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General Availability

ETX-2

Carrier Ethernet Demarcation

- Feature-rich demarcation and aggregation suite, offering a complete Service Assured Access (SAA) solution
- Ideal for service providers, wholesalers, and mobile operators, seeking to deliver and monitor SLA-based MEF-certified 3.0 and TDM-over-PSN services
- Versatile offering of multirate Ethernet over fiber, GPON, and TDM traffic, assuring unified service delivery over any access technology
- TWAMP and Layer-2 OAM, diagnostics for scalable and accurate traffic monitoring, quick fault detection, and troubleshooting of Layer-2 and Layer-3 networks

The ETX-2 carrier Ethernet demarcation device is the main component of RAD's Service Assured Access solution, providing:

- Ethernet service uniformity over multiple access technologies including GbE
- Both indoor and outdoor enclosures operating in diverse topologies including ring, daisy chain, and hub and spoke
- PW functionality for mobile backhauling and business services
- Synchronization for mobile 2G, 3G, LTE, and LTE-A backhauling networks.

ETX-2 is offered in two main product options: ETX-203AX, and ETX-205A.

MARKET SEGMENTS AND APPLICATIONS

ETX-2 is ideal for carriers, service providers, municipalities, wholesale providers, and mobile operators seeking to offer unified SLA-based Ethernet business services, such as E-Line, E-LAN, E-Tree, and E-Access.

INTEROPERABILITY

The ETX-2 family features and services are standard based and should work with any 3rd party equipment using standard based features and services.

NETWORK TOPOLOGIES

ETX-2 supports network topologies such as linear, daisy chain, and self-healing rings (G.8032v2).

CARRIER ETHERNET 2.0 SERVICES

ETX-2 incorporates a complete set of CE 2.0-certified Ethernet service tools that allow service providers to distinguish between high- and low-priority traffic and optimizes TCP sessions.

ETX-2 provides MEF 10.3 color-aware and unaware Policers, delivering high-scale multi-CoS services with hierarchical Quality of Service (HQoS).

It supports advanced scheduling, WRED per CoS, shaping per EVC and port, with flexible classification rules and access lists.

MEF Services

ETX-2 delivers E-Line (EVL, EVPL), E-LAN (EPLAN, EVPLAN), E-Tree (EP-TREE, EVP-TREE), and E-Access services.

Layer-2 Control Processing

ETX-2 can be configured to forward or discard Layer-2 control frames (including other vendors' L2CP frames).

DHCP and MLDv2 Snooping

With DHCP and MLDv2 snooping, multicast data is selectively forwarded only to a list of self-learned ports (per multicast group membership), instead of being flooded to all ports in a VLAN.

TDM PSEUDOWIRE

ETX-205A with built-in E1 ports and ETX-2 with smart SFP (MiTOP) provide pseudowire (PW) services. The PWs can be encapsulated using CESoPSN per IETF RFC 5086 or SAToP per IETF RFC 4553.

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RESILIENCY

ETX-2 offers fast protection for virtually any kind of failure, in any linear, ring, or dual-homed topology. The device employs IEEE 802.3ad link aggregation (1:1 LAG), ITU-T G.8032v2 Ethernet ring protection, and ITU-T G.8031 Ethernet linear protection, to ensure continuous availability and sub-50 ms restoration in the event of network outages.

It also supports MSTP and RSTP (IEEE 802.1Q) to perform loop-free Bridge forwarding over a mesh/ring physical topology.

TIMING AND SYNCHRONIZATION

ETX-2 incorporates RAD's advanced synchronization and timing over packet feature set to support mobile heterogeneous network (HetNet) topology.

The device combines Synchronous Ethernet (SyncE) with IEEE 1588v2 Precision Time Protocol per ITU-T G.8265.1, G.8275.1, and G.8275.2 Telecom profiles for cost-effective synchronization of frequency and phase.

With 1588v2 Grandmaster support, ETX-2 offers a Distributed GM™ solution, allowing mobile operators and service providers to cost-effectively provide reliable frequency and phase accuracy for LTE-A.

