An introduction to

Google fiber

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A short history of Google Fiber

February 2010

Google announces “Think Big With A Gig” challenge, inviting US cities to tell us if they’d want us to build a new, gigabit-speed network in their community.

March 2011

Kansas City, Kan. is chosen from 1,100+ applicants to be the first Google Fiber city.

April 2011

Kansas City, Mo. is added, making Google Fiber available on both sides of the state line.

July 2012

Signups for Google Fiber begin in Kansas City, Kan. and Kansas City, Mo.

November 2012

The first customer is connected to Google Fiber in Kansas City, Kan.

April 2013

Austin, Texas becomes the latest location for Google Fiber.

April 2013

Google Fiber agrees to purchase and upgrade an existing fiber network in Provo, Utah.

Summer 2013

Google Fiber announces expansion into several suburbs of Kansas City.

February 2014

34 cities are invited to explore what it would take to bring fiber to their communities.

December 2014

The first customer is connected to Google Fiber in Austin, Texas.

January 2015

Google Fiber announces expansion into 18 cities across the Atlanta, Charlotte, Nashville, and Raleigh-Durham metro areas.

What is Google Fiber?

Today, when most Americans connect to the Internet from their homes, their signal travels along a local telecommunications infrastructure built mostly of copper cables that run along utility poles or underground. This technology has been around for over 100 years, and it just wasn't built for what we're trying to use it for today.

Fiber-optic cables are much better suited to 21st century communications demands. They are made of glass, and they use lasers to transmit information — close to the speed of light!

This is far better and faster than copper at transmitting information, such as the bits that make up your favorite websites, YouTube videos, video chats, or online games.

So that's where Google Fiber gets its name — we're building thousands of miles of brand new fiber-optic cable, right to people's homes. There's plenty of fiber-optic cable in America already, but very little of it goes directly to people's homes — so this means your Internet signal travels at Autobahn speeds for most of its journey, but then turns onto a dirt road as it gets near your house. Google Fiber aims to change that.

Google Fiber aims to deliver Internet speeds at one gigabit per second. This is up to 100 times faster than the basic broadband speeds currently available in the US.

Fiber-optic cables are often bundled together as they're installed along a network. Since fiber is made of fragile glass, its casing is built to protect it from breaking. A fiber-optic cable often includes (listed from from the outer layer inward): An outer polyurethane jacket, a protective layer (made from a material like kevlar), a plastic coating (in different colors, so technicians can follow the path of each strand), and enclosed in all of these, a glass fiber.

 100 times faster Internet claim is based on the FCC's benchmark for broadband of 4 Mbps download and 1 Mbps upload. FCC's Sixth Broadband Deployment Report, paragraph 11 (2010). Go to Google Fiber Help Center at http://goo.gl/vBzLP for further details.

What is a “gig” or “gigabit”?

Internet speeds are measured in bits per second — i.e. how many bits of data can be passed along the network each second. The more bits that can be passed along each second, the faster the networks — and thus the more you can do with your favorite applications, like watching videos or playing games without a delay. Google Fiber is capable of delivering speeds up to 1 Gig per second (1 Gbps) — that’s up to 1,000 Megabits per second, compared to the average Internet speed in America today which is 11.5 Mbps (Akamai, Q3 2014).

With a gig you can…

- Stop fighting your family members for bandwidth! A gig lets you use multiple devices, all connected to the same network, with minimal lag.
- Purchase and download a digital movie in a little under 2 minutes
- Stream HD video with little to no buffering. In fact, Google Fiber has been at the top of Netflix’s speed rankings each month for over a year. (source: Netflix speed index)

How Google Fiber came about

One day, in the fall of 2009, a group of Googlers was discussing our response to the US government's National Broadband Plan with one of our co-founders, Sergey Brin. While everyone agreed that the government's initiative was important, Sergey asked a very good question — if we think higher broadband speeds are so important, why don't we do something about it ourselves?

So in February 2010, we announced our plans to "think big with a gig" — we offered to build an ultra-high-speed, fiber-to-the-home network that could serve 50,000 to 500,000 people. Our goal was to deliver speeds up to 100 times faster than what most Americans had access to. We asked communities across America to contact us and let us know if they'd be interested in partnering with us to offer this type of service to their residents.

The response was overwhelming. More than 1,100 communities and nearly 200,000 individuals sent in an application and clamored for our attention. In Sarasota, Florida the Mayor jumped into a tank of sharks, and the mayor of Duluth, Minnesota jumped into a frozen Lake Superior. Topeka, Kansas, even changed its name to "Google" for a day.

