

# AccessPON

## FTTH Over The Last-Mile Coaxial

- **No infrastructure Change is Needed to Deliver Multi-Gigabit PON Service to Homes Over Existing HFC Network**
- **Transition is Completely Transparent to Home Subscribers**
- **Full Ethernet/IP Transport Network to Deliver up to 4.8 Gbps Data Service Over Optional Existing Cable TV (QAM) Service**
- **Compatible with Fiber Deep/RFoG Network with PON Overlay**
- **Low Implementation Cost to Save CapEx and High Management Capability to Save OpEx**
- **Ideal Solution to Supply High-Speed Internet Service Over Cable TV Service to Underground Residential Homes and MDUs without Replacing the Last-Mile Coaxial Cables**
- **Flexible Configuration and Upgrade Path to Support Modern PON or 5G Access Technologies**
- **Modular Design with Centralized Remote Management and Monitoring Functions**
- **Advanced Migration Path to switch from HFC to FTTH Deployment without Changing the Wirings as Needed**
- **Inter-operable with Existing MoCA LAN Home Network**
- **Runtime QoS Bandwidth Control and Traffic Policing of Connected Subscribers**
- **Plug-and-Play Installation and Maintenance**

The AccessPON Host transponder is a modular system designed to reduce the cost of providing Cable/Satellite TV and high-speed Ethernet / IP services during a system upgrade to Fiber Deep optics by utilizing the existing coaxial drop cable.

Data service in the form of Ethernet / IP and conventional HFC overlay is transported through PON fiber optic deployment to the residents' connection point, via an aerial or pedestal mount service.

At this point, the signals are converted from PON to Ethernet and, if HFC signals are present, from RFoG to RF. The Ethernet signals are then converted to MoCA bonded channel modulation, combined with HFC if present, and launched into the subscriber coax.

These signals are then received by the MoCA home gateway, giving the subscriber access to 5 MHz to 1.2 GHz HFC service and a >1.25 GHz data service, yielding 1.2 Gbps data speed at this time.

AccessPON Host transponder can support up to 4.8 Gbps aggregated Ethernet data speed over four (4) coaxial output interfaces, which can satisfy the latest GPON 2.5 or the future 10G-EPON deployment.

The MoCA home gateway has one (1) bi-lateral port for HFC, four (4) 1000Base-T ports, and an optional 802.11 b/g/n/ac Wi-Fi broadband router. This system is MoCA Intranet (LAN) blocked to allow compatibility with existing MoCA network in the home while providing MoCA Internet (WAN) access service simultaneously.

System powering can be provided from commercial power supply, from HFC coaxial cable, from MDU basement, or from another external power source to the remote AccessPON Host transponder in the pole, pedestal, or wiring closet. Outdoor casting with modular design to host multiple AccessPON Host transponders is also available.



**A Cost-Effective, Reliable PON to MoCA Data Transponder with RF Overlay for MDUs and Residential Homes**



**MH2048 Host**

Input 4 x 1000Base-T + 1 x RF 75Ω F  
Output 4 x RF 75Ω F (Ethernet 4 x 1.2 Gbps)  
Access 63 Nodes per 75Ω F



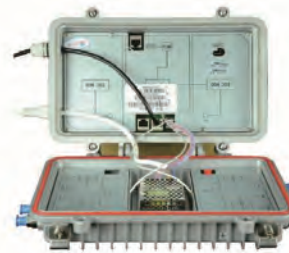
**AH2015 Host**

Input 2 x 1000Base-T + 1 x RF 75Ω F  
Output 1 x RF 75Ω F (Ethernet 1.5 Gbps)  
Access 63 Nodes per 75Ω F

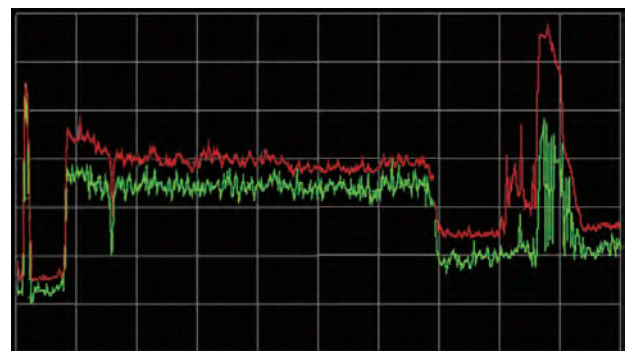


**MH1108 Host**

Input 2 x 1000Base-T + 1 x RF 75Ω F  
Output 2 x RF 75Ω F (Ethernet 800 Mbps)  
Access 63 Nodes per 75Ω F



