HiOSO EOC System

I EOC

HA3200 Series

HA3200 series is central EOC equipment, including HA3200W, HA3202W, and HA3204W, applied widely in several ways of network management.

HA3200W

Profile

HA3200W EOC master is single-channel-100M outdoor equipment, with carrying capacity of 253 EOC slaves. It can work in atrocious weather with good stability because of its waterproof and lightproof shell.

Character

- Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology.

- Highly adaptable to network, amplifier and distributor.

- Highly effective filter, lower interference to CATV

- Supply VLAN, IGMP and QoS

- Cable TV input RF band: 47~860MHz

- IP input RF band: 7.5~30MHz

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Support integrated management for slaves

- Support AC220V or AC60V power supply

Website: www.hioso.com   www.haishuo.com   2
Tel: 0086 755 83128820   Fax: 0086 755 83151488
Email: sale1@hioso.com
Address: 6TH Floor,12th Building,Wangtang Industrial Zone,Xingao Road,Xili,Nanshan District,Shenzhen

Technical Specification

Parameter	Specification
System Bandwidth	Physical layer data rate 200Mbps MAC layer data rate 100Mbps
Modulation	1024/256/64/16/8-QAM, QPSK, BPSK, ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5 ~ 30MHz
Protocol and Standard	IEEE 802.1Q, IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB CLI SNMP
Data Interface	2 10/100Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3, IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBµV Insertion Loss: <1dB Flatness in Band: ±0.5dB Return Loss: >20dB suppression ratio of out band: 55dB Impedance: 75Ω
Light Indicator	PWR (power LED) RUN (management system LED) SYS (system LED) LINK (link LED) ETH (Ethernet port LED)
Distance	700m

Working Environment

Power	AC220V /AC60V
Power Consumption	6W
Working Temperature	-25℃ ~ +60℃
Storage Temperature	-40℃ ~ +70℃
Working Humidity	20% ~ 85%(non-condensing)
Storage Humidity	10% ~ 90%(non-condensing)
Dimension	224mm(length) × 200mm(width)× 110mm(height)

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Address: 6TH Floor,12th Building,Wangtang Industrial Zone,Xingao Road,Xili,Nanshan District,Shenzhen

HA3200

Profile

HA3200 EOC master is single-channel-100M indoor equipment, with carrying capacity of 253 EOC slaves.

Character

- Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology.

- Highly adaptable to network, amplifier and distributor.

- Highly effective filter, lower interference to CATV

- Supply VLAN, IGMP and QoS

- Cable TV input RF band: 47~860MHz

- IP input RF band: 7.5~30MHz

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Support integrated management for slaves

- Support AC220V or AC60V power supply

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Technical Specification

Parameter	Specification
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Modulation	1024/256/64/16/8-QAM、QPSK、BPSK、ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5 ~ 30MHz
Protocol and Standard	IEEE 802.1Q IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB CLI SNMP
Data Interface	2 10/100Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3, IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBµV Insertion Loss: <1dB Flatness in Band: ±0.5dB Return Loss: >20dB suppression ratio of out band: 55dB Impedance: 75Ω
Light Indicator	PWR (power LED) RUN (management system LED) SYS (system LED) LINK (link LED) ETH (Ethernet port LED)
Distance	700m

Working Environment

Power	AC220V /AC60V
Power Consumption	6W
Working Temperature	-25℃ ~ +60℃
Storage Temperature	-40℃ ~ +70℃
Working Humidity	20% ~ 85%(non-condensing)
Storage Humidity	10% ~ 90%(non-condensing)
Dimension	218mm(length) × 176mm(width)× 38mm(height)

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HA3202W

Profile

HA3202W is two-channel-100M outdoor equipment, with carrying capacity of 253 slaves per channel, total 506 slaves. It can work in atrocious weather with good stability because of its waterproof and lightproof shell.

