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- High Bandwidth
- Operational Cost-Effective
- High Scalability and Flexibility



For more product information, visit us on the web at www.ZyXEL.com

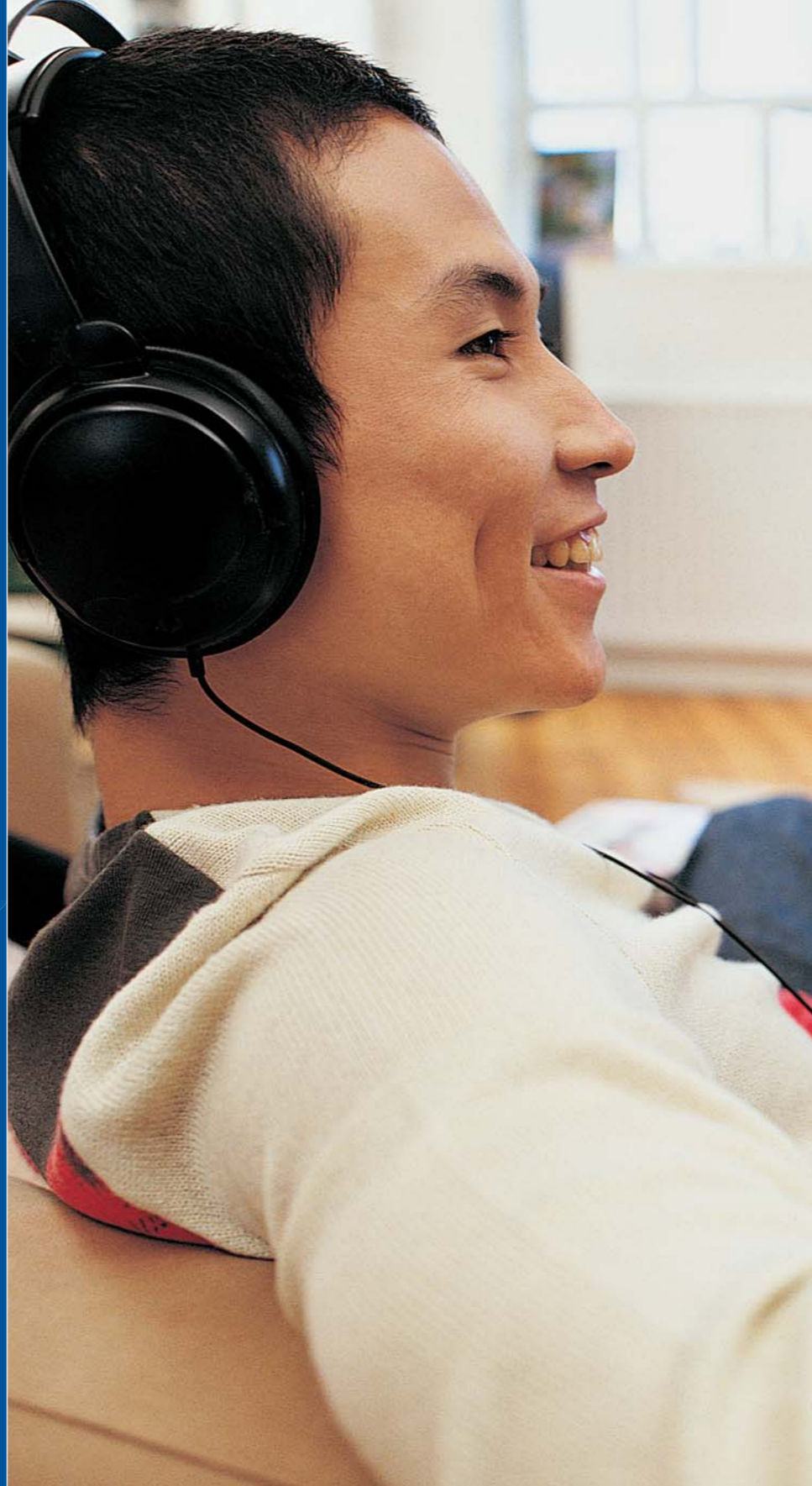


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FTTx Enables Very High Speed Broadband Services

Overview

The success of triple-play and rich media services relies on the operators' ability to provide a dramatically enhanced experience through user-centric broadband services balanced with the best performance and cost effectiveness. The demand for service flexibility and economy requires operators to offer many access types and technologies to reach all subscribers effectively through both fixed and mobile connectivity.

