FTTH Council - Definition of Terms

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INTRODUCTION

The mission of all the FTTH Councils in North America, Europe and Asia-Pac includes the communication to stakeholders in our respective regions of the extent of usage of FTTH throughout the world and forecasting the growth of FTTH.

This task has been made difficult by the proliferation of terms and acronyms while no doubt useful to individual organizations for their specific purposes, lack precise definitions.

This is of particular concern when different research organizations choose their own definitions when conducting research. As a consequence it becomes impossible to compare the research on FTTH between different regions, or between different studies of the same region.

This document defines the terms used by all the FTTH Council's (North-America, Europe, Asia-Pacific). To promote consistency when commissioning or commenting on research the Councils' members will confine themselves to those terms defined in this document.

This document specifically aims to reduce the terms used to a subset that are well defined, adequate and useful.

THE TERMS

Fiber-to-the-Home[1] (FTTH)

"Fiber to the Home" is defined as a communications architecture in which the final connection to the subscriber's premises is Optical Fiber.

The fiber optic communications path is terminated on or in the premise for the purpose of carrying communications to a single subscriber.

In order to be classified as FTTH, the access fiber must cross the subscriber's premises boundary and terminate

- inside the premises, or
- on an external wall of the subscriber's premises, or
- not more than 2m from an external wall of the subscriber's premises.

FTTH services may deliver just one application, but generally deliver several such as data, voice and video.

This FTTH definition excludes architectures where the optical fiber terminates in public or private space before reaching the premises and where the access path

[1] Important note: This document uses the American English spelling "fiber". The FTTH-Council Europe uses the British English spelling "fibre" in their communication. This is seen to be the same.

continues to the subscriber over a physical medium other than optical fiber (for example copper loops, power cables, wireless and/or coax).

Fiber-to-the-Building (FTTB)

"Fiber to the Building" is defined as a communications architecture in which the final connection to the subscriber's premises is a communication medium other than fiber.

The fiber communications path is terminated on the premises for the purpose of carrying communications for a single building with potentially multiple subscribers.

It is implicit that in order to be classified as FTTB, the fiber must at least

- enter the building, or
- terminate on an external wall of the building, or
- terminate no more than 2m from an external wall of the building, or
- enter at least one building within a cluster of buildings on the same property, or
- terminate on an external wall of one building within a cluster of buildings on the same property, or
- terminate no more than 2m from an external wall of one building within a cluster of buildings on the same property.

FTTB services may deliver just one application, but generally deliver several such as data, voice and video.[2]

This FTTB definition excludes architectures where the optical fiber cable terminates in public space more than 2m from an external wall of one building (for example an operator's street-side cabinet) and where the access path continues to the subscriber over a physical medium other than optical fiber (for example copper loops, power cables, wireless and/or coax).

Communictaions Architecture

The cable plant which connects the operators' premises and subscribers' premises can be deployed in the following different topologies:

[2] FTTB construction is a transitional form commonly used as a means to deliver services to existing buildings in conjunction with associated FTTH construction (for example for new buildings). By introducing fiber cables from the fiber termination point to the premises FTTB can be subsequently converted to full FTTH. Such a conversion is desirable as FTTH provides better capacity and longevity than FTTB.

"Point-to-Point" (P2P, Pt-Pt, or PtP) cable plant provides optical fiber paths from a communication node to a single premises such that the optical paths are dedicated to traffic to and from this single location. (Uninterrupted single fiber from last communication switching equipment-point to the premises.)[3]

"Point-to-Multipoint" (P2MP) cable plant provides branching optical fiber paths from a communication node to more than one premises such that a portion of the optical paths are shared by traffic to and from multiple premises. In generic terms this is a tree topology.[4]

"Ring" cable plant provides a sequence of optical fiber paths in a closed loop that connects a series of more than one communication node.

Note that from these definitions it is not possible to identify the access protocol used over the cable plant.

It is possible for a network to be built so that a common cable plant can include a mix of different architectures, or be re-configured over time to support different architectures, to allow for mixed user categories, to allow access diversity for reliability, and for future flexibility and network longevity.

Definition: Premises, Subscriber

"**Premises**" is defined as the subscriber's home or place of business. In a multi dwelling unit[5] each apartment is therefore counted as one premises.

"**Subscriber**" is a premises that is connected to a FTTH/B-network and uses at least one service on this connection under a commercial contract.

Network Size

The size of FTTH/FTTB Networks is described in the following terms:

The number of **"Homes Passed"** is the potential number of premises to which an operator has capability to connect in a service area, but the premises may or may not be connected to the network.[6]

This definition excludes premises that cannot be connected without further installation of substantial cable plant such as feeder and distribution cables (fiber) to reach the area in which a potential new subscriber is located.