Character

● Supply 2 hybrid signal output ports, each port can connect to maximum 253 users

● Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology

● Highly adaptable to network, amplifier and distributor

● Highly effective filter, lower interference to CATV

● Supply VLAN, IGMP and QoS

● Cable TV input RF band: 47~860MHz

● IP input RF band: 7.5~30MHz

● Support SNMP, WEB and CLI management

● Support remote software upgrade

● Support integrated management for slaves

● Support AC220V and AC60V power supply

● Supply two data interfaces

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Technical Specification

Parameter	Specification
System Bandwidth	Physical layer data rate 200Mbps MAC layer data rate 100Mbps
Modulation	1024/256/64/16/8-QAM、QPSK、BPSK、ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5 ~ 30MHz
EOC module	2
Carrying Capability	253 per channel, total 506 slaves
Protocol and Standard	IEEE 802.1Q IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB, CLI, SNMP
Data Interface	Two 10/100 Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3 and IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBμV Insertion Loss: <1dB Flatness in Band: ±0.5dB Return Loss: >20dB suppression ratio of out band: 55dB Impedance: 75Ω
Light Indicator	PWR (power LED) RUN (management system LED) SYS (system LED) LINK (link LED) ETH (Ethernet port LED)
Distance	700m

Note: the above-mentioned parameter is for SINGLE EOC master module, 2 modules parameters are the same

Working Environment

Power	AC220V /AC60V
Power Consumption	12W
Working Temperature	-25℃ ~ +60℃
Storage Temperature	-40℃ ~ +70℃
Working Humidity	20% ~ 85%(non-condensing)
Storage Humidity	10% ~ 90%(non-condensing)
Dimension	330mm(length) × 220mm(width)× 120mm(height)

HA3204W

Profile

HA3204W is four-channel-100M outdoor equipment, with carrying capacity of 253 slaves per channel, total 1012 slaves. It can work in atrocious weather with good stability because of its waterproof and lightproof shell.

Character

- Supply 4 hybrid signal output ports, each port can connect to maximum 1012 users

- Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology

- Highly adaptable to network, amplifier and distributor

- Highly effective filter, lower interference to CATV

- Supply VLAN, IGMP and QoS

- Cable TV input RF band: 47~860MHz

- IP input RF band: 7.5~30MHz

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Support integrated management for slaves

- Support AC220V and AC60V power supply

- Supply four data interfaces

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Technical Specification

Parameter	Specification
System Bandwidth	Physical layer data rate 200Mbps MAC layer data rate 100Mbps
Modulation	1024/256/64/16/8-QAM、QPSK、BPSK、ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5~ 30MHz
EOC module	4
Protocol and Standard	IEEE 802.1Q IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB CLI SNMP
Data Interface	2 10/100 Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3 and IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBμV Insertion Loss: <1dB Flatness in Band: ±0.5dB Return Loss: >20dB suppression ratio of out band: 55dB Impedance: 75Ω
Light Indicator	PWR (power LED) RUN (management system LED) SYS (system LED) LINK (link LED) ETH (Ethernet port LED)

Note: the above-mentioned parameter is for SINGLE EOC master module, 4 modules parameters are the same

Working Environment

Power	AC220V /AC60V
Power Consumption	12W
Working Temperature	-25℃ ~ +60℃
Storage Temperature	-40℃ ~ +70℃
Working Humidity	20% ~ 85%(non-condensing)
Storage Humidity	10% ~ 90%(non-condensing)
Dimension	372mm(length) × 227mm(width)× 190mm(height)

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HA300 Series

HA300 EOC slave receives Ethernet and CATV signal through coaxial cable, working with HA3200, HA3200W, HA3202W, and HA3204W EOC master.

HA302

Profile

HA302 supplies one RF hybrid signal input port, one RF CATV output port and two 100M full-duplex RJ45 output Ethernet ports to have access to both TV and computer. HA302 supports bandwidth set, and supports to limit he max uplink and downlink bandwidth.

Character

- Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology.

- Highly adaptable to network, amplifier and distributor.

