

ETS-1-10G-E

Ethernet Access Switch

- L3 switch
- Bandwidth up to 176 Gbps
- Non-blocking architecture
- Up to 4 x 10G and 48 x 1G Ports
- Multicast support (IGMP Snooping, MVR)
- Advanced security (with multi-layer ACL, IP Source Guard, and Dynamic ARP Inspection)
- Stacking up to 8 devices

MARKET SEGMENTS AND APPLICATIONS

New generation access switch provides end user connectivity to large-scale corporate networks, small and medium business networks, and service provider networks, using 1G/10G interfaces.

The switch supports physical stacking, VLANs, multicast groups, and advanced security.

Specifications

CAPACITY

Switching Capacity	See Table 2. Performance
Throughput	See Table 2. Performance
Max. Frame Size	Jumbo Frame: 10K bytes
MAC Address Table	16384
RAM (DDR4)	2 GB
ROM (RAW NAND)	512 MB
VLAN Table	4094
L2 Multicast Groups	2048
VRRP Routers	255
VRF Number	16 (including default VRF)
L3 Interfaces	2032
Maximum Size of ECMP Groups	8
Buffer Memory	See Table 2. Performance
Stacking	Up to 8 devices

ETHERNET INTERFACES

Ports	See Table 1. Interfaces
Power over Ethernet (PoE)	PoE (15.4W per port): 802.3af PoE+ (30W per port): 802.3at
Features	Head-of-line blocking (HOL) protection Auto MDI/MDIX Flow control (IEEE 802.3X) Port mirroring (SPAN, RSPAN) Stacking Jumbo Frames Back pressure

IP ADDRESSING AND ROUTING

Addressing	IPv4 and IPv6
	IP Unnumbered
Routing Protocols	Dynamic Routing Protocols
	RIPv2
	OSPFv2, OSPFv3
	BGP (IPv4 Unicast, IPv4 Multicast): Requires license, see Ordering
	BFD Protocol (for BGP)
	VRRP
	PIM SM, PIM DM, IGMP Proxy
	ECMP Load Balancing
	IS-IS (IPv4 Unicast)
	MSDP with VRF-lite
Proxy ARP	
Routing Technologies	IP Routes
	Policy-Based Routing (IPv4)
DNS	Server and Client

RESILIENCY

L2 Protection	ERPS (G.8032v2)
	STP (Spanning Tree Protocol, IEEE 802.1d)
	STP Multiprocess
	RSTP (Rapid Spanning Tree protocol, IEEE 802.1w)
	MSTP (Multiple Spanning Tree, IEEE802.1s)
	STP Root Guard
	STP Loop Guard
	STP BPDU Guard
	PVSTP+
	RVSTP+
	BPDU Filtering
	Spanning Tree Fast Link option
	Layer 2 Protocol Tunneling
	Loopback Detection
	Flex-Link
Private VLAN	
Link Aggregation	LAG Group Creation
	Dynamic LAG (LACP)
	MLAG (Multi-Switch Link Aggregation Group)
	L2PT (Layer 2 Protocol Tunneling)
	LAG Balancing Algorithm

