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 Carrier Ethernet 2.0, Layer-3 VPN, and TDM-over-packet services
- Versatile offering of multi-rate Ethernet over fiber, SHDSL, VDSL, PDH, and TDM, assuring unified service delivery over any access technology
- TWAMP and Layer-2 OAM, as well as diagnostics for scalable and accurate traffic monitoring, quick fault detection, and troubleshooting of Layer-2 and Layer-3 networks
- Distributed network functions virtualization (D-NFV) for rapid rollout of new services

The ETX-2 Carrier Ethernet demarcation device and ETX-5 Carrier Ethernet aggregation platform are the main components of RAD’s Service Assured Access solution, providing:

- Ethernet service uniformity over multiple access technologies including GbE and 10GbE, SHDSL, VDSL, PDH, and SDH
- Operation in diverse topologies including ring, daisy chain, and hub and spoke
- PW functionality for mobile backhauling and business services

ETX-2 is offered in a variety of product options (ETX-203AM, ETX-203AX, ETX-205A, ETX-220A, ETX-2i). The new ETX-2i member is a next-generation hybrid L2 and L3 demarcation device. Table 1 provides further information on the capabilities offered by each device.

MARKET SEGMENTS AND APPLICATIONS

ETX-2 is ideal for carriers, service providers, 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 services, as well as L3 VPNs and value-added services using virtualization at the customer edge.

NETWORK TOPOLOGIES AND INTEROPERABILITY

ETX-2 supports several network topologies such as linear, daisy chain, and self-healing rings (G.8032v2), working with ETX-5 or third-party Ethernet devices.

D-NFV

The D-NFV option allows for seamless insertion of a standard Intel x86 core as an optional module. The D-NFV module hosts virtual machines providing virtual network functions (VFs) or value-added service capabilities. This enables service providers to quickly and easily provide new services and implement new network capabilities, with the benefit of function localization at the customer premises.

CARRIER ETHERNET 2.0

ETX-2 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 optimize TCP sessions.

ETX-2 provides MEF 10.3 rank policers, delivering high-scale multi-CoS services with hierarchical Quality of Service (HQoS).

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

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 Layer-2 control frames (including other vendors’ L2CP frames), with optional MAC change, across the network or to peer supported protocols (IEEE 802.3-2005 and LACP), or to discard the L2CP frames.

ROUTING

ETX-2 offers an optional embedded router with Virtual Routing and Forwarding (VRF) instances, allowing service providers to deploy L2 and L3 VPNs. The forwarding engine capability ranges from 1 to 8 Gbps, allowing for Carrier Ethernet and IP services to be offered in a single device providing high-capacity performance monitoring, network function virtualization (NFV), and more.
ETHERNET OVER PDH
ETX-2 transports Ethernet over PDH infrastructure via the following NG-PDH technologies:
- Generic Framing Procedure (GFP G.7041)
- GFP or PDH (G.8040)
- PDH 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. Integrated management of MiRiCi and MiTOP smart SFPs provides TDM (E1/T1/E3/T3/OC-3/STM-1) connectivity over PDH or SDH legacy networks.

TDM PSEUDOWIRE
ETX-2 provides pseudowire (PW) services via 4 or 8 integrated E1/T1 interfaces, as well as via a smart SFP (MiTOP). The PWs can be encapsulated using CESoPSN per IETF RFC 5086 or SAToP per IETF RFC 4553. The PWs are transmitted over IP networks or L2 networks with UDP/IP or MEF-8 encapsulation.

RESILIENCY
ETX-2 offers fast protection for virtually any kind of failure and 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-50ms restoration in the event of network outages.

TIMING AND SYNCHRONIZATION
ETX-2 incorporates RAD’s advanced SyncTop synchronization and timing over packet feature set to support mobile heterogeneous network (HetNet) topology. The device combines Synchronous Ethernet (SyncE) with IEE, 1588v2 Precision Time Protocol per ITU-T G.8265.1 and G.8275.1 Telecom profiles for cost-effective synchronization of frequency and phase.

With an integrated GNSS receiver and 1588v2 Grandmaster support, ETX-2 offers a Distributed GMSTM solution, allowing mobile operators and service providers to cost-effectively provide reliable frequency and phase accuracy for LTE-A. The device also supports 1588v2 slave clock, boundary clock (BC), and transparent clock (TC), as well as a dual master operating simultaneously in G.8265.1 and G.8275.1 mode.

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.

