

ETX-204A

Carrier Ethernet Demarcation Device



Demarcation point for
SLA-based Ethernet
business services and
mobile backhaul



The ETX-204A Carrier Ethernet demarcation device combines cell-site gateway with Ethernet demarcation functionalities to provide end-to-end service control and performance management across packet backhaul.

The device delivers SLA-based business services to the customer premises over native Ethernet access networks.

ETX-204A transports up to five Gbps of user throughput while ensuring SDH/SONET-like performance and Five Nines reliability.

- Carrier-class Ethernet demarcation device for Synchronous Ethernet (ITU-T G.8262) and cellular backhaul synchronization applications, including 1588-2008 clock recovery and end-to-end transparent clock
- MEF certified, supporting MEF applications Ethernet Private Line (EPL) and Ethernet Virtual Private Line (EVPL) with flexible mapping of user traffic into Ethernet flows
- Robust bandwidth control mechanism and Service Level Agreement (SLA) monitoring per Ethernet flow starting at customer premises
- Complete Ethernet OAM solution based on IEEE 802.3-2005 (formerly 802.3ah), IEEE 802.1ag-D8, and ITU-T Y.1731 for Opex reductions
- Built-in RFC-2544 generator and analyzer

ETX-204A can deliver IP VPN, VoIP, and dedicated Internet access over the same physical link as a Layer-2 LAN-to-LAN service, all with differentiated quality of service and end-to-end monitoring.

Incorporating RAD's SyncToP™ synchronization and timing over packet feature set, ETX-204A utilizes standard technologies to ensure highly accurate clock recovery and distribution over both the physical and packet layers.



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All ETX-204A units are equipped with SFP/UTP combo Ethernet ports that accommodate a wide range of Fast Ethernet and Gigabit Ethernet SFP transceivers, allowing service providers to seamlessly connect customers located at different distances from the device.

A temperature-hardened version is available with matching SFPs intended for industrial installations.

MARKET SEGMENTS AND APPLICATIONS

ETX-204A is used in the following MEF-defined applications:

- Mobile demarcation device – ETX-204A is installed at the operator tower and controller sites equipped with an Ethernet port, connecting the NodeB or eNodeB to the packet network, providing sophisticated traffic management and service assurance capabilities, including proactive service monitoring and fault identification throughout the entire network (see *Figure 1*)
- Ethernet demarcation device – ETX-204A 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 2*)

- IP Node B backhauling – ETX-204A acts as a transport demarcation device, connecting the base station to the packet network.
- Ethernet Private Line (EPL) – ETX-204A provides site-to-site connectivity over dedicated bandwidth without service multiplexing
- Ethernet Virtual Private Line (EVPL) – ETX 204A delivers site-to-site connectivity over shared bandwidth with service multiplexing.

Classification

Traffic is mapped to the Ethernet flows using very flexible classification criteria that can be combined, for example:

- Port-based (All-to-one bundling)
- VLAN + VLAN priority
- VLAN + IP precedence
- VLAN + DSCP
- Ether Type
- IP/MAC source/destination address
- UDP port
- Untagged.

More classification criteria and combinations can be found in the user manual.

Layer-2 Control Processing

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

L2PT support with optional MAC address replacement offers LACP tunneling through any Layer-2 network. LACP tunneling provides transparent support of LACP between customer endpoints.

OAM

ETX-204A 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, and MIB parameter retrieval. Active and passive mode are supported.
- End-to-end connectivity OAM based on IEEE 802.1ag-D8 that enables Ethernet service providers to monitor their services proactively and guarantee that customers receive the contracted SLA

