ETX-2i

IP & Carrier Ethernet Demarcation with D-NFV

- Feature-rich demarcation and aggregation suite, offering a complete Service Assured Access (SAA) solution, Line rate Layer-3 services, and vCPE applications, including distributed network functions virtualization (D-NFV) for rapid rollout of new services and network capabilities

- 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 with optional virtualization

- Versatile offering of multirate Ethernet over fiber, SHDSL, VDSL, GPON, PDH, and TDM, 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-2i IP & Carrier Ethernet Demarcation with D-NFV device is the main component of RAD's Service Assured Access solution, providing:

- Ethernet service uniformity over multiple access technologies including GbE and 10GbE, SHDSL, VDSL, PDH, and SONET/SDH

- Operation 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

- Network Function Virtualization (NFV) for vCPE solutions

ETX-2i is offered in a variety of product options: ETX-2i, ETX-2i-B, and ETX-2i-10G. ETX-2i is a next-generation hybrid L2 and L3 demarcation device. The ETX-2i-B branch office device is an optimized access box adapted to the requirements of next-generation vCPE networks. The ETX-2i-10G device is an ETX-2i version supporting 10GbE ports. *Table 1* provides further information on the capabilities offered by each ETX-2i device.

MARKET SEGMENTS AND APPLICATIONS

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

vCPE

ETX-2i leverages Network Functions Virtualization (NFV), allowing carriers to provide a vCPE solution in various models, including Centralized and Decentralized architectures. This solution reduces CAPX and OPEX by eliminating the physical appliance required for hosting virtual functions.

The D-NFV options allow for seamless insertion of i7 and ATOM (Rangeley) based x86 cards 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-2i 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-2i 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.

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

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

DHCP and MLD 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.

ROUTING

ETX-2i models with enabled routing offer 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 Carrier Ethernet and IP services to be offered in a single device providing high-capacity performance monitoring, network function virtualization (NFV), and more.

TDM PSEUDOWIRE

ETX-2i provides pseudowire (PW) services via a smart SFP (MiTOP).
The PWs can be encapsulated using CESoPSN per IETF RFC 5086 or SAToP per IETF RFC 4553.

ETHERNET OVER PDH

ETX-2i 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 smart SFPs provides TDM (E1/T1/E3/T3/OC-3/STM-1) connectivity over PDH or SDH legacy networks.

RESILIENCY

ETX-2i 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-50ms restoration in the event of network outages.

