

# OcNOS® Service Provider Solution

## Data Sheet

### Overview

The service provider mobile and wireline network of the future will not just need to provide exponentially higher bandwidth at lower operating costs but will also have to be capable of enabling new applications such as pervasive mobile broadband, IoT/sensor networks, autonomous vehicles and smart consumer wireless devices. Mobile network operators are actively seeking cost-effective cell site gateway solutions to accommodate the mass rollout of 4G/5G services to meet this mobile traffic demands. Disaggregated, open network solutions benefit operators as they build out 4G/5G infrastructure by reducing costs, expanding the vendor ecosystem and leveraging automation so they are more agile in introducing new services.

### OcNOS® Software

OcNOS (Open Compute Network Operating System) is a robust, programmable and innovative operating system, featuring a single software image that runs across the entire portfolio of Open Compute platforms from leading network device vendors. This guarantees consistent operations, workflow automation and high availability, while significantly reducing operational expenses.

OcNOS borrows heavily from the popular ZebOS line of products, which provides a rich feature

density and robustness that have been built up over the years and validated in thousands of diverse customer networks. OcNOS provides industry standard CLI, supports all standard MIBs and other standard operation and management tools. Its integrated centralized management and provisioning layer allow for transaction-based configuration and device feature modelling.

The management layer has support for Netconf, REST APIs besides custom CLI generation capability. This allows an OcNOS system to be configured, managed and controlled by Network Management System for scaled topologies and in flexible ways.

OcNOS is a modular, multi-tasking network operating system, with tight integration capabilities on commodity hardware. This design allows for scaled and performance critical deployments.

The niche coupling with merchant silicon utilizes key hardware capabilities for better performance and feature set.

Disaggregated Cell Site Gateway (DCSG) proposes to use WhiteBox switches with an Open NOS as a Cell Site Router (CSR) unit. The openness of HW and NOS makes the solution highly cost effective, interoperable, avoids vendor lock-in and provides opportunities for innovation from third party.

## 1.0 Features on OcNOS SP Release

The table below lists the software features in the latest OcNOS SP available release. Note, the following mentioned features are only indicative and the detail feature list may vary. Please refer to Feature Matrix for complete feature list on supported ODM platforms.