The key challenge for operators introducing these technologies is to minimize the impacts by maintaining a unified pattern of operations across all access networks.

The FTTx infrastructure provides operators with the flexibility and headroom to introduce new services and scale existing services without compromising on cost or performance. Operators can concentrate on attracting and retaining customers through their service offerings, leveraging the brand equity generated by their ability to deliver services flawlessly.

FTTx enables the right-sized deployments that can cost-effectively grow to support mass-market service rollouts. It also provides key service capabilities across networks that activate optimized policies across different nodes as traffic patterns and services evolve. This allows operators to optimize their service infrastructures and each service to scale in a cost-effective manner.

Benefit of ZyXEL FTTx Solution

Minimizing operational impacts

ZyXEL provides a total solution for service delivery infrastructures to leverage the full breadth of access portfolio and methods such as Very-high-bit-rate Digital Subscriber Line 2 (VDSL2) and FTTH, and to enable the ultimate flexibility and smooth migration in the first mile.

Ability to introduce new services and scale existing services

In addition to improving system performance, ZyXEL also offers an integrated access platform with more value-added services to meet diversified customer demands as well as guaranteeing low system costs and decent return on investment.

Optimize the cost of service infrastructures

ZyXEL's high-bandwidth solutions can improve Quality of Service (QoS) and advanced networking functions that allow service providers to scale existing and new services without performance/service setbacks or being forced to initiate a network or service reorganization. ZyXEL solutions not only provide ample opportunity for future expansions and upgrades, but also give service providers the opportunity to "right-size" their infrastructures over time in order to optimize their CAPEX.

