

## H5000 Outdoor Mini Virtual HUB

The H5000 is an RFOG Indoor/Outdoor Mini Virtual Hub that provides an optical distribution point for downstream traffic and an aggregation point for upstream traffic, making it easy for cable operators to extend their fiber networks far beyond the traditional hub/headend infrastructure. By using the H5000, the operators can make the best use of their fiber to deliver improved high-speed internet, cable IPTV, and multi-screen services over their existing networks using RFoG technology. The H5000 also allows PON overlay.

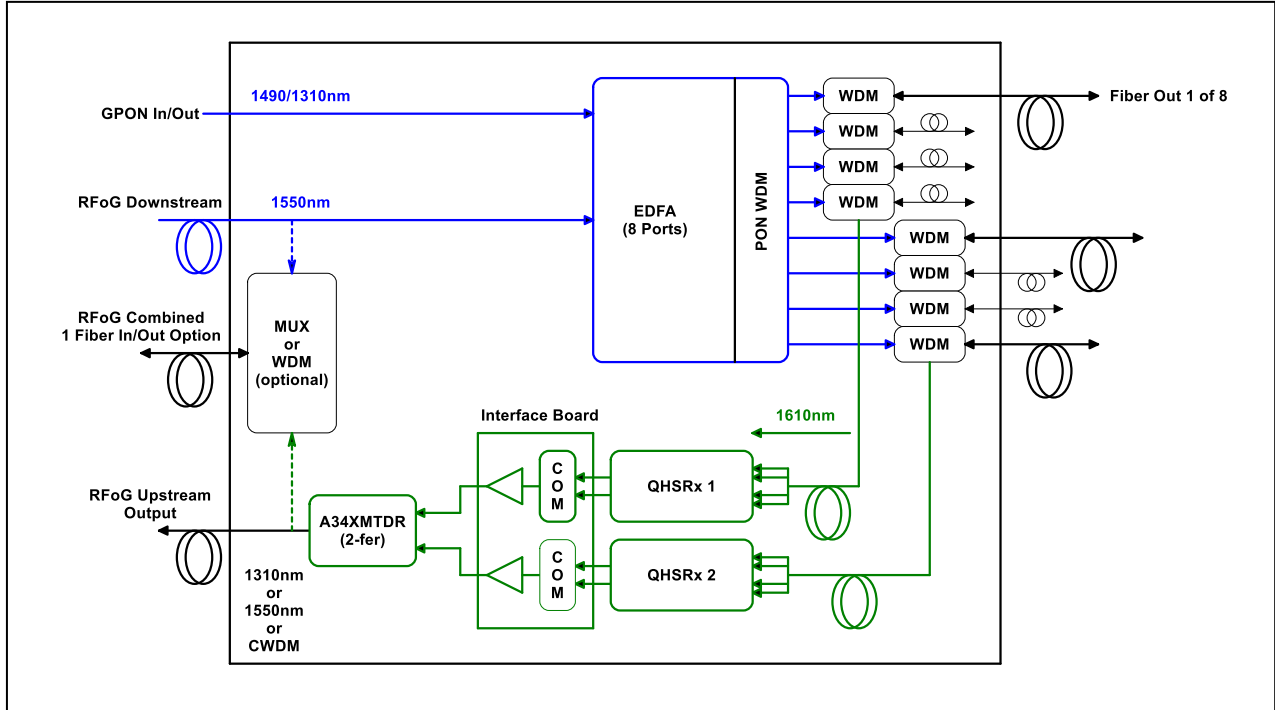
The Mini-Hub provides Optical Amplification, Wavelength Conversion, Wavelength Collapsing, Optical Muxing/Demuxing/Splitting, and RFoG / PON service.

