



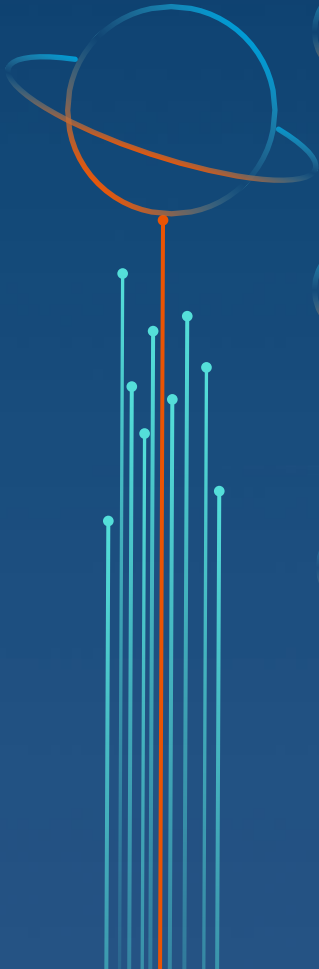
FiberHome FTTH Solution in Ultra BB Era

FiberHome



FiberHome Telecommunication Technologies Co., LTD
2021

Content

A decorative graphic on the left side of the slide. It consists of a blue circle with an orange ring around it, and a series of vertical lines of varying heights in blue and orange, some ending in small dots.

① FiberHome overview

② Product Introduction

③ Successful Stories



FiberHome FTTx Overview

Global presence

120+ million lines
30+ countries



Recent achievements

- ✓ More than 15 years PON technology R&D.
- ✓ More than 1000 technical standard proposals and patents in ITU-T, IEEE, CCSA.
- ✓ 1st commercialized FTTH project deployed in China.
- ✓ 1st turnkey vendors in China. One of the Most competitive FTTH total solution vendors.
- ✓ 1st FTTx+xDSL scenario commercialized project deployed in China.

2005

1G-PON on 1st FTTH program in China

2011

Commercially available 10G-EPON, 10G-GPON

2012

Began the study of TWDM-PON, release in 2014

2016

100G-PON experiment in Shanghai Jiao Tong University

2018

XGS-PON COMBO applicants in commercial area

■ Global Sales & Service Network



- **Global service system**
 - 10 regional centers
 - covering 90+ countries

- **Global service quality**
 - 300-second response time
 - 7*24 technical support

- **Global service resource**
 - 3000+ experts & PMP
 - 6000+ engineers

FiberHome Position in the FTTx field

Total OLT

Vendor shipments – Ports

Vendor	2011	2012	2013	2014	2015	2016	2017	2018
Adtran	3.000	2.250	11.200	18.400	24.000	33.900	38.540	24.625
Calix	79.004	23.151	26.400	42.000	52.400	53.400	66.500	60.900
Dasan Zhone	-	-	-	-	-	54.798	100.866	97.792
Fiberhome	326.930	248.321	455.011	399.003	598.776	850.258	1.068.324	797.433
Fujitsu	14.700	8.087	1.000	10.260	8.167	12.122	7.333	2.295
Huawei	1.706.971	1.475.788	1.829.062	2.212.424	3.466.172	4.323.410	3.915.854	4.004.304
Mitsubishi	105.800	65.000	92.400	66.500	47.400	31.646	25.480	15.380
NEC	29.500	25.600	13.000	7.000	2.000	7.000	37.000	8.800
Nokia	190.962	322.736	372.304	575.204	607.166	919.532	680.828	938.740
Sumitomo	91.294	75.875	90.500	63.961	48.352	32.290	39.700	29.300
ZTE	1.824.600	1.716.568	1.302.226	1.762.110	2.645.656	2.402.350	2.607.012	2.225.884
Others	122.394	117.918	129.703	131.668	139.223	126.457	123.900	124.200
Total	4.495.155	4.081.294	4.322.806	5.288.530	7.639.312	8.847.163	8.711.337	8.329.653
YoY change	115,2%	-9,2%	5,9%	22,3%	44,5%	15,8%	-1,5%	-4,4%

ONT/ONU Total

Vendor shipments – Ports

Vendor	2011	2012	2013	2014	2015	2016	2017	2018
Adtran	26.000	25.000	45.500	50.700	73.500	138.700	190.710	214.640
Calix	589.840	260.306	335.000	518.000	696.000	875.000	940.000	1.212.350
Dasan Zhone	-	-	-	-	-	1.142.257	1.898.004	2.554.122
Fiberhome	1.448.788	1.416.029	4.413.746	6.445.671	12.787.148	11.283.039	12.456.131	17.456.914
Fujitsu	1.592.888	1.308.888	1.981.988	1.888.888	781.128	882.184	881.884	418.888
Huawei	9.140.097	12.341.135	18.865.092	24.016.636	45.450.447	43.612.552	37.655.343	44.554.681
Mitsubishi	1.240.000	1.280.000	1.012.500	1.155.400	1.345.000	766.917	758.000	523.600
NEC	190.500	308.000	17.000	130.000	143.000	154.000	99.000	175.000
Nokia	2.373.931	5.860.795	5.141.706	6.571.897	10.815.230	13.455.582	13.823.445	16.221.346
Sumitomo	1.241.600	1.140.400	1.157.025	1.145.793	1.464.156	805.080	58.400	60.900
ZTE	7.461.010	13.024.266	12.758.954	17.894.424	34.557.358	25.600.010	29.252.130	32.659.879
Others	1.929.785	2.379.143	2.101.889	1.970.286	1.918.907	4.055.396	11.594.800	11.047.450
Total	27.173.551	39.338.074	46.879.912	60.985.407	110.031.875	102.770.637	109.387.467	127.095.882
YoY change	101,2%	44,8%	19,2%	30,1%	80,4%	-6,6%	6,4%	16,2%

Rank No.4 of OLT shipments

Rank No.3 of ONT shipments

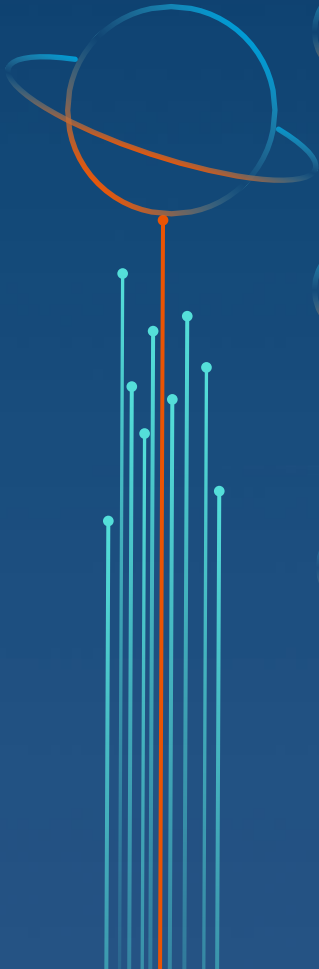


**Mainstream telecom operators
partner in Global Market**



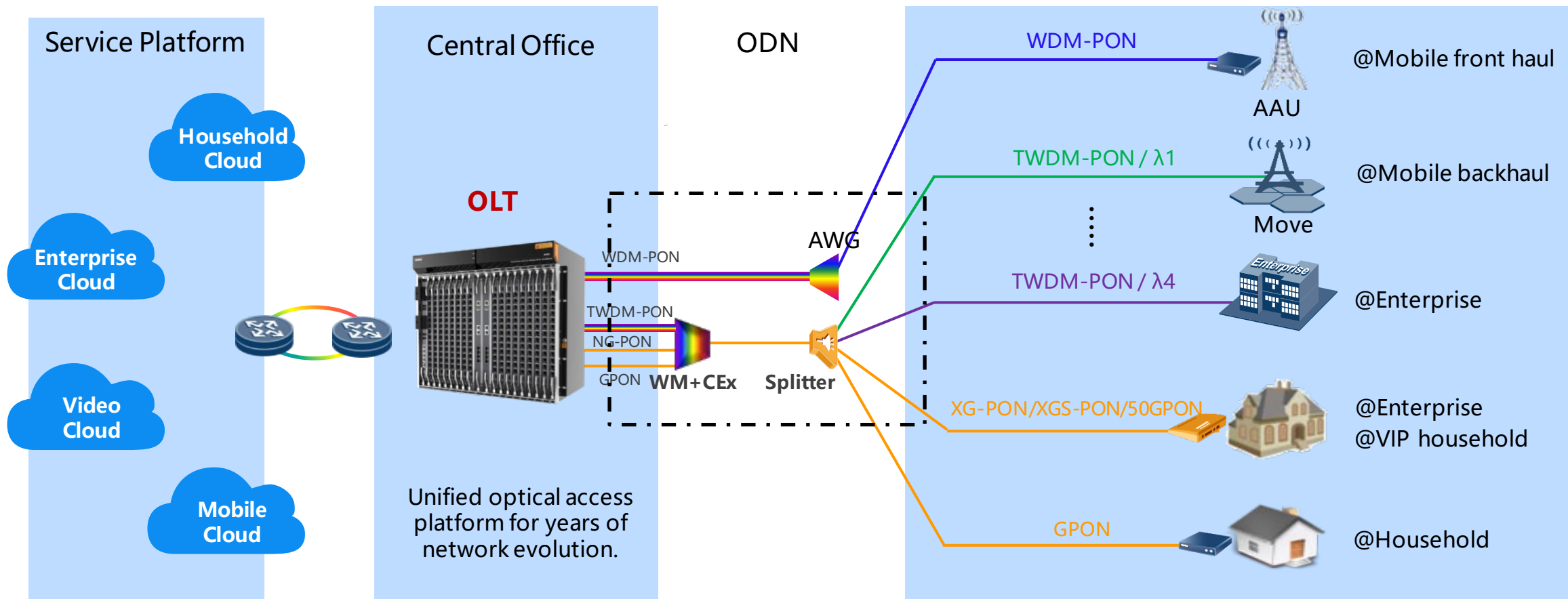
Data source: OVUM 2019 Q1 official report

