

### Ideal loss of splitter is 3dB per branch

Number of Ports	Ideal loss of splitter(dB)	Actual loss of splitter(dB)
2	3	3.6
4	6	7.2
8	9	10.2
16	12	13.5
32	15	16.2
64	18	20.5

### Average loss of each wavelength

Wavelength	Attenuation Loss
850nm	1.81 dB/Km
1310nm	0.33 dB/Km
1383nm	0.28 dB/Km
1490nm	0.21 dB/Km
1550nm	0.19 dB/Km
1625nm	0.21 dB/Km

### Main factors of optical power attenuation:

- Insertion loss introduced by splitters (different splitting ratio indicates different insertion loss)
- Inherent loss of the fiber is dependent on the fiber length
- Fusion Splice Loss
- Insertion Loss of Pigtail/Patch Cord Connected to Adapters
- Connection Loss

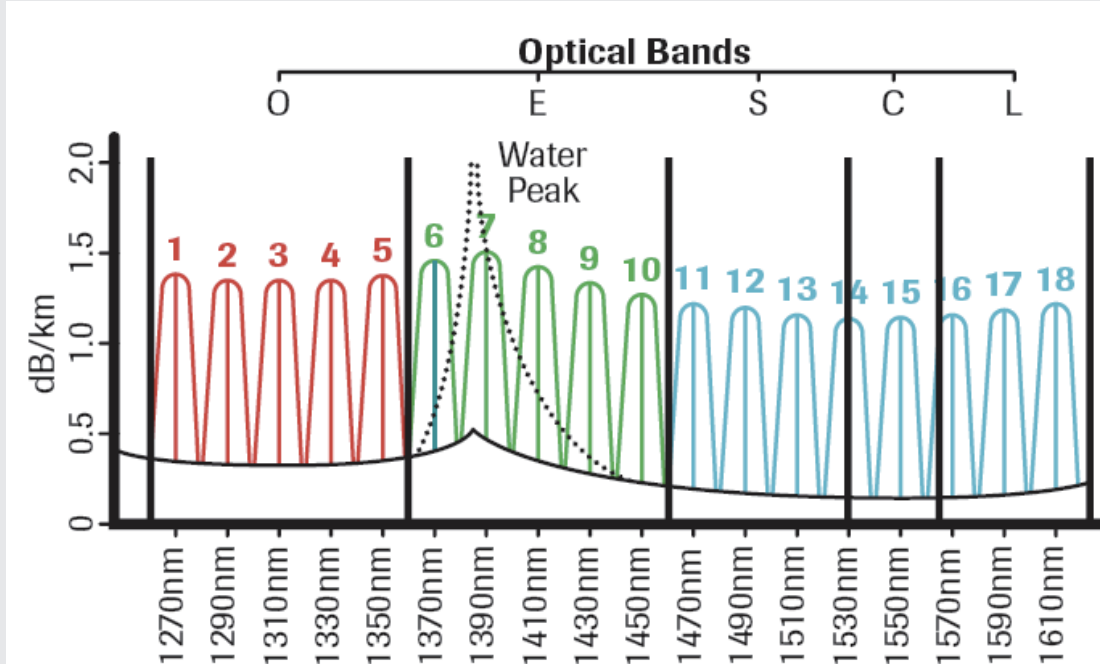
### PON OTDR Trace (OLT ONU)



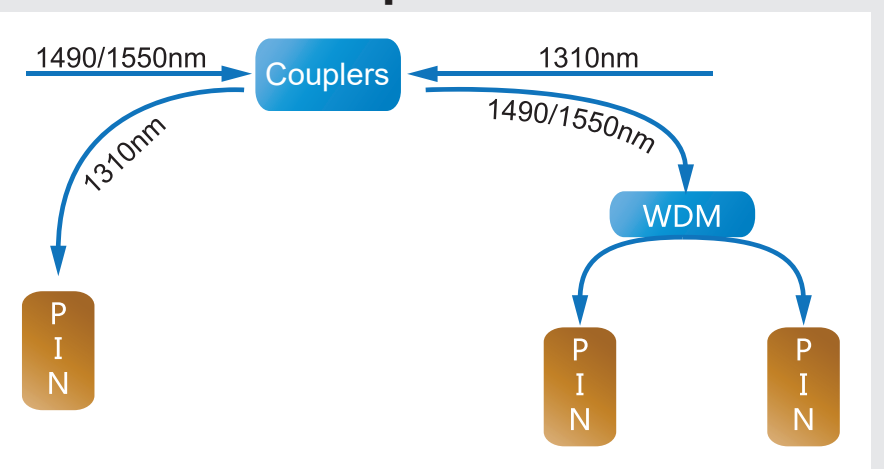
### PON OTDR Trace (ONU OLT)



