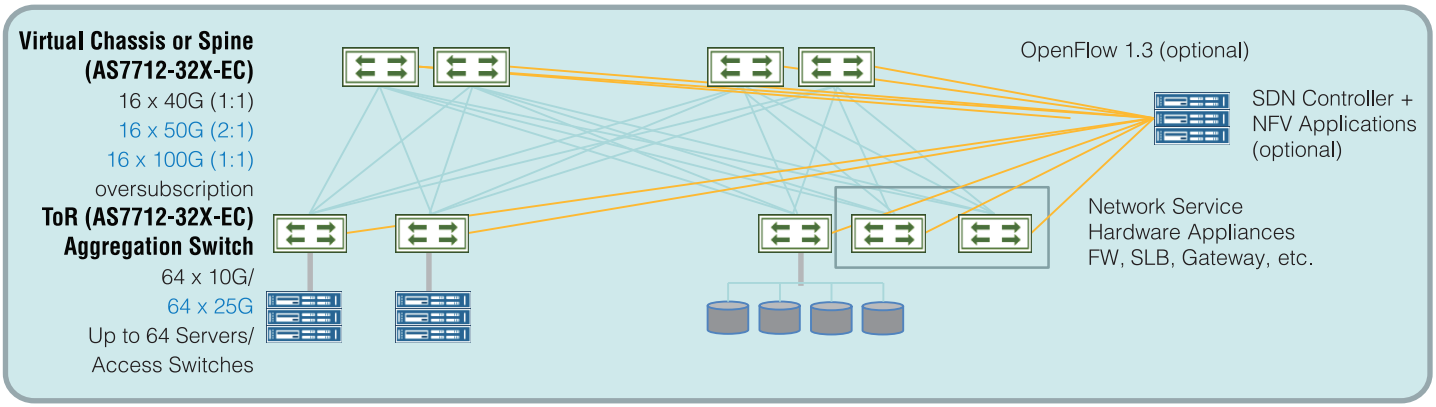
AS7712-32X-EC

100 GbE L3 Switch with SDN Capability

Product Overview

The AS7712-32X-EC is a 32-port 100 GbE QSFP28 switch designed for carrier/enterprise aggregation, data center top-of-rack/spine and SDN-enabled networks. It is an ideal solution for traditional three-tier aggregation or core and folded-Clos architectures, serving with a 1:1 non-oversubscription.

The switch runs EdgeCOS, providing traditional Layer 2 and Layer 3 switching functionality, as well as OpenFlow 1.3*, leveraging Broadcom's OpenFlow Data Plane Abstraction (OF-DPA*) that delivers the most out of the switching silicon. By using OF-DPA, EdgeCOS provides more tables, larger table sizes, and a streamlined OpenFlow pipelining, compared to legacy OpenVswitch-based software solutions.



Key Features and Benefits

- 32 x 100G QSFP28 ports, each supporting 1 x 100 GbE or 1 x 40 GbE, or via breakout cables, 2 x 50 GbE or 4 x 25 GbE or 4 x 10 GbE
- Deploy as top-of-rack switch supporting 10 or 25 GbE to servers, with 40, 50, or 100 GbE uplinks
- Deploy as spine switch supporting 40, 50, or 100 GbE ToR and spine interconnects.
- Layer 2/Layer 3, and OpenFlow 1.3*
- OF-DPA 2.0*
- Compatible with OpenFlow 1.3 capable controllers and applications written for OF-DPA
- Debian GNU/Linux Open Linux Environment*
- 310 W typical power consumption
- 9 K Bytes Jumbo Frames
- Dual hot-swappable, load-sharing, redundant power supplies (AC, 48 VDC, 12 VDC, HVDC 380 V*)
- Port-to-power and power-to-port airflow options
- 1:1 non-oversubscription in folded-Clos networks
- 5 +1 redundant, hot-swappable fans
- MLAG support
- VxLAN ready
- Perpetual license with optional annual maintenance contract

* Future Release

Highlights

OF-DPA

OF-DPA is Broadcom's new OpenFlow 1.3 implementation for data center and carrier switches.

Earlier implementations based on OpenVswitch were not able to leverage the full capacity of the switching ASIC. The OpenVswitch design did not set boundaries on how tables can be used. However, the switching ASIC has a fixed processing pipeline and the hardware tables along this pipeline are of fixed sizes. Therefore, OpenFlow designs based on OpenVswitch often do not fit the ASIC's design.

To solve this problem, Broadcom has introduced OF-DPA, which is an abstraction layer between OpenFlow 1.3 and the switching ASIC. OF-DPA provides a defined OpenFlow-compatible flow pipeline with defined tables and increased table sizes, and the ability to leverage the full capacity of the switching ASIC.

