ETX-5

Ethernet Service Aggregation Platform

- Feature-rich CE2.0-certified aggregation platform, the cornerstone of RAD's Service Assured Access (SAA) solution
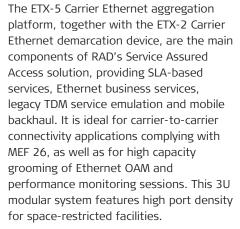- Ideal for carriers, wholesalers and mobile operators, building fully redundant networks with diverse topologies for delivery and monitoring of MEF-certified Ethernet and TDM-over-packet services
- Unmatched level of resiliency with self-healing Ethernet rings and LAG, enhanced traffic management capabilities for fully color-aware networks
- Hardware-based OAM and diagnostics for scalable and accurate traffic monitoring, quick fault detection and user-friendly troubleshooting
- Easy service provisioning, using the Service Manager application and Performance Monitoring portal

The ETX-5 Carrier Ethernet aggregation platform, together with the ETX-2 Carrier Ethernet demarcation device, are the main components of RAD's Service Assured Access solution, providing SLA-based services, Ethernet business services, legacy TDM service emulation and mobile backhaul. It is ideal for carrier-to-carrier connectivity applications complying with MEF 26, as well as for high capacity grooming of Ethernet OAM and performance monitoring sessions. This 3U modular system features high port density for space-restricted facilities.

ETX-5 features non-blocking architecture, allowing wire-speed forwarding of all packet sizes. It is designed for high availability and "Always-On" service.

Operating over various topologies (linear, daisy chain, and self-healing G.8032v2 rings), ETX-5 builds a complete color-aware access network.

ETX-5 provides CE2.0-certified Ethernet services including:

- E-Line (EPL and EVPL) for LAN-to-LAN, VoIP and IP-VPN connectivity, as well as for storage and dedicated Internet access
- E-LAN (EP-LAN and EVP-LAN) for multipoint Layer-2 VPN, transparent LAN services and multicast networks
- E-Tree (EP-Tree and EVP-Tree) for combining multiple Ethernet technologies across different domains
- E-Access for reaching the service provider's out-of-franchise subscriber locations as part of the end-to-end service
- 2G, 3GPP, LTE and LTE-A transport.

ETX-5 is available as temperature-hardened or NEBS-compliant (DC only) chassis intended for street-cabinets and cellular-tower installations. These options operate at the extended temperature range of −20 to 65°C (-4 to 149°F). The temperature-hardened model requires hardened main, I/O and service cards, as well as industrially hardened SFPs and XFPs.

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CARRIER INTEROPERABILITY

ETX-5 is interoperable with RAD's intelligent Ethernet demarcation devices (ETX-2, ETX-1, MiNID), and TDM pseudowire gateways (IPmux), to build optimized access networks – both TDM and packet-based – over PSN.

Fault-tolerant hardware design with fully redundant timing, management and power sub-systems, prevents service downtime.

ETHERNET 2.0

ETX-5 incorporates a complete set of CE 2.0-certified Ethernet service tools that allow the service provider to distinguish between high- and low-priority traffic, and to optimize TCP sessions.

Traffic Management
ETX-5 efficiently handles multi-priority traffic on a per-flow basis. Its 120-Gbps capacity enables simultaneous processing of thousands of flows, allowing service providers to deploy true traffic-engineered, color-aware networks.

The powerful H-QoS traffic manager performs hierarchical scheduling and shaping at port-, tunnel- and EVC-level. It employs two-rate, three-color policers and advanced color mapping/marking techniques to deliver a true multi-CoS solution. Multi-curve WRED profiles assure CIR traffic priority over EIR.

OAM
A hardware-based OAM CFM mechanism with Up and Down MEP support provides enhanced scale of line-rate CCM/DMM/LMM measurement for end-to-end service assurance, according to IEEE 802.1ag-D8 requirements. ETX-5 monitors performance per Y.1731.

Point-to-point Ethernet links can be monitored, using OAM EFM technology, as defined by IEEE 802.3ah. ETX-5 uses OAM EFM for discovery of OAM-enabled entities, event notification and loopback control.

SMART SFPS

GbE ports on E5-GBE-20 card can host up to ten unmanaged smart SFPs for Ethernet over TDM (MiRICi-E1/T1 or MiRICi-E3/T3) or pseudowire (MiTOP-E1/T1 or MiTOP-E3/T3) functionality.

RESILIENCY

ETX-5 functions as a fully-redundant aggregation and demarcation point that enables end-to-end visibility and smooth service hand-off. ETX-5 offers various tools to ensure continuous availability and sub-50 ms restoration in the event of network outage.