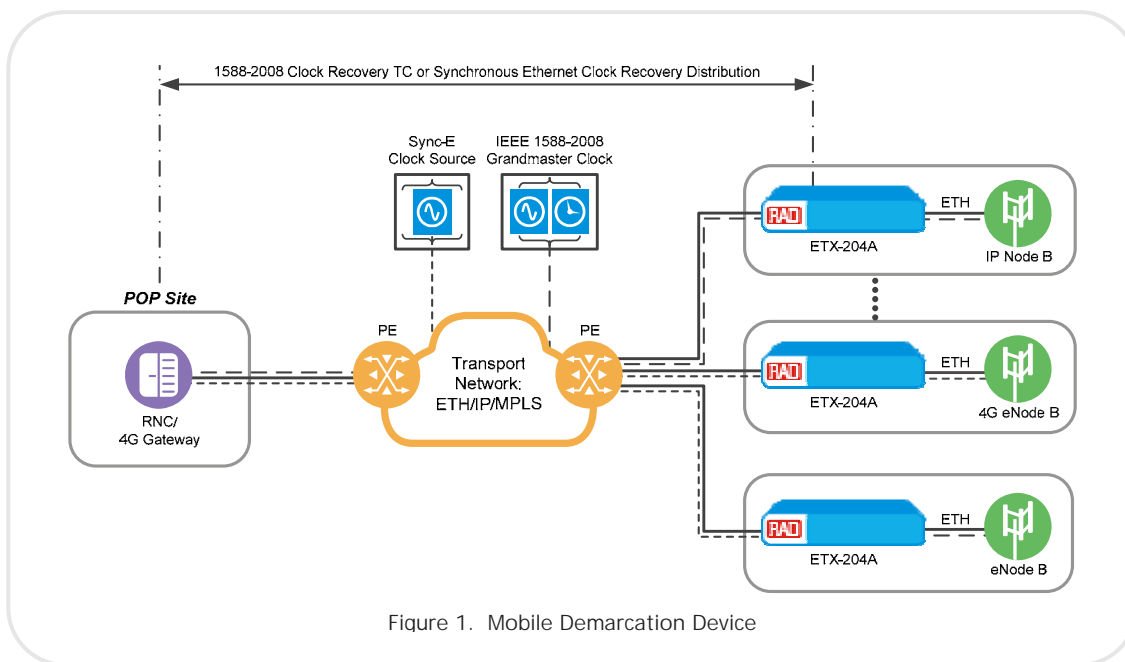


Figure 1. Mobile Demarcation Device

- End-to-end service and performance monitoring based on ITU-T Y.1731. Fault monitoring and end-to-end performance measurement include frame delay, frame delay variation, frame loss and availability.

Featuring ultra fast, hardware-powered processing, ETX-204A 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 with live traffic testing
- Flow-level monitoring, enabling simultaneous processing of hundreds of OAM sessions
- Loopback testing at line rate.

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.

For prioritizing user traffic, ETX-204A maps user traffic to up to eight separate queues per service. Each can be configured as strict priority queues or weighted fair queues (WFQ).

The queues handle traffic with different service demands, such as real-time traffic, premium data, or best-effort data.

The device uses the WRED policy to ensure that in case of congestion, green packets are not dropped (yellow packets may be dropped).

ETX-204A delivers managed quality of service in next-generation radio access networks (RANs), allowing mobile operators to enhance their 3.5G/4G service performance by combining Ethernet aggregation with OAM and SLA enforcement capabilities – starting at the eNodeB, HSDPA base station, or WiMAX cell site.

Forwarding

Every flow per EVC or EVC.cos has its own queues and scheduler. ETX-204A supports up to 192 flows, and a total of 30 queue blocks per network port. Each queue block is a group of eight queues per CoS.

The VLAN priority bit in Ethernet frames can be modified at network ingress according to the 'color' of the frame. This allows service consistency and QoS continuity across color-aware (Drop Eligible-enabled) as well as color-unaware networks.

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. ETX-204A supports configuration and statistic collection for the smart SFP TDM port.

