preliminary

ETX-203AM

Universal Carrier Ethernet Demarcation Device

Unified Carrier Ethernet services over copper/fiber or DSL infrastructure

EtherAccess

- Modular uplink with options for Gigabit Ethernet, SHDSL, E1/T1, T3
- Reducing complexity and TCO for purchasing, homologation, training, service production, and management integration
- MEF- certified E-Line and E-LAN services with CIR/EIR traffic profiles and hierarchical scheduling providing traffic management at the edge of Carrier Ethernet networks
- Complete hardware-based OAM toolset: ITU-T Y.1731, IEEE 802.1ag, IEEE 802.3-2005, enabling quick network fault detection and very accurate traffic monitoring
- Throughput testing across routed/switched networks up to line rate by using Layer-2 RFC-2544 traffic generator and analyzer, and Layer-2/3 loopbacks

ETX-203AM is a compact Carrier Ethernet demarcation device with a changeable uplink module that supports different interface types, providing end-to-end service control and performance management over a variety of access networks.

The ETX-203AM modular uplink design enables carriers to provide universal homogenous Carrier Ethernet service while saving operational costs.

The device delivers SLA-based business services to the customer premises over native Ethernet interfaces, terminating over any type of packet network.

ETX-203AM transports Ethernet traffic, ensuring TDM-like performance and Five Nines reliability.

ETX-203AM can deliver IP VPN, VoIP, and dedicated Internet access over the same physical link as Layer-2 E-LINE and E-LAN services, all with differentiated quality of service and end-to-end monitoring.

The ETX-203AM architecture ensures powerful traffic management that allows the service provider to control bandwidth, monitor and enforce network traffic SLA.

CE 2.0 MEF CERTIFIED

RAD data communications
The Access Company

ETX-203AM

Universal Carrier Ethernet Demarcation Device

The ETX-203AM modular uplink design enables utilizing a single Ethernet demarcation device over different access networks and infrastructures, while providing uniform service. The following uplink modules are available:

- GbE – Two redundant combo ports (SFP/copper)
- EFM (Ethernet in the first mile) DSL – One or two SHDSL ports providing up to 22 Mbps over bonded SHDSL.bis copper lines
- PDH –Four or eight bonded E1/T1 lines, or one or two clear-channel T3 circuits

MARKET SEGMENTS AND APPLICATIONS

ETX-203AM is used as an Ethernet demarcation device that separates the service provider network, the access provider network, and the customer network, providing proactive service monitoring and easy fault localization throughout the entire network (see *Figure 1*).

ETHERNET

Classification

Traffic is mapped to the Ethernet flows using flexible classification criteria based on incoming port (port-based all-to-one bundling), VLAN ID, VLAN priority, IP precedence, DSCP, Ethertype, and IP/MAC source/destination address. VLAN-tagged and untagged traffic can be classified.

Layer-2 Control Processing

The device can be configured to forward Layer-2 control frames per EVC (including other vendors' L2CP frames) across the network, to peer supported protocols (IEEE 802.3-2005 and LACP), or to discard the L2CP frames.

ETX-203AM provides LACP transparency by translating LACP traffic to L2PT inside the network, thus enabling end-to-end link aggregation.

OAM

Featuring ultra fast, hardware-powered processing, ETX-203AM performs OAM and PM measurements in line rate with maximum precision, offering the following powerful benefits:

- Immediate detection of loss of continuity (LOC), ensuring under 50 ms protection switching
- Highly accurate frame loss measurements of live traffic
- Flow-level (per CoS) monitoring, enabling simultaneous processing of multiple OAM sessions with E-LAN and E-Tree support
- Non-disruptive MAC and IP level loopback testing of network integrity.

ETX-203AM provides these types of Ethernet OAM:

- Single-segment (link) OAM according to IEEE 802.3-2005 (formerly 802.3ah) for remote management and fault indication, including remote loopback, dying gasp with SNMP trap, and MIB parameter retrieval. Active and passive mode are supported.
- End-to-end connectivity OAM based on IEEE 802.1ag that enables Ethernet service providers to monitor their services proactively and guarantee that customers receive the contracted SLA
- End-to-end service and performance monitoring based on ITU-T Y.1731. Fault monitoring and end-to-end performance measurement include delay, delay variation, frame loss and availability.