### Features

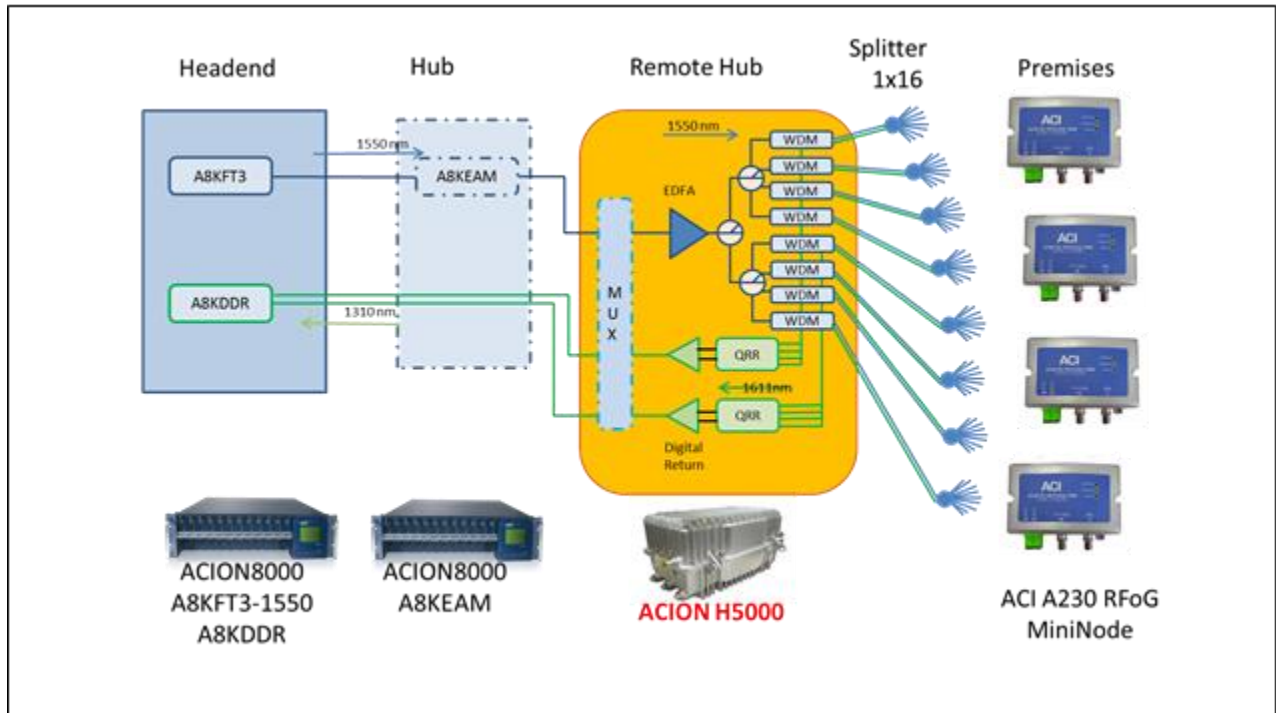
- Field-hardened outdoor type housing
- Single fiber to Multi-point distribution
- One way or Bidirectional optical transmission
- High power Multiport C-band EDFA optical amplification
- Redundant power supplies
- Built-in optical wavelength Multiplexing and De-Multiplexing modules
- PON overlay capability
- No need for a standalone power supply just to feed the hub.
- Cable 40-90 VAC or Mains 90-240 VAC power supply options

# Block Diagrams

## The H5000 Outdoor Micro Hub structure



# Application



# Specifications

ACI		H5000 Outdoor Mini Virtual Hub				
<b>Absolute Maximum Ratings</b>						
Parameters	Min	Typ.	Max	Units	Notes	
AC Input Voltage	90	-	240	Vac	50/60Hz, line power	
H5000 Total Power Consumption	-	-	100	W		
Operating Temperature	-40	-	60	°C		
Storage Temperature	-40	-	85	°C		
Relative Humidity	0	-	95	%	(non-condensing)	
Input Optical Power into DS EDFA	-	-	8	dBm		
<b>System Performance</b>						
Parameters	Conditions	Units	Min	Typ.	Max	Notes
Optical Input Power (to EDFA)	@ 1550 nm	dBm	-5	-	+8	
Optical Output Power/Port (with PON Pass Thru Option)	After WDM	dBm	18	-	-	
Optical Output Power/Port (No PON Pass Thru Option)	After WDM	dBm	19	-	-	
<b>Upstream Performance</b>						
Operating BW	42 MHz Option 85 MHz Option	MHz	5 5	-	42 85	
Frequency Response Flatness	5 – 42 MHz 5 – 85 MHz	dBpk-pk	-	-	2	
Optical Input Range	No PON WDM With PON WDM	dBm	-23 -22	-	-10 -9	1
RF Out Level (in AGC Range)	AGC ON Optical In -20 to -10dBm R-ONU: 8.8% OMI/ch 4ch for 42MHz Option 8ch for 85MHz Option	dBmV/ch	34	36	38	2
RF Out Level (Out of AGC Range)	AGC ON Optical In -22 to -8 R-ONU: 8.8% OMI/ch 4 ch for 42 MHz Option 8 ch for 85 MHz Option	dBmV/ch	30	32	38	2
DR @ 38 dB NPR	-	dB	10	-	-	3