Figure 1. Access Aggregation with SLA-Based Services
### Table 1. Feature Comparison

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<th>ETX-2i Modular Uplink</th>
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<td>Strict priority and weighted fair queuing (WFQ) scheduling</td>
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<td>1:1 link protection with dual homing</td>
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<td>Synchronous Ethernet (SyncE) on all interfaces</td>
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<td>IEEE-1588v2 precision time protocol (PTP) per G.8265.1 and G.8275.1 Telecom profiles</td>
<td>TC</td>
<td>TC</td>
<td>Slave, TC, BC, GM with integrated GPS</td>
<td>Slave, TC, BC, Slave, TC</td>
<td>Slave, TC, BC Slave, TC</td>
<td>Slave, TC, BC Slave, TC</td>
<td>Slave, TC, BC Slave, TC, BC</td>
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<tr>
<td>D-NFV option with x.86 processor</td>
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</table>

Order from: Cutter Networks Inc
Ph: 727-398-5252 / Fax: 727-397-9610
www.bestdatasource.com
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 wire-speed 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. A high-scale PM controller option based on ETX-205A with a dedicated enclosure provides high-scale TWAMP.

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.

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

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

### Table 1. Feature Comparison (Continued)

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<thead>
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<th>ETX-2i Modular Uplink</th>
<th>ETX-2i D-NFV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-in Y.1564 service activation testers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ (up to 10G services)</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Continuity fault management (CFM) per IEEE 802.3ag</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Service utilization and performance monitoring per ITU-T G.1003.1, including synthetic loss measurement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>Delay and loss measurements per MEF 36</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>TWAMP light generator and responder (SW license)</td>
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<td>High-scale PM controller with TWAMP light generators (with D-NFV option)</td>
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<td>Accurate one-way KPI measurements</td>
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* Not applicable with D-NFV option
Specifications

CAPACITY
Max. Frame Size
- 12,288 bytes with Ethernet uplinks
- 2,048 bytes with SHDSL uplink module
- 2,112 bytes with VDSL uplink module
- 10,240 bytes with E1/T1/T3 EoPDH uplink module

BRIDGE
Compliance
- 802.1D, 802.1Q, 802.1ad
Mode
- VLAN-aware, VLAN-unaware
VLAN Editing
- Inner/outer VLAN editing per VLAN and p-bit values

ROUTER
(ETX-203AM, ETX-205A, ETX-2i)
Router (if ordered) providing:
- Up to 1 Gbps in ETX-203AM and ETX-205A
- Up to 8 Gbps in ETX-2i
- Layer-3 IPv4 and IPv6 forwarding with performance of over 2 MPPS
- Bidirectional forwarding detection (IP-BFD single hop) for fast forwarding path failure detection
- Inbound ACLs
- Static routing, or dynamic routing with OSPFv2, BGPv4, VRRPv2, and VRRPv3.

Hierarchical Quality of Service (HQoS)
Policing
- Dual token bucket with user-configurable CIR +CBS and BR +EBS
ETX-220A, ETX-2i: Bandwidth policing per MEF 10.3
Scheduling
- 8 x CoS per EVC scheduling elements
Strict Priority (SP) and Weighted Fair Queue (WFQ)

SHDSL INTERFACES
(Provided with SHDSL network module for ETX-203AM modular ordering option and ETX-2i modular and D-NFV ordering options)
Type
- SHDSLbis
Number of Ports
- 2 or 4
Number of Wires
- 4 or 8
Connectors
- Replaceable network 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
- 135Ω
Compliance
- ITU-T G.991.2, G.994.1, ETSI TS 101524
Bonding
- According to IEEE 802.3ah, ITU-T G.998.2

Table 2. SHDSL Typical Ranges (26 AWG)

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<tr>
<td>22784</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Carrier Ethernet Demarcation**

**VDSL2 INTERFACES**
(Provided with VDSL2 network module for ETX-203AM modular ordering; operates in CPE mode only)

- **Type**: VDSL.bis
- **Number of Ports**: Four VDSL2 ports (two per connector)
- **Number of Wires**: 8
- **Connectors**: Replaceable network module, with two RJ-45s (UTP)
- **Line Coding**: DMT
- **Payload Rate**: 100Mbps DL/50Mbps UL per line
- **Impedance**: VDSL2 over POTS: 100Ω
  VDSL2 over ISDN: 135Ω
- **Compliance**: ITU-T G.993.2, G.997.1, G.998.2, IEEE 802.3, ETSI TS 101524
- **Bonding**: According to ITU-T G.998.2 VDSL2 PTM
  One bonding group; supports up to four VDSL port(s) per group
  Bonding payload rate up to 400Mbps DL/200Mbps UL, with packet forwarding throughput 380Mbps DL/180Mbps UL

