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Google Fiber

On November 13, 2012, some residents of Kansas City woke up to internet speeds of 700 Mbps. Google Fiber had gone live. After months of fanfare and anticipation, the promise of faster internet had finally come to those lucky enough to live in homes immediately eligible for Google Fiber. For just $70 per month Google Fiber was offering 1 Gbps speeds, which was both cheaper and faster than their competitors. Google Fiber was positioned to put other ISPs to shame, but many questions remained about the viability of the venture over the long-term. Did Google intend for Fiber to be the latest in a number of experiments, or were they committed to bringing blazing internet speeds to Middle America and beyond? What was Google’s strategy? Could Google Fiber be profitable? How scalable was it? How would the competition respond?

Growth of an Internet Giant

Cultivated in the halls of Stanford University, Google spun out from the graduate research of classmates Larry Page and Sergey Brin, who in 1995 developed a new algorithm that indexed web pages. At the time, most internet content was accessed through web portals and basic keyword-driven search engines like Yahoo! and AltaVista, but Page and Brin’s search algorithm differed in that it used inbound links to determine the importance of specific websites. The pair registered the domain google.com in 1997, and the company was incorporated the following year with an initial angel investment of $100,000.

While the company initially ran no advertising and survived on infusions of venture capital and technology licensing fees, Google introduced AdWords (contextual, keyword-based search advertising) in 2000, which steadily became the company’s main source of revenue and promoted the exploration of other forms of advertising. In August 2004, Google issued close to 20 million shares of common stock in its Initial Public Offering and soon after launched a series of free productivity solutions like Gmail, Google Maps and Google Talk, as well as the open-source Android mobile operating system and the Google Chrome internet browser, which attracted users away from competitors. The company further developed its suite of advertising by introducing a display ad network and an ad exchange market, and merged with mobile phone company Motorola in 2011. In 2010, Google launched its semi-secret research facility, Google X, which worked on projects like driverless cars, drones, artificial intelligence, and Google Glass.

Google’s continued introduction of free tools and integration of services around a universal login led to rapid growth and capture of market share. As of February 2012, Google had captured 66% market share of searches in the U.S. In Europe, the figure was over 80%, though in China’s massive market, Google trailed its main competitor at only 16.7%.

Advertising primarily drove Google’s revenue and profits, meaning the company needed to continually grow its user base in order to meet the profit expectations of shareholders. The company had traditionally pursued multiple strategies simultaneously, and this stage was no different. Should
they invest in more products or strategic acquisitions to draw existing internet users away from competitors? Or invest in internet access for underserved populations in order to grow the overall pie? With plenty of cash on hand, Google could do almost anything...as long as it could plausibly lead to growth.

**Fiber Optics to Google Fiber**

*Technology*

Optical fiber is die-casted glass or plastic that is both flexible and transparent. The fiber functions as a guide for light signals transmitted from one end to the other. Scientists in 1966 promoted the idea of using optical fibers as a means of communicating by demonstrating that it was possible to transmit signals over 100 kilometers. VIII Greater refinement in the purity of the fiber material allowed for transmission over even greater distances with almost no loss in data. IX As a medium for transmitting information, optical fiber suffers from much lower attenuation\(^1\) and electromagnetic interference\(^2\) relative to copper wires used in electrical signal transmission. Optical fibers also transmit huge amounts of data relative to electrical signals over copper wire. The amount of information optical fibers are able to transmit makes them ideal for connecting high capacity communication nodes and in network cores. For example, Bell Labs was able to achieve transmission speeds of 100 petabits per second in 2009, which is the equivalent of sending 400 DVDs per second from Chicago to Paris.\(^x\)

*Commercialization*

Fiber-optic communication was first developed for commercial use in the 1970s by researchers at Corning Glass Works. XI They produced optical fibers that were practical for telecommunications due by limiting the loss of data to only 4 dB/km. As the amount of data circulating around the world increased and the speed and efficiency of technology increased, telecommunications companies replaced more copper wire with optical fiber in the 1980s and 1990s.

