

Intelligent Switch Solution (ISS) NOS

Overview

CapGemini Engineering's Intelligent Switch Solution (ISS) is a comprehensive NOS (Network Operating System) for a variety of applications using Ethernet switching, IP routing, MPLS transport, SDN (Software Defined Networking), Telemetry, Timing and Synchronization. It facilitates equipment manufacturers and network administrators to include these standard capabilities in their devices and networks rapidly. The software allows users to focus on advanced network automation and service rollouts, by removing the barriers in assembling standard networking capabilities using custom designed or white box hardware. The truly disaggregated, hardware agnostic and platform agnostic architecture, proven over years in the market, provides an interoperable, mature and stable platform to build advanced networks with.

Wide ecosystem

CapGemini works with a variety of partners towards a competitive and vibrant ecosystem to offer the best value to the leaders and innovators in networking. Current partners include:

ASIC partners	CPU options	Management System partners	Timing Solution partners	ODM / white box partners
<ul style="list-style-type: none"> Broadcom Intel Marvell RealTek 	<ul style="list-style-type: none"> ARM MIPS PowerPC X86 	<ul style="list-style-type: none"> Atrinet YumaWorks 	<ul style="list-style-type: none"> Microchip Renesas 	<ul style="list-style-type: none"> Alpha Celestica Delta Edgecore Inventec Pegatron Ufispac Zyxel

Target applications

A wide range of network elements have been created and deployed using the software, including the following.

- Carrier Ethernet and Metro Ethernet devices
- Cellular / mobile backhaul, cell site routers
- Packet microwave switches / routers
- Campus, Datacenter and Enterprise switches
- Industrial Ethernet switches
- Optical transport
- Secure routers, VPN / security gateways
- OLT, BNG

Disaggregated solutions for specific network applications / deployments

CapGemini continually creates application specific variants to further accelerate innovation and time to deployment. Current application specific variants for disaggregated networking solutions include:

- Broadband Network Gateway (BNG / vBNG)
- CU router / DU router / vRouter
- Datacenter leaf / spine / ToR switches
- Disaggregated Cell Site Gateway (CSG / CSR)
- Fronthaul Gateway
- Optical Line Termination (OLT / vOLT)

The software has a comprehensive set of features including the following. Select features are available integrated on specific select white box or reference hardware models.

Switch / router management and base infrastructure

- CLI (console, Telnet, SSH)
- SNMP (v1, v2c, v3), full MIB support
- Netconf, Yang models for all features
- Configuration persistency
- Software upgrade with SFTP or TFTP
- Syslog, Email alerts
- TCP/IP IPv4 & IPv6, UDP, ARP, ND, ping, traceroute
- DHCP client, server, relay – IPv4 & IPv6
- DNS client – IPv4 & IPv6
- Radius based authentication - IPv4 & IPv6
- Tacacs+ based authentication - IPv4 & IPv6
- RMON, DSMON
- IP authorized managers
- System resource monitoring
- Uplink failure detection, Link up delay
- OpenFlow
- Switch stacking and switch / router redundancy

Timing and synchronization

- IEEE 1588v2 PTP, 802.1AS
- SyncE
- Time of Day, Frequency & Phase synchronization
- Transparent Clock
- Boundary Clock
- ITU-T G.8273.2, G.8273.3
- NTP – client, server, IPv4 & IPv6
- SNTP – client server, IPv4 & IPv6

Carrier Ethernet

- MEF management, CE 2.0
- E-LAN, E-Line, E-Tree, P2P & P2MP EVCs
- Provider bridging, Q-in-Q
- Ethernet OAM 802.3ah
- Ethernet CFM 802.1ag, Y.1731
- G.8031 path protection, G.8032 ring protection
- ELMI, L2GP
- PBB, PBB-TE
- RFC 2544 performance test
- Y1564 service activation test

Traffic management

- L2, L3 and L4 ACLs
- Traffic filtering
- Rate limiting, Storm control, Flow control
- QoS – metering, marking, queuing, shaping, 802.1p, DiffServ, traffic prioritization, H-QoS
- QoS profiles
- PCP
- OpenFlow

Ethernet switching

- Transparent bridging, 802.1Q VLANs
- RSTP, MSTP, PVRST+
- Link aggregation, LACP, MC-LAG
- 802.1x authentication
- IGMP snooping, filtering, proxy, MLD snooping
- LLDP, LLDP-MED
- GARP, GVRP, GMRP
- MRP, MVRP, MMRP
- DHCP snooping
- IP source guard, ARP guard, IPv6 RA guard
- Root guard, BPDU guard
- Loop prevention

Data center bridging

- Priority flow control
- Enhanced transmission selection
- Congestion notification, Pause flood
- DCBX – IEEE, CEE
- TRILL
- FIP Snooping
- Ethernet virtual bridging

Cyber security and network security

- 802.1x authentication
- Radius and Tacacs+ based authentication
- User privilege levels, authorization
- DoS attack protection, stateful firewall
- IPSec, IKE
- IP authorized managers, secure management
- Root guard, BPDU guard

IP / routing

- IPv4 & IPv6 static routing
- IS-IS – IPv4 & IPv6, graceful restart
- BGP – IPv4 & IPv6, graceful restart
- OSPFv2, OSPFv3, graceful restart, OSPF-TE
- Authenticated router neighborhood
- Route redistribution, route maps
- Policy based routing
- IPv4 multicast – IGMP v1/v2/v3, PIM-SM, PIM-SSM, DVMRP, MSDP
- IPv6 multicast – MLD v1/v2, PIM-SM, PIM-SSM
- Router ports
- Virtual routing
- VRF
- VRRP router redundancy – IPv4 & IPv6
- BFD – per IP destination or routing protocol peer

MPLS

- IP-MPLS, MPLS-TP
- Provisioned LSPs & pseudowires (sans signaling)
- LDP, T-LDP
- RSVP-TE
- Fast ReRoute
- P2P and P2MP provisioned LSPs
- L2VPN, PWE3, VPWS, VPLS, BGP auto discovery
- L3VPN, BGP MPLS VPN
- MPLS-TP OAM – BFD, Y.1731, VCCV, LSP ping
- MPLS-TP resiliency – end-to-end path protection and instant recovery
- MPLS PM – LM / DM

Network virtualization and overlays

- VxLAN, EVPN
- L2TPv3

Segment Routing

- SR with OSPF extensions
- SR with IS-IS extensions
- L2VPN/L3VPN services over SR paths