



# TDM Network Solutions

**STM1/E1 Access Multiplexer**  
**E1 Access Unit/Multiplexer**  
**Ethernet Bridge**

**VDSL2 IP DSLAM**  
**VDSL2 Bridge/Router**  
**EFM LAN Extender**

**E1 TDM over IP**  
**Ethernet Serial Server**





# EFM-10/20/40

## 4-Port EFM G.SHDSL.bis LAN Extender

EFM is an Ethernet Network Extender designed to provide bonded high-speed Ethernet First Mile services over SHDSL on existing copper infrastructure. It is a bridge mode modem that delivers Ethernet services with symmetrical bandwidth at rates up to 22.8 Mbps (4 Pairs, Standard mode with TC-PAM 32) and 61 Mbps (4Pairs, Enhanced mode with TC-PAM 128). Implemented on IEEE 802.3ah EFM standards for advanced performance and management features. EFM ensures high reliability, low expense and maximum throughput. The introduction of EFM copper bonding technology allows delivery of higher bandwidth to longer distances over multiple copper pairs, enabling a good alternative in place where fiber is not economical to deploy. This Ethernet-pure solution provides a seamless integration into today and tomorrows networks. Designed with standard-based EFM technology (2BASE-TL), deployment of Ethernet services with EFM is quick and simple on the existing copper plant.

### Features

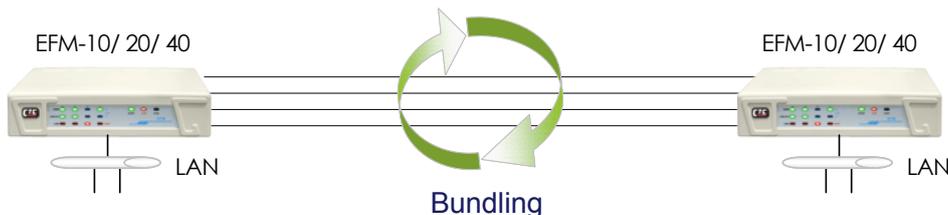
- Extending Ethernet Services to sites with existing copper infrastructure
- Supports TC-PAM 32 for 5.7 Mbps over single pair copper
- EFM Bonding up to 61 Mbps (4 pairs, TC-PAM 128)
- Flexible and Rapid Service Deployment
- Flexible configuration as CPE or CO
- Supports EFM OAM complying IEEE 802.3ah
- Low Delay, Jitter and packet loss for delay sensitive applications
- Comprehensive and easy OAM & P functions in provisioning and management
- QoS feature for guaranteed Ethernet service
- Future-proof Ethernet traffic management and QoS features

### Specifications

<b>Standards</b>	LAN	4-Port switching hub 10/100Base-T auto-negotiation & sensing Auto MDI/MDI-X	<b>Management Interface</b>	Easy to use web-based GUI for quick setup, configuration and management Menu-driven interface for local console and telnet access Password protected management and access control list for administration SNMP v1/v2 (RFC1157/1901/1905) agent and MIB II (RFC1213/1493) EFM OAM (IEEE 802.3ah) Software upgrade via web-browser / TFTP
	WAN	ITU-T G.991.2.(2004) EFM bonding (IEEE 802.3ah OAM) 2BASE-TL Data Rate: • Nx 64 Kpbs (N=3~89) using TC-PAM 16/32 • Max. 5.696Mbps (1-Pair) • Max. 11.392Mbps (2-Pair) • Max. 22.784Mbps (4-Pair) • N x 64 Kpbs (N=3~239) using TC-PAM 64/128 • Max. 15.296 Mbps (1-Pair) • Max. 30.592 Mbps (2-Pair) • Max. 61.184 Mbps (4-Pair) • Supports of Annex A, Annex B, Annex AF & Annex BG		<b>VLAN Support</b>
<b>LAN Protocols</b>	802.1d Transparent Bridging Up to 2K MAC Address learning bridge		<b>QoS Support</b>	Rate limiting by rule-based/port-based Traffic classification based on port/802.1p/ DSCP WRR (Weighted Round Robin) / SPQ (Strict Priority Queuing) scheduling algorithm,IPv6 (RFC 5430) pass through
	<b>Hardware Interface</b>	DSL : RJ-45 x 1, LAN : RJ45 x 4, Console Port x 1 MGMT : RJ45 x1, DC Power Jack x 1 Reset Button : Load Factory Default	<b>Environment</b>	Operating Temperature : 0 ~ 50°C Storage Temperature : -40 ~ 85°C Relative Humidity : 98%, non-condensing
<b>Indicator</b>	LAN : Link/Act, 10/100 per port System : Power, Alarm, MGMT WAN : Link per loop		<b>Regulatory</b>	ISO 9001 Quality Management, CE Approval
			<b>Physical / Electrical</b>	Dimension : 195 x 48 x 168mm (D x W x H) AC Power Adapter (100 ~ 240VAC) Weight : 1.3kg
			<b>Memory</b>	2MB Flash Memory, 8MB SDRAM