- Highly effective filter, lower interference to CATV

- Supply VLAN, IGMP and QoS

- Cable TV input RF band: 47~860MHz

- IP input RF band: 7.5~30MHz

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Managed intensively by central EOC, support TELNET management

- No need to configure, start work once connected

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Technical Specification

Parameter	Specification
System Bandwidth	Physical layer data rate 200Mbps MAC layer data rate 100Mbps
Modulation	1024/256/64/16/8-QAM、QPSK、BPSK、ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5~ 30MHz
Protocol Standard	IEEE 802.1Q IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB, CLI, SNMP
Data Interface	2 10/100 Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3 and IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBμV Insertion Loss: <1dB Impedance: 75Ω
Light Indicator	ETH (2 Ethernet ports LED) DATA (Data LED) SYS (system LED) PWR (power LED)

Working Environment

Power	DC 12V/1A
Power Consumption	4W
Package	146mm(length) × 105mm(width)× 35mm(height)
Operating Temp	-10℃ ~ + 55℃
Storage Temp	-20℃ ~ + 70℃
Operating Humidity	20% ~ 85% (non-condensing)
Storage Humidity	10% ~ 90% (non-condensing)

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HA304

Profile

HA304 supplies one RF hybrid signal input port, one RF CATV output port and four 100M full-duplex RJ45 output Ethernet ports to have access to both TV and computer. HA304 supports bandwidth set, and supports to limit the max uplink and downlink bandwidth.

Character

- Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology.

- Highly adaptable to network, amplifier and distributor.

- Highly effective filter, lower interference to CATV

- Supply VLAN, IGMP and QoS

- Cable TV input RF band: 47~860MHz

- IP input RF band: 7.5~30MHz

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Managed intensively by central EOC, support TELNET management

- No need to configure, start work once connected

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Technical Specification

Parameter	Specification
System Bandwidth	Physical layer data rate 200Mbps MAC layer data rate 100Mbps
Modulation	1024/256/64/16/8-QAM、QPSK、BPSK、ROBO
MAC Protocol	TDMA and CSMA
EOC technology	HomePlug AV
Frequency	7.5~ 30MHz
Protocol Standard	IEEE 802.1Q IGMP v1, v2 IEEE 802.1P QoS
NMS	WEB, CLI, SNMP
Data Interface	4 10/100 Base-TX RJ45 ports Auto MDI/MDIX Comply with 802.3 and IEEE802.3u
RF Interface	2 RF ports (Metric thread F type) Output level: 110dBμV Insertion Loss: <1dB Impedance: 75Ω
Light Indicator	ETH (4 Ethernet ports LED) DATA (Data LED) SYS (system LED) PWR (power LED)

Working Environment

Power	DC 12V/1A
Power Consumption	4W
Package	180mm(length) × 105mm(width)× 35mm(height)
Operating Temp	-10℃ ~ + 55℃
Storage Temp	-20℃ ~ + 70℃
Operating Humidity	20% ~ 85% (non-condensing)
Storage Humidity	10% ~ 90% (non-condensing)

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HA304WIFI

Profile

HA304WIFI is used at CATV cable network to establish a layer 2 Ethernet transmission channel. It can transmit and receive Ethernet signal through CATV coaxial cable but not interfere the CATV signal.

HA304WIFI EOC salve adopts the most advanced chip technology. It supplies one RF hybrid signal input port, one RF CATV output port and four 100M full-duplex RJ45 to connect PC, digital set-top-box and IP phone, etc. It also supplies WIFI 11N routing function.

Character

● Frequency range: 2.412~2.484GHz

● Good anti-jamming capability with OFDM (kind of MCM, Multi-Carrier Modulation) and channel-adaptive technology.

