# AS5710-54X-EC

10GbE L3 Switch with SDN capability, supporting OpenFlow 1.3 and OF-DPA

Product Overview

The AS5710-54X-EC is a 48-port 10GbE SFP+ switch with 6-port 40GbE uplinks designed for carrier/ enterprise aggregation, data center top-of-rack, and SDN-enabled networks. It is an ideal solution for traditional three-tier aggregation, or for core and folded-Clos architectures, serving with a 2:1 oversubscription.

The switch runs EdgeCOS, providing traditional Layer 2 and Layer 3 switching functionality, as well as OpenFlow 1.3, leveraging Broadcom's OF-DPA, to get 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.
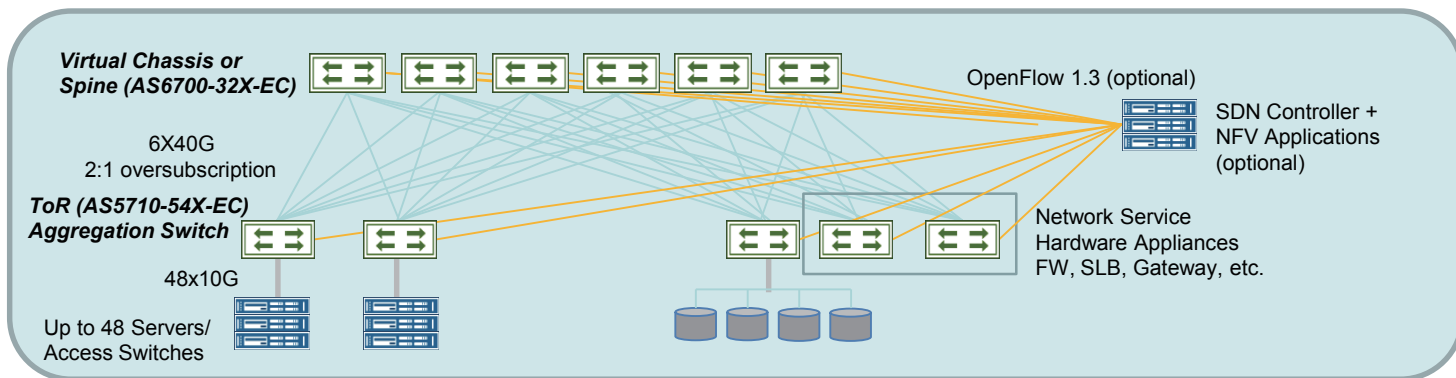
Key Features and Benefits

- 48 x 10G SFP+ and 6 x 40G QSFP+ ports

- Layer 2/Layer 3, and Hybrid OpenFlow 1.3

- OF-DPA 1.0/2.0*

- Compatible with OpenFlow 1.3 capable controllers and applications written for OF-DPA

- Debian GNU/Linux Open Linux Environment*

- 346 W typical power consumption

- 12KBytes Jumbo Frames

- Dual hot-swappable Power Supplies (AC, 48VDC, 12VDC)

- Port-to-power and Power-to-port airflow options

- 2:1 Oversubscription in folded-Clos networks

- 4+1 hot-swappable fans

- MLAG support

- VXLAN ready*

- Perpetual license with optional annual maintenance contract

* = EdgeCOS 2.0

OF-DPA

OF-DPA is Broadcom's new OpenFlow 1.3 implementation for data center/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 following table illustrates the increased table sizes in comparison to the older OpenVswitch-based approach.

