

MiNID

Miniature Programmable Network Interface Device



- Field programmable Network Interface Device (NID) for service providers, wholesalers, and mobile operators
- Part of RAD's Distributed Network Functions Virtualization (D-NFV) portfolio
- Patent-protected design for seamless integration and enhancement of any existing network device
- Service demarcation, SLA assurance and diagnostic tools at Layer 2, 3, and 4
- Low OpEx due to decreased power consumption, space and installation costs

RAD's patent-protected MiNID® is a field-programmable miniature L2/L3 network interface device (NID), available in an SFP form factor, SFP sleeve form factor, or in a standalone enclosure. As part of RAD's Distributed Network Functions Virtualization (D-NFV) offering, MiNID enriches the Service Assured Access portfolio with software-defined network functionalities, including for enhanced demarcation, remote monitoring, and fault isolation. MiNID programmability is based on a powerful FPGA that enables field updates to the product software and application.

The SFP sleeve is a revolutionary platform for service providers seeking to upgrade their networks to deliver reliable bandwidth with end-to-end SLA assurance. MiNID's innovative patent-based design breaks through the barriers of cost and complexity to make Carrier Ethernet available to everyone, everywhere.

MiNID provides instant Carrier Ethernet functionality for switches, routers, DSLAMs, and mobile base stations. It offers comprehensive tools for service activation, performance monitoring, and fault diagnostics, providing ongoing SLA reports while reducing costs associated with fault isolation.

MiNID can be ordered in SFP form factor with integrated optics, SFP-sleeve form factor, or as a standalone unit, all offering similar functionality.

The SFP sleeve patent-protected design is easily pluggable into standard SFP ports, eliminating the use of external power, and reducing space, and cabling expenses.

MiNID transparently envelops a large variety of SFPs, enabling full reuse of customer equipment and seamless deployment over multiple access infrastructure types, such as short-haul and long-haul fiber connections, bidirectional single-fiber links, and copper lines.

MiNID is also available as an SFP with integrated optical module.

In its standalone version, MiNID offers a compact, low power, low-cost two-port solution. When equipped with combo interfaces, it allows seamless installation in any field scenario; when equipped with copper interfaces, it also offers bypass relays that bypass the device in the event of critical failure.

MiNID is a true plug-and-play solution. Its zero-touch provisioning capabilities enable easy installation by anyone.

MiNID preserves existing investments, enhancing legacy networks with Carrier Ethernet capabilities without requiring existing equipment to be discarded and replaced.

MARKET SEGMENTS AND APPLICATIONS

As an important part of the toolkit offered by RAD's Service Assured Access portfolio, MiNID is the perfect solution for service assurance in residential and mobile backhauling networks, small cells, business services, and wholesale services.

As a service demarcation device, MiNID ensures proper service handling throughout the service provider's network by policing customer traffic, attaching service VLANs, and adding priority marking to multiple services at the customer premises.

Simultaneously, MiNID offers multi-layer performance monitoring tools for every service. At Layer-2, it offers OAM and PM tools that actively measure key performance indicators including delay, jitter, and packet loss rate. At Layer-3, its integrated TWAMP Light controller/responder and UDP echo responder allow seamless monitoring across any packet network and in multi-vendor environments.

MiNID also participates in service activation tests and offers wire-speed L2, L3, and L4 loopbacks for diagnostic purposes.

For the mobile backhauling, MiNID can offer Sync-E support including transparent ESSM message forwarding.

ETHERNET

MiNID can be ordered as an FE or FE/GbE device. The GbE option supports auto-negotiation and can support both rates.



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Service Demarcation

For service demarcation, MiNID provides the following:

- Port-based and flow-based classification of multiple services
- Flow classification per VLAN, 2 VLANs, VLAN range, P-bits, DSCP, EtherType or source/destination MAC address
- Per flow, MEF 10.3 policing
- VLAN or 2 VLAN addition, VLAN replacement per flow with priority marking per P-bits and DSCP
- Layer-2 control protocol tunneling with optional MAC change (L2PT)

MONITORING AND DIAGNOSTICS

OAM

MiNID provides the following OAM tools per EVC.COS or untagged traffic:

- IEEE-802.1ag (CFM) for continuity check, loopback, and link trace
- ITU-T Y.1731 for loss (synthetic and real traffic), delay, and delay variation measurements, as well as fault propagation (AIS/RDI)
- MEF 36-based MIBS for PM reports
- IEEE 802.3-2005 link OAM and dying gasp trap

- RFC-5357 TWAMP Light controller and responder with multiple session reflectors offering hardware-based time stamping.