- 1) QHSR sensitivity range: -23 to -10 dBm.
- 2) RF out level is measured from QDR's RF Out.
- 3) Fiber length = 20 km, Rx Optical = -10 dBm, Opt attenuator needs to be between Tx and Fiber, Tx burst mode disable.

**EDFA Module Specification**

Parameters	Conditions	Units	Min	Typ.	Max	Notes
Uplink Ports	RFoG Port GPON Port		1 (Single fiber), 2 (Dual fiber) 8			
Down Link Ports	RFoG & GPON		8			
RFoG System WDM Wavelength	1550 nm (DS) 1610 nm (US)	nm	1545 1600	-	1563 1610	
PON Pass Through WDM Wavelength	1310 nm (US) 1490 nm (DS)	nm	1260 1480	1310 1490	1360 1500	
Output Power/Port (No PON Pass Thru Option)		dBm	19	-	-	
Output Power/Port (with PON Pass Thru Option)	After WDM	dBm	18	-	-	
Total Input Power	@ 1550 nm	dBm	-5	-	+8	
Saturated Output Power	Pin ≥ -5 dBm @ 1550 nm	dB	Po	Po+0.3	Po+1	
Output Power Variation	-	dB	0	-	1	
Output Power Stability	Over λ <sub>OP</sub>	dB	-	-	1	
NF @ Pin=0 dBm	-	dB	-	-	5.5	
PDG	Over λ <sub>OP</sub>	dB	-	-	0.5	
PMD	Over λ <sub>OP</sub>	ps	-	-	0.5	
Optical Return Loss	All Ports	dB	45	-	-	
Input Optical Connector			LC/APC (Standard)			
Output Optical Connector			LC/APC (Standard)			
PON Input Optical Connector			LC/UPC (Standard)			
Optical IL with WDM RFoG System PON Pass Thru (optional)	1550 & 1610 1310 & 1490	dB	-	-	1 1.2	
Output Isolation		dB	45	-	-	

A34XMTDR Digital Return Transmitter Specification				
Parameters	Conditions	Units	Specification	Notes
<b>Optical Specifications</b>				
Laser Type			FP, DFB or CWDM	
Optical Return Loss	Min.	dB	45	
Optical Output Power	Min.	dBm	-5 to 0 0 to 3	
Wavelength	DFB/FP laser CWDM laser		1310 ± 20 nm ITU-T CWDM 1271 – 1611 nm	
Spectral Line Width (RMS)	FP DFB CWDM	nm	1.5 (typical) 0.4 (typical) 0.4 (typical)	
<b>RF Specifications</b>				
Operating Bandwidth	45 MHz 85 MHz	MHz	5 to 45 5 to 85	
Impedance		Ω	75	
RFIN 1 and RFIN 2 Level		dBmV/ch	16	
RFIN 1 and RFIN 2 Input Return Loss	Max	-dB	16	
RF Input Level Adjustment Range	0.1 dB step	dB	0 to 20	
RFIN 1 and RFIN 2 Flatness	Link	dBpk-pk	±1	
RF Input Test Point Level		-dB	20 ± 0.5	
RF Input Test Point Return Loss	Max	-dB	16	
<b>Link Performance</b>				
Link Gain		dB	20	
Peak NPR	45 MHz 85 MHz	dB	53 52	
Dynamic range	@ 40 dB CNR	dB	18	
MER		dB	38	
BER			<1x10 <sup>-9</sup>	
<b>Environmental</b>				
Power Consumption	Maximum	Watt	7.5	
Operating Temperature	Inside Optical Node Ambient Temperature	°C °F	-25 to +85 -32 to +185	
Relative Humidity	Non-condensing	%	0 to 95	
Optical Connector			LC/APC	
Dimensions	D × H × W	Inch. (mm)	5.81 × 1.16 × 2.95 (147.6 × 29.5 × 74.9)	

