



Operator's Requirements for G-PON:

Summary Of Work In ITU-T SG15/Q2 GSR

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Introduction

- ☞ This presentation contains an overview of Telco Operator requirement's for Gigabit-capable PON systems. This presentation summarizes the current draft of the ITU-T GSR document that is actively being worked in SG15/Q2.



Service Requirements for G-PON

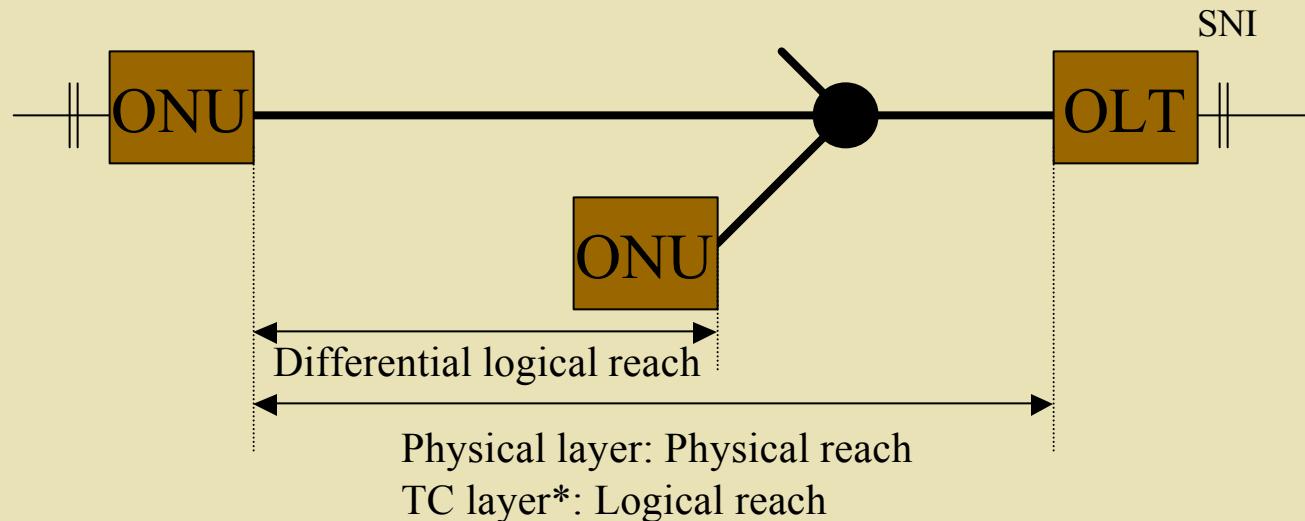
Item	Requirements
Services	Full Service ^{*1} (e.g. 10/100/1000 Base-T, ATM, Voice(POTS), ISDN, Leased lines, etc.)
Physical reach ^{*2}	20Km or 10Km
Logical reach ^{*2}	60Km
Differential logical reach ^{*2}	Max 20Km
Split ratio	Max 1:64 in physical layer Max 1:128 in TC layer
ODN classes	Class A, B and C
Service overlay	For enhanced services, G-PON complies with ITU-T G.983.3.

*1 Full services on Ethernet/IP are also being focused on by some operators.

*2 See the next slide.



Definition of several reaches



Logical reach; the maximum length that can be achieved for a particular transmission system, independent of optical budget.

Physical reach; the maximum physical length that can be achieved for a particular transmission system.

Differential logical reach; the difference of the distance between the nearest and furthest ONU from the OLT.

*TC layer is the transmission convergence layer that is same as layer 2.

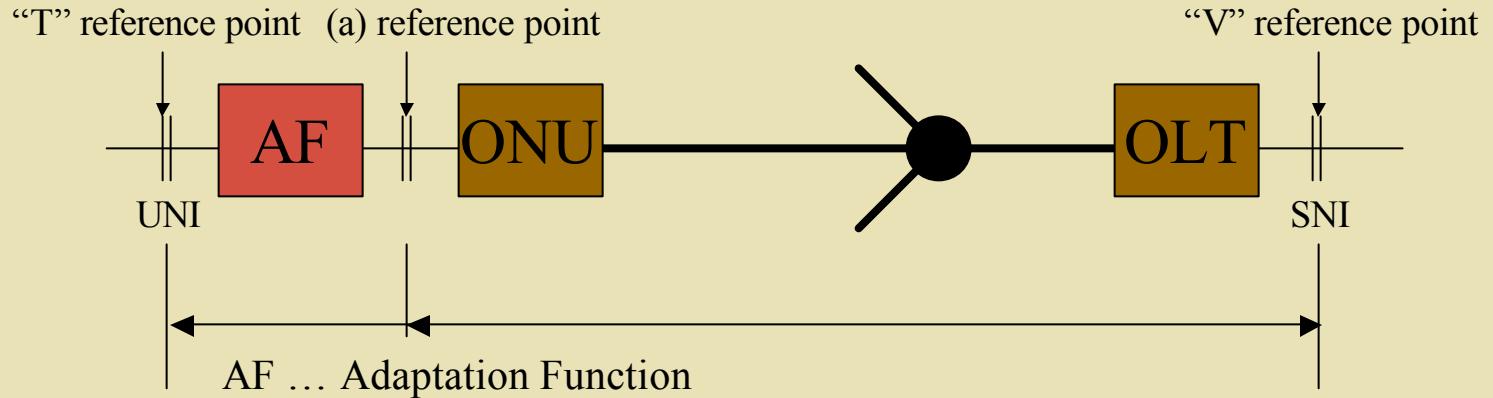


Services and network architectures

Service category	Network architecture
Asymmetric (e.g. digital broadcast, VOD, file download)	FTTH, FTTBldg/MDU, FTTC, FTTCab
Symmetric (e.g. group software, content broadcast, e-mail, file exchange)	FTTBldg/Business
Symmetric (content broadcast, e-mail, file exchange, distance learning, telemedicine, online-gaming)	FTTH, FTTBldg/MDU, FTTC, FTTCab
POTS and ISDN	ALL
Private line (T1, E1, DS3, E3, ATM)	FTTBldg /Business
xDSL backhaul	FTTC, FTTCab



Maximum transfer delay



A maximum **mean signal transfer delay** time between T-V (or (a)-V, depending on operator's decision) should be less than 1.5 ms for specified services, such as telephony service. This requirement is common to ITU-T G.982.

