

One Million Japanese Customers Now Have Fiber-To-The-Home

Driven by demand rather than by network providers, the FTTH market is adding up to 90,000 subscribers per month — with speeds 100 times faster than in the U.S.

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Author Profile

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Right now, according to numbers released by the Japanese government, there are more than one million fiber-to-the-home (FTTH) customers in Japan — and 80,000 to 90,000 more are added each month. By comparison, the U.S. FTTH market is minuscule and nascent.

Therefore, companies getting an early start in the U.S. FTTH market now have an extraordinary opportunity to capitalize on the lessons offered by the Japanese FTTH experience.

It is important for U.S. FTTH providers now to fully understand the history of FTTH in Japan, and to study both how the Japanese business model is constructed and which lessons from that model can be applied in North America.

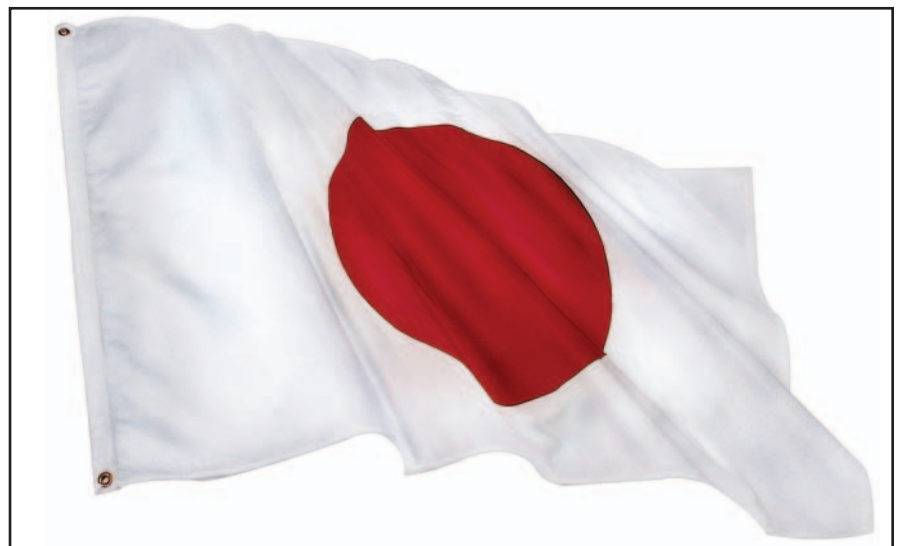
The Competition In Japan

In Japan, FTTH competes against a hugely successful Digital Subscriber Line (DSL) industry that offers data transfer rates in excess of 20 megabits per second (Mbps) downstream to users' computers. Speeds of 40Mbps

downstream and 1Mbps upstream are very common, and DSL services are offered nearly everywhere nationwide. In fact, DSL modems are handed out for free in Japan's subway stations. (Yahoo!BB, a leading DSL service provider in Japan, occasionally places representatives in subway stations to distribute DSL modems to passing commuters.) However, DSL suffers from a perception of being "unfair," because only customers close to the service provider's central office (CO) can get the higher speeds.

To stay competitive, the incumbent telecommunications companies and New Common Carriers or NCCs — the equivalent of U.S. "CLECs" or competitive local exchange carriers (phone companies) — started offering FTTH in late 2001.

Initially it was an expensive, point-to-point service, and FTTH did not really start to succeed until the introduction of low cost passive optical networks, or PONs, in 2002. With the elimination of most installation charges and a lowering of the monthly subscription fee in 2003, FTTH became



cost-competitive with DSL. For a relatively small premium, customers could have 100Mbps bi-directional service (at least 1.5 times faster download and 100 times faster upload than DSL) to their homes, regardless of their distance from the CO. The popularity of FTTH then soared.

In the U.S., customers are happy to get 3Mbps downstream and a few hundred kilobits per second (Kbps) upstream speeds via DSL or cable-modem service. It is easy to imagine that a customer would be willing to pay extra for the 100Mbps speeds offered by the Japanese FTTH model. And, indeed, Verizon recently announced that it plans to test that assertion by offering 20Mbps service on its fledgling FTTH network in Texas.