The device also supports 1588v2 ordinary clock (OC), boundary clock (BC), and transparent clock (TC), as well as a dual master operating simultaneously in G.8265.1 and G.8275.1 modes.

MANAGEMENT AND SECURITY

The device can be managed via RADview, RAD's carrier-class NMS, or any SNMP-based management system. ETX-2 supports a variety of access protocols, including CLI over Telnet, SNMPv3, and TFTP. Security features include SNMPv3, RADIUS (client authentication), TACACS+ (client authentication, authorization, and accounting), SSH, and SFTP.

Access Control Lists (ACL) can also be used to flexibly filter and mark management traffic, enabling service providers to maintain network security by dropping unwanted packets.

MANAGEMENT OF RAD MITOPS

RAD's pluggable smart SFPs, MiTOP T1/E1 and MiTOP T3/E3 are designed for quick and simple insertion into ETX-2 Ethernet ports. ETX-2 manages inserted RAD MiTOPs as integrated parts of the device.

MONITORING AND DIAGNOSTICS

Featuring multi-layer OAM and PM tools, ETX-2 performs hardware-based monitoring and diagnostics at high scale and precision. End-to-end connectivity OAM (IEEE 802.1ag) as well as single-segment OAM (IEEE 802.3-2005) ensure flow-level fault management and performance monitoring over Layer-2 networks and also quickly detect connectivity failures for robust protection. Layer-2 and 3 wirespeed loopbacks offer flexible diagnostic tools.

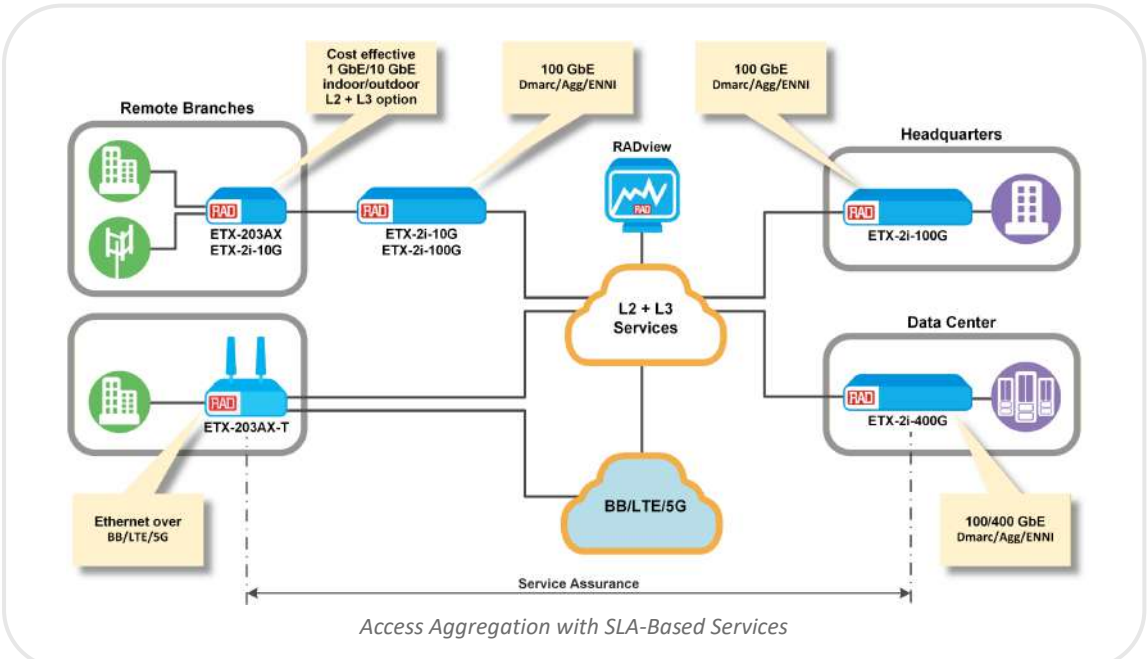
RFC-5357 TWAMP light delivers the same functionality over Layer-3 networks, as well as one-way TWAMP with counters for loss, delay, fragmented packets, reorders and duplication, in addition to configurable test packet size. Multiple VRF support the robust TWAMP setup.
The Performance Management Portal is an SLA assurance system that is part of the RADview management system, enabling real-time monitoring of Ethernet service performance by collecting KPI data from RAD devices.