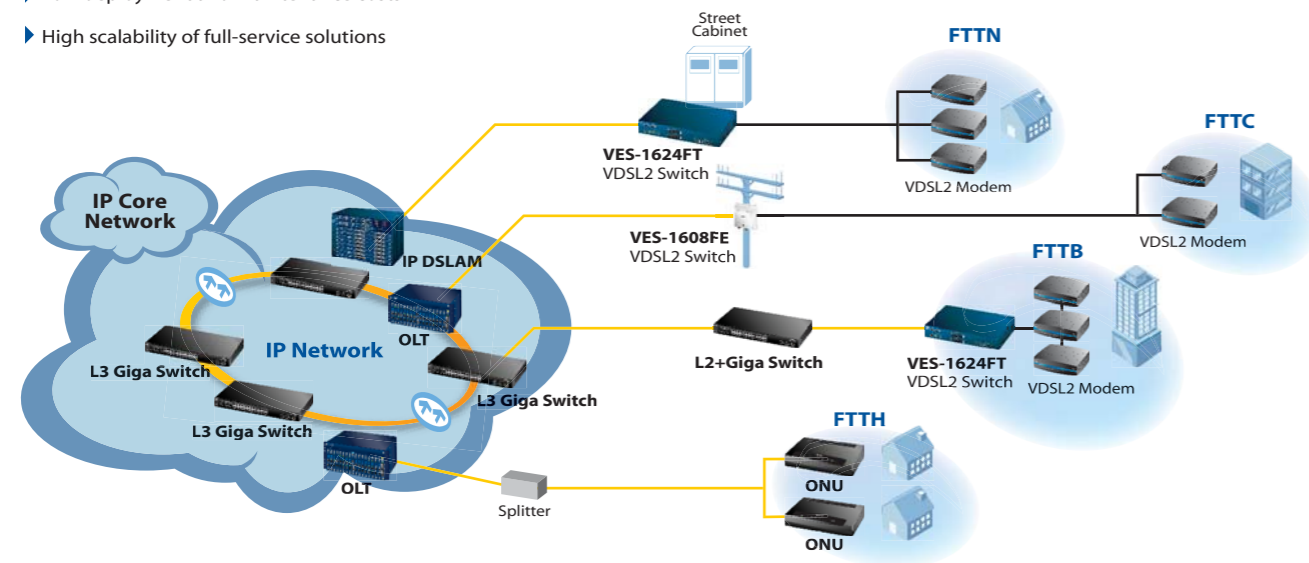


Solution/Offering

Scenario 1. FTTx Applications

Key Advantages and Benefits

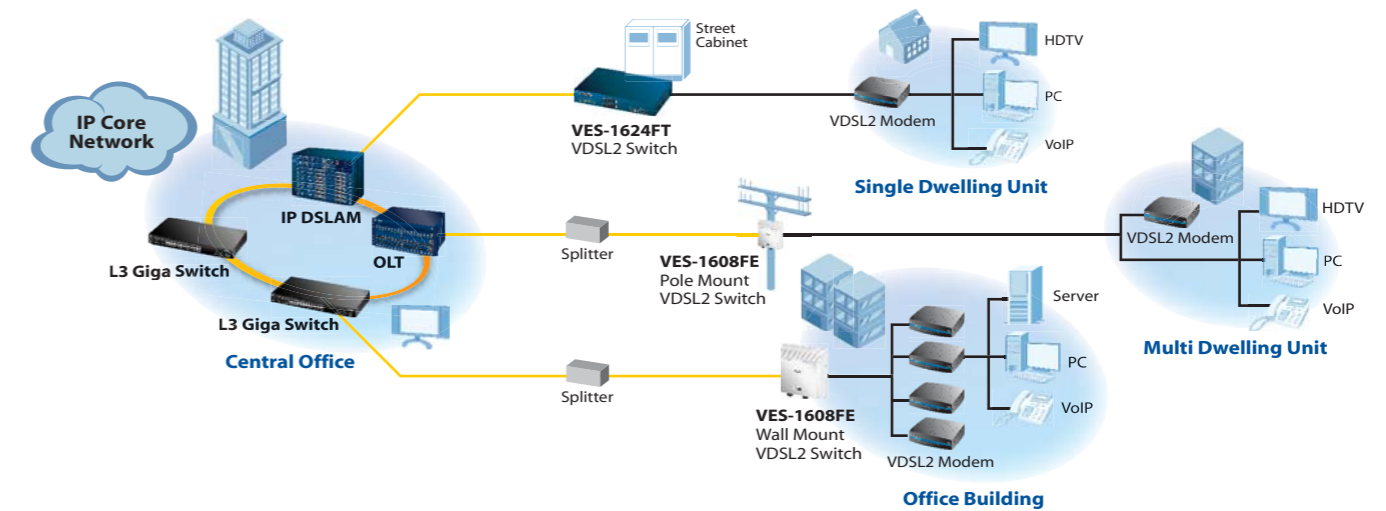
- ▶ Deliver high-speed Internet access
- ▶ Low deployment and maintenance costs
- ▶ High scalability of full-service solutions



Scenario 3. FTTB/C/N Applications (VDSL2)

Key Advantages and Benefits

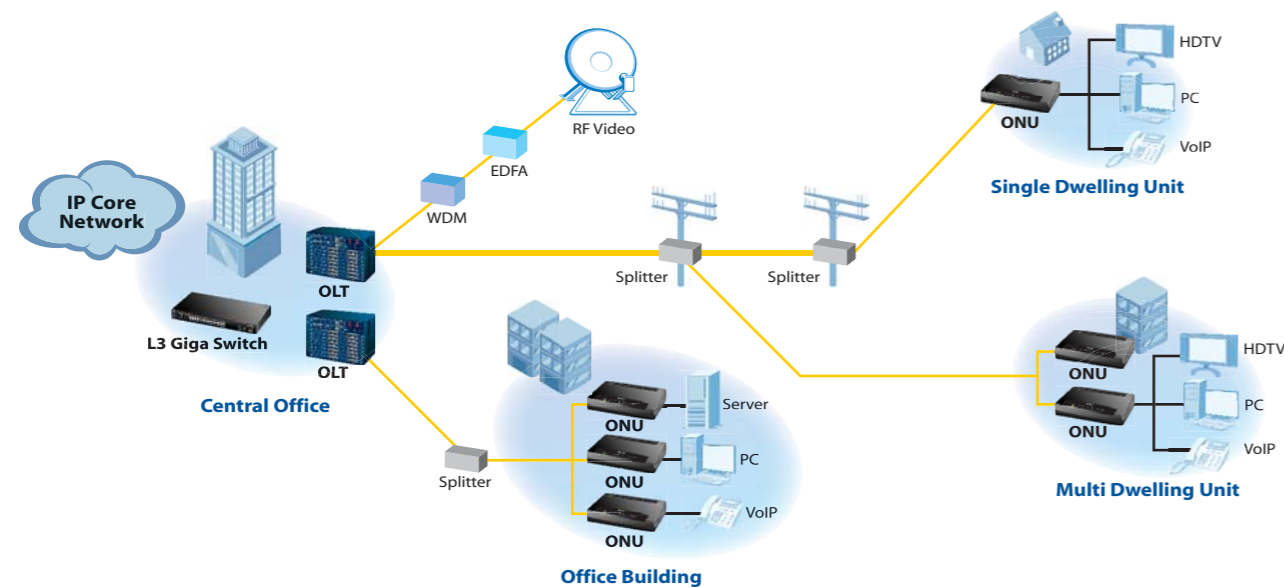
- ▶ No major network upgrades required. Twisted-pair lines laid by telephone companies on premises can be reused. No extra space needed, CAPEX/OPEX savings
- ▶ Deployment flexibility from temperature-/environmental-hardened devices
- ▶ Offering voice, data and video service bundles