	OpenVswitch based	OF-DPA 1.0 on AS5710-54X
Tables	1	7
L2 Bridging	32K	160K
L3 Unicast	1500 (shared)	80K (IPv4)/40K (IPv6)
L3 Multicast	1500 (shared)	72K (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.
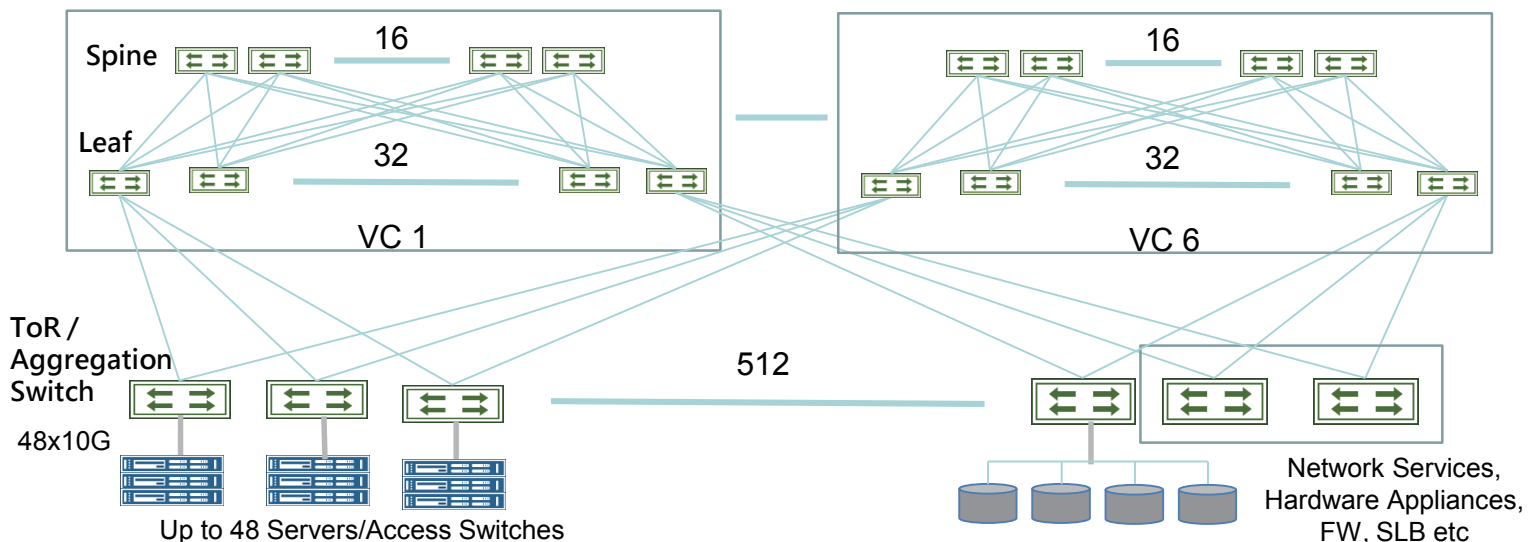
Compared to a traditional chassis, a Virtual Chassis is more flexible in scaling than a fixed-size chassis. This results in lower power consumption and space saving in the racks for certain configurations.

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 AS5710-54X-EC for top-of-rack/aggregation switches, you can connect to six virtual chassis using ECMP to balance the traffic. This provides a 2:1 oversubscription to hosts.

For the leaf and spine switches within the virtual chassis, we suggest to use the AS6700-32X-EC EdgeCOS 32x40G QSFP+ switch with no oversubscription.

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Features

Ports

Switch Ports:
  48 x SFP+ each supporting 10GbE or 1GbE
  6 x QSFP each supporting 40GbE or 4 x 10GbE
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: 1.44 Tbps
MAC Addresses: 160 K
VLAN IDs: 4 K
Jumbo frames (12KBytes)
L3 Routes: IPv4 80 K, IPv6 40 K
Packet Buffer Size: 12 MB shared buffer pool

L2 Features

Flow control: IEEE 802.3x for full duplex mode
Jumbo frames: 12 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
  Root Guard
  Loopback detection
VLAN:
  Supports 4k VLANs
  Port Based VLAN
  IEEE 802.1Q VLAN
  Traffic Segmentation (Port Isolated)
L2 Virtual Private Network: QinQ
Link Aggregation
  Static Trunk
  802.3ad LACP
  Trunk group: 26
  Load balance based on MAC SA/DS, 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)
UDLD: Digital Diagnostic Monitoring (DDM)

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

IPv6 QoS Features

* DiffServ: SrcIPv6/DstIPv6

Security Features

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

IPv6 ACL
  Number of ACE (SW): 4K (Compressed)
  L2/L3/L4: SrcIPv6/DstIPv6

OAM

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

Features

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
IPv6 Syslog
IPv6 SNTP
IPv6 TFTP
Remote IPv6 Ping
Ping over IPv6
Trace route over IPv6
IPv6 sFlow
DHCPv6:
  Client
  Relay