Digital Diagnostics Monitoring

ETX-2 supports digital diagnostics monitoring (DDM) SFP functions according to SFF-8472, excluding external DDM calibration.

Service Activation Tests

The ETX-2 family offers service activation tools with multiple RFC-2544, Y.1564, and L3 SAT testers.



Access Aggregation with SLA-Based Services

Specifications

INTERFACES

E1/T1 Interfaces (TDM Pseudowire)

(ETX-205A: built-in TDM PW E1/T1 ports)

Number of Ports	4 or 8
Compliance	E1: G.703, G.732N, G.732S
	T1: ANSI T1.101, ANSI T1.403
Data Rate	E1: 2.048 Mbps
	T1: 1.544 Mbps
Line Coding	E1: HDB3
	T1: B8ZS
Framing	E1: Framed (G.732N with or without CRC) Framed with CAS (G.732S with or without CRC) Unframed
	T1: Unframed or ESF
Impedance	E1: 120Ω, balanced 75Ω, unbalanced (via adapter cable)
	T1: 100Ω, balanced
Connectors	Electrical, RJ-45
Payload Encapsulation	CESoPSN, SAToP
Network Encapsulation	MEF 8, UDP/IP

MANAGEMENT AND SECURITY

Management Options	Local management via LAN port or serial port
	Remote management via in-band VLAN
Protocols and Security	SSH (Secure CLI)
	Telnet
	SNMPv3
	SFTP
	NETCONF/YANG management interface
	Password-protected access
	Authorization levels
	RADIUS or TACACS+ authentication
	Static routing
	Access Control List (ACL)
Large Deployments	Plug and play zero touch provisioning (DHCP, PPPoE, XML configuration files download via TFTP/SCP)
	Configuration backup and restore

Control Port

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

Ethernet Management Port

Type	10/100BASE-T
Connector	RJ-45

Table 1. Interfaces

Specifications	ETX-203AX 	ETX-205A 
E1/T1	EoPDH E1 network port	TDM PW E1/T1 ports
E1/T1/T3	Via integrated Smart SFP (MiRIC)	
E1/T1/T3 PWE services	Via integrated Smart SFP (MiTOP)	
1GbE Copper	10/100BASE-T or 10/100/1000 BASE-T	
1GbE Fiber Optic (SFP-based)	Fast Ethernet: 100BASE-FX, 100BASE-LX10, 100BASE-BX10 Gigabit Ethernet: 1000BASE-SX, 1000BASE-LX10, 1000BASE-BX10	
1GbE Ports	4/6 SFP or copper ports 5 out of 6 in use in ETX-203AX-ODU 4 in ETX-203AX/X	6 SFP/copper combo port
Timing	-	2 MHz, 2 Mbps, 1PPS, ToD

Note: *It is strongly recommended to order this device with original RAD SFP transceivers. RAD cannot guarantee full compliance to product specifications for units using non-RAD transceivers. For full details on SFP transceivers, see the* ***Pluggable Transceivers data sheet****.*

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Carrier Ethernet Demarcation

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NETWORKING CAPABILITIES

Services	Ethernet E-LAN, E-Line, E-Tree
	MEF 3.0 compliant
	Layer-2 services with available bandwidth
Layer-2 Forwarding	Jumbo frame support
Flow Classification Rules	Outer VLAN or outer + inner VLAN
	PCP
	TOS/DSCP
	EtherType
	IP/MAC source/destination address
Policing	Color aware/unaware dual token bucket with user-configurable CIR + CBS and EIR + EBS
	2-rate/3-color policing per EVC.CoS
	Hierarchical envelope policer per MEF 10.3
Scheduling	8 × CoS per EVC scheduling elements
	Strict Priority (SP) and Weighted Fair Queue (WFQ)
Shaping	Per EVC
	Per EVC.CoS

