

2RU Top-of -Rack switch offering convergence, customization and cloudification

Converged Ethernet/Storage switch offering 48-port 10 GbE/FCoE — of which 12 ports are 1/2/4/8G FC capable and 4-port 40 GbE (40 GbE ports can be configured as 4 x 10 GbE)

Customized switch enabling 3rd party applications on Appliance modules

Cloud enabler and a building block for both virtualized and non-virtualized data centers

1.28 Tbps line rate, non-blocking, ultra low-latency and lower power switch enabling a greener, faster data center

L2/L3 Feature Richness and TRILL/EVB ready

### High-Performance Application-Enabled Top-of-Rack Switch

The S7000 is a compact next-generation switch/router product designed to meet the requirements for high density 10/40GE, Ethernet/storage convergence, and ability to run multiple applications at the Top of Rack in a Data Center. The S7000 is a building block for both virtualized and non-virtualized data centers designed to address data center 10/40GE/Convergence/Application requirements for High Performance Enterprise and Financial Data Centers, Cloud Computing Data Centers and Provider Hosted Data Centers. The S7000 can be positioned as a Top of Rack (ToR) switch or End of Row (EoR) switch within a Data Center. The product can support 36 ports of 1/10GE, 12 ports of converged Ethernet/Fibre Channel 10GE/1/2/4/8GFC and 4 ports of 40GE. The 40GE ports can be realized as 4x10GE ports through breakout cables. The S7000 supports a full suite of Ethernet switching and Routing protocols in the hardened FTOS operating system to enable either layer 2 or layer 3 network architectures.

In today's demanding data centers, there is a need to run applications closer to the compute nodes. As an example, large data centers can increase efficiency by deploying tiered load balancing at the core, cluster and POD levels. The appliance module on S7000 can address such application for POD level. The S7000 addresses a new breed of appliance modules offering customization to data centers in different vertical market segments. The initial application networking appliance module enables users to run their own applications. The S7000 offers 4 slots for the pluggable appliance modules in the top rack unit.

### Applications

- Converged High-density 10G/40G Ethernet, 10G FCoE and 1/2/4/8G FC ports
- Application Enablement on the ToR switch
- Containerized Data Centers, Provider Hosted Data Centers, Cloud Computing Data Centers and High performance Enterprise/Financial Data Centers

### Key Features

- 2-RU ToR Switch with 36 1/10GbE ports, 12 1/2/4/8G FC/10GbE ports and 4 40GbE ports
- 1.28 Tbps non-blocking, cut-through switching fabric delivers line-rate performance under full load.
- Scalable L2 and L3 Ethernet switching with QoS and a full complement of standards-based IPv4 for unicast and multicast applications
- Intel powered switch and appliance modules
- Reversible front-to-back or back-to-front airflow
- Packet buffer memory of 9MB
- Redundant, hot-swappable power supplies and fans
- Hardware support for TRILL and EVB (Roadmap)
- Open Automation Framework adds VM-awareness as well as automated configuration and provisioning capabilities to simplify the management of virtual network environments
- Modular Force10 Operating System (FTOS) software delivers inherent stability as well as advanced monitoring and serviceability functions.
- Data Center Bridging (DCB) support enables a lossless Ethernet fabric for iSCSI storage and NFS traffic
- Supports jumbo frames for high-end server connectivity
- 128 link aggregation groups with up to 8 members per group, using advanced hashing with random seed values
- VirtualView real-time network and application traffic monitoring for virtualized data centers
- Low power consumption



