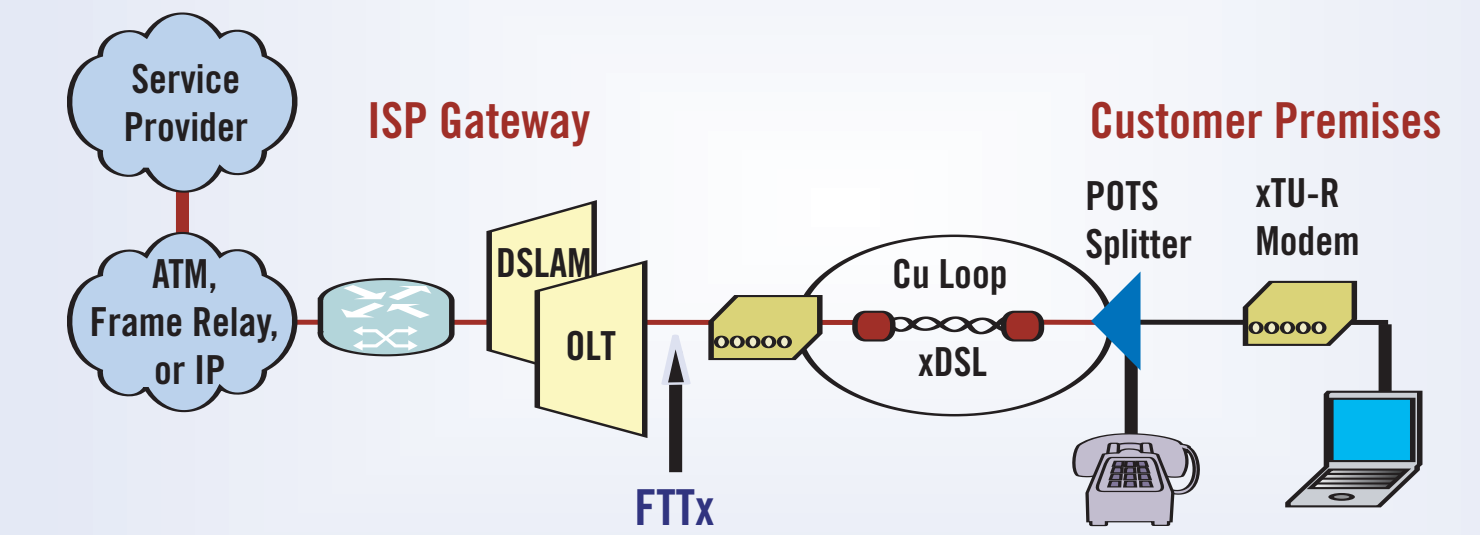
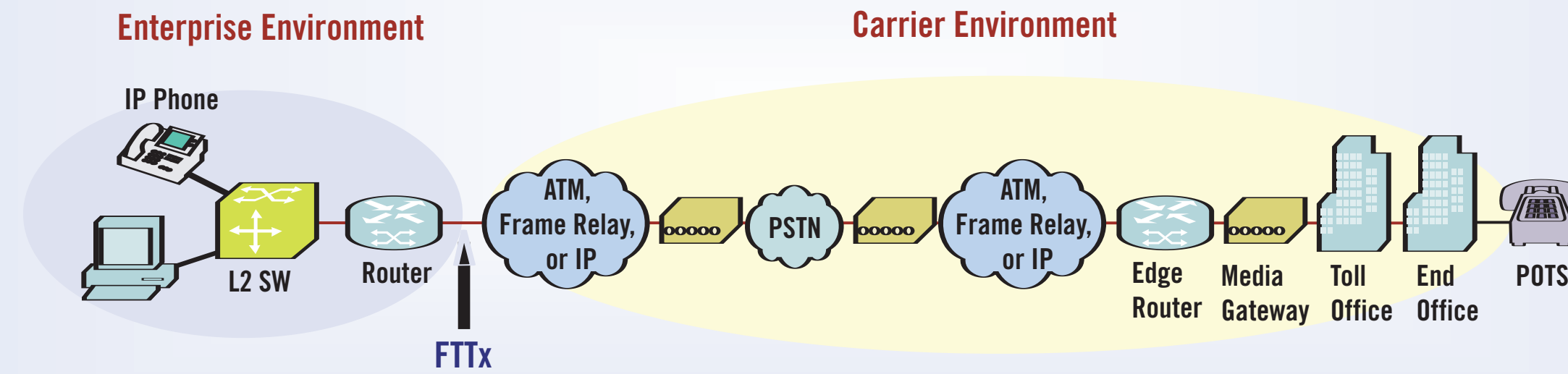