Google Fiber comes to the Silicon Prairie

In the end, we chose Kansas City, Kansas, and Kansas City, Missouri, as the first locations for Google Fiber. Both cities have great infrastructure and a business-friendly environment. They were cities where we thought abundant high-speed Internet could make a real impact on the community, in economic development and education. Lastly, we had wonderful local government and community leaders to collaborate with — there really was a shared vision for bringing the full potential of this project to life. For example, the mayors created a Bi-State Innovation team — now called KC Digital Drive — which has a playbook for how the cities can take advantage of faster broadband in sectors such as education, workforce development, tourism, and more.

Kansas City Startup Village (KCSV)

One of the very first places where we installed Google Fiber was home to several aspiring entrepreneurs, who were all excited about using gigabit technology to build new web applications. Since November 2012, over two dozen new home-based startups have popped up in areas connected with Google Fiber — and today there is a whole community full of tech developers and entrepreneurs, running on a gig.

"The fact that Google made the decision to make Kansas City its initial market for Google Fiber helped validate Kansas City as a technology town."

— **Jim Lysinger**, VP, North America for BIME Analytics. BIME, a French cloud computing company chose to locate their North American HQ in Kansas City

Why Gigabit Speeds Matter

There is a myth floating around out there that Internet users don't want and can't use more bandwidth. In our experience, that's not true at all — we've seen that there is huge consumer demand for faster Internet speeds because nobody likes to wait on the web.

Unfortunately, many of the things we love to do online (like gaming, watching movies, video chatting) require a lot of bandwidth — which means that, using today's connections, we often get stuck waiting for photos to upload or for that little buffering wheel to go away. Statistics show that these delays are so annoying and disruptive that we walk away from slow-loading sites.

How does speed affect the way we use the web?

80% of people walk away from a video that starts to buffer

(source: TubeMogul)

People will visit a Web site less often if it is slower than a close competitor by more than 250 milliseconds (less than a blink of the eye!)

[source: The New York Times, Feb. 2012]

When Google Maps was rebuilt from the ground up to load much faster, within a matter of weeks people were spending 25% more time on Maps.

(source: Google Maps)

One Kansas City producer told us that when she wants to share big video files with colleagues in Chicago, it's faster for her to just hop on a plane with her computer than it is to upload and share them online.

But gig networks aren't just about meeting today's speed needs. We believe higher Internet speeds will lead to the next chapter of the Internet. Do you remember dial-up? Images loaded line-by-line, websites were made of blocks of text, and simple webpages like Google.com took 10 seconds (or more) to load. Back then, we never could have imagined being able to video chat with a service like Google Hangouts, or watch HD movies. We believe that the next 100x leap in broadband speeds — to gigabit Internet — will lead to innovation we can't imagine today, just like the shift from dial-up to broadband brought us online maps, banking, e-commerce, online video and more.

Access to these faster networks is still limited — but the demand for them is spreading. Over the last few years, cities and counties across America have started to prioritize improving local broadband. Community leaders are realizing that more access to faster broadband is more than just a "nice to have;" it can help to create jobs, drive economic growth, and help businesses succeed on the web, and give local families and students access to online resources.

United States Broadband Stats

11.5
Mbps average connection speed

14th
in the world average connection speed

13%
of connections are fiber (compare to 86% in Japan, 67% in Korea)

61%
of Americans have connections slower than 10Mbps

Sources: Akamai Q3 2014, OECD Broadband Portal

Building Google Fiber

Building a new fiber-optic network is a big job that requires a lot of work before anyone picks up a shovel or climbs a ladder. We think of it in 5 stages.

1 Exploration

First, we work alongside city leaders to explore whether we can bring Google Fiber to their area. This covers some pretty mundane stuff, usually across 3 main topics:

