



Tokyo Electric Power:

# Japan's FTTH Powerhouse

TEPCO goes open-access, but also offers its own content and novel services

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Mention advanced telecommunications and Japan in the same breath and NTT is probably the name that comes to mind, not Tokyo Electric Power Company. But TEPCO, one of the world's largest power utility companies, has quietly become a powerhouse in Japan's FTTH marketplace and implemented a business model that should be studied by overbuilders around the globe.

TEPCO now wholesales its open-access fiber to 16 ISP's offering 100 Mbps symmetric broadband. Japan has, of course, been a leader in fiber deployment, starting with the eJapan initiative in 2002. The country is on target to meet

a national goal of 10 million FTTH users by the end of 2006. Passing the baton from DSL to fiber, Japan's most recent government data shows DSL growing at 6 percent annually while FTTH is growing at 16 percent. FTTH service providers are adding almost 100,000 new subscribers per month to a market that now boasts over two million subscribers. To put this in perspective, Render Vanderlice estimates for the North American fiber picture suggested less than 150,000 fiber subscribers as of September 2004 (*Broadband Properties*, December).










### The Business Model

On the surface, TEPCO is not unlike any large power utility that has leveraged

the advantages of the fiber network it built to support internal communication needs. Power system protection, substation control and other requirements led TEPCO to create a 73,000-km fiber optic network. Utility deregulation sparked TEPCO's desire to diversify and leverage its core competencies inside high-growth businesses such as telecommunications.

TEPCO's communication services began in October 1999 as an effort to use excess network capacity via the dark fiber leasing business. That continues to be a core segment. As of March 2004, TEPCO was leasing 13,000 fiber kilometers to a portfolio of 39 customers including Japan's largest carriers and cable television operators.



ISPs									
Monthly Charge for Internet Service	\$57.00	\$57.00	\$57.00	\$57.00	\$55.00	\$64.00	\$55.00	\$65.00	\$63.00
Monthly Rental Fee for Media Converter	\$9.00	\$9.00	\$9.00	\$9.00	\$9.00	\$9.00	\$9.00	\$9.00	\$9.00
Total Monthly Charge	\$66.00	\$66.00	\$66.00	\$66.00	\$64.00	\$73.00	\$64.00	\$74.00	\$72.00

ISP's and 100 Mbps pricing available on the TEPCO Hikari Network as of February 2005. Prices do not include any installation fees, which vary by service provider.

*Monthly fees in Japan tend to be higher than in the US, but users get much more bandwidth; note the high monthly equipment rental fee.*





*Customer sees this Fujikura FNT 3011 Media Converter CPE – single fiber input, single RJ45 10/100 BaseT output port.*

It didn't take long for TEPCO's vision to extend into the last mile. After all, the last mile is where TEPCO's 28 million electric customers are located. The desire to build a FTTH network gave birth to the TEPCO Hikari network – the centerpiece of TEPCO's communication business portfolio. Hikari means "light" in Japanese and moving photons is the primary business. The initial 100 Mbps service was launched in March 2002 and is on track by 2005 to pass eight million homes.

TEPCO has adopted a "wholesale" open-access business model. This is a company that builds and manages the infrastructure, but lets ISPs and other providers ride the network and handle the retail transaction with customers. In Japan, this approach provides subscribers with an amazing variety of choices for ISP and content providers, which in turn improves the competitiveness of the network and drives all-important

market share. Japanese consumers enjoy the world's lowest monthly fee for each Mbps of bandwidth. Regardless of which ISP the customer selects, TEPCO wins; service provider fees offset capital costs to expand the network. As the take rate increases, TEPCO retains the core asset, a fiber optic bandwidth pipe connected to homes and business.

### **Network Architecture and Technology**

TEPCO leverages the advantages of an Ethernet point-to-point network to support most of the Hikari network. Neighborhood substations are generally the "POP" (point-of-presence) locations and define the handoff between TEPCO's core network and the FTTH access network. From these locations, the network radiates to several network "drop points," typically within 50 to 250 feet of a potential subscriber. TEPCO uses market studies to determine when a specific area is ready for network deploy-

ment. TEPCO's aggressive marketing campaigns, and those of its ISP partners, help recruit new subscribers. Drop cables are installed on demand, as customers request service. Typically, trunk and feeder cable installation is handled by TEPCO, while TEPCO-approved contractors support drop cable and customer premise equipment installation.

In many instances, the POP location is home to Fujikura's FNT3824 Ethernet Concentrator. Fujikura's solution was chosen primarily because of its layer two simplicity, scalability, and cost-effectiveness. In Japan, space is at a premium. Each concentrator occupies only one RU (1.5") of vertical rack space, and supports up to 24 individual 100 Mbps links (see Figure 3).

The Fujikura FNT 3011 media converter supports the subscriber side of the network. The media converter on the customer's premise is a compact, indoor-only device that has one single-mode fiber input and an RJ-45 Ethernet output. In many situations the drop cable extends directly into the CPE, which includes a clever fiber management tray accommodating either a mechanical or fusion splice.