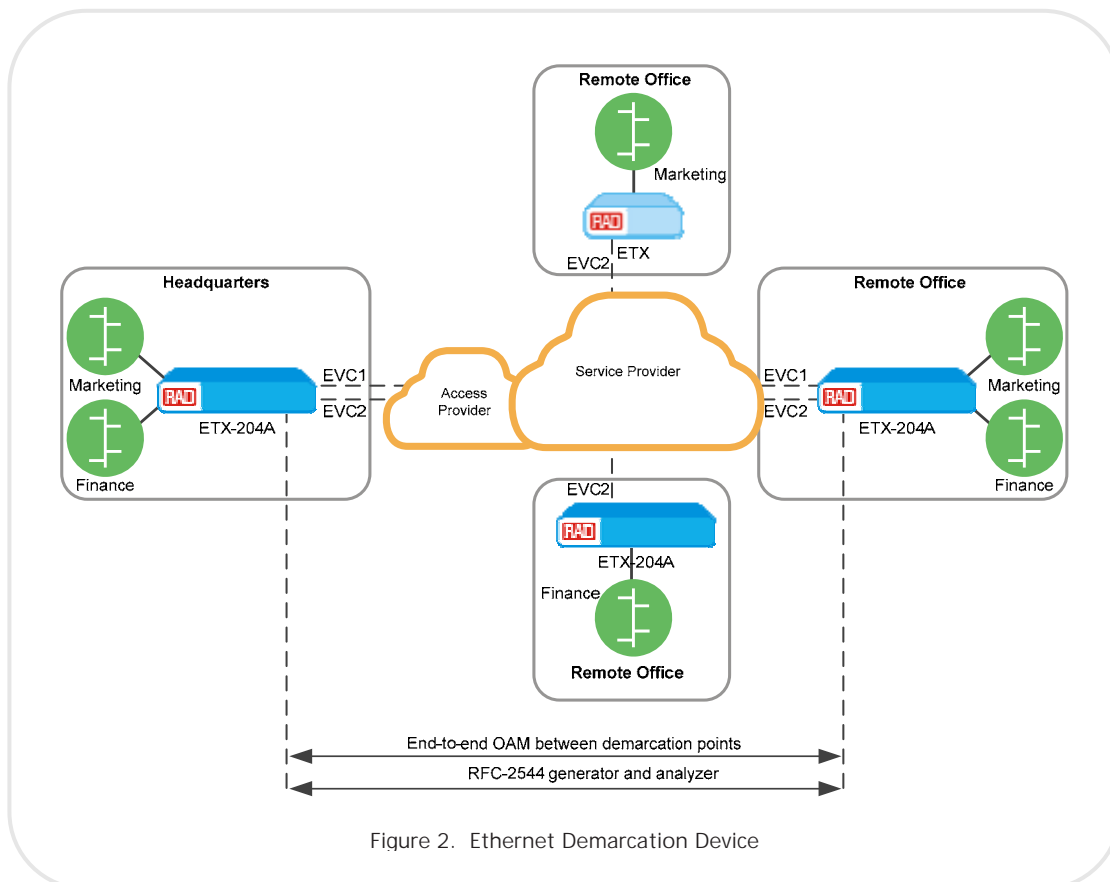


Figure 2. Ethernet Demarcation Device

RESILIENCY

Dying Gasp

ETX-204A 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. For 24V DC power supply, dying gasp is sent only from 19" unit.

Fault Propagation

The unit provides a user-configurable fault propagation mechanism in the network-to-user or user-to-network direction. When a link failure is detected or OAM failure received, ETX-204A can shut down the affected port or forward 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

The following protection methods are provided via port-based resiliency on the network ports:

- Link aggregation (LAG) based on 802.3ad
- Dual homing (1:1), allowing ETX-204A to be connected to two different upstream devices.

Ethernet Path Protection

Flow-based resiliency on uplinks is provided, as well as G.8031 – Ethernet linear protection on the network ports.

ETX-204A implements EPS Ethernet Path protection according to ITU-T G.8031.

The device protects one or multiple EVCs in the network via standard APS messages and via OAM ETH AIS/LOC criteria, ensuring protection switching under 50 msec. The protected EVC runs over one uplink or dual uplinks per customer requirement.

The protection is available for the following topologies:

- End-to-end EPS path protection for one or multiple EVCs transported over MPLS/VPLS access network
- Opposite standard PE supporting G.8031 EPS.

TIMING AND SYNCHRONIZATION

ETX-204A delivers simultaneous use of multiple timing and synchronization technologies, to reconcile different methodologies used in various network segments, eliminating the need for costly upgrades:

- Synchronous Ethernet (SyncE) master and slave clock support per ITU-T G.8261-G.8264, with primary/secondary clock redundancy
- 1588v2 Precision Time Protocol slave and transparent clock with hardware-based time stamping
- 1 PPS, E1/T1, and 2MHz signal frequency extracted from SyncE, E1/T1, or 1588v2 slave.

Powerful clock transfer capabilities allow backhaul providers to ensure SDH/SONET-level performance, including frequency accuracy of 16 parts per billion (ppb) or better, without investing in dedicated hardware.

MANAGEMENT AND SECURITY

The following security protocols are provided by ETX-204A to ensure client server communication privacy and correct user authentication:

- SNMPv3
- RADIUS (client authentication)
- TACACS+ (client authentication)
- SSH for Secure Shell communication session.