OcNOS-SP FEATURE	TECHNICAL SPECIFICATIONS – NOS SOFTWARE FEATURES
Layer 2 Switching	Virtual LANs with Port-based VLANs, Routed VLAN interface, Port based VLAN interface, Private VLAN, Ingress and egress VLAN translation for C-VLAN and S-VLAN at PNP, Cvlan translation at CEP, Q-in-Q, L2PT, STP, Multiple Spanning, Tree Protocol (MSTP), Rapid Spanning Tree (RSTP), LLDP v2, Link Aggregation Control Protocol (LACP), Static link aggregation group, MC-LAG Active/Standby support as attachment circuit for VPWS Pseudowire Redundancy, BPDU Protect, Root Guard, MAC Learning Disable, Static MAC Address Assignment, Port based authentication with Radius server
Layer 3 Routing	Ethernet ARP, Path MTU for IPv4 & IPv6, Transmission of IP Datagrams over Ethernet, Congestion Control in IP/TCP Networks, IP Broadcast, IP Broadcast in the Presence of Subnets, IP Subnetting, Classless Inter-Domain Routing (CIDR), Requirements for IP Version 4 Routers, Route Redistribution across RIP, OSPF and BGP, VLAN Routing, URPF, BGP, RIP, OSPF, ISIS, BFD, VRRP
MPLS	MPLS Architecture, MPLS Label Stack Encoding, Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks, MPLS Diffserv, Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base (MIB), Multiprotocol Label Switching (MPLS) Forwarding Equivalence Class to Next Hop Label Forwarding Entry (FEC-To-NHLFE) Management Information Base (MIB), Label Distribution Protocol (LDP), Resource Reservation Protocol (RSVP), Layer 2 VPN (VPWS and VPLS), Layer 3 VPN, MPLS OAM, MPLS PW and LSP Traffic Statistics
Carrier Ethernet	Connectivity Fault Management (CFM) MD, MA, MIP, Down MEP, Continuity check (multicast CCM), Ping (unicast), Link trace, Fault reporting (RDI, Mac Status defect, CCM Cross Connect Defect, Error CCM Defect), CFM over L2 Bridge with xSTP, CCM over VPWS, Frame Delay and inter frame delay variation measurement using DMM and DMR over L2 Bridge, Frame Dealy and inter frame dealy variation measurement using DMM and DMR over VPWS Frame Loss Measurement using LMM/LMR and SLM/SLR over VPWS Ethernet Ring Protection Switching (ERPS) ERPS over CFM on Provider/Customer domain, Sub-ring support (Multiple ring and ladder topologies), Support of multiple ERP Instances on single ring
VxLAN with EVPN	EVPN for VXLAN, EVPN Multihoming for VXLAN, VxLAN QoS
Multicast Features	PIM, IGMP
Quality of Service (QoS)	Diffserv Field in IPv4/IPv6 Headers, Assign matching traffic flow to a specific queue, 1/2/3 Level queuing hierarchy, L2 and L3 QoS, Rate Limiting - 1/2/3 rate coloring, policing and marking, Shaping per queue, per port, Multiple hardware queues per port, WRR/WFQ/SP Scheduling Per Queue, WRED, 802.1p remarking, Classification based on interface, ACL, DSCP, IP precedence, RTP, 802.1p, and VLAN, Trust IEEE 802.1p/DSCP, Remarking of bridged packets, Police Rate (SRTCM/TRTCM), Minimum and Maximum Bandwidth Per Queue, Service Queuing (Mapping services to specific vlans and shaping each vlan based traffic)
Management	Role based CLI management and access, CLI access via console, telnet and SSH, Authentication using tacacs+/radius client, Extended ping and traceroute, SNMP v1, v2, and v3, sFlow, DHCP client, DHCP relay, NTP, syslog, File Upload/Download using FTP/TFTP/SFTP/SCP, Management VRF, Ansible, Yang, NETCONF, Patch Upgrade Mechanism with & without ONIE
Security	Secure interface login and password, SSH v1, v2, Storm control, Flow control, DHCP Snooping, IP Source Gaurd Access Control Lists (ACLs) based on: Source IP address, Destination IP address, TCP/UDP source port, TCP/UDP destination port, IP protocol type, Source MAC address, Destination MAC address, Ethertype TCP Flags, Protocol type, IP fragment flags, DSCP, CoS, IP precedence, Rule prioritization and Re sequence, On-fly modification
Hardware-Specific Features	Switched port analyzer (SPAN), Remote switched port analyzer (RSPAN), Unified Forwarding Table (UFT), Dynamic load balancing (RTAG7 hash), Port Breakout, TCAM space monitoring
Chassis Monitoring	Temperature monitor, Fan control, Power Monitoring, CPU load monitoring, Board information (EEPROM), Fan and PSU FRU information, Hardware MIB and Traps
Digital Diagnostics Monitoring	Temperature monitor, Power Monitoring (Power, Current, Voltage), Hardware MIB and Traps
Timing and Synchronization	SyncE, ESMC, G.8271.1 (T-BC), G.8273.2, G.8275.1
Subinterface	L3 termination of IPv4 and IPv6 packets

## 1.1 Validated Platform Details

Following are the details for the platforms supported against the SKU specified in Section 2.1.