The table opposite illustrates the increased table sizes in comparison to the older OpenVswitch-based approach.

	Open Vswitch Based	OF-DPA 1.0 on AS7712-32X-EC
Tables	1	7
L2 Bridging	32 K	160 K
L3 Unicast	1500 (shared)	80 K (IPv4) / 40K (IPv6)
L3 Multicast	1500 (shared)	72 K (IPv4) / 36K (IPv6)
VLANs	494	4094 x 54 ports

As an early adopter, EdgeCOS is one of the first switch operating systems to support OF-DPA, providing a future-proof OpenFlow implementation to end users and application providers.

Verified OpenFlow controllers compatible with OF-DPA:
- OpenDaylight (with Table Type Patterns)
- Ryu (with custom OF-DPA library)

Virtual Chassis

A Virtual Chassis (VC) works just like a real chassis, only that it is made of individual switches instead of fabric and module blades.
In a virtual chassis, the fabric modules are called spine switches, while the port modules are called leaf switches.

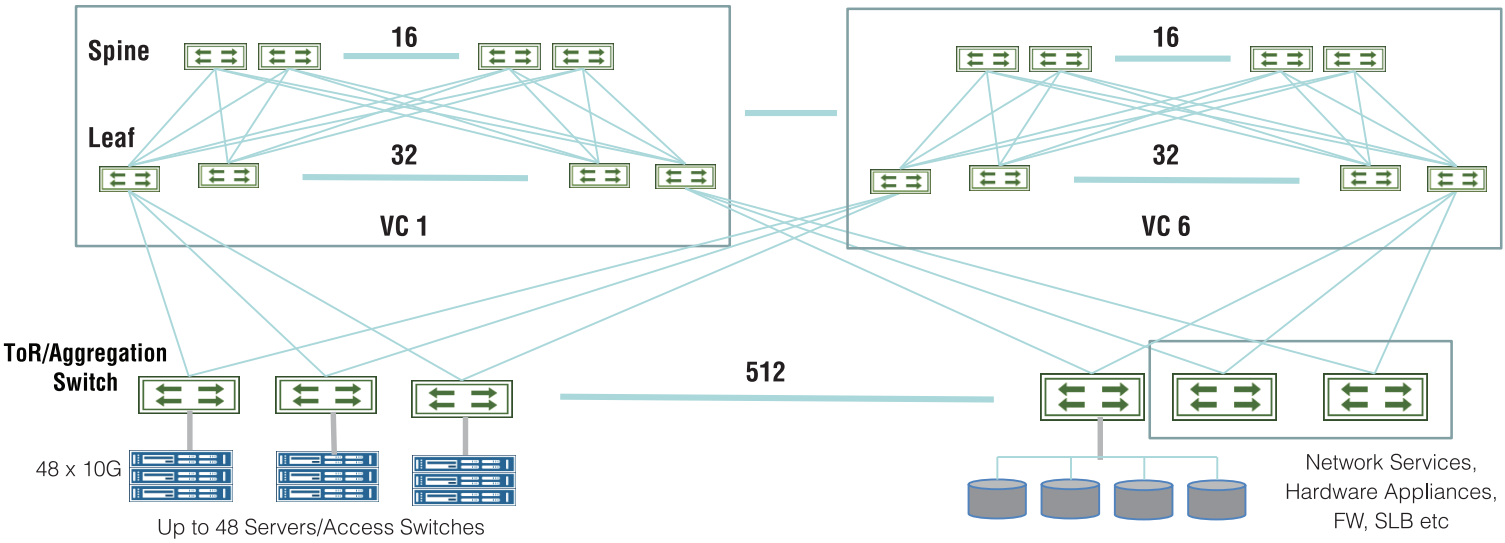
Compared to a traditional chassis, a virtual chassis is more flexible in scaling than a fixed-size chassis. This results in lower power consumption and space saving in the racks for certain configurations.

In addition, a virtual chassis can be scaled to support twice the amount of downstream ports to top-of-rack/aggregation switches, just by adding another layer of 1 RU switches into the Clos architecture.

Tier	Switches per VC	40G ports to ToRS
2	48	512
3	112	1024
4	240	2048
5	496	4096

Using the AS7712-32X-EC for the top-of-rack/aggregation switches, one can connect to 6 virtual chassis using ECMP to balance the traffic. This provides a 2:1 oversubscription to the hosts.

For the leaf and spine switches within the virtual chassis, it is suggested to use the "AS7712-32X-EC EdgeCOS" 32 x 100G QSFP+ switch with no oversubscription.