The dot-com boom saw an explosion in optical fiber networks with telecommunications companies building excess capacity in anticipation of future growth, and attempting to corner the market. In the late 1990s, there was a belief widely held in the market that the amount of internet traffic was going to double every 90 days, which justified the extraordinary expansion of fiber optic networks to support the growing traffic. The exuberance of the dot-com bubble caused companies like UUNet\(^3\) to engage in “a million-dollar-a-day capital expenditure plan to add the bandwidth needed to handle more users and increasing traffic loads.” XII The collapse of the dot-com bubble left large amounts of

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1 Attenuation is the gradual loss intensity of a signal during transmission due to the physical properties of the medium. The loss of light signals in optical fibers is low relative to electrical signals transmitted through copper wires. Glass fiber has a lower attenuation than plastic fiber and is therefore a better medium for long-distance transmission.
2 Electromagnetic interference is the disturbance to electrical signals caused by electromagnetic radiation. Interference can result in the loss or degradation of the information carried by the electrical signal. Electromagnetic interference is caused by any object that carries an electrical current such as electrical power transmission lines.
3 UUNet was acquired by WorldCom in 1996. WorldCom filed for Chapter 11 bankruptcy in 2002 and was acquired by Verizon Communications in 2006.
fiber optic infrastructure unused and selling at a steep discount. As the telecommunications industry has consolidated and the manufacturing cost of optic fiber has shrunk, companies have begun to offer consumer services that utilize fiber optics such as cable television and high-speed internet.

**Google Fiber**

Google Fiber is a fiber-to-the-premises (FTTP) internet and television service. It was announced in February 2010 as an experiment to bring fiber-optic broadband internet services to a small number of U.S. communities. Google promised to bring internet speeds 100 times faster than the American average at a competitive price to 50,000 to 500,000 people. Google framed the endeavor in part as a response to the Federal Communications Commission’s National Broadband Plan, which was released in March 2010 and had the goal of ensuring “every American has access to broadband capability.” Additionally, Google cited in its public policy blog that the U.S. lagged far behind many other countries in Europe and Asia in both broadband speed and availability (see Exhibit 1). Although Google was careful to avoid suggesting that Fiber was the solution to the sorry state of broadband service in the U.S., they suggested that both consumers and developers suffered as a result.

Google’s own vision for Fiber centered around three results of faster broadband internet:

1) Next generation apps that utilize ultra high-speed connections;
2) New deployment techniques on how to build and operate a fiber network;
3) Openness and choice in service providers.

**Demand for Google Fiber**

Google put out a request for information to communities that were interested in Fiber in February 2010. The selection process was competitive with over 1,100 communities submitting applications. Some cities went to great lengths to draw attention to their bid, such as Topeka, Kansas, which temporarily changed its name to “Google”. Google eventually selected Kansas City, Kansas as the sight of its Fiber experiment, having agreed on the terms of the development agreement by March 2011.

**Bridging the Digital Divide**

Google carefully charted out Kansas’ neighborhoods and required each to pass a threshold of residents signing up for it’s service before it would declared the neighborhood a “fiberhood.” Not surprisingly, there was a stark socio-economic divide between first-adopter neighborhoods and those that lagged behind. Google claimed that it was “committed to addressing the digital literacy and relevance problem head on” and deployed a “field team” of 60 employees to raise awareness of their new service in low-income and racially segregated areas.
Fiber Business Model

When Fiber launched in Kansas City, 180 “fiberhoods” were approved to receive the service, which accounted for 89% of residents. Fiber offered three tiers of service:

1. Baseline service provided broadband service at speeds near the national average (5Mbps download and 1Mbps upload) for free, with no cap on data and a one-time installation fee of $300. After the installation fee, which could be paid in installments of $25/month, users could expect to pay nothing for 7 years.
2. The second tier of service guaranteed internet speeds of 1Gbps download and upload with no data restrictions for $70/month and waived the installation fee.
3. The third tier of service provided the same 1Gbps download and upload speeds along with Google’s TV service for $120/month and no installation fee.

“What is Competition?” – Kendrick Lamar

Considering the competitive environment that Google Fiber operates in, it is unique as a strategic play in the telecom space, meant to drive competition amongst the old guard of monopoly ISPs, without the same concern for sustainability in operations. Fiber is playing the role of the antagonist in order to better serve Google’s other businesses and products, and must only be sustainable insofar as it can be viewed as a reasonable alternative to the traditional monopoly ISPs.