QHSR Quad High-Sensitivity Return Optical Receiver (for RFoG)				
Parameters	Conditions	Units	Specification	Notes
<b>Optical Specification</b>				
Receive Optical Power		dBm	-23 to -10	
Responsivity	1310 nm 1550 nm	mA/mW	0.8 0.9	
Optical Test Point	-23 to -10 dBm	V/mW	20	0.1V = -23 2V = -10
Optical Return Loss		dB	45	
Optical Wavelength		nm	1260 to 1620	
<b>RF Specification</b>				
Operating Bandwidth		MHz	5 - 200	6 ch for 42 MHz 8 ch for 85 MHz
RFout1 and RFout2 Return Loss	Max.	dB	-16	
RX1 to & Rx4 RF Output Level	8 ch @ 8.8% OMI/ch -23 dBm Rx Opt	dBmV/ch	≥ 5	RF Atten set to 0 dB, After 2x1
Optical AGC Range	Rx Opt = -10 to -20 dBm	dB	10	RFout = 10 dBmV/ch
AGC Accuracy	Rx Opt = -10 to -20 dBm	dB	± 1.5	
RF Path Gain Adjustment Range	0.1 dB steps	dB	0 to 25	
Rx1 to Rx4 Response Flatness	5 – 200 MHz	dBpk-pk	±1	
RF Output Test Point Level RFout 1, RFout2	Relative to RF Output	dB	-20 ± 1	5 – 200 MHz
RF Output Test Point Return Loss	Max.	dB	-16	TP1, TP2
RFout1 to RFout2 Isolation		dB	<-50	
Receiver EIN	Max.	pA/√Hz	2	
Discrete Second Order (DSO)	2-tone Opt Test	dBc	-55	Note 1
Discrete Third Order (DTO)		dBc	-60	
<b>Environment</b>				
Module Dimensions	D x H x W	mm	176 x 74.9 x 30.7	
Power Consumption	Max.	W	5	
Operating Temperature		°C	-40 to 80	Internal
Relative Humidity	Non-condensing	%	0 to 95	
Optical Connector	Standard		SC/APC	