The following port and service protection mechanisms are employed: LAG (protection and load-balancing), ERP (G.8032v2, including multiple virtual rings on the same physical ports), Ethernet protection grouping (dual homing), TDM APS.

A fault propagation mechanism propagates failures from and to Ethernet ports, LAG or at OAM (CFM) level. This ensures that the traffic is sent via operational links. If a failure occurs, the unit triggers redundancy mechanisms at user equipment.
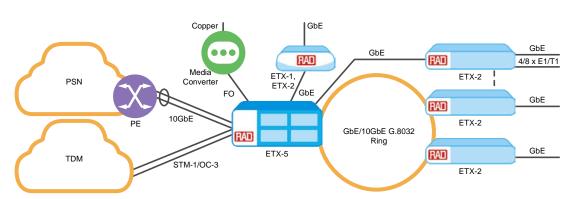
Applications

Figure 1. Access Aggregation with SLA-Based Services

ETX-5 supports multiple access topologies (linear, mesh and ring) and services (E-Line, E-LAN, E-Access) with redundancy (LAG, ring). It aggregates Ethernet traffic from a variety of advanced NIDs, featuring hardware OAM and traffic management.

TIMING AND SYNCHRONIZATION

Incorporating RAD's SyncToP synchronization over packet and Ethernet physical layer (Sync-E), ETX-5 utilizes standard technologies to ensure accurate clock recovery and distribution, with IEEE-1588v2 grandmaster functionality and Sync-E support over all Ethernet ports.

MONITORING AND DIAGNOSTICS

Performance Management Portal
ETX-5 is integrated into the Performance Management portal of the RADview network management system, enabling real-time monitoring of Ethernet service performance by collecting KPI data from RAD devices.

Y.1564
A standard service activation tool (Y.1564 generator/responder) is used to assess the configuration and performance of an Ethernet service prior to customer notification and delivery.

MANAGEMENT AND SECURITY

The device can be managed via RADview, RAD's carrier-class NMS for Windows, Unix and Linux. ETX-5 also supports a variety of access protocols, including CLI over Telnet, SNMPv3, and TFTP. Security features include SSH, SNMPv3, RADIUS and TACACS+.

ETX-5 uses the **RADview Service Manager** provisioning system for creating, testing and monitoring networks.

Windows-based standalone element manager, Shelf View, displays a dynamic graphic representation of the device panel(s), providing an intuitive, user-friendly GUI for monitoring and configuration.

Specifications

CAPACITY

Switching
200 GB half duplex

MTU
Up to 12 kB

Classification
According to outer or outer+inner VLAN, P-bit, IP Precedence, DSCP, Ethertype, IP/MAC source/destination address
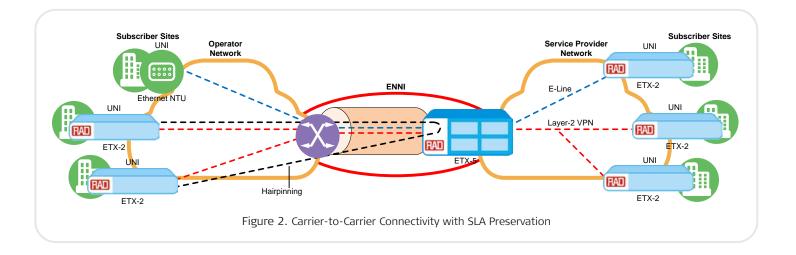
VLAN Editing
Inner/outer VLAN editing per VLAN and P-bit

10GBE INTERFACES

Four 10GbE on main card, NNI

Two 10GbE on I/O card, UNI/NNI

XFP: 10GBASE-SR, 10GBASE-LR and 10GBASE-ER

FE/GBE INTERFACES

20 GbE on I/O card, NNI or UNI, SFP or UTP

SFP: 100BaseFx/1000BaseSx/Lx, 10/100/1000BaseTx

Figure 2. Carrier-to-Carrier Connectivity with SLA Preservation

FE/GBE AND 10GBE SFPS/XFPS

For the list of supported SFP/XFP transceivers, see the [SFP/XFP Compatibility](#) document on the product webpage.