● Highly effective filter, lower interference to CATV

● Supply VLAN, IGMP snooping and QoS

● Cable TV input RF band: 47~860MHz

● IP input RF band: 7.5~30MHz

● Support bridge mode and routing mode

● Support WIFI network based at IEEE802.11n standard, supply maximum 150Mbps

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Email: sale1@hioso.com
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stable transmission and apply to IEEE802.11b and IEEE802.11g

- Support SNMP, WEB and CLI management

- Support remote software upgrade

- Managed intensively by central EOC, support TELNET management

- No need to configure, start work once connected

Technical Specification

Parameter		Description
Standards		HomePlug AV, IEEE 802.3u, IEEE802.1q, IEEE802.1x, EEE 802.11b/g/n
Ports	WAN	1 Thread Cable Port
	LAN	4 10/100M RJ45 Ports
	TV	1 CATV Coaxial Port
WIFI	Operation Arrange	2.4~2.4835GHz
	Transmission Speed	11n: 270/243/216/162/108/81/54/27Mbps 135/121.5/108/81/54/40.5/27/13.5Mbps 130/117/104/78/52/39/26/13Mbps 65/58.5/52/39/26/19.5/13/6.5Mbps
		IEEE 802.11g: 54/48/36/24/18/12/9/6
		IEEE 802.11b: 11/5.5/2/1M
	Operating Channels	13
	Data Modulation	DBPSK,DQPSK,CCK, OFDM(BPSK/QPSK/16-QAM/64-QAM)
	Sensitivity	270M: -68dBm@10% PER；130M: -68dBm@10% PER； 108M: -68dBm@10% PER；54M: -68dBm@10% PER 11M: -85dBm@8% PER；6M: -88dBm@10% PER 1M: -90dBm@8% PER； (typical value)
	Transmission Distance	Maximum 120 meters (Indoor) Maximum 360 meters (outdoor) (according to environment)
	RF Power	20dBm EIRP
	Antenna	3dBi detachable HG antenna
EoC	Frequency	7.5-30MHz
	Data Modulation	BPSK/QPSK/8-QAM/16-QAM/64-QAM/256-QAM/1024-QAM/ROBO
	Transmission	Physical Layer:200Mbps

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	Speed	
	IP	50-85Mbps
	RF Impedance	75 Ohm
LED	WAN	WAN Lighting: link / Blink: data transmission
	LAN	LAN Lighting: link / Blink: data transmission
	Other	POWER(on/off) / EOC(initialization status)/ Wireless(on/off)

Working Environment

Power	DC 12V/1A
Power Consumption	<4W
Package	180(mm)*110(mm)*31(mm)
Operating Temp	-10℃ ~ + 55℃
Storage Temp	-40℃ ~ + 70℃
Operating Humidity	10% ~ 90% (non-condensing)
Storage Humidity	10% ~ 90% (non-condensing)

Order Information

Type	Data Interface	Coaxial Cable interface	Package (L×W×H)mm	Power
HA304WIFI	4×10/100BASE-TX	1×Cable,1×TV	180×110×31	DC12V/1A

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Email: sale1@hioso.com
Address: 6TH Floor,12th Building,Wangtang Industrial Zone,Xingao Road,Xili,Nanshan District,Shenzhen

II EPON+EOC Solution

Preface

Through 20 years development, China CATV network owns largest amount users in the world. At the end of 2006, there are one hundred million CATV users (46 million in country); about 3300pcs front terminals; 40,000KM national-level optical cable line, more than 100,000km provincial/prefecture-level optical cable line, and 300,000km prefecture/county distribution network. At the end for Q1th, 2007, there are 15 million cable digital TV users. Several cities complete CATV digital integrated transformation, and supply multi broadcasting services. Some network companies implemented broadband data access, VOD and other bi-directional services.

However, there are 90% CATV network haven't implemented bi-directional transformation. It just meets the requirements of analog TV transmission, but can't transmit multimedia mutual services through the existed network.

CATV network meets fierce competition: Telecom network operate IPTV service, to win CATV high medium-end customers; DBS service and DTV service scram for CATV medium low-end customers. These competition is competition between high-bandwidth and low-bandwidth, bi-directional network and unilateral network, multi-service and single service, high cost and low cost. As fiber access to residential area, copper cable transmission distance short to 100m, and development of multi service access technology, the bandwidth advantage of coaxial network is losing. Unitary DTV integrated transformation couldn't change this situation. So, the future of CATV network is developing bi-directional transmission services at the base of the huge existed HFC network.