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■ Various Access Solutions Which FH Can Provide



Support: GPON、XG-PON、XG-PON COMBO、XGS-PON、XGS-PON COMBO、TWDM PON、WDM PON、P2P

The solutions support a variety of scenarios which increase network value and improve the ROI

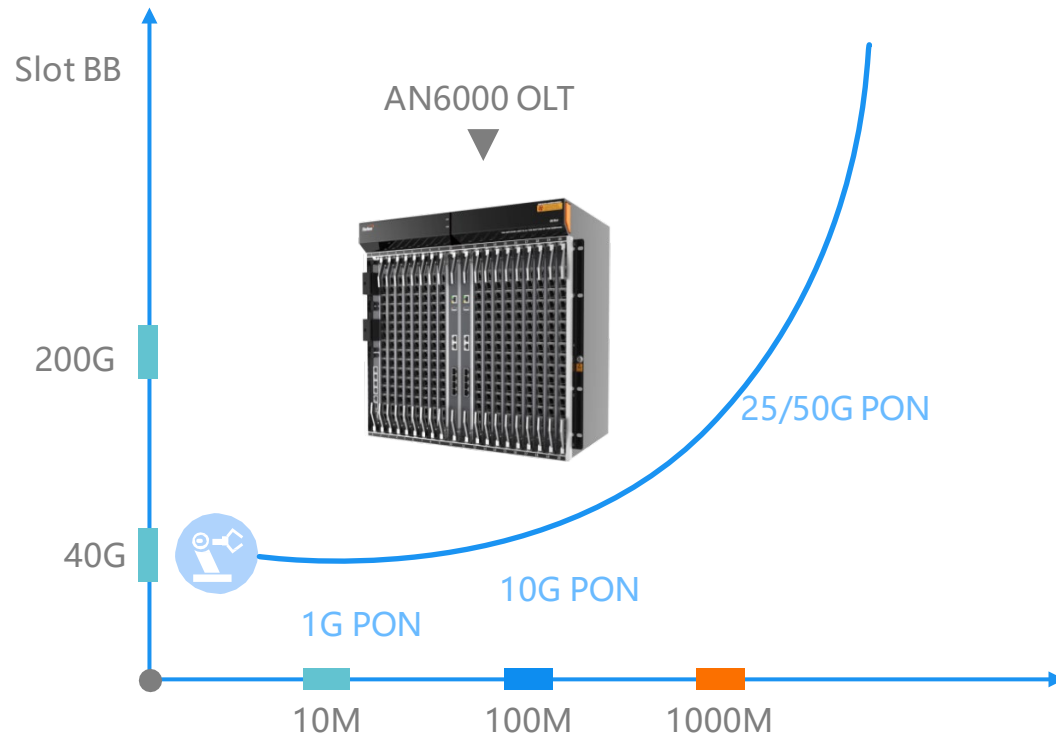
The solutions simplify the Network Structure and reduce the OPEX

FiberHome AN6000 Series OLT

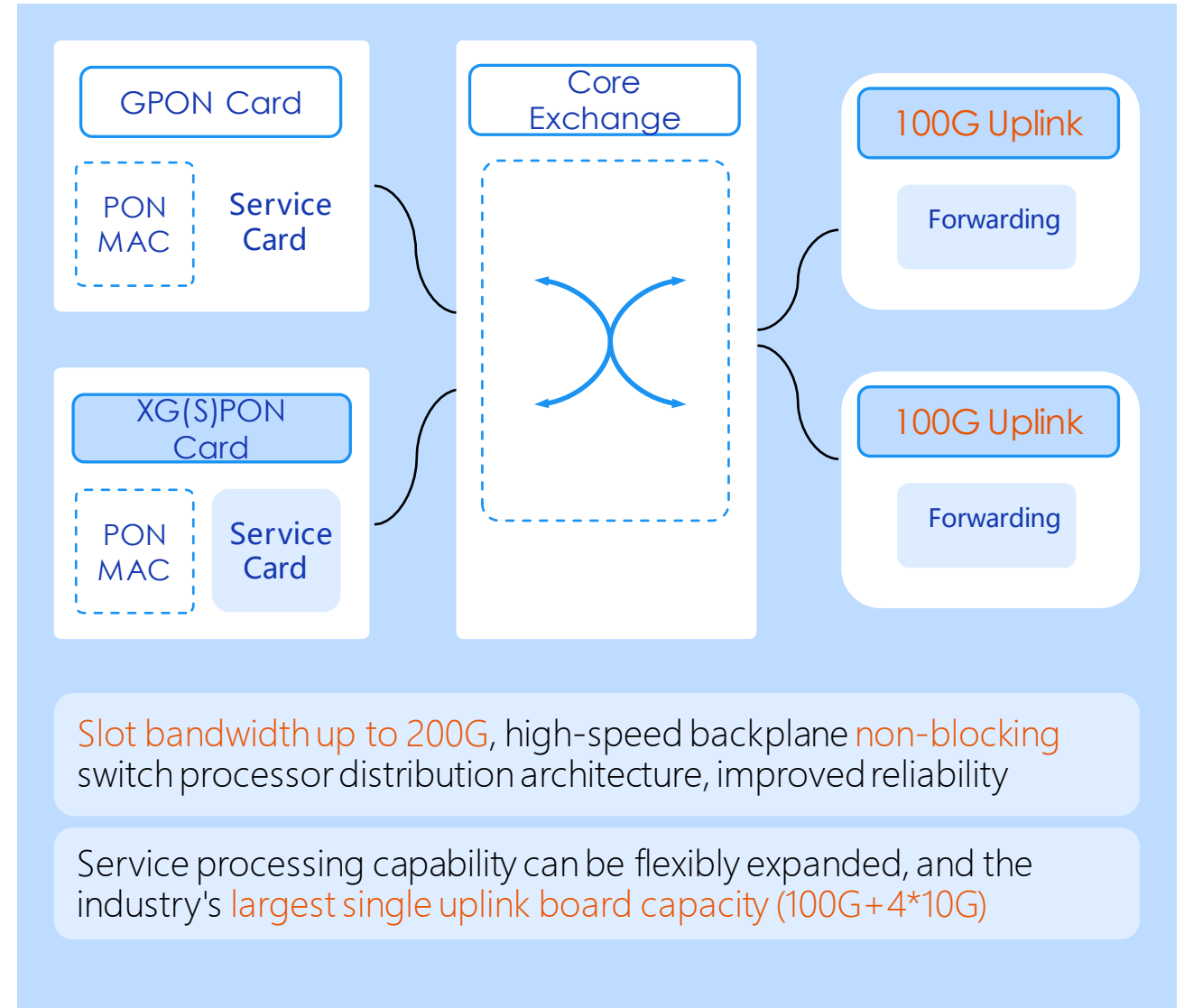


Rack	21 inches	19/21 inches			
Slots	Main Control: 2 Service or Uplink: 17 Common Interface: 1 Power Units: 2 Fan Unit: 1	Main Control: 2 Service or Uplink: 15 Common Interface: 1 Power Units: 2 Fan Unit: 1	Main Control: 2 Service or Uplink: 7 Common Interface: 1 Power Units: 2 Fan Unit: 1	Main Control & Uplink: 2 Service: 2 Power Units: 2 Fan Unit: 1	Main Control & Uplink & Service: 1 Power Units: 2
Dimension (H*W*D)	486*530*284 mm (21")	486 * 530 * 284 mm (21")	266 * 530 * 254 mm (21")	88 * 530 * 254 mm (21")	44.4 * 530 * 229 mm (21")
	N/A	486 * 480 * 284 mm (19")	266 * 480 * 254 mm (19")	88 * 480 * 254 (19")	44.4 * 480 * 229 mm (21")
Switch Capacity	6.8 T	6.8 T	6.8 T	880G	—
Slots Bandwidth	200 G	200 G	200 G	200 G	—
4K subscribers Qty.	17K	17K	8,000	4,000	1,000
ONTs Qty.	17K	17K	8,000	4,000	1,000
MAC address	256 K	256 K	256 K	256K	64 K
ARP/router	128 K	128 K	128 K	80 K	8 K
GPON ports	272	240	112	32	16
XGPON ports	272	240	112	32	—
XGSPON ports	272	240	112	32	—
Voltage	-48V	-48V	-48V	DV: -48V, AC: 110/220V	DV: -48V, AC: 110/220V
Temperature	-40℃ ~ +65℃ (Working) , -25℃ ~ +65℃ (Starting)				