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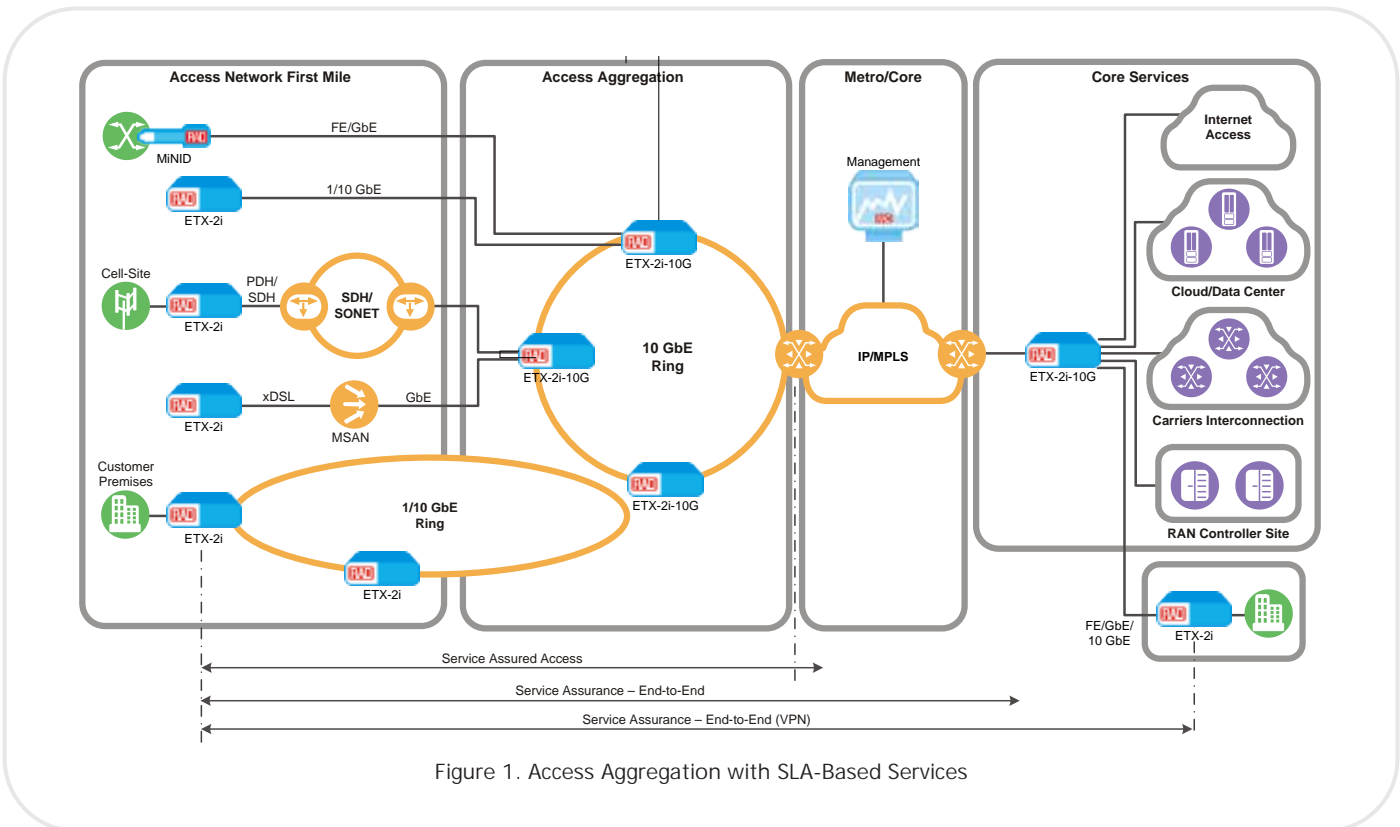

Figure 1. Access Aggregation with SLA-Based Services

TIMING AND SYNCHRONIZATION

ETX-2i incorporates RAD's advanced SyncTop 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 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

ETX-2i can be managed via 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

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.

NETCONF/YANG
The XML-based network configuration protocol NETCONF is supported and provides an easy interface for NFV/SDN orchestrators to install, manipulate, and delete the configuration of ETX-2i.

Out-of-band management backup can be performed using a USB cellular dongle.

MONITORING AND DIAGNOSTICS

Featuring multi-layer OAM and PM tools, ETX-2i 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 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.

The Performance Management Portal is an SLA assurance system that is part of the RADview management system, enabling real-time monitoring of service performance.