**E1/T1 INTERFACES**
(ETX-203AM: EoPDH E1/T1 network module)

- **Number of Ports**: 4 or 8
- **Compliance**: G.703, G.823
- **Data Rate**: E1: 2.048 Mbps
  T1: 1.544 Mbps
- **Line Coding**: E1: HDB3
  T1: B8ZS
- **Framing**: E1: Framed (G.732N with CRC)
  T1: Framed (ESF)
- **Impedance**: E1: 120Ω, balanced
  75Ω, unbalanced (via adapter cable)
  T1: 100Ω, balanced
- **Connectors**: Replaceable network module, with four RJ-45 connectors:
  Four E1/T1 ports:
  One E1/T1 interface per RJ-45
  Eight E1/T1 ports:
  Two E1/T1 interfaces per RJ-45, with adapter cable

**T3 INTERFACES**
(ETX-203AM: EoPDH T3 network module)

- **Number of Ports**: 1 or 2
- **Compliance**: G.703, G.823
- **Data Rate**: 44.736 Mbps
- **Line Coding**: B3ZS
- **Framing**: C-bit parity
- **Impedance**: 75Ω, unbalanced
- **Connectors**: Replaceable network module, with one or two pairs of BNC connectors:
  One T3 port - One pair
  Two T3 ports - Two pairs

**E1/T1 INTERFACES**
(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

---

**Table 3. VDSL Ranges**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Bandwidth (MHz)</th>
<th>Number Downstream Carriers</th>
<th>Carrier Bandwidth (kHz)</th>
<th>Max Aggregate Downstream Transmit Power (dBm)</th>
<th>Max Downstream Throughput (Mbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8a</td>
<td>8.832</td>
<td>2048</td>
<td>4.3125</td>
<td>+17.5</td>
<td>50</td>
</tr>
<tr>
<td>8b</td>
<td>8.832</td>
<td>2048</td>
<td>4.3125</td>
<td>+20.5</td>
<td>50</td>
</tr>
<tr>
<td>8c</td>
<td>8.5</td>
<td>1972</td>
<td>4.3125</td>
<td>+11.5</td>
<td>50</td>
</tr>
<tr>
<td>8d</td>
<td>8.832</td>
<td>2048</td>
<td>4.3125</td>
<td>3.9</td>
<td>50</td>
</tr>
<tr>
<td>12a</td>
<td>12</td>
<td>2783</td>
<td>4.3125</td>
<td>3.5</td>
<td>68</td>
</tr>
<tr>
<td>12b</td>
<td>12</td>
<td>2783</td>
<td>4.3125</td>
<td>3.4</td>
<td>68</td>
</tr>
<tr>
<td>17a</td>
<td>17.664</td>
<td>4096</td>
<td>4.3125</td>
<td>3.4</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table 4. Ethernet Interfaces

<table>
<thead>
<tr>
<th>Specifications</th>
<th>ETX-203AX</th>
<th>ETX-203AM</th>
<th>ETX-205A</th>
<th>ETX-220A</th>
<th>ETX-2i Fixed Ports</th>
<th>ETX-2i Modular Uplink D-NFV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Ports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiber Optic (XFP-based)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>connector</strong></td>
<td></td>
<td></td>
<td>XFP slot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XFP Transceivers</td>
<td>See Note</td>
<td>See Note</td>
<td>See Note</td>
<td>See Note</td>
<td>See Note</td>
<td>See Note</td>
</tr>
</tbody>
</table>

| **Number of Ports**  | Network: 2 | Network: 2 (with GbE module) | Network: 2 | Network: up to 2 | 4 (2 additional optional ports with GbE module) |
| **User**             | User: 4    | User: 4                            | User: 4 with regular router, or 2 with wire-speed router or D-NFV option | User: up to 10 or 20          | 4 (2 additional optional ports with GbE module) |

| **Type**             | SFP or copper port | SFP/copper combo port | SFP/copper (RJ-45) combo ports | SFP/copper (RJ-45) combo ports | SFP/copper (RJ-45) combo ports |

| **Fiber Optic (SFP-based)** | Fast Ethernet: 100BaseFx, 100BaseLx10, 100BaseBx10 | Gigabit Ethernet: 1000BaseSx, 1000BaseLx10, 1000BaseBx10 | 100BaseFx, 1000BaseLx/Sx |

| **Copper**            | 10/100BaseT or 10/100/1000BaseT | 10/100/1000BaseT |

| **Connector**         | Port 1: SFP slot | Replaceable module with SFP slot or RJ-45 | SFP slot or RJ-45 | SFP slot or RJ-45 | SFP slot or RJ-45 | SFP slot or RJ-45 |
|                      | All other ports: SFP slot or RJ-45 |

| **SFP Transceivers**  | See Note | See Note | See Note | See Note | See Note | See Note |

