

# Pluribus Freedom 9532-C Switch

High-Performance Enterprise and Cloud Data Center Spine Switch Supporting Advanced Network Services and Network Function Virtualization Capabilities with 32 40/100 Gigabit Ethernet QSFP28 Interfaces or up to 128 10/25 Gigabit Ethernet Interfaces

## Highlights

- Compact 1 RU standards-based open network switch built on ONIE
- Optimized to support Netvisor OS advanced services
- Deployment-proven Broadcom Tomahawk switching ASIC
- Intel Xeon Broadwell CPU with 2x 10G ports supports Advanced Network Function Virtualization
- Low-latency and sustained performance predictability for all configurations
- Large-scale VXLAN configurations supported in hardware
- Architected for high availability operations
- Minimal power consumption with up to 93% power efficiency, reduces operating costs
- Reversible airflow supports hot-aisle and cold-aisle placement
- Low heat dissipation minimizes cooling requirements



## Product Overview

The Pluribus Freedom™ 9532-C switch is an advanced best-in-class, programmable open network platform that provides high-capacity, standards-based networking to stay ahead of evolving service demands driven by cloud, and Internet of Things requirements for enterprise and cloud data centers. Built on the deployment-proven Broadcom StrataXGS® Tomahawk switching ASIC, the Pluribus Freedom 9532-C is optimized to deliver the comprehensive advanced services of the Pluribus Netvisor® operating system. The Pluribus Freedom 9532-C is Open Compute Project (OCP) compliant, and is built with the Open Network Install Environment (ONIE) to support any compatible network operating system for maximum flexibility and adaptability to meet future data center networking requirements.

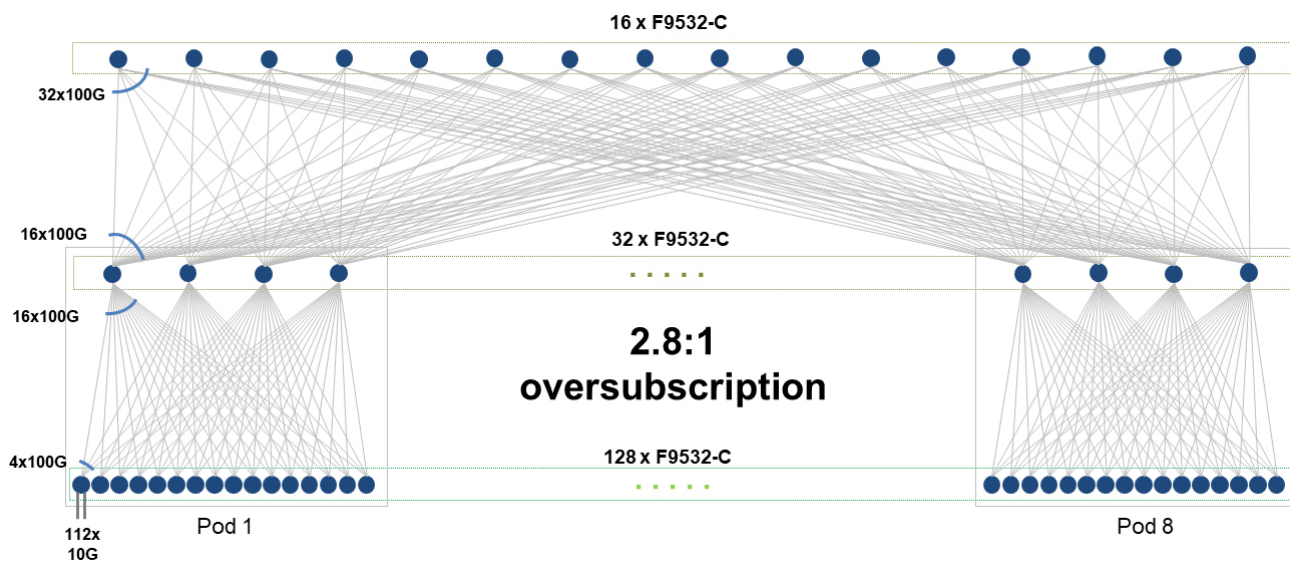
The platform delivers wire-speed layer 2 and layer 3 switching and routing with sustained packet forwarding performance of 3.2 Terabits per second (Tb/s) and 4.7 Billion packets per second (Bp/s) throughput, even when complex, process-intensive services are enabled. The switch provides 32 ultra-low latency QSFP28 FlexPorts that can support high-density 100, 40, 25, and 10 Gigabit Ethernet connections. The platform is highly power efficient, and is architected for high availability environments with redundant and hot swappable power and fan units. To meet diverse environmental requirements the Pluribus Freedom 9532-C switch offers air-flow flexibility to support hot or cold aisle deployments.