Scenario 2. FTTH Applications (GEPON)

Key Advantages and Benefits

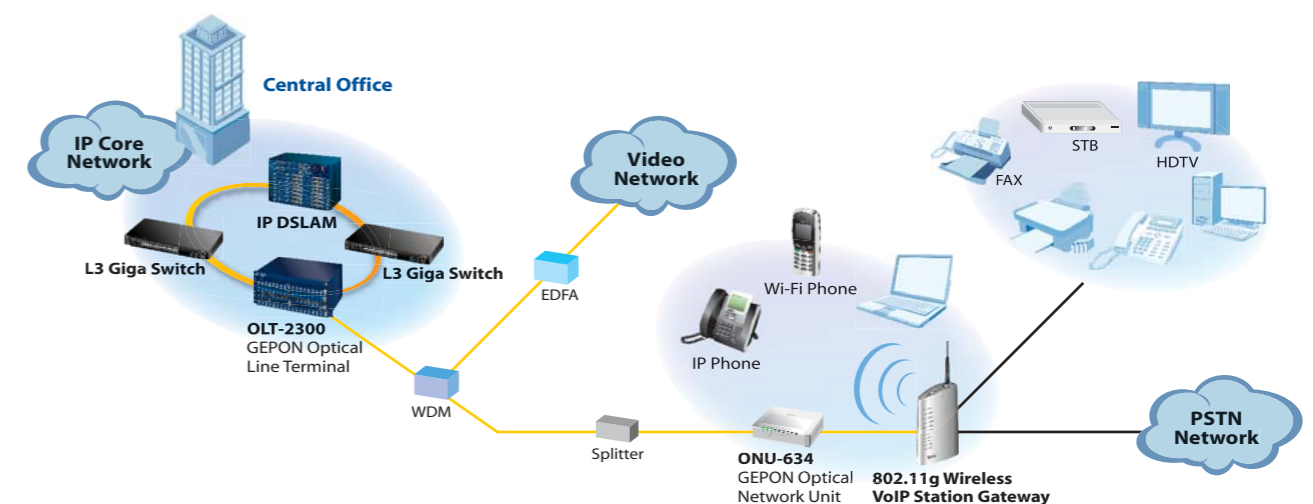
- ▶ Minimizing network maintenance cost and requirements
- ▶ Providing reliable, scalable and secure bundled services including voice, high-speed data, analog or digital CATV, DBS and Video on Demand
- ▶ Future-proof network architecture



Scenario 4. Multi-Play Applications

Key Advantages and Benefits

- ▶ Guaranteed minimum bandwidth for voice and data applications
- ▶ The strict Priority Queue for voice, video and data that puts a time-critical service in a priority queue.
- ▶ VLAN stacking for distinguishing customer VLANs from different ISPs





Product at a Glance

VDSL2 Switch



VES-1624FT-54A/55A

24-port DMT VDSL2 Switch

The VES-1624FT is a 24-port VDSL2 switch based on Discrete Multi Tone (DMT) modulation and the latest Ethernet technologies. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor cabinet deployments. The IEEE 802 standard-based firmware capable of IGMP snooping, VLAN Stacking/double tagging Q-in-Q, Rapid Spanning Tree Protocol (RSTP), broadcast storm control and MAC filtering enables service providers and system administrators to support triple-play services on their networks in a cost-effective manner. It complies with the VDSL2 G993.2 standard and supports the fallback mode in standard-based ADSL/ADSL2/ADSL2+.

Key Features

- ▶ VDSL2 downstream/upstream: 100/50 Mbps
- ▶ Temperature harden
- ▶ 2-slot Gigabit fiber uplinks/downlinks (Combo)
- ▶ Support ADSL2+ fallback
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)

VES-1624FT-54/55

24-port DMT VDSL2 Switch

The VES-1624FT is 24-port VDSL2 aggregators based on Discrete Multi Tone (DMT) modulation and the latest Ethernet technologies. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor cabinet deployments. The VES-1624FT offers a rich feature set of Internet Group Management Protocol (IGMP) snooping, IGMP proxy, Multicast VLAN Registration (MVR), broadcast storm control and MAC filtering to enable service providers to build cost-effective, full-service networks successfully. It complies with the VDSL2 G993.2 standard and supports up to VDSL2 Profile 17a.