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AS7712-32X-EC Product Specifications

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Feature

Ports
- Switch Ports:
  - 32 x QSFP28 each supporting 100GbE or10GbE or 40GbE or 25GbE
- Management Ports on Front Panel:
  - 1 x RJ-45 serial console
  - 1 x RJ-45 100/1000BASE-T management port
  - 1 x USB Type A storage port

Performance
- Wire Speed Forwarding: L2 and L3
- Switching Capacity: 3.2 Tbps
- MAC Addresses: 8K (min)/136 K (max)
- VLAN IDs: 4 K
- L3 Routes: IPv4 8 K (min)/72 K (max), IPv6 4 K (min)/36 K (max)
- Packet Buffer Size: 16 MB shared buffer pool

L2 Features
- Flow control: IEEE 802.3x for full duplex mode
- Jumbo frames: 9 KB
- Storm Control:
  - Broadcast
  - Multicast
  - Unknown Unicast
- Spanning Tree Protocol:
  - IEEE 802.1D STP
  - IEEE 802.1w RSTP
  - IEEE 802.1s MSTP (32 instances)
  - BPDU Guard/BPDU Filtering
  - Root Guard
  - Loopback detection
- VLAN:
  - Supports 4k VLANs
  - Port-Based VLAN
  - IEEE 802.1Q VLAN
  - Traffic Segmentation (Port Isolated)
- Link Aggregation:
  - Static Trunk
  - 802.3ad LACP
  - Trunk group: 16
  - Load balance based on MAC SA/DA, SIP, DIP, TCP/UDP Port
- IGMP Snooping:
  - IGMP v1/v2/v3 Snooping
  - IGMP querier support
  - IGMP Immediate Leave
  - IGMP Filtering/Throttling
  - IGMP Snooping Proxy (V1/V2/V3)
- IPv6 MLD Snooping
- UDLD
- Digital Diagnostic Monitoring (DDM)
- L2 Virtual Private Network
- QinQ

OAM
- IEEE 802.1ag Connectivity Fault Management:
  - Connectivity check
  - Loopback
  - Linktrace
- ITU-T Y.1731 Performance and Throughput Management
  - Frame Delay
  - Frame Delay variation

QoS Features
- 8 Priority queues per port
- Traffic Scheduling:
  - Strict Priority
  - WRR (Weighted Round Robin)
  - Hybrid (WRR +Strict)
- Traffic Classification (CoS):
  - 802.1p based CoS/port
  - IP ToS precedence based
  - IP DSCP based CoS
  - TCP/UDP Port based CoS
  - PHB (Per Hop Behavior – internal priority)
  - Drop precedence (color aware)
  - Port based default priority
- DiffServ:
  - SRTCM (1 rate 3 color) color aware/color blind
  - TRTCM (2 rate 3 color) color aware/color blind
  - Ingress policy map
  - Egress policy map
  - Rate limiting (Egress only)

IPv6 QoS Features
- *DiffServ: SrcIPv6/DstIPv6

Security Features
- Port Security
- DHCP Snooping
- IP Source Guard
- DHCP Snooping option 82
- Dynamic ARP Inspection
- 802.1x Port based/MAC based Authentication:
  - Dynamic VLAN assignment
  - Dynamic QoS
- MAC Authentication
- Web Authentication
- MAC Filtering
- ACL:
  - Number of ACL (SW): 1K rules
  - Number of ACE per ACL (SW): 100
  - Auto compress ACE
  - L2/L3/L4
  - Ingress
  - Egress
  - Statistics
- Username/Password Authentication:
  - Authenticate management access
  - Local Authentication
  - Remote Authentication via RADIUS
  - Remote Authentication via TACACS+
- HTTPS and SSL (Secured Web)
- SSH 1.5/V2.0 (Secured Telnet Session)
- Management Interface Access Filtering (SNMP, Web, Telnet)

IPv6 Security Features
- DHCPv6 Snooping
- IPv6 Source Guard
- IPv6 ND Snooping
- IPv6 RA Guard
- IPv6 ACL:
  - Number of ACE (SW): 4K (Compressed)
  - L2/L3/L4: SrcIPv6/DstIPv6

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Feature

IPv6 Features

- IPv4/IPv6 Dual Protocol Stack
- IPv6 Address Type:
  - Unicast
  - Multicast
- ICMPv6
- ICMPv6 Redirect (Host)
- IPv6 Path MTU Discovery
- IPv6 Neighbor Discovery:
  - Duplicate Address
  - Static Cache Entry
  - Address Resolution
  - Unreachable Neighbor Detection
- Manual Configuration
- SNMP over IPv6
- HTTP over IPv6
- SSH over IPv6
- IPv6 Telnet Support
- IPv6 Syslog Support
- IPv6 SNTP Support
- IPv6 TFTP Support
- Remote IPv6 Ping
- Trace route over IPv6
- IPv6 sFlow
- DHCPv6:
  - Client
  - Relay