The Fujikura solution is compatible with traditional fiber interconnect solutions such as SC-UPC connectors, avoiding an upgrade to angle polish connectors required by legacy video services.

Fiber-to-the-subscriber is only one part of TEPCO's deployment plan. Within high-rise multiple dwelling unit buildings (MDUs), TEPCO deploys "fiber-to-the-basement" and then supports the subscribers via VDSL over existing copper connections. While this solution does not provide the same bandwidth as a direct fiber connection, users enjoy "best effort" service that provides download speeds as high as 54 MB.

### **The Consumer Experience**

A typical customer has several op-





tions when selecting service offered over TEPCO's Hikari network. Currently, TEPCO Hikari's website (<http://www.tepco.ne.jp/>) features links to sixteen individual ISPs, each offering an array of packages and pricing plans (see Chart 2 for some examples). Service fees for 100 Mbps start at \$56 per month, excluding CPE rental charges.

One ISP, Asahi Net ([www.asahi-net.or.jp/en/tepco.com](http://www.asahi-net.or.jp/en/tepco.com)), includes detailed English-language FAQs, including how to determine if a specific address is within the service territory and how to initiate a request for service. Asahi Net lists a number of factors that determine if FTTH service can be supported to a specific residence (location near the network, cable ingress, appropriate property

owner permissions, and so forth). Once that gateway is passed, the timeline from application to service turn-up can take up to 30 days or longer, depending on the location of the network access point.

At the beginning of a new service agreement, various "initiation" fees are collected. Fees offset the cost of drop cable and CPE installation, and range from less than \$30 to over \$100, depending upon the specifics. However, in many cases, the start-up fees are waived as part of marketing campaigns designed to attract new subscribers. For example, TEPCO recently ran a "triple zero" promotion that offered zero cost for installation, zero cost for CPE, and zero cost for the initial three months of service. Most ISP service agreements require a

6-month contract to avoid penalties for early termination.

Japan's residential FTTH service is typically "best effort" and does not establish a guaranteed level of service. However, a peek inside some of the FTTH chat rooms reveals that customers are experiencing real-world bandwidth tests of 80 Mbps – speeds that exceed the capability of most servers to provide information on the Web.

### Beyond Wholesale

Subscribers arrive for speed, but they stay for content – and a 100 Mbps pipe can support staggering amounts of content. TEPCO realizes this and see a large opportunity to participate in the content side of the business, particularly for next




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Fujikura FNT 3824 Ethernet Concentrator has 24 ports (each 100 Mbps), Gigabit Ethernet uplinks, 15-20 km range.

generation IP services such as gaming and IP video.

TEPCO's communications portfolio includes several companies that contribute content. Examples include casTY Incorporated, a joint venture with Yoshimoto Kogyo (www.yoshimoto.co.jp), a leading live-entertainment and television production company. Beyond the acquisition of existing broadband content, casTY is also involved in the development of next-generation services and the critical business of copyright and digital rights management.

PoweredCom (www.poweredcom.net) is another TEPCO affiliate company that is providing solutions for leveraging capacity in a FTTH network. PoweredCom broke new ground last November with the announcement of the world's first video distribution service using subscriber-based DVD recorders. In essence, FTTH subscribers download movie and music content directly to DVD-RAM discs via in-house recorders. Content is available for purchase or one-time view-

ing during a defined time period. The service began as a trial and offers 300 titles, mainly movie and Japanese animation video content, from 19 content providers around the globe.

The system, marketed as "Hikari de DVD" brings together the expertise of three companies – Toshiba, PoweredCom and TEPCO. Toshiba developed the system's digital rights management and DVD system. The system trial will run until March 31, at which time the companies will determine the next steps toward commercial service (see figure).

**At the Speed of Light**

TEPCO's Hikari network is on target to exceed one million subscribers by 2008, and has raised the bar on what is possible for a network overbuilder. By creating a FTTH network that can achieve cost-recovery on currently available IP content, the firm has built a sustainable business model that sidesteps the incumbents -- all the while recognizing that the end game is accessing and

developing the next generation content and services that will fill the pipe. That's moving at the speed of light. ♦

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**TEPCO affiliate companies within the Information and Communication business.**

PoweredCom Incorporated  
A telecommunications business offering telephone and IP services using a primarily optical-fiber network.

Japan Digital Serve Corporation  
Digital broadcast delivery, broadband programming delivery.

AT Tokyo Corporation  
Data center operation.

Japan e-Market Co., Ltd  
e-Marketplace operation.

Japan Cablenet Holding Limited  
Management of cable TV companies.

CASTY Inc.  
FTTH broadband programming delivery.

Fiber optic network company  
FTTH business, core wire leasing business, fixed wireless access (FWA) business.

TEPCO UQuest  
Development of embedded software.