Key Features

- ▶ VDSL2 downstream/upstream: 100/50 Mbps
- ▶ Temperature harden
- ▶ 2-slot 100/1000 Mbps Ethernet uplinks/downlinks and 2-slot Gigabit fiber uplinks/downlinks (Combo)
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)



VES-1624FTV-54A/55A

24-port DMT VDSL2 Switch

The VES-1624FTV is a 24-port VDSL2 switch integrated with a built-in VoIP module supporting SIP protocols. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor cabinet deployments. The IEEE 802 standard-based firmware includes advanced features such as IGMP snooping, broadcast storm control and MAC filtering. With these features, the VES-1624FTV enables service providers and system administrators to build full-service networks that make all kinds of media-rich applications possible. The integration of VoIP and ADSL2+ fallback support further reduces the infrastructure costs and accelerates network convergence. It complies with the VDSL2 G993.2 standard and supports the fallback mode in standard-based ADSL/ADSL2/ADSL2+.

Key Features

- ▶ VDSL2 downstream/upstream: 100/50 Mbps
- ▶ Temperature harden
- ▶ 2-slot Gigabit fiber uplinks/downlinks (Combo)
- ▶ Support ADSL2+ fallback
- ▶ Built-in 24-port VoIP module
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)

VES-1624PT-54/55

24-port DMT VDSL2 Switch

The VES-1624PT is a 24-port VDSL2 switch with one GPON uplink. The built-in GPON uplink comes with advantages such as longer reach, higher bandwidth and lower infrastructure cost. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor cabinet deployments. VES-1624PT enhances the security and bandwidth utilization with the IEEE 802 standard-based firmware supporting advanced features such as IGMP snooping, VLAN Stacking/double tagging Q-in-Q, RSTP, broadcast storm control and MAC filtering.

Key Features

- ▶ VDSL2 downstream/upstream: 100/50 Mbps
- ▶ 1 dual-personality GbE ports (RJ-45/SFP slot)
- ▶ One Gigabit single mode PON uplink (ClassB+)
- ▶ Hot swappable fan module
- ▶ Support ADSL fallback
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)



GEPON

VES-1616FE-54A/55A

16-port DMT VDSL2 Switch

The VES-1616FE is a 16-port VDSL2 switch based on Discrete Multi Tone (DMT) modulation and the latest Ethernet technologies. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor cabinet deployments. The IEEE 802 standard-based firmware capable of IGMP snooping, VLAN Stacking/double tagging Q-in-Q, Rapid Spanning Tree Protocol (RSTP), broadcast storm control and MAC filtering enables service providers and system administrators to support triple-play services on their networks in a cost-effective manner. It complies with the VDSL2 G993.2 standard and supports the fallback mode in standard-based ADSL/ADSL2/ADSL2+.

Key Features

- ▶ VDSL2 downstream/upstream: 100/50 Mbps
- ▶ Environmental Harden
- ▶ 2-slot Gigabit fiber uplinks/downlinks (Combo)
- ▶ Support ADSL2+ fallback
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)



VES-1616FE-54/55

16-port DMT VDSL2 Switch

The fanless VES-1616FE VDSL2 switch is an 16-port VDSL2 aggregator based on Discrete Multi Tone (DMT) modulation and the latest Ethernet technologies. It complies with the VDSL2 G993.2 standard and provides 30 MHz PSD with 8 VDSL2 profiles; it also provides Power Spectral Density (PSD) shaping features to avoid interference with other DSL flavors. The product is designed to ensure its resiliency to temperature changes and to provide users with the choice of outdoor wall-mount or polemount deployments. With a broad array of advanced firmware features, the VES-1616FE enables service providers to optimize their triple-play service networks.