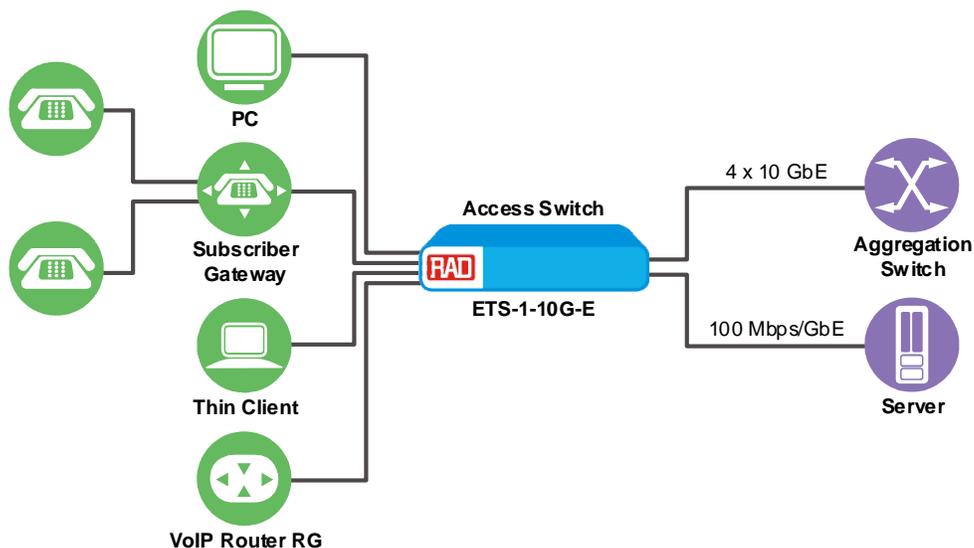


Figure 1. ETS-1-10G-E Ethernet Access Switch Use Case

LAYER 2

VLAN	802.1Q
	Q-in-Q
	Selective Q-in-Q (VLAN Translation)
	Voice VLAN
	GVRP
	Guest VLAN
MAC Table	Independent learning mode per VLAN
	MAC Multicast Support
	Configurable aging time of MAC addresses
	Static MAC entries
	MAC flapping
L2 Multicast	Multicast profiles
	Static Multicast groups
IGMP	IGMP Snooping v1,2,3
	Port/host-based IGMP Snooping Fast Leave
	IGMP querier
	IGMP proxy-report
	IGMP authorization via RADIUS
MVR	
MLD	MLD Snooping v1,2
DHCP	DHCP snooping
	DHCP clients filtering
	DHCP autoprovision
	DHCP Option 12
	DHCP relay (Option 82)

BPDU	BPDU attack prevention
	STP BPDU Guard
	BPDU Filtering

QUALITY OF SERVICE (QOS) AND RATE LIMITING

Class of Service	IEEE 802.1p Class of Service (CoS)
Bandwidth Control	Bandwidth management
	Shaping
	Policing
	Storm Control for different traffic (broadcast, multicast, unknown unicast)
	Scheduling algorithms: Strict
	Priority/Weighted Round Robin (WRR)
	Three marking colors
	ACL-based VLAN mark assignment
	IEEE 802.1p priority for management VLAN
	802.1p, DSCP mark assignment for IGMP
	ACL-based CoS/DSCP mark assignment
	DSCP to CoS/CoS to DSCP remarking
	QoS statistics

Table 1. Interfaces

Specification	ETS-1-10G-E/4SP /24U	ETS-1-10G-E/4SP /4CMB/20S	ETS-1-10G-E/4SP /24P	ETS-1-10G-E/4SP /48P	ETS-1-10G-E/4SP /48U/12V/AC
10/100/1000BASE-T (RJ-45)	24	-	-	-	48
10/100/1000BASE-T (RJ-45) PoE/PoE+	-	-	24	48	-
1000BASE-X/100BASE-FX (SFP)	-	20	-	-	-
10/100/1000BASE-T/1000BASE-X/100BASE-FX Combo	-	4	-	-	-
10GBASE-R (SFP+)/1000BASE-X (SFP)	4	4	4	4	4

Table 2. Performance

Specification	ETS-1-10G-E/4SP /24U	ETS-1-10G-E/4SP /4CMB/20S	ETS-1-10G-E/4SP /24P	ETS-1-10G-E/4SP /48P	ETS-1-10G-E/4SP /48U/12V/AC
Bandwidth (Gbps)	128	128	128	176	176
Throughput for 64 bytes (MPPS)	94.49	95.2	94.49	130.95	130.95
Buffer memory (MB)	1.5	1.5	1.5	3	3
L3 IPv4 Unicast routes ¹	4066	4066	4063	4063	4063
L3 IPv6 Unicast routes ¹	1015	1015	1014	1014	1014
L3 IPv4 Multicast (IGMP Proxy, PIM) routes ¹	2029	2029	1981	1981	1981
L3 IPv6 Multicast (IGMP Proxy, PIM) routes ¹	505	505	505	505	505
ARP Table ²	2039	2039	1981	1981	1981
IPv4/IPv6 ACL rules	1975/988	1975/988	1974/897	1974/897	1974/897
SQinQ rules ingress/egress	988/988	988/988	1320/1320 ³	1320/1320 ³	1320/1320 ³
MAC ACL rules	1966	1966	1974	1974	1974

¹ IPv4/IPv6 Unicast/Multicast routes share hardware resources.

² For each host in the ARP table, an additional entry is created in the switching table.

³ There are 1974 rules in total, shared between ingress and egress rules in varying proportions, but no more than 1320 for each direction.