L3 Features IPv4

- Multi-netting
- CIDR (Classless Inter-Domain Routing)
- Unicast Routing:
  - Static Routes (1K),
  - Floating Route, Null route
  - RIPv1/v2
  - OSPFv2 (include RFC2328 PDC Encryption, RFC1370 Virtual Link, RFC3101 Route Aggregation, RFC1365 Route Filtering)
  - BGP4+
  - Equal Cost multipath routing (ECMP)
- Multicast Routing:
  - PIM-DM
  - PIM-SM
  - IGMP v1/v2/v3
  - IGMP v2/v3 Proxy
- IP Redundancy: VRRP RFC3768
- DHCP Relay

L3 Features IPv6

- IPv6 Unicast Routing:
  - Static Routes (1K)
  - OSPFv3
  - MLD v1/v2
  - Equal Cost multipath routing (ECMP)
- IPv6 Multicast Routing:
  - PIM6-DM
  - PIM6-SM
  - DHCPv6 Relay

Management Features

- Switch Management:
  - CLI via console port or Telnet
  - Web management
  - SNMP v1, v2c, v3
- Terminal Setting
- Multiple Management IP Interface
- Software Download/Upgrade
  - TFTP, Xmodem/Ymodem (Boot code only), FTP, HTTP
- Dual Images
- Configuration Download/Upload: TFTP, HTTP, FTP
- Auto Upgrade (Zero Tourch Configuration, DHCP option 66/67)
- RMON:
  - RMON1 (1,2,3,9 group)
  - RMON2 (partly)
- DHCP
  - Client
  - Relay
- Port Mirroring
- RSPAN
- Event/Error Logging
  - Syslog (local Flash)
  - Remote log (RFC3164)
- Remote Ping
- SNTPv4 (FRC2030)
- NTP
- LLDP (802.1ab)
  - Link Layer Discovery Protocol
  - LLDP-MED (VoIP related)
- sFlow (V4/V5)
- Delay reload
- Port Utilization (kbits/sec,Pkts/sec, %Util in recent 300 secs)
- Historical data (15 min,24 hr)
- IPv6 Management (Telnet Server/ICMP v6)
- Monitor Environment
  - Power Status
  - FAN
- Thermal monitor
  - Fan speed control
  - Show temperature
  - Send trap
- Fan Failure Detection: Send trap
- Partial config
  - FTP
  - TFTP
- Craft port
- Trace Route
- MAC learning
- HW/SW watchdog
- Restore and configure from USB
- USB port management

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Feature

Data Center Features

802.1Qbb (PFC)
802.1Qau (ECN)
802.1Qaz (ETS)
DCBx
MLAG
VxLAN
ONIE
OpenFlow 1.3*
OF-DPA 2.0*
Tunneling*
Supports multiple SDN controllers*
Supports 40G to 4 x 10G breakout cables and 4 x 10G port grouping*

Physical and Environmental

Dimensions (WxDxH): 438 x 515 x 43.5 mm (17.4 x 18.6 x 1.71 in)
Weight: 10 kg (23 lbs), with two installed PSU modules
Fans: hot-swappable 4+1 redundant fans
Operating Temperature: 0°C to 45°C (32°F to 104°F)
Storage Temperature: -40°C to 70°C (-40°F to 158°F)
Operating Humidity: 5% to 95% non-condensing
Operating Altitude: up to 3048 m (10,000 ft)

Power

PSUs: 2 redundant, load-sharing, hot-swappable AC or -48 VDC
Input Voltage: 90 to 264 VAC at 50-60 Hz. -36 to -72 VDC
PSU Efficiency: Up to 93% for AC PSUs
12 VDC power input options

Supported Optics and Cables

QSFP28 Ports:
100GBASE-CR4 DAC: 0.5 m to 5 m; passive and active
100GBASE-CR4 DAC to 4 x SFP28 25GBASE-CR: 0.5 m to 5 m; passive and active
100GBASE-SR4: up to 70 m over OM3 MMF, 100 m over OM4 MMF
100GBASE-SR4 to 4 x SFP28 25GBASE-SR: up to 70 m over OM3 MMF, 100 m over OM4 MMF
100GBASE-LR4: up to 10 km over SMF
40GBASE-CR4 DAC: 0.5 m to 7 m; passive and active
40GBASE-CR4 DAC to 4 x SFP+ 10GBASE-CR DAC: up to 5 m passive; up to 10 m active
40GBASE-SR4: up to 100 m over OM3 MMF, 150 m over OM4 MMF
40GBASE-SR4 to 4 x SFP+ 10GBASE-SR/SRL: 100/300 m over OM3, 150/400 m OM4
40GBASE-LR4: up to 10 km over SMF