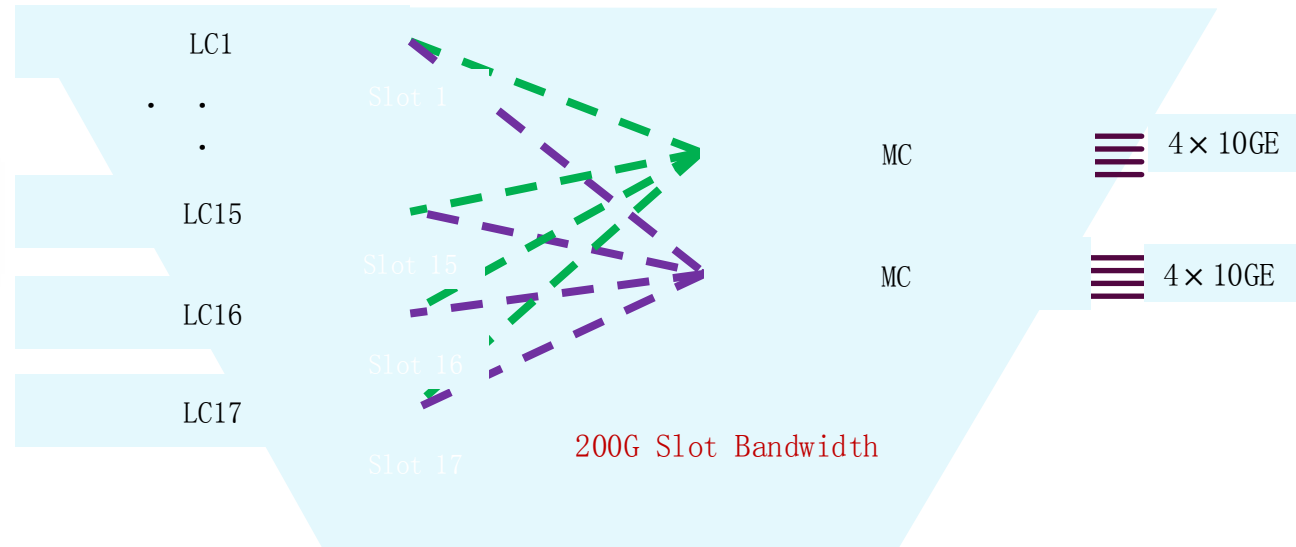
OLT AN6000 Distributed Architecture



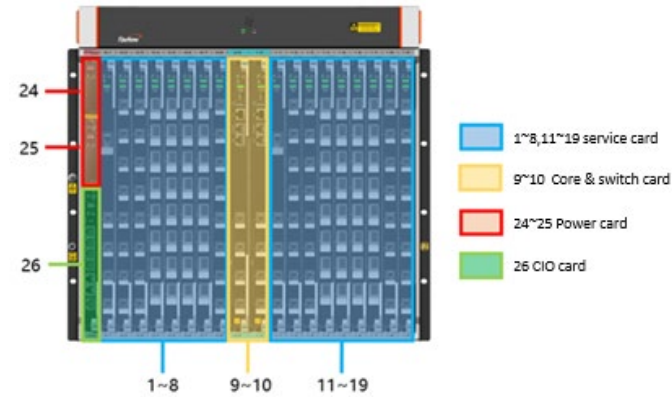
High-performance Platform fully supports Gigabit on table



■ 200G Slot Bandwidth Design

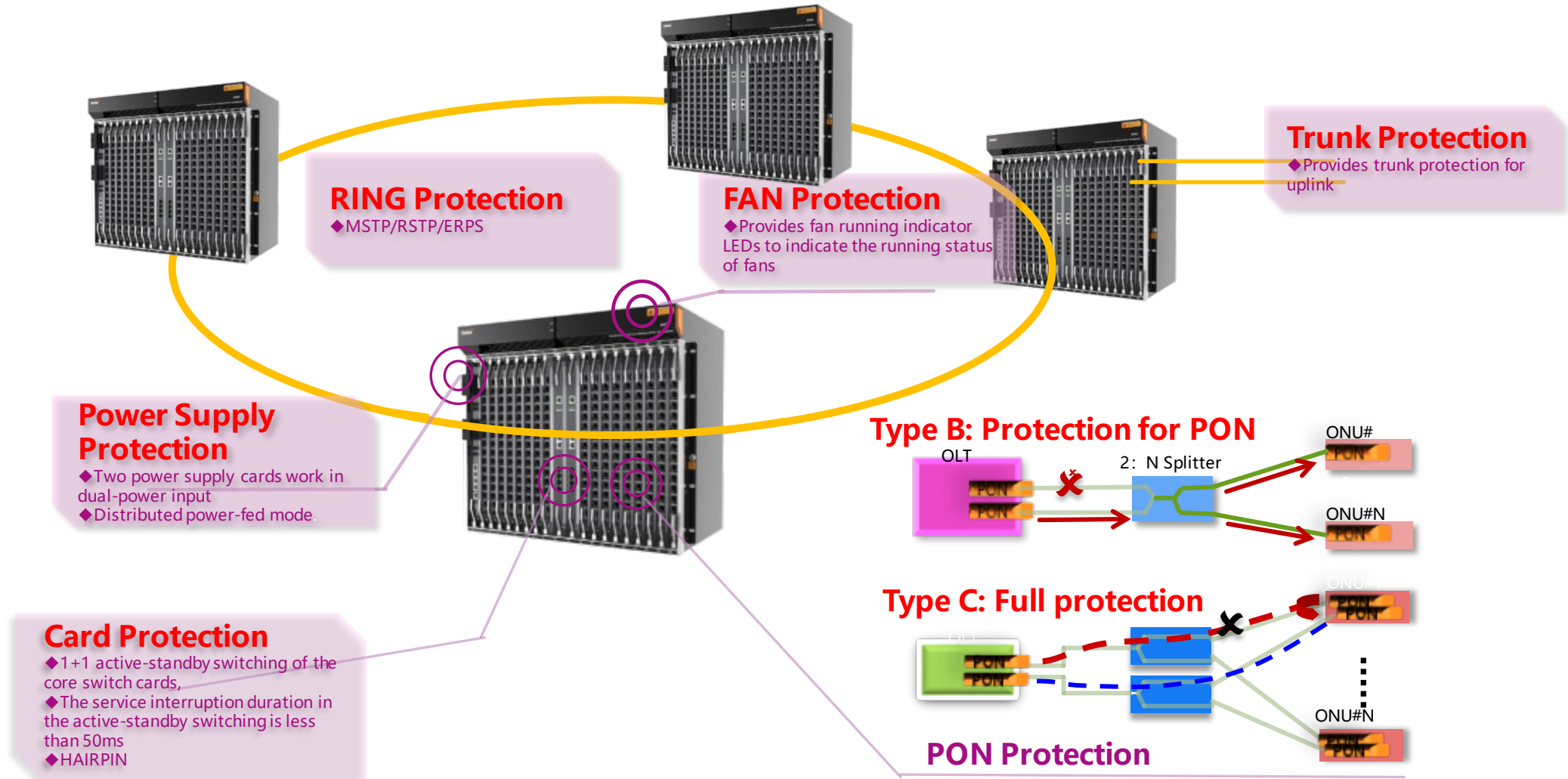


- 200G slot bandwidth supports GPON/XGPON to 25G+ PON evolution
- Ultra big back panel design



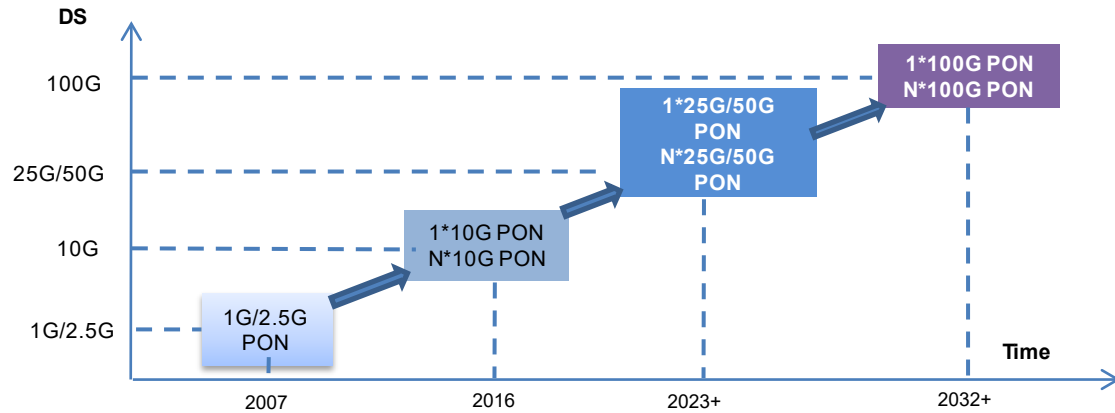
- 100G port uplink board, service no convergence
- Huge switching and non-blocking forwarding capability