# Specifications: S7000 – Open Cloud ToR Switch for Next Generation Data Center

## Ordering Information

ORDER NUMBER	DESCRIPTION
S7000P	Base unit includes 48 dual speed 1G/10G (SFP/SFP+) ports and 4 40G (QSFP+) ports with 4 optional module slots
S7000P-AC	Base unit, 1 AC power supply and fan subsystem <sup>1</sup>
S7000P-DC	Base unit, 1 DC power supply and fan subsystem <sup>1</sup>
S7000P-AC-R	Base unit, 1 AC power supply and fan subsystem <sup>2</sup>
S7000P-DC-R	Base unit, 1 DC power supply and fan subsystem <sup>2</sup>
S7000P-FC	FC unit includes 36 dual speed 1G/10G (SFP/SFP+) ports, 12 1G/10G/1/2/4/8FC ports and 4 40G (QSFP+) ports with 4 optional module slots
S7000P-FC-AC	FC unit, 1 AC power supply and fan subsystem <sup>1</sup>
S7000P-FC-DC	FC unit, 1 DC power supply and fan subsystem <sup>1</sup>
S7000P-FC-AC-R	FC unit, 1 AC power supply and fan subsystem <sup>2</sup>
S7000P-FC-DC-R	FC unit, 1 DC power supply and fan subsystem <sup>2</sup>
S7000P-FAN	Fan Subsystem <sup>1</sup>
S7000P-FAN-R	Fan Subsystem <sup>2</sup>
S7000P-PWR-AC	AC power supply <sup>1</sup>
S7000P-PWR-AC-R	AC power supply <sup>2</sup>
S7000P-PWR-DC	DC power supply <sup>1</sup>
S7000P-PWR-DC-R	DC power supply <sup>2</sup>
S7000P-APP-AN	Appliance Module for Application Networking
S7000P-SW-FCGW	Force10 Operating System Software License for FC Gateway functionality, Latest version
S7000P-SW-L3	Force10 Operating System Software License for L3, Latest version
GP-QSFP-40GE-1SR	40GE QSFP+ short reach optics
GP-QSFP-40GE-1LR	40GE QSFP+ long reach optics
CBL-QSFP-40GE-10M	40GE QSFP+ active fiber cable (10m)
CBL-QSFP-40GE-50M	40GE QSFP+ active fiber cable (50m)
CBL-QSFP-40GE-PASS-1M	40GE QSFP+ passive cable (1m)
CBL-QSFP-40GE-PASS-5M	40GE QSFP+ passive cable (5m)
GP-10GSFP-1S	Qualified 10G SFP+ optics module SR
GP-10GSFP-1L	10GE LR Optics
GP-10GSFP-1E	Qualified 10G SFP+ optics module ER
GP-SFP2-1S	Qualified GbE SFP optics module SX
GP-SFP2-1T	Qualified GbE SFP module 1000Base-T
GP-SFP2-1Y	Qualified GbE SFP optics module LX
GP-SFP2-1Z	Qualified GbE SFP optics module ZX
CBL-10GSFP-DAC-0.5M	10GE SFP+ Copper Cable <sup>3</sup> (0.5m)
CBL-10GSFP-DAC-1M	10GE SFP+ Copper Cable <sup>3</sup> (1m)
CBL-10GSFP-DAC-2M	10GE SFP+ Copper Cable <sup>3</sup> (2m)
CBL-10GSFP-DAC-5M	10GE SFP+ Copper Cable <sup>3</sup> (5m)
CBL-10GSFP-DAC-7M	10GE SFP+ Copper Cable <sup>3</sup> (7m)
CBL-10GSFP-DAC-10M	10GE SFP+ Copper Cable <sup>3</sup> (10m)
Optics	1GFC, 2GFC, 4GFC, 8GFC – Support multimode and single-mode SFP/SFP+ (Qualification in Progress)

<sup>1</sup> Airflow from I/O to power supply panels

<sup>2</sup> Airflow from power supply to I/O panels

<sup>3</sup> Direct attach copper cable

## Physical

2RU form-factor  
 36 line-rate 1/10 Gigabit Ethernet SFP/SFP+ ports  
 12 line-rate combo 1/2/4/8 Gigabit Fibre Channel and 1/10Gigabit Ethernet SFP/SFP+ ports  
 4 line-rate 40 Gigabit Ethernet QSFP+ ports  
 (QSFP+ ports can be configured as 4 x10 GbE interfaces)  
 64 line rate 10 Gigabit Ethernet  
 4 bays for optional pluggable modules  
 1 RJ45 console port  
 1 10/100/1000 Base-T management port  
 1 USB 2.0 Type A mass storage device

Redundant Power supply: 100–240 VAC 50/60 Hz  
 –40 to –70 VDC

Max. Power consumption: 800W  
 Max. Thermal output: 2730 BTU/h  
 Operating temperature: 0°C to 40°C  
 Operating humidity: 10% to 85% (RH), non-condensing  
 Storage temperature: –40°C to 70°C  
 Storage humidity: 5% to 95% (RH), non condensing

## Redundancy

Hot swappable redundant power  
 Hot swappable redundant fans  
 Non Stop Switching  
 ISSU (In-Service Software Upgrade)\*

## Performance

Switch fabric capacity: 1.28 Tbps  
 MAC addresses: 128K  
 IPv4 routes: 16K  
 Queues per port: 10 COS queues  
 VLANs: 4096  
 Line-rate Layer 2 switching  
 Line-rate Layer 3 routing: IPv4 and IPv6  
 ACLs: 8K ingress, 4k egress  
 LAGs: 128 with up to 8 members.  
 LAG load balancing: based on Layer 2, IPv4 or IPv6 headers  
 Packet buffer memory: 9MB