Modular Outdoor Casting for Access Host



**Spectrum View of HFC and MoCA Access Carriers through 940ft (287m) or 70dB Loss Budget of Drop Coax**

# AccessPON

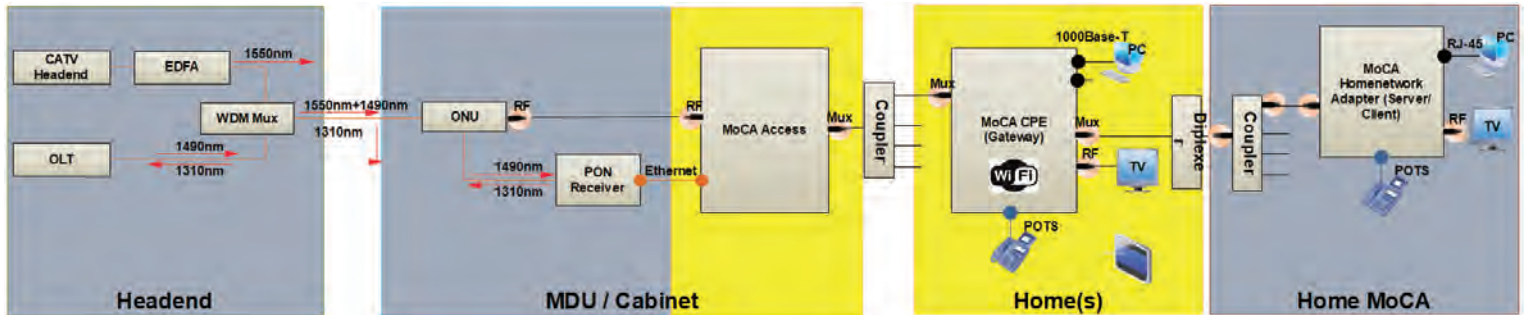
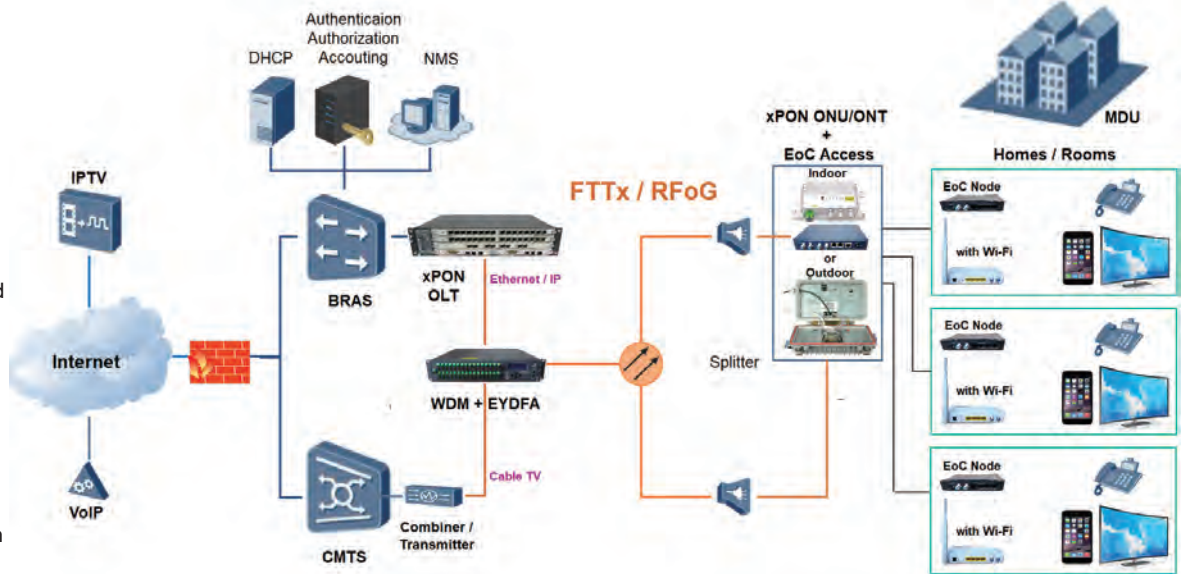
## FTTH Over The Last-Mile Coaxial

The ROI is realized initially by using the existing coaxial drop instead of burying or laying fibers to the home. Future ROI can be realized by using the same AccessPON devices when PON infrastructure is upgraded with faster aggregation data pipe (e.g. GPON 2.5, 10G-EPON).

Operating costs are reduced by the facts that the electronics need ed for service are not installed until activation. The bandwidth and traffic policing can be remotely configured in runtime for billing.

When a new customer is added, simply connect the subscriber drop, and install the gateway in the home to activate. This system can easily be operated in parallel with the existing HFC network and switched over to PON-based FTTH whenever needed.