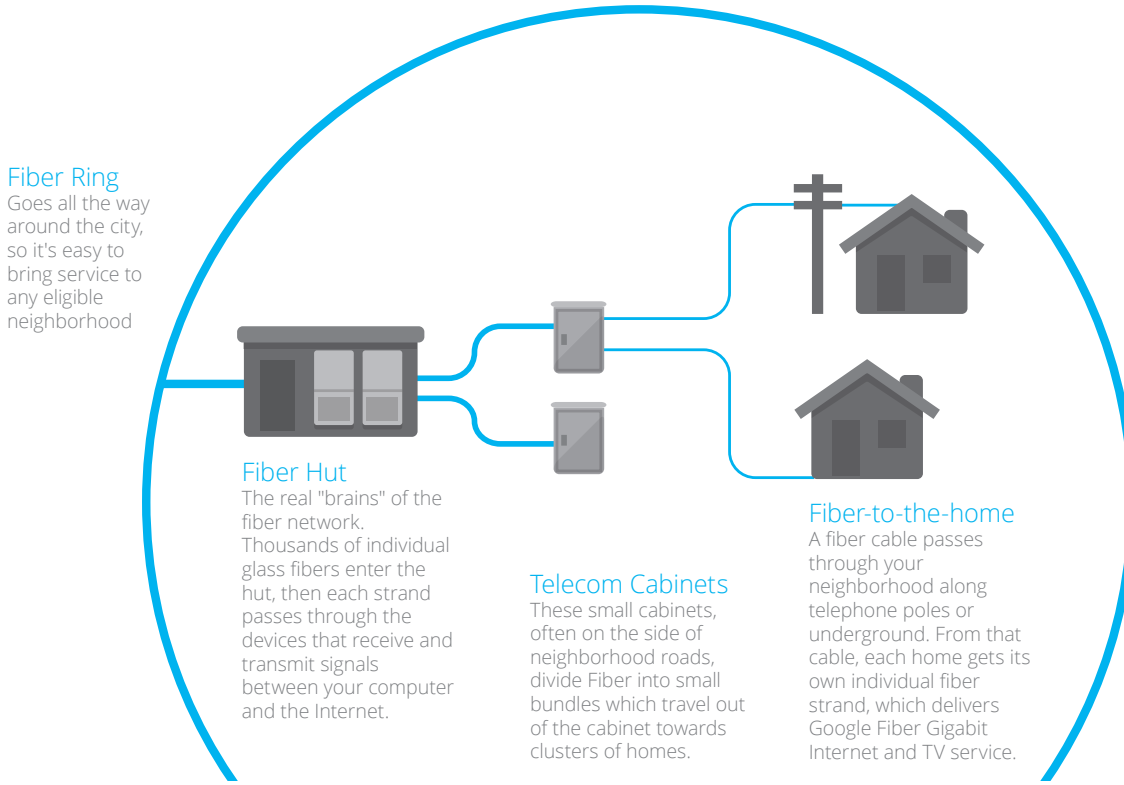
- **Information sharing** — Before we can start designing our network, we need to know where every inch of our fiber will go. We ask cities to provide accurate maps of local infrastructure like utility poles, conduit and existing water, gas and electricity lines so that we know where we can safely build our fiber network.
- **Access to infrastructure** — We work with a city to figure out ways to avoid having to put up duplicate poles or dig up streets.
- **Permit processes** — We'll likely need to submit thousands of construction permits in order to build a network — but many cities have small permitting offices that might not be prepared for that volume of paperwork. We work with cities to figure out how to make this process efficient and predictable.

2 Designing the Network

Then, if we mutually agree to move ahead, we will begin designing the new high-speed network. Every mile of this super-fast network has to be planned and diagrammed—we can't just put it anywhere. We use the data the city shared with

us to create a map of where we can build (such as existing utility poles) and areas we should avoid (like water, sewer, and electric lines). Then, a team of surveyors and engineers hits the street to fill in any missing details.

After that, we design the network, street by street. In general, you can think of it as a hub-and-spoke design:



Every mile of this network has to be planned and diagrammed (imagine planning a network that touches ~30 utility poles per mile, for thousands of miles). We also plan and build backup fiber routes; we want to be ready just in case there's a break in service along any section of our network (it just so happens that squirrels love to chew through fiber lines).

3 Construction begins

With our plan in place, we start the hard work of stringing and laying thousands of miles of brand new, state-of-the-art fiber optic cable. You'll see us on the streets with our boom trucks, boring machines, and rolls of cable.

4 Sign-ups open

Google Fiber is different, and getting it is too. We build the fiber network in areas where people want it. Cities are divided into small communities we call fiberhoods. You can get Fiber if enough people in your fiberhood show interest.

5 Installation at your home

If your fiberhood qualifies for Google Fiber, we'll be in touch to ask you to select a Google Fiber service package. Residents will be able to choose from three different options:

Gigabit Internet
plan will give you an Internet connection that's up to 100 times faster than today's basic broadband.

Gigabit Internet + TV
plan will give you access to hundreds of TV channels, a storage box that can record up to 8 shows at once and hold up to 500 hours of HD content, plus an ultrafast Internet connection.

Basic Internet
plan will give you basic broadband speeds for a one-time installation fee, with no monthly costs for at least 7 years.

After you choose your plan, we'll need to bring a brand new fiber-optic cable directly to the side of your home, and then into your home. This will take two steps.

First we'll let you know that a technician will be installing a network box on the outside of your home — this can be done any time and you don't need to be home unless you want to be. Then we'll schedule an appointment for a technician to come and get your Google Fiber service up and running in your house. Then you're all set!