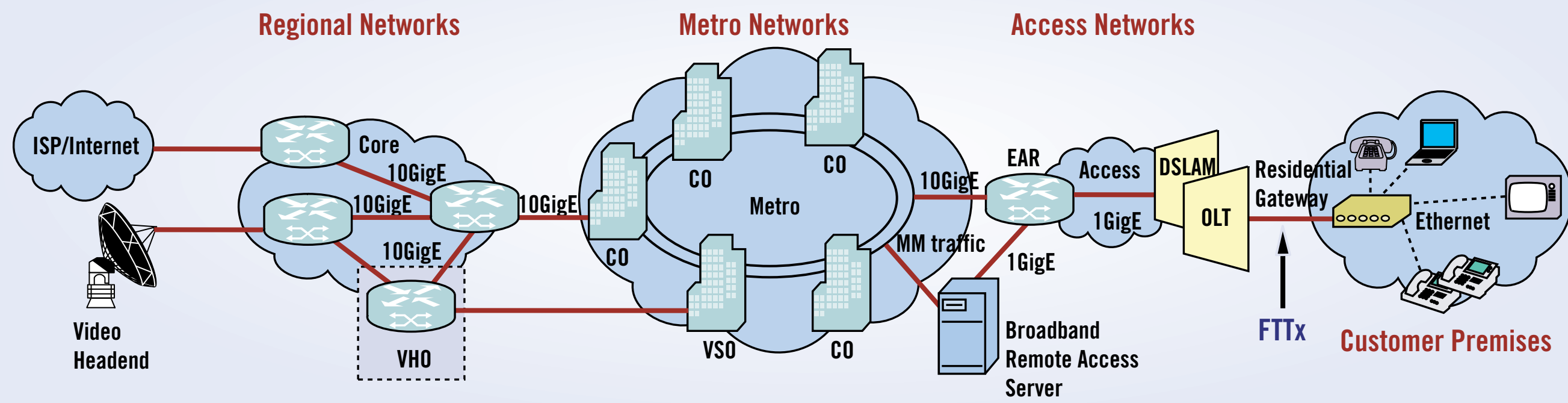