**Note:** It is strongly recommended to order this device with original RAD SFPs/XFPs. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs/XFPs. For full details on SFP/XFP transceivers, see the SFP/XFP Transceivers data sheet at [www.rad.com](http://www.rad.com). For the list of SFP/XFP transceivers supported by ETX-220A, see the [SFP/XFP Compatibility](http://www.rad.com) document.
ETX-2
Carrier Ethernet Demarcation

**PAYLOAD ENCAPSULATION**
- CESoPSN, SAToP

**TYPICAL ENCLOSURE**
- MEF 8, UDP/IP

**TIMING**

- Synchronous Ethernet
- ITU-T G.8261-G.8264
- 1588v2
- Slave clock (ETX-205A, ETX-220A, ETX-2i)
- Boundary clock (ETX-205A, ETX-220A, ETX-2i)
- Grandmaster with GNSS (ETX-205A, ETX-220A)
- Dual master operating simultaneously in G.8265.1 and G.8275.1 mode (ETX-205A, ETX-220A, ETX-2i)
- Transparent clock (TC)
- Phase and frequency synchronization

**Station Clock**
- (ETX-205A, ETX-220A, ETX-2i)
- Type: Balanced E1, unbalanced E1 (via adapter cable)
- Connector: RJ-45

**CONFIDENTIALITY**

- Pseudowire (ETX-205A)
- payload encapsulation

**PAYLOAD ENCAPSULATION**
- CESoPSN, SAToP

**TYPICAL ENCLOSURE**
- MEF 8, UDP/IP

**TIMING**

- Synchronous Ethernet
- ITU-T G.8261-G.8264
- 1588v2
- Slave clock (ETX-205A, ETX-220A, ETX-2i)
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- Grandmaster with GNSS (ETX-205A, ETX-220A)
- Dual master operating simultaneously in G.8265.1 and G.8275.1 mode (ETX-205A, ETX-220A, ETX-2i)
- Transparent clock (TC)
- Phase and frequency synchronization

**Station Clock**
- (ETX-205A, ETX-220A, ETX-2i)
- Type: Balanced E1, unbalanced E1 (via adapter cable)
- Connector: RJ-45

**POWER ENCAPSULATION**
- CESoPSN, SAToP

**TYPICAL ENCLOSURE**
- MEF 8, UDP/IP

**TIMING**

- Synchronous Ethernet
- ITU-T G.8261-G.8264
- 1588v2
- Slave clock (ETX-205A, ETX-220A, ETX-2i)
- Boundary clock (ETX-205A, ETX-220A, ETX-2i)
- Grandmaster with GNSS (ETX-205A, ETX-220A)
- Dual master operating simultaneously in G.8265.1 and G.8275.1 mode (ETX-205A, ETX-220A, ETX-2i)
- Transparent clock (TC)
- Phase and frequency synchronization

**Station Clock**
- (ETX-205A, ETX-220A, ETX-2i)
- Type: Balanced E1, unbalanced E1 (via adapter cable)
- Connector: RJ-45

**PTP Ports**
- (ETX-205A, ETX-220A, ETX-2i)
- TOD/1PPS (RJ-45)
- External clock (CONN.COAX SMA)
- 1PPS (CONN.COAX SMA)

**MANAGEMENT**

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

- Control Port
  - (ETX-203AM, ETX-203AX, ETX-205A, ETX-220A)
  - Interface: V.24/RS-232 DCE
  - Connector: RJ-45
  - Format: Asynchronous
  - Data rate: 9.6, 19.2, or 115.2 kbps

- Interface: RS-232 DCE
  - Connector: Mini USB
  - Format: Asynchronous
  - Data rate: 9.6, 19.2, or 115.2 kbps

**MANAGEMENT OPTIONS**
- Password-protected access, authorization levels
- Secure CLI via SSH
- Telnet, SNMPv3, SFTP
- RADIUS or TACACS+ authentication
- Plug and play zero touch provisioning
- Routing for Management
  - IP forwarding, dual-stack IPv4 and IPv6 routing, static routing

**GENERAL**

**COMPATIBILITY**
- CE 2.0, MEF 6 (E-Line – EPL and EVPL, E-LAN – EPLAN and EVPLAN), MEF 10, MEF 9, MEF 14, MEF 20, MEF 36, IEEE 802.3, 802.3u, 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, ITU-T Y.1564