### Application

Bandwidth Aggregation up to 22.8Mbps Over 4 pair of Copper wires



### Ordering Information

Model Name	Description
EFM-10	2W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX
EFM-20	4W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX
EFM-40	8W, 2Base-TL EFM LAN Extender with 4x10/100Base-TX

Example: EFM -  - 10



## VDTU2A-301

### VDSL2 LAN Extender

The VDTU2A-301 is our lowest cost LAN extension solution using the G993.1/993.2 VDSL2 technology and providing up to 100Mbps throughput with only a single copper wire pair. A LAN extender is a device that forwards traffic between LANs transparently to higher network-layer protocols over distances that far exceed the distance limitations of standard Ethernet. A LAN is a high-speed data network (usually employing Ethernet technology) that connects computer workstations, printers, servers, and other devices. Designed specifically for LAN to LAN extension and supporting both symmetrical and asymmetrical transmission at up to 100/75Mbps within 300 meters or 10/10Mbps rate at 1000 meters, this is a perfect solution to extend a LAN to an adjacent building, garage or any location outside of the 100 meter reach of Ethernet UTP.

### Features

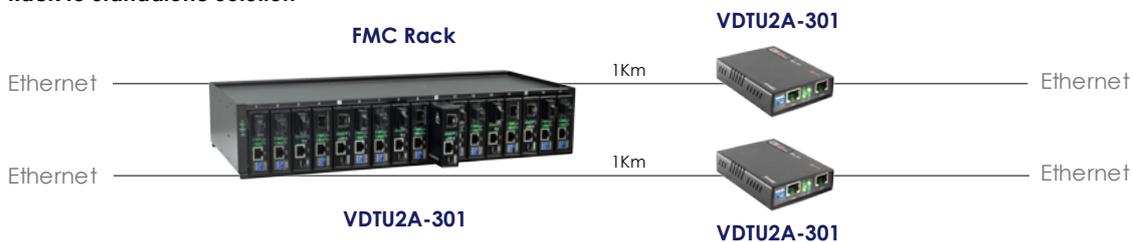
- Cost effective bridge function to connect two Ethernet LANs
- 100/75Mbps @ 300m (980 Ft)
- 10/10Mbps @ 1km (3300 Ft)
- Supports flow control via Pause frame or back pressure
- 802.1Q VLAN tag transparent
- Selectable CPE and CO mode via DIP switch
- Selectable fast and interleaved mode
- Selectable target band plan
- Selectable target SNR margin 9dB or 6dB