# Part Number Ordering Matrix

## H5000 Configuration Sheet

Customer: \_\_\_\_\_

Created By: \_\_\_\_\_ Order Date: \_\_\_\_\_

### ORDERING MATRIX

November 27, 2018

Position		1	2	3	4	5	6	7	8	9	10	11
<b>PART NUMBER</b>	<b>H5000</b>											

1	<input type="checkbox"/>	<b>Port Number for EDFA</b> 4 = 4 Ports 8 = 8 Ports											2A = 85MHz, Single RF, Single 1471nm CWDM-Type Laser, 80km 2B = 85MHz, Single RF, Single 1491nm CWDM-Type Laser, 80km 2C = 85MHz, Single RF, Single 1511nm CWDM-Type Laser, 80km 2D = 85MHz, Single RF, Single 1531nm CWDM-Type Laser, 80km 2E = 85MHz, Single RF, Single 1551nm CWDM-Type Laser, 80km 2F = 85MHz, Single RF, Single 1571nm CWDM-Type Laser, 80km 2G = 85MHz, Single RF, Single 1591nm CWDM-Type Laser, 80km 2H = 85MHz, Single RF, Single 1611nm CWDM-Type Laser, 80km
2	<input type="checkbox"/>	<b>WDM Options for EDFA</b> 0 = No PON Bypass WDM 3 = With PON Bypass WDM (1490/1310)											
3	<input type="checkbox"/>	<b>Network Management</b> 0 = None 1 = SNMP (Media Converter)											3A = 45MHz, Dual RF, Single 1471nm CWDM-Type Laser, 80km (2-fer) 3B = 45MHz, Dual RF, Single 1491nm CWDM-Type Laser, 80km (2-fer) 3C = 45MHz, Dual RF, Single 1511nm CWDM-Type Laser, 80km (2-fer) 3D = 45MHz, Dual RF, Single 1531nm CWDM-Type Laser, 80km (2-fer) 3E = 45MHz, Dual RF, Single 1551nm CWDM-Type Laser, 80km (2-fer) 3F = 45MHz, Dual RF, Single 1571nm CWDM-Type Laser, 80km (2-fer) 3G = 45MHz, Dual RF, Single 1591nm CWDM-Type Laser, 80km (2-fer) 3H = 45MHz, Dual RF, Single 1611nm CWDM-Type Laser, 80km (2-fer)
4	<input type="checkbox"/>	<b>Power Supply</b> 0 = Cable Power (40 - 90Vac) 1 = Universal Line Power (100 to 240Vac)											
5-6	<input type="checkbox"/>	<b>EDFA Output Power</b> 18 = 18 dBm											
7	<input type="checkbox"/>	<b>RFoG Receiver</b> 1 = One QHSR 2 = Two QHSR											4A = 85MHz, Dual RF, Single 1471nm CWDM-Type Laser, 80km (2-fer) 4B = 85MHz, Dual RF, Single 1491nm CWDM-Type Laser, 80km (2-fer) 4C = 85MHz, Dual RF, Single 1511nm CWDM-Type Laser, 80km (2-fer) 4D = 85MHz, Dual RF, Single 1531nm CWDM-Type Laser, 80km (2-fer) 4E = 85MHz, Dual RF, Single 1551nm CWDM-Type Laser, 80km (2-fer) 4F = 85MHz, Dual RF, Single 1571nm CWDM-Type Laser, 80km (2-fer) 4G = 85MHz, Dual RF, Single 1591nm CWDM-Type Laser, 80km (2-fer) 4H = 85MHz, Dual RF, Single 1611nm CWDM-Type Laser, 80km (2-fer)
8-9	<input type="checkbox"/>	<b>Digital Return Transmitter Options (See Note 1)</b>  01 = 45MHz, Single RF, Single FP-Type Laser, 10km 02 = 45MHz, Dual RF, Single FP-Type Laser, 10km (2-fer) 03 = 45MHz, Single RF, Single 1310nm DFB-Type Laser, 40km 04 = 45MHz, Dual RF, Single 1310nm DFB-Type Laser, 40km (2-fer) 05 = 85MHz, Single RF, Single FP-Type Laser, 10km 06 = 85MHz, Single RF, Single 1310nm DFB-Type Laser, 40km 07 = 85MHz, Dual RF, Single 1310nm DFB-Type Laser, 40km (2-fer)  1A = 45MHz, Single RF, Single 1471nm CWDM-Type Laser, 80km 1B = 45MHz, Single RF, Single 1491nm CWDM-Type Laser, 80km 1C = 45MHz, Single RF, Single 1511nm CWDM-Type Laser, 80km 1D = 45MHz, Single RF, Single 1531nm CWDM-Type Laser, 80km 1E = 45MHz, Single RF, Single 1551nm CWDM-Type Laser, 80km 1F = 45MHz, Single RF, Single 1571nm CWDM-Type Laser, 80km 1G = 45MHz, Single RF, Single 1591nm CWDM-Type Laser, 80km 1H = 45MHz, Single RF, Single 1611nm CWDM-Type Laser, 80km											
													10 <input type="checkbox"/> <b>OPTICAL CONNECTOR</b> 1 = HE Interfaces: SC/APC; EDFA Ports: LC/APC; PON Bypass: LC/APC
													11 <input type="checkbox"/> <b>WDM Options for HE Interface</b> 0 = No WDM      5 = 1550/1531 1 = 1550/1310    6 = 1550/1571 2 = 1550/1471    7 = 1550/1591 3 = 1550/1491    8 = 1550/1611 4 = 1550/1511

### NOTES:

1. Refer to the A8KQDR Data Sheet for selecting the corresponding headend digital receiver.



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