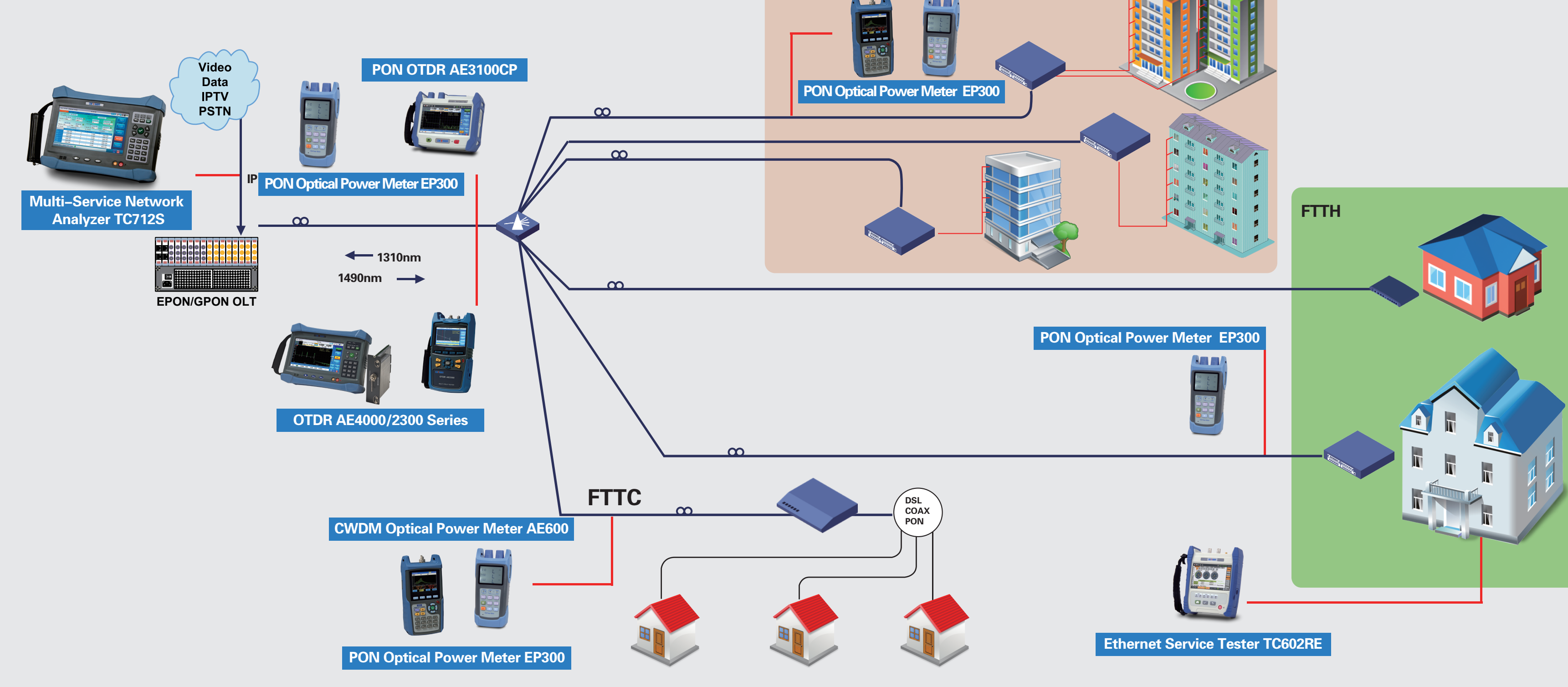
### ITU-T G.694.2 CWDM Optical Spectrum