### 1.1.1 EdgeCore AS7316-26XB

ODM PRODUCT IDENTIFICATION	EC AS7316-26XB	
Switch Silicon	Broadcom Qumran-AX BCM88470	
CPU Modules	Processor: Intel Broadwell-DE D-1519 1.5G 4C Memory: DDR4 SO-DIMM 2x 8GB SDRAM with ECC support SSD: 128 GB	
Ports	<p><b>Switch Ports:</b> 16 x SFP+ (each supporting 10 GbE or 1 GbE) 8 x SFP28 (each supporting 10 GbE or 25 GbE) 2 x 100G QSFP28 (each supporting 1 x 40/100 GbE or 4 x 10/25 GbE or 2 x 50 GbE)</p> <p><b>Management Ports on Front Panel:</b> 1 x RJ-45 serial console 1 x RJ-45 1000BASE-T management Ethernet port (MGMT) 1 x USB Type A storage port</p> <p>Clocking and Timing ports: 1 x 1PPS Input port 1 x 1PPS Output port 1 x 10MHz Input port 1 x 10MHz Output port 1 x Time of day (ToD) RJ-45 port 1 x Building-Integrated Timing System port (BITS)</p> <p><b>GPS Antenna:</b> 1 x GPS antenna port</p>	
Performance	High performance packet processor : Switching Capacity: 300 Gbps full-duplex Packet Throughput: 300 Mpps processing rate	
Regulatory Compliance	<p><b>Safety</b> UL (CAN/CSA 22.2 No 60950-1 &amp; UL60950-1) CB (IEC/EN60950-1) CCC (GB4943.1-2011) BSMI (CNS14336-1)</p>	<p><b>Electromagnetic Compatibility</b> CE Mark EN55032 Class A EN55024 (Immunity) for Information Technology Equipment EN 61000-3-3 EN 61000-3-2 FCC Title 47, Part 15, Subpart B Class A VCCI Class A CNS 13438 (BSMI) CCC (GB9254-2008)</p>
Power	<p><b>48 VDC Power Supply:</b> 400W PSU 36-75VDC input Front-to-back airflow Supports load-sharing function</p>	<p><b>AC Power Supply:</b> 400W PSU 100-240V AC input Front-to-back airflow Supports load-sharing function Power Consumption: Approx. 230 W (Max), 170 W (Typical)</p>
OcNOS SKU	OCNOS-SP-CSR	

### 1.1.2 EdgeCore AS5912-54X

ODM PRODUCT IDENTIFICATION	EC AS5912-54X
Switch Silicon	Broadcom Qumran MX BCM88370
CPU Modules	Intel Rangeley C2538 4C 2.4GHz Processor DDR3 SO-DIMM 8 GB x 2 mSATA: 32 GB
Ports	<p><b>Switch Ports:</b> 48 x SFP+ each supporting 10 GbE or 1 GbE 6 x 100G QSFP28 each supporting 1 x 40/100 GbE</p> <p><b>Management Ports on Front Panel:</b> 1 x RJ-45 serial console 1 x RJ-45 100/1000BASE-T management port 1 x USB Type A storage port</p> <p><b>Supported Optics and Cables:</b> SFP+ Ports: 10GBASE-CR DAC: up to 3 m passive; up to 10 m active 10GBASE-SRL/SR: up to 100/300 m over OM3 MMF 10GBASE-LR: Up to 10 km over SMF 10GBASE-ER: Up to 40 km over SMF 1000BASE-SX, 1000BASE-LX, 100/1000BASE-T QSFP+ Ports: 40GBASE-CR4 DAC; up to 3 m passive; up to 10 m active 40GBASE-CR4 DAC to 4 x SFP+ 10GBASE-CR DAC; up to 3 m passive; up to 10 m active 40GBASE-SR4: Up to 100 m over OM3 MMF, 150 m over OM4 MMF 40GBASE-LR4: Up to 10 km over SMF 100GBASE-SR4: 100 Gbps short reach transceiver 100GBASE-LR4: 100 Gbps long reach transceiver QSFP28 AOC Cable: 100 Gbps to 100 Gbps AOC cable with upto 30 M 100G QSFP28 DAC Cable: 100GBASE-CR4 100 Gbps to 100Gbps Twinax DAC Cable</p>
Performance	Switching Capability: 800 Gbps Forwarding Rate: 720 Mpps Jumbo Frame: 9 Kbytes 16MB on-chip buffering Deep DRAM buffering: 6 GB
Regulatory Compliance	<p><b>EMI:</b> CE Mark, EN55032 Class A, EN55024, EN61000-3-2, EN61000-3-3, FCC Part 15 Subpart B Class A, VCCI Class A, BSMI</p> <p><b>Safety:</b> CB, UL/CUL</p> <p><b>Environmental:</b> NEBS Level 1</p> <p><b>RoHS 2.0 Compliant WEEE Standards:</b> The switches complied with the following WEEE standards: Waste Electrical and Electronic Equipment (WEEE Directive 2002/96/EC)</p>
Power	PSUs: 2 redundant, load-sharing, hot-swappable AC or -48 VDC AC input range: 90 V ~ 240 VAC DC input range: -36 ~ -72 VDC
OcNOS SKU	OCNOS-SP-IPBASE, OCNOS-SP-MPLS, OCNOS-SP-IPADV-CE-AGGR, OCNOS-SP-PLUS