L3 Features IPv4

Multi-netting
CIDR (Classless Inter-Domain Routing)
Unicast Routing:
  Static Unicast Routes
  RIPv1/v2
  OSPF
  BGP4+
  Equal Cost multipath routing (ECMP)
Multicast Routing:
  PIM-DM
  PIM-SM
  IGMP v1/v2/v3
  IGMP v2/v3 Proxy
IP Redundancy:
  VRRP RFC3768

L3 Features IPv6

IPv6 Unicast Routing:
  Static Routes
  OSPFv3
  MLD v1/v2
  Equal Cost multipath routing (ECMP)
IPv6 Multicast Routing:
  PIM-DM6
  PIM-SM6

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: TFTP, FTP
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)
IPv6 Management (Telnet Server/ICMP v6)
Monitor Environment: Power Status, FAN
Thermal monitor:
  Fan speed control
  showing temperature
  send trap
Fan failure detection: send trap
Partial config: FTP, TFTP
Historical data (15min,24HR)
Craft port
Trace route
MAC learning
HW/SW watchdog
Restore and Configure from USB
USB Port Management

Features

Data Center Features

802.1Qbb (PFC)
802.1Qau (ECN)
802.1Qaz (ETS)
DCBx
MLAG
ONIE
OpenFlow 1.3
OF-DPA 1.0
  VLAN Flow Table: 221076 entries (54 ports, 4094 VLANs per port)
  L2 Bridging Flow Table: 160K entries
  Unicast Routing Flow Table: 80K entries
  Multicast Routing Flow Table: 72K entries
Compatible with OpenDaylight/Ryu
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): 443 x 473 x 43.4mm (17.4 x 18.6 x 1.71in)
Weight: 8.5 kg (18.74lbs), with two installed PSU modules
Fans: hot-swappable 4+1 redundant fans
Operating Temperature: 0°C to 40°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 (10,000ft)

Power

PSUs: 2 redundant, load-sharing, hot-swappable AC or -48 VDC
Input Voltage: 90 to 264 VAC at 50-60Hz. -48 to -72 VDC.
Input Current: Max 6 A @100/120 VAC, 3 A @200/240 VAC, 10 A @-72 VDC
PSU Efficiency: Up to 93% for AC PSUs
12 VDC power input options

Supported Optics and Cables

SFP+ Ports:
  10GBASE-CR DAC: up to 5 m passive; up to 10 m active
  10GBASE-SRL/SR: up to 100/300 m over OM3 MMF
  10GBASE-LR: Up to 10 km over SMF
  1000BASE-SX, 1000BASE-LX, 100/1000BASE-T
QSFP+ Ports:
  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 6 x 10GBASE-SR: 100 m over OM3, 150 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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OrderingInformation

Base Model: AS5710-54X-EC 48-Port 10G SFP+ with 6x40G QSFP uplinks; ONIE software installer

Model Number	CPU Module	PSU	Airflow	Region (power cord)
5710-54X-O-AC-F-US	Freescale P2041 processor	dual AC PSUs	port-to-power airflow	N. America
5710-54X-O-AC-B-US	Freescale P2041 processor	dual AC PSUs	power-to-port airflow	N. America
5710-54X-O-AC-F-EU	Freescale P2041 processor	dual AC PSUs	port-to-power airflow	Europe
5710-54X-O-AC-B-EU	Freescale P2041 processor	dual AC PSUs	power-to-port airflow	Europe
5710-54X-O-AC-F-UK	Freescale P2041 processor	dual AC PSUs	port-to-power airflow	UK
5710-54X-O-AC-B-UK	Freescale P2041 processor	dual AC PSUs	power-to-port airflow	UK
5710-54X-O-AC-F-JP	Freescale P2041 processor	dual AC PSUs	port-to-power airflow	Japan
5710-54X-O-AC-B-JP	Freescale P2041 processor	dual AC PSUs	power-to-port airflow	Japan
5710-54X-O-48V-F		dual -48V DC PSUs	port-to-power airflow	
5710-54X-O-48V-B		dual -48V DC PSUs	power-to-port airflow	
5710-54X-O-12V-F		dual -48V DC PSUs	port-to-power airflow	
5710-54X-O-12V-B		dual -48V DC PSUs	power-to-port airflow	
5710-54X-SSW-OF-E	AS5710-54X EdgeCOS L2/L3/OpenFlow perpetual software license (included in selected hardware)			
PSU-AC-400-F		400W AC Power Supply FRU	port-to-power airflow	no power cord
PSU-AC-400-B		400W AC Power Supply FRU	power-to-port airflow	no power cord
PSU-48V-400-F		-48V DC Power Supply FRU	port-to-power airflow	no power cord
PSU-48V-400-B		-48V DC Power Supply FRU	power-to-port airflow	no power cord
PSU-12V-400-1		12V DC power input unit FRU		
FAN-1U-1x1D-F		Fan Tray FRU	port-to-power airflow	
FAN-1U-1x1D-B		Fan Tray FRU	power-to-port airflow	