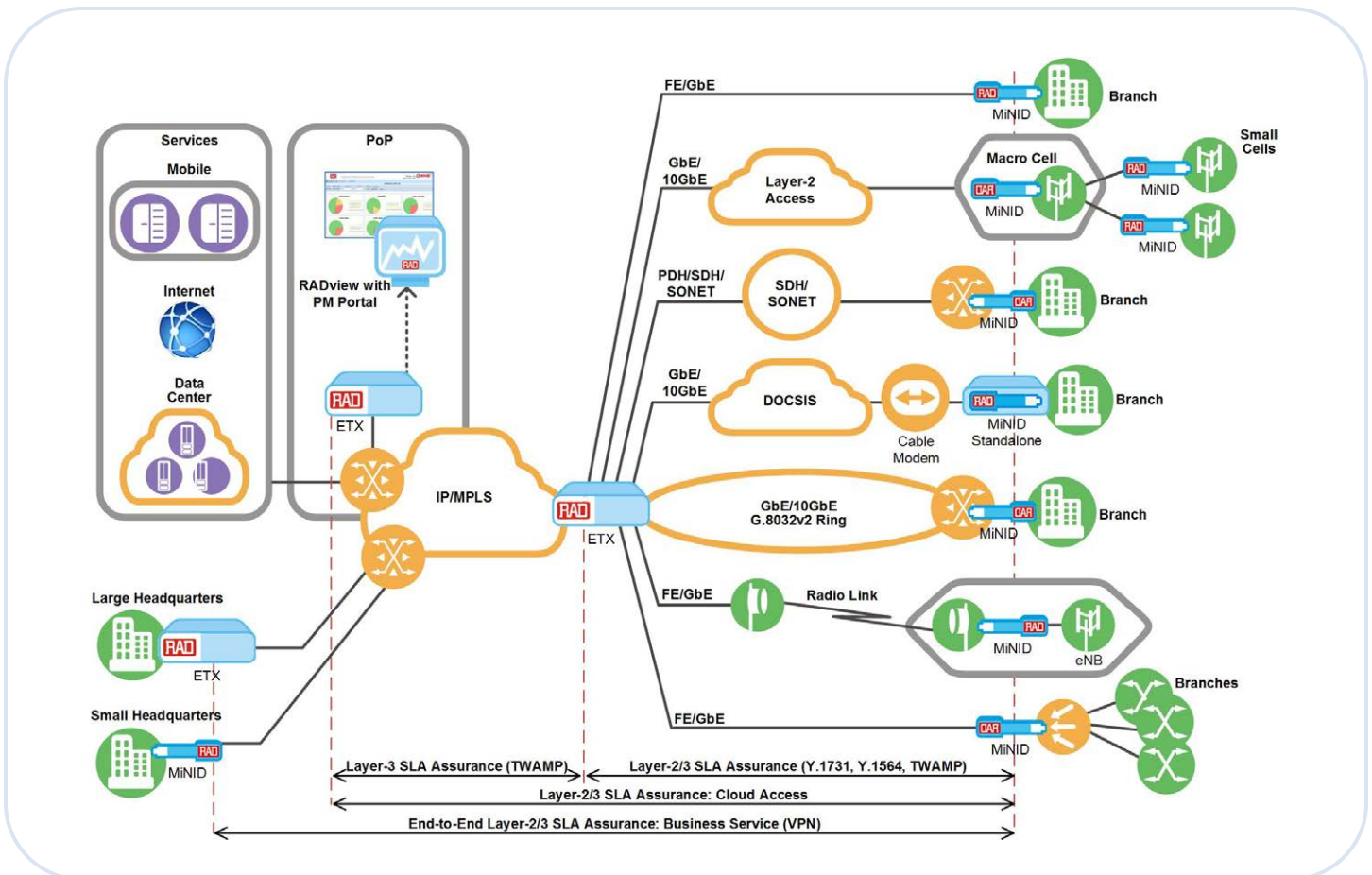
Loopback Tests

MiNID can perform on-demand intrusive and non-intrusive Layer-2/3/4 loopbacks at wire speed, with optional MAC, IP and UDP port swap per flow. MiNID also offers UDP echo responder functionality.

