High Density Converged Headend 4RU Access Platform

AH1000 Series

- High Density 19” Chassis
- 1310 nm TX and Quad RRX
- 1550 DMOD TX and EDFA
- Low Power Consumption
- Suitable for FTTH Video Overlay Applications
- Redundant Power
- Intuitive Front Panel LED Design and Local Setup
- Universal Management through SNMP management interface

ACT AH1000 4RU Multi-Services Headend Access Platform is a converged headend, hub access platform to enable MSO cable operators and services providers to build, migrate or upgrade their existing analog and/or digital networks to meet ever growing demand for advanced Video, HSD and VOIP services.

The AH1000 Headend Access Platform simplifies MSO operator’s transition to fiber deep HFC and next generation FTTx architecture by offering a complete range of hot swappable, robust optical and RF application modules for HFC, RFoG, PON video overlay related applications.

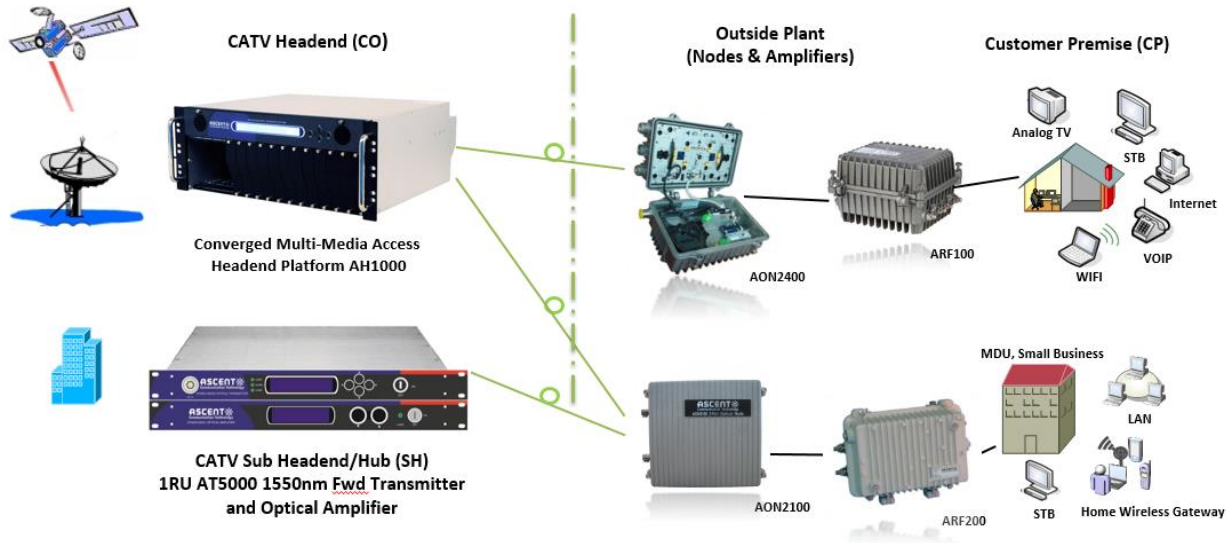
The compact design fits in a standard 19” rack of 4RU height, with 16 slots for active modules including 1310nm, 1550nm transmitters, return receivers, EDFA, RF amplifiers, redundant AC or DC power supply modules. This high density design provides capability for up to 16 standard forward-path laser transmitters in a two-power-supply setting with one control module.

AH1000 platform offers the user-friendly management interface through the one slot wide control module which supports advanced SNMP oriented network management via standard Ethernet network interface.

Key Features

- Highest density with 16 slots for single, dual or quad active modules in one 4RU headend platform
- Low power consumption saves operation expenditure
- Suitable for FTTH video overlay application
- Hot-swappable application modules with auto-config feature through management module
- Reliable, fully redundant, hot-swappable power supplies
- Front-panel LED for local monitoring of transmitter status
- System Management Module(SMM) integrated with the chassis for local and remote monitoring
- SNMP monitoring, management and control through standard SCTE-HMS MIBs
- Fully RoHS and CE compliant.