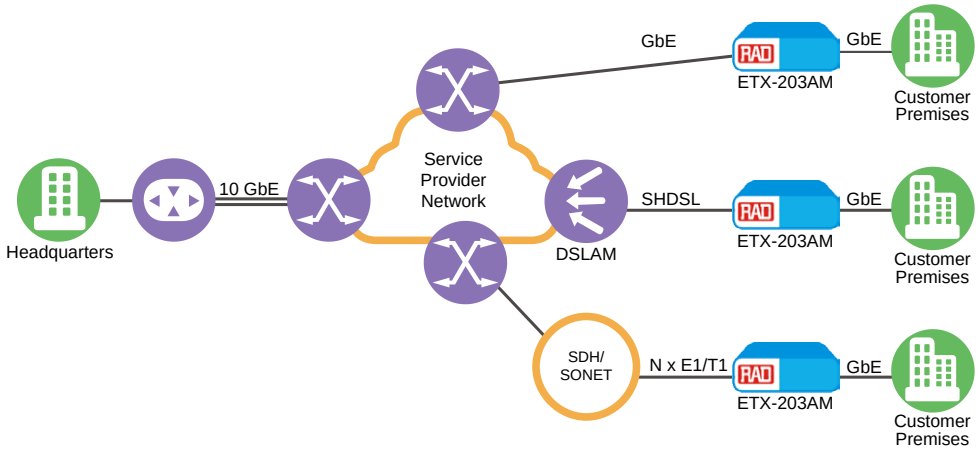

Figure 1. Ethernet Demarcation Device

Traffic Management/QoS

Different service types require different levels of QoS to be provided end-to-end.

QoS can be defined per subscriber as well as per service. QoS has three aspects: rate limitation, traffic shaping, and traffic prioritization.

Traffic policing is applied per flow or group of flows, and operates according to the dual token bucket mechanism based on user-configurable CIR + CBS and EIR + EBS. Traffic can be limited to the line rate or the data rate.

Depending on ordering option, up to 31 shaped services are available for Ethernet network ports 1 and 2, as well as user port 3 in the event of SHDSL network module (up to eight shaped services are available for the other Ethernet user ports).

Forwarding

ETX-203AM delivers layer-2 traffic forwarding via flows and bridge.

Every flow per EVC or EVC.cos has its own queues and scheduler supporting strict priority and weighted fair queues (WFQ). Queue blocks of eight queues per EVC are scheduled and shaped, forming an H-QoS model with shaped services and prioritized classes of service. The WRED mechanism is used for smart packet drop.

The layer-2 switching functionality supports VLAN-aware or VLAN-unaware forwarding, and delivers E-LAN and E-Tree services. Furthermore, ETX-203AM supports L2CP with MAC change over the bridge.

Smart SFPs

Integrated management of MiRICi smart SFPs provides TDM (E1/T1/E3/T3/OC-3/STM-1) connectivity over PDH or SDH legacy networks. Integrated management of MiTOP smart SFPs provides PDH over packet PWE services. ETX-203AM supports configuration and statistic collection for the smart SFP port.

ETHERNET OVER PDH

ETX-203AM transports Ethernet over PDH infrastructure via the following NG-PDH technologies:

- Generic Framing Procedure (GFP G.8040)
- Virtual Concatenation (VCAT G.7043)
- Link Capacity Adjustment Scheme (VCAT G.7042).

NG-PDH solutions improve overall network availability by reducing latency and optimizing line utilization and throughput.

RESILIENCY

Dying Gasp

ETX-203AM reports power failures to defined network management stations by sending an IEEE 802.3-2005 message or SNMP trap, thus enabling the unit to properly disconnect from the network with notification of the reason for the service problem.

Fault Propagation

When a link failure is detected or OAM failure received, ETX-203AM shuts down the affected port or forwards the OAM failure message. The fault propagation mechanism enables routers and switches connected to both ends of the link to reroute the traffic to the redundancy path.

Link Protection

ETX-203AM provides the following network interface protection modes:

- 802.3ad link aggregation (LAG), providing 1:1 link protection with Link Aggregation Control Protocol (LACP) support
- Dual homing (1:1), allowing ETX-203AM units to be connected to two different upstream devices.

Ethernet Ring Protection

ETX-203AM provides a logical ring (per ITU-T G.8032v2) that protects against link and node failures. The ring delivers sub 50 ms protection for Ethernet traffic.