■ OLT High Reliability Design(AN6000 Series OLT)



■ Solution For Smooth Evolution To Next Generation PON

50G PON becomes the new trend



● TDM-PON structure (50G GPON)



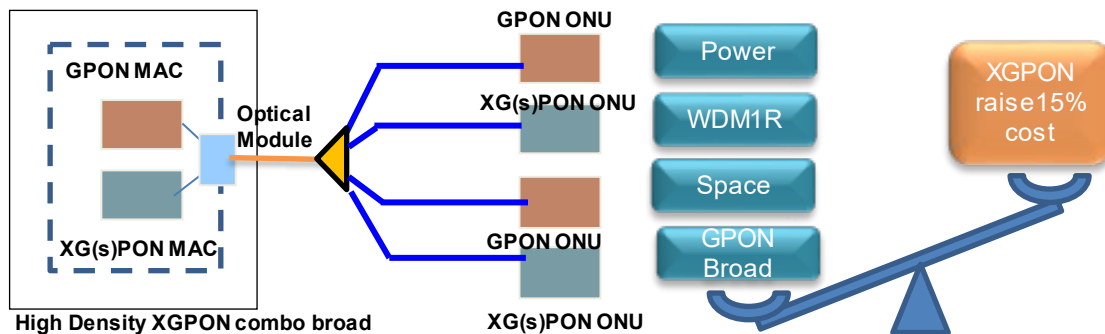
- Single wave-length for uplink/downlink. Smoothly upgrade
- 50G in one wavelength
- Main equipment providers` option

● TWDM-PON structure (NG PON2)

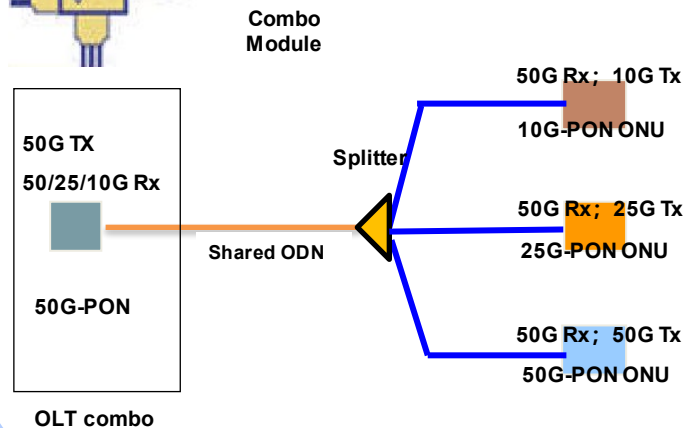
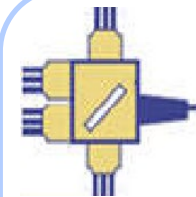


- 4 wave-lengths for 10G (4*10G), more complicated
- ONU side need tunable T/Rosa. Cost High
- System cost too much frequency.

XGS-PON Combo Solution



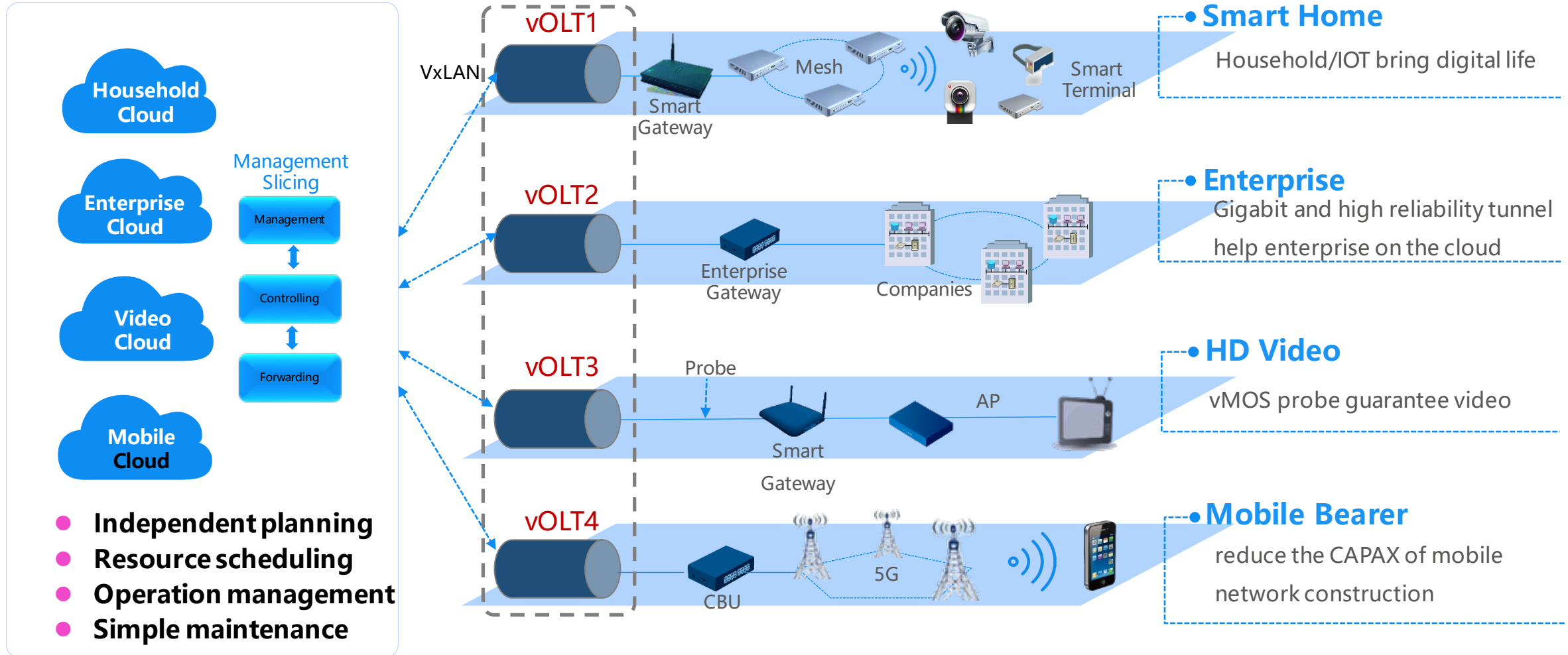
50G-PON Combo



- **Single λ 10G/50 G**
- Bandwidth reach 50Gbps and 100Gbps
- Make full use of 50G industry chain

Smoothly Upgrade

■ Slicing helps Telcos to Provide Multiple Services



OLT Slicing Principle



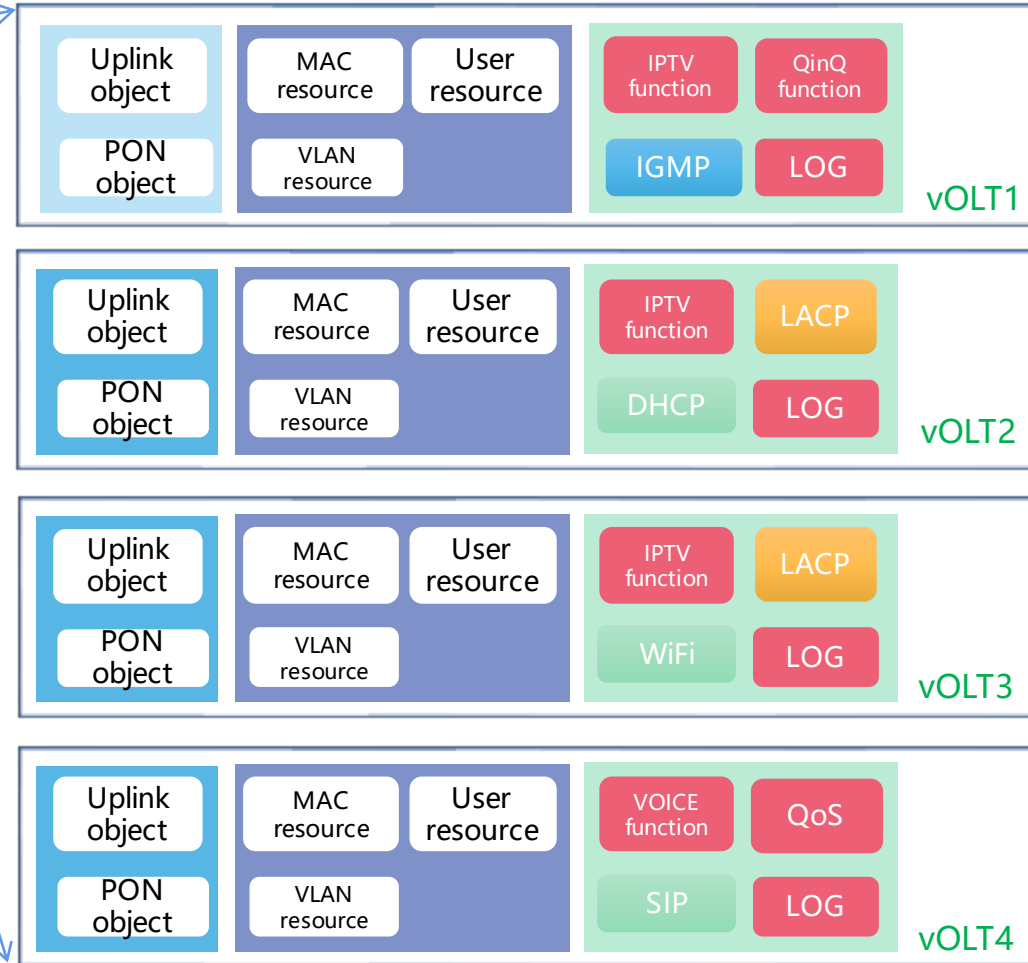
Independent Hardware Resource

- Forwarding domain isolation
- Independent MAC address resource
- Independent uplink resource
- Independent VLAN resource