**MANAGEMENT**

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

- Control Port
  - (ETX-203AM, ETX-203AX, ETX-205A, ETX-220A)
  - Interface: V.24/RS-232 DCE
  - Connector: RJ-45
  - Format: Asynchronous
  - Data rate: 9.6, 19.2, or 115.2 kbps

**POWER SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>ETX-203AX</th>
<th>ETX-203AM</th>
<th>ETX-205A</th>
<th>ETX-220A</th>
<th>ETX-2i Fixed Ports</th>
<th>ETX-2i Modular Uplink</th>
<th>ETX-2i D-NFV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (19” enclosure)</td>
<td>AC: 100 to 240 VAC, AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC, AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
<td>DC: 24/48 VDC nominal (20 to 72 VDC)</td>
</tr>
<tr>
<td>Power (8.5” enclosure)</td>
<td>AC: 100 to 230 VAC (±10%), 47–63 Hz</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
</tr>
<tr>
<td></td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
<td>DC: -48 VDC (36 to 72 VDC)</td>
</tr>
<tr>
<td></td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
<td>DC: 48 VDC (40 to 370 VDC)</td>
</tr>
<tr>
<td></td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
<td>AC: 100 to 240 VAC</td>
</tr>
<tr>
<td></td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
<td>DC: Dual DC feed of 48 VDC</td>
</tr>
</tbody>
</table>

**MANAGEMENT OPTIONS**
- Password-protected access, authorization levels
- Secure CLI via SSH
- Telnet, SNMPv3, SFTP
- RADIUS or TACACS+ authentication
- Plug and play zero touch provisioning
- Routing for Management
  - IP forwarding, dual-stack IPv4 and IPv6 routing, static routing

**GENERAL**

**COMPATIBILITY**
- CE 2.0, MEF 6 (E-Line – EPL and EVPL, E-LAN – EPLAN and EVPLAN), MEF 10, MEF 9, MEF 14, MEF 20, MEF 36, IEEE 802.3, 802.3u, 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, ITU-T Y.1564
Table 5. Power, Physical, and Environmental Specifications (Continued)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>ETX-203AX</th>
<th>ETX-203AM</th>
<th>ETX-205A</th>
<th>ETX-220A</th>
<th>ETX-2i Fixed Ports</th>
<th>ETX-2i Modular Uplink</th>
<th>ETX-2i D-NFV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>15W max</td>
<td>Modular base: 12W max</td>
<td>19&quot;: 22W max</td>
<td>70W max</td>
<td>Non-modular product base (8GbE): 35W max</td>
<td>Modular base: 30W</td>
<td>Modular base: 30W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>½ 19&quot;: 21W max</td>
<td></td>
<td></td>
<td>D-NFV module: 5W</td>
<td>D-NFV: 35W</td>
<td>D-NFV module: 5W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modular uplink: 5W max</td>
<td></td>
<td></td>
<td>VDSL: 10W max</td>
<td>VDSL: 10W max</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VDSL/router: 10W max</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Size (19&quot; enclosure):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>440 mm (17.4 in)</td>
<td>440 mm (17.4 in)</td>
<td>440 mm (17.4 in)</td>
<td>440 mm (17.4 in)</td>
<td>440 mm (17.4 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>240 mm (9.5 in)</td>
<td>Non-NEBS: 240 mm (9.5 in)</td>
<td>Non-NEBS: 240 mm (9.5 in)</td>
<td>300 mm (11.8 in)</td>
<td>300 mm (11.8 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NEBS: 300 mm (11.8 in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size (8.5&quot; enclosure):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>43.7 mm (1.7 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>220 mm (8.6 in)</td>
<td>215 mm (8.5 in)</td>
<td>215 mm (8.5 in)</td>
<td>215.9 mm (8.5 in)</td>
<td>215.9 mm (8.5 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>170 mm (6.7 in)</td>
<td>300 mm (11.8 in)</td>
<td>300 mm (11.8 in)</td>
<td>-</td>
<td>300 mm (11.8 in)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td>-40 to 85°C (-40 to 185°F)</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Regular: 0 to 50°C (32 to 122°F)</td>
<td>Temperature hardened and NEBS: -20 to 65°C (-4 to 149°F)</td>
<td>Temperature hardened and NEBS: 0 to 50°C (32 to 122°F)</td>
<td>Temperature hardened and NEBS: -20 to 65°C (-4 to 149°F)</td>
<td>Regular: 0 to 50°C (32 to 122°F)</td>
<td>Temperature hardened and NEBS: 0 to 50°C (32 to 122°F)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regular: 0 to 50°C (32 to 122°F)</td>
<td>Temperature hardened and NEBS: -20 to 65°C (-4 to 149°F)</td>
<td>Temperature hardened and NEBS: -20 to 65°C (-4 to 149°F)</td>
<td>Temperature hardened and NEBS: -20 to 65°C (-4 to 149°F)</td>
<td>Regular: 0 to 50°C (32 to 122°F)</td>
<td>Temperature hardened and NEBS: 0 to 50°C (32 to 122°F)</td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>Up to 90%, non-condensing</td>
<td>Up to 90%, non-condensing</td>
<td>Up to 90%, non-condensing</td>
<td>5% to 90%, non-condensing</td>
<td>5% to 90%, non-condensing</td>
<td>5% to 90%, non-condensing</td>
<td></td>
</tr>
</tbody>
</table>

