Controlled Availability

**100G EADs**

# ETX-2i-100G

## Business Access and Cell Site Gateway



- 100G Ethernet demarcation device built for mobile 4G/5G xHAUL service delivery

- High density 25GbE and 10GbE ports for flexible mobile RU site connectivity, and network interface operating at 100G, 40G, or 25G rates

- Superior precise timing synchronization, with Class C IEEE1588v2 and enhanced SyncE

- Advanced TM with HQoS and dedicated fast lanes for latency sensitive special business and fronthaul traffic

- Ready for CPRI/eCPRI RoE mapping

- Small footprint (1 RU, 19") and low-power consumption solution addressing today's key network challenges

The global proliferation of mobile, video, and cloud applications creates an increasing demand for high-bandwidth access, generating new opportunities for communication service providers.

**Traffic Management**

ETX-2i-100G offers best in class traffic management capabilities, including advanced classification engine, VLAN manipulation, and sophisticated service shaping for full flexibility and control over traffic flows. ETX-2i-100G supports hierarchical QoS, thus enabling delivery of multiple prioritized service types along with best effort services, while efficiently utilizing available network bandwidth. ETX-2i-100G can forward delay sensitive mobile fronthaul (eCPRI) traffic flows, using dedicated "fast-lanes" for guaranteed low latency.

ETX-2i-100G 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 per port, with flexible classification rules and access lists.

ETX-2i-100G can be configured to forward or discard Layer-2 control frames (including other vendors' L2CP frames).

## MARKET SEGMENTS AND APPLICATIONS

Incorporating a complete set of Carrier Ethernet service tools, ETX-2i-100G is ideal for carriers, service providers, wholesale providers, and mobile operators seeking to offer unified SLA-based Ethernet business services, such as E-Line (EVL, EVPL), E-LAN (EPLAN, EVPLAN), E-Tree (EP-TREE, EVP-TREE), Access E-Line, and Transit E-Line services compliant with MEF 3.0 and CE 2.0.

ETX-2i-100G enables operators to deliver service level guarantees, by supporting multi-layer diagnostics, fine-grained SLA enforcement, and accurate performance monitoring. Built-in service activation testers support verifying end-to-end network performance.

## INTEROPERABILITY

ETX-2i-100G features and services are standard based and should work with any 3rd party equipment using standard based features and services.

## NETWORK TOPOLOGIES

ETX-2i-100G supports several network topologies such as linear, daisy chain, and self-healing rings (G.8032v2), working with ETX-5 or any third-party standard compliant Ethernet device.

## SERVICES

ETX-2i-100G is capable of delivering up to 100-GbE services using a mix of 10GbE and 100GbE interfaces, while offering CE 2.0 / MEF 3.0 compliant service models, service monitoring, flexibility, and manageability.

ETX-2i-100G addresses the need to deliver flexible, high bandwidth Ethernet services for deployment of 4G and/or 5G cell sites. It can aggregate multiple 4G and/or 5G RU (eCPRI, O-RAN) service flows over the network interface, creating a cost effective, hybrid fronthaul and backhaul delivery solution.

## RESILIENCY

ETX-2i-100G offers fast protection for virtually any kind of failure, in any linear, ring, or dual-homing topology. The device employs IEEE 802.3ad link aggregation (1:1 LAG and load-balancing 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 outage.



RAD

Your Network's Edge®

# ETX-2i-100G

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## TIMING AND SYNCHRONIZATION

ETX-2i-100G incorporates RAD's advanced synchronization and timing over packet feature set to support mobile heterogeneous network topology. The device combines Synchronous Ethernet (SyncE) with IEEE 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 GM, ETX-2i-100G allows a Distributed Grandmaster timing design solution, offering mobile operators to cost-effectively provide reliable frequency and phase accuracy.

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

The device is ready for Enhanced SyncE (eSyncE) and Class C 1588v2 BC.

## MONITORING AND DIAGNOSTICS

Featuring multi-layer OAM and PM tools, ETX-2i-100G performs hardware-based monitoring and diagnostics at high scale and with 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 to quickly detect connectivity failures for robust protection. Layer-2 and 3 loopbacks offer flexible diagnostic tools.

RFC-5357 TWAMP Light delivers the same functionality over Layer-3 networks, as do one-way TWAMP and two-way ICMP Echo with counters for loss, delay, fragmented packets, reorders, and duplication, in addition to configurable test packet size. Multiple VRF support the robust TWAMP setup.

ETX-2i-100G offers service activation tools with multiple Y.1564 and L3 SAT testers.

## SDN READY MANAGEMENT AND CONTROL

ETX-2i-100G leverages RAD's field-proven, carrier grade operating system – integrated in the entire ETX-2/2i family – to provide a familiar and uniform interface for provisioning, administration, and maintenance operations.