# FTTx Triple-Play Technologies and Applications

## IP Video Service

## VoIP Service

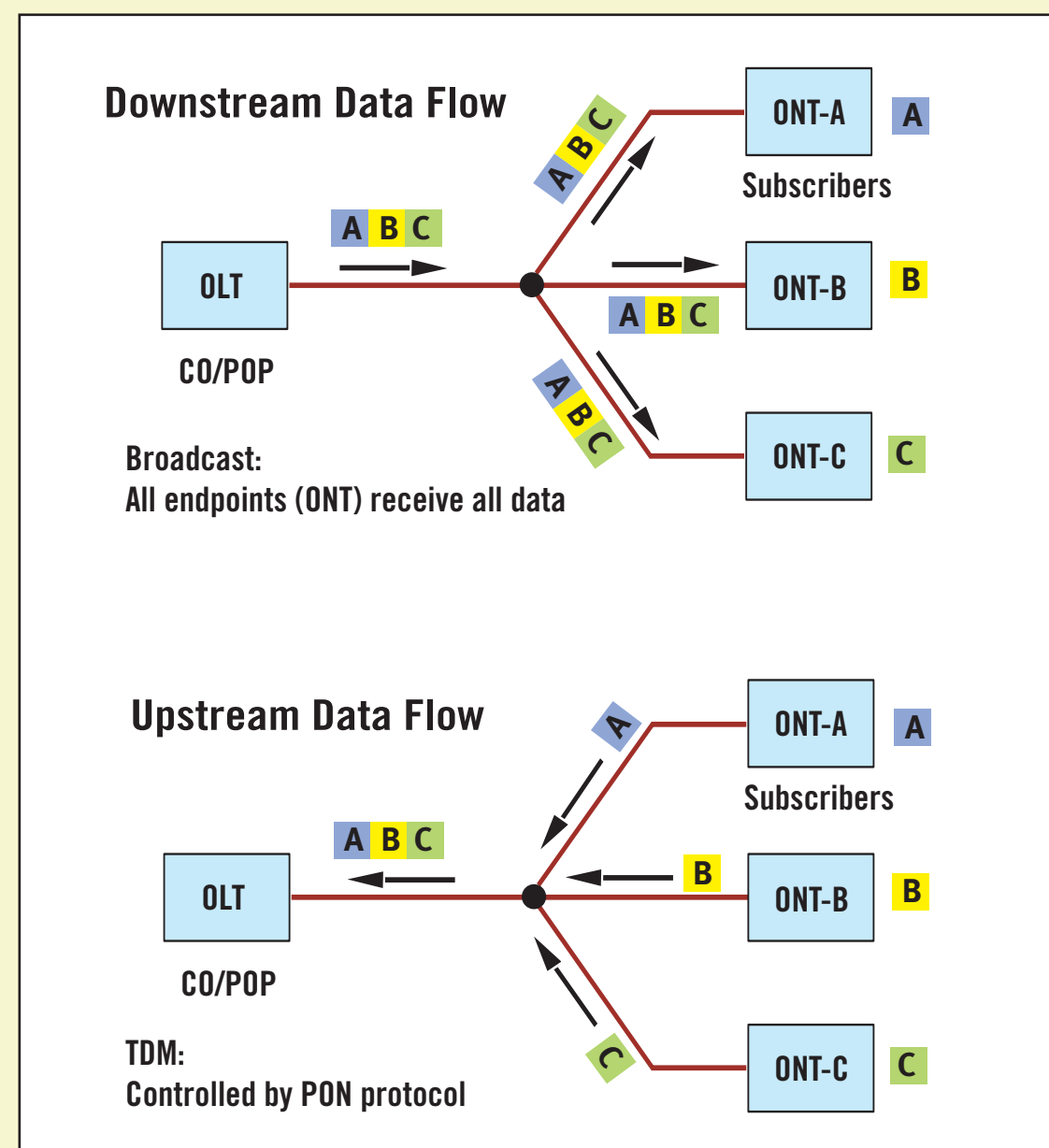
## Internet Data Service



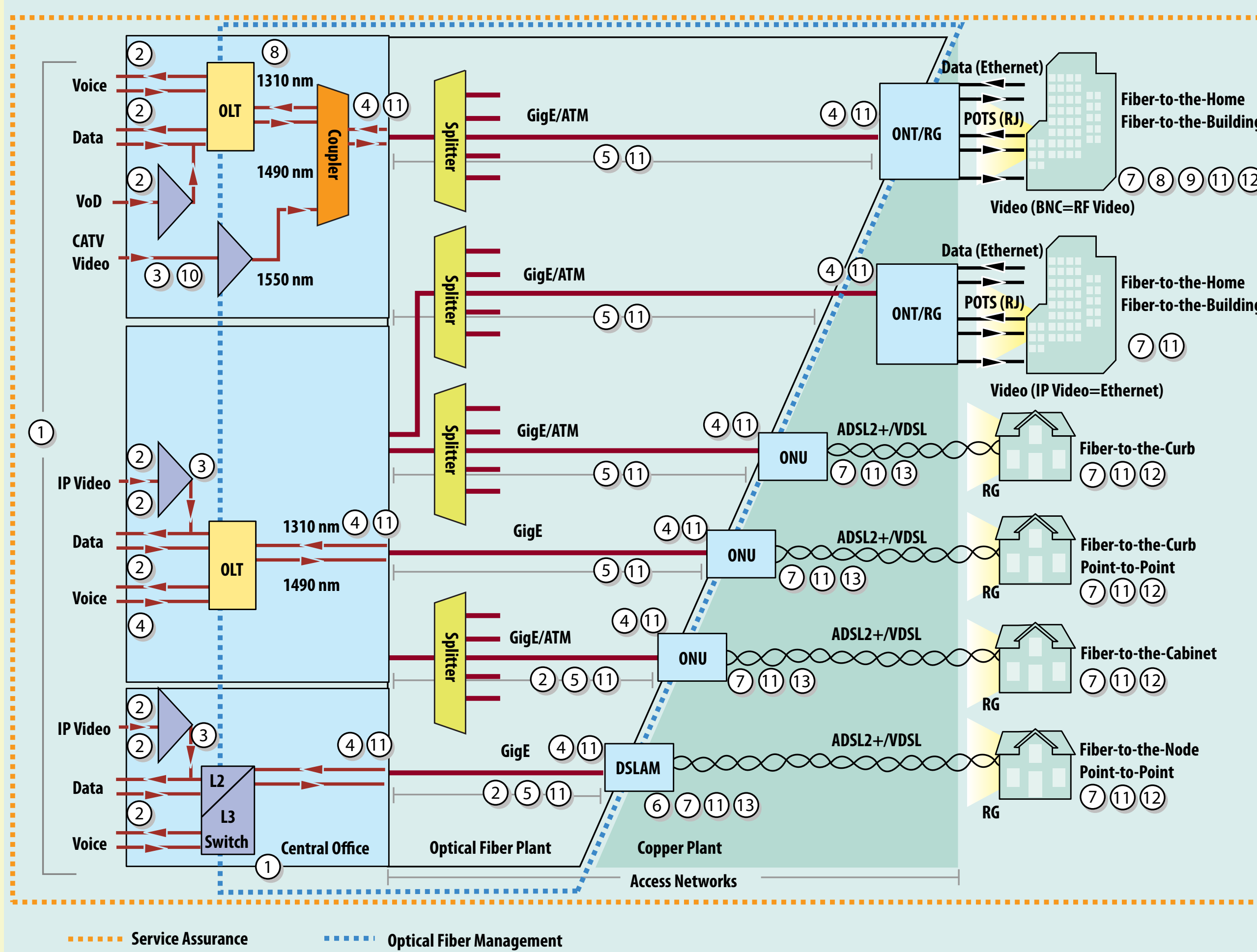
## PON Standards

	B-PON	G-PON	E-PON
Span	20 km	60 km max, 20 km differential	10 km today, 20 km planned
Maximum insertion loss	20/25/30 dB	15/20/25 dB	15/20 dB
Maximum number of branches	32	64 (128 Considered)	32
Bit rate (Mbps)	Down: 155, 622, 1244 Up: 155, 622	Down: 1244, 2488 Up: 155, 622, 1244, 2488	Down: 1244 Up: 1244
Wavelengths	Down: 1480-1500 nm Video at 1550 nm Up: 1260-1360 nm	Down: 1480-1500 nm Video at 1550 nm Up: 1260-1360 nm	Down: 1490 nm Up: 1300 nm
Traffic mode	ATM	ATM, Ethernet, TDM	Ethernet
Architecture	Asymmetric or Symmetric	Asymmetric or Symmetric	Ethernet
Video overlay	Yes	Yes	No
Applicable standard	ITU-T G.983.x	ITU-T G.984.x	IEEE 802.3ah
Chipset support	Available	Available	Available
Upstream burst time	Fixed 56 bytes (ATM)	Guard: 25.6 ns Preamble: 35.2 ns (typical) Delimiter: 16.9 ns	AGC setting and CDR lock: 400 ns