Ordering

RECOMMENDED CONFIGURATIONS

**ETX-203AX:**
- ETX-203AX/2SFP/4UTP
  - 2 SFP Ethernet ports, 4 Ethernet UTP ports
- ETX-203AX/2UTP/4UTP
  - 2 UTP Ethernet ports, 4 Ethernet UTP ports
- ETX-203AX/1SFP1UTP/4UTP
  - 1 SFP Ethernet slot, 1 UTP Ethernet port, 4 Ethernet UTP ports

**Note for ETX-203AX:** All ordering options are available with FE, GE, GE30, or H (hardened) option.

**ETX-203AM:**
- ETX-203AM/DC/GE30/2ETH/2SFP2UTP
  - DC power supply, GE Ethernet ports with multiple shapers, Ethernet network module, 2 SFP Ethernet ports, 2 copper Ethernet ports
- ETX-203AM/AC/SH4W/4UTP
  - AC power supply, fast Ethernet ports, SHDSL 4-wire network module, 4 copper Ethernet ports
- ETX-203AM/AC/GE/2ETH/4SFP
  - AC power supply, GE Ethernet ports,
ETX-2

Carrier Ethernet Demarcation

Ethernet network module, 4 SFP Ethernet ports
ETX-203AM/AC/GE30/8E1T1/4UTP
AC power supply, GbE Ethernet ports, multiple shaped EVCs, E1/T1 8-port network module, 4 copper Ethernet ports
ETX-203AM/AC/GE4UTP
AC power supply, GbE Ethernet ports, no network module, 4 copper Ethernet ports

Notes for ETX-203AM:
- All ordering options are available with FE, GE, GE30, or H (hardened) option.
- Only the Ethernet network module (2ETH) is NEBS certified.
- The router module (RTR) is provided only with a temperature-hardened enclosure.

ETX-205A
ETX-205A/AC/19
AC power supply, 19" enclosure
ETX-205A/AC/19/4E1T1
AC power supply, 19" enclosure, 4 E1/T1 ports
ETX-205A/AC/19/8E1T1
AC power supply, 19" enclosure, 8 E1/T1 ports
ETX-205A/AC/19/SYE
AC power supply, 19" enclosure, SyncE
ETX-205A/AC/19/PTP
AC power supply, 19" enclosure, 1588v2 timing and SyncE
ETX-205A/AC/19/4E1T1/PTP
AC power supply, 19" enclosure, 4 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/AC/19/8E1T1/PTP
AC power supply, 19" enclosure, 8 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/AC/19/GPS
AC power supply, 19" enclosure, integrated grandmaster and GNSS receiver
ETX-205A/AC/PTP
AC power supply, 8.5" enclosure, 1588v2 timing and SyncE
ETX-205A/DC/4E1T1/PTP
DC power supply, 8.5" enclosure, 4 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/H/DC/19/PTP
Dual DC power supply, temperature-hardened NEBS-certified 19" enclosure, 1588v2 timing and SyncE
ETX-205A (D-NFV):
ETX-205A/AC/19V/DCX128S/PMC
AC power supply, dual core 2.5 GHz x86 processor, 128 GB solid state disk (SSD), high-scale PM controller application

Note for ETX-205A: 19" ordering options are available with any combination of AC or DC power supplies.

ETX-220A:
ETX-220A/AC/2XFP/20S/SYE/ESK
AC power supply, 2 XFP 10GbE ports, 20 SFP GbE ports, SyncE, enhanced SW key
ETX-220A/AC/2XFP/10U10S/SYE/ESK
AC power supply, 2 XFP 10GbE ports, 10 copper GbE ports, 10 SFP GbE ports, SyncE, enhanced SW key
ETX-220A/AC/3XFP/10S/SYE/ESK
AC power supply, 3 XFP 10GbE ports, 10 SFP GbE ports, SyncE, enhanced SW key

Note for ETX-220A:
- The Basic Software Key (BSK) option provides basic scheduling with a single queue block per port; the Enhanced Software Key (ESK) option allows for HQOS with shaping per EVC by providing more queue blocks per port (refer to user manual for the exact number).
- All ordering options are available with AC, DC, dual AC (ACR) or dual DC (DDR) power supplies.
- All ordering options are available with H (hardened) option.