ETX-2i-100G can be managed using RADview, RAD's carrier-class NMS, or any SNMP-based management system. The device supports a variety of access protocols, including CLI over Telnet, SNMPv3, and TFTP, with a comprehensive security suite including SNMPv3, RADIUS, TACACS+, SSH, SFTP, and flexible Access Control Lists.

ETX-2i-100G implements RAD's unique ZTP process, allowing devices to onboard automatically and securely without human intervention, reducing operational costs and enabling operators to provision services easily and reliably.

ETX-2i-100G is delivered ready for SDN transformation with comprehensive support for the NETCONF/YANG protocol, enabling operators to utilize modern network service orchestrators.



*ETX-2i-100G Demarcation and Aggregation*
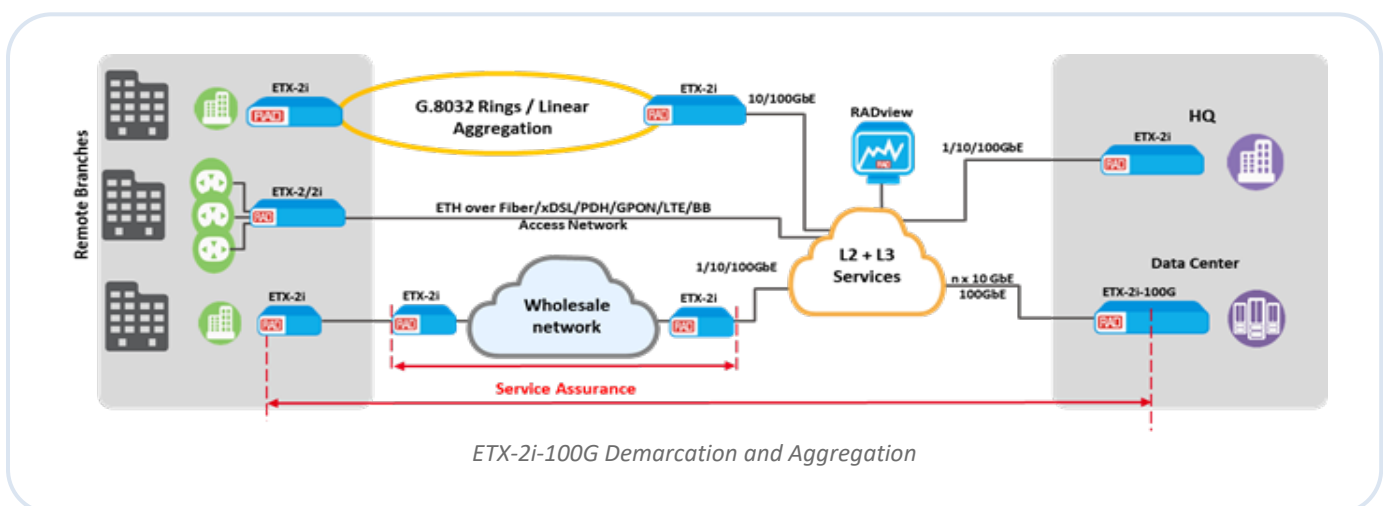
# ETX-2i-100G

Business Access and Cell Site Gateway

## Specifications

### INTERFACES

**Ethernet Ports**

| 19-inch Enclosure 100G/4Q | 4 QSFP28 100 GbE |
|---|---|
| | 16 SFP+ 1/10GbE or 8 SFP+ 1/10GbE and 8 SFP28 10/25GbE |
| 19-inch Enclosure 100G/3Q | 3 QSFP28 100GbE |
| | 10 SFP+ 1/10GbE |

**Management Port**

| Type | 10/100/1000BASE-T |
|---|---|
| Connector | RJ-45 |

**Control Port**

| Interface | V.24/RS-232 DCE |
|---|---|
| | Optional native USB on ETX-2i-100G/4Q |
| Connector | ETX-2i-100G/3Q: Mini USB |
| | ETX-2i-100G/4Q: Micro USB |
| Format | Asynchronous |
| Data Rate | 9.6, 19.2, or 115.2 kbps |

**PTP Ports (optional):**

| Station Clock | Type: Balanced E1, unbalanced E1 (via adapter) |
|---|---|
| | Connector: RJ-45 |
| ToD/1PPS | RJ-45 |
| External Clock | Connector: COAX SMA |
| 1PPS | Connector: COAX SMA |
| GNSS Antenna | Connector: SMA (HW ready) |

### Alarm Relay (optional)

| Type | Dry contacts with three "in" |
|---|---|
| Connector | Terminal block, 9-pin |

### BRIDGE

| Max. Frame Size | ETX-2i-100G/3Q: 12,288 bytes |
|---|---|
| | ETX-2i-100G/4Q: 9600 bytes |
| Compliance | 802.1D, 802.1Q, 802.1ad |
| Mode | VLAN-aware, VLAN-unaware |
| VLAN Editing | Inner/outer VLAN editing per VLAN and p-bit values |