Application Diagram



Chassis, PS, SMM Specifications

AH1000 Multi-Services Headend Access Platform – 19” 4RU

General Specifications

Chassis	19” EIA, 4RU
Modules	Up to 16 application modules
Operating Temperature	0 to +50 °C
Storage Temperature	-40 °C to +70 °C
Operating Humidity	5 % to 95 % RH (non-condensing)
Dimensions (W × D × H)	483 mm × 420 mm × 176 mm
Weight	5.5 kg (20 kg fully loaded)

Power Supply Specifications

Load Sharing	Built-in auto-recovery
Input Voltage	176 V AC to 264 V AC IEC Male or 48 V DC
Power Consumption	350 W
Power Efficiency	85 % @ 230 V AC
Short Circuit Protection	Yes
Dimensions (W × D × H)	155 mm × 300 mm × 45 mm
Weight	1.3 kg

SMM Module Specifications

EMS	Local and remote SNMP management
Front Panel LED	Local monitoring and setting
RS232 Interface	Local console
SNMP Interface	RJ45, 10 Mbps, (GUI EMS)
Power Consumption	5 W maximum
Dimensions (W x D x H)	483 mm × 420 mm × 44 mm
Weight	1 kg

1310 nm 1 GHz Forward Transmitter F3ST

Optical Specifications	
Wavelength	1310 nm ± 20 nm
Line Width	≤1 MHz
Optical Output Power	3, 6, 8, 10, 11, 12, 13, 14, 15 dBm
Optical Connector	SC/APC
Optical Return Loss	55 dB
RF Specifications	
RF Bandwidth	47 MHz to 1003 MHz
RF Flatness	±0.75 dB
RF Input Level	20 dBmV ± 5 dBmV
RF Input Return Loss	≥16 dB
RF Input Impedance	75 Ω
RF Test Point	-20 dB ± 1 dB
TV Channel Plan	59 PAL channels, 77 NTSC channels plus QAM
Link Performance	
CNR	51 dB (78 ch NTSC + 75 ch QAM, 15 km fibre, 0 dBm receive)
CTB	-68 dBc
CSO	-64 dBc
MER	38 dB (154 QAM channels from 52 MHz to 1003 MHz of 256 QAM)
XMOD	-65 dBc
General Specifications	
Power Consumption	≤8.5 W
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

1310 nm 1.2 GHz Forward Transmitter F3CT

Item	Description	
Optical Specifications		
Output Optical Wavelength	1310 nm ± 20 nm	
Output Optical Power	6, 8, 10, 11, 12, 13, 14, 15 dBm	
Laser Type	DFB laser	
Optical Modulation Mode	Direct optical intensity modulation	
Optical Connector Type	SC/APC or FC/APC	
Optical Return Loss	>45 dB	
RF Specifications		
Frequency Range	47 MHz to 1218 MHz	
Flatness In Band	± 0.75 dB	
RF Input Impedance	75 Ω	
Input Test Port	-20 dB ± 1 dB	
Laser Drive Level Test Port	-20 dB ± 1 dB	
Input Return Loss	≥16 dB	
Input Port Isolation	≥50 dB	
Link Performance		
C/N	≥52 dB	550 MHz 59 CH analog signal 77 dBµV/CH
C/CTB	≥67 dB	550 MHz to 870 MHz 40 CH digital signal 67 dBµV/CH
C/CSO	≥62 dB	-1 dBm optical receiving power, 0 km fiber
RF Input Level	77 dBµV ± 5 dBµV	
Adjusting Range Under AGC Mode	± 5 dB	
MGC Attenuation Range	0 dB to 20 dB	
General Specifications		
Operating Temperature	-5 °C to +55 °C	
Storage Temperature	-30 °C to + 70 °C	
Maximum Power Consumption	≤10 W	
Weight	1 kg	

Multi-Wavelength CWDM Transmitter M3ST

Optical Specifications	
Wavelength	O-band 1270 nm, 1290 nm, 1310 nm, 1330 nm
Optical Output Power	4, 6, 8, 10, 11, 12 dBm
Optical Connector	SC/APC
RF Specifications	
RF Bandwidth	47 MHz to 1218 MHz
RF Input Ports	2
RF Flatness	±0.75 dB
RF Input Level	17 dBmV ± 4 dBmV (OMI = 4.5 %)
RF Input ATT	10 dB (1 dB step electronically)
RF Input EQ	6 dB (1 dB step electronically)
RF Input Port Isolation	≥50 dB (47 MHz to 860 MHz) ≥40 dB (860 MHz to 1218 MHz)
RF Input Return Loss	≥18 dB
RF Input Impedance	75 Ω
RF Test Point	-20 dB ± 1 dB
TV Channel Plan	30 PAL channels, 170 channels 256 QAM
Link Performance	
CNR	51.5 dB (77 ch NTSC, 15 km fibre, -1 dBm receive)
CTB	-67 dBc
CSO	-62 dBc
BER	<1E-9 @ post FEC
General Specifications	
Power Consumption	≤8.5 W
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