DIAGNOSTICS

Connectivity Fault Management (CFM)	Per IEEE 802.1ag
Counters	RMON2 port-level counters
Delay and Loss Measurements	Per MEF 36
EFM Link-fault OAM	Per IEEE 802.3ah
ICMP Echo	Over L2 and L3 services
	Tests IP connectivity (PING)
KPI Measurements	Accurate one-way KPI measurements
Link-level OAM	Per IEEE 802.3-2005
Limiting Multicast Traffic Flooding	DHCP and MLDv2 snooping
Loop Prevention	Using MSTP and RSTP
Loopback Tests	Non-disruptive loopback per flow, with MAC/IP address swap
	Loopbacks at Ethernet port level
	On-demand Layer-2 and 3 loopbacks
LLDP Discovery	Per IEEE 802.1AB
Service Activation Tests	RFC-2544: Eight built-in wirespeed testers
	ITU-T Y.1564: Eight built-in wirespeed testers
Service Utilization and Performance Monitoring	Per ITU-T Y.1731.2012, including synthetic loss measurement
TWAMP	TWAMP light generator and responder (SW license)
	ITU-T Y.1731 PM (SLM; DM)
	RFC 5618 TWAMP responder and receiver
	TWAMP sender

Table 2. Timing and Synchronization

Specifications	ETX-203AX	ETX-205A
		
Best Master Clock Algorithm (BMCA)	-	+
IEEE-1588v2 precision time protocol (PTP) per G.8265.1, G.8275.1, and G.8275.2 Telecom profiles	TC	OC, TC, BC GM with integrated GNNS Slave clock
PTP ports	-	ToD/1PPS (RJ-45), External clock (CONN.DIN 1.0/2.3, AKA min-BNC), 1PPS (CONN.DIN 1.0/2.3, AKA min-BNC), 2M (SMA)
Station clock	-	Balanced E1, unbalanced E1 (via adapter cable); RJ-45 connector
Synchronous Ethernet (SyncE), eSyncE	-	ITU-T G.8261-G.8264

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BRIDGE

Compliance	802.1D, 802.1Q, 802.1ad
Max. Frame Size	9600 bytes
Mode	VLAN-aware, VLAN-unaware
VLAN Editing	Inner/outer VLAN editing per VLAN and p-bit values

RESILIENCY

Dual Homing	Dual homing link redundancy
Ethernet Path Protection	G.8031 linear 1:1 protection
Ethernet Ring	G.8032v2 rings with sub 50 ms protection for Ethernet traffic
Link Aggregation	IEEE 802.1ax (802.3ad) 1:1 LAG with LACP for pairs of network or user Ethernet ports
	LAG with load balancing (ETX-220A)

ENVIRONMENTAL

Humidity	5% to 90%, non-condensing ETX-203AX Outdoor: 5% to 100% condensing
Operating Temperature	Regular: 0 to 50°C (32 to 122°F)
	Extended temperature (metal): ETX-203AX -20 to 65°C (-4 to 149°F)
	Extended temperature (metal): ETX-205A, ETX-203AX/B, ETX-203AX/ODU/X: -40 to 65°C (-40 to 149°F); cold start above c-20°C (-4°F)
	ETX-205A: 0 to 45°C (32 to 113°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)

Note: *In the temperature-hardened devices, a single SFP-30H is supported at temperature up to 62°C (143°F).*

STANDARDS COMPLIANCE

CE	CE 2.0
IEEE	802.3, 802.3u, 802.1D, 802.1Q, 802.1p, 802.3ad, 802.3-2005, 802.1ax, 802.1ag
ITU-T	Y.1731, G.8031, G.8032v2, G.8262, G.8265, RFC-2544, Y.1564
MEF	MEF 2.0, MEF 3.0, MEF 9, MEF10, MEF 14, MEF 20, MEF 36, MEF 46
	MEF 6: E-Line: EPL and EVPL E-LAN: EPLAN and EVPLAN

GENERAL

Push Buttons	FD push button for resetting unit to factory defaults (ETX-203AX only).