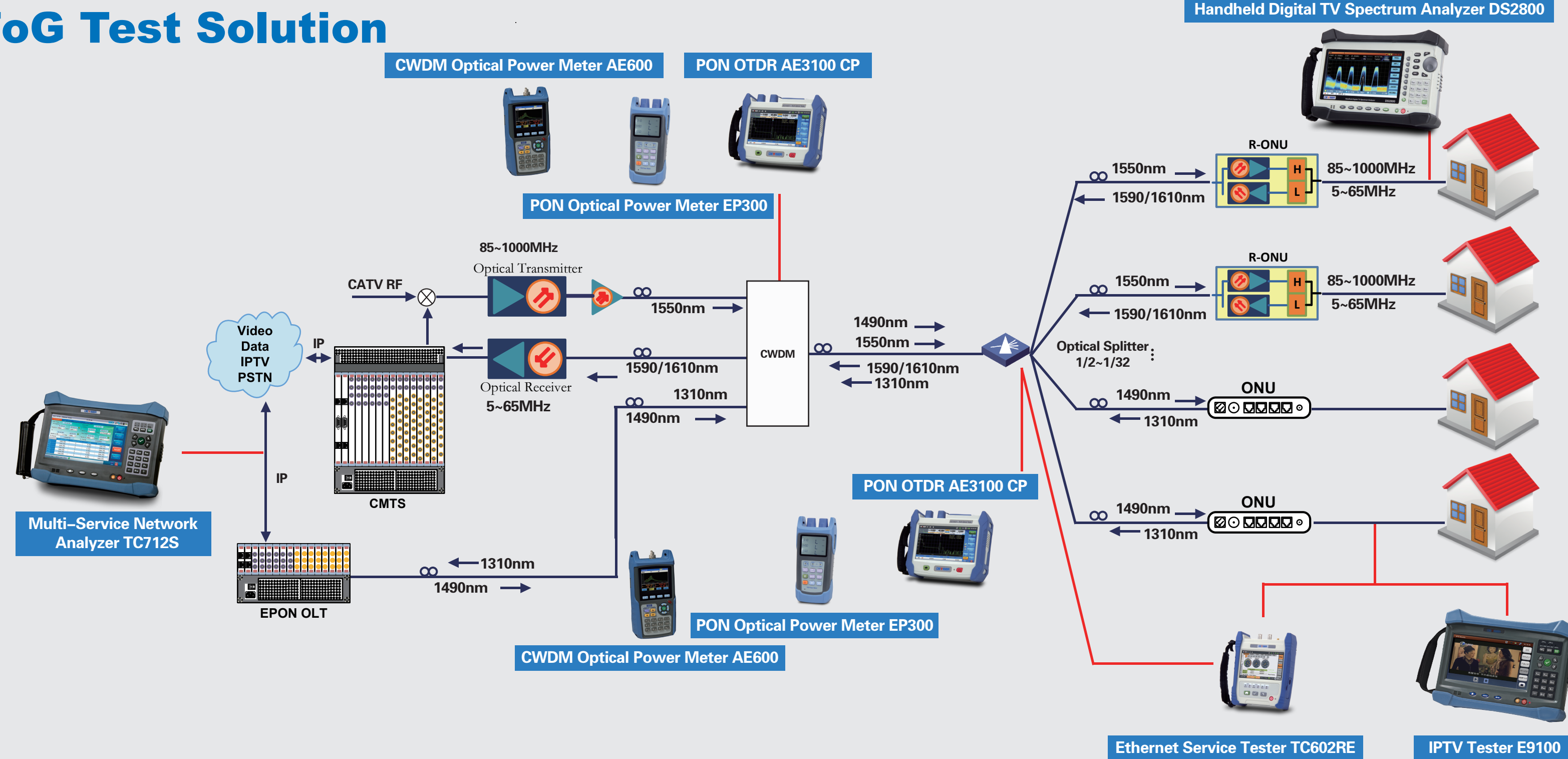
### Measurement Principle of PON Power Meter