ETX-205A
ETX-205A/AC/19
AC power supply, 19" enclosure
ETX-205A/AC/19/4E1T1
AC power supply, 19" enclosure, 4 E1/T1 ports
ETX-205A/AC/19/8E1T1
AC power supply, 19" enclosure, 8 E1/T1 ports
ETX-205A/AC/19/SYE
AC power supply, 19" enclosure, SyncE
ETX-205A/AC/19/PTP
AC power supply, 19" enclosure, 1588v2 timing and SyncE
ETX-205A/AC/19/4E1T1/PTP
AC power supply, 19" enclosure, 4 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/AC/19/8E1T1/PTP
AC power supply, 19" enclosure, 8 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/AC/19/GPS
AC power supply, 19" enclosure, integrated grandmaster and GNSS receiver
ETX-205A/AC/PTP
AC power supply, 8.5" enclosure, 1588v2 timing and SyncE
ETX-205A/DC/4E1T1/PTP
DC power supply, 8.5" enclosure, 4 E1/T1 ports, 1588v2 timing and SyncE
ETX-205A/H/DC/19/PTP
Dual DC power supply, temperature-hardened NEBS-certified 19" enclosure, 1588v2 timing and SyncE
ETX-205A (D-NFV):
ETX-205A/AC/19V/DCX128S/PMC
AC power supply, dual core 2.5 GHz x86 processor, 128 GB solid state disk (SSD), high-scale PM controller application

Note for ETX-205A: 19" ordering options are available with any combination of AC or DC power supplies.

ETX-220A:
ETX-220A/AC/2XFP/20S/SYE/ESK
AC power supply, 2 XFP 10GbE ports, 20 SFP GbE ports, SyncE, enhanced SW key
ETX-220A/AC/2XFP/10U10S/SYE/ESK
AC power supply, 2 XFP 10GbE ports, 10 copper GbE ports, 10 SFP GbE ports, SyncE, enhanced SW key
ETX-220A/AC/3XFP/10S/SYE/ESK
AC power supply, 3 XFP 10GbE ports, 10 SFP GbE ports, SyncE, enhanced SW key

ETX-220A/DC/4XFP/SYE/ESK
DC power supply, 4 XFP 10GbE ports, SyncE, enhanced SW key
ETX-220A/AC/2XFP/20S/GPS/BSK
AC power supply, 2 XFP 10GbE ports, 20 SFP GbE ports, integrated grandmaster and GNSS receiver, basic SW key

Notes for ETX-220A:
- The Basic Software Key (BSK) option provides basic scheduling with a single queue block per port; the Enhanced Software Key (ESK) option allows for HQOS with shaping per EVC by providing more queue blocks per port (refer to user manual for the exact number).
- All ordering options are available with AC, DC, dual AC (ACR) or dual DC (DDR) power supplies.
- All ordering options are available with H (hardened) option.

ETX-2i:
ETX-2i/AC/19
AC power supply, 19" enclosure, 8 fixed GbE SFP/copper combo port
ETX-2i/AC/M
AC power supply, 8.5" enclosure, 4 fixed GbE SFP/copper combo ports, modular uplink
ETX-2i/DDC/M/PTP
Dual DC feed power supply, 8.5" enclosure, 4 fixed GbE SFP/copper combo ports, modular uplink, SyncE and 1588v2 timing
ETX-2i/H/AC/19/PTP
AC power supply, 19" enclosure, temperature-hardened, 8 fixed GbE SFP/copper combo ports, SyncE and 1588v2 timing
ETX-2i/H/ACR/19/PTP
Dual AC power supply, 19" enclosure, temperature-hardened, 8 fixed GbE SFP/copper combo ports, SyncE and 1588v2 timing
ETX-2i/H/AC/PTP
AC power supply, 19" enclosure, NEBS compliant, temperature-hardened, 8 fixed GbE SFP/copper combo ports, SyncE and 1588v2 timing
ETX-2i/H/ACR/19/V
AC power supply, 19" enclosure, NEBS compliant, 4 fixed GbE SFP/copper combo ports, modular uplink, D-NFV module slot

Note: Any D-NFV option must be ordered together with a RADcare Package and RADcare Project Assurance Package.