So, if access speed is driving FTTH deployment in Japan, why are high speeds so much more prevalent in Japan than in the U.S. and what can be done to increase demand for speed in the U.S.? One major reason for higher access speed deployment in Japan is that demand for speed is very much driven by the Japanese consumer, while in the U.S. access technology is driven by the network providers.

In Japan, higher speeds are seen as a status symbol and are demanded by customers. The applications are very much the same as in the US – file transfer, streaming video, large email files, peer-to-peer networks, and gaming to name a few. The network providers in Japan have discovered that offering higher speed access to their customers encourages higher speed applications and content from third party providers.

In Japan, FTTH network providers routinely open their networks to content providers, which offer voice and video services to the customers, to complement high-speed Internet access.

Strong competition in the Japanese broadband market allows customers to choose the company with the fastest speeds and the best pricing, and has driven FTTH network providers to engineer greater capacity and future growth potential to compete against ever-improving DSL technologies.

In the U.S., the only real competition in the broadband market is

between DSL and cable-modem services – two technologies with similar speed capabilities.

It has been interesting to observe the U.S. providers' claims of greater bandwidth – for example, many cable-modem service providers now offer 3Mbps data transfer rates – and the eagerness of at least some American consumers to follow the speed leader. This demonstrates that the American consumer is like the Japanese consumer in his desire for more bandwidth. Here, like in Japan, applications such as VoIP and downloadable video are just starting to capitalize on the greater speeds available with broadband.

FTTH allows network providers to leapfrog the capabilities of both the DSL and cable-modem networks and to offer higher speeds at prices that are comparable to the prices of the competing technologies. The Japanese experience and anecdotal evidence in the U.S. market show that customers here would respond favorably to such an offering.

What Does Triple Play Mean?

In the U.S., "triple play" -- voice, video and data service offerings – is seen as the primary driver for FTTH deployment. Bundling all three services together makes economic sense and generates multiple revenue streams from a variety of customers. Most U.S. network providers assume that triple play includes broadcast video (like cable-TV) and standard telephone service. However, in the Japanese market the drivers are somewhat different.

The Japanese FTTH business model is based on the idea that providing very high speed data pipes into customer homes will generate demand for services. Therefore, it is believed that the network provider can charge service providers to access its network. Plus, in Japan, the large incumbent telephone companies are legally prohibited from broadcasting video in competition with the large incumbent television company. Yet all services – not just broadcast video – are typically handled by third parties in Japanese FTTH networks. These services include Internet access and Internet-based telephone service

(VoIP).

This scheme is very similar to the "wholesale" model being attempted by some U.S. FTTH networks today, and it allows the network provider to concentrate on the area in which it has the most expertise.

In general, cable-TV is less popular in Japan than in the U.S. and is seen as less of a driver for FTTH deployment. This, coupled with the prohibition against broadcast video by the incumbent telephone company, means that the capabilities of the FTTH network to offer cable-TV emulating broadcast video are not implemented in Japan. On the other hand, video-on-demand or VoD service is offered over broadband connections, and is very popular with consumers. In fact, the installation procedures for FTTH in Japan include directions on setting up a home theater around the computer screen or the television and, thanks to the high bandwidth offered by FTTH, the VoD service is near real-time.

NTT-East, the incumbent telephone company in the Tokyo metropolitan area, offers a limited set of free VoD content to FTTH subscribers in certain areas of Tokyo as an incentive to upgrade to FTTH. Many other ISPs and content providers connect to the FTTH network, and pay for the bandwidth they use, as well. High speed access is the source of revenue, not video delivery, Internet connectivity, or VoIP – although all three are drivers for customer demand.

FTTH Network Design in Japan

FTTH networks in Japan are built either as point-to-point networks or as broadband PON (B-PON) networks based on standards established by the International Telecommunications Union (ITU).

In general, the point-to-point home deployments have dwindled to very few while the number of B-PON installations has grown rapidly. According to the G.983 technology standard on which the B-PON networks are built, the networks offer a 156Mbps upstream data transfer rate and a 622Mbps downstream speed, and they are built around a shared optical medi-

um that can be passively split up to 32 times. The signaling on the B-PON is based on an established technology named Asynchronous Transfer Mode, or ATM, which helps to ensure high quality and equal access to all users. In addition, B-PON networks benefit from low equipment and operational costs, and price competition, because of the standardization.