The powerful next-generation switch can be deployed top-of-rack (ToR) or as a distributed spine enabling scale-out architectures, and eliminating the need for costly, over-sized chassis switches in the data center. Its simplicity empowers network operators to build a highly flexible architecture that can scale capacity horizontally to optimize performance and enhance agility to support growing application traffic on a pay-as-you-grow basis. The compact design of the Pluribus Freedom 9532-C switch dramatically reduces the deployment footprint, requires less power, and lower cooling, which immediately reduce the cost of data center network operations.

### System Highlights

- Wire-speed Layer 2 and Layer 3 forwarding up to 3.2 Tb/s and 4.7 Bp/s
- 32 QSFP28 FlexPorts – each supporting 1x 100/40G, or 4x 25/10G ports
- Broadcom Tomahawk switching ASIC
- 16 Mb shared packet buffer with SmartTable and SmartBuffer technologies enable high-scale data centers
- VXLAN services supported in hardware at wire-speed
- Configurable pipeline latency enabling sub-400 ns port-to-port operation
- Intel Xeon (Broadwell) D-1518 quad-core 2.6 GHz processor
- All ports on front; PSUs and fans accessible from rear
- Dual redundant, load-sharing, hot-swappable PSUs
- 310 Watt typical power consumption with efficiency of up to 93%
- 5+1 redundant, hot-swappable fan modules
- Configurable hot/cold aisle with port-to-power and power-to-port airflow
- 1 RU compact form factor mountable in either a standard 19” or 21” rack

### 100/10G Cloud-Scale Design With One Fixed Switch Model



Modern IP data center architecture built exclusively with the Pluribus Freedom 9532-C switch in the Spine and Leaf layers across 8 pods, with 16 switches providing 112 ports per pod for a total of 14,366 edge ports.

#### Deployment Examples

- Deploy Freedom 9532-C as common switch platform for Spine and Leaf (ToR) placements supporting all interfac speed requirements
- Deploy Freedom 9532-C as Spine switch supporting 40G and 100G Spine interconnects and Leaf uplinks
- Deploy Freedom 9532-C as Leaf (ToR) switch supporting high density 10G and 25G to servers with 40G, or 100G uplinks to existing Spine switches
- Deploy as a high-capacity Spine switch supporting uplinks from other Freedom 9000 series switches utilized as Leaf devices

## Simplify the Data Center Architecture with a Single Device

The interface flexibility of the Pluribus Freedom 9532-C switch allows a single device to be leveraged for all deployment points, such as the Leaf and Spine, in the data center architecture. Each of the 32 QSFP28 FlexPorts can be configured to support 100G, 40G, 25G or 10G interfaces for maximum agility. This flexibility optimizes data center network infrastructure investments through the standardization of fewer, simpler switching platforms that can be deployed everywhere. This dramatically simplifies deployment complexity, reduces the cost of sparring and lowers the total cost of operations.

## Netvisor Operating System

Enabling simple, plug-and-play deployments, the Pluribus Freedom 9532-C switch is delivered as an integrated, turn-key solution that is shipped pre-configured with the Pluribus Netvisor Operating System (ONVL) installed on the ONIE foundation.

The Pluribus Netvisor OS is a virtualized Network Operating System (NOS) that provides a best-in-class layer 2 and layer 3 networking foundation, advanced network services, VXLAN, distributed Adaptive Cloud Fabric™ intelligence and embedded network performance monitoring telemetry.

The Pluribus Netvisor software virtualizes the switch hardware, decoupling network resources from the underlying hardware to create multiple network containers on a single device. Each container can be dynamically allocated, and a single switch can instantiate multiple network containers. Each container has its own virtualized router and can support granular east/west and north/south network segmentation, strict multi-tenant services, security and policies, and the integration of virtualized network services and functions.

Pluribus Netvisor software is available as a perpetual or subscription license, and offers several software license-based feature options to meet different deployment requirements.