ETS-1-10G-E

Ethernet Access Switch

SECURITY

ACL	L2-L3-L4 ACL	
	IPv6 ACL	
	ARP ACL over GRE tunnel	
	ACL based on:	
	<ul style="list-style-type: none"> VLAN ID EtherType DSCP Protocol type Switch port 802.1p priority TCP/UDP port number User defined bytes Time-based 	
	TACACS+	TACACS+
	RADIUS	RADIUS clients
	Syslog	Nothing to say?
	Passwords	Password encryption
		Password recovery
Security Functions	IP Source Guard	
	Dynamic ARP Inspection	
	Traffic segmentation	
	Debugging commands	
	Management interface blocking	
	MAC-based authentication, Port Security, Static MAC entries	
	Protection against non-authorized DHCP servers (DHCP Snooping)	
	sFlow	
SSL/SSH	SSH, Telnet server	
	SSH, Telnet client	
	SSL	
IEEE 802.1X	Port-based authentication IEEE 802.1x	

MANAGEMENT

Configuration	Web-Based Interface
	Command Line Interface (CLI) with password-protected access
Console Port	RS-232 interface, RJ-45 connector
Protocols	SNTP (Simple Network Time Protocol)
	SNMP (Simple Network Management Protocol)
	LLDP (802.1ab) + LLDP MED
	Upload/download of configuration file and firmware via TFTP/SCP
	Traceroute
Access	Switch Access Control — Privilege levels for users
	Local Authentication
	IP address filtering for SNMP
	Rate limit of traffic to CPU
	CLI command logging
	Macro commands
	System log
IPv6	IPv6 Host
	Dual-Stack IPv4, IPv6

MONITORING AND DIAGNOSTICS

Diagnostics	Ping (IPv4/IPv6 support)
	Virtual Cable Testing (VCT)
	Optical transceiver diagnostics
Monitoring	Statistics on interfaces
	CPU utilization monitoring per task and per queue
	RAM utilization monitoring
	Temperature monitoring
	TCAM monitoring
	RMON/SMON
	IP SLA
	Green Ethernet
OAM	802.3ah Ethernet Link OAM
	802.3ah Unidirectional Link Detection (UDLD)

Table 3. Power Specifications

ETS-1-10G-E Ordering Version	Power supply	Maximum power consumption (W)	Heat dissipation (W)	PoE budget (W)	Dying gasp support
ETS-1-10G-E /4SP/24U	100 – 240 VAC, 50/60 Hz or 36 – 72 VDC	20	20	—	Yes
ETS-1-10G-E /4SP/4CMB/20S/DC	36 VDC – 72 VDC	35	35	—	No
ETS-1-10G-E /4SP/4CMB/20S/12V/AC	100 – 240 VAC, 50/60 Hz or 12 VDC	55	43	—	Yes
ETS-1-10G-E /4SP/24P/AC	200–240 VAC, 50–60 Hz	445	65	380	No
ETS-1-10G-E /4SP/24P/DC	36-72V DC	480	100	380	No
ETS-1-10G-E /4SP/48U/12V/AC	100 – 240 VAC, 50/60 Hz or 12 VDC	55	43	—	Yes
ETS-1-10G-E/4SP/48P (Hot swappable power supply)	Up to 2 hot swappable power supplies, see Ordering (ordered separately)	1600w (including PoE)	150	1450	No

Table 4. Dimensions and Environmental Specifications

ETS-1-10G-E Ordering Version	Operating Temperature	Storage Temperature	Operating Humidity	Cooling	Form Factor	Dimensions W x D x H mm (in)	Weight (kg)
ETS-1-10G-E /4SP/24U	-20 to 50°C -4 to 122°F			Passive		430 x 204 x 44 (17 x 8 x 1.7)	2.94
ETS-1-10G-E /4SP/4CMB/20S/DC	-20 to 65°C -4 to 149°F			4 fans		430 x 305 x 44 (17 x 12 x 1.7)	4.03
ETS-1-10G-E /4SP/4CMB/20S/12V/AC	-20 to 65°C -4 to 149°F			4 fans		430 x 305 x 44 (17 x 12 x 1.7)	4.08
ETS-1-10G-E /4SP/24P/AC	-20 to 50°C -4 to 122°F	-50 to 70°C (-58 to 158°F)	Up to 80% non-condensing	2 fans	19", 1U	440 x 203 x 44 (17 x 7.9 x 1.7)	3.2
ETS-1-10G-E /4SP/24P/DC	-20 to 50°C -4 to 122°F			2 fans		440 x 203 x 44 (17 x 7.9 x 1.7)	3.2
ETS-1-10G-E /4SP/48U/12V/AC	-20 to 50°C -4 to 122°F			2 fans		440 x 280 x 44 (17 x 11 x 1.7)	4.1
ETS-1-10G-E/4SP/48P (Hot swappable power supply)	-10 to 50°C 14 to 122°F			4 fans		440 x 490 x 44 (17.3 x 19.3 x 1.7)	9.98