### TRAFFIC MANAGEMENT

| Classification | Per port |
|---|---|
| | 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 |
| Scheduling | Eight CoS per EVC scheduling elements |
| | Strict Priority (SP) |
| | Weighted Fair Queue (WFQ) |
| Shaping | Per port |
| | Per EVC |
| | Per EVC.CoS |



*4G/5G xHaul Mobile Application*
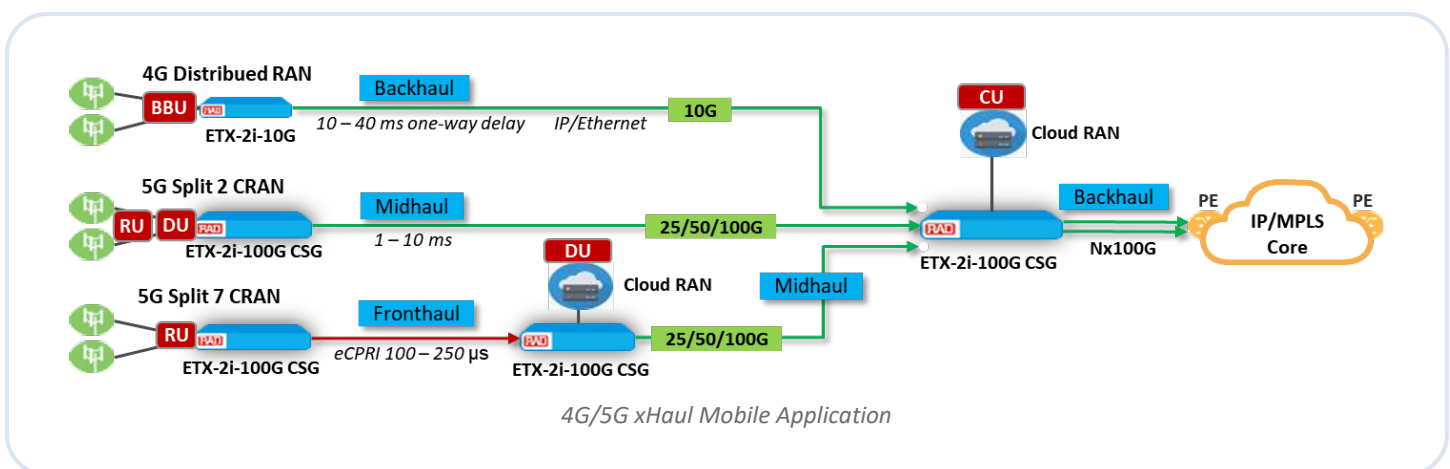
# ETX-2i-100G
## Business Access and Cell Site Gateway

## OAM AND DIAGNOSTICS

| | |
|---|---|
| **Connectivity Fault Management (CFM)** | IEEE 802.1ag |
| **EFM Link-fault OAM** | IEEE 802.3ah |
| **PM (SLM; DM)** | ITU-T Y.1731 |
| **TWAMP** | RFC 5618 TWAMP responder and receiver TWAMP sender |
| | RFC 5357 TWAMP – Light sender and responder |
| **Service Activation Tests** | RFC-2544: 8 built-in testers |
| | ITU-T Y.1564: 8 built-in testers |
| **Loopback Tests** | Non-disruptive loopback per flow, with MAC/IP address swap |
| | Loopbacks at Ethernet port level |
| **ICMP Echo** | Over L2 and L3 services |
| | Tests IP connectivity (PING) |

## MANAGEMENT

| | |
|---|---|
| **Management Options** | Local management via LAN port or serial port |
| | Remote management via in-band VLAN |
| | Password-protected access with authorization levels |
| **Protocols and Security** | Secure CLI via SSH |
| | Telnet, SNMPv3, SFTP |
| | NETCONF/YANG management interface |
| | Dual Stack IPv4 and IPv6 |
| | RADIUS or TACACS+ authentication |
| | Access Control List (ACL) |
| | Configuration backup and restore |
| **Plug and Play Zero Touch Provisioning** | DHCP auto-configuration |
| | XML configuration files download via TFTP/SCP |

## RESILIENCY

| | |
|---|---|
| **Dual Homing** | Dual homed 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** | Load balancing LAG with up to 4 ports in a LAG group (on 10G ports) |

## TIMING AND SYNCHRONIZATION

(Per relevant ordering options)

| | |
|---|---|
| **Synchronous Ethernet (eSyncE ready)** | ITU-T G.8261-G.8264 |
| **1588v2** | Slave clock |
| | Boundary clock (Class C ready) |
| | Dual master operating simultaneously in G.8265.1 and G.8275.1 modes |
| | Transparent clock (TC) |
| | Phase and frequency synchronization |