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

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

Table 1. Feature Comparison – ETX-2i Product Options

Specifications	ETX-2i Fixed Ports	ETX-2i/M & D-NFV	ETX-2i-B	ETX-2i-B D-NFV	ETX-2i-10G
Interfaces					
10GbE SFP+ interfaces	–	–	–	–	+
FE/GbE SFP interfaces	+	+	+	+	+
10/100/1000 electrical interfaces	+	+	+	+	+
GbE combo interfaces	+	+	+	–	+
Extension slot for network interface module	–	+	–	–	–
Extension slot for D-NFV module	–	+	–	+	–
PDH network interfaces (GFP mapping)	–	4/8 E1/T1, 1/2 T3	–	–	–
SHDSL network interfaces	–	+	–	–	–
VDSL2 network interfaces	–	+	–	–	–
E1/T1/T3/STM-1/OC-3 network interfaces via integrated Smart SFP (MiRIC)	+	+	+	+	+
E1/T1/T3 PWE services via integrated Smart SFP (MiTOP)	+	+	+	+	+
Optional timing interfaces (2 MHz, 2 Mbps, 1PPS, ToD)	+	+	–	–	+
Networking Capabilities					
Ethernet E-Line, E-LAN, E-Tree, and E-Access services	+	+	+	+	+
Layer-2 forwarding	+	+	+	+	+
Embedded router supporting VRFs, static routing, BGPv4, OSPFv2, BFD, and VRRP	+ (8G)	+ (8G)	+ (1G)	+(1G)	–
Flow classification rules	+	+	+	+	+
ACL classification rules	+	+	+	+	+
Available bandwidth measurements for Layer-2 services	+	+	+	+	+
2-rate/3-color policing per EVC.CoS	+	+	+	+	+
Shaping per EVC and EVC.CoS	+	+	+	+	+
MultiCoS EVCs per MEF 10.3 policing	+	+	+	+	+
Strict priority and weighted fair queuing (WFQ) scheduling	+	+	+	+	+
G.8031 linear protection	+	+	+	+	+
G.8032v2 ring protection	+	+	+	+	+
1:1 link protection with 1:1 LAG/LACP	+	+	+	+	+
1:1 link protection with dual homing	+	+	+	+	+
LAG with load balancing	+	+	+	+	+
Jumbo frame support	+	+	+	+	+
Synchronous Ethernet (SyncE) on all interfaces	+	+	–	–	+
SyncE recovery from PDH module to Ethernet ports	+	+	–	–	–
IEEE-1588v2 precision time protocol (PTP) per G.8265.1 and G.8275.1 Telecom profiles	OC, TC, BC	OC, TC, BC	TC	TC	OC, TC, BC

Table 1. Feature Comparison – ETX-2i Product Options (Continued)

Specifications	ETX-2i Fixed Ports	ETX-2i/M & D-NFV	ETX-2i-B	ETX-2i-B D-NFV	ETX-2i-10G
OAM and Diagnostics					
Service utilization and performance monitoring per ITU-T Y.1731.2012, including synthetic loss measurement	+	+	+	+	+
Built-in Y.1564 service activation testers	+	+	+	+	+
Continuity fault management (CFM) per IEEE 802.3ag	+	+	+	+	+
Delay and loss measurements per MEF 36	+	+	+	+	+
TWAMP light generator and responder (SW license)	+	+	+	+	+
Accurate one-way KPI measurements	+	+	+	+	+
LLDP discovery per IEEE 802.1AB	+	+	+	+	+
Link-level OAM per IEEE 802.3-2005	+	+	+	+	+
RMON2 port-level counters	+	+	+	+	+
MSTP and RSTP	+	+	+	+	−
DHCP and MLDv2 snooping	+	+	+	+	−
On-demand Layer-2 and 3 loopbacks	+	+	+	+	+
General and Management					
Zero-touch provisioning (DHCP, PPPoE)	+	+	+	+	+
SNMPv1/v2/v3	+	+	+	+	+
RADIUS and TACACS+ AAA	+	+	+	+	+
Network time protocol (NTP)	+	+	+	+	+
NETCONF	+	+	+	+	+
Cellular interface with external dongle	+	+	+	+	+
Power supply redundancy	+	+	−	−	+
NEBS option	+	+	−	−	+
Temperature-hardened option	+	+	−	−	+
MEF CE2.0	+	+	+	+	+

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-2i, ETX-2i-B)

Router (if ordered) providing:

- Up to 1 Gbps in ETX-2i-B
- Up to 8 Gbps in ETX-2i
- Bidirectional forwarding detection (IP-BFD single hop) for fast path failure detection
- 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 EIR + EBS

Bandwidth policing per MEF 10.3

Scheduling
8 × CoS per EVC scheduling elements
Strict Priority (SP) and Weighted Fair Queue (WFQ)

Shaping
Per port
Per EVC
Per EVC.CoS

FLOWS

Classification
Per port, outer VLAN or outer + inner VLAN, PCP, TOS/DSCP, Ethertype, IP/MAC source/destination address, or 5-tuple ACL

