

# ETS-1-10G-A

## Ethernet Aggregation Switches



- Bandwidth up to 640 GBPS
- Non-blocking architecture
- Up to 32x10G ports
- L3 switches
- Front-to-Back cooling
- Stacking up to eight devices
- Hot-swappable redundant power supplies

### MARKET SEGMENTS AND APPLICATIONS

ETS-1-10G-A switches are high performance devices with 10GBASE-R/1000BASE-X that can be used as aggregation switches in carrier networks and small data centers.

The devices support operating bandwidths of 1 Gbps (SFP) and 10 Gbps (SFP+), which enable flexible use and smooth transition to higher data rates. The non-blocking architecture guarantees lossless packet forwarding at high loads with minimum and predictable delays for all types of traffic.

The front-to-back cooling provides effective cooldown in modern data centers.

The redundant and hot-swappable fans and AC/DC power supplies with advanced hardware monitoring functions provide high reliability and uninterrupted services.

## Specifications

### CAPACITY

Switching Capacity	See Table 1
Throughput on 64-byte packets	1050 MPPS
Buffer Memory	12 MB
MAC Address Table	See Table 1
RAM (DDR3)	1 GB
ROM (NAND Flash)	1 GB
VLAN Table Size	4k
ARP Table Size	See Table 1
Jumbo Frames	10240 bytes
Link Aggregation Groups (LAG)	32 groups, up to 8 ports in one LAG

QoS	8 queues per port
Stacking	Up to 8 devices

### ETHERNET INTERFACES

Ports	See Table 1
Features	Head-of-line blocking (HOL) protection
	Auto MDI/MDIX
	Flow control (IEEE 802.3X)
	Jumbo frames
	Stacking
	Back pressure
	Port mirroring

### MANAGEMENT

Access Options	Web-based interface
	Command Line Interface (CLI)
Control Port	RS-232 interface, RJ-45 connector
Protocols	SNTP (Simple Network Time Protocol)
	Traceroute
Access Control	Access control – privilege levels
	Local authentication
	IP addresses filtering for SNMP
	Flash File System
	Limiting of traffic to CPU
	Password encryption
	Password recovery
	Telnet server
	SSH server
	SSL
	CLI command logging
	System log
	Macro commands
IPv6	IPv6 host
	IPv6/IPv4 compatibility



# ETS-1-10G-A

## Ethernet Aggregation Switches

## Data Sheet

### SECURITY

ACL	L2-L3-L4 ACL
	Time-based ACL
	IPv6 ACL
	Management ACL
	ACL based on:
	<ul style="list-style-type: none"><li>Physical port number</li><li>IEEE 802.1p</li><li>VLAN ID</li><li>EtherType</li><li>DSCP</li><li>Protocol type</li><li>TCP/UDP port number</li></ul>
TACACS+	TACACS+ clients
RADIUS	RADIUS clients
Security Features	IP source guard
	sFlow
	MAC address limitation
	Guest VLAN
	NetBIOS/NetBEUI filtering
	Dynamic ARP inspection
	Traffic segmentation
	Debugging commands
	MAC-based authentication
	Static MAC entries
	DoS attacks prevention
IEEE 802.1X	IEEE 802.1x port-based interface authentication

### QUALITY OF SERVICE (QOS) AND RATE LIMITING

Class of Service	IEEE 802.1p Class of Service (CoS)
Bandwidth Control	Shaping
	Policing
	Scheduling algorithms: Strict Priority/Weighted Round Robin (WRR)
	ACL-based traffic classification
	QoS statistics
	Broadcast Storm Control
	Three marking colors

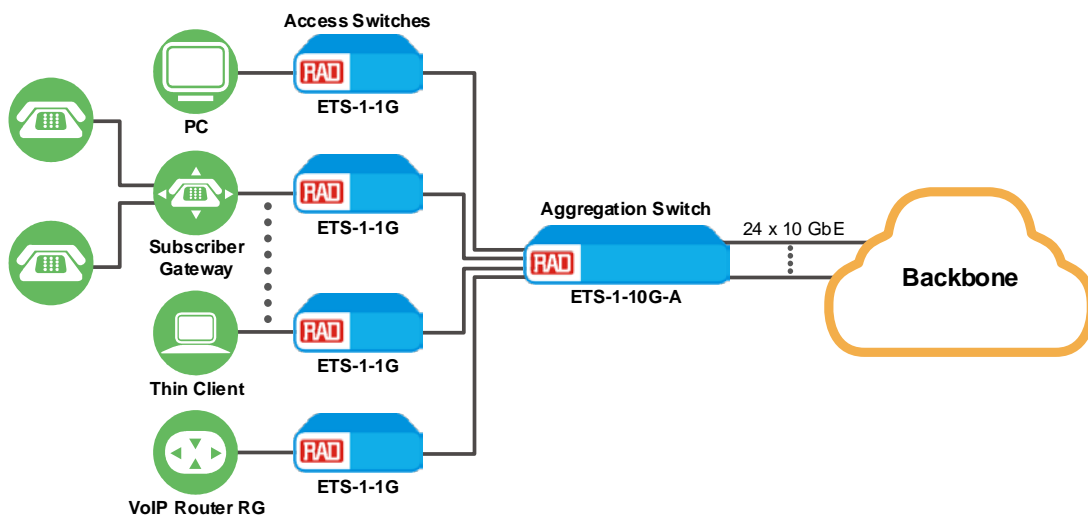


Figure 1. ETS-1-10G-A Ethernet Aggregation Switch Application

### LAYER 2

VLAN	802.1Q
	Q-in-Q
	Selective Q-in-Q (VLAN translation)
	GVRP
	Voice VLAN
	Support for L2VPN services
MAC Table	Independent learning mode per VLAN
	MAC multicast support
	Configurable aging time of MAC addresses
	Static MAC entries
	MAC flapping logging
L2 Multicast	Multicast profiles
	Static multicast groups
IGMP	IGMP snooping v1,2,3
	Port/host-based IGMP snooping fast leave
	IGMP querier
	IGMP authorization via RADIUS
MLD	MLD snooping v1,2
DHCP	DHCP snooping
	DHCP clients filtering
	DHCP auto provisioning
	DHCP relay (IPv4 support)
	DHCP options 12 and 82
BPDU	BPDU attack prevention
	STP BPDU guard
	BPDU filtering