## ELECTRICAL

| | |
|---|---|
| **Power Supply** | Hot swappable, redundant AC or DC PS |
| | AC: 100-240 VAC (±10%), 50/60 Hz |
| | DC: 48 VDC (40-60 VDC) |
| **Power Consumption** | ETX-2i-100G/3Q: 350W |
| | ETX-2i-100G/4Q: 170W |

## DIMENSIONS

**19" Enclosure**

| | |
|---|---|
| **Height** | 44 mm (1.7") |
| **Width** | 440 mm (17.32") |
| **Depth** | 400 mm (15.75") |

## ENVIRONMENTAL

| | |
|---|---|
| **Storage Temperature** | -40 to 85°C (-40 to 185°F) |
| **Operating Temperature** | Regular: 0 to 50°C (32 to 122°F) Hardened: -20 to 65°C (-4 to 149°F) |
| **Humidity** | 5% to 90%, non-condensing |
| **Airflow** | Front to back airflow |

## STANDARDS COMPLIANCE

| | |
|---|---|
| **CE** | CE 2.0 |
| **MEF 3.0*** | E-Access: Access EPL, Access EVPL |
| | E-LAN: EP-LAN, EVP-LAN |
| | E-LINE: EPL, EVPL |
| | E-Tree: EP-Tree, EVP-Tree |
| **MEF 6** | E-Line: EPL and EVPL |
| | E-LAN: EPLAN and EVPLAN |
| **MEF** | MEF 9, MEF10, MEF 14, MEF 20, MEF 36, MEF 46 |
| **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.8262, G.8265, RFC-2544, Y.156 |

\* Targeted for Q1/2021

# ETX-2i-100G

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## Ordering

**ETX-2I-100G/?/!/@/#/~/%**

| | | |
|---|---|---|
| **?** | Temperature Range | |
| | H | Extended temperature |
| **!** | Power Supply | |
| | AC | Rear access AC power supply (for ETX-2i-100G/3Q) |
| | ACF | Front access AC power supply (for ETX-2i-100G/4Q) |
| | ACR | Rear access redundant AC power supply |
| | ACRF | Front access redundant AC power supply |
| | DC | Rear access 48V DC power supply |
| | DCF | Front access 48V DC power supply |
| | DCR | Rear access redundant DC power supply |
| | DCRF | Front access redundant DC power supply |
| **@** | Ethernet Network or User Ports | |
| | 3QSFP | 3 QSFP28 100GbE ports |
| | 4Q | 4 QSFP28 100GbE ports |
| **#** | Ethernet User Port | |
| | 10SFPP | 10 SFPP 1/10GbE ports |
| | 16SFPP | 16 SFPP 1/10GbE ports |
| | 8SP8S28 | 8 SFPP 1/10GbE, 8 SFP28 10/25GbE ports |
| **~** | Timing Options | |
| | G | Integrated GPS, 1588v2 timing and Sync-E |
| | PTP | 1588v2 timing and Sync-E |
| **%** | Control Port | Default: RS232 |
| | US | Native USB support |

### RECOMMENDED CONFIGURATIONS

**ETX-2I-100G/ACR/3QSFP/10SFPP**

**ETX-2I-100G/DCR/3QSFP/10SFPP**

**ETX-2I-100G/ACRF/4Q/8SP8S28/PTP\***

**ETX-2I-100G/DCRF/4Q/8SP8S28/PTP\***

**ETX-2I-100G/ACRF/4Q/16SFPP**

**ETX-2I-100G/DCRF/4Q/16SFPP**

\* Future availability

### SUPPLIED ACCESSORIES

AC power cord (for AC models)
DC power cord (for DC models)

**RM-50**
HW kit for mounting ETX-2i-100G unit in a 19" rack

**CBL-MUSB-DB9F**
Mini-USB cable to connect ETX-2i-100G/3Q to a serial port

**CBL-UUSB-DB9F**
Micro-USB cable to connect ETX-2i-100G/4Q to a serial port
*Note: This cable is not supplied for devices with a native USB.*

### OPTIONAL ACCESSORIES

**ETX-2I-100G-PS/AC**
Rear access single AC power supply (ETX-2i-100G/3Q only)

**ETX-2I-100G-PS/DC**
Rear access single DC power supply (ETX-2i-100G/3Q only)

**ETX-2I-100G-PS/ACF**
Front access single AC power supply (ETX-2i-100G/4Q only)

**ETX-2I-100G-PS/DCF**
Front access single DC power supply (ETX-2i-100G/4Q only)

**RM-53**
HW kit for mounting a 19" unit in a 19" rack 100mm deep installation

**ETX-2i-SW TWAMP**
Optional software license to activate and operate TWAMP functionalities

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