RESILIENCY

Dual Homing
Dual homed link redundancy

Link Aggregation
IEEE 802.1ax (802.3ad) 1:1 LAG with LACP for pairs of network or user Ethernet ports

Ethernet Ring
G.8032v2 rings with sub 50 ms protection for Ethernet traffic

Ethernet Path Protection
G.8031, for linear 1:1 protection

DIAGNOSTICS

Loopback Tests
Non-disruptive loopback per flow, with MAC/IP address swap

Loopbacks at Ethernet port level

Service Activation Tests
RFC-2544: 8 built-in wirespeed testers
ITU-T Y.1564: 8 built-in wirespeed testers

Alarm Relay
(optional)

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

ICMP Echo
Over L2 and L3 services
Tests IP connectivity (PING)

SHDSL INTERFACES

Provided with SHDSL network module for ETX-2i modular and D-NFV ordering options

Type
SHDSL.bis

Number of Ports
2 or 4

Number of Wires
4 or 8

Connectors
Replaceable network module, with one RJ-45 connector for 4-wire ordering option or two RJ-45 connectors for 8-wire ordering option

Line Coding
16 or 32 TC-PAM

Line Rate
192–5696 kbps (see *Table 2*)

Impedance
135 W

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)

Data Rate	4-wire		8-wire	
[kbps]	[km]	[mi]	[km]	[mi]
192	8	4.9	8	4.9
512	6.7	4.1	6.7	4.1
1536	6	3.7	6.5	4
2048	5.7	3.5	6.4	3.9
4096	5.1	3.1	5.7	3.5
4608	5	3	5.5	3.4
5696	4.6	2.8	5.1	.1
11392	2.9	1.8	4.6	2.8
17088	—	—	3.5	2.1
22784	—	—	2.9	1.8

VDSL2 INTERFACES

Provided with VDSL2 network module for ETX-2i modular and D-NFV ordering options

Operates in CPE mode only

Type
VDSL.bis

Temperature
Operates in non-hardened devices of up to 35°C (90°F). Above this temperature, requires hardened device.

Number of Ports
Four VDSL2 ports (two per connector)

Number of Wires
8

Connectors
Replaceable network module, with two RJ-45 connectors (UTP)

Impedance
VDSL2 over POTS: 100 W
VDSL2 over ISDN: 135 W

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 ports per group

Bonding payload rate up to 400 Mbps DL /200 Mbps UL, with packet forwarding throughput 380 Mbps DL/180 Mbps UL

Line Coding
DMT

Payload Rate
100 Mbps DL/50 Mbps UL per line

E1/T1 INTERFACES

(ETX-2i/M & D-NFV: 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 (G732N with CRC)
T1: Framed (ESF)

Impedance
E1: 120W, balanced
    75W, unbalanced (via adapter cable)
T1: 100W, 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

ETHERNET INTERFACES

See *Table 4* for ETX-2i product options.

T3 INTERFACES

Number of Ports
1 or 2

Compliance
G.703, G.823

Data Rate
44.736 Mbps

Line Coding
B3ZS

Framing
C-bit parity

Impedance
75W, unbalanced

Connectors
Replaceable network module, with one or two pairs of BNC connectors:
One T3 port – One pair
Two T3 ports – Two pairs

Table 3. VDSL Ranges

Profile	Bandwidth (MHz)	Number Down-stream Carriers	Carrier Bandwidth (kHz)	Max Aggregate Downstream Transmit Power (dBm)	Max Downstream Throughput (Mbit/s)
8a	8.832	2048	4.3125	+17.5	50
8b	8.832	2048	4.3125	+20.5	50
8c	8.5	1972	4.3125	+11.5	50
8d	8.832	2048	4.3125	3.9	50
12a	12	2783	4.3125	3.5	68
12b	12	2783	4.3125	3.4	68
17a	17.664	4096	4.3125	3.4	100