### Specifications

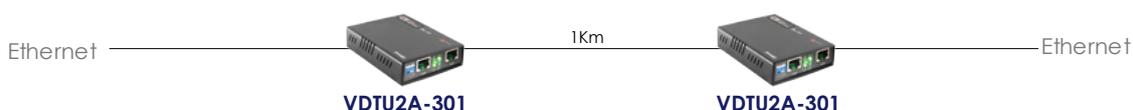
<b>LAN Interface</b>	Complies with IEEE 802.3 10Base-T and 802.3u 100Base-TX Connector : RJ45 MTU : 1536 Bytes	<b>Power Consumption</b>	4.2W
<b>VDSL2 Interface</b>	Complies with ITU-T G993.1/993.2/ G997.1 Connector : RJ45 DMT encoding On-board surge protection	<b>Dimensions</b>	97 x 73 x 23mm (D x W x H)
<b>4-position DIP Switch</b>	Selectable CO or CPE mode Selectable fast or interleave mode ( Impulse noise protection) Selectable Band plan (Symmetric or Asymmetric) Selectable target SNR margin (6dB or 9dB)	<b>Weight</b>	80g
<b>Indicator</b>	LAN : Act/Link, 10/100Mbps, Half/Full duplex VDSL : CO/CPE, Idle/Trained/Link, Power	<b>Temperature</b>	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
<b>Standard</b>	ITU-T G.993.1, 993.2, IEEE802.3, 802.3u	<b>Humidity</b>	10 ~ 90% non-condensing
<b>Power</b>	DC 12V via AC switching adapter	<b>Certification</b>	CE, FCC, RoHS compliant
		<b>MTBF</b>	50,000 hrs
		<b>Emission</b>	EN 55022: 2006 + A1:2007, Class B AS/NZS CISPR 22: 2006, Class B EN 61000-3-2: 2006 + A1: 2009 + A2: 2009, Class A EN 61000-3-3: 2008
		<b>Immunity</b>	EN 55024: 1998 + A1: 2001 + A2:2003 IEC 61000-4-2: 2008 ED.2.0 IEC 61000-4-3: 2006+A1: 2007 ED.3.0 IEC 61000-4-4: 2004+A1: 2010 ED.2.0 IEC 61000-4-5: 2005 ED.2.0 IEC 61000-4-6: 2008 ED.3.0 IEC 61000-4-8: 2009 ED.2.0 IEC 61000-4-11: 2004 ED.2.0

### Application

#### Rack to Standalone Solution



#### Standalone to Standalone Solution



### Ordering Information

Model Name	Description
VDTU2A-301	VDSL2 LAN Extender with 1x 10/100Base-TX
FMC-CH17-AC/DC/AD	2U, 17-slot FMC converter Chassis with AC, DC or AD Power

VDTU2A -   
 Example: VDTU2A - 301  
Chassis      Power Type  
 FMC-CH17 -   
 Example: FMC-CH17 - AD



# VDTU2A-304

## 4-Port VDSL2 LAN Extender

The VDTU2A-304 VDSL2 LAN Extender is a long reach Ethernet extender with four Ethernet ports and two phone jacks, in which one is for VDSL2 connection and the other is for POTS (Plain Old Telephone Service) connection. It has built-in POTS splitter to share the existing phone line with POTS eliminating the need for replacing the existing copper wiring. It is ideal for use as an Ethernet extender to an existing Ethernet network. While accommodating VDSL2 (Very-high-data-rate Digital Subscribe Loop) technology to extend Ethernet service over single-pair phone line, VDTU2A-304 can reach up to 100/75 Mbps bandwidth (line rate) within 300M or 40/10 Mbps bandwidth (line rate) for 1 Km long-range connections. By providing ultra-high speed, VDTU2A-304 LAN Extender makes your telephone line achieve its best performance ever. It has the advantage of minimum installation time (simple as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference. VDTU2A-304 delivers everything needed to quickly deploy a high-speed IP-based network for providing high-speed Internet access, video-on demand services and voice services. The resulting compact, cost-effective form factor offers systems integrators and small business owners an attractive long reach Ethernet solution.