1550 nm 1 GHz Direct Mod Forward Transmitter F5ST

Optical Specifications	
Wavelength	1550 nm ± 20 nm, DWDM ITU
Optical Output Power	6, 8, 10 dBm, ±0.5 DFB
Optical Connector	SC/APC
Optical Return Loss	55 dB
RF Specifications	
RF Bandwidth	47 MHz to 1003 MHz
RF Flatness	±0.75 dB
RF Input Level	20 dBmV ± 5 dBmV (BC), 27 dBmV ± 5 dBmV (NC)
RF Input Return Loss	≥16 dB (47 MHz to 550 MHz)
	≥14 dB (550 MHz to 1003 MHz)
RF Input Impedance	75 Ω
RF Test Point	-20 dB ± 1 dB (BC), -32 dB ± 1 dB (NC)
TV Channel Plan	60 PAL channels, 80 NTSC channels
Link Performance	
CNR	51 dB (77 ch NTSC, 20 km fibre, 0 dBm receive)
CTB	-65 dBc
CSO	-60 dBc
MER	39 dB (154 QAM channels from 52 MHz to 1003 MHz of 256 QAM)
BER	<1E-9 @ post FEC
General Specifications	
Power Consumption	≤8.5 W
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

1550 nm 1.2 GHz Direct Mod Forward Transmitter F5CT

Optical Specifications	
Wavelength	1550 nm ± 10 nm, DWDM ITU
Optical Output Power	6, 8, 10 dBm, ±0.5 DFB
Optical Connector	SC/APC
RF Specifications	
RF Bandwidth	47 MHz to 1218 MHz
RF Flatness	±0.75 dB
RF Input Level	20 dBmV ± 5 dBmV
RF Input Return Loss	≥16 dB
RF Input Impedance	75 Ω
RF Test Point	-20 dB ± 1 dB (BC), -32 dB ± 1 dB (NC)
MGC Scope	±5 dB
TV Channel Plan	60 PAL channels, 80 NTSC channels
Link Performance	
CNR	50 dB (77 ch NTSC, 20 km fibre, 0 dBm receive)
CTB	-65 dBc
CSO	-60 dBc
MER	38 dB (154 QAM channels from 52 MHz to 1003 MHz of 256 QAM)
BER	<1E-9 @ post FEC
General Specifications	
Power Consumption	≤8.5 W
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

Analog Return Quad Receiver (200 MHz) ARQR

Optical Specifications

Receiving Optical Power range	-12 dBm to +2 dBm
Optical AGC Range	-10 dBm to 0
Optical Return Loss	≥45 dB
Optical Receiving Wavelength Range	1100 nm to 1600 nm
Optical Connector Type	SC/APC
Fiber Type	Single mode

RF Specifications

Frequency Range	5 MHz to 200 MHz
Output Level	97 dBµV (Pin > -10 dBm)
Flatness in Band	≤0.75 dB
Return Loss	16 dB
Output Impedance	75 Ω
Level Adjustable Range	0 to 10 dB
RF Test Port	-20 dB
Stability of RF Output Level	<1 dB
NPR Dynamic Range	15 dB

Link Performance

C/N	51 dB
C/CTB	65 dB
C/CSO	60 dB

General Characteristics

Power Consumption	<25 W
Operating Temperature	0 to +45 °C
Storage Temperature	-20 °C to +65 °C

Analog Return Quad Receiver (300 MHz) CRQR

Optical Specifications	
Wavelength	1260 nm to 1620 nm
Optical Input Ports	4
Optical Input Level	-12 dBm to +2 dBm (AGC -10 dBm to 0 dBm)
Optical Connector	SC/APC
RF Specifications	
RF Bandwidth	5 MHz to 300 MHz
RF Flatness	±0.75 dB
RF Output Level	50 dBmV (Pin > -1 dBm)
RF Attenuation	≥ 16 dB
RF Return loss	0 dB to +10 dB @ AGC, 0 dB to +30 dB @MGC, 1dB step
RF Input impedance	75 Ω
RF Test Point	-20 dB
Link Performance	
CNR	44 dB (measured with -2 dBm input, OMI = 6 %, AGC)
IMD2	-52 dBc (AGC, OMI=6%, 0 dBm input)
NPR (≥35 dB)	15 dB
MER	38 dB (154 QAM channels from 52 MHz to 1003 MHz of 256 QAM)
General Specifications	
Power Consumption	≤10 W
Dimensions (W × D × H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