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Tel:　　　0086 755 83128820　　Fax: 0086 755 83151488
Email:　　sale1@hioso.com
Address: 6TH Floor,12th Building,Wangtang Industrial Zone,Xingao Road,Xili,Nanshan District,Shenzhen

EPON Profile

EPON adopts point to multi-point topology structure, using fiber and passive components for physical layer transmission and offering multi services bandwidth access technology at the base of Ethernet protocols.

EPON system consists of an OLT (Optical Line Termination)), ONU (Optical Network Unit) and ODN (Optical Distribution Network). ODN includes optical splitter and fiber. The splitter is a passive device, used to connect the OLT and ONU, distributing downlink data and integrate uplink data. EPON adopts 802.3 frame broadcast technology for downlink data flow, and TDM technology for uplink data flow. EPON also adopts MPCP (multi-point control protocol), as the data from uplink can be transmitted to only one user each specified time.
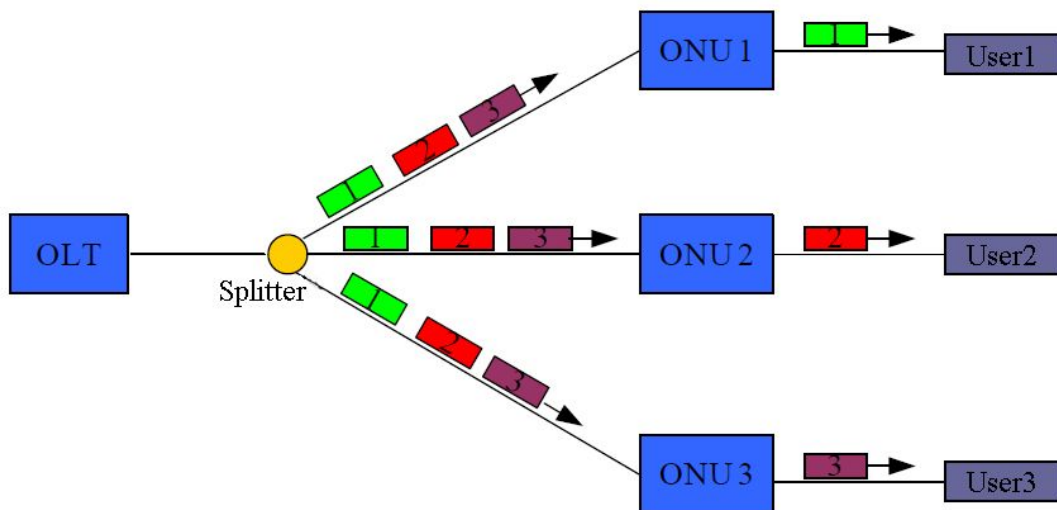
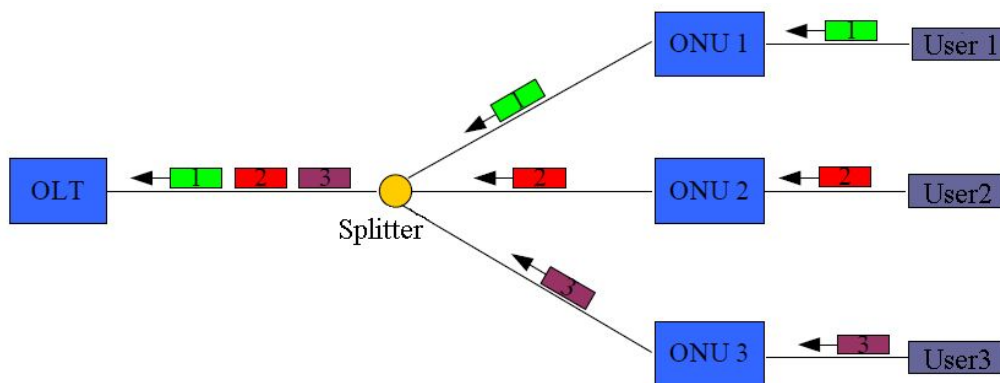Figure 1 EPON downstream data flow

Figure 2 EPON upstream data flow

EPON system integrates the advantage of PON technology and Ethernet technology. It offers a low cost solution to supply bandwidth and fiber access from CO to terminal users. PON system adopts point to multi-point topology structure, and uses passive components to lower maintenance cost. It offers a best bandwidth access solution for access network.