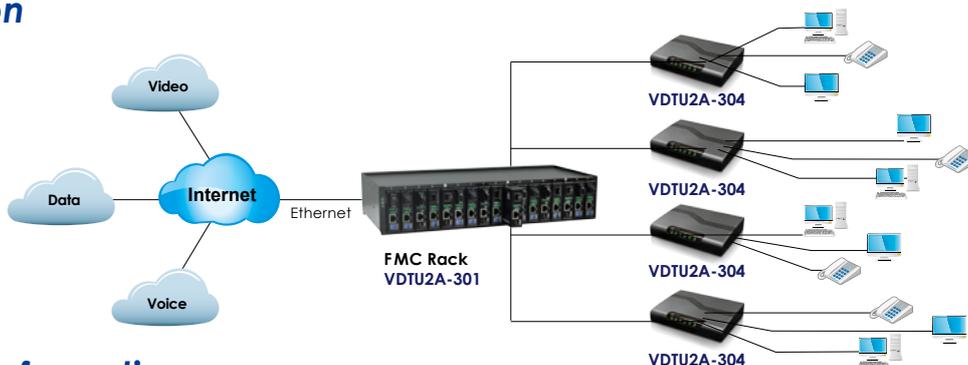
### Features

- Cost effective bridge function to connect two Ethernet LAN
- Easy installation via simple plug-and-play
- Selectable CPE and CO mode : Two working modes are built in the same unit, which keep the flexibility of installation and easy provision of service but lower inventory of service provider.
- Selectable fast and interleaved mode: Fast mode guarantees a minimum end to end latency less than 1 mS. Interleaved mode provides impulse noises protection for any impulse noise with duration less than 250uS. Interleaved mode has a maximum end to end latency of 10mS.
- Selectable target band plan : VDSL2 defines multiple band plans and configuration modes to allow asymmetric and symmetric services in same binder for data transmission.
- Asymmetric is selected that provides better downstream performance. Symmetric is selected that provides better upstream performance.
- Selectable target SNR margin: It has the ability to select fixed SNR margin value on 9 dB or 6db. The systems will maintain the SNR margin at their value across all usable loop length. The higher SNR value gets better line quality, but lower performance.

### Specifications

<b>Standards</b>	Compliant with ITU VDSL2 standard G.993.2 Annex A, Annex B and Annex C Supports VDSL2 profile : 8a, 8b, 8c, 8d, 12a, 12b and 17a Band plan profile: symmetric (Plan 997) and asymmetric (Plan 998) Supports fast and interleaved mode Target SNR Margin : Selectable Built-in POTS splitter to share voice and data (Optional)
<b>Management</b>	Web-based GUI for quick setup, configuration and management Firmware upgradable from Web
<b>LAN</b>	Filtering functions for MAC/IP/Port QoS for Port/VLAN/DSCP/TCP-UDP Port number Port Based VLAN & IEEE 802.1q VLAN Tagging Port configuration for Bandwidth/Duplex/Speed/Flow control/Broadcast storm
<b>Interfaces</b>	Ethernet : 4x RJ-45 connectors for Ethernet 10/100Mbps ports with Auto-MDI/MDIX VDSL : 1x RJ-11 connector for VDSL2 port Phone : 1x RJ-11 connector for POTS Splitter (Optional) General : PWR and SYS WAN (VDSL2) : CO, CPE, LINK and ALM LAN (Ethernet) : 1, 2, 3, 4 LNK/ ACT
<b>Indicators</b>	General : PWR and SYS WAN (VDSL2) : CO, CPE, LINK and ALM LAN (Ethernet) : 1, 2, 3, 4 LNK/ ACT
<b>Power</b>	Input : AC 90~240V/50 ~ 60Hz ; Output : DC 12V/1A
<b>Power consumption</b>	9 watts maximum
<b>Environment</b>	Temperature : 0 ~ 45°C Humidity : 0% ~ 95% (non-condensing)
<b>Dimensions</b>	131.5 x 180 x 36.5 mm (D x W x H)
<b>Weight</b>	300g

### Application



### Ordering Information

Model Name	Description
VDTU2A-304/US	VDSL2 LAN Extender with 4-port 10/100Base-TX, splitter 600 ohm

## VDTU2A-404

### VDSL2 LAN Extender with 4 Ports GbE Ethernet

The VDTU2A-404 VDSL2 LAN Extender is a high-speed Ethernet Extender designed for applications under harsh environment. It is equipped with 4 Gigabit Ethernet Ports (RJ-45 connector) and one VDSL port (RJ-45 connector) in metal enclosure for easy installation in harden environment. It is a bridge mode modem, well accommodating VDSL2 (Very-high-data-rate Digital Subscribe Loop) technology to extend Ethernet service over single-pair phone line. It is compliant to ITU-T G.993.2 standard and supports VDSL2 30a profile that features 100Mbps of symmetric data rate over the existing copper wires. Supporting both symmetric and asymmetric transmission, it can reach up to **190/110Mbps** bandwidth (line rate) within 300M. By providing ultra-high speed, the VDTU2A-404 VDSL2 LAN Extender makes your telephone line achieve its best performance than before. It has the advantage of minimum installation time (simply as plug-n-play) and minimum expense by allowing video streaming and data to share the same telephone pair without interference.

The VDTU2A-404 VDSL2 LAN Extender delivers everything needed to quickly deploy a high-speed IP-based network for providing high-speed Internet access, video-on demand services and voice services. The resulting compact, cost-effective form factor offers Systems Integrators, small business owners an attractive Long Reach Ethernet solution.