With its lightweight, rugged design, and easy integration to your existing system, the AccessPON devices are the most cost-effective data transponder for signal conversion needs.



Functional Block Diagram of AccessPON Solution

### AccessPON Solution

Components	Input	Output
PON	Down 1490nm±20nm Up 1310nm±20nm	
RFoG	1550nm±20nm, 1490nm±20nm 1610nm±20nm, 1310nm±20nm	
NNI	GEAPON, GPON, GPON 2.5, RFoG, 5G OLT	
ONU (optional)	1 x PON SFP 1550nm±20nm, 1490nm±20nm 1610nm±20nm (optional), 1310nm±20nm	Cable TV RF 75Ω F 1490nm±20nm, 1310nm±20nm
PON Receiver (optional)	1 x PON SFP 1490nm±20nm 1310nm±20nm	4 x 1000Base-T
UNI	MoCA Access 1 to 4 x 1000Base-T Cable TV RF 75Ω F	1 to 4 x MoCA Access 75Ω F
CPE 1	MoCA Home Gateway MoCA Access 75Ω F	Cable TV RF 75Ω F 4 x 1000Base-T 802.11 b/g/n/ac Wi-Fi 2 x POTS (optional) MGCP/SIP Agent
CPE 2	MoCA Home Device MoCA Access 75Ω F	Cable TV RF 75Ω F 1 x 1000Base-T

### MH2048 Host Specifications (subject to change without notice)

Parameters		Min.	Typical	Max.	Unit
Modulation	MoCA Bonded Channels				
Standards	IEEE802.3, IEEE802.3x, IEEE 802.3ab				
Operating Frequency	Configurable	1100	1350	1650	MHz
Output Power			50		dBmV
Input Power		-20			dBmV
Modulation	OFDM, TDMA/TDD				
Channel Bandwidth			50		MHz
Max. Attenuation			75		dB
PHY Data Rate			1400		Mbps
MAC Data Rate			1100		Mbps
Encryption	128-bit AES				
Data Interface	Modular one (1) to four (4) 10/100/1000 Base-T Auto Negotiation, MDI/MDIX	10	1000	1000	Mbps
RF Interface	Modular one (1) to four (4) 75Ω F	10	1000	1000	Mbps
Power Supply	12VDC		300		mA
Operating Temperature		-20		55	°C
Safety and Environment	CE, FCC Compliant, RHoS				



# AccessPON

## FTTH Over The Last-Mile Coaxial

### RFoG ONU Specifications

Parameters		Min.	Typical	Max.	Unit
Drop Wavelength Band- Forward		1540		1560	nm
Add Wavelength Band- Return		1600		1620	nm
Pass Wavelength- Forward		1475		1500	nm
Pass Wavelength Band- Return		1280		1380	nm
Pass Band Insertion Loss				1	dB
Pass to Add-Drop Crosstalk	Bi-directional	35			dB
Forward to Return Crosstalk	Bi-directional	35			dB
<b>Forward</b>					
Optical Wavelength		1540	1550	1560	nm
Monitor Voltage	$\lambda=1550$		1		V/mW
Optical Input Power	Continuous	-6	-1	2	dBmW
Bandwidth	Customizable	54		1002	MHz
Flatness of Frequency Response	f=54 to 1002MHz		$\pm 0.75$	$\pm 1$	dB
Output Return Loss		14	16		dB
Reference Output Level	Measured at 1002MHz		17		dBmV
Slope			5		dB
Optical Input Return Losses		45			dB
C/N	59 Pal-D channel	50			dB
CTB	loading			-65	dB
CSO	(-1dBmW Optical Input)			-60	dB
Equivalent Noise Input	f=55MHz			7	pA/Hz
<b>Return</b>					
Optical Wavelength		1600	1610	1620	nm
Optical Output Power		0.5	1	3	mW
RF Input Level		10	28	40	dBmV
Bandwidth(optional)		5		42	MHz
Flatness of Frequency Response	f=5 to 42MHz		$\pm 0.75$	$\pm 1$	dB
Input Return Loss	f=5 to 42MHz	14	16		dB
Optical Output Return Loss		45			dB
Power at which optical turn ON	Adjustable		15		dBmV
Power at which optical turn OFF	Adjustable		-4		dBmV
Time to 90% optical ON				1.3	ms
Time for optical falls to 10%				1.6	ms
<b>General</b>					
Power Supply	12VDC		280		mA
Operating Mounting Base Temperature		-20		55	°C
Safety and Environment	CE, FCC Compliant, RoHS				