ETS-1-10G-E

Ethernet Access Switch

Ordering

ETS-1-10G-E/4SP/24U/AC

L3 Ethernet switch,
24 ports of 10/100/1000BASE-T,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP),
100-240 VAC

ETS-1-10G-E/4SP/24U/DC

L3 Ethernet switch,
24 ports of 10/100/1000BASE-T,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP),
36– 72 VDC

ETS-1-10G-E/4SP/4CMB/20S/DC

L3 Ethernet switch,
20 ports of 1000BASE-X/1000BASE-FX (SFP),
4 ports of 10/100/1000BASE-T/1000BASE-X/100BASE-FX Combo,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP),
36– 72 VDC

ETS-1-10G-E/4SP/4CMB/20S/12V/AC

L3 Ethernet switch,
20 ports of 1000BASE-X/100BASE-FX (SFP),
4 ports of 10/100/1000BASE-T/1000BASE-X/100BASE-FX Combo,
4 ports of 10GBASE-R (SFP+)/1000BASE-X (SFP),
100 – 240 VAC or 12 VDC

ETS-1-10G-E/4SP/24P/AC

L3 Ethernet switch,
24 ports of 10/100/1000BASE-T with PoE/PoE+,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP),
200 – 240 VAC

ETS-1-10G-E/4SP/24P/DC

L3 Ethernet switch,
24 ports of 10/100/1000BASE-T with PoE/PoE+,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP),
36 – 72 VDC

ETS-1-10G-E/4SP/48U/12V/AC

L3 Ethernet switch,
48 ports of 10/100/1000BASE-T (RJ-45),
4 ports of 10GBASE-R (SFP+)/1000BASE-X (SFP),
single 100 – 240 VAC or 12 VDC

International Headquarters

24 Raoul Wallenberg St., Tel Aviv 6971923, Israel
Tel/Fax 972-52-4748272 | Fax 972-3-6498250
Email market@rad.com

Switch with Dual Power Supply Slots

(Power supplies are ordered separately)

ETS-1-10G-E/4SP/48P

L3 Ethernet switch,
48 ports of 10/100/1000BASE-T with PoE/PoE+,
4 ports of 10GBASE-X (SFP+)/1000BASE-X (SFP), dual PS slots (PSs not included)

Hot Swappable Power Supplies

Separately ordered per needed quantity (1 or 2) and type (DC or AC) for the device with dual slots for removable power supplies

ETS-1-10G-PS/AC/950W

Power Supply Module for ETS-1-10G-E/4SP/48P,
90-264 VAC, 950W

ETS-1-10G-PS/DC48/950W

DC Power Supply Module for ETS-1-10G-E/4SP/48P,
36-72 VDC, 950W

OPTIONAL ACCESSORIES

ETS-1-BGP-LIC

License for using BGP protocol

CBL-SGW-RJ45-D9-F-6FT

RJ-45 to DB-9 console cable

Transceivers

For the list of available transceivers, see the [Pluggable Transceivers data sheet](#) at www.rad.com

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

North American Headquarters

900 Corporate Drive, Mahwah, NJ 07430, USA
Tel 201-529-1100 | Toll Free: 800-444-7234 | Fax: 201-529-5777
Email market@radusa.com



Your Network's Edge®

www.rad.com

751-101-02/26 (1.0) Specifications are subject to change without prior notice. © RAD Data Communications Ltd. RAD products/technologies are protected by registered patents. To review specifically which product is covered by which patent, please see ipr.rad.com. The RAD name, logo, logotype, and the product names MiNID, Optimux, Airmux, IPmux, and MiCLK are registered trademarks of RAD Data Communications Ltd. All other trademarks are the property of their respective holders.