Table 3. Dimensions

Specifications	8.5-inch Enclosures		19-inch Enclosure	Aluminum IP67 Outdoor Enclosure
	ETX-203AX	ETX-205A	ETX-205A	ETX-203AX/ODU/X
				
Height	43.7 mm (1.7 in)		43.7 mm (1.7 in)	250 mm (9.8 in)
Width	Regular plastic: 220 mm (8.7 in) Metal: 215.5 mm (8.5 in)		440 mm (17.4 in)	192 mm (7.6 in)
Depth	Regular plastic: 170 mm (6.7 in) Metal: 152.5 mm (6 in)	300 mm (11.8 in)	Regular: 240 mm (9.5 in) NEBS: 300 mm (11.8 in)	93 mm (3.7 in)
Weight	Regular plastic: 0.7 kg (1.5 lb) Metal: 0.9 kg (2 lb)	2.4 kg (5.2 lb)	Regular: 3.1 kg (6.8 lb) ETX-205A: 3.9 kg (8.6 lb)	2.89 kg (6.4 lb)

Ordering

The information below represents examples of supported configurations. For additional configuration options, please contact your local RAD partner.

Note: All options must have /X (extended memory)

ETX-203AX

(See **Ordering Options** below for options details)

ETX-203AX/2SFP/4SFP/X

ETX-203AX/GE/2SFP/4SFP/X

ETX-203AX/2SFP/2UTP2SFP/X

ETX-203AX/2SFP/4UTP/X

ETX-203AX/1SFP1UTP/4UTP/X

ETX-203AX/AC/ODU/GE30/1S1U/2U2P/X

ETX-203AX/ME/1SFP1UTP/4UTP/X

ETX-203AX/ME/GE30/2SFP/2UTP/X

ETX-203AX/ME/GE30/2SFP/4UTP/X

ETX-203AX/ME/GE30/1SFP1UTP/4UTP/X

ETX-203AX/ME/GE30/2SFP/2UTP2SFP/X

ETX-203AX/N/GE30/2SFP/2UTP/X

ETX-203AX/N/2SFP/2UTP/X

Notes:

- *Product options are available with FE, GE, or GE30 interfaces.*
- *All ordering options can be temperature hardened (have the /H option). For temperature-hardened options, use industrial type SFP transceivers with maximum operating temperature 85°C (185°F).*

ETX-203AX-SW/GE30
Software license for 1 Gbps per port, and up to 64 shaped EVCs per port

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

ETX-205A

(See **Ordering Options** below for options details)

ETX-205A/AC/19/X

ETX-205A/AC/19/4E1T1/X

ETX-205A/AC/19/8E1T1/X

ETX-205A/AC/19/SYE/X

ETX-205A/AC/19/PTP/X

ETX-205A/AC/19/4E1T1/PTP/X

ETX-205A/AC/19/8E1T1/PTP/X

ETX-205A/AC/PTP/X

ETX-205A/DC/4E1T1/PTP/X

ETX-205A/HN/DCR/19/PTP/X

Note: *19 inch ordering options are available with any combination of AC or DC power supplies.*

ETX-2-SW TWAMP

License to activate and operate TWAMP related functionalities in ETX-2

ETX-2

Carrier Ethernet Demarcation

ORDERING OPTIONS

- Some options or option combinations are for specific models.
- Some option combinations require a minimum order.
- To determine the BOM for your application, please contact your local RAD partner.