This strategy seeks to win in the space of internet service on two fronts, by expanding Google’s market share for internet-based services overall, partly through their competitors’ responses to Google Fiber’s superior product offering, and partly by establishing a new base of customers as an ISP. Therefore, Google needs for Google Fiber to be sustainable only insofar as it remains a viable alternative to the old guard as a means of keeping pressure on the monopolies. Without this pressure as a viable alternative that will eat into the ISPs market share, Google’s strategy would fall apart. Yet Google is also not looking to become dominant as an ISP, but simply to push the envelope of internet speeds and access, in order to further the rest of its business operations.

Google’s strategy towards the competition is highly effective in two ways, allowing Google to win on two fronts. First, by driving competition amongst current ISPs Google can win through the expansion of internet services by its competitors as a response to their fiber offerings (such as increased speeds, more products, and lowering prices, which increases access and potential customers for Google’s own products and services). Second, Google can also win through the creation of its new ISP business model in the telecom space, adding another revenue stream for Google in the future, as well as the ability to offer free Wi-Fi in cities that connect to their fiber infrastructure. However, considering the high costs in developing the infrastructure and the number of barriers to entry for other competitors, Google’s goal of forcing the hand of ISP providers allows them to play on different terms than their competitors. Google is uniquely situated to provide the
capital investment necessary to shock the traditional ISP model; Fiber does not currently need to be a profitable enterprise in order to achieve its goal of ISP competition and expansion.

**Competitive Landscape**

The players in the internet service provider market are gigantic monopoly telecom companies that have grown primarily through the purchasing other companies and assets, and via their monopoly position within their market. The major players in this market are Comcast, Time Warner Cable, CenturyLink, Charter, AT&T, and Verizon (FiOS), with Comcast, AT&T and Verizon also offering fiber optic services, with speeds ranging from 50-75 Mbps on average and a potential for up to 500 Mbps in the case of Verizon. The cost to consumers for such services can vary widely across markets and speed options, which creates an opportunity to exploit price and speed differences within each market. However, barriers to entry are prohibitively high due to the high cost of infrastructure development, maintenance, and upgrades, in addition to legal factors that prevent the sharing of key infrastructure components. In addition, there is an additional cost to consumers for Fiber Optic services with the cost of installation, which is pushed to the end consumer. Google Fiber’s response has been to waive this cost for consumers for a 1-year commitment to the service.

The two primary factors for competitiveness in the ISP market are price and speed. For the end user, accessing the internet is the same experience regardless of the provider, but the speed of the service and the cost per megabit of data are the determining factors. Google Fiber’s service seeks to put severe pressure on the competition through both of these components, by offering free internet access at current national averages (5 Mbps), in addition to offering by far the cheapest option for high speeds ($70 for 1000 Mbps). Furthermore, those speeds of 1000 Mbps are more than double the maximum potential being offered by their closest competitors, such as Comcast, Verizon, or AT&T. Currently, Comcast believes that such speeds are excessive for most people’s needs and therefore do not represent a metric that they must meet.

**Barriers to Entry**

Considering the generally poor reputations of telecom companies and ISP providers in particular, and the amount of variance around ISP speeds and costs for service, there should exist many opportunities for another player to enter the market and to create a competitive position by exploiting one of these components (either speed or price). However, this has historically been prevented due to the very high barriers to entry that prevents competition within the telecom market.

The cost for developing infrastructure and establishing the necessary connections for a viable business model is exceedingly high within the ISP/telecom business. Therefore, any new entrant to the market will need to spend a tremendous amount of capital in order to enter the market. In the case of Google Fiber, Goldman Sachs estimates that the cost of rolling the program out nationally would cost upwards of $140 billion, while Google cash holdings are roughly $45 billion.
Furthermore, legal barriers to entry serve to increase these costs by preventing the sharing of critical communications infrastructure, increasing the cost of development and creating duplication across the telecom system. The history of the telecom industry tells the story of individual firms being granted special permissions that allow for their monopoly status, due to the intensive capital nature of the telecom industry. As it has evolved, several of the key components for delivery of telephone or internet service to a home or premise are owned by one of the large monopoly firms and broadband has been classified differently allowing for them to be kept private. While FCC regulation is often noted as a cause for such restrictions, the most prevalent legal impediment to entry in the ISP market is from local governments and public utilities, including “rights of way” and “pole attachment” contracts with public utilities, which can double the cost of implementation. Other local requirements can include “donated equipment”, free internet for government buildings, or expanding service to low demand areas. Such factors at the local level could slow the rollout of Google Fiber and greatly increase its costs, which could then provide more time for competitors to adjust their models accordingly. Google believes they are in a unique position to take on that challenge.