EPON Network Feature

- Save trunk network fiber resource, one fiber allow multi fiber access through passive splitter
- Low building cost and maintenance cost, as passive component is used during transmission, and convenient to upgrade
- Offer 1.25G uplink and down link symmetrical bandwidth
- Point-to multi-point network, covers large area
- Flexible bandwidth allocation, supply port SLA and QoS assurance
- Support 1550nm CATV signals transmitted in the same network through WDM technology

EOC Profile

EOC (Ethernet Over Coax) technology adopts CATV coaxial network to transmit Ethernet signal. It adopts specified medium conversion technology (mainly include impedance conversion, balance/imbalance conversion), transmit 802.3 standard data signals through coaxial cable, to users home. EOC technology apply to multi services: surf Internet at high speed, HD/SD, broadcasting, IPTV, VOD and VOIP.

EOC Feature

- Apply to HFC network structure, no need to reconstruct the existed network in the building, takes full advantage of coax cable resource in the HFC network
- High reliability, convenient maintenance. Central device and branch devices in the building are all passive, less faults.
- High adaptive capability, high bandwidth, strong anti-noise capability and link loss endurance.
- Convenient to install, no need to adjust at the terminal ends.

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● SNMP supported, convenient to operate.

HiOSO Bidirectional Transformation Solutions

EPON (Ethernet passive optical networks) adopts point to multi-point topology structure, using fiber and passive component for physical layer transmission. It supplies multi services through Ethernet protocols. EPON is a multi users shared system. EPON integrates the advantage of PON technology and Ethernet network technology, with simple topology structure, low cost, and no active devices between terminal end and central office. EPON topology structure is like the CATV network structure, it can use CATV network fiber line to transmit data service, saving network building cost. It is the best solution for broadcasting TV network bi-directional transformation.

EOC is a general designation for the technologies, which use coaxial cable to transmit Ethernet data. So, video, data and voice service can be transmitted together through one coaxial cable. Downlink network transmits CATV and voice signal, uplink network transmits data signal, so to supply a return path for bi-directional DTV platform.

HiOSO EPON includes HA7000 series OLT and HA7200 series ONU; EOC system includes HA3200 series central device and HA300 series terminal device.

HiOSO EOC applies to HomePlug AV standard, using 7.5 ~ 30MHz low frequency band in the HFC network to transmit data service, and separate CATV signal and data signal. HiOSO EOC adopts OFDM technology to enhance the anti-jamming ability, and use point to multi-point communication control protocol technology, to transmit Ethernet data through point to multi-point coaxial access network. EOC solution supplies a high-efficiency and stable solution for bi-directional transformation.