### MoCA Diplexer Specifications

Parameters		Min.	Typical	Max.	Unit
Frequency Range		5		3000	MHz
High Pass	Configurable	1125	1350	1525	MHz
Rejection	Configurable (5-1002MHz, 2300-3000MHz)		45		dB
Insertion Loss	1125-1525MHz		2		dB
Return Loss	1125MHz		12		dB
Return Loss	1525MHz		9		dB
HFC Low Pass	Configurable	5	1200	1200	MHz
Rejection	Configurable (1125-3000MHz)		40		dB
Insertion Loss	5MHz-400MHz		0.3		dB
Insertion Loss	1002MHz		1.4		dB
Return Loss	5MHz-400MHz		12		dB
Return Loss	1002MHz		8		dB
Impedance	F Connectors		75		$\Omega$
Casting	Zinc Alloy Die				
Operating Temperature		-20		55	°C





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## FTTH Over The Last-Mile Coaxial

### MoCA Home Gateway Specifications

Parameters		Min.	Typical	Max.	Unit
<b>Modulation</b>	Bonded MoCA				
<b>Ethernet Standards</b>	IEEE802.3, IEEE802.3x, IEEE 802.3ab, 802.1D Bridging, 802.1q VLAN, 102.1x Authentication, 802.1p ToS/DSCP, IGMP v2/v3, Braodcast/Multicast Rate Limiting				
<b>OAM</b>	ITU-T G.988 Embedded Operations Channel, Prvisioning, Performance Monitoring, Software Image Download/Activation/Rebootign/Rollback				
<b>Modulation</b>	OFDM, TDMA/TDD				
<b>Channel Bandwidth</b>			50		MHz
<b>Operating Frequency</b>		1150	1350	1500	MHz
<b>Max. Attenuation</b>			75		dB
<b>PHY Data Rate</b>			1400		Mbps
<b>MAC Data Rate</b>			1000		Mbps
<b>Encryption</b>	128-bit AES				
<b>Ethernet/IP Interface</b>	4 x 10/100/1000 Base-T, Auto Negotiation, MDI/MDIX, CoS, IPv4, IPv6 Stateless AAC	10	1000	1000	Mbps
<b>WiFi (Optional) 802.11ac (2x2 MIMO Optional)</b>	802.11 b/g/n/ac at 2.4GHz and 802.11 n/ac at 5GHz				
<b>2.4GHz Channels</b>	1,2,3,4,5,6,7,8,9,10,11,12,13				
<b>5GHz Channels</b>	149,153,157,161,165				
<b>Security</b>	WEP, WPA-PSK, WPA2-PSK				
<b>Access Point</b>	Multiple SSIDs, Hidden SSID, WPS				
<b>Routing</b>	DHCP(v6)/Static, DNS(v6), PPPoE(v6), DNS Relay, NAT, NAPT, Port Forwarding, Static Routing, ACL				
<b>Gateway</b>	VPN PassThru/PPTP, LWTP/IPSec, Firewall, ALG, DMZ, DDNS, NTP, uPnP, IGMP Proxy				
<b>Management</b>	Web Portal				
<b>Tx Power</b>			100		mW
<b>Tx Data Rate</b>			867		Mbps
<b>POTS (Optional)</b>	ANSI and ETSI, T.38 Facsimile				
<b>Interface</b>	2 x RJ11				
<b>VoIP</b>	SIP and MGCP				
<b>TDM Voice</b>	GR.303, GR57, TR-08				
<b>Routing</b>	DHCP/Static				
<b>Dial Plan, Frequency, Cadence</b>	Configurable				
<b>Power Supply</b>	12VDC		900		mA
<b>Operating Temperature</b>		0		40	°C
<b>Safety and Environment</b>	CE, FCC Compliant, RoHS				



### MoCA Home Adapter Specifications

Parameters		Min.	Typical	Max.	Unit
<b>Modulation</b>	MoCA Bonded Channels				
<b>Standards</b>	IEEE802.3, IEEE802.3x, IEEE 802.3ab				
<b>Operating Frequency</b>	Configuarable	1100	1350	1650	MHz
<b>Output Power</b>			50		dBmV
<b>Input Power</b>		-20			dBmV
<b>Modulation</b>	OFDM, TDMA/TDD				
<b>Channel Bandwidth</b>			50		MHz
<b>Max. Attenuation</b>			75		dB
<b>PHY Data Rate</b>			1400		Mbps
<b>MAC Data Rate</b>			1100		Mbps
<b>Encryption</b>	128-bit AES				
<b>Data Interface</b>	1 x 10/100/1000 Base-T Auto Negotiation, MDI/MDIX	10	1000	1000	Mbps
<b>RF Interface</b>	75Ω F Connector	10	1000	1000	Mbps
<b>Power Supply</b>	5VDC		300		mA
<b>Operating Temperature</b>		-20		55	°C
<b>Safety and Environment</b>	CE, FCC Compliant, RHoS				