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

SDH/SONET INTERFACES

4 channelized STM-1/OC-3 on I/O card

Compliance: G.783/G.825 (STM-1),
     Telecordia GR-253 core (OC-3), G.707

NETWORK TOPOLOGY

Linear, ring per G.8032v2 with ladder topology

Services
E-Line, E-LAN, E-Tree, E-Access

Compliance
CE2.0, MEF 6, MEF 8, MEF 9, MEF 10/10.1/10.2, MEF 11, MEF 14, MEF 22, MEF 26

BRIDGE

Compliance
802.1D, 802.1Q, 802.1ad (provider bridge)

Mode
VLAN-aware

Spanning Tree Protocols
Up to 32 RSTP/MSTP instances per chassis

ROUTER

IP forwarding, static routing

PSEUDOWIRE

Payload Encapsulation
CESoPSN, SAToP

Network Encapsulation
MEF 8, UDP/IP

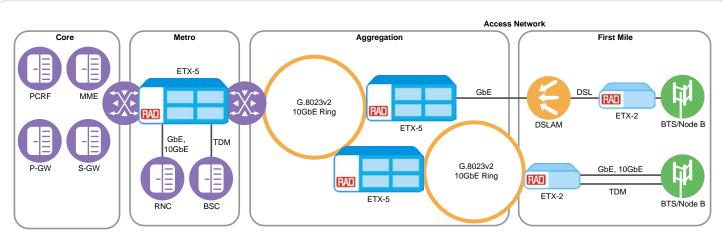**Capacity**
Up 252 E1 or 336 T1 TDM PWs per I/O card

Figure 3. Mobile Backhaul

ETX-5 can be used by fixed and mobile carriers building their own access infrastructure to provide cell-site connectivity. It aggregates base station traffic, serves as an intelligent demarcation device with GbE/10GbE fiber connectivity and allows ring connectivity towards the backhaul.

QUALITY OF SERVICE (H-QoS)

Capacity
3 levels with EVC, tunnel and port-level scheduling and shaping

8 × CoS per EVC scheduling and shaping elements

CoS Mapping
Per flow, P-bit, DSCP, IP precedence

Congestion Avoidance
WRED per queue

Shapers
Single- and dual-rate

Policers
Dual-rate three-color policer on ingress flows with up to 10 Gbps rate

OAM CFM

Type
Hardware-based, per EVC and EVC.CoS

Compliance
IEEE-802.1ag, ITU-TY.1731

OAM EFM

Type
Active, passive

Functions
Discovery, event notification, loopback control

Compliance
IEEE 802.3ah

TIMING

Synchronous Ethernet
G.8261, G.8263, G.781

1588v2 PTP
Ordinary clock grandmaster or slave

E2E, one-step transparent clock (TC)

Phase and frequency synchronization

TOD interface

1 PPS, 10 MHz signal

Clock Sources
Domain:

  Synchronous Ethernet

  1588v2 packets

  BITS (2.048 MHz, 1.544 MHz)

  TOD interface (10 MHz)

  STM-1/OC-3

E1/T1:

  Tx clock derived from internal E1/T1

  Adaptive, recovered from TDM PW

Domain Clock Resiliency
Redundant clock sources per main card:

- 1588v2 grandmaster and slave
- GPS interface (1PPS/10 MHz/TOD)
- BITS

Compliance
GR-253-CORE (SONET), GR-1244-CORE (Stratum 3), ITU-G813 Option 1/2 (SDH Equipment Clock)

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MANAGEMENT

Ethernet Management Port
Type: 10/100/1000BaseT
Connector: RJ-45

Control Port
Interface: V.24/RS-232 DCE
Connector: 9-pin D-type, female

Management Options
Command line interface with password protected access, authorization levels

Telnet/SSH, SNMPv2/v3, RADview, SFTP

RADIUS, TACACS+, management ACL

RESILIENCY

Hot-swappable cards

Card- and port-level traffic redundancy

Management sub-system redundancy

Domain clock redundancy

Dual power supply

Replaceable fan tray

Link Aggregation
Protection or load-balancing LAG with LACP between Ethernet ports on the same or different cards as per IEEE 802.3-2005, and 802.1ax requirements

G.8032v2 Ring
Up to 16 simultaneous rings between Ethernet ports on the same or different cards

APS
1+1 unidirectional between TDM ports on the same or different I/O cards

Ethernet Dual Homing
Up to 8 1:1 bidirectional protection groups

DIAGNOSTICS

Alarms
Hard-coded alarm severity, masking

ITU Y.1564
Verification of Ethernet service configuration and delivery

Digital Diagnostics Monitoring SFPs
SFF-8472-compatible SFPs, excluding external calibration

GENERAL

Physical
Regular chassis:
Height: 133 mm (5.2 in)
Width: 440 mm (17.3 in)
Depth: 380 mm (15 in), DC version
Depth: 455 mm (23.6 in), AC version
Weight: 12 kg (26.4 lb), maximum

NEBS-compliant chassis:
Height: 132.5 mm (5.2 in)
Width: 541.6 mm (21.3 in)
Depth: 385.2 mm (15.1 in)
Weight: 20 kg (44 lb), maximum