Mean signal transfer delay is defined as the following;
The average upstream and downstream values between reference points; a given value is determined by measuring round-trip delay, then dividing by two.

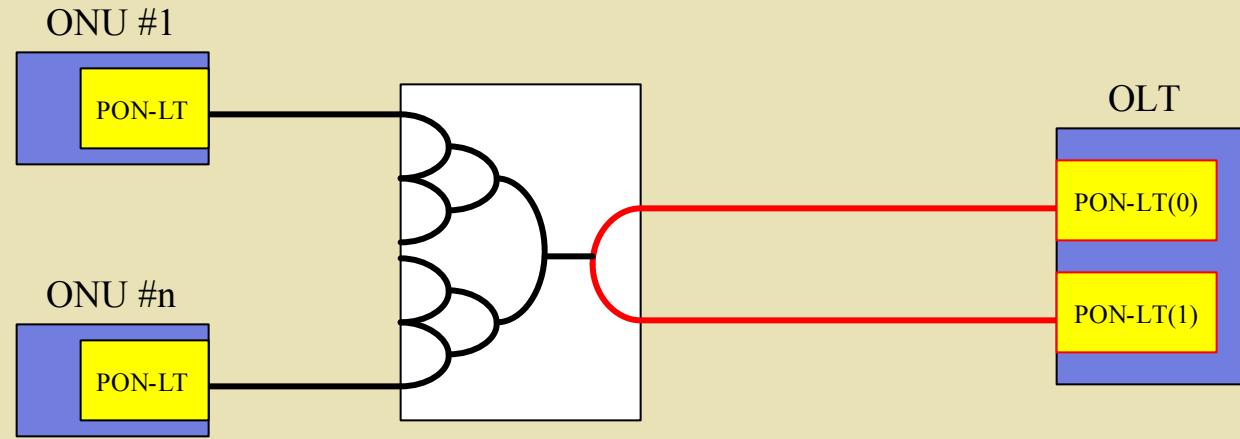


Protection policy

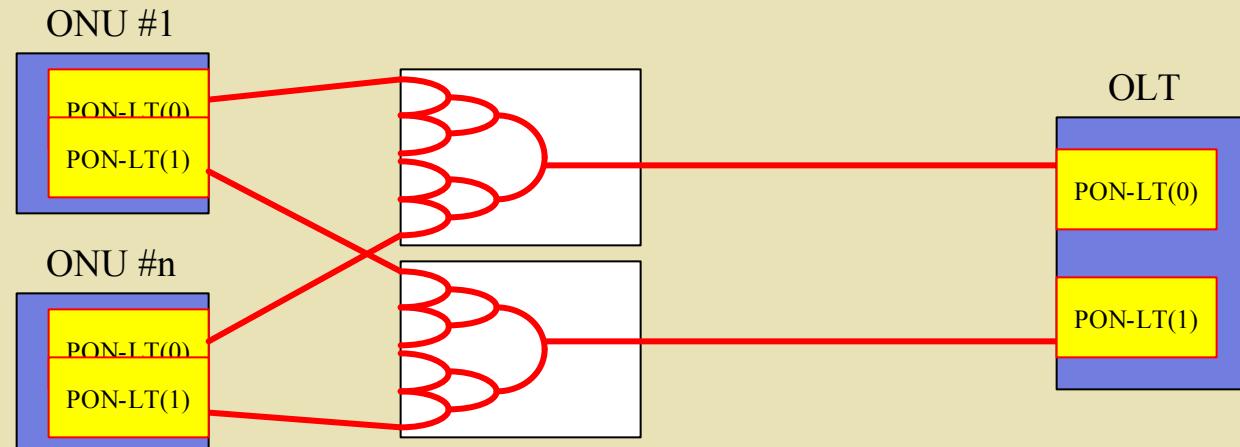
- ☞ G-PON should consider a protection mechanism in order to enhance the reliability of the access network.
- ☞ An example protection policy, which complies with ITU-T G.983.1, is as follows;
 1. The protection switching function should be optional.
 2. Both automatic protection switching and forced switching are possible.
 3. All configuration examples in the following slides should be possible.
 4. The switching mechanism is generally part of the OAM function, therefore, the required OAM information field must be reserved in the OAM frame.
- ☞ The switching time, which is the duration between detection of the switch trigger and completion of the switch, should be less than 50ms for 32 ONUs.
- ☞ ITU-T G.983.5 is an example of a PON Protection Protocol.

Protection configuration examples 1-2

Example 1 ... OLT-only duplex system



Example 2 ... Full duplex system



PON-LT: PON Line Terminal

Protection section is described by a red line.



Security

Due to the multicast nature of the PON, downstream frames need some type of security mechanism at the TC layer.

In ITU-T G.983.1, the churning key mechanism was selected on the premise that encryption at a higher layer would be used for any data or service that required a higher level of security.

In G-PON, the security mechanism is an open issue currently under discussion.