



SAKSHAM - 4000

Modular Data Center Switch cum Router



Product Highlights

- Upto 25.6 Tbps Switching fabric capacity
- Chassis based High Availability system
- 1+1 redundant switch & controller card
- Eight Line card slots for Network I/O
- 3.2 Tbps capacity per slot
- Three types of Line Cards for 4x400G, 16x100G and 12x25G, 24x10G/1G ports
- 200G, 50G & 40G also supported
- MACSec Support on ports
- 5 RU, 19" rack-mountable chassis
- Compact & Modular system
- 3+2 PSU redundancy
- 230V, 50Hz AC or -48V DC power supply option
- N+1 Fan redundancy
- Front to rear cooling
- 10/100/1000 Mbps OOB Management port
- Alarm Interface
- IEEE 1588v2, SyncE, NTP

Overview

The rise of 4G/5G traffic and network virtualization calls for ultra-high capacity, low-latency and scalable network infrastructure. With this, there is also a need for a modular high-capacity network switch, which can be used in both leaf and spine deployments in a Data Center. Some of these products are required by the service providers as well, where very high-speed interfaces are desired.

C-DOT's SAKSHAM-4000 is a 25.6 Tbps capacity, 5U Chassis based, Modular Data Center Switch cum Router system, designed to meet the requirements of Carrier Grade Leaf and Spine switches in Data-Centers for 4G/5G and beyond networks, as well as for deployment as Edge/Core Router in Service Provider Network. The system has redundant switch/controller cards, thereby ensuring a non-blocking forwarding and high-availability. The system also has redundant and hot-swappable power supplies and fans. It delivers high-density, flexible-speed Ethernet ports with non-blocking performance. Additionally, built-in MACSec encryption support on all the line interfaces, provide an ideal platform for secure data transmission.

The modular architecture of the system enables seamless adaptability across multiple market segments, from hyperscale data center infrastructures to service provider's core and edge networks. With support for different line card types, having 400G, 200G, 100G and 1G/10G/25G interface ports-the platform delivers unmatched flexibility and scalability to meet evolving network demands. The chassis has eight universal line card slots, thereby ensuring simplified upgrades and port equipage options, while flexible port configurations provide granular speed optimization for diverse deployment scenarios.

Hardware Features

SAKSHAM-4000 is powered by high performance hardware accelerated data path ensuring wire-speed Layer-2 and Layer-3 processing with advanced features like ACL and QoS enabled with low power consumption at all packet sizes from 64 bytes to 9K bytes and multi-core redundant control processors capable of running the complex protocol stack with high-availability. System has 1+1 redundant switch and controller cards, 3+2 redundant AC/DC Power Supply units and two sets of N+1 redundant Fan trays, that are all hot-swappable and field replaceable. The Network I/O Line-cards are also hot-swappable and field replaceable. The SAKSHAM-4000 system is designed for maximum interoperability and investment protection, featuring advanced line cards ensuring support of current high-speed ethernet Interfaces as well as futuristic 400G based interfaces. Hardware also supports both PTP and SyncE for time sensitive applications.

Software Feature Highlights

- Comprehensive L2, L3 and Multicast support
- Feature rich MPLS support for integrated router functionality
- ECMP
- Indigenously designed with no malware
- Control, Management and data Plane Separation for fault isolation
- VRF support including Management VRF
- RADIUS/TACACS+
- IP Spoofing protection with DHCP snooping ACL and PBR
- CoPP
- ZTP
- Multi-chassis LAG
- EVPN-VxLAN
- Hardware accelerated OAM/BFD
- sFlow support
- Fabric Management System for centralized monitoring and analytics

Software Features

SAKSHAM-4000 runs on CROS (C-DOT Routing Operating System) software stack that provides scalable, feature-rich and secure software to run and manage the hardware. CROS follows standard secure boot feature which prevents compromised booting codes and software from running. CROS has a modular architecture with memory protection and loosely coupled Control Plane, Data Plane and Management Plane that allows feature enhancements as the needs of the network evolve. The system supports comprehensive Layer-2, IP and MPLS protocols for inter-operating in legacy data center environments along with newer data center features that are used to build modern 2-stage leaf-spine scalable IP fabric.

Quality of Service

The system supports flexible traffic classification in meeting various bandwidth requirements. Policing and Shaping can be done at flow, VLAN or port level. Additionally, scheduling disciplines like Strict Priority, Weighted Round Robin (WRR) and congestion avoidance techniques like WRED are supported

Management

The product can be managed locally using the console port or remotely using secure access. Access to the switch via CLI commands, SNMP interface and NETCONF/RESTCONF is available for integration with EMS/NMS and SDN controllers. Commands can be authorized via RADIUS/TACACS+ and all operations are authorized and logged. Extensive logging is supported which can be sent to syslog servers.