### Features

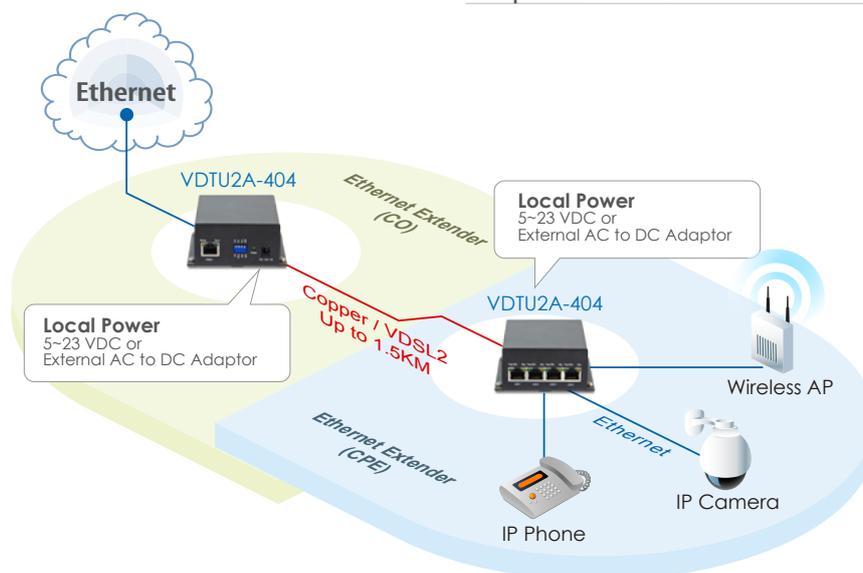
- Metal enclosure for easy installation in Utility applications
- Cost effective bridge function to connect two Ethernet LAN
- Support extended temperature range: -40°C ~75°C
- IEEE 802.1Q VLAN tag transparent
- Easy installation via simple plug-and-play
- 4-Position Dip Switch for quick set up
- Wall Mount

### Specifications

<b>VDSL Interface</b>	RJ-45 connector DMT Encoding Complying with ITU-T G993.1/993.2/G.997.1 On-board surge protection
<b>LAN Interface</b>	4 x RJ-45 connectors 10/100/1000 Base-T; Auto-Negotiation, Auto-MDI/MDI-X. Complying with IEEE 802.3/802.3u/802.3z
<b>4-position DIP Switch</b>	Selectable CO or CPE mode Selectable Fast or interleave mode Selectable 30a or 17a (VDSL2 Profile) Selectable target SNR margin (6dB or 9dB)

<b>LED</b>	Power: On/Off LAN: Fast Ethernet/Gigabit Ethernet VDSL2: Mode - CO/CPE Sync - Idle/Trained/Link
<b>Power supply</b>	External 12V/1A Power Adaptor
<b>Power Consumption</b>	4.5 Watts maximum
<b>Dimension</b>	110.7 x 88 x 40mm (DxWxH)
<b>Operating Temperature</b>	-40°C ~75°C
<b>Humidity</b>	0%~95%RH (non-condensing)
<b>Installation</b>	Wall Mounting
<b>Regulatory Compliance</b>	CE, FCC Part 15 Class A, EN60950

### Application



### Ordering Information

Model Name	Description
VDTU2A-404	VDSL2 LAN Extender with 4-ports 10/100/1000Base-T RJ45



# EOC-10A

## Gigabit Ethernet / CATV over Coax Modem

The EOC-10A is point-to-point EoCNA (Ethernet over Coax Network Alliance) solution that efficiently extends 10/100/1000Mbps Ethernet circuits up to 700 meters (2,296feet) at full Fast Ethernet speed using existing coaxial cable. The EOC-10A will allow Ethernet connectivity in existing facilities or homes without pulling extra cable. This is perfect solution for Ethernet on the factory floor where systems have been upgraded from slower serial communication to Ethernet networking. Installation is easy with absolutely no settings required. The EOC-10A is used in Coaxial cable systems to extend Ethernet connectivity over existing CCD/CATV grade Coaxial cable. The EOC-10A works by sharing the same cable with CATV signals, without interference to the existing CATV signals.