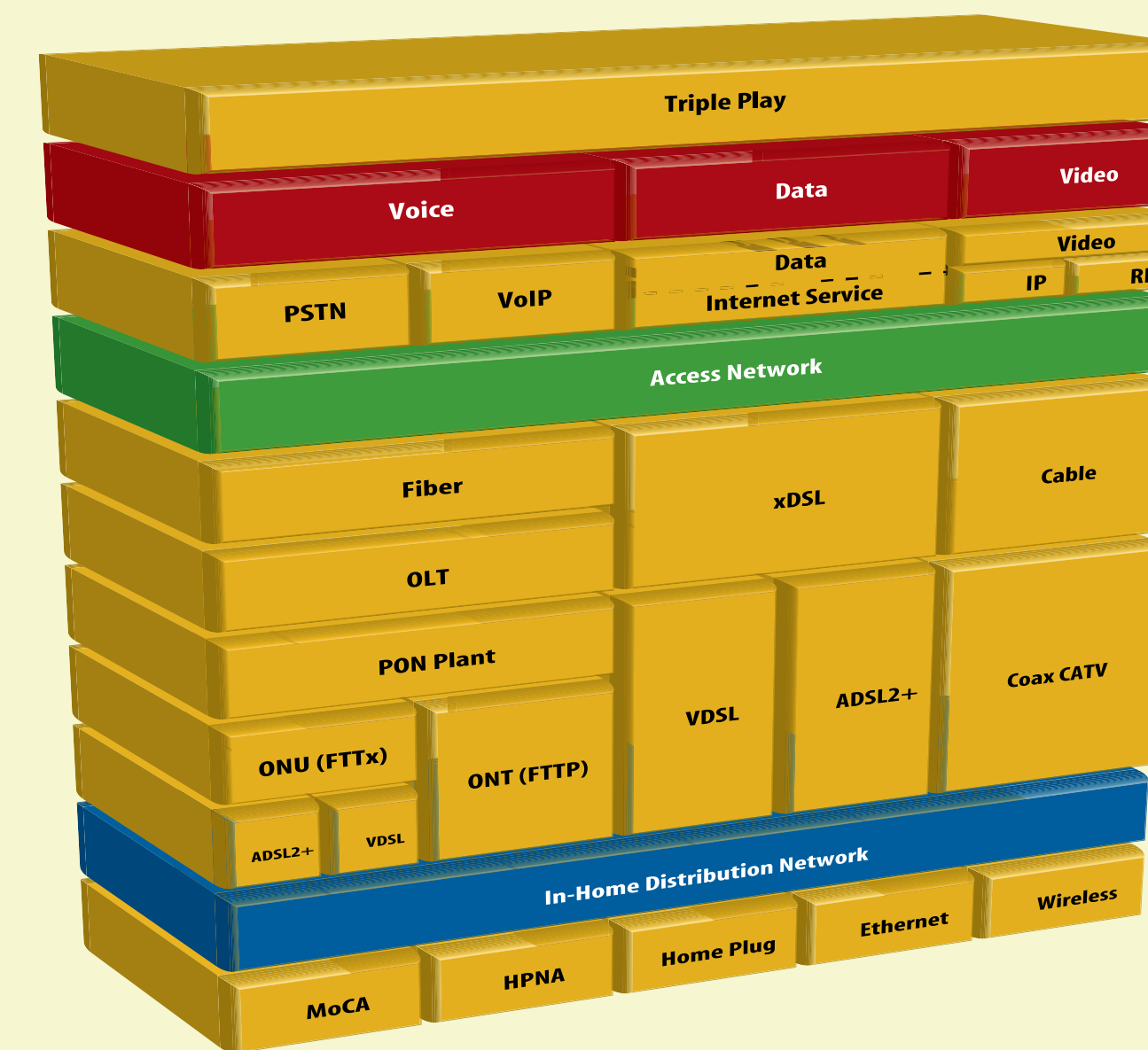
## PON Frame



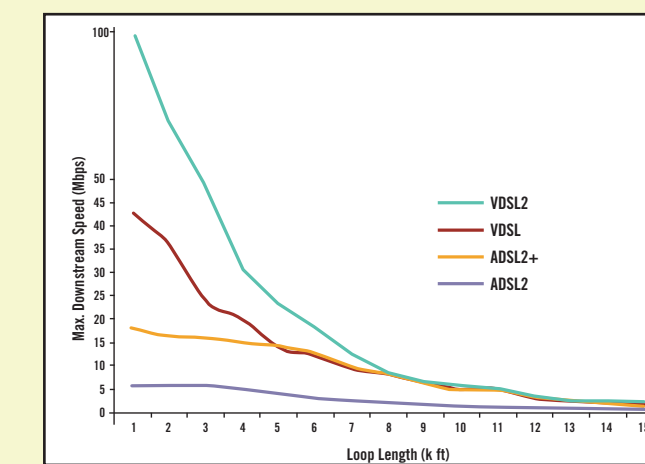
## FTTx Topologies



## Triple-Play Building Blocks



## xDSL Maximum Downstream Speed as a Function of Copper Loop Length



## Triple-Play Access Networks Speeds

Type of Service	Max Download (Typical)	Typical Service
ADSL1	8 Mbps	3 Mbps
ADSL S=1/2	12 Mbps	6 Mbps
ADSL2+	24 Mbps	6-8 Mbps
ADSL2+ bonded (2)	48 Mbps	12 Mbps
VDSL1	52 Mbps	20 Mbps
VDSL2	100 Mbps	30-40 Mbps
BPON	622 Mbps	Shared by 32
EPON	1 Gbps	Shared by 32