Special Configurations
Please contact your local RAD partner for additional configuration options for

Order from: Cutter Networks Inc
Ph: 727-398-5252 / Fax: 727-397-9610
www.bestdatasource.com
ETX-203AX, ETX-203AM, ETX-205A, ETX-220A, and ETX-2i (including the integrated router option).

**SUPPLIED ACCESSORIES**

**ETX-203AX:**
- AC power cord

**ETX-203AM:**
- AC power cord (if AC power supply is ordered), or DC connector kit (if DC power supply is ordered)
- CBL-E1-SPLIT
  - Cable to extract 2 E1/T1 ports from one RJ-45 connector of ETX-203AM E1/T1 network module (four cables are supplied if 8 E1/T1 option is ordered)

**ETX-205A:**
- Power cord (one per power supply)

**RM-34**
- Hardware kit for mounting one 19" ETX-205A unit in a 19" rack

**ETX-220A:**
- Power cord (one per power supply)

**RM-34**
- Hardware kit for mounting one ETX-220A unit in a 19" rack

**ETX-2i:**
- AC power cord

**OPTIONAL ACCESSORIES**

**ETX-203AX:**
- CBL-RJ45/D9/F/6FT
  - Control port cable with male RJ-45 and female DB-9 connector

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

**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-203A**
- Wall mount hardware kit for one ETX-203AM unit

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

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

**Ethernet Uplink Modules**

**ETX-M/2ETH**
- Ethernet uplink module for ETX-203AM with two combo ports

**ETX-M/SH4W**
- EFM bonded uplink module for ETX-203AM with 2 SHDSL ports (4-wire)

**ETX-M/SH8W**
- EFM bonded uplink module for ETX-203AM with 4 SHDSL ports (8-wire)

**ETX-M/4E1T1**
- Ethernet uplink module for ETX-203AM with 4 E1/T1 ports

**ETX-M/8E1T1**
- Ethernet uplink module for ETX-203AM with 8 E1/T1 ports

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

**ETX-M/1T3**
- Ethernet uplink module for ETX-203AM with 1 T3 port

**ETX-M/2T3**
- Ethernet uplink module for ETX-203AM with 2 T3 ports

**ETX-M/RTR**
- Ethernet module with integrated 1 Gbps router (provided only with temperature-hardened enclosure)

**ETX-205A:**
- CBL-RJ45/D9/F/6FT
  - Control port cable with male RJ-45 and female DB-9 connector

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

**RM-35/@**
- Hardware kit for mounting one 19" ETX-205A unit in a 23" rack
  - Rack mount kit (Default=both kits):
    - P1 Kit for mounting one unit
    - P2 Kit for mounting two units

**ETX-M/RTR**
- Ethernet module with integrated 1 Gbps router (provided only with temperature-hardened enclosure)

**ETX-220A:**
- CBL-RJ45/D9/F/6FT
  - Control port cable with male RJ-45 and female DB-9 connector

**RM-34-23**
- Hardware kit for mounting one 8.5" ETX-205A units in a 19" rack

**ETX-220A**
- Wall mount hardware kit for one ETX-205A unit

**ETX-205A-PS/?/!**

**Option**
- NEBS
  - NULL International
  - N NEBS3
  - ! Power supply
    - AC Single AC power supply
    - DC Single DC power supply

**ETX-220A:**
- CBL-RJ45/D9/F/6FT
  - Control port cable with male RJ-45 and female DB-9 connector

**RM-34-23**
- Hardware kit for mounting one ETX-220A unit in a 23" rack

**WM-34**
- Wall mount HW kit for one ETX-220A unit
ETX-2
Carrier Ethernet Demarcation

ETX-220A_PS/N/

! Power supply:
AC Single AC power supply
DC Single DC power supply

ETX-2i:
DC connection kit

RM-34
HW kit for mounting 19" unit in a 19" rack

RM-35/@
Hardware kit for mounting one or two 8.5" units in a 19" rack

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

WM-35
Wall mount hardware kit for one 8.5" unit

ETX-2i-PS/?/

? NEBS
NULL International
N NEBS3

! Power supply
AC Single AC power supply
DC HP High power DC power supply for D-NFV
AHP High power AC power supply for D-NFV

Network interface modules for modular options:
Similar to ETX-203AM Ethernet Uplink Modules.

D-NFV modules for D-NFV ordering options:
ETX-DNFV-M/i7/128S
D-NFV module based on Quad Core i7 and 128 GB SSD
ETX-DNFV-M/i7/128S/8R
D-NFV module based on Quad Core i7 and 128 GB SSD, 8 GB RAM

SOFTWARE LICENSES FOR ETX-2
ETX-2-SW TWAMP
License to activate and operate TWAMP related functionalities in ETX-2

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