Management decentralized domain

- Independent management domain

Software feature independence



vOLT composition

Object set

- Uplink port
- Board (uplink/service)
- PON port

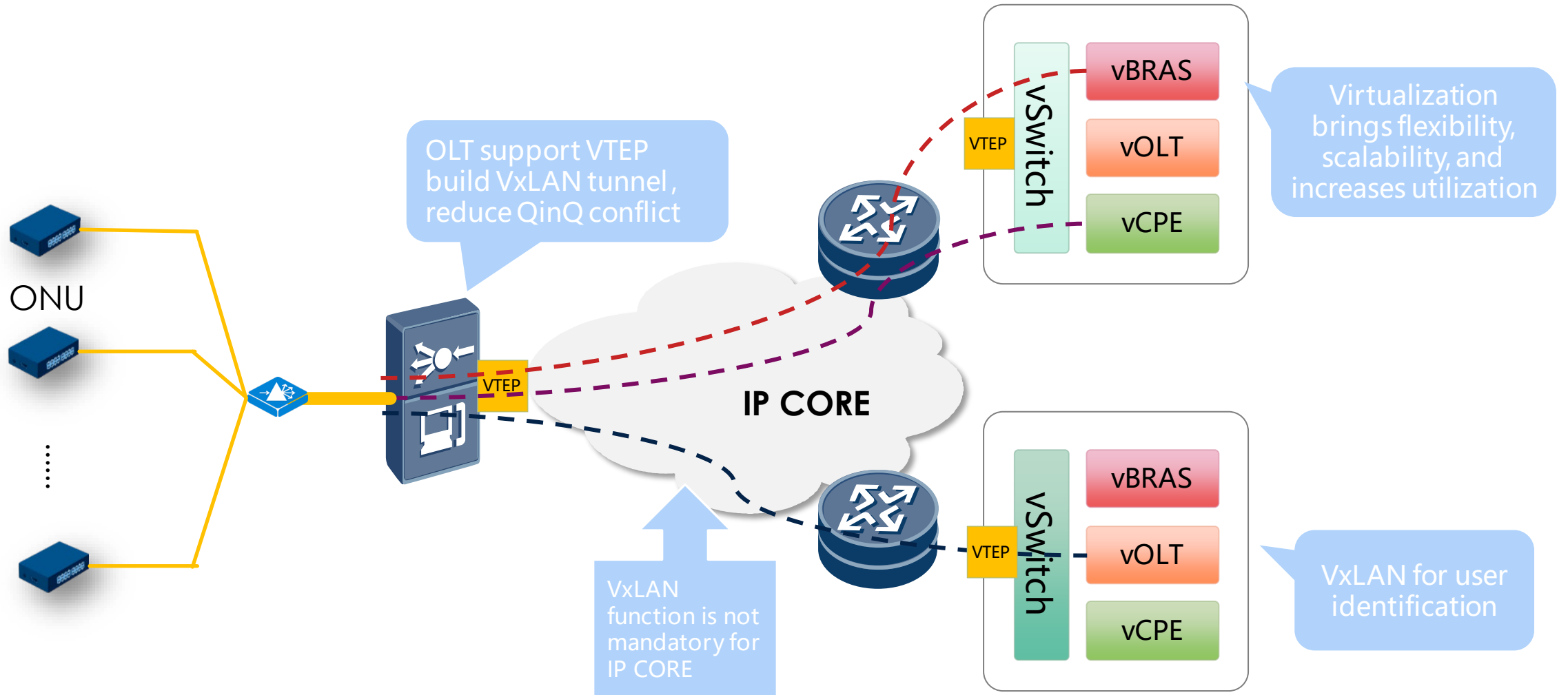
Resource

- MAC resource
- Subscriber resource
- VLAN resource
-

Capability set

- LACP function
- IGMP function
- HQoS function
-

VxLAN Tunnel is the Key to Slicing



■ HSCA Main Control Board



Functional characteristics

- System control, service exchange and convergence
- Support active/standby backup and service load sharing
- Support synchronous Ethernet, 1588v2
- Support OLT slicing and VxLAN

Management interface

- CONSOLE (RJ45): RS-232 maintenance serial port
- ETH (RJ45): Maintenance Ethernet interface
- ESC (RJ45): RS485 monitor serial port
- USB: Reserved

Communication interface

- SFP+ 1~4: GE/10GE Upper interface

Specifications

Switching capacity (load sharing)	6.8T
Maximum frame length	13K byte
Number of access ONUs	17K
Number of MAC addresses	256K
IPv4/IPv6 routing table item	16K/8K
The number of access ONU	17K
vOLT slice number	8
The number of VxLAN tunnel	4K
Working temperature	-40~65°C
Static/Typical/Maximum Power Consumption	58 W/74 W/90 W

KU1B Uplink Board



Functional characteristics

- Support uplink function
- Support intra-board link aggregation
- Support cross-board link aggregation
- Support dual uplink protection
- Support MSTP ring network protection

External interface

- 1*100G (QSFP28),
- 4*GE/10GE(eSFP/SFP+)

Specifications

Forwarding Performance	140 Gbits/s
Max Frame	13K byte
LACP	Intra-board link aggregation Cross-board link aggregation
Network Protection	Dual uplink protection MSTP ring network protection
QoS	Support
Working temperature	-40~65°C
Static power consumption	12W
Maximum Power Consumption	25 W

■ GNOA XGS-PON COMBO card



Functional characteristics

- Support ITU-T G.984 GPON access.
- High density 16 channels GPON/XGS-PON non blocking forwarding
- Support for Type-B and Type-C protection reversing
- Support rogue ONU detection
- Support ONU granularity slicing

External interface

- 16*GPON & XGS-PON Combo ports
- Maximum split ratio 1:128 for GPON, 1:256 for XGS-PON
- Support CLASS C+ optical module
- SC/PC optical fiber connector

Specifications

Forwarding Performance	160 Gbits/s
Rate	1.25Gbit/s/2.5Gbit/s, 10Gbit/s/10Gbit/s
The number of T-CONT supported per PON port	2048
Maximum frame length	9600
Number of MAC addresses	65536
Logical distance	60KM
Maximum differential fiber distance	40KM
Variable length OMCI	Support
HQoS	Support
Speed limit based on ONU and flow	Support
Working temperature	-40~65°C
Static/Typical/Maximum Power Consumption	60 W/110 W/120 W

■ GFOA Agile-PON card



Functional characteristics

- Support ITU-T G.984 GPON access.
- High density 16 channels GPON/XG-PON/XGS-PON non blocking forwarding
- Support for Type-B and Type-C protection reversing
- Support rogue ONU detection
- Support ONU granularity slicing

External interface

- 16*GPON & XG-PON & XGS-PON Combo ports
- Maximum split ratio 1:128 for GPON,1:256 for XG(S)-PON
- Support CLASS C+ optical module
- SC/PC optical fiber connector

Specifications

Forwarding Performance	160 Gbits/s
Rate	1.25Gbit/s/2.5Gbit/s, 10Gbit/s/2.5Gbit/s,10Gbit/s/10Gbit/s
The number of T-CONT supported per PON port	2048
Maximum frame length	9600
Number of MAC addresses	65536
Logical distance	60KM
Maximum differential fiber distance	40KM
Variable length OMCI	Support
HQoS	Support
Speed limit based on ONU and flow	Support
Working temperature	-40~65°C

Broadband ONT Series

ONT

AN5506-01-A



GPON, 1GE

AN5506-02-B



GPON, 2GE+1POTS

HG6240A



GPON, 4GE+2POTS

HG5852SA



XGSPON, 1*10GE+4GE+2POTS

Wi-Fi 4/Wi-Fi 5 HGU ONT

HG6543C



GPON, Single band Wi-Fi,
2GE+2FE+1POTS

HG6243C



GPON, Single band Wi-Fi,
4GE+2POTS

HG6245D/HG6143D



GPON, Dual band Wi-Fi,
4GE+2/1POTS

Wi-Fi 6 HGU ONT

HG6145F



GPON, Dual band Wi-Fi 6,
4GE+1POTS, AX1800

HG6245N



GPON, Dual band Wi-Fi 6
4GE+2POTS, AX2700

HG62456R



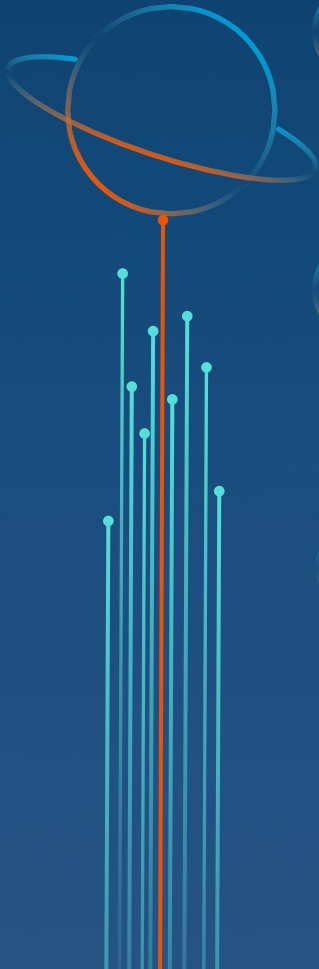
GPON, Dual band Wi-Fi 6
4GE+2POTS+CATV, AX2400