IP & Carrier Ethernet Demarcation with D-NFV

Table 4. Ethernet Interfaces – ETX-2i Product Options

	Specifications	ETX-2i Fixed Ports	ETX-2i/M & D-NFV	ETX-2i-B	ETX-2i-B D-NFV	ETX-2i-10G
10GbE	Number of Ports	–	–	–	–	2 or 4
	Type	–	–	–	–	SFP+
	Fiber Optic (SFP+ based)	–	–	–	–	1000BaseLx/Sx 10GBase-SR/LR/ER/ZR
	XFP Transceivers	–	–	–	–	See *Note*
GbE	Number of Ports	8	4 (2 additional optional ports with GbE module)	6 or 10	6	8 or 24
	Type	SFP/copper (RJ-45) combo ports	SFP/copper (RJ-45) combo ports	SFP or copper	SFP or copper	SFP or copper
	Fiber Optic (SFP-based)	100BaseFx, 1000BaseLx/Sx,				
	Copper	10/100/1000BaseT				
	Connector	SFP slot or RJ-45	SFP slot or RJ-45	Port 1: SFP slot All other ports: SFP slot or RJ-45	Ports 1 and 2: SFP slot Ports 3 to 6: RJ-45	SFP slot or RJ-45
	SFP Transceivers	*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. *For the list of SFP/XFP transceivers supported by ETX-220A, see the* SFP/XFP Compatibility *document.*

TIMING

Synchronous Ethernet
ITU-T G.8261-G.8264

1588v2
Ordinary clock (OC) (ETX-2i, ETX-2i-10G)

Boundary clock (BC) (ETX-2i, ETX-2i-10G)

Dual master operating simultaneously in
G.8265.1 and G.8275.1 modes
(ETX-2i, ETX-2i-10G)

Transparent clock (TC)

Phase and frequency synchronization

**Station Clock
(ETX-2i, ETX-2i-10G)**
Type: Balanced E1, unbalanced E1
(via adapter cable)
Connector: RJ-45

**PTP Ports
(ETX-2i, ETX-2i-10G)**
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
Interface: V.24/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

NETCONF/YANG management interface

Routing for Management
IP forwarding, dual-stack IPv4 and IPv6
routing, static routing

GENERAL

Compliance
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, 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.8032v2, G.8262, G.8265,
RFC-2544, ITU-T Y.1564

Table 5. Power, Physical, and Environmental Specifications – ETX-2i Product Options