Virtualization

The system supports EVPN-VxLAN as the overlay tunneling technology which is needed for implementing a Layer-2 overlay network over a spanning-tree free IP underlay, providing support for VM workload mobility across racks and even data centers.

Security Features

The product is designed with security in mind. Control Plane and Management Plane are decoupled from data plane and are protected by rate limiting of control packets. Authentication is supported for control protocols, management access is protected by management ACL, 802.1x, MAB, role-based access control is supported with RADIUS and TACACS+. It also supports line-rate with advanced security features like MACSec for point-to-point data protection for handling security use-cases at Data-center Interconnect, Access points.

Advanced Monitoring and Provisioning

The SAKSHAM-4000 provides traffic visibility and automated deployment tools to simplify day-to-day operations. Zero Touch Provisioning allows automated device onboarding and configuration. For continuous traffic inspection and performance analysis, the system supports Port and Flow Mirroring, RMON, sFlow, and ERSPAN to capture and export network telemetry across both local and routed paths. Service health and path verification are maintained using IP/MPLS OAM and IP SLA monitoring, while Uplink Failure Detection provides rapid fault detection on upstream links to trigger fast path convergence and protect critical traffic.

Layer 2 Features

- Spanning Tree (RSTP/MSTP)
- 802.1Q VLAN
- LLDP
- Link Aggregation/LACP
- Jumbo Frames (9216 Bytes)
- IGMP Snooping

Layer 3 Features

- Integrated Routing and Bridging
- IPv4/v6 Dual Stack
- Virtual Routing & Forwarding
- Static Routes
- RIP, RIP-ng
- OSPFv2, OSPFv3
- IS-IS
- BGP
- PIM-SM, DM, SSM
- IGMP and MLD
- ECMP
- PBR
- BFD
- GRE and IP Tunnels

MPLS Features

- LDP
- RSVP-TE
- Fast Reroute
- MPLS OAM
- MPLS L3 VPN
- MPLS L2 VPN (VPWS & VPLS)

QoS Support

- DiffServ QoS
- L2, L3, L4 based classification
- srTCM, trTCM
- Shaping
- Strict Priority
- WRED, ECN
- 8 queues per port

High Availability

- Switch/Controller redundancy
- PSU and FAN redundancy
- VRRP
- Graceful Restart/NSF
- MC-LAG/EVPN Multi-Homing
- ECMP

Network Virtualization

- EVPN/VxLAN

Management

- CLI
- SNMP (v2c/v3)
- NETCONF/RESTCONF/Yang
- Dual software image
- Remote software upgrade
- User Management (AAA)
- Syslog
- Management over both IPv4 and IPv6

Advanced Monitoring/Provisioning

- Zero Touch Provisioning
- Port and Flow Mirroring
- RMON
- sFlow
- ERSPAN
- IP/MPLS OAM
- Uplink Failure Detection
- IP SLA

Security Features

- Role Based Access Control
- RADIUS/TACACS+ AAA
- Secure Shell (SSH)
- Access Control List (ACL)
- Management ACL
- Management VRF
- Storm Control
- MACSec limit, BPDU guard and Root guard
- Control Plane Protection
- DHCP Snooping
- Dynamic ARP Inspection
- IP Source Guard
- MACSec
- 802.1X

Timing Synchronization and others

- NTPv2
- PTP/SyncE/BITS
- DHCP Relay
- DNS Resolver

Line Card Port Configuration Options

Speed	QIO-CTX-4K	PIO-CTX-4K	XIO-CTX-4K
1GbE	16 *	32 *	24
10GbE	16 *	32 *	24
25GbE	16 *	32 *	12
50GbE	32 * /4	-	-
40GbE	4	16	-
100GbE	16 * /4	16	-
200GbE	8 * /4	-	-
400GbE	4	-	-

*With suitable optics and breakouts

Chassis Port Configuration

Speed	Maximum Ports	Speed	Maximum Ports
1GbE	250	40GbE	128
10GbE	250	100GbE	128
25GbE	250	200GbE	64
50GbE	250	400GbE	32

Physical Characteristics

Parameter	Specifications
Network Ports	Three types of Line Cards for 4x400G, 16x100G and 12x25G, 24x10G/1G ports. Flexible port configurations for supporting other speeds. Eight Line Card slots per system
Switch/Controller	1+1 redundant and hot-swappable Switch/Controller Cards
Management Ports	Console, OOB management
Power Supply	230V AC/-48V DC Power Supply Options 3+2 Redundant & Hot-swappable power supplies
Cooling	Two sets of 5 hot-swappable Fans (4+1 redundant), front to rear air-flow
Operating Temperature	0°C to 40°C

Certification

EMI/EMC	CISPR 32 Class A, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-11, IEC 61000-4-29
Environmental	QM333
IT Equipment Safety	IS/IEC 62368-1: 2018



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