*HG5855SW (*development)*



XGSPON, Dual band Wi-Fi 6
1*10GE+4GE+2POTS, AX6000

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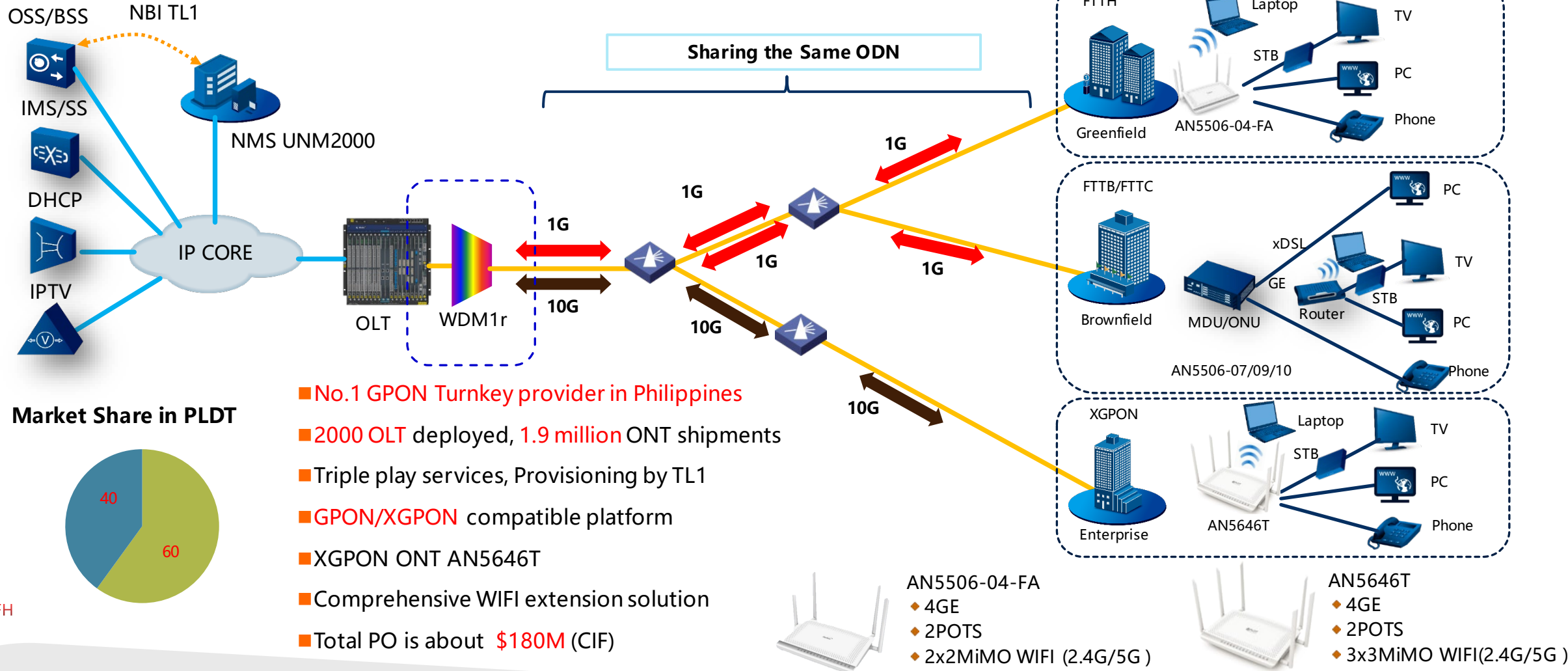


Global successful stories

GPON/XGPON Turnkey Provider in Philippines



Philippines



■ Global successful stories



Indonesia

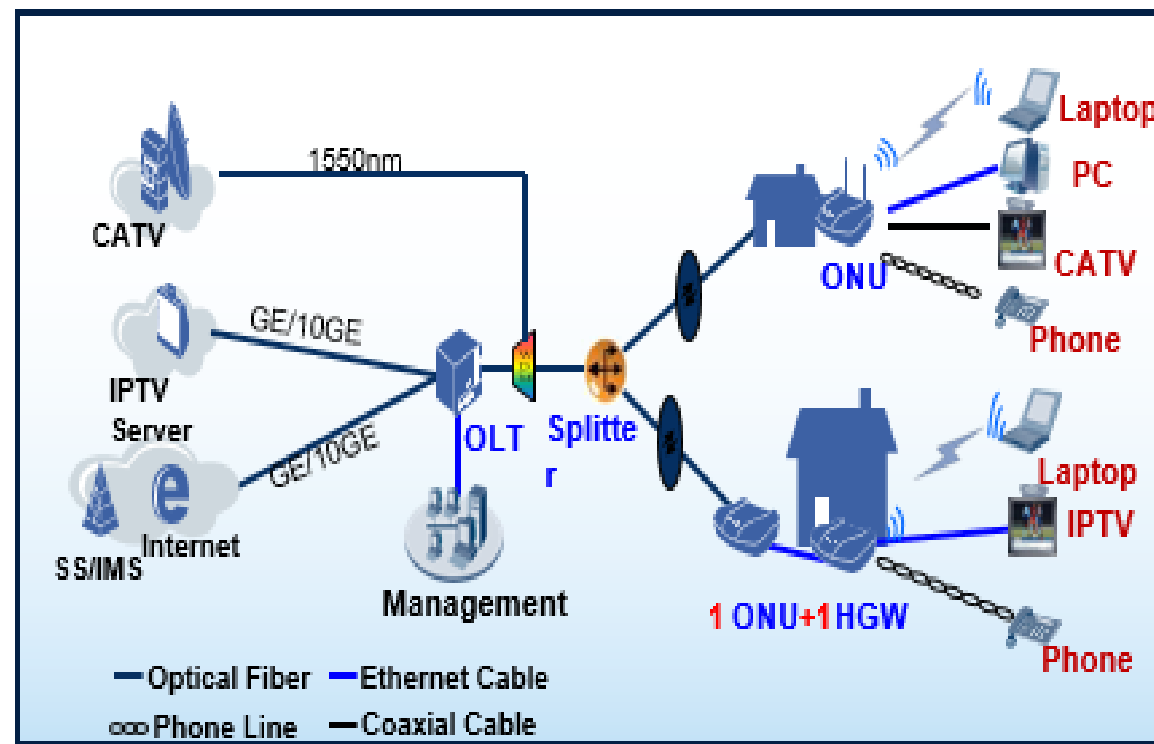
Telkom Indonesia FTTH Project

Fiberhome is important supplier of Telkom Indonesia .Now Fiberhome is deploying XGS-PON service for Telkom Indonesia .In 2019 FiberHome has supplied 23 AN6000 OLTs, this year FiberHome shall supply over 70 AN6000 OLT and 400 service cards for Telkom Indonesia. FiberHome has now provided over 200,000 HG6243C ONT devices, and XGSPON ONT had been deployed in 2020.

Until now Fiberhome had supplied 1.5M ONT / 1000 OLT in Indonesia. Total PO is over \$60M.



Customer Oriented, Dedication & Integrity



■ Global successful stories



Romania

Romania RCS&RDS GPON FTTH Project



- ONU Highly Customized in 3 months
- Delivery quick and Flexible services by Local technical team
- FiberHome successfully achieved dual-IOP with Huawei and ZTE
- Year 2016-2020 **400K GPON ONT, 500 OLT**. Through deep cooperation in recent four years, we have helped RCS&RDS from rank 2 to No.1 in BB Era. **Total PO is over \$20M.**

RCS & RDS DIGI

■ Global successful stories



Malaysia

FTTx Project in Malaysia



FiberHome is one of the largest deployment FTTH providers in TM. For FTTH Solution , FiberHome GPON technology is preferred.

Until now Fiberhome had supplied 330K ONT /615 OLT for TM, Total PO is over 15M.; and supplied 13K ONT/ 25 OLT for YTL.