## IEEE Compliance

802.1AB LLDp  
 802.1ag Connectivity fault Management  
 802.1D Bridging, STP  
 802.1p L2 Prioritization  
 802.1Q VLAN Tagging, Double VLAN Tagging, GVRP  
 802.1s MSTP  
 802.1w RSTP  
 802.1X Network Access Control  
 802.3ab Gigabit Ethernet (1000BASE-T)  
 802.3ac Frame Extensions for VLAN Tagging

802.3ad Link Aggregation with LACP  
 802.3ae 10 Gigabit Ethernet (10GBASE-X)  
 802.3ba 40 Gigabit Ethernet (40GBASE-SR4, 40GBASE-CR4, 40GBASE-LR4) on optical ports  
 802.3u Fast Ethernet (100BASE-TX) on mgmt ports  
 802.3x Flow Control  
 802.3z Gigabit Ethernet (1000BASE-X)  
 ANSI/TIA-1057 LLDP-MED  
 Force10 PVST+  
 MTU 12,000 bytes

## Data Center Protocols

TRILL\*  
 802.1Qbg Edge Virtual Bridging\*

## Data Center Bridging (DCB)

802.1Qaz Enhanced Transmission Selection (ETS)  
 802.1aQbb Priority-based Flow Control (PFC)  
 Data Center Bridging Exchange Protocol (DCBX)  
 802.1Qau Quantized Congestion Notification (QCN)\*

## FC/FCoE

FCoE Transit Switch and FCoE Gateway  
 FIP Snooping  
 N Port ID Virtualization (NPiV)

## RFC and I-D Compliance

### General Internet Protocols

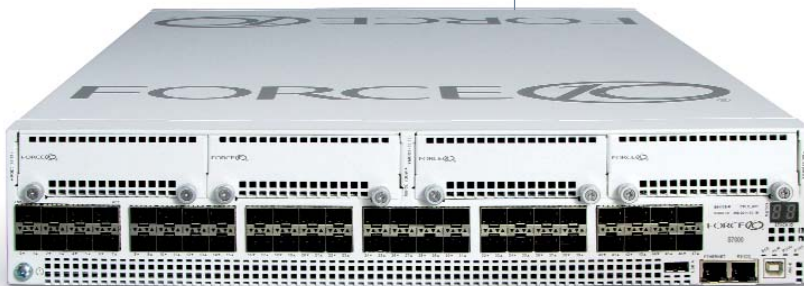
768 UDP  
 793 TCP  
 854 Telnet  
 959 FTP  
 1321 MD5  
 1350 TFTP  
 2474 Differentiated Service  
 2698 Two Rate Three Color Marker  
 3164 Syslog  
 SSHv2

### General IPv4 Protocols

791 IPv4  
 792 ICMP  
 826 ARP  
 1027 Proxy ARP  
 1035 DNS (client)  
 1042 Ethernet Transmission  
 1191 Path MTU Discovery  
 1305 NTPv3  
 1519 CIDR  
 1542 BOOTP (relay)  
 1812 IPv4 Routers  
 1858 Security considerations for IP Fragment Filtering  
 2131 DHCP Server and Relay  
 2338 VRRP  
 3021 31-bit prefixes on point-to-point IPv4 links  
 3046 DHCP Option 82  
 3069 Private VLAN  
 3128 Tiny Fragment Attack Protection

## RIP

1058 RIPv1  
 2453 RIPv2



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## OSPF

2154	MD5
1587	NSSA
2328	OSPFv2
2370	Opaque LSA
3623	OSPF Graceful Restart
4222	Prioritization and congestion avoidance with OSPFv2

## BGP

1997	Communities
2385	MD5
2439	Route Flap Damping
2796	Route Reflection
2842	Capabilities
2858	Multiprotocol Extensions
2918	Route Refresh
3065	Confederations
4360	Extended Communities
4893	4-byte ASN
5396	4-byte ASN representations
draft-ietf-idr-bgp4-20	BGPv4
draft-ietf-idr-restart-06	Graceful Restart
draft-michaelsen-4byte-as-representation-05	4-byte ASN Representation (partial)
draft-ietf-idr-addl-paths-04.txt	ADD PATH