[3] the abbreviaton P2P is sometimes also used to describe peer-to-peer-networks, e.g. to exchange files over the internet. This P2P is not connected to the point-to-point definition in this document.
[4] P2MP is often referred as "Passive Optical Network" (PON), whereby the path from the active or powered communication node to the terminating fiber location has no active or powered elements.
[5] multi-tenanted unit in some countries
[6] Typically new service activation will require the installation and/or connection of a drop cable from the homes passed point (e.g. fiber-pedestal, handhole, chamber, utility-pole) to the premises, and the installation of subscriber premises equipment, including an ONT (Optical Network Termination) device at the premises.

The number of **"Homes Connected"** is the number of premises which are connected to an FTTH/FTTB-network.

With respect to a particular network, either FTTH or FTTB, the following three definitions are measures of network utilization and calculated as follows:

The "**Penetration Rate**" - "Homes Connected" divided by the number of premises in a served area.

The **"Take Rate"** - "Subscribers" divided by "Homes Connected" .[7]

The **"Connect Rate"** - "Homes Connected" divided by "Homes Passed"

CONCLUSION

The intention of this document is to make it possible for Council Members and the FTTH industry to speak a common language when discussing FTTH statistics and network characteristics.

No doubt Council members and other stakeholders will feel the need to use a wide range of terms for technical solutions, concepts, and models. This document does not discourage this activity, as it is inherent in the free flow of communication on which our industry thrives.

However to be successful, the terms defined in this document must be used frequently and consistently. Thus all Council Members and other stakeholders such as operators, analysts, journalists, and government and regulatory staff are encouraged to use these terms as the well-defined vocabulary that underpins the more general expressions.

With regards to Market Research however, in order for research by different organisations conducted in the same or different regions to be meaningfully compared, it is essential that these terms are used and no others.

[7] It is expressed as a percentage. "Take rates" can be based on each type of service, for example, data take rates, video take rates, and voice take rates, or triple/quadruple services take rates

BACKUP DEFINITIONS

Access Protocol

Access Protocols are the methods of communication used by the equipment located at the ends of the optical paths to ensure reliable and effective transmission and reception of information over the optical paths. These protocols are defined in detail by the standards organisations that have created them, and are recognized and implemented by manufacturers around the world.

The Access Protocols in use today for FTTH Networks and the optical portion of FTTB Networks are:

"EFM" defined as Ethernet in the First Mile in IEEE 802.3ah

"EP2P" defined as Ethernet over P2P in IEEE 802.3ah

"EPON" defined as Ethernet PON in IEEE802.3ah (Note that the expression Gigabit EPON is synonymous with EPON.)

"BPON" defined as Broadband PON in ITU-T Recommendation G.983

"GPON" defined as Gigabit PON in ITU-T Recommendation G.984

"OTHER" access protocols such as proprietary or pre-standard access protocols may be noted for the purpose of completeness in research.

Where a Passive Optical Network (PON) is defined as a point-to-multipoint, fiber to the premises network architecture in which unpowered optical splitters are used to enable a single optical fiber to serve multiple premises, typically 32-128. A PON consists of an Optical Line Terminal (OLT) at the service pronvider's central office and a number of Optical Network Terminals (ONTs) also called Optical Network Units (ONUs) at the premises

Network Usage

FTTH/FTTB Networks may be dedicated to the services of a single retail service provider, or made available to many retail service providers, who may connect to the network at the packet, wavelength or physical layer.

"Exclusive Access" refers to the situation where a single retail service provider (who may or may not be the network operator) has exclusive use of the FTTH network.

"Open Access (Packet)" refers to the situation where multiple retail service providers may use the FTTH Network on an equable base by connecting at a packet layer interface and compete to offer their services to end users.

"Open Access (Wavelength)" refers to the situation where multiple retail or wholesale service providers may use the FTTH Network on an equable base by connecting at a wavelength layer interface and compete to offer their services.

"Open Access (Fiber)" refers to the situation where multiple retail or wholesale service providers may use the infrastructure by connecting at a physical layer ("dark" fiber) interface and compete to offer their services.

"Open Access (Duct)" refers to the situation where multiple retail or wholesale service providers may share the use of infrastructure covering a substantial region by drawing or blowing their fiber cables through the shared ducts, and compete to offer their services.

Services

FTTH/FTTB Networks are used to deliver the following services.

"Internet/Data" refers to use of the Public Internet for exchanging email, web-browsing, etc..

"Voice" refers to the exchange of human bi-directional, real time, full-duplex conversations by use of **"IP"** or **"Other"** encoding and transport protocols. (This category does not include Voice carried over the Public Internet.)

"Video" refers to the exchange of visual material by use of **"IP" (IPTV), "RF"** (carried via a separate optical wavelength, overlay video) or **"Other"** encoding and transport protocols. (This category does not include Video carried over the Public Internet.)

Applications other than those listed above are categorized as **"Other"**.