	Specifications	ETX-2i Fixed Ports	ETX-2i/M & D-NFV	ETX-2i-B	ETX-2i-B D-NFV	ETX-2i-10G
Power	Power Supply (19″ enclosure)	AC: 100-240 VAC (±10%), 50/60 Hz DC: 24/48 VDC (20-60 VDC)	AC: 100-240 VAC (±10%), 50/60 Hz DC: 24/48 VDC (20-60 VDC)	–	–	AC: 100-240 VAC (±10%), 50/60 Hz DC: 48 VDC (40-60 VDC)
	Power Supply (8.5″ enclosure)	AC: 100-240 VAC (±10%), 50/60 Hz DC: Dual DC feed of 24/48 VDC (20-60 VDC)	AC: 100-240 VAC (±10%), 50/60 Hz DC: Dual DC feed of 24/48 VDC (20-60 VDC)	Wide-range AC/DC with auto detection AC: 100-240 VAC, (±10%), 50/60 Hz DC: 48 VDC (40-60 VDC)	AC: 100-240 VAC (±10%), 50/60 Hz DC: Dual DC feed of 24/48 VDC (20-60 VDC)	AC: 100-240 VAC (±10%), 50/60 Hz DC: 48 VDC (40-60 VDC)
	Power Consumption	Non-modular product base (8 GbE): 35W max	Modular base: 30W Modular uplink: 5W max VDSL: 10W max D-NFV: 30W	23W	Modular base: 23W D-NFV: 30W	8.5″ enclosure: 90W 19″ enclosure: 120W
Physical	Size (19″ enclosure):					
	Height	43.7 mm (1.7 in)	43.7 mm (1.7 in)	–	–	43.7 mm (1.7 in)
	Width	440 mm (17.4 in)	440 mm (17.4 in)	–	–	440 mm (17.4 in)
	Depth	240 mm (9.5 in)	300 mm (11.8 in)	–	–	240 mm (9.5 in)
	Size (8.5″ enclosure):					
	Height	43.7 mm (1.7 in)	43.7 mm (1.7 in)	1U: 43.7 mm (1.7 in) 2U: 88.2 mm (3.5 in)	43.7 mm (1.7 in)	43.7 mm (1.7 in)
	Width	215.9 mm (8.5 in)	215.9 mm (8.5 in)	220 mm (8.7 in)	215.5 mm (8.5 in)	215.5 mm (8.5 in)
	Depth	300 mm (11.8 in)	300 mm (11.8 in)	170 mm (6.7 in)	280 mm (11 in)	301 mm (11.8 in)
Environment	Storage Temperature	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)
	Operating Temperature	Regular: 0 to 50°C (32 to 122°F) Temperature hardened: -40 to 65°C (-40 to 149°F)	Regular: 0 to 50°C (32 to 122°F) Temperature hardened: -40 to 65°C (-40 to 149°F)	Regular: -5 to 55°C (23 to 131°F) ETX-2i-B with ten ports (2U): -20 to 65°C (-4 to 149°F) **Note:** *In the ETX-2i-B with ten ports, a single SFP-30H is supported at temperature up to 62°C.*	Regular: 0 to 50°C (32 to 122°F)	Regular: 0 to 50°C (32 to 122°F) Temperature hardened: -40 to 65°C (-40 to 149°F)
	Humidity	5% to 90%, non-condensing	5% to 90%, non-condensing	5% to 90%, non-condensing	5% to 90%, non-condensing	5% to 90%, non-condensing

Ordering

RECOMMENDED CONFIGURATIONS

ETX-2i:

ETX-2i/AC/19
AC power supply, 19" enclosure, 8 fixed GbE SFP/copper combo ports

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/HN/AC/19/PTP
AC power supply, 19" enclosure, NEBS compliant, temperature-hardened, 8 fixed GbE SFP/copper combo ports, SyncE and 1588v2 timing

ETX-2i/N/ACHP/19V
AC power supply, 19" enclosure, NEBS compliant, 4 fixed GbE SFP/copper combo ports, modular uplink, D-NFV module slot

ETX-2i/H/AC/M/VDSL8W/POTS
Hardened, AC power supply, modular uplink, four VDSL ports (8-wire) over POTS

ETX-2i/H/AC/M/VDSL8W/ISDN
Hardened, AC power supply, modular uplink, four VDSL ports (8-wire) over ISDN

Note for ETX-2i: Any D-NFV option must be ordered together with a RADcare Package and RADcare Project Assurance Package.

ETX-2i-B:

ETX-2i-B/WR/2SFP/2CMB
Wide-range power supply, 1/2 19" metal enclosure, 2 SFP Ethernet ports, 2 combo ports

ETX-2i-B/WR/2SFP/2CMB/DRC
Wide-range power supply, 1/2 19" metal enclosure, 2 SFP Ethernet ports, 2 combo ports, 2 IN dry contacts

ETX-2i-B/WR/2SFP/4UTP
Wide-range power supply, 1/2 19" metal enclosure, 2 SFP Ethernet ports, 4 Ethernet UTP ports

ETX-2i-B/H/WR/2SFP/8SFP
Wide-range power supply, temperature-hardened, 1/2 19" metal enclosure, 2 SFP network ports, 8 SFP user ports

Note: Although this device option has ten active ports, processing capability is limited to six GbE.