Ethernet Path Protection

ETX-203AM applies standard ITU-T G.8031 Ethernet Linear Protection switching for fast protection of one or more EVCs from end to end. The standard implementation ensures interoperability with third-party devices. With standard APS functionality, Ethernet OAM messages provide bandwidth-efficient unidirectional or bidirectional 1:1 protection.

The EVC protection path can be configured on the same network port, enabling the transport network to provide an alternative path for the working and protecting path. It can also be configured on separate network ports, adding protection at the access layer and enabling load balancing on network interfaces by splitting traffic between the two network ports.

The performance of the hardware-based Ethernet OAM together with protection switching for physical layer failure ensures fast protection in any scenario.

ETX-203AM

Universal Carrier Ethernet Demarcation Device

MANAGEMENT AND SECURITY

The following security protocols are provided by ETX-203AM to ensure client server communication privacy and correct user authentication:

- SNMPv3
- RADIUS (client authentication)
- TACACS+ (client authentication, authorization, and accounting)
- SSH (secure shell communication session)
- SFTP (secure file transfer).

Ports

The unit can be managed using the following ports and applications:

- Local management via an ASCII terminal connected to the RS-232 port
- Out-of-band management via a dedicated management port.
- Remote inband management via user or network ports routed via separate VLANs, Telnet, or an SNMP-based management system.

Access Control List (ACL)

Access control lists are used to flexibly filter and mark incoming and outgoing management traffic, enabling service providers to maintain network security and save network resources by dropping unwanted packets.

Command Line Interface (CLI)

The easy-to-use command line interface includes a user-configurable login banner and context-sensitve help. Databases and scripts of commonly used commands can be easily created and applied to multiple units.

Trap Synchronization

Traps are sent with sequence IDs to network manager groups, to enable the managers to detect when traps are lost and request the traps be sent again.

Zero Touch Provisioning

IP address and mask, default gateway, and software and configuration files can be automatically obtained using standard DHCP client functionality. This enables seamless node setup and configuration for quick and scalable network setup and deployment as well as configuration consistency when replacing nodes.

MONITORING AND DIAGNOSTICS

RFC-2544

The device provides a built-in RFC-2544 wirespeed traffic generator and analyzer for unidirectional and bidirectional testing of throughput, latency, and frame loss. Based on standard OAM messages, the tests can be simultaneously performed over multiple flows, at the EVC.CoS level.

Enhanced RFC-2544 functionality provides service-oriented KPI analysis. SLA conformance is measured per service bandwidth and packet size, within a user-defined amount of time, for faster service introduction

Loopback Tests

Layer-2 and/or layer-3 network integrity can be tested by a non-disruptive loopback performed per flow, with swapping of MAC address and optionally IP address. When the loopback is activated, ETX-203AM exchanges the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges (MAC address) and routers (IP address), and can be configured to remain active after ETX-203AM is reset.

Specifications

CAPACITY

Max. Frame Size

GbE uplink module: 12,288 bytes
SHDSL uplink module: 2,048 bytes
E1/T1/T3 uplink module: 10,240 bytes

ETHERNET NETWORK INTERFACES

Number of Ports

2

Type

SFP/copper (RJ-45) combo ports:
Fiber optic:
Fast Ethernet (100BaseFx, 100BaseLX10, 100BaseBx10), SFP-based
Gigabit Ethernet (1000BaseSx, 1000BaseLX10, 1000BaseBx10), SFP-based
Copper: 10/100BaseT or 10/100/1000BaseT

Connector

Replaceable module with SFP slot and RJ-45

SFP Transceivers

For full details, see the SFP Transceivers data sheet at www.rad.com

***Note**: It is strongly recommended to order this device with **original** RAD SFPs **installed**. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.*

Table 1. ETX Family Comparison Table

Feature	ETX-203AM (Ver. 4.5B)	ETX-203AX (Ver. 4.5B)	ETX-205A (Ver. 4. 5B)
			