Key Features

- ▶ VDSL2 downstream/upstream: 100/100 Mbps
- ▶ Environmental harden
- ▶ 2-slot Gigabit fiber uplinks/downlinks (Combo)
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ 802.1x service authentication
- ▶ Advanced security: VLAN, IGMP snooping and MVR (Multicast VLAN Registration)



OLT-2300

16-port GEPON Optical Line Terminal

The OLT-2300 is a chassis-based Optical Line Terminal system with highly scalable GEPON ports and uplink ports. The OLT-2300 can terminate up to 512 subscribers with up to 1:32 split and utilize optics at up to 20 km fiber loop distances. It is supervised through a centralized management that can be equipped for redundancy. The OLT-2300 is a series includes one OLT-2300M (chassis cabinet), one OFC-2300 (FAN module), one OPA-2300 (DC power module), one OMC-2301 (management card) and up to sixteen OLC-2301HA-12 (line card).

Key Features

- ▶ 16 GEPON ports and 16 uplink (1000Base-T/1000Base-SX/LX) ports
- ▶ Wavelength: 1.31 um for upstream and 1.49 um for downstream
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ Advanced security: 802.1x port authentication, IGMP V1/V2 snooping & Filtering, AES algorithm with 128-bit encryption



OLT-1308

8-port GEPON Optical Line Terminal + L2 Switch

The OLT-1308 is a stand-alone managed Layer-2 GEPON switch providing 8 GEPON ports, 4 combo uplink ports (copper plus SFP) and one 10/100Mbps Ethernet port for out-of-band management.

Key Features

- ▶ 8 IEEE 802.3ah-compliant GEPON ports
- ▶ 4 GbE uplink ports (1000Base-T/1000Base-SX/LX)
- ▶ Wavelength: 1.31 um for upstream, 1.49 um for downstream
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ Advanced security: 802.1x port authentication, IGMP V1/V2 snooping & Filtering, AES algorithm with 128-bit encryption





OLT-1308H

8-port GEPON Optical Line Terminal

The OLT-1308H provides 8 uplink ports without Layer-2 switch. For compatible CPE, there are different LAN interfaces to adapt to your network applications, one GbE for high bandwidth, four FE for multiple users and Coaxial for the 1550 nm video support.

Key Features

- ▶ 8 IEEE 802.3ah-compliant GEPON ports
- ▶ 8 Auto MDI/MDI-X 1000 Mbps uplink ports
- ▶ Wavelength: 1.31 um for upstream, 1.49 um for downstream
- ▶ IP QoS support: VLAN, multicasting and priority queue
- ▶ Advanced security: 802.1x port authentication, IGMP V1/V2 snooping & Filtering, AES algorithm with 128-bit encryption



ONU-634HA-11/12

GEPON Optical Network Unit + 4-port Switch

The ONU-634HA-11/12 Series is a 4-port ONU supporting Ethernet applications for residence, SOHO and SMB users. The ONU-634HA-11 is for 1000BASE-PX10U with a maximum transmission distance of 10km, while the ONU634HA-12 is for 1000BASE-PX20U with a maximum transmission distance of 20 km.

Key Features

- ▶ 1 Gigabit single-mode PON port (IEEE 802.3ah)
- ▶ 4 10/100Based-TX (IEEE 802.3, IEEE 802.3u)
- ▶ Fiber Tray
- ▶ Supports remote control from OAM channel and data loop back test
- ▶ IP QoS support: VLAN, multicasting, priority queue and 802.1x



ONU-634FA-11

GEPON Optical Network Unit + RF overlay

The ONU-634FA-11 is a 4-port ONU supporting Ethernet applications and 1-port F-type connector for RF overlay to service residence, SOHO and SMB users. The ONU-634FA-11 is for 1000BASE-PX10U with a maximum transmission distance of 10 km.

Key Features

- ▶ 1 Gigabit single-mode PON port (IEEE 802.3ah)
- ▶ 4 10/100Based-TX (IEEE 802.3, IEEE 802.3u)
- ▶ 1550 nm RF overlay
- ▶ Supports remote control from OAM channel and data loop back test
- ▶ IP QoS support: VLAN, multicasting, priority queue and 802.1x



ONU-631HA-11/12

GEPON Optical Network Unit

The ONU-631HA-11/12 Series is a wall-mount type one-port ONU supporting Ethernet applications for residence, SOHO and SMB users. The ONU-631HA-11 is for 1000BASE-PX10U with a maximum transmission distance of 10km, while the ONU631HA-12 is for 1000BASE-PX20U with a maximum transmission distance of 20 km.