Model Number	Description
ORSA-1U	Open Rack Switch Adapter, for mounting standard 19 inch form factor 1U switches into 21 inch Open Rack
CBL-PWR-US	AC Power Cable - US (125V/13A, 1830mm) – only required with spare power supplies
CBL-PWR-EU	AC Power Cable - Europe (250V/10A, 1830mm) – only required with spare power supplies
CBL-PWR-UK	AC Power Cable - UK (250V/10A, 1830mm) – only required with spare power supplies
CBL-PWR-JP	AC Power Cable - Japan – only required with spare power supplies

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OrderingInformation

ET4201-RJ45	1000BASE-T Copper SFP transceiver
ET4202-SX	1000BASE-SX Multi mode SFP transceiver, up to 500m (850nm)
ET4202-LX	1000BASE-LX Single mode SFP transceiver, up to 10km (1310nm)
ET5402-SR	10 Gigabit SFP+, 850nm Multimode, 802.3ae 10GBASE-SR Compliance, 300m, LC port
ET5402-LR	10 Gigabit SFP+, 1310nm Singlemode, 802.3ae 10GBASE-LR compliance, 10km, LC port
ET5402-DAC-1M	10 Gigabit SFP+ DAC 1m cable
ET5402-DAC-3M	10 Gigabit SFP+ DAC 3m cable
ET5402-DAC-5M	10 Gigabit SFP+ DAC 5m cable
ET5402-AOC-3M	10 Gigabit SFP+ AOC 3m cable
ET5402-AOC-5M	10 Gigabit SFP+ AOC 5m cable
ET5402-AOC-7M	10 Gigabit SFP+ AOC 7m cable
ET5402-AOC-10M	10 Gigabit SFP+ AOC 10m cable
ET6402-40DAC-1M	40G to 40G DAC cable, QSFP+ DAC cable, 1m
ET6402-40DAC-3M	40G to 40G DAC cable, QSFP+ DAC cable, 3m
ET6402-40DAC-5M	40G to 40G DAC cable, QSFP+ DAC cable, 5m
ET6402-10DAC-1M	40G to 4 10G DAC cable, QSFP+ DAC- 4*SFP+DAC Cable, 1m
ET6402-10DAC-3M	40G to 4 10G DAC cable, QSFP+ DAC- 4*SFP+DAC Cable, 3m
ET6402-10DAC-5M	40G to 4 10G DAC cable, QSFP+ DAC- 4*SFP+DAC Cable, 5m
ET6402-10AOC-5M	40G to 4 10G AOC cable, QSFP+ AOC- 4*SFP+AOC Cable, 5m
ET6402-10AOC-7M	40G to 4 10G AOC cable, QSFP+ AOC- 4*SFP+AOC Cable, 7m
ET6402-10AOC-10M	40G to 4 10G AOC cable, QSFP+ AOC- 4*SFP+AOC Cable, 10m
ET6402-10AOC-15M	40G to 4 10G AOC cable, QSFP+ AOC- 4*SFP+AOC Cable, 15m
ET6402-40AOC-3M	40G to 40G AOC cable, QSFP+ AOC cable, 3m
ET6402-40AOC-5M	40G to 40G AOC cable, QSFP+ AOC cable, 5m
ET6402-40AOC-7M	40G to 40G AOC cable, QSFP+ AOC cable, 7m
ET6402-40AOC-10M	40G to 40G AOC cable, QSFP+ AOC cable, 10m
ET6402-40AOC-15M	40G to 40G AOC cable, QSFP+ AOC cable, 15m
ET6402-40AOC-30M	40G to 40G AOC cable, QSFP+ AOC cable, 30m
ET6401-LR4	40G QSFP+ long range transceiver
ET6401-SR4	40G QSFP+ short range transceiver