FTTH Councils Global Alliance – FCGA

FCGA - Definition of Terms
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About FCGA:

The FTTH Council Global Alliance (FCGA) is the platform for cooperation of the four global FTTH Councils and the Fiber Broadband Association. The organization share a common goal: the acceleration of fiber to the home adoption. The five entities act as powerful and independent organizations in their specific market. This regional focus gives the FCGA a special strength to adapt its activities to the particular market situation in their area.

The FTTH Council Global Alliance ensures that those regional efforts are combined with the power of global cooperation. Within the FCGA the organizations exchange studies, information and latest market developments.

Contact FCGA:

FTTH Council Europe: info@ftthcouncil.eu – www.ftthcouncil.eu
Fiber Broadband Association: infofiber@fiberbroadband.org – www.fiberbroadband.org
FTTH Council APAC: info@ftthcouncilap.org – www.ftthcouncilap.org
Fiber Broadband Association LATAM Chapter: latamchapter@fiberbroadband.org – www.fiberbroadband.org/latamchapter
FTTH Council MENA: info@ftthcouncilmena.org – www.ftthcouncilmena.org
FTTH Council Africa: juanita@ftthcouncilafrica.com – www.ftthcouncilafrica.com

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INTRODUCTION

The mission of all the organizations in North America, Europe, Asia Pacific, LATAM, Middle East & North Africa and Africa includes the communication to stakeholders in our respective regions of the extent of usage of Fiber throughout the world and forecasting the growth of FTTH and Fiber Technology.

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 Fiber deployment (to-the-home, business or endpoint) between different regions, or between different studies of the same region.

This document defines the terms used by all the organizations in the FCGA (North America, LATAM, Europe, Asia Pacific, Middle East & North Africa, Africa).

It is common in the industry to refer to systems that bring optical fiber close to the subscriber Premises as *FTTx*. FTTx is a generic term where optical fiber replaces or supplements copper in the access network. This document explicitly defines FTTH and FTTB in which the fiber terminates at the subscriber's home or building.

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

However, to be successful, the terms defined in this document must be used frequently and consistently. Thus, all members of the organization 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 underpin the more general expressions.

With regards to market study, however, in order to compare the research conducted by different organizations in the same or different regions, it is essential that these terms are used and not interchanged with other. The FCGA will assure that the definitions of this document will be used for their market research.

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THE TERMS

Supporting definitions:

"**Premises**" is a home or place of business. In a multi-dwelling unit [1] each apartment is therefore counted as one Premises.

"**Subscriber**" is a Premises that is connected [2] to a network and uses at least one service on this connection under a commercial contract.

"Homes Passed" is the potential number of Premises which a Service Provider has capability to connect to an FTTH/FTTB network in a service area. Typically new service activation will require the installation and/or connection of a drop cable from the homes passed point (e.g. fiber-pedestal, manhole, chamber, utility-pole) to the Premises, and the installation of subscriber Premises equipment at the Premises. This definition excludes Premises that cannot be connected without further installation of substantial fibre plant such as feeder and distribution cables (fiber) to reach the area in which a potential new subscriber is located.

"Homes Connected" is the number of Premises which are connected to a network and are already subscribers or can be turned into a subscriber without further installation work.

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[1] Multi-tenant unit in some countries.
[2] Implies a service termination point.

"**Penetration Rate**" equals "Subscribers" divided by the number of Premises in a service area.[3]

"**Connect Rate**" equals "Homes Connected" divided by "Homes Passed".

"**Take Rate**" equals "Subscribers" divided by "Homes Passed".[4]

Fiber-to-the-Home[5] (FTTH)

"Fiber to the Home" is defined as an access network architecture in which the connection to the subscriber's Premises is Optical Fiber.

The fiber optic communications path is terminated on or inside the Premises for the purpose of carrying communication services 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

FTTH may enable just one service, but generally enables several such as data, voice and video and potentially from multiple service providers.

This FTTH definition excludes architectures where the optical fiber terminates in a public or private space before reaching the Premises 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).

Fiber-to-the-Building (FTTB) [6]

"Fiber to the Building" is defined as an access network architecture in which the final connection to the subscriber's Premises.

The fiber optic communications path is terminated within the building for the purpose of carrying communication services for a single building with potentially multiple subscribers.