## Netvisor OS Licensing Options

- **Netvisor Enterprise** – includes Layer 2 and Layer 3 switching and routing functionality with all standard networking protocols and high availability features
- **Netvisor Fabric** – adds VXLAN, Telemetry, Adaptive Cloud Fabric, Data Center Interconnect and security and segmentation capabilities

## Optional licensed capabilities

- **vNET License** – supports multi-tenant and network/traffic segmentation requirements. Licensed one per fabric based upon number of segments required. vNet capabilities requires at least one Pluribus Freedom 9532-C switch to be a member of the Adaptive Cloud Fabric architecture
- **VirtualWire™ feature license** – additive license per switch and can co-exist with standard network interfaces

## Integrated Network Function Virtualization

The embedded Intel Xeon Broadwell CPU provides 4 high-performance multi-threaded cores, and 2x 10G internal ports with SRIOV support to integrate Network Function Virtualization (NFV) KVM services. The quad-core, server-class CPU supports advanced Netvisor software services, as well as specialized third-party network services. The CPU supports Kernel-based Virtual Machine (KVM) and SRIOV operations allowing multiple virtual machines to run on a single Pluribus Freedom 9532-C switch.

## Warranty

The Pluribus Freedom 9532-C switch is backed by a three-year limited hardware warranty. Multiple extended support options, including advanced replacement and 24x7 on-demand support services, are available. Contact Pluribus Networks or a Pluribus Networks authorized reseller for complete details.

# Specifications

## Pluribus Freedom 9532-C Switch

### Switching Engine

- Broadcom Tomahawk (BCM56960) ASIC

### Onboard CPU / NFV Engine

- Intel Xeon (Broadwell) D-1518 quad-core 2.6 Ghz processor
- 16 GB SD-DIMM DDR3 RAM
- 16 MB SPI Flash
- 32 GB M.2 SSD MLC
- 2x 10G ports to switching ASIC

### Software

- Switch is loaded with Open Network Install Environment (ONIE) software installer
- Pluribus Netvisor OS - Open Netvisor Linux (ONVL) based upon license options ordered

### Interface Ports

#### Network Interfaces

- 32 x QSFP28 FlexPorts – Each FlexPort supports 1x 40/100G, or 4x 10/25G using splitter cables

#### Management Ports

- 1x RJ45 serial console
- 1x RJ-45 100/1000BASE-T management
- 1x USB Type A Storage

### Performance

- Wire-speed L2 and L3 packet forwarding
- Switching capacity: 3.2 Tb/s
- Forwarding rate: 4.7 Bp/s
- Supports jumbo frames up to 9216 Bytes
- 16 MB pooled packet buffer
- Ultra-low latency 450 ns with configurable pipeline latency enabling sub-400 ns port-to-port operation
- Supports high-performance storage/RDMA protocols including RoCE and RoCEv2

### Hardware Capacity

- VXLAN supported in hardware
- 104K MAC addresses
- 40K IPv4 host routes
- 20K IPv6 host routes
- 16K+ IPv4 routes
- VLAN IDs: 4K

### Operational

- 2 redundant, load-sharing, hot-swappable PSUs
- Input voltage 90 to 240 VAC at 50-60 Hz
- PSU efficiency up to 93%
- 350W maximum power (without pluggable optics)
- 310W typical power (without pluggable optics)
- Hot-swappable 5+1 redundant fan modules
- Supports both hot-aisle and cold-aisle placement with reversible airflow

### Physical and Environmental

- 1RU, mountable in either 19" or 21" racks
- Dimension: (WxDxH) 43.8 X 51.5 x 4.35cm (17.3 x 20.3 x 1.7in)
- Weight: 10 kg (23 lbs)
- Storage Temp: -40 °C to 70 °C (-40 °F to 158 °F)
- Operating Temp: 0 °C to 45 °C (32 °F to 113 °F)
- Operating Humidity: 5% to 95% non-condensing
- Operating Altitude: 0 to 3,048 meters (0 to 10,000 Feet)

### LEDs

- QSFP28 FlexPorts: status, activity, rate
- Ethernet Management port: status, activity
- Console Port: status
- System: diagnostic, locator, PSU and fan status

### Regulatory

#### EMI

- CE Mark
  - EN55022 Class A
  - EN55024
- EN6100-3-2
- EN6100-3-3

#### FCC Part 15 Subpart B Class A

#### VCCI Class A

#### Safety

- CB
- UL/CUL

#### Environmental

- Temperature: IEC 68-2-14
- Vibration: IEC 68-2-36, IEC 68-2-6
- Shock: IEC 68-2-29
- Drop: ISTA 2A
- Acoustic Level: 62Db@ 27 °C

RoHS-6 compliant