Service Activation Tests

MiNID responds to RFC-2544 and Y.1564 service activation tests at wire speed. It can also initiate Layer-3 SAT with its own generator.

Within the Platinum package, MiNID enables smart packet capturing remotely. It can transport classified traffic to any standard Wireshark station for further analysis. For best efficiency, MiNID can send truncated packets.



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Digital Diagnostic Monitoring

Digital Diagnostics Monitoring (DDM) information read from an SFP plugged into a MiNID is stored on the MiNID. This information can be forwarded to the host and retrieved directly from the device via a remote management system.

Microburst Monitoring

Within the Platinum package, MiNID offers the ability to monitor network traffic, on a per-flow or multiple-flows basis, and detect unexpected bursts of data in very short time intervals measured in microseconds. It provides clear indication of traffic and bursts passed, dropped, or exceeding thresholds based on CIR/CBS and EIR/EBS. In addition, it helps facilitate bandwidth on demand.

Auto Responder

MiNID can automatically detect and respond to L2, L3, L4 loopbacks and OAM traffic with minimal installation effort and no configuration. The auto-responder mode is transparent to user traffic and provides a smooth introduction of service visibility into the network.

MANAGEMENT AND SECURITY

Management Options

MiNID can be managed via the following interfaces:

- Web-based and menu-driven interface in English and Chinese
- Command Line Interface (CLI) via secured Telnet (SSH)
- SNMPv2
- Inband management (VLAN-based)
- Out-of-band management and software configuration from any Ethernet port in the host device

MiNID supports secure management using TACACS+ (client authentication, authorization, and accounting).

MiNID is equipped with two MAC addresses; one for management and one for services. This enables the device to work and be managed in a Layer-2 untagged environment, as well as VLAN and double VLAN-tagged.

MiNID acquires Time of Day through NTP.

Access Control List (ACL)

The ACL enables permission/denial of management access to specified IP addresses for increased security.

Application software can be downloaded to MiNID via the following:

- SFTP or TFTP for remote software download
- SFP-CA.2 unit, using YMODEM protocol for the SFP sleeve option
- Serial interface for the standalone option

Zero Touch Provisioning

Host IP address and configuration files can be automatically obtained using standard DHCP client functionality.

Loaned IP

MiNID can be managed without a dedicated IP address, by loaning the IP address of the hosting device.

Network Management with RADview

RADview manages MiNID, and the RADview PM portal provides SLA reports based on PM counters and utilization measurements.

Specifications

ETHERNET INTERFACES

SFP sleeve: SFP-based, MSA-compliant edge connectors

MiNID SFP: GE/FE SFP interface

Standalone: Two SFPs/Copper/Combo ports

Type

SFP sleeve: 100BASE-FX/1000BASE-FX

Standalone: 100/1000BASE-T, 100BASE-FX, or 1000BASE-FX

SFP Transceivers

Electrical: 100BASE-T/1000BASE-T

Optical: Dual/single, multi-mode/single mode fiber:

FE: 100BASE-FX/LX/BX

GbE: 1000BASE-SX/LX/ZX/BX and CWDM

Compliance

IEEE 802.3, MEF CE 2.0

Max. Frame Size

12,000 bytes

DIAGNOSTICS

Syslog

Loopback Tests

Intrusive and non-intrusive L2/L3/L4 loopbacks, with optional MAC, IP, and UDP port swap per flow

Service Activation Tests

RFC-2544 responder

ITU-T Y.1564 responder

L3 SAT generator

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GENERAL

Power Consumption

SFP sleeve:

1.2W without SFP

1.65W (including standard 10km SFP)

Standalone: max 3.75W

Note: See the table below for available optic interfaces for the SFP form factor.