E1/T1 Ports	4E1T1	4 E1/T1 ports
	8E1T1	8 E1/T1 ports
Enclosure	*Default*	**Indoor 8.5-inch 1U plastic box (ETX-203AX)** **Half 19-inch metal box (ETX-205A)**
	19	19-inch 1U metal box
	H	Temperature hardened, metal enclosure
	HN	Temperature-hardened, NEBS-certified
	ME	Metal enclosure
	N	NEBS Compliant
	ODU	Outdoor unit
Ethernet Network or User Port	1SFP	1 SFP Eth port
	2SFP	2 SFP Eth ports
	4SFP	4 empty SFP slots
	1SFP1UTP	1 SFP Eth slot, 1 UTP Eth port
	1S1U	1 SFP or 1 UTP
	1UTP	1 copper Ethernet port
	2UTP	2 copper Ethernet ports
	2U2P	2 UTP and 2 UTP with PoE
Platform	X	Extended memory
Power Supply	AC	Single AC power supply
	ACDC	AC and DC power supplies
	ACR	Redundant (dual) AC power supply
	ACEX	External AC power supply
	DC	Single 48V DC power supply
	DCR	Redundant (dual) DC power supply
	DDC	Dual feed DC power supply
Port Type (SW license)	*Default*	**FE of 100 Mbps per port** (ETX-203AX)
	GE	1 Gbps per port (ETX-203AX)
	GE30	1 Gbps and up to 64 shaped EVCs per port (ETX-203AX)
Software Package	*Default*	**No software package**
Timing Options	*Default*	**Standard clock recovery**
	PTP	1588v2 timing and SyncE
	SYE	SyncE (synchronous Ethernet)

Table 4. Power

Specifications	ETX-203AX 	ETX-205A 
Power Supply	**ETX-203AX:** • Integrated wide-range AC/DC with auto detection • AC: 100–240 VAC (-10%, +6%), 50/60 Hz • DC: 48 VDC (40 to 60 VDC) **ETX-203AX/B:** • AC: 100–240 VAC (ext. PS) • DC: 12 VDC **ETX-203AX/ODU/X:** • AC: 100–240 VAC (-10%, +6%), 50/60 Hz	**8.5-inch enclosure:** • AC: 100 to 240 VAC (-10%, +6%), 50/60 Hz • DC: 48 VDC (20 to 60 VDC) **19-inch enclosure:** • AC: 100 to 240 VAC, 50/60 Hz • DC: 24/48 VDC nominal (20 to 72 VDC)
Power Consumption	• 15W (max) • 12W (average) • 10W (minimum) **ETX-203AX/ODU/X:** • Without PoE – 25W • With PoE – 85W (25W regular + 60W PoE)	**8.5-inch enclosure:** • 21W (max) **19-inch enclosure:** • 22W (max) • 18W (average) • 14W (minimum)
Power Redundancy		+ (19-inch enclosure only)

ETX-2

Carrier Ethernet Demarcation

SUPPLIED ACCESSORIES

AC power cord (one per AC power supply)

DC connection kit, PLUG-DC/TB-S/J

ETX-205A-PS/?/!
Extractable power supply for ETX-205A

OPTIONAL ACCESSORIES

ETX-203AX-AC-DC-ADPTOR
AC/DC connector adapter, when using 48 VDC input

ETX-203AX-AC-DC-ADPTOR/90DEG
90-degree AC/DC connector adapter, when using 48 VDC input

CBL-E1-SPLT
Cable to extract two E1/T1 ports from one RJ-45 connector of E1/T1 network module

CBL-RJ45/2BNC/E1/X
Balanced E1 (RJ-45) to unbalanced E1 (2 BNC) adapter cable (ETX-205A)

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

See **Table 5. Mounting Kits** below.

Table 5. Mounting Kits

Product	19-inch Rack	23-inch Rack	Wall	Pole
ETX-203AX plastic (8.5 in)	RM-33-2– one or two units	–	Built into device enclosure	
ETX-203AX metal (8.5 in)	RM-35/A – one unit RM-35/A2 – two units	–	WM-35-TYPE4	
ETX-203AX/B (8.5 in)	RM-35/A – one unit RM-35/A2 – two units	–	WM-35-TYPE4	
ETX-203AX NEBS (8.5 in)	RM-35/P1 – one unit RM-35/P2 – two units	RM-35-23/P1 – one unit RM-35-23 – two units	WM-35-TYPE4	
ETX-203AX/ODU/X (8.5 in)	–	–	WM-35-ODU/P	WM-35-ODU/P
ETX-205A (8.5 in)	RM-35/P1 – one unit RM-35/P2 – two units	–	WM-35	
ETX-205A (19 in)	RM-34 (supplied)	RM-34-23	WM-34	

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