Bandwidth	100/1000 Mbps per port, depending on license option	100/1000 Mbps per port, depending on license option	100/1000 Mbps per port
Ethernet Ports (net/net/user)	Module/4 SFP/copper combo	1/1/4 SFP/copper	1/1/4 SFP/copper combo
Network interface	Network module: 2 × GbE, 4W SHDSL, 8W SHDSL, 4 E1/T1, 8 E1/T1, 1 T3, 2 T3	Up to 2 × GbE or FE SFP or copper ports	Up to 2 × GbE or FE SFP/copper combo ports
User interface	Up to 5 × GbE or FE SFP or copper ports	Up to 5 × GbE or FE SFP or copper ports	Up to 5 × GbE SFP/copper combo ports
Number of flows (EVC.cos) / shapers / MEPs	192/2/128 or 192/30/128, depending on license option	192/2/128 or 192/30/128, depending on license option	192/30/128
Service type	EPL and EVPL (flow-based) E-LAN and E-TREE (bridge-based)	EPL and EVPL (flow-based) E-LAN and E-TREE (bridge-based)	EPL and EVPL (flow-based) E-LAN and E-TREE (bridge-based)
Forwarding mode	Flow-based, bridge-based	Flow-based, bridge-based	Flow-based, bridge-based
Bandwidth profile	CIR/CBS, EIR/EBS per EVC.CoS	CIR/CBS, EIR/EBS per EVC.CoS	CIR/CBS, EIR/EBS per EVC.CoS
Max. frame size	GbE uplink: 12,288 bytes SHDSL uplink: 2,000 bytes E1/T1/T3 uplink: 10,240 bytes	12,288 bytes	12,288 bytes
E1/T1, E3/T3, OC-3/STM-1 bridging	Via smart SFP, with integrated management	Via smart SFP, with integrated management	Via smart SFP, with integrated management
E1/T1 TDM pseudowire	Via smart SFP, with integrated management	Via smart SFP, with integrated management	4/8 E1/T1 interfaces, or via smart SFP, with integrated management
Timing options	1588v2 TC (Transparent Clock)	1588v2 TC (Transparent Clock)	Synchronous Ethernet (SyncE), 1588v2 slave, 1588v2 TC (Transparent Clock)
Management interface	Command line	Command line	Command line
Temperature-hardened option	No	No	Yes
Power supply	AC or DC	Universal AC/DC	AC or DC
Power supply redundancy	No	No	Yes

ETX-203AM

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SHDSL NETWORK INTERFACES

Type
SHDSL.bis

Number of Ports
2 or 4

Number of Wires
4 or 8

Connector
Replaceable module, with one RJ-45 for 4-wire ordering option or two RJ-45s for 8-wire ordering option

Line Coding
16 or 32 TC-PAM

Line Rate
192–5696 kbps (see *Table 2*)

Impedance
135W

Compliance
ITU-T G.991.2, ETSI TS 101524

Bonding
According to IEEE 802.3ah, ITU-T G.998.2

E1 NETWORK INTERFACES

(E1/T1 module configured to E1 mode)

Number of Ports
4 or 8

Compliance
G.703, G.823

Data Rate
2.048 Mbps

Line Coding
HDB3

Framing
Framed (G732N with CRC)

Impedance
120W, balanced

75W, unbalanced (via adapter cable)

Connector
Replaceable module, with four RJ-45 connectors:
Four E1 ports – One line per RJ-45
Eight E1 ports – Two lines per RJ-45

T1 NETWORK INTERFACES

(E1/T1 module configured to T1 mode)

Number of Ports
4 or 8

Compliance
G.703, G.823

Data Rate
1.544 Mbps

Line Coding
B8ZS

Framing
Framed (ESF

Impedance
100W, balanced

Connector
Replaceable module, with four RJ-45 connectors:
Four T1 ports – One line per RJ-45
Eight T1 ports – Two lines per RJ-45

T3 NETWORK INTERFACES

Number of Ports
1 or 2

Compliance
G.703, G.823

Data Rate
44.736 Mbps

Line Code
B3ZS

Framing
C-bit parity

Line Impedance
75W, unbalanced

Connector
Replaceable module, with one or two pairs of BNC connectors:
One T3 port – One pair
Two T3 ports – Two pairs

ETHERNET USER INTERFACES

Number of Ports
4

Type
SFP or copper port

Connector
SFP slot or RJ-45

SFP Transceivers
For full details, see the SFP Transceivers data sheet at www.rad.com

Table 2. SHDSL Typical Ranges (26 AWG)

Data Rate	4-wire		8-wire	
[kbps]	[km]	[mi]	[km]	[mi]
192	8	4.9	8	4.9
512	6.7	4.1	6.7	4.1
1536	6	3.7	6.5	4
2048	5.7	3.5	6.4	3.9
4096	5.1	3.1	5.7	3.5
4608	5	3	5.5	3.4
5696	4.6	2.8	5.1	3.1
11392	2.9	1.8	4.6	2.8
17088	–	–	3.5	2.1
22784	–	–	2.9	1.8