Physical

- SFP sleeve:
 - Height: 12.7 mm (0.50 in)
 - Width: 14.3 mm (0.56 in)
 - Depth: 81.1 mm (3.19 in)
 - Weight: 30.0 g (1.0 oz)
- MiNID SFP:
 - Height: 12.7 mm (0.50 in)
 - Width: 14.3 mm (0.56 in)
 - Depth: 75.1 mm (2.96 in)
 - Weight: 40.0 g (1.4 oz)
- Standalone:
 - Height: 30 mm (1.18 in)
 - Width: 113 mm (4.45 in)
 - Depth: 113 mm (4.45 in)
 - Weight: 0.3 kg (0.66 lb)

Environment

- SFP sleeve, MiNID SFP:
 - Case temperature: -40 to 85°C (-40 to 185°F)
 - Storage Temperature: -40 to 85°C (-40 to 185°F)
 - Humidity: Up to 90%, non-condensing
- Standalone:
 - Ambient temperature: 0 to 50°C (32 to 122°F) for regular option
 - 40 to 65°C (-40 to 149°F) for hardened option
 - Storage Temperature: -40 to 85°C (-40 to 185°F)
 - Humidity: Up to 90%, non-condensing

Note: Reaching the operating temperature of -20/-40 to 65°C (-4/-40 to 149°F) requires the use of industrial SFPs.

Table 1. Optic Interfaces

Media	Wave Length, Fiber Type	Rate	Typical Max Range	
			[km]	[miles]
Fiber	1310, 9/125 single mode	GbE	10	6.2
Fiber	1310, 9/125 single mode	GbE	40	24.8
Fiber	1550, 9/125 single mode	GbE	80	49.7
Fiber	850, 50/125 multimode	GbE	0.55	0.3
Single Fiber	Tx -1310/Rx -1490, 9/125 single mode (single fiber)	GbE	10	6.2

Ordering

RECOMMENDED CONFIGURATIONS

Hardware:

MiNID/SLV/GE

SFP sleeve enclosure, 1 Gbps per port

MiNID/SFP/5DH/GE

SFP enclosure, 850 nm, 300m (984ft) 62.5/125 multimode, 550m (1804ft) 50/125 multimode, 1 Gbps per port

MiNID/SFP/6DH/GE

SFP enclosure, 1310 nm, 10km (6.2mi) 62.5/125 single mode, 1 Gbps per port

MiNID/STU/GE/ACEX/CMB

Standalone enclosure, 1 Gbps per port, external 100-240 VAC power supply, 2 combo Ethernet ports

MiNID/STU/GE/ACEX/BPS/UTP

Standalone enclosure, 1 Gbps per port, external 100-240 VAC power supply, bypass relay, 2 RJ-45 Ethernet ports

MiNID/STU/GE/ACEX/CMB/SYE

Standalone enclosure, 1 Gbps per port, external 100-240 VAC power supply, 2 combo Ethernet ports, Sync-E

MiNID/STU/GE/ACEX/BPS/CMB

Standalone enclosure, 1 Gbps per port, external 100-240 VAC power supply, bypass relay, 2 combo Ethernet ports

MiNID/STU/GE/H/ACEX/BPS/UTP

Standalone enclosure, 1 Gbps per port, temperature-hardened, external 100-240 VAC power supply, bypass relay, 2 RJ-45 Ethernet ports

MiNID/STU/GE/H/ACEX/CMB

Standalone enclosure, 1 Gbps per port, temperature-hardened, external 100-240 VAC power supply, 2 combo Ethernet ports

MiNID/STU/GE/DCEX/CMB

Standalone enclosure, 1 Gbps per port, external 48 VDC power supply, 2 combo Ethernet ports

MiNID/STU/GE/DCEX/BPS/UTP

Standalone enclosure, 1 Gbps per port, external 48 VDC power supply, bypass relay, 2 RJ-45 Ethernet ports

Note: All options are available with Fast Ethernet.

Software:

MiNID-SW/DEMARC

Service demarcation application software

MiNID-SW/PLATINUM

Platinum application software, includes demarcation application software and additional features

Note: Order a hardware and a software option.

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for configuration options.

SUPPLIED ACCESSORIES

P/S-AC/5/2000/UNIVERSAL-W/LOCK

External AC power supply for MiNID standalone AC ordering options

P/S-DC/48/5

External DC power supply for MiNID standalone DC ordering options

OPTIONAL ACCESSORIES

SFP-CA.2

Adapter to connect MiNID to a PC

CBL-MUSB-DB9F

Mini-USB cable to connect MiNID standalone to a serial port

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