**Moving the ISP Heard**

The question for Google is how long until the pressure exerted by Fiber is felt by the major ISPs, and will the major ISP providers move to increase their speeds and offerings in order to stop the advancement of Google Fiber? Such a response focuses on the speed component, but is not as likely to deal with the price component, as ISPs hope to hold their current pricing systems relative intact. However, the ability of ISPs to address Google Fiber is limited without further adoptions of Google’s model of subsidized installations, which installs the necessary fiber infrastructure into people’s homes (FTTP).

The big ISP providers, such as Comcast and Time Warner, may be able to offer similar fiber service with a larger immediate reach through their more established infrastructures. However, as the expansion of fiber technology will require a great deal of upgrading and retrofitting across these infrastructures, including running all new lines of cable, these companies will need to incur a great deal of cost in order to meet the standards set by Google. With Google Fiber poised as a legitimate alternative and beginning to expand markets, the old guard of ISPs will need to innovate their offerings and address both speed and price in order to keep from losing market share.

Ultimately, with this Fiber strategy, Google wins whether or not Google Fiber ultimately succeeds. As such, Google’s competitive landscape is larger than that of the ISPs, or mobile telecom providers, or other advertising services. As a massive internet services company, with a great deal of capital to employ, Google, and more specifically Google Fiber, is really only competing with itself as it moves to shock the internet market and push monopoly ISPs towards better product offerings and lower costs, which ultimately serve Google’s ends. What this will do to barriers to entry for the long-term and for small and medium sized companies without Google’s clout remains unclear.
What Alternatives?

Faster internet access in markets already served by Google products could help the business, but the company also recognized that more than two thirds of the globe did not yet have access to internet. Theoretically, the more users Google amassed, the more eyeballs there would be looking at Google-powered advertisements—a multi-billion dollar opportunity, if it worked.\textsuperscript{xxiv} Google X had begun researching internet delivered by balloons floating in the stratosphere in 2011, but the project was still in stealth mode.\textsuperscript{xxv} Competitor Facebook was also working on ways to tap the under-networked markets through minimalist products like Facebook Zero, launched in 2010, and were also assumed to be working on a larger-scale initiative to invest in connectivity infrastructure.\textsuperscript{xxvi}

Was Fiber the right play, or should Google invest in growing the market of Internet users? Could they do both simultaneously? Google had to move quickly and decide where to play in order to stay ahead of its competitors in both developed and developing markets. The strategy they have employed is both bold and indirect in its approach.
Exhibit 1: Global Internet Speeds

<table>
<thead>
<tr>
<th>Country</th>
<th>Q3 09 Mbps</th>
<th>Q2–Q3 Change</th>
<th>YoY Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Global</td>
<td>1.7</td>
<td>18%</td>
<td>13%</td>
</tr>
<tr>
<td>1 South Korea</td>
<td>14.6</td>
<td>29%</td>
<td>16%</td>
</tr>
<tr>
<td>2 Japan</td>
<td>7.9</td>
<td>8.2%</td>
<td>11%</td>
</tr>
<tr>
<td>3 Hong Kong</td>
<td>7.6</td>
<td>10%</td>
<td>13%</td>
</tr>
<tr>
<td>4 Romania</td>
<td>6.2</td>
<td>-0.1%</td>
<td>12%</td>
</tr>
<tr>
<td>5 Sweden</td>
<td>5.7</td>
<td>-5.0%</td>
<td>6.2%</td>
</tr>
<tr>
<td>6 Ireland</td>
<td>5.3</td>
<td>26%</td>
<td>73%</td>
</tr>
<tr>
<td>7 Netherlands</td>
<td>5.2</td>
<td>2.2%</td>
<td>18%</td>
</tr>
<tr>
<td>8 Switzerland</td>
<td>5.0</td>
<td>-</td>
<td>1.0%</td>
</tr>
<tr>
<td>9 Denmark</td>
<td>4.8</td>
<td>1.6%</td>
<td>7.7%</td>
</tr>
<tr>
<td>10 Czech Republic</td>
<td>4.8</td>
<td>-3.1%</td>
<td>23%</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 United States</td>
<td>3.9</td>
<td>1.8%</td>
<td>-2.4%</td>
</tr>
</tbody>
</table>


Sources:

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