

# AS5710-54X-EC

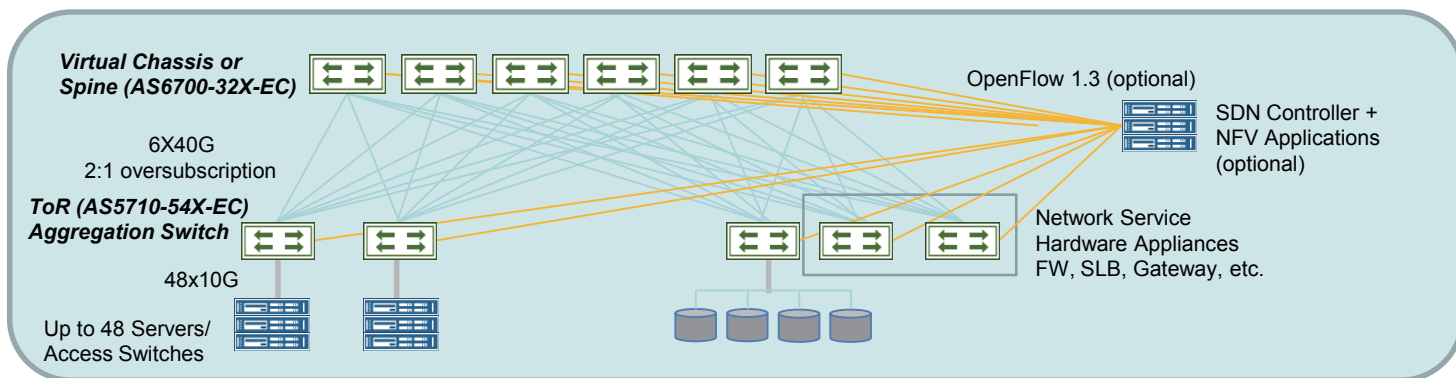
## 10GbE L3 Switch with SDN capability, supporting OpenFlow 1.3 and OF-DPA



### 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
<b>Tables</b>	1	7
<b>L2 Bridging</b>	32K	160K
<b>L3 Unicast</b>	1500 (shared)	80K (IPv4)/40K (IPv6)
<b>L3 Multicast</b>	1500 (shared)	72K (IPv4)/36K (IPv6)
<b>VLANs</b>	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.

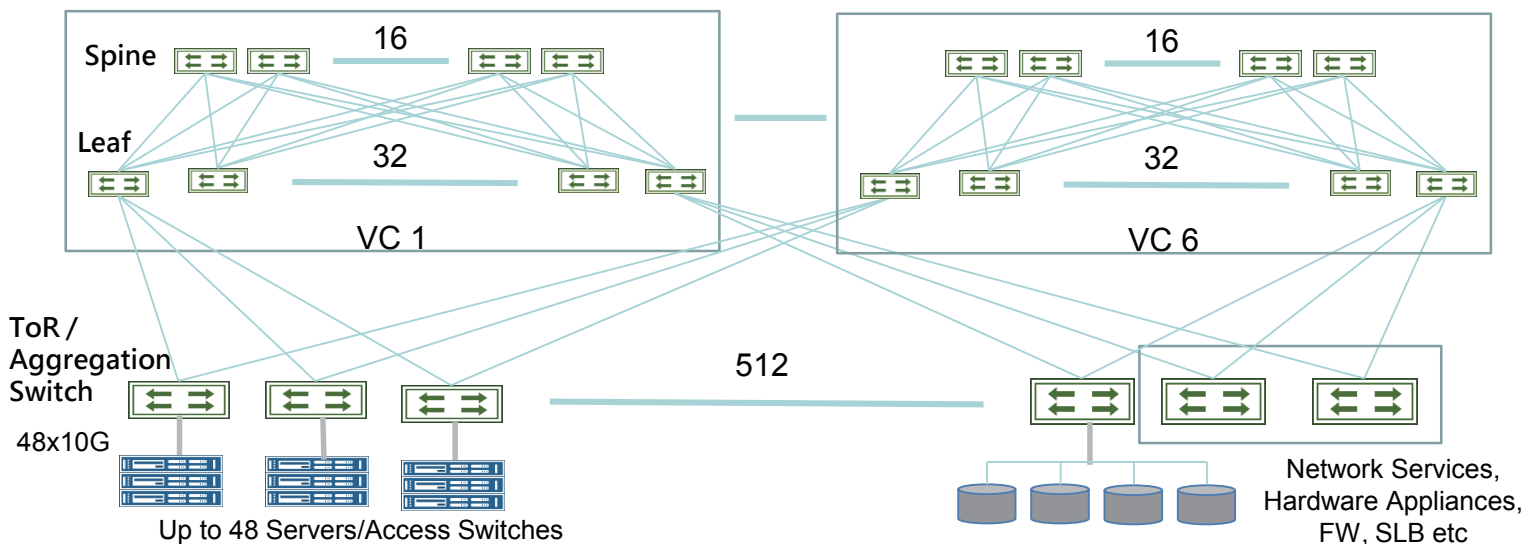
Compared to a traditional chassis, a Virtual Chassis is more flexible in scaling than a fixed-size chassis. This results in lower power consumption and space saving in the racks for certain configurations.

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
<b>2</b>	48	512
<b>3</b>	112	1024
<b>4</b>	240	2048
<b>5</b>	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.



## 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: 8.5kg (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 3048m (10,000ft)

### Power

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

### Supported Optics and Cables

SFP+ Ports:  
10GBASE-CR DAC: up to 5m passive; up to 10m active  
10GBASE-SR/SR: up to 100/300m over OM3 MMF  
10GBASE-LR: Up to 10km over SMF  
100GBASE-SX, 100GBASE-LX, 100/100GBASE-T  
QSFP+ Ports:  
40GBASE-CR4 DAC; 0.5m to 7m; Passive and Active  
40GBASE-CR4 DAC to 4 x SFP+ 10GBASE-CR DAC; up to 5m passive; up to 10m active  
40GBASE-SR4: Up to 100m over OM3 MMF, 150m over OM4 MMF  
40GBASE-SR4 to 6 x 10GBASE-SR: 100m over OM3, 150m OM4  
40GBASE-LR4: Up to 10km 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](http://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](http://www.edge-core.com).

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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.

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## Features

### 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

## Features

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