Key Features

- ▶ 1 Gigabit single-mode PON port (IEEE 802.3ah)
- ▶ 1 10/100/1000Based-Tx (IEEE 802.3, IEEE 802.3u, IEEE 802.3ab)
- ▶ Supports remote control from OAM channel and data loop back test
- ▶ IP QoS support: VLAN, multicasting, priority queue and 802.1x

GPON



P-3202HW-B

GPON IAD

The P-3202HW-B is a GPON ONU that provides high-speed fiber access with residential gateway, VoIP and wireless features. It allows users to widely deploy triple-play services such as voice, video, data, high-definition television (HDTV) and interactive gaming easily.

Key Features

- ▶ ITU-T GPON standard compliance: G.984.1, G.984.2, G.984.3, G.984.4
- ▶ 1 Gigabit single mode PON interface (Class B+)
- ▶ Support GPON access rate up to DS 2.4 Gbps/US 1.244 Gbps
- ▶ 802.11g wireless lan AP function built in
- ▶ Advance QoS for Triple play services
- ▶ Standard VoIP SIP compliance (RFC3261)
- ▶ TR-069/104 remote management agent built in



Feature Matrix

VDSL2 Switch

Product Description	VDSL2 Switch					
Model No.	VES-1624FT-54A/55A	VES-1624FT-54/55	VES-1624FTV-54A/55A	VES-1624PT-54/55	VES-1616FE-54A/55A	VES-1608FE-54/55
System Overview						
Dimensions (W x D x H)	440 x 250 x 66 mm	440 x 250 x 66 mm	440 x 250 x 66 mm	440 x 250 x 66 mm	380 x 380.5 x 114 mm	380 x 380.5 x 114 mm
Housing Type	Temperature Harden	Temperature Harden	Temperature Harden	Temperature Harden	Environmental Harden	Environmental Harden
Height	1.5U	1.5U	1.5U	1.5U		
Power	AC 100-240V/DC -36 ~ -72V	AC 100-240V/DC -36 ~ -72V	AC 100-240V/DC -36 ~ -72V	AC 100-240V/DC -36 ~ -72V	AC 100-240V	AC 100-240V
Power Consumption	< 80 W	< 80 W	< 100 W	< 100 W	< 100 W	< 85 W
Operating Temperature	-40°C ~ 65°C	-40°C ~ 65°C	-40°C ~ 65°C	-40°C ~ 65°C	0°C ~ 50°C	0°C ~ 50°C
Operating Humidity	5 ~ 90%	5 ~ 90%	5 ~ 90%	5 ~ 90%	5 ~ 90%	5 ~ 90%
Transmission Rate	100/50 Mbps	100/50 Mbps	100/50 Mbps	100/50 Mbps	100/100 Mbps	100/100 Mbps
ADSL fallback	•		•			
Interface						
GbE Interface	2 x Dual Personality (RJ-45/SFP slot)	2 x Dual Personality (RJ-45/SFP slot)	2 x Dual Personality (RJ-45/SFP slot)	1 x Dual Personality (RJ-45/SFP slot)	2 x Dual Personality (RJ-45/SFP slot)	2 x Dual Personality (RJ-45/SFP slot)
VDSL Interface	24	24	24	24	16	16
POTS Interface	24	24	24	24		
Maintenance Interface	Mini RJ11	Mini RJ11	Mini RJ11	Mini RJ11	1 DB9 console	1 DB9 console
Outband Management	1	1	1	1	1	1
Alarm Interface	1	1	1	1		
QoS Function						
802.1p Priority Queue	8	8	8	8	8	8
802.1ad VLAN Q-in-Q	•	•	•	•	•	•
802.1q Tag-based VLAN	•	•	•	•	•	•
802.3x Flow Control	•	•	•	•	•	•
Management						
IGMP v1, v2	•	•	•	•	•	•
SNMP v1, v2	•	•	•	•	•	•
MIBs II	•	•	•	•	•	•
DHCP Relay, Client	•	•	•	•	•	•
Port Mirroring		•				
Web-based GUI	•	•	•	•	•	•
Telnet CLI	•	•	•	•	•	•
802.1x Authentication	•	•	•	•	•	•
MAC Filtering	•	•	•	•	•	•
MAC Counting	•	•	•	•	•	•
SSH Encrypting Administration Traffic	•	•	•	•	•	•
Regulation						
ANSI/ETSI	VES-1624FT-54	VES-1624FT-54	VES-1624PT-54	VES-1624PT-54	VES-1608PE-35	VES-1608FA-35
Compatible CPE	P-870H-51 P-870HW-51	P-870H-51 P-870HW-51	P-870H-51 P-870HW-51	P-870H-51 P-870HW-51	P-870H-51 P-870HW-51	P-870H-51 P-870HW-51