ETX-2i-B/AC/V/2SFP/4UTP
AC power supply, 1/2 19" metal enclosure, 2 SFP Ethernet ports, 4 Ethernet UTP ports, D-NFV module slot

ETX-2i-B/DDC/V/2SFP/4UTP
Dual DC feed power supply, 1/2 19" metal enclosure, 2 SFP Ethernet ports, 4 Ethernet UTP ports, D-NFV module slot

ETX-2i-10G:

ETX-2i-10G/AC/4SFPP/4SFP4UTP
AC power supply, 1/2 19" metal enclosure, 4 SFP+ Ethernet ports, 4 SFP Ethernet ports, 4 Ethernet UTP ports

ETX-2i-10G/H/ACR/4SFPP/12SFP12UTP/PTP
Dual AC power supply, 19" enclosure, temperature-hardened, 4 SFP+ Ethernet ports, 12 SFP Ethernet ports, 12 Ethernet UTP ports, SyncE and 1588v2 timing

ETX-2i-10G/H/DCR/4SFPP/12SFP12UTP/PTP
Dual DC power supply, 19" enclosure, temperature-hardened, 4 SFP+ Ethernet ports, 12 SFP Ethernet ports, 12 Ethernet UTP ports, SyncE and 1588v2 timing

ETX-2i
IP & Carrier Ethernet Demarcation with D-NFV

SUPPLIED ACCESSORIES

AC power cord

RM-34
HW kit for mounting 19" unit in a 19" rack (for ETX-2i only)

OPTIONAL ACCESSORIES

AC/DC adapter

CBL-MUSB-DB9F
Mini-USB cable to connect device to a serial port (ETX-2i, ETX-2i-10G)

CBL-RJ45/D9/F/6FT
Control port cable with male RJ-45 and female DB-9 connector (ETX-2i-B)

RM-33-2
Hardware kit for mounting one or two ETX-2i-B units 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

RM-42
Rack-mount kit for mounting ETX-2i-B 2U unit

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

WM-35-TYPE4
Wall mount HW kit for ETX-2i-B

ETX-2i-PS/?/!

? NEBS
NULL International
N NEBS3
! Power supply
AC Single AC power supply
DCHP High power DC power supply for D-NFV
ACHP High power AC power supply for D-NFV

SFP-GPON-1DH
GPON optical network terminal SFP

Network interface modules for modular options (for ETX-2i):

ETX-M/2ETH
Ethernet uplink module with two combo ports

ETX-M/SH4W
EFM bonded uplink module with two SHDSL ports (4-wire)

ETX-M/SH8W
EFM bonded uplink module with four SHDSL ports (8-wire)

ETX-M/VDSL8W/POTS
EFM bonded uplink module with four VDSL ports (8-wire) over POTS

ETX-M/VDSL8W/ISDN
EFM bonded uplink module with four VDSL ports (8-wire) over ISDN

ETX-M/4E1T1
Ethernet uplink module with 4 E1/T1 ports

ETX-M/8E1T1
Ethernet uplink module with 8 E1/T1 ports

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

ETX-M/1T3
Ethernet uplink module with 1 T3 port

ETX-M/2T3
Ethernet uplink module with 2 T3 ports

D-NFV modules for D-NFV ordering options (for ETX-2i):

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

ETX-DNFV-M/i7/128S/16R
D-NFV module based on Quad Core i7 and 128 GB SSD, 16 GB RAM

D-NFV modules for D-NFV ordering options (for ETX-2i-B)

ETX-DNFV-M/R4C/128S/8R
D-NFV module based on Intel® Atom Rangeley C2558 and 128 GB SSD, 8 GB RAM

ETX-DNFV-M/R8C/128S/8R
D-NFV module based on Intel® Atom Rangeley C2758 and 128 GB SSD, 8 GB RAM

SOFTWARE LICENSES FOR ETX-2

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

International Headquarters
24 Raoul Wallenberg Street
Tel Aviv 69719, Israel
Tel. 972-3-6458181
Fax 972-3-6498250, 6474436
E-mail market@rad.com

North American Headquarters
900 Corporate Drive
Mahwah, NJ 07430, USA
Tel. 201-5291100
Toll free 1-800-4447234
Fax 201-5295777
E-mail market@radusa.com

www.rad.com Order this publication by Catalog No. 805055

RAD
Your Network's Edge®