### IP ADDRESSING AND ROUTING

Addressing	IPv4 and IPv6
	IP unnumbered
Routing Protocols	Dynamic routing protocols
	Address Resolution Protocol (ARP)
	BFD
	BGP (requires license, see Ordering)
	IS-IS
	LDP
	MPLS: L3 VPN, LSP, P and PE roles
	OSPFv2, OSPFv3
	PHP
	PIM SM, IGMP proxy
	RIP
	Syslog
	VRF lite
	VRRP
Routing Technologies	Static IP routes
Services	Support for L3VPN services

### RESILIENCY

L2 Protection	STP (Spanning Tree Protocol, IEEE 802.1d)
	RSTP (Rapid Spanning Tree protocol, IEEE 802.1w)
	MSTP (Multiple Spanning Tree, IEEE802.1s)
	STP root guard
	Spanning tree fast link option
	Loopback Detection (LBD)
	ERPS (G.8032v2)
	PVSTP+
Link Aggregation	RPVSTP+
	Link Aggregation Groups (LAG)8 groups
	Dynamic LAG (LACP)
	Multi-switch Link Aggregation Group (MLAG)
LAG Balancing Algorithm	

### MONITORING AND DIAGNOSTICS

Diagnostic	Ping (IPv4/IPv6 support)
	Optical transceiver diagnostics
Monitoring	Statistics on interfaces
	Remote monitoring RMON/SMON
	Task- and traffic type-based CPU utilization monitoring
	IPFIX
	Green Ethernet
	Temperature monitoring
	TCAM utilization monitoring

### GENERAL

#### Environment

See Table 1

#### Physical and Power

See Table 2

Table 1. Technical Features

Specification	ETS-1-10G-A/16SP/DPS	ETS-1-10G-A/32SP/DPS
<b>Common Parameters</b>		
Packet processor	Marvell 98DX8316	Marvell 98DX8332
RAM (DDR3)	1 GB	
ROM (NAND Flash)	1 GB	
<b>Interfaces</b>		
10/100/1000BASE-T (OOB)	1	
10GBASE-R (SFP+)/1000BASE-X (SFP)	16	32
Console port	RS-232/RJ-45	
<b>Performance</b>		
Bandwidth	320 Gbps	640 Gbps
Throughput for 64 bytes	238 MPPS	
Buffer memory	3 MB	
MAC table	32K	
VLAN table	4K	
TCAM	For routing: 16K IPv4, 8K IPv6 For traffic processing: 9K x 10B	
ARP table <sup>1</sup>	32K	
L2 Multicast groups	4K	
Quality of Service (QoS)	8 egress queues per port	
Link Aggregation Groups (LAG)	32, up to 8 ports per LAG	
Jumbo frame size	10240 bytes	
Stacking	Up to 8 devices	

Table 2. Power, Physical, and Environmental Specifications

Specification	ETS-1-10G-A/16SP/DPS	ETS-1-10G-A/32SP/DPS
Power supply (separately ordered)	AC power: 220V+-20%, 50Hz DC power: -36..-72V	
Power supply options:	1 AC/DC power supply 2 AC/DC hot-swappable power supplies	
Max. power consumption	57W	75W
Operating temperature	-10 to +45°C	
Storage temperature	-40 to +70°C	
Operating humidity	80% max	
Cooling	Front-to-Back, 4 fans	
Dimensions (WxDxH), mm	430x275x44 mm	
Weight	3.6 kg	3.8 kg

# ETS-1-10G-A

## Ethernet Aggregation Switches

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### Ordering

#### ETS-1-10G-A/16SP/DPS

Ethernet Aggregation switch, 16 x 10GBASE-R/1000BASE-X (SFP+/SFP), dual PS slots (PSs not included)

#### ETS-1-10G-A/32SP/DPS

Ethernet Aggregation switch, 32 x 10GBASE-R/1000BASE-X (SFP+/SFP), dual PS slots (PSs not included)

#### Hot Swappable Power Supplies

(Must be ordered separately)

#### ETS-1-10G-PS/AC/160W

220VAC 160W Power Supply Module for ETS-1-10G-A

#### ETS-1-10G-PS/DC48/100W

48VDC, 100W Power Supply Module for ETS-1-10G-A

### OPTIONAL ACCESSORIES

#### ETS-1-BGP-LIC

License for using BGP protocol

#### ETS-1-MPLS/LIC

MPLS license for ETS-1-10G-A

**Note:** MPLS license does not include BGP license (order separately if needed)

#### 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](http://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.

#### International Headquarters

24 Raoul Wallenberg St., Tel Aviv 6971923, Israel  
Tel 972-3-6458181 | Fax 972-3-7604732  
Email [market@rad.com](mailto:market@rad.com)

#### 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](mailto:market@radusa.com)



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