Ports

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

- Local management via an ASCII terminal connected to the RS-232 port
- Remote inband management via user or network ports routed via separate VLANs, Telnet, or RADview, RAD's SNMP-based management system
- Out-of-band management via a dedicated management port
- SFTP – Secure File Transfer Protocol.

Command Line Interface (CLI)

Databases and scripts of commonly used commands can be easily created and applied to multiple units using command line interface.

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.

DHCP

IP address, IP mask, and default gateway can be automatically obtained using DHCP.

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. The tests are performed over Layer-2, based on standard OAM messages, and can be performed for multiple flows.

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-204A exchanges the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges (MAC address) and routers (IP address).

Specifications

ETX-204A provides up to six Ethernet network and user ports.

CAPACITY

Max. Frame Size
12,288 bytes

ETHERNET NETWORK INTERFACES

Number of Ports
Up to 2 (redundancy)

Type

SFP/UTP combo port:

Fiber optic:

Fast Ethernet (100BaseFx, 100BaseLX10, 100BaseBx10, 100BaseT), SFP-based
Gigabit Ethernet (1000BaseSx, 1000BaseLX10, 1000BaseBx10, 1000BaseT), SFP-based

Copper: 10/100/1000BaseT (built-in)

Connector

SFP slot or RJ-45

SFP Transceivers

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

ETX-204A can be ordered bundled with low-cost MiRIC or MiRICi SFPs (managed by ETX-204A).

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.*

ETHERNET USER INTERFACES

Number of Ports

Up to 5 (port 2 can function as network or user)

Type

SFP/UTP combo port

Connector

SFP slot or RJ-45

SFP Transceivers

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

MANAGEMENT

Ethernet Management Port

Type: 10/100BaseT

Connector: RJ-45

Control Port

Interface: V.24/RS-232 DCE

Connector: 9-pin D-type, female

Format: Asynchronous

Data rate: 9.6, 19.2, or 115.2 kbps

TIMING

The SYE ordering option provides SyncE on all Ethernet ports, as well as master/slave and external clock (RJ-45), via E1/T1 or 2 Mhz.

The PTP ordering option adds IEEE 1588v2 support, with the following additional ports: TOD/1PPS (RJ-45), external clock (BNC), and 1PPS (BNC).

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GENERAL

Certifications

MEF 9, MEF 14: EPL and EVPL

Compliance

MEF 6 (E-Line – EPL and EVPL), MEF 10, IEEE 802.3, 802.3u, 802.1q, 802.1p, 802.3ad, 802.3-2005, 802.1ag-D8, ITU-T Y.1731, G.8031, G.8262, RFC-2544

Indicators

PWR (green):

On – ETX-204A is powered up

TST/ALM (red):

On – One of the Ethernet links is down

Blinking – Diagnostic loopback is active

LINK/ACT ETH (green):

On – Ethernet link OK

Blinking – Data is being transmitted

and received on the Ethernet link

LINK/ACT EXT CLK (green):

On – Station clock port connected

Power

AC power supply:

100–240 VAC, 50/60 Hz

DC power supply:

48V (-48 to 60VDC)

24V (20 to 32VDC)

Power Consumption

18.5W max

Physical

Unit with single power supply:

Height: 43.7 mm (1.7 in)

Width: 215 mm (8.4 in)

Depth: 300 mm (11.8 in)

Weight: 2.4 kg (5.2 lb)

Unit with dual power supply:

Height: 43.7 mm (1.7 in)

Width: 440 mm (17.4 in)

Depth: 240 mm (9.5 in)

Weight: 3.1 kg (6.8 lb)

Environment



Temperature:

ETX-204A: 0–50°C (32–122°F)

ETX-204A/H: -40 to 65°C (-40 to 149°F)

Humidity: Up to 90%, non-condensing

Table 1. ETX Family Comparison Table

Feature	ETX-203A (Ver. 3.02)	ETX-204A (Ver. 3.02)
		