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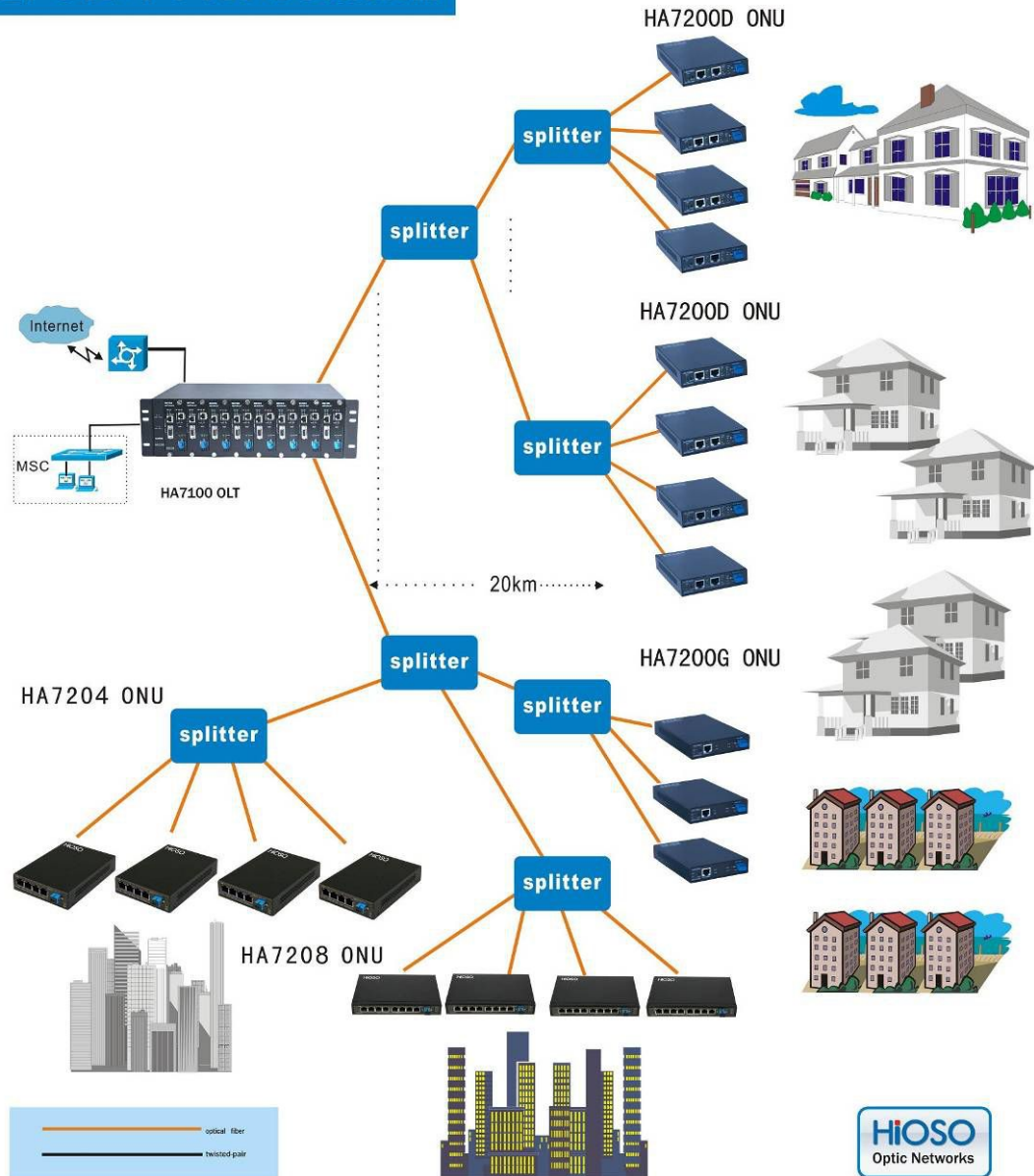
EPON Solution

1. EPON FTTH solution

FTTH (Fiber To The Home) soluiton, place EPON head end equipment OLT in the control station, adopt cascaded network structure by using optic splitters, then connect to EPON terminal equipment ONUs when fiber reaches to user end. EPON soluiton implements point to multipoint communication, save fiber resource, provide fast broadband access, and passive network structure with ow fault spot, convienent for maintenance.