By the way, if you live in a condo or apartment building ("MDUs," or multiple-dwelling units in industry terms), Google will work with your building's management to make arrangements for installing Google Fiber. Then, just as if you lived in a single family home, you'll choose your package online and arrange to have a Google Fiber technician come and hook up your connection in your unit. You should let your landlord know that you want Google Fiber, and ask them to fill out our landlord interest form at support.google.com/fiber/contact/mdu_interest

Build-by-demand

How do we choose what part of a city will get Google Fiber first? Our approach is to build where people want us.

Fiber optic cable will travel into your neighborhood into boxes called telecom cabinets (see diagram on page 11). One of these cabinets can serve you and a few hundred of your neighbors with Fiber — we call this grouping your “fiberhood”.

That’s where you come in. For us to bring Google Fiber to you — i.e. for us to light up your local telecom cabinet with working Google Fiber service and then for us to bring that service right down the street and up to your house — you and your neighbors first need to tell us you want us. Each fiberhood will have a sign-up goal that you can see on our website by entering your address — and the process is transparent, so you and your neighbors can see how close your fiberhood is to the goal.

After you and your neighbors reach your goal, we’ll be able to bring fiber the last mile (or so) from the cabinet to your home.

Wondering why we do it this way? It’s because we focus our energy on a handful of fiberhoods at once, doing an all-out installation and construction blitz. We do this so we can provide you with better, faster service; we won’t make you wait around for a crew that’s stuck across town. After we’re done in one fiberhood, we’ll move on to the next.

Top FAQS

Where is Google Fiber currently available?

Google Fiber is currently available in Kansas City (Kansas and Missouri) and Provo, Utah, and we recently connected our first customers in Austin, Texas, where we are currently building a Google Fiber network.

Will you expand Google Fiber to other places in the U.S. or internationally?

In 2014, we invited 34 U.S. cities to explore what it would take to bring Fiber to their communities; right now we're working closely with officials in those cities. We're thrilled to share that we'll be bringing Fiber to 18 cities across the Atlanta, Charlotte, Nashville, and Raleigh-Durham metro areas. We are also still exploring bringing Google Fiber to the San Jose, Portland, Phoenix, San Antonio, and Salt Lake City metro areas.

How do you decide which areas in a city will get Fiber?

With Google Fiber, we let local residents decide. Each fiberhood has a goal — a number of homes that need to sign up — that will be posted online for residents to see. After a fiberhood meets their goal, they'll get service!

Do you have an option for small businesses?

Google Fiber for Small Business is currently available in select areas of Kansas City and Austin through an Early Access program. We plan to expand the program to additional areas as we learn and grow. Learn more at google.com/fiber/smallbusiness

Can I get Fiber if I live in an apartment or condo building?

If you live in a condo or apartment building ("MDUs," or multiple-dwelling units in industry terms), Google will work with your building's management to make arrangements for installing Google Fiber. Then, just as if you lived in a single family home, you'll choose your package online and arrange to have a Google Fiber technician come and hook up your connection in your unit. You should let your landlord know that you want Google Fiber, and ask them to fill out our landlord interest form at support.google.com/fiber/contact/mdu_interest

I want Google Fiber in my city — what can I do to get you to come?

The best way to prepare your community for a local fiber network is to (1) develop a vision or a plan for how to improve local broadband access and (2) prepare for a large-scale infrastructure build by following some best practices. There's more information about this at toolkit.ftthcouncil.org

Are there other gig networks in America, or is Google Fiber the only one?

There are over a hundred experimental and consumer gigabit projects in America! Many communities and mayors are pioneering new ways of bringing super high speed Internet to their residents, and "improving broadband" is quickly becoming a priority for cities across the U.S.

Can I call Google Fiber for help or with questions?

Yes! We're available 24/7 at (866) 777-7550.

Links and Resources

Google Fiber Resources

Google Fiber website: www.google.com/fiber

Google Fiber blog (with all of our latest news): www.googlefiberblog.blogspot.com

Landlord or Property Manager interest form:
support.google.com/fiber/contact/mdu_interest

Follow us on social media:

google.com/+GoogleFiber facebook.com/GoogleFiber twitter.com/googlefiber

Third-Party Resources

The Fiber-to-the-Home Council's mission is to accelerate deployment of all-fiber access networks: www.ftthcouncil.org

US Ignite is working with developers who want to build Gigabit-ready digital experiences and applications: www.us-ignite.org

www.gigabit-communities.com has a helpful report for communities who want to help facilitate local private or public broadband construction.

Gig.U is seeking to accelerate the deployment of ultra high-speed networks to leading U.S. universities and their surrounding communities construction: www.gig-u.org

Google fiber

google.com/fiber

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