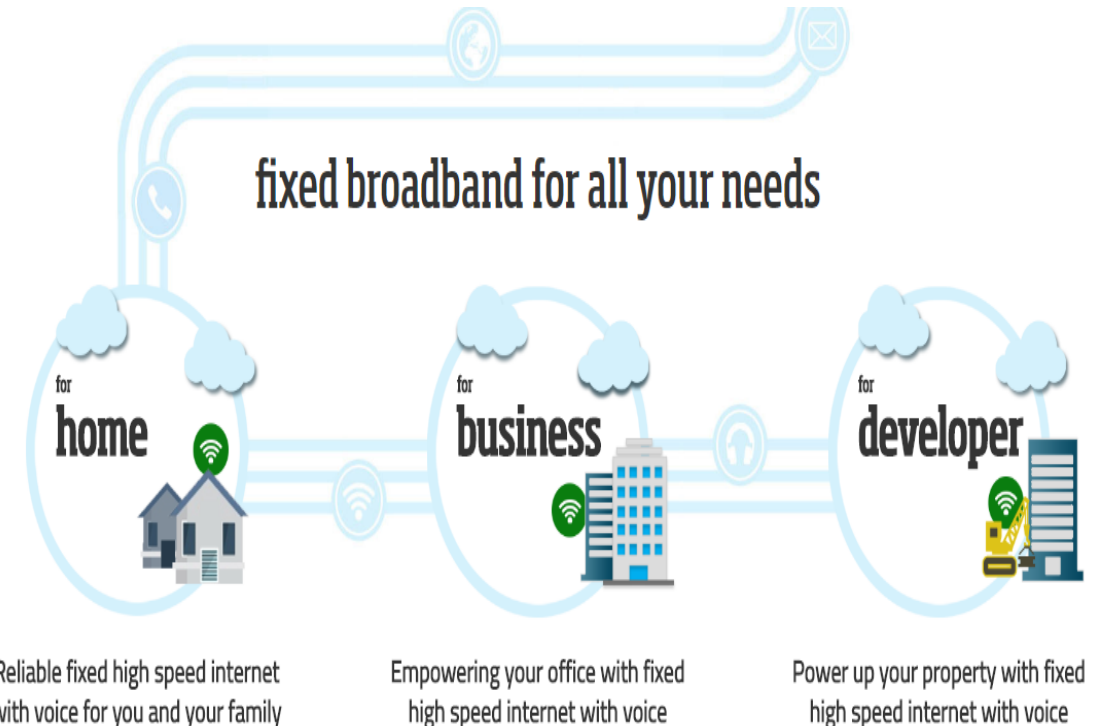
Shah Alam GPON project



TDDI GPON project



FTTH OSP Project



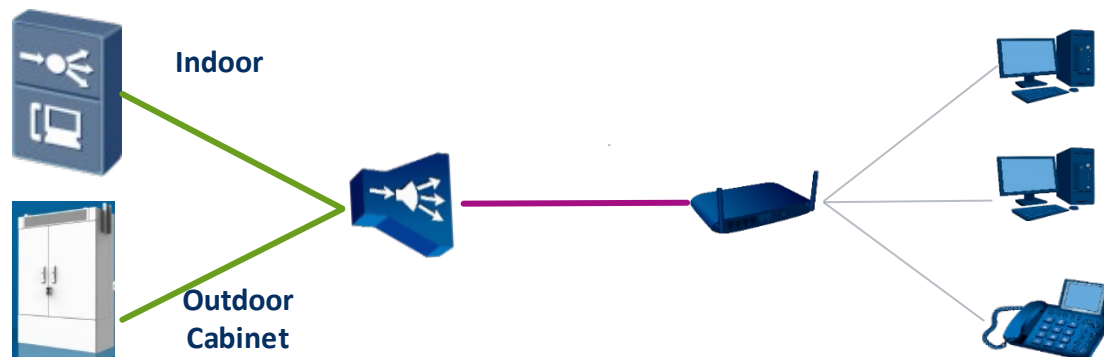
■ Global successful stories

Full FTTH Solution



Spain

Adamo FTTH IOP Project in Spain



adamo

FAST! Fiber + Calls + Unlimited Mobile
1.000 Mb The fastest Internet in the country

Interoperability

OLT	ONT	Types
FiberHome	Huawei	HG8245H
	Zhone	ZNID-GPON-2424A
	Comtrend	VG-8040un
	TP-LINK	TX-6610



- ◆ More than 500 sets OLT , 150K ONT shipment
- ◆ 34 customized OBC for OLT installations Airheat exchanging.
- ◆ Total PO is over \$8M.

■ Global successful stories



Ecuador

CNT FTTH IOP Project in Ecuador

Fiberhome solution highlight

- OLT and ONU Interoperable with HW OLT and ONU
- ONU Supply IPV4/IPV6 service
- OMCI+TR069 management
- Single band & Dualband WIFI ONU
- Since 2016, FiberHome supply 80K ONT.
- Total PO is over \$6M.



■ Global successful stories



Thailand

FTTx Project in Thailand



Wi-Fi 6
HG6245N

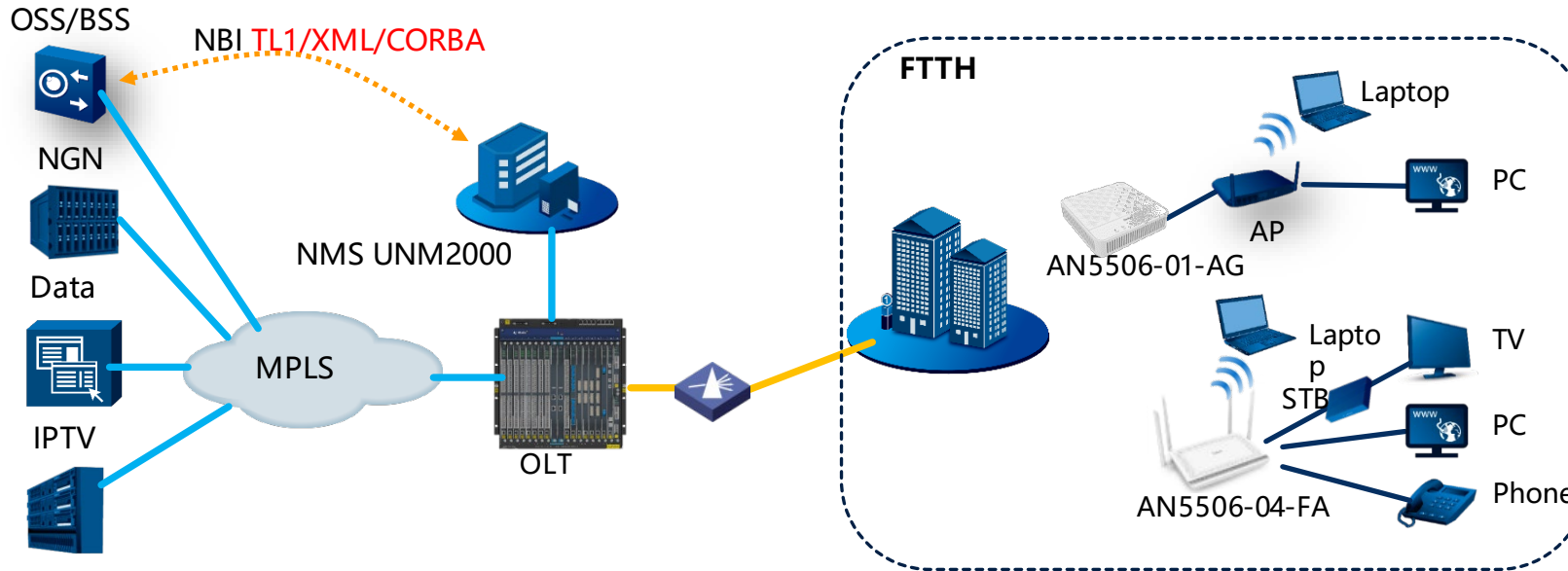


- WIFI : 2.4G 3x3 MIMO 5G
3x3 MIMO
802.11a/b/g/n/ac/ax(WIFI 6)

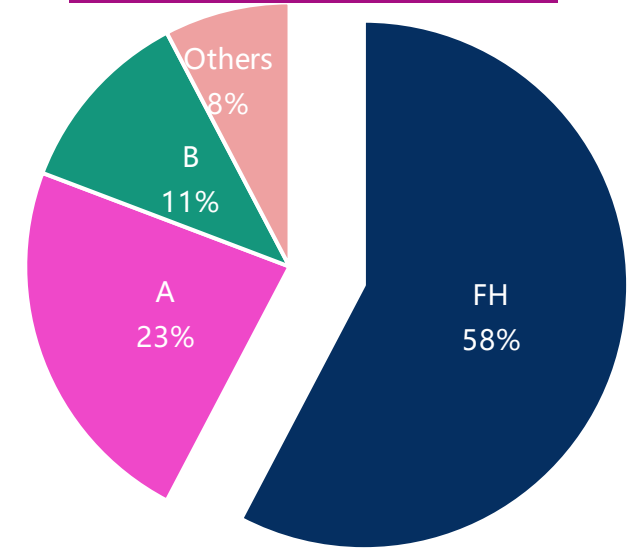
- FiberHome cooperated with all 5 mainstream operator in Thailand
- Totally 4000 sets OLT, 1.5 million ONT shipment (including 90K Wi-Fi 6 ONT)
- Customized outdoor cabinet: suitable for installation of electricity pole, reduced the CAPEX
- Environment monitoring: temperature, humidity, power module and battery status, etc.