## Acronyms and Abbreviations

- 8VSB: 8-level Vestibular Sideband
- ADSL: Asymmetric Digital Subscriber Line
- ADSL2+: Higher Speed Version of ADSL
- ASI: Asynchronous Serial Interface Standard DVB Interface for Transport Stream
- ATM: Asynchronous Transfer Mode
- ATSC: Advanced Television Systems Committee
- ATV: Advanced Television (North American Standard for Digital Broadcasting)
- B-PON: Broadband Passive Optical Network
- BRAS: Broadband Remote Access Server
- CATV: Community Antenna TV (sometimes thought to be Cable Television). The distribution of multiple TV channels to subscribers via a cable network
- Coax: Coaxial Cable
- CO: Central Office
- Cu Loop: Copper Loop
- DSLAM: Digital Subscriber Line Access Multiplexer
- DVB: Digital Video Broadcasting (European consortium that has standardized digital TV broadcasting)
- EAR: Edge Aggregation Router
- EO: End Office
- E-PON: Ethernet Passive Optical Network
- Fiber-to-the-Business: Fiber-to-the-Business
- FTTC: Fiber-to-the-Curb
- FTTCab: Fiber-to-the-Cabinet
- FTTH: Fiber-to-the-Home
- FTTP: Fiber-to-the-Premises
- FTTx: Fiber-to-the-x, where x=(H)ome, (C)urb, (B)usiness, or a DSL technology
- GigE: Gigabit Ethernet
- G-PON: Gigabit Passive Optical Network
- IAD/RG: Integrated Access Device/Residential Gateway
- IP: Internet Protocol
- ISO: International Standardization Organization
- ISP: Internet Service Provider
- L2: Layer 2 (Data Link Layer)
- L2SW: Layer 2 Switch
- MG: Media Gateway
- MM: Multimedia
- OLT: Optical Line Terminal/Termination
- ONT: Optical Network Terminal/Termination
- ONU: Optical Network Unit
- POTS: Plain Old Telephone Service
- PSTN: Public Switched Telephone Network
- QPSK: Quadrature Phase Shift Keying (Type of modulation for digital signals used in satellite transmission (DVB-S))
- TO: Toll Office
- VDSL: Very High Bit Rate Digital Subscriber Line
- VDSL2: Higher Speed Version of VDSL
- VOD: Video on Demand
- VHO: Video Hub Office
- VSO: Video Serving Office
- xDSL: Generic Digital Subscriber Line
- xTU-R: Various Transceiver Units-remote

<p>1 QT-600 IP Ethernet, multi-service (data, voice, video)</p>	<p>2 T-BERD®/MTS-6000A Multi-Services Application Module and FST-2802 Ethernet, video, and IP services</p>	<p>3 DTS-200 DVB turn-up testing, MPEG-2 and MPEG-4 analysis, QAM, QPSK, GigE, SPI, and ASI interfaces</p>	<p>4 OLP-57 Optical power measurements</p>	<p>5 T-BERD®/MTS-8000 and T-BERD®/MTS-6000A Optical fiber/event loss, reflectance/ORL, OTDR/distance to event</p>	<p>OFI-2000 Bidirectional insertion loss, ORL/length delay, optical power</p>	<p>SmartClass™ OLx Insertion loss, power, ORL</p>	<p>ONMS PON monitoring</p>	<p>6 QT-200 xDSL service and copper loop</p>	<p>7 HST-3000 Copper, DSL, Triple-Play services</p>	<p>8 DSAM Signal level, digital video, and analog video meter</p>	<p>9 Validator™ NT-950 Network/Cabling Certifier</p>	<p>10 Pathtrak™ Forward Path Monitoring System Analog and QAM RF Video monitoring</p>	<p>11 T-BERD®/MTS-4000 Optical, optical fiber loss/event loss, reflectance/ORL, OTDR, PON, Copper, DSL, Triple-Play services</p>	<p>12 SmartClass™ ADSL Copper, DSL, and video</p>	<p>13 SmartClass™ TPS ADSL 1/2/2+, IP Data, VoIP, and IP Video testing</p>	<p>14 OCETS Plus Optical component qualification testing</p>
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To learn more, visit [jdsu.com/fttx](http://jdsu.com/fttx)



We wrote the book on Triple-Play Testing. Visit us online for your free copy.



Note: Specifications, terms and conditions are subject to change without notice. 1016194 502 1108 FTTx\_PDF\_F03M\_AE