Power
AC: 100 to 240 VAC (115/230 VAC nominal), 50/60 Hz

DC: 40–72 VDC (48 or 60 VDC nominal)

Power Consumption
AC: 590W max, 540W average under full traffic load

DC: 520W max, 480W average under full traffic load

Environment
Temperature:
Operating: Regular chassis: 0 to 50°C (32 to 122°F)
Temperature-hardened chassis: –20 to 65°C (-4 to 149°F)

Storage: -20 to +70°C (0 to 150°F)

Humidity: Up to 93%, non-condensing

Cooling: Replaceable fan tray

Ordering

ETX-5 must be ordered with the RADcare BasicPlus Service Package (minimum 1 year) and the RADcare Professional Service Package.
In the USA and Canada, ETX-5 must be ordered with the RADcare Project Assurance Package only.

RECOMMENDED CONFIGURATIONS

Chassis
ETX-5300A/AC
Chassis with fan unit, AC power supply and AC power inlet

ETX-5300A/ACDC
Chassis with fan unit, AC and DC power supplies, AC and DC power inlets

ETX-5300A/ACR
Chassis with fan unit, two AC power supplies and two AC power inlets

ETX-5300A/DC
Chassis with fan unit, DC power supply and DC power inlet

ETX-5300A/DCR
Chassis with fan unit, two DC power supplies and two DC power inlets

ETX-5300A/NB/DC
NEBS-compliant chassis with fan unit, DC power supply and DC power inlet

ETX-5300A/NB/DCR
NEBS-compliant chassis with fan unit, two DC power supplies and two DC power inlets

ETX-5300A/NBH/DC
NEBS-compliant chassis with fan unit, DC power supply and DC power inlet, temperature-hardened

ETX-5300A/NBH/DCR
NEBS-compliant chassis with fan unit, two DC power supplies and two DC power inlets, temperature-hardened

Notes: *NEBS-compliant chassis must be ordered with air filter (ETX-5300A-AF), see the Service Card section below.*

Main and I/O Cards

Note: *Temperature-hardened chassis supports up to two temperature-hardened E5 GBE-20 or E5-10GBE-2 cards.*

ETX-5300A-MC/4 XFP/AT
Main card with four 10GbE ports, XFP slots, advanced timing capabilities

ETX-5300A-MC/4 XFP/AT/H
Main card with four 10GbE ports, XFP slots, advanced timing capabilities, temperature-hardened

ETX-5300A-ETH/20XGE/SFP
GbE card with 20 GbE ports, SFP slots

ETX-5300A-ETH/20XGE/SFP/H
GbE card with 20 GbE ports, SFP slots, temperature-hardened

ETX-5300A-ETH/20XGE/UTP
GbE card with 20 GbE ports, UTP

ETX-5300A-ETH/20XGE/UTP/H
GbE card with 20 GbE ports, UTP, temperature-hardened

ETX-5300A-ETH/2X10GE/XFP
10GbE card with two 10GbE ports, XFP slots

ETX-5300A-ETH/2X10GE/XFP/H
10GbE card with two 10GbE ports, XFP slots, temperature-hardened

ETX-5300A-MS/CH/S4
SDH/SONET card with four channelized STM-1/OC-3 ports, SFP slots

ETX-5300A-MS/CH/S4/H
SDH/SONET card with four channelized STM-1/OC-3 ports, SFP slots, temperature-hardened

Service Cards
ETX-5300A-FAN
Fan unit

ETX-5300A-FAN/H
Fan unit, temperature-hardened

ETX-5300A-FAN/NBH
NEBS-compliant fan unit, temperature-hardened

ETX-5300A-FAN/NB
NEBS-compliant fan unit

ETX-5300A-PS/AC
AC power supply

ETX-5300A-PS/AC/H
AC power supply, temperature-hardened

ETX-5300A-PS/DC
DC power supply

ETX-5300A-PS/DC/H
DC power supply, temperature-hardened

ETX-5300A-PSI
AC power inlet

ETX-5300A-AF
Air filter, required for NEBS-complaint chassis

SPECIAL CONFIGURATIONS

Contact your local RAD partner for additional configuration options.

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SUPPLIED ACCESSORIES

RM-ETX-5300-3U-19-FRONT
Hardware kit for front-edge mounting of ETX-5 into a 19" rack

RM-ETX-5300-AC-3U-19-FRONT
Hardware kit for front-edge mounting and rear-end fastening of ETX-5 in a 19" rack

OPTIONAL ACCESSORIES

RM-ETX-5300-3U-23-FRONT
Hardware kit for front-edge mounting of ETX-5 into a 23" rack

RM-ETX-5300-3U-23-FRAME
Hardware kit for mid-chassis mounting of ETX-5 into a 23" rack

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