### 1.1.3 EdgeCore AS5916-54XKS

ODM PRODUCT IDENTIFICATION	EC AS5916-54XKS
Switch Silicon	Broadcom Qumran-MX BCM88375 + BCM52311 TCAM
CPU Modules	Intel® Xeon® D-1548 processor 8 cores 2.0 GHz DDR4 SO-DIMM 16 GB x 2 m.2 SSD: 128GB MLC
Ports	<p><b>Switch Ports:</b> 48 x SFP+ each supporting 10 GbE or 1 GbE 6 x 100G QSFP28 each supporting 1 x 40/100 GbE</p> <p><b>Management Ports on Front Panel:</b> 1 x RJ-45 serial console 1 x RJ-45 100/1000BASE-T management port 1 x USB Type A storage port 1 x BMC</p> <p><b>Supported Optics and Cables:</b> SFP+ Ports: 10GBASE-CR DAC: up to 3 m passive; up to 10 m active 10GBASE-SR: up to 100/300 m over OM3 MMF 10GBASE-LR: Up to 10 km over SMF 1000BASE-SX, 1000BASE-LX, 100/1000BASE-T QSFP28 Ports: 40GBASE-CR4 DAC; up to 3 m passive; up to 10 m active 40GBASE-CR4 DAC to 4 x SFP+ 10GBASE-CR DAC; up to 3 m passive; up to 10 m active 40GBASE-SR4: Up to 100 m over OM3 MMF, 150 m over OM4 MMF 40GBASE-LR4: Up to 10 km over SMF 100GBASE-SR4: 100 Gbps short reach transceiver 100GBASE-LR4: 100 Gbps long reach transceiver QSFP28 AOC Cable: 100 Gbps to 100 Gbps AOC cable with upto 30 M 100G QSFP28 to 100 G QSFP28</p>
Performance	Switching Capacity: 800 Gbps Processing Rate: 700 Mpps Jumbo Frame: 9 Kbytes 16MB on-chip Buffering Deep DRAM Buffering: 8 GB
Regulatory Compliance	<p><b>EMI:</b> CE Mark, EN55032 Class A, EN55024, EN61000-3-2, EN61000-3-3, FCC Part 15 Subpart B Class A, VCCI Class A</p> <p><b>Safety:</b> CB, UL/CUL</p> <p><b>Environmental:</b> NEBS Level 3</p> <p><b>RoHS 2.0 Compliant WEEE Standards:</b> The switches complied with the following WEEE standards: Waste Electrical and Electronic Equipment (WEEE Directive 2002/96/EC)</p>
Power	PSUs: 2 redundant, load-sharing, hot-swappable AC or -48 VDC AC input range: 100–240 VAC DC input range: -36~-72 VDC
OcNOS SKU	OCNOS-SP-IPBASE, OCNOS-SP-MPLS, OCNOS-SP-IPADV-CE-AGGR, OCNOS-SP-PLUS