Forward Redundant Receiver FRDR

Optical Specifications	
Wavelength	1200 nm to 1600 nm
Optical Input Ports	2
Optical Input Level	-8 dBm to +2 dBm
Optical Connector Type	SC/APC
RF Specifications	
RF Bandwidth	54 MHz to 1003 MHz
RF Flatness	± 0.75 dB
RF Output Level	38 dBmV @ -5 dBm
RF Return Loss	≥18 dB
RF Input Impedance	75 Ω
Manual Gain Control	0 dB to -20 dB
RF Test Point	-20 dB ± 0.75 dB
Link Performance	
CNR	51 dB (0 dB att, OMI = 3.5 %, -2 dBm receive)
CTB	-67 dBc (38 dBmV output)
CSO	-62 dBc
General Specifications	
Power Consumption	≤10 W
Dimensions (W × D × H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

Forward Redundant Receiver (1.2 GHz) CRDR

Item	Description	
Optical Part		
Optical Return Loss	>45 dB	
Optical Receiving Wavelength	1100 nm to 1600 nm	
Optical Connector Type	SC/APC or specified by the user	
Fiber Type	Single mode or specified by the user	
RF Part		
Optical AGC Range	-8 dBm to +2 dBm	
Optical AGC Control Range	-8/-7/-6/-5/-4/-3/-2 dBm adjustable	
Frequency Range	45 MHz to 1200 MHz	
Flatness in Band	±0.75 dB	
Max Output Level	≥ 104 dBµV	
Output Return Loss	≥16 dB	
AB Channel Isolation	>60 dB	
Electronic Control EQ Range	0 dB to 15 dB	
Electronic Control ATT Range	0 dB to 15 dB: A channel	
	0 dB to 10 dB: B channel	
C/N	≥ 51 dB	Optical receiving power: -1 dBm
C/CTB	≥ 67 dB	84 analog signals with an output level of 98 dBµV
C/CSO	≥ 62 dB	
Others		
Operating Temperature	-5 °C to + 55 °C	
Storage Temperature	-30 °C to + 70 °C	
Maximum Power Consumption	≤18 W	
Weight	1 kg	

Return CWDM Transmitter RCST

Optical Specifications	
Working Mode	Continuous or Burst
Out Wave Length	1310 nm, 1550 nm, or CWDM
Output Power	FP: 0 dBm
	DFB: 0, 3 dBm
Optical Connector Type	SC/AP or FC/APC
Frequency Range	5 MHz to 300 MHz
Flatness	±0.75 dB
Normal In Level (@3.2 MHz Bandwidth)	80 dBµV (75 dbµV to 90 dbµV)
In Level Adjusting Range	-30 dBµV to 0 dBµV
Impedance	75 Ω
Reflect Loss	>16 dB
Drive Level Test Port	-20 dB ±1 dB
NPR Dynamic Range	FP: ≥15 (NPR ≥30)
(Receiving at -6 dBm)	DFB: ≥20 (NPR ≥30)
General Specifications	
Power Consumption	<3 W
Temperature	-5 °C to +55 °C
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	1.2 kg

1550 nm Erbium-Doped Fiber Amplifier EDFA

Optical Specifications	
Operating Wavelength	1530 nm to 1565 nm
Input Optical Power Range	-5 dBm to +10 dBm
Output Optical Power	23 dBm per port
Output Power Stability	±0.5 dBm
Noise Figure	<5 dB (output power ≤ 20 dBm)
	<5.5 dB (output power ≤ 23 dBm)
Polarization Dependence Gain	0.5 dB
Polarization Mode Dispersion	0.5 ps
Return Loss	≥45 dB
Connector	SC/APC or FC/APC
General Specifications	
Power Consumption	≤15 W
Dimensions (W × D × H)	25 mm × 380 mm × 138 mm
Weight	2 kg