Although the B-PON standard dictates an ATM protocol between the head-end and the end user, there are no requirements on the connections outside of the network.

Therefore, the Japanese network providers dictated to their vendors that all customer and network interfaces on their B-PON equipment use Internet Protocol (IP) and Ethernet-based equipment, which is ubiquitous and significantly less expensive than ATM equipment. Expertise in IP technology and equipment is easier to find, and applications and content for IP services are much more prevalent.

Based on their understanding of the move towards VoIP deployment and IP-based VoD, the Japanese network providers standardized on an IP-based regional network. In fact, the incumbents have declared that even their legacy voice network will migrate to VoIP in the near future, eventually providing an end-to-end IP solution for all customers.

Voice and access networks in the U.S., especially among the incumbents, are much larger, much older, and therefore much more prone to inertia than their Japanese counterparts. Although recent announcements from several incumbents indicate their desire to move to an IP network for their voice traffic, the access networks are still dominated by legacy equipment that requires a dedicated connection between end-points using a technology known as Time Division Multiplexing, or TDM, as well as ATM.

This complexity makes it much more expensive for large network operators to install an FTTH network here, which is another reason for the slow rollout of FTTH by the largest U.S. network providers.

However, smaller U.S. companies and municipalities are not burdened by the demands of a huge network, and that is why the FTTH revolution in the U.S. has started locally with municipalities and small independent telephone companies.

The Japanese FTTH Business Model

The monthly fee for FTTH service in Japan is typically around \$41 for residential 100Mbps PON service. Of the \$41 customer fee, about \$2 is the cost of maintaining indoor wiring, \$18 is the cost of maintaining the outside line, \$9 is the cost of the IP network, and \$7 pays for other of the network provider's business expenses. The remaining \$4 to \$5, or about 11 percent of the monthly fee, is profit.

The reported costs are conservative estimates and profit may be even greater. This business model thus provides a profit stream in excess of \$4 million a month (based on one million users) to Japanese FTTH providers.

Since Japanese FTTH networks are centered on the philosophy that high-speed access drives all business, "tiered" services are not generally offered to FTTH customers – at least not in the sense that the term, is understood in the U.S. Rather, the telephone companies and NCCs offer lower-speed access via DSL and high-speed access via fiber. Everyone who orders a fiber connection gets the same 100Mbps bi-directional access speed.

Businesses that are willing to pay more can get a dedicated fiber service to guarantee the 100Mbps transmission speed. However, even B-PON subscribers who must share the transmission medium achieve 70 percent to 80 percent of the 100Mbps peak rate on average – even though the 32 users often share a single bandwidth-limited 100Mbps connection to the regional network.

Japanese network engineers take full advantage of the statistical nature of IP to avoid overbuilding their networks while still providing the customers with the feeling of a full-speed network.

This allows a very efficient and low-cost network design that can recover costs quickly, even without providing services directly.

Lessons Learned

There are obvious differences between the U.S. and Japan that have yielded Japan's phenomenal success with FTTH. Population density, competition in the high-speed network market, consumer demand, network operator agility, network size, and cultural attitudes towards video and other services all have helped to accelerate Japanese deployment of FTTH.

However, the success of the FTTH business in Japan can still offer valuable lessons to U.S. network providers.

The decision of Japanese network providers to leapfrog DSL by going immediately to fiber has generated a demand for higher and higher speeds, and has allowed the incumbents to compete in the cut-throat broadband market.

Japanese providers' concentration on their areas of expertise (what is called a "wholesale model" in the U.S.) has allowed them to keep costs low. While this may not yet be the correct model for the U.S. (the content providers aren't ready yet, in many cases), it serves as an instructional model for the maturing U.S. FTTH market.

Conclusion

Finally, the way in which the Japanese network designers built their networks based on the applications that they wanted to offer – such as VoIP or IP-based VoD – is a perfect example for anyone who is planning the way an FTTH network will be used here.

U.S. network designers would be well served to follow that model and think holistically about their entire network and services plan.

If nothing else, the success of FTTH deployments in Japan should help drive down the cost of equipment for U.S. network providers, by generating the cost savings inherent in high production volumes. This alone could help to spark the U.S.

FTTH revolution that is so greatly anticipated by many of us in the broadband business. ♦