### 1.1.4 UfiSpace S9500-30XS

ODM PRODUCT IDENTIFICATION	UFISPACE S9500-30XS	
Switch Silicon	Broadcom Qumran-AX BCM88470	
CPU Modules	Processor: Intel® Broadwell-DE D-1519 1.5G 4-Core Memory: DDR4 SODIMM 2x16GB with ECC support SSD: 128 GB	
Ports	Total 10 GE SFP+: 20 Total 25 GE SFP28: 8 Total 100 GE QSFP28: 2 1 RJ45 + Micro USB console/management ports 1 1000 Base-T Ethernet port for Out-of-Band management 1 USB 2.0 Type-A general purpose port GNSS, 1PPS, 10M, ToD, and BITS timing ports	
Performance	Packet Throughput 300 Mpps Packet Switching Capacity 300 Gbps	
Regulatory Compliance	<b>Safety</b> NEBS Level3 UL 62368-1 IEC/EN 60950-1 IEC/EN 62368-1 BSMI CNS 14336-1	<b>Electromagnetic Compatibility</b> NEBS Level 3 FCC Part 15, Subpart B, Class A EN55032, Class A EN300 386 EN55024 EN301 489-1 EN301 489-19 EN303413 BSMI (CNS 13438), Class A
Power	AC input: 100 ~ 240V, 6 ~ 3A, 50 ~ 60Hz DC input: -36 ~ -75V, 16 ~ 8A Max power: 400 Watts	
OcNOS SKU	OCNOS-SP-CSR	

### 1.1.5 Delta AGC7648A

ODM PRODUCT IDENTIFICATION	AGC7648A
Switch Silicon	Broadcom Qumran-MX BCM88375
CPU Modules	Intel Rangeley C2538 8GB x1 DDR3 32GB m.2 SSD 16MB SPI-Flash (Boot) Packet Buffer: 4GB GDDR5 T-CAM: NL88659 (AGC7648S V1)
Ports	48 x 1/10GbE SFP+ ports 6 x 40/100GbE QSFP28 ports 1 x RJ45 Console port 1 x RJ45 100/1000BASE-T OOB Management port 1 x USB port <b>Supported Optics &amp; Cables</b> SFP+ : 10GBASE-SR 300m, 10GBASE-LRM 220m, 10GBASE-LR4 2km, 10GBASE AOC 3m, 10GBASE DAC, 1m, 3m QSFP28: 100GBASE-SR4 100m, 100GBASE-LR4 2km, 10km, 100GBASE-PSM4, 100GBASE AOC 3m, 100GBASE DAC, 3m, 5m, 100G to 4x25G AOC 5m, 100G to 4x25G DAC 1m, 3m, 40GBASE-SR 150m, 300m, 40GBASE-LR4, 2km, 10km, 40GBASE-PSM4 Lite, 40GBASE AOC 3m, 5m, 40GBASE DAC, 1m, 3m, 5m, 7m, 40G to 4x10G AOC, 5m 40G to 4x10G DAC, 3m, 5m
Performance	Packet Buffer: 4GB GDDR5 External TCAM - 2M records Switch Fabric: 800Gb/s full-duplex Processing Rate: 720 Mp/s Support Jumbo frames up to 9K MAC Addresses: 750 K VLAN IDs: 4K Forwarding Table Sizes: Subject to NOS Network Virtualization: Subject to NOS
Regulatory Compliance	Safety: EN 60950-1, UL 60950-1, CAN/CSA C22.2 No. 60950-1-07, IEC 60950-1 Emissions: AS/NZS CISPR 22: Class A, ICES-003, Issue Class A, EN55032: Class A, VCCI Class A, FCC CFR 47 Part 15, Subpart B Class A Immunity: EN55024, EN 61000-3-2, EN 61000-3-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN61000 -4-8, EN61000-4-11 EU RoHS Compliant
Power	2 slots for Hot-swappable PSUs and 1+1 redundancy support 4 slots for Hot-swappable FANs and 3+1 redundancy support Applicable worldwide ranging PSU AC to DC: 100 ~ 240 VAC 50/60 Hz DC to DC: -48 ~ -60 VDC nominal
OcNOS SKU	OCNOS-SP-IPBASE, OCNOS-SP-MPLS, OCNOS-SP-IPADV-CE-AGGR