Global successful stories

No.1 FTTH Solution Provider in Brazil



NO.1 in Brazil ISP Market



- More than 3500 OLT
- More than 4.5 million ONT online
- Provisioning by TL1/XML/CORBA
- Triple play for Home user and Enterprise



AN5506-01-AG
◆ 1GE

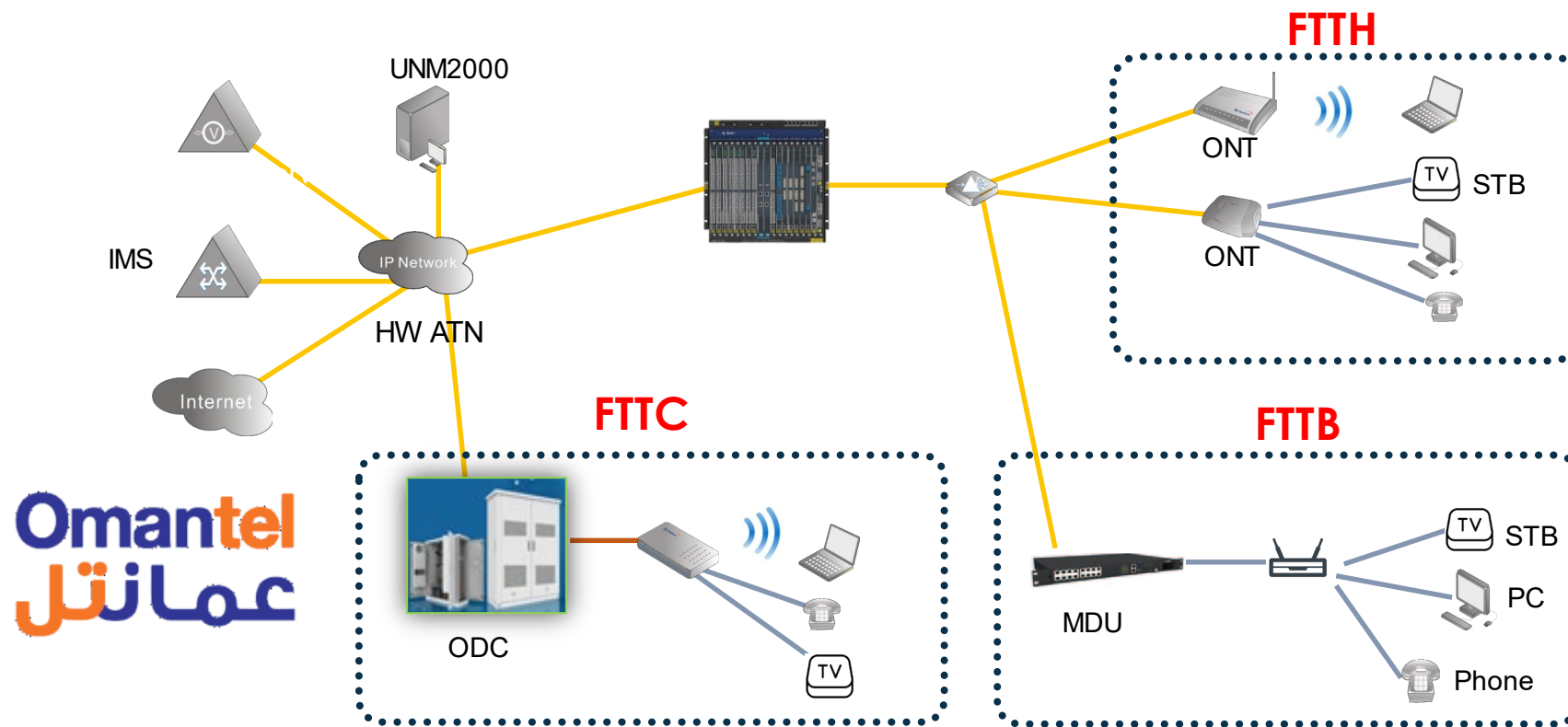


AN5506-04-FA
◆ 4GE
◆ 2POTS
◆ 2x2MiMO WIFI (2.4G/5G)

AN5506-01-AG	1GE
AN5506-02-BG	1GE+1FE+1POTS
AN5506-02-FG	1GE+1FE+1POTS+WIFI
AN5506-04-FG	4GE+2POTS+WIFI
AN5506-04-FA (2*2)	4GE+2POTS+2.4G/5GWIFI
AN5506-04-FAT(3*3)	4GE+2POTS+2.4G/5GWIFI

Global successful stories

FTTX Project In Omantel of Oman



60 days delivery after PO

90 OLT

53 customized OBC for 2 large OLT installations

Air conditioning and heat exchanging.



AN5506-04 FAT

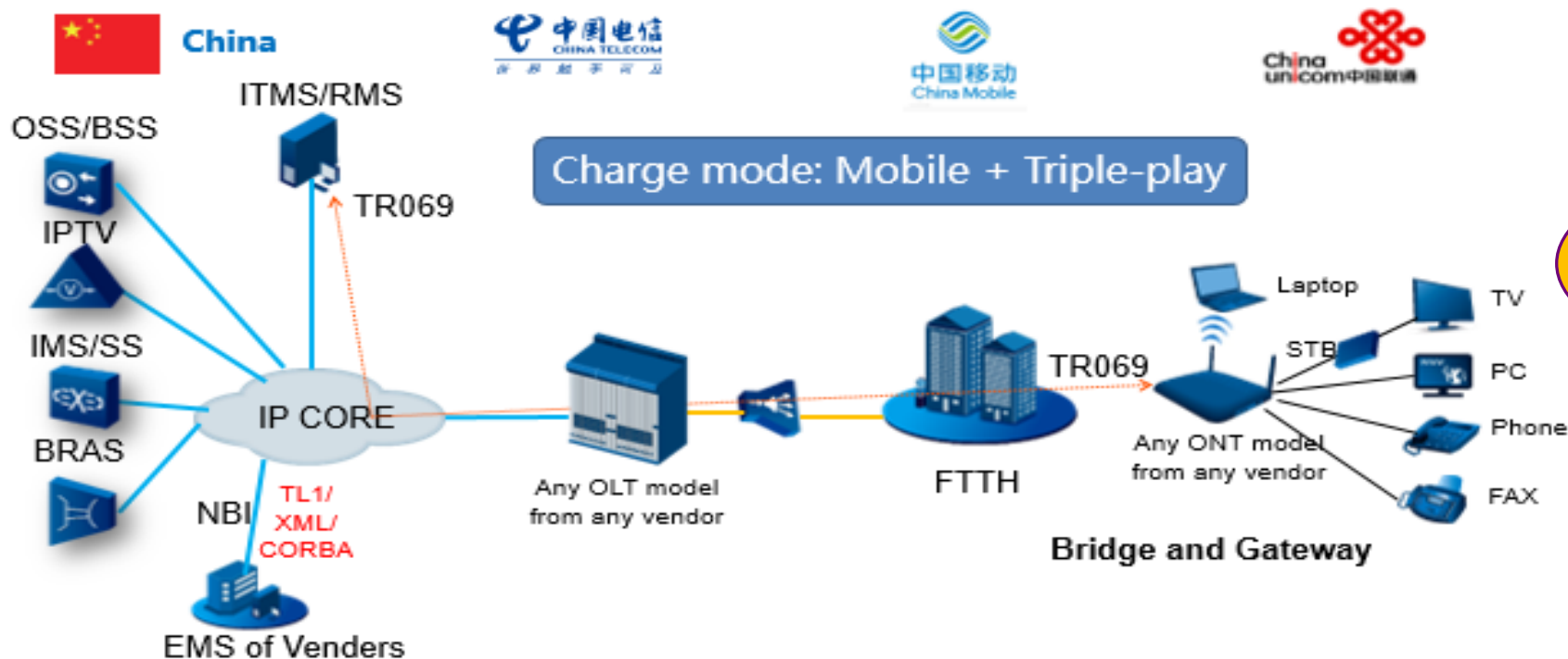
4GE+2POTS+WiFi+2USB

2.4G(3*3MIMO) and 5G(3*3MIMO)

OMCI/Web UI/TR069

Global successful stories

China FTTH Projects



TOP 2 GPON Provider

Deliver over 20 million ONTs per year

- In 2012, FH completed IOP with Huawei/ZTE/Nokia in China Telecom; In 2013, FH completed IOP with Huawei/ZTE/Nokia in China Unicom; In 2014, FH completed IOP with Huawei/ZTE/Nokia in China Mobile;
- Physical/Logical SN provisioning by ACS, Triple-play service;
- ITMS platform for all of ONTs provisioning, management and maintenance, No ONT license charged;
- Comprehensive WiFi extension solution, e.g. AP/Router, Repeater;
- XGPON massively deployed

Advantage of Having FiberHome:

- Interoperable with other vendors' ONT by FH OLT
- Interoperable with other vendors' OLT by FH ONT
- Strong local maintenance team to solve issues
- Competitive prices



THANKS!



FiberHome