## FTTH Test Solution



## RFoG Test Solution



### Abbreviations

Abbreviation	English	Chinese
CWDM	Coarse Wavelength Division Multiplexing	粗波分复用
DWDM	Dense Wavelength Division Multiplexing	密集波分复用
EPON	Ethernet based Passive Optical Network	以太无源光网络
EDFA	Erbium Doped Fiber Amplifier	掺铒光纤放大器
FTTB	Fiber To The Building	光纤到楼
FTTC	Fiber To The Curb	光纤到路边
FTTCab	Fiber To The Cabinet	光纤到机箱
FTTH	Fiber To The Home	光纤到户
FTTP	Fiber To The Premises	光纤到建筑物
FTTx	Fiber to the x, x=Building, Curb, Home, Premises	
GPON	Gigabit capable Passive Optical Network	千兆能力的无源光网
OLT	Optical Line Terminal/Termination	光线路终端
ONU	Optical Network Unit	光网络单元
QoS	Quality of Service	服务质量
OTDR	Optical Time Domain Reflectometer	光时域反射仪
PON	Passive Optical Network	无源光网络
RFoG	Radio Frequency over Glass	光纤上的射频传输
R-ONU	RFoG ONU RfOg	光网络单元
VoIP	Voice over Internet Protocol	网络电话
VLAN	Virtual Local Area Network	虚拟局域网
WDM	Wavelength Division Multiplexing	波分复用

### PON Specifications

	EPON	GPON
Standard	IEEE 802.3ah	ITU-T G.984.x
Protocol	Ethernet	ATM, TDM, WDM, Ethernet
Upstream Rate	1.25 Gbps	1.25Gbps or 622 Mbps
Downstream Rate	1.25 Gbps	2.5Gbps or 1.25Gbps
Split Ratio	1 : 32	1:32, 1:64, 1:128
Bandwidth Utilization	72%	92%
Maximum Transmission Distance	Support maximum distance of 20km at splitting ratio 1:16; Support maximum distance of 10km at splitting ratio 1:32;	
Packet Size (in Byte)	1518	From 53 to 1518
Line Encoding	8B/10B (with FEC)	NRZ (with FEC)
Downstream Wavelength	1490±10 nm	1490±10 nm
Upstream Wavelength	1260nm to 1360nm	1260 nm to 1360 nm
Communication Protocol	Ethernet	ATM, Ethernet, TDM
Audio	VoIP or TDM	
Video	1550nm Overlay	RF or IP
Optical Module Dynamic Range	1000Base-PX10 (23dB)	A(5-20 dB), B(10-25 dB), C(15-30 dB)
Minimum Source Power (Upstream)	-1 dBm(PX10)	-2 dBm(1.25 Gbits/sec; Class B)
Minimum Source Power (Downstream)	-3 dBm(PX10)	+1 dBm(1.25 Gbits/sec; Class B)
Minimum Sensitivity (Upstream)	-24 dBm(PX10)	-28 dBm(1.25 Gbits/sec; Class B)
Minimum Sensitivity (Downstream)	-24 dBm(PX10)	-25 dBm(1.25 Gbits/sec; Class B)
Service Encapsulation	Anything over Ethernet	Anything over GEM
Encryption	Triple Agitation, AES-128	AES-128
DBA	Fixed, Assured, Best Effort	Fixed Assured, Non-Assured, Best Effort
Qos	LLID+IEEE 802.1P	GEM_PORT/T-Cont
TDM Bearing Mode	CES PWE3/MEF8	G.984.3(Native) or CES
TDM Performance	Special Line and Base Station Bearing Capacity	Special Line and Base Station Bearing Capacity
Operation and Maintenance	CCSA+Ethernet OAM	G.984.4 (OMCI)
Fiber Detection	Yes	Yes

## List of FTTx and RFoG Test Measurement Instruments



PON OTDR AE3100 CP



PON OTDR AE4000 Series



PON OTDR AE2300 Series



PON Optical Power Meter EP300



CWDM Optical Power Meter AE600



IPTV Tester E9100



Ethernet Service Tester TC602RE



Handheld Digital TV Spectrum Analyzer DS2800



Multi-Service Network Analyzer TC712S