## Multicast

1112	IGMPv1
2236	IGMPv2
3376	IGMPv3
draft-ietf-pim-sm-v2-new-05	PIM-SM
3569	SSM for IPv4
4541	IGMPv1/v2 Snooping

## General IPv6 Protocols

1981	Path MTU Discovery (partial)
2460	IPv6
2461	Neighbor Discovery (partial)
2462	Stateless Address Autoconfiguration (partial)
2464	Ethernet Transmission
2675	Jumbo grams
3587	Global Unicast Address Format
4291	IPv6 Addressing
4443	ICMPv6
5798	VRRPv3 for IPv6*
IPv6	Dynamic Routing Protocols*

## Network Management

1155	SMLv1
1156	Internet MIB
1157	SNMPv1
1212	Concise MIB Definitions
1215	SNMP Traps
1493	Bridges MIB
1850	OSPFv2 MIB
1901	Community-based SNMPv2
2011	IP MIB
2012	TCP MIB
2013	UDP MIB
2024	DLSw MIB
2096	IP Forwarding Table MIB
2570	SNMPv3
2571	Management Frameworks
2572	Message Processing and Dispatching
2574	SNMPv3 USM
2575	SNMPv3 VACM
2576	Coexistence Between SNMPv1/v2/v3
2578	SMLv2
2579	Textual Conventions for SMLv2
2580	Conformance Statements for SMLv2
2618	RADIUS Authentication MIB
2665	Ethernet-like Interfaces MIB
2674	Extended Bridge MIB
2787	VRRP MIB
2819	RMON MIB (groups 1, 2, 3, 9)
2863	Interfaces MIB
2865	RADIUS
3273	RMON High Capacity MIB
3416	SNMPv2
3418	SNMP MIB
3434	RMON High Capacity Alarm MIB
3580	802.1X with RADIUS
5060	PIM MIB
ANSI/TIA-1057	LLDP-MED MIB
draft-grant-tacacs-02	TACACS+
draft-ietf-idr-bgp4-mib-06	BGP MIBv1
IEEE 802.1AB	LLDP MIB
IEEE 802.1AB	LLDP DOT1 MIB
IEEE 802.1AB	LLDP DOT3 MIB
ruzin-mstp-mib-02	MSTP MIB (traps)
sFlow.org	sFlowv5
sFlow.org	sFlowv5 MIB (version 1.3)
FORCE10-BGP4-V2-MIB	Force10 BGP MIB (draft-ietf-idr-bgp4-mibv2-05)
FORCE10-IF-EXTENSION-MIB	
FORCE10-LINKAGG-MIB	
FORCE10-COPY-CONFIG-MIB	
FORCE10-MON-MIB	
FORCE10-PRODUCTS-MIB	
FORCE10-SS-CHASSIS-MIB	
FORCE10-SMI	
FORCE10-SYSTEM-COMPONENT-MIB	
FORCE10-TC-MIB	
FORCE10-TRAP-ALARM-MIB	
FORCE10-FORWARDINGPLANE-STATS-MIB	

## Automation

Bare Metal Auto Configuration (BMAC)  
Smart Scripts  
JumpStart\*  
HyperLink\*  
OpenConnect\*

## Appliance Module

Intel based appliance module

## Regulatory Compliance

### Safety

UL/CSA 60950-1, Second Edition  
EN 60950-1, Second Edition  
IEC 60950-1, Second Edition Including all National Deviations and Group Differences  
EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide  
EN 60825-2 Safety of Laser Products Part 2: Safety of Optical Fibre Communication Systems  
FDA Regulation 21 CFR 1040.10 and 1040.11

### Emissions

Australia/New Zealand: AS/NZS CISPR 22: 2006, Class A  
Canada: ICES-003, Issue-4, Class A  
Europe: EN 55022: 2006+A1:2007 (CISPR 22: 2006), Class A  
Japan: VCCI V3/2009 Class A  
USA: FCC CFR 47 Part 15, Subpart B:2009, Class A

### Immunity

EN 300 386 V1.4.1:2008 EMC for Network Equipment  
EN 55024: 1998 + A1: 2001 + A2: 2003  
EN 61000-3-2: Harmonic Current Emissions  
EN 61000-3-3: Voltage Fluctuations and Flicker  
EN 61000-4-2: ESD  
EN 61000-4-3: Radiated Immunity  
EN 61000-4-4: EFT  
EN 61000-4-5: Surge  
EN 61000-4-6: Low Frequency Conducted Immunity

### RoHS

All S7000 components are EU/China RoHS compliant.



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