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# FTTX AS A SOLUTION FOR SUBSCRIBER'S ACCESS NETWORKS

**Voronin Roman**
*Institute of Telecommunication Systems (ITS)*
*National Technical University of Ukraine "Kyiv Polytechnic Institute"*
*E-mail: roma.voronin88@gmail.com*

## FTTX як рішення для абонентських мереж доступу

*Анотація* - В даній роботі наведено короткий аналіз технології FTTx. Дана волоконно-оптична технологія використовується в мережах абонентського доступу і дозволяє при низьких експлуатаційних витратах здійснювати прийом та передачу інформації абонентами на швидкостях до 40 Гбіт/с.

This article shows a brief analysis of FTTx technology. This fiber optic technology is used in subscriber's access networks and allows performing reception and transmission of information for subscribers with speeds up to 40 Gbit/s with low operating costs.

As the demand for data rates and channel capacity is growing steadily, service providers using cable lines recognize that traditional copper cables can no longer meet the expectations of users. Optical fiber transmission, already presents on many long haul routes, is to be used. However, given typical costs of some $2,000 per subscriber to deliver fiber to the home, the high cost and long payback period make this commercially unviable [1].

Would not it be great if we could find a way to provide the benefits of fiber to the majority of customers without incurring such high costs?

FTTx is a family of solutions that solves this dilemma and balances the high cost of fiber deployment with the market price of the service delivered. FTTx is a general term describing where some part of the local copper access wiring is replaced by fiber. This includes FTTC (Fiber to the Cabinet), FTTB (Fiber to the Building) and FTTH (Fiber to the Home). Typically, a short run of wire remains for each customer – a few tens or hundreds of meters – consolidated in a street side or basement cabinet where the fiber terminates. The shortened length of wire, far less than the kilometers common in many DSL deployments, means that rates of 40Mbit/s to 10Gbit/s (FTTH) are easily achievable with low contention from other users [2].

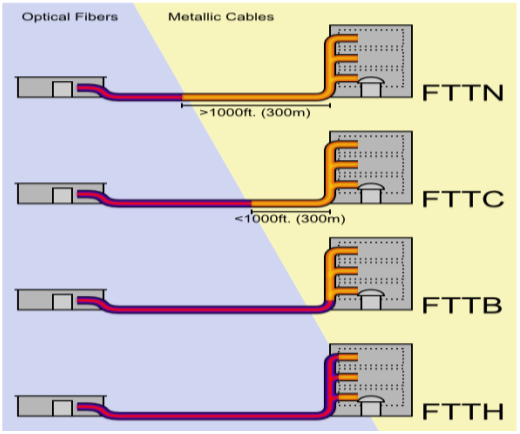


Figure 1. Overview of FTTx solutions

Some countries are making substantial investments in a common nationwide FTTx infrastructure. In many other countries, you can find individual service providers rolling out their own upgrades. It is clear that this architecture is both popular and commercially viable, with growing worldwide adoption [3].

**Architecture.** There is one obstacle that prevents the fiber-optic services being directly implemented in the residential sector and to small businesses - a high cost of connecting each subscriber to the central node. Such a huge number of connections such as "point to point" would require a large number of active components, fiber optic cables and thus would have prohibitive cost of construction and operation.

FTTx architecture offers an attractive solution to these problems. With FTTx passive optical network (PON) allows multiple subscribers to share a single connection without using active components (i.e., components that create or convert radiation using opto-electro-optical conversions) [3].

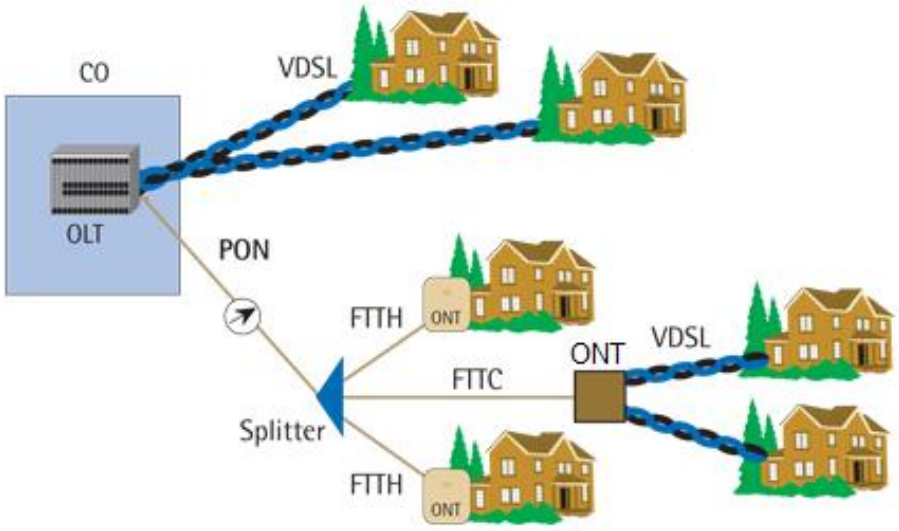


Figure 2. FTTx architecture in common with DSL (VDSL)

Main fiber optic line is placed between the optical line terminal, located at the central node and fiber hub switchgear located near a group of people (see Fig.2). At this point, passive splitter is used to connect up to 32 subscribers to one main fiber. Then each subscriber is provided with optical network terminals (ONT), which are connected to the branches of the splitter. This architecture ("point - a lot of points") significantly reduces the cost of construction, management and operation [4].

**Services.** FTTx technology allows subscribers to use such modern facilities and high-speed services: Internet, corporate users data, private line, Frame Relay, connection to the ATM, interactive games, security systems and monitoring, telephone (one or more lines), analog and digital TV, high definition television image (HDTV) and others [4].

**Planning the build-out of FTTx.** The transition to FTTx offers the wire line service provider an ideal opportunity to introduce modern and efficient OSS planning and design tools. Each duct, new fiber and termination point can be planned, designed and validated during the build process.

The scale of the task should not be underestimated. Some very large investments are required to upgrade access to millions of customers, enabling a wide range of new services. Planning tools which combine knowledge of the physical

ducting, cabling and equipment with the customer premises served are essential to ensure efficient and effective deployment. Although such systems can be retro-fitted, there are obvious benefits by using such tools from the outset [5].

**FTTx benefits.** Promotion of new modern services is the only way to be a leader in a very competitive telecommunication market.

One of the most common reasons for the reluctance of investors to invest in the development of FTTx is a "lack of demand". But it is natural that consumers are unable to demonstrate demand for the services they do not know. However, the research has shown that FTTx subscribers use 3-5 times more bandwidth (upload and aggregate distribution) than users ADSL.

An additional benefit to providers is that FTTx networks have lower operating costs (OPEX) than existing copper or coaxial cable networks.

• FTTH Networks consume less power, by some estimates, 20 times than VDSL;

• Full automation and control software simplifies maintenance of the network, so you need less staff;

• Reduced maintenance costs, as there is no active equipment, and optical network elements are extremely robust;

• Optical fibers are not susceptible to electromagnetic interference, which is causing disruptions in the copper networks;

• Lifetime of fiber optic cable is up to 30 years;

• The fiber has almost unlimited bandwidth [6].

Traditional operators are generally sluggish, aware of the inevitable transition to optical networks and FTTH deployment plan in the coming years. Operators and providers of cable television will have to switch completely to optics. FTTH Networks generate significant social, environmental and economic improvement. Many countries have moved to this technology over the last decade. For the government, local authorities and government organizations, these benefits can be a serious argument for the development of optical networks [7].

## References


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