BRIDGE

Compliance
IEEE 802.1D, IEEE 802.1Q

MAC Address Table
Up to 32K entries

Operation Mode
VLAN-aware, VLAN-unaware

OAM
IEEE 802.1ag, MEP/MIP
ITU-T Y.1731, PM
Loopback, link trace, RFC-2544

ROUTER

IP forwarding, static routing
User-configurable management source IP address for single point of contact

RESILIENCY

APS
R-APS between ring nodes

Ethernet Ring
One G.8032v2 ring

Ethernet Path Protection
G.8031, for end-to-end 1:1 protection
Dual homing

MANAGEMENT

Ethernet Management Port
Type: 10/100BaseT
Connector: RJ-45

Control Port
Interface: V.24/RS-232 DCE
Connector: RJ-45
Format: Asynchronous
Data rate: 9.6, 19.2, or 115.2 kbps

GENERAL

Compliance
MEF 6 (E-Line – EPL and EVPL, E-LAN – EPLAN and EVPLAN), MEF 10, MEF 9, MEF 14, IEEE 802.3, 802.3u, 802.1q, 802.1p, 802.3ad, 802.3-2005, 802.1ag-, ITU-T Y.1731, G.8031, G.8032v2, RFC-2544

Device software is similar to that of ETX-203AX, which is MEF CE 2.0 certified

Indicators
PWR (green): On –Device is powered up
1–4 (green):
On – Corresponding Ethernet link OK
Blinking – Data is being transmitted and received on the Ethernet link
LINK/ACT (green):
On – Ethernet link OK
Blinking – Data is being transmitted and received on the Ethernet link

Power
AC: 100–230 VAC (±10%), 47–63 Hz
DC: -48 VDC

Power Consumption:
GbE uplink module: 15W max
SHDSL uplink module (4-wire): 15W max
SHDSL uplink module (8-wire): 17W max
E1/T1/T3 uplink module: 5W max

Physical
Height: 43.7 mm (1.7 in)
Width: 215 mm (8.5 in)
Depth: 300 mm (11.8 in)
Weight: 2.3 kg (5.1 lb)

Environment
Temperature: 0 to 50°C (32 to 122°F)
Humidity: Up to 90%, non-condensing

Ordering

RECOMMENDED CONFIGURATIONS

ETX-203AM/AC/4UTP
ETX-203AM/AC/2SFP2UTP
ETX-203AM/AC/2ETH/2SFP2UTP
ETX-203AM/AC/2ETH/4UTP
ETX-203AMAC/SH4W/4UTP
ETX-203AM/AC/SH8W/4UTP
ETX-203AM/AC/SH8W/2SFP2UTP
ETX-203AM/AC/4E1T1/4UTP
ETX-203AM/AC/8E1T1/4UTP
ETX-203AM/AC/1T3/4UTP
ETX-203AM/AC/2T3/4UTP
ETX-203AM/DC/4UTP
ETX-203AM/DC/2ETH/2SFP2UTP
ETX-203AM/DC/2ETH/4UTP
ETX-203AM/DC/SH4W/4UTP
ETX-203AM/DC/SH8W/4UTP
ETX-203AM/DC/4E1T1/4UTP
ETX-203AM/DC/8E1T1/4UTP
ETX-203AM/DC/1T3/4UTP
ETX-203AM/DC/2T3/4UTP
ETX-203AM/AC/GE/4UTP
ETX-203AM/AC/GE/2SFP2UTP
ETX-203AM/AC/GE/4SFP
ETX-203AM/AC/GE/2ETH/4UTP
ETX-203AM/AC/GE/2ETH/2SFP2UTP
ETX-203AM/AC/GE/2ETH/4SFP
ETX-203AM/AC/GE/SH4W/4UTP
ETX-203AM/AC/GE/SH4W/2SFP2UTP
ETX-203AM/AC/GE/SH8W/2SFP2UTP
ETX-203AM/AC/GE/SH8W/4UTP
ETX-203AM/AC/GE/4E1T1/4UTP
ETX-203AM/AC/GE/8E1T1/4UTP
ETX-203AM/AC/GE/1T3/4UTP
ETX-203AM/AC/GE/2T3/4UTP