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[3] In the FTTH Global Ranking, the service area is defined as the country / economy.

[4] 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.

[5] 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.

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

FTTB may enable just one service, but generally enables several such as data, voice and video and potentially from multiple service providers.

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

[6] 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.

SOME MORE TERMS

Network Topology

The fibre plant connects the operator's Premises and subscribers' Premises. It can be deployed in the following different topologies:

"Point-to-Point" (P2P[7], Pt-Pt, or PtP) fibre plant provides optical fibre paths from a communication node located outside of the building to a single Premises - such that the optical paths are dedicated to traffic to and from this single location.

"Point-to-Multipoint" (P2MP) fibre plant provides branching optical fiber paths from a communication node to more than one Premises (or building) - such that a portion of the optical paths are shared by traffic to and from multiple Premises. This branching is typically realized through power or wavelength splitters or active switches.

"Ring" fibre plant provides a sequence of optical fiber paths in a closed loop that connects a series of communication nodes.

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

		Technology		
		Ethernet	**T(W)DM PON** (GPON, EPON, RFoG, 10GEPON, XG-PON1, NG-PON2)	**WDM-PON** (wavelength per customer)
Topology	**Point-to-Point**	Ethernet P2P	PON P2P	N.A.
	Point-to-Multipoint	Active Ethernet	PON P2MP	WDM PON

[7] The abbreviation P2P is sometimes also used to describe peer-to-peer-networks, e.g. to exchange files over the internet. This P2P is not related to the point-to-point definition in this document economy.

Relationship between topologies and technologies (rings have been omitted).

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

Feeder Network
It is the fiber network deployed from the Central office OLT to the first branching point in the fibre plant.

Distribution Network
It is the fiber network deployed from first branching point to the curb connection point.

Drop Cable
It is the fiber cable connecting the subscriber to the curb connection point and into the network.

Access Protocol

Access Protocols are the methods of communication used by the equipment located at the communication nodes and at the subscribers' Premises (or buildings) to ensure reliable and effective transmission and reception of information over the optical paths. These protocols are defined in detail by the standards organizations 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:

"Ethernet" defined in IEEE 802.3

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

"10GEPON" defined in IEEE802.3av is an upgrade of EPON to carry 10Gbps downstream and 1 or 10Gbps upstream.

"B-PON" defined as Broadband PON in ITU-T Recommendation G.983 (largely obsolete).

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

"XG-PON1" defined as 10G PON in ITU-T Recommendation G.987

"NG-PON2" defined as TWDM PON in ITU-T Recommendation G.989

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

Network Usage

FTTH/FTTB networks may be dedicated to the services of a single retail or wholesale 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. Such a service provider is called "vertically integrated".

"Open Access (Packet)"[8] 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. This packet layer interface may be implemented on layer 2 (Ethernet) or 3 (IP).

"Open Access (Layer2)"[9] refers to the situation where multiple retail service providers may use the FTTH network on an equable base by connecting at a layer 2 Ethernet interface from OLT or an aggregation point and compete to offer their services to end users.

"Open Access (Layer3)"[10] refers to the situation where multiple retail service providers may use the FTTH network on an equable base by connecting at a layer 3 IP or MPLS layer interface from OLT or an aggregation point and compete to offer their services to end users.

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[8] In many cases this is also called "Bitstream Open Access".

[9] In many cases this is also called "Bitstream Open Access".

[10] In many cases this is also called "Bitstream Open Access".

"Open Access Wavelength/Lambda"[11] 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[12]) interface and compete to offer their services.

"Open Access Duct/Dark Air" refers to the situation where multiple retail or wholesale service providers may share the use of infrastructure by drawing or blowing their fiber cables through the shared ducts, and compete to offer their services.

"Open Access Flexibility point" refers to the concentration point where multiple retail or service providers may connect via their feeder cables and access layer 1 feeder fiber connectivity to each household. This concentration or flexibility point may be located at the building or cabinet or ODF.

Open access on multiple layers can be implemented in the same network, e.g., on a dark fiber level, and on a bitstream level. This is then called **"Multilayer Open".**

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[11] Open Access on a wavelength level was originally planned for WDM-PONs (which have never received sufficient market traction), but it will become relevant in the context of NG-PON2.

[12] Dark Fiber is a strand of fiber which is made available to a provider, without active termination points, on an exclusive basis.