Software License

Switch is loaded with Open Network Install Environment (ONIE) software installer
EdgeCOS perpetual license

Regulatory

EMI
CE Mark (EN55022 Class A)
FCC Part 15 Class A
VCCI
Safety
CB, EN 60950
UL/CUL
Environmental: Temperature: IEC 68-2-14
Drop: ISTA 2A
RoHS-6 Compliant

Warranty

Please check www.edge-core.com for the warranty terms in your country.

For More Information

To find out more about Edgecore Networks Corporation products and solutions, visit www.edge-core.com.

About Edgecore Networks Corporation

Edgecore Networks Corporation is in the business of providing innovative network solutions. In the service provider network, in the data center or in the cloud, Edgecore Networks Corporation delivers the software and systems that transform the way the world connects. Edgecore Networks Corporation serves customers and partners worldwide. Additional information can be found at www.edge-core.com.

Edgecore Networks Corporation is a subsidiary of Accton Technology Corporation, the leading network ODM company. The Edgecore Data Center switches are developed and manufactured by Accton.

To purchase Edgecore Networks solutions, please contact your Edgecore Networks Corporation representatives at +886 3 563 8888 (HQ) or +1 (949)-336-6801 or authorized resellers.

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Ordering Information

Base Model: AS7712-32X-EC; 32-Port 100G QSFP28; ONIE software installer; EdgeCOS L2/L3 perpetual software license

Model Number		PSU	Airflow	Region (power cord)
7712-32X-EC-AC-F-US	Intel Atom C2538 processor	dual AC PSUs	port-to-power airflow	N. America
7712-32X-EC-AC-B-US	Intel Atom C2538 processor	dual AC PSUs	power-to-port airflow	N. America
7712-32X-EC-AC-F-EU	Intel Atom C2538 processor	dual AC PSUs	port-to-power airflow	Europe
7712-32X-EC-AC-B-EU	Intel Atom C2538 processor	dual AC PSUs	power-to-port airflow	Europe
7712-32X-EC-AC-F-UK	Intel Atom C2538 processor	dual AC PSUs	port-to-power airflow	UK
7712-32X-EC-AC-B-UK	Intel Atom C2538 processor	dual AC PSUs	power-to-port airflow	UK
7712-32X-EC-AC-F-JP	Intel Atom C2538 processor	dual AC PSUs	port-to-power airflow	Japan
7712-32X-EC-AC-B-JP	Intel Atom C2538 processor	dual AC PSUs	power-to-port airflow	Japan
7712-32X-EC-48V-F	Intel Atom C2538 processor	dual 48 VDC PSUs	port-to-power airflow	
7712-32X-EC-48V-B	Intel Atom C2538 processor	dual 48 VDC PSUs	power-to-port airflow	
7712-32X-EC-12V-F	Intel Atom C2538 processor	one 12 VDC PSUs	port-to-power airflow	
7712-32X-EC-12V-B	Intel Atom C2538 processor	one 12 VDC PSUs	power-to-port airflow	
PSU-AC-650A-F		650W AC Power Supply FRU	port-to-power airflow	no power cord
PSU-AC-650A-B		650W AC Power Supply FRU	power-to-port airflow	no power cord
PSU-48V-650-F		650W -48 VDC Power Supply	port-to-power airflow	no power cord
PSU-48V-650-B		650W -48 VDC Power Supply	power-to-port airflow	no power cord
PSU-12V-750		12 VDC power input unit FRU		
FAN-1U-1x1C-F		Fan Tray FRU	port-to-power airflow	
FAN-1U-1x1C-B2		Fan Tray FRU	power-to-port airflow	
CBL-PWR-US	AC Power Cable - US (25 V/13 A, 1830 mm) – only required with spare power supplies			
CBL-PWR-EU	AC Power Cable - Europe (250 V/10 A, 1830 mm) – only required with spare power supplies			
CBL-PWR-UK	AC Power Cable - UK (250 V/10 A, 1830 mm) – only required with spare power supplies			
CBL-PWR-JP	AC Power Cable - Japan – only required with spare power supplies			
ORSA-1U	Open Rack Switch Adapter, for mounting standard 19 inch form factor 1U switches into 21 inch Open Rack.			

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