Data Sheet

ETX-203AM

Universal Carrier Ethernet Demarcation Device

ETX-203AM/DC/GE/2ETH/4UTP
ETX-203AM/DC/GE/2ETH/2SFP2UTP
ETX-203AM/DC/GE/SH4W/4UTP
ETX-203AM/DC/GE/SH4W/2SFP2UTP
ETX-203AM/DC/GE/SH8W/2SFP2UTP
ETX-203AM/DC/GE/SH8W/4UTP
ETX-203AM/DC/GE/4E1T1/4UTP
ETX-203AM/DC/GE/8E1T1/4UTP
ETX-203AM/DC/GE/1T3/4UTP
ETX-203AM/DC/GE/2T3/4UTP
ETX-203AM/AC/GE30/2ETH/4UTP
ETX-203AM/AC/GE30/2ETH/2SFP2UTP
ETX-203AM/AC/GE30/2ETH/4SFP
ETX-203AM/AC/GE30/SH4W/4UTP
ETX-203AM/AC/GE30/SH4W/2SFP2UTP
ETX-203AM/AC/GE30/SH8W/4UTP
ETX-203AM/AC/GE30/SH8W/2SFP2UTP
ETX-203AM/AC/GE30/4E1T1/4UTP
ETX-203AM/AC/GE30/8E1T1/4UTP
ETX-203AM/AC/GE30/1T3/4UTP
ETX-203AM/AC/GE30/2T3/4UTP
ETX-203AM/DC/GE30/2ETH/4UTP
ETX-203AM/DC/GE30/2ETH/2SFP2UTP
ETX-203AM/DC/GE30/SH4W/4UTP
ETX-203AM/DC/GE30/SH4W/2SFP2UTP
ETX-203AM/DC/GE30/SH8W/4UTP
ETX-203AM/DC/GE30/SH8W/2SFP2UTP
ETX-203AM/DC/GE30/4E1T1/4UTP
ETX-203AM/DC/GE30/8E1T1/4UTP
ETX-203AM/DC/GE30/1T3/4UTP
ETX-203AM/DC/GE30/2T3/4UTP

SPECIAL CONFIGURATIONS

ETX-203AM/!/MA/+3

Legend

! Power supply
- **AC** AC power supply
- **DC** DC power supply

MA Network port module (Default= no network port module)
- **2ETH** 2 Ethernet combo ports
- **SH4W** 2 SHDSL ports (4-wire)
- **SH8W** 4 SHDSL ports (8-wire)
- **4E1T1** 4 E1/T1 ports
- **8E1T1** 8 E1/T1 ports
- **1T3** 1 T3 port
- **2T3** 2 T3 ports

+3 Ethernet user ports
- **4UTP** 4 copper Ethernet ports
- **4SFP** 4 SFP Ethernet ports
- **2UTP2SFP** 2 copper slots + 2 SFP Ethernet ports

LICENSE PACKAGES

ETX-203AM-SW/GE30
Software license for 1 Gbps per port, 30 shaped EVCs

ETX-203AM-SW/GE
Software license for 1 Gbps per port

SUPPLIED ACCESSORIES

AC power cord (if AC power supply is ordered)
DC connector kit (if DC power supply is ordered)

CBL-RJ45/D9/F/6FT
Control port cable with male RJ-45 and female DB-9 connector

CBL-E1-SPLT
Cable to extract 2 E1/T1 ports from one RJ-45 connector (four cables are supplied if 8 E1T1 option is ordered)

OPTIONAL ACCESSORIES

RM-35/@
Hardware kit for mounting one or two ETX-203AM units in a 19" rack

@ Rack mount kit (Default=Both kits):
- **P1** Kit for mounting one unit
- **P2** Kit for mounting two units

ETX-M/2ETH
Ethernet uplink module with two combo ports

ETX-M/SH4W
EFM bonded uplink module with 2 SHDSL ports (4-wire)

ETX-M/SH8W
EFM bonded uplink module with 4 SHDSL ports (8-wire)

ETX-M/4E1T1
Ethernet uplink module with 4 E1/T1 ports

ETX-M/8E1T1
Ethernet uplink module with 8 E1/T1 ports

***Note**: The CBL-E1-SPLT cables must be ordered separately when ordering this module.*

ETX-M/1T3
Ethernet uplink module with 1 T3 port

ETX-M/2T3
Ethernet uplink module with 2 T3 ports

CBL-RJ45/2BNC/E1/X
Balanced E1 (RJ-45) to unbalanced E1 (2 BNC) adapter cable

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