Function	Advanced NTU	Premium NTU
Bandwidth	100/1000 Mbps per port	100/1000 Mbps per port
Ethernet Ports (Net/net/user)	1/1/2 SFP/UTP	1/1/2 or 1/1/4 SFP/UTP Combo
Network interface	Up to 2 × Gigabit or Fast Ethernet	Up to 2 × Gigabit or Fast Ethernet SFP/UTP combo ports
User interface	Up to 3 × Gigabit or Fast Ethernet	Up to 5 × Gigabit Ethernet SFP/UTP combo ports
Number of flows (EVC.cos) / shapers / MEPS	192/30/128 or 192/2/128	192/30/64
Service type	EPL and EVPL (flow-based)	EPL and EVPL (flow-based)
Forwarding mode	Flow-based forwarding	Flow-based forwarding
Management interface	Command line	Command line
G.8031 protection	Yes	Yes
QoS	Rate limitation per flow Traffic classification (Port-based, VLAN, 802.1p bits, ToS, DSCP) Shaping	Rate limitation per flow Traffic classification (Port-based, VLAN, 802.1p bits, ToS, DSCP) Shaping
Bandwidth profile	CIR/CBS, EIR/EBS per EVC.COS	CIR/CBS, EIR/EBS per EVC.COS
RFC-2544 testing	Yes	Yes
Max. frame size	12,288 bytes	12,288 bytes
E1/T1, E3/T3, OC-3/STM-1 bridging	Supported, includes integrated management	Supported, includes integrated management
Timing options	No	Yes (SyncE, IEEE 1588v2 slave)
Temperature-hardened option	No	Yes
Power supply	Universal AC/DC	AC or DC
Power supply redundancy	No	Yes

ETX-204A

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Ordering

RECOMMENDED CONFIGURATIONS

ETX-204A/AC

ETX-204A/AC/4

ETX-204A/DC/4

ETX-204A/ACR/4

ETX-204A/DCR/H/4

ETX-204A/AC/19/SYE

ETX-204A/DC/19/PTP

SPECIAL CONFIGURATIONS

ETX-204A/?/!/BT/B/_

Carrier Ethernet Demarcation Device in
19" enclosure (swappable power supplies)

Legend

- ? Enclosure type (Default=Regular enclosure):
- H** Industrially-hardened enclosure

Note: The ETX-204A/H version requires industrially-hardened SFP transceivers.

- I** Power supply (swappable):
- AC** Single AC power supply
- DC** Single -48 DC power supply
- 24DC** Single 24 DC power supply
- ACR** Dual AC power supply
- DCR** Dual -48 DC power supply
- 24DCR** Dual 24 DC power supply
- BT** Enclosure size:
- 19** 19" metal enclosure for single power supplies only (for dual power supplies, do not include this option)
- B** Number of user ports (Default=2 user ports):
- 4** 4 user ports
- Timing (Default=No hardware support for synchronization over packet):
- SYE** SyncE full support
- PTP** SyncE and 1588v2 clock recovery support

ETX-204A/?/!/ B/_

Carrier Ethernet Demarcation Device in
8.5" enclosure (fixed power supply)

Legend

- ? Enclosure type (Default=Regular enclosure):
- H** Industrially-hardened enclosure

Note: The ETX-204A/H version requires industrially-hardened SFP transceivers.

- I** Power supply (fixed):
- AC** Single AC power supply
- DC** Single -48 DC power supply
- 24DC** Single 24 DC power supply
- B** Number of user ports (Default=2 user ports):
- 4** 4 user ports
- Timing (Default=No hardware support for synchronization over packet):
- SYE** SyncE full support
- PTP** SyncE and 1588v2 clock recovery support

SUPPLIED ACCESSORIES

AC power cord

DC connection kit (if DC power supply is ordered)

RM-34

Hardware kit for mounting one ETX-204A unit with 19" enclosure in a 19" rack

WM-34

Hardware kit for mounting one ETX-204A unit with 19" enclosure on a wall

OPTIONAL ACCESSORIES

ETX-204A_PS/!

- I** Power supply for 19" unit:
- AC** Single AC power supply
- DC** Single -48DC power supply
- 24DC** Single 24DC power supply

RM-35/+

Hardware kit for mounting one or two ETX-204A units with 8.5" enclosure in a 19" rack

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

WM-35

Hardware kit for mounting one ETX-204A unit with 8.5" enclosure on a wall

CBL-DB9F-DB9M-STR

Control port cable

CBL-RJ45/2BNC/E1/X

Adaptor cable for converting a balanced E1 interface to an unbalanced E1 interface, with an RJ-45 balanced connector and two unbalanced BNC coaxial connectors

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