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Email: sale1@hioso.com
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Email: sale1@hioso.com
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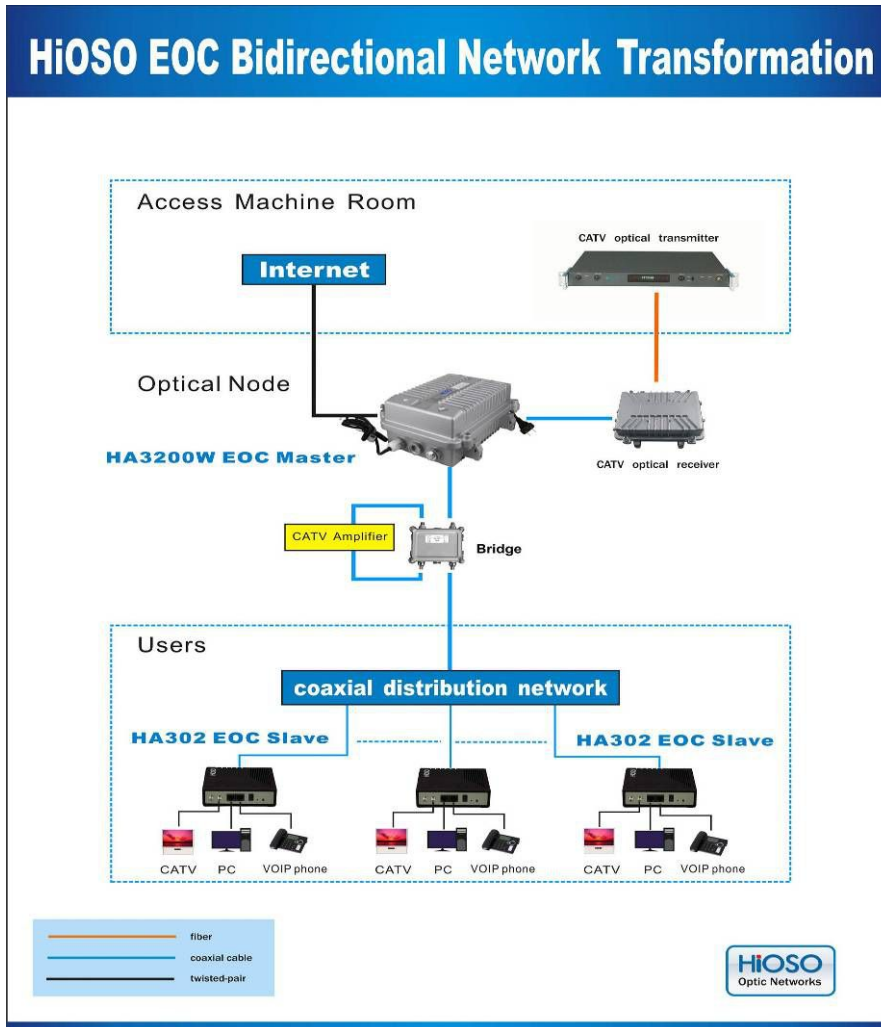
2. EOC Hybrid Solution

EOC (Ethernet Over Coax) is mainly used in CATV bidirectional network transformation. EOC system consists of HA3200 series EOC master, HA300 series EOC salve and coaxial distribution network.

CATV signal from the CATV optical transmitter and IP signal from IP transmitting equipment in the control center, transmit to HA3200W EOC master at the optic node, HA3200W integrates the two signals and then output from the Hybrid RF port to coaxial network. If there are one way RF amplifiers connected in the distribution network, IP signal can't return from user end EOC slave to EOC master, bridge needed to implement bidirectonal communication.

HA302 EOC slave at user end devides the IP signal and CATV signal, offers two 10/100M RJ45 output ports and one RF cable port. Ethernet ports for PC and VOIP, and cable port for CATV.

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Email: sale1@hioso.com
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3. EPON + EOC Hybrid Solution

This solution implements bidirectional network transformation based at HFC netowrk. As the EPON network structure is similar to HFC network structure, no need to greatly change the exixting HFC network. Just set the headend equpment OLT at the control center, connect to a preserved fiber, then connect to the splitter. IP signals split to the terminal equipment ONU at optic node. Then IP signal is access to the optic nodes.

Access user home network adopts EOC technology to implement "last mile" access. EOC master at the optic node integrates the CATV signal and IP signal, then transmit to EOC slave through coxial distribution network. Then EOC slave devides the CATV signal and IP

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Email: sale1@hioso.com
Address: 6TH Floor,12th Building,Wangtang Industrial Zone,Xingao Road,Xili,Nanshan District,Shenzhen

signal. EOC salve offers one cable output port for CATV and two 100M output ports for

internet and VOIP, so to implement triply play services access.

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