### 1.1.6 Dell S4248FB-ON/S4248FBL-ON

ODM PRODUCT IDENTIFICATION	S4248FB-ON/S4248FBL-ON		
Switch Silicon	Broadcom Qumran-MX BCM88375		
CPU Modules	CPU memory: S4248FB-ON: 8GB S4248FBL-ON: 32GB		
Ports	40 x 10 Gigabit Ethernet SFP+ ports 2 x 40 Gigabit Ethernet QSFP+ ports 6 x 100 Gigabit Ethernet QSFP28 ports 1 RJ45 console/management port with RS232 signaling		
Performance	Switch fabric capacity: 1.6Tbps (full-duplex) 800Gbps (half-duplex) Forwarding capacity: 720 Mpps Packet buffer memory: 6GB		
		S4248FB-ON	S4248FBL-ON
	MAC scale	750K	750K
	IPv4 hosts	96K	96K
	PVST instance	128	128
	Ingress ACL	8192	8192
	Egress ACL	2048	2048
	L3 VLAN	500	500
	IPv4 routes	130K	2 Million
IPv6 routes	64K	400K	
Regulatory Compliance	<p><b>Safety</b>            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</p> <p><b>Emissions</b>            Australia/New Zealand: AS/NZS CISPR 22: 2009, 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</p> <p><b>Immunity</b>            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</p> <p><b>RoHS</b>            All S-Series components are EU RoHS compliant.</p>		



<b>Power</b>	Power supply: 100–240 VAC 50/60 Hz DC power supply: -36V to -72V Max. thermal output: 2047 BTU/h Thermal dissipation: 1433 BTU/hr (S4248FB-ON); 1604 BTU/hr (S4248FBL-ON) Max. current draw per system: 6A/5A at 100/120V AC 3A/2.5A at 200/240V AC Typical power consumption (S4248FB-ON): 150W Max power consumption (S4248FB-ON): 420W Typical power consumption (S4248FBL-ON): 180W Max power consumption (S4248FBL-ON): 470W Max. operating specifications: Operating temperature: 32° to 104°F (0° to 45°C) Operating humidity: 5 to 90% (RH), non-condensing Max. non-operating specifications: Storage temperature: -40° to 158°F (-40° to 70°C) Storage humidity: 5 to 95% (RH), non-condensing
<b>OcNOS SKU</b>	OCNOS-SP-IPBASE, OCNOS-SP-MPLS, OCNOS-SP-IPADV-CE-AGGR, OCNOS-SP-PLUS

## 2.0 Solution Ordering Guide

### 2.1 OcNOS-SP

SKU	PORT DENSITY	ODM	SWITCHES
OCNOS-SP-CSR	16 x 10G, 8 x 25G, 2 x 100G	Edgecore	AS7316-26XB
		Ufispaces	S9500-30XS
OCNOS-SP-IPBASE	40 x 10G, 2 x 40G, 6 x 100G or 48 x 10G, 6 x 100G	Dell	S4248FBL-ON, S4248FB
		Delta	AGC7648A
		Edgecore	AS5912-54X, AS5916-54XKS
OCNOS-SP-MPLS	40 x 10G, 2 x 40G, 6 x 100G or 48 x 10G, 6 x 100G	Dell	S4248FBL-ON, S4248FB
		Delta	AGC7648A
		Edgecore	AS5912-54X, AS5916-54XKS
OCNOS-SP-IPADV-CE-AGGR	48 x 10G, 6 x 100G, 40 x 10G, 2 x 40G, 6 x 100G	Dell	S4248-FBL-ON, S4248-FB-ON
		Delta	AGC7648A
		Edgecore	AS5912-54X, AS5916-54XKS
OCNOS-SP-PLUS	48 x 10G, 6 x 100G 40 x 10G, 2 x 40G, 6 x 100G	Dell	S4248-FBL-ON, S4248-FB-ON
		Edgecore	AS5912-54X, AS5916-54XKS

## 2.2 Maintenance & Support

SKU	MAINTENANCE & SUPPORT