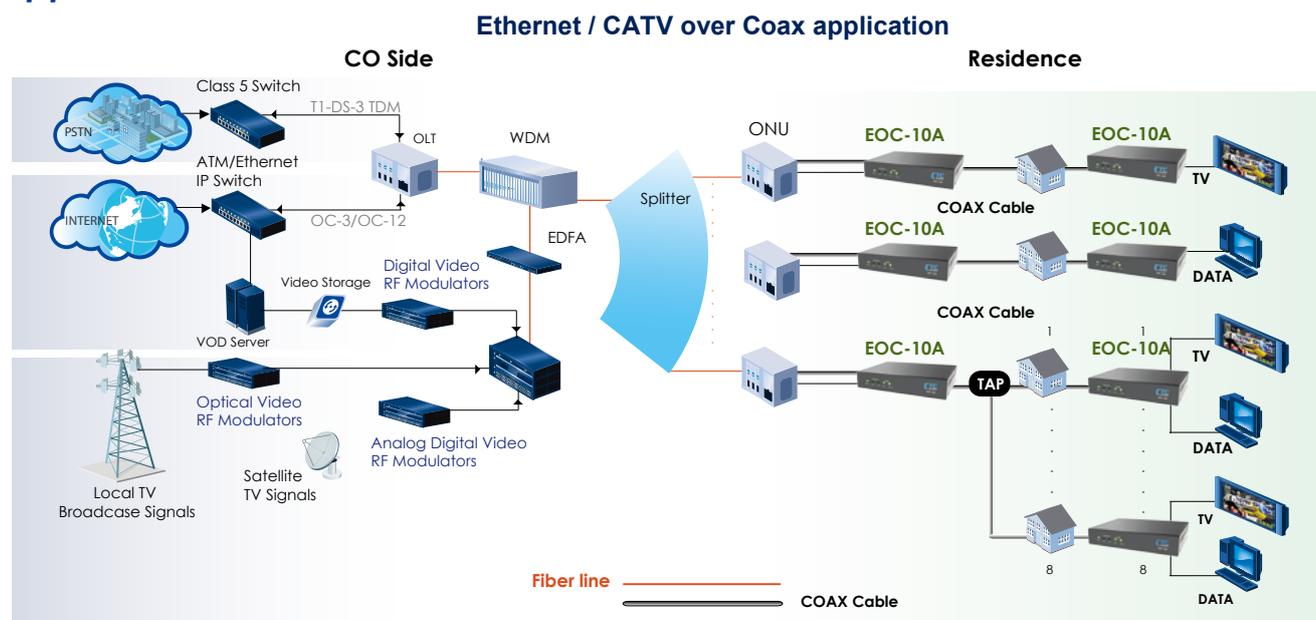
### Features

- Extends LAN connectivity using existing coaxial cable
- Transmits CATV and Ethernet over the same coaxial cable
- 192Mbps @ up to 700 meters (2,296feet)
- 64Mbps @ 1.2Km (4,000feet)
- Supports point to point
- Supports point to multi-point up to 8 nodes over tap/splitter
- Asymmetrical using EoCNA standard
- Operates transparently to high layer protocols such as TCP/IP
- Auto MDI / MDIX
- Auto negotiation
- Plug and Play, no configuration required
- Status LEDs for simple monitoring

### Specifications

<b>Ethernet Interface</b>	Two 10/100/1000 Mbps, RJ45	<b>Standards</b>	IEEE802.3, IEEE802.3u, IEEE802.3ab, IEEE802.3x
<b>Coax Interface</b>	Two F-Type Female Coax Connectors, One for EoCNA, the other for TV/ CCD	<b>Power Input</b>	12VDC (via AC switching adapter)
<b>Protocol</b>	Transparent to higher layer protocols	<b>Power Consumption</b>	<4W
<b>Transmission Power and Spectrum</b>	0 dBm, 12~44 MHz	<b>Dimensions</b>	83 x 138 x 28mm (D x W x H)
<b>Physical layer</b>	224Mbps maximum speed	<b>Weight</b>	0.33kg
<b>transmission speed and distance</b>	Up to 192Mbps@700 meters	<b>Temperature</b>	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
	Up to 64Mbps @ 1.2Km (-176dBm/Hz Noise Floor)	<b>Humidity</b>	10 ~ 90% non-condensing
<b>Indications</b>	LEDs (PWR, LAN Link/Act, Coax Link/Act, Sync)	<b>Certification</b>	CE, FCC, RoHS compliant
		<b>MTBF</b>	57,000 hrs

### Application



### Ordering Information

Model Name	Description
EOC-10A	CATV+2x10/100/1000-T over Coax Modem with AC Adapter