Forward RF Switch RFSW

RF Specifications	
RF Bandwidth	5 MHz to 1003 MHz
RF Input Level	20 dBmV to 70 dBmV
RF Return Loss	18.5 dB
RF Insertion Loss	≤3 dB
Frequency Response	± 0.75
RF Input Impedance	75 Ω
RF Test Point	-20 dB ± 1 dB
Switching Range	±3 dB to ± 10 dB (±0.5 accuracy)
Switching Time	≤15 ms
General Specifications	
Power Consumption	≤2 W
Dimensions (W × D × H)	25 mm × 380 mm × 138 mm)
Weight	1.0 kg

Forward RF Amplifier RFAF

RF Specifications	
RF Bandwidth	45 MHz to 1003 MHz
RF Flatness	± 0.6 dB
RF Return loss	≥ 18 dB
RF Input impedance	75 Ω
Gain	20 dB
Attenuation Range	0 dB to +20 dB
Slope Range	0 dB to +20 dB
Noise Figure	6.5 dB (30 dB) 7.5 dB (20 dB)
RF Test Point	-20 dB ± 0.8 dB
CSO/CTB	70/74
Connector	F-Female
General Specifications	
Power Consumption	≤16 W
Dimensions (W x D x H)	25 mm × 380 mm × 138 mm
Weight	2 kg

Optical Switch OPSW

Optical Specifications	
Operating Wavelength	1200 nm to 1600 nm
Insertion Loss	≤1.3 dB (tested at 1310 nm, 1550 nm)
Switching Time	≤10 ms
Return Loss	≥55 dB
Max Input Optical Power	500 mW
Switching Life	≥10 million times
Optical Connector Type	FC/APC or SC/APC
General Specifications	
Supply Voltage	160 V_{AC} to 250 V_{AC} (50 Hz)
Power Consumption	≤2 W
Operating Temperature	-5 °C to +55 °C
Operating Humidity	<95 % (non-condensing)
Storage Temperature	-30 °C to +70 °C
Storage Humidity	<95 % (non-condensing)

Ordering Information

AH1000 Headend Platform	Description
AH10-CHASSIS	AH1000 19-inch chassis
AH10-PS-AC	AH1000 power supply 176 V AC to 264 VAC
AH10-PS-DC	AH1000 power supply 48 V DC
AH10-SMM	AH1000 SMM module
AH10-F3ST-xx-S	AH1000 1310 1 GHz Single Forward Transmitter, xxdBm, SC/APC
AH10-F3CT-xx-S	AH1000 1310 1.2 GHz Single Forward Transmitter, xxdBm, SC/APC
AH10-M3ST-xx-S	AH1000 1310 Single CWDM Forward Transmitter, xxdBm, CWDM ch 1yy0 nm, SC/APC
AH10-F5ST-xx-S	AH1000 1550 DMOD TX, 1 GHz, 1550 nm, xxdBm, SC/APC
AH10-F5ST-xx-yy-S	AH1000 1550 DMOD TX, 1 GHz, 1550 nm, xxdBm, ITU channel yy, SC/APC
AH10-F5CT-xx-S	AH1000 1550 DMOD TX, 1.2 GHz, 1550 nm, xxdBm, SC/APC
AH10-F5CT-xx-yy-S	AH1000 1550 DMOD TX, 1.2 GHz, 1550 nm, xxdBm, ITU channel yy, SC/APC
AH10-ARQR-ST-S	AH1000 Analog 200 MHz Quad Return Receiver Standard version SC/APC
AH10-CRQR-ST-S	AH1000 Analog 300 MHz Quad Return Receiver Standard version SC/APC
AH10-FRDR-S	AH1000 Forward Redundant Receivers, 2 optical in, 1 RF out, SC/APC
AH10-CRDR-S	AH1000 Forward Redundant 1.2 GHz Receiver, 2 optical in, 1 RF out, SC/APC
AH10-RCST-xx-yy-S	AH1000 Return CWDM Transmitter, xx dBm, CWDM channel yy, SC/APC
AH10-EDFA-xx-01-S	AH1000 EDFA Optical Amplifier, xxdBm output power, 1 output port, SC/APC
AH10-RFSW-S	AH1000 RF Switch Module SC/APC
AH10-RFAF-20	AH1000 RF Forward Amplifier Module 20 dB Gain
AH10-OPSW-S	AH1000 Optical Switch Module SC/APC

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