GEAPON

Product Description	Optical Line Terminal/Optical Network Unit			
Model No.	OLT-2300	OLT-1308H	OLT-1308	ONU-634FA-11
System Overview				
Dimensions (W x D x H)	435.7 x 232 x 191.85 mm	440 x 450 x 43.6 mm	440 x 450 x 43.6 mm	181 x 123 x 36 mm
Housing Type	Chassia	Pizza box	Pizza box	Wallmount
Power	Dual DC -48 V	AC 100V-240V ±10%	AC 100V-240V ±10%	12 V/1 A
Power Consumption	< 200 W	< 85 W	< 85 W	< 12 W
Operating Temperature	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C
Operating Humidity	5 ~ 85% RH	5 ~ 85% RH	5 ~ 85% RH	Less than 90% RH
Interface				
Uplink Interface	1000Base-T	16	8	4
	1000Base-SX/LX	16		4
LAN Interface				4 x 10/100Based
PON Interface	16	8	8	1000BASE-PX10U
RF Video Interface				1x F-type female connector
Maintenance Interface	10/100Base-T	1	1	1
	DB9 Serial port	1	1	1
QoS Function				
802.1p Priority Queue	4 queues	4 queues	4 queues	8
802.1q Tag-based VLAN	•	•	•	•
802.3x Flow Control	•	•	•	•
Management				
SNMP v1, v2	•	•	•	•
MIBs II	•	•	•	•
Web-based GUI	•	•	•	•
Telnet CLI	•	•	•	•
Loop Testing	Loop back	Loop back	Loop back	Loop back
Failure Alarm Detecting Function (Power/Linkdown/UNI Port Status)	Detection	Detection	Detection	Detection
Security Function				
802.1x Authentication	•	•	•	•
Encryption (AES-128)	•	•	•	•
VLAN Stacking	•	•	•	•
MAC Filtering	•	•	•	•
MAC Counting	•	•	•	•
MAC Address Table	8,000/PON	8,000/PON	8,000/PON	64

GEAPON & GPON

Product Description	Optical Line Terminal/Optical Network Unit				
	GEAPON				GPON
Model No.	ONU-631HA-11	ONU-631HA-12	ONU-634HA-11	ONU-634HA-12	P-3202HW-B
System Overview					
Standard Compliance					ITU-T G.984
Dimensions (W x D x H)	110 x 170 x 17 mm	110 x 170 x 17 mm	182 x 134 x 36 mm	182 x 134 x 36 mm	219 x 146 x 44 mm
Fiber Storage			•	•	
Housing Type	Wall-mounting	Wall-mounting	Wall-mounting	Wall-mounting	Stand-alone
Power	12 V/1 A	12 V/1 A	12 V/1 A	12 V/1 A	18 V/1 A
Power Consumption	< 8 W	< 8 W	< 10 W	< 10 W	< 13 W
Operating Temperature	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 50°C	0°C ~ 40°C
Operating Humidity	5 ~ 85% RH	5 ~ 85% RH	5 ~ 85% RH	5 ~ 85% RH	20 ~ 85% RH
Interface					
PON Interface (20 km or 10 km)	1000Base-PX10	1000Base-PX20	1000Base-PX10	1000Base-PX20	1
Maintenance Interface (10/100Base-T)			1	1	
Subscriber Interface	1 x 10/100/1000Base-T	1 x 10/100/1000Base-T	4 x 10/100Base-T	4 x 10/100Base-T	
LAN Interface					4 x 10/100 Base-T
QoS Function					
802.1p Priority Queue	4 queues	4 queues	4 queues	4 queues	8
802.1q Tag-based VLAN	•	•	•	•	•
802.3x Flow Control	•	•	•	•	•
Management					
SNMP v1, v2	•	•	•	•	•
MIBs II	•	•	•	•	•
Web-based GUI	•	•	•	•	•
Telnet CLI	•	•	•	•	•
Loop Testing	Loop back	Loop back	Loop back	Loop back	Loop back
Failure Alarm Detecting Function (Power/ Linkdown/UNI Port Status)	Detection	Detection	Detection	Detection	Detection
Security Function					
802.1x Authentication	•	•	•	•	•
Encryption (AES-128)	•	•	•	•	•
VLAN Stacking	•	•	•	•	•
MAC Filtering	•	•	•	•	•
MAC Counting	•	•	•	•	•
MAC Address Table	64	64	64	64	64
Regulation					
Wireless (802.11b/g)					•
VoIP					•

