netflix, Amazon and Wal Mart are preparing to offer feature-length movies for download. More people are looking to upload their own home movies into emails or web pages. Consumer electronics companies are coming out with devices that connect televisions to the Internet. High-definition video is fast becoming the state-of-the-art – and one high definition movie takes up as much bandwidth as 35,000 web pages. All of these applications – and many others we haven't even dreamed of yet – are going to require much greater bandwidth than what is generally available today, even from so-called "broadband" providers.

Q. But it was only a few years ago that I upgraded from dial-up to DSL. Are you telling me I'm going to have to upgrade again?

A. Think about it. A little more than two years ago, the Internet video service *You Tube* didn't even exist. Today, *You Tube* viewers watch 100 million video clips a day. It was the advance from dial-up to DSL and cable modem that made *You Tube* possible. And now a growing number of Americans are watching their favorite television programs and news and sporting events over the Internet. We have no reason to believe these innovations will stop. This trend will continue into high-definition video, telemedicine, distance learning, telecommuting and many other broadband applications that have thus far been limited only by the amount of high-bandwidth connections into people's homes. Only fiber-to-the-home can deliver the bandwidth we are going to need in the future. Fiber-to-the-home providers are now providing this higher capacity at competitive prices.

Q. Why can't I get these high-bandwidth applications with DSL or cable modem?

A. DSL and cable modem rely on copper wire to deliver signals to your home – and copper can deliver high bandwidth only over very short distances. That's fine if you happen to live a few hundred yards from your provider's switching station, but most people don't. Optical fiber does not have this limitation and thus is able to carry high bandwidth signals over great distances to homes and businesses. Only fiber-to-the-home can deliver the immense bandwidth that the applications of the future will require.

Q. I've heard that wireless technologies like WiFi and WiMAX can deliver the same kind of service as fiber-to-the-home without having to go through the trouble of installing new wires into homes. Is this true?

A. No. Wireless broadband is subject to spectrum availability – the cost of which limits the bandwidth, and hence the applications it can provide. The wireless technologies cannot deliver high definition television – and, in fact, they have trouble delivering standard television. And HDTV is only one of the many high-broadband applications now being developed for our broadband future.



FIBER-TO-THE-HOME: BASIC QUESTIONS AND ANSWERS

Q. What about satellite? Most people have that choice, don't they?

- A. Satellite offers video, of course, but it cannot offer robust broadband Internet service because the subscriber can only download the signal. Upload is normally provided through the subscriber's telephone lines, which limits transmission speeds for user-generated content.

Q. Is fiber-to-the-home service affordable?

- A. Fiber-to-the-home services are being rolled out nationwide at prices that are competitive with video, voice and data services being delivered by incumbent carriers. In places where consumers have previously had little or no choice in their video and Internet services, the addition of a fiber-to-the-home competitor has helped keep prices down and lift service quality.

Q. How many homes are hooked up directly to fiber networks?

- A. As of March 2007, 1.34 million U.S. homes were the number of homes in the U.S. now receiving video, data and voice services over direct fiber optic connections. The number of fiber-to-the-home subscribers has doubled over each of the last two years.

Q. What percentage of internet subscribers are getting their service through fiber-to-the-home systems?

- A. The construction of fiber-to-the-home systems began in earnest only in the last three or four years, and today about 1.2% of households are connected with fiber. Only about half of all U.S. households have any form of broadband connectivity.

Q. Is there a calculated value of having a fiber-connected home?

- A. Yes. A recent study by RVA & Associates, a Tulsa-based consulting firm, surveyed home buyers and developers. It found that fiber-to-the-home adds about \$5,000 to the purchase price of an individual dwelling.

Q. How does the U.S. compare internationally in terms of fiber-to-the-home connections?

- A. Japan is a world leader, with nearly eight million fiber-to-the-home connections. South Korea and many European nations also lead the U.S. in the number of homes connected directly to fiber networks. However, the U.S. now leads all these countries in annual growth in the number of connections.

Q. Where in the U.S. are the fiber-to-the-home subscribers located?

- A. Verizon, the nation's largest provider of fiber-to-the-home service, has wired up nearly 900,000 homes, mostly in the Northeast, mid-Atlantic, Indiana, Florida, Texas and California. More than three dozen municipalities and local public utilities across the U.S. have built their own fiber networks. Many developers of new residential communities are wiring up their new developments with fiber. And many FTTH subscribers across the nation are getting their service from small rural telephone companies, medium-sized telephone service providers, cable companies, and private facilities-based competitive local exchange carriers.



FIBER-TO-THE-HOME: BASIC QUESTIONS AND ANSWERS

Q. But, when it comes right down to it, isn't fiber-to-the-home really just a Verizon activity?

A. While Verizon is the largest provider of fiber-to-the-home services and is making enormous investments in this technology, it is also true that about one-third of all FTTH subscribers (430,000) get their service from municipalities, small rural telephone companies, medium-sized telephone service providers, cable companies and competitive local exchange carriers. In fact, small rural telephone companies are actually leading the way in terms of penetration, with three percent of their combined customer base now connected via fiber-to-the-home.

Q. What are the regulations on fiber-to-the-home? Do companies have to have government approvals to wire up homes and neighborhoods?

A. Yes. Because they typically carry video services and thereby compete directly with incumbent cable television providers, fiber-to-the-home providers normally must comply with state and local regulations governing the cable television industry. Most states leave it to municipalities and/or county governments to issue video franchises. And, while federal law requires local governments to allow competition, in many cases the strictures placed on new entrants are too onerous to enable them to take the financial risk of building a new system. Accordingly, about a dozen states have streamlined their video franchising processes, and it's in these states where the bulk of fiber-to-the-home deployments are occurring. A study we did in Texas showed that, after that state streamlined its video franchising process, video-enable fiber-to-the-home deployments grew eight times faster there than in the rest of the country.

Q. The last time fiber lines were installed in my city, some ten or 12 years ago, the streets were dug up for months. Is that going to happen again as fiber-to-the-home networks are built?

A. The technology for drilling and burying cable has changed a lot over the past decade. Contractors can now use horizontal drilling techniques, where underground conduits are installed at a single entry point and special equipment runs them to their destinations without having to dig open trenches. Sometimes fiber can be put in existing ducts, water pipes, sewers and gas lines. And many network builders use "aerial" fiber that is installed on poles along with existing telephone, electric and cable wiring.

Q. Is fiber-to-the-home primarily a technology for getting high-definition movies on demand?

A. Not at all. While the vastly higher bandwidth and transmission speeds offered by fiber-to-the-home is certainly enabling video providers to offer a wider range of products and services, users of other applications that will benefit as well. Gamers will get access to more powerful multi-player applications. Avenues will open for distance learning and telemedicine. Opportunities for telecommuting and working at home will increase. And, just as Internet applications and solutions have grown more sophisticated with the expansion of available bandwidth thus far, you can be sure that this leap into next-generation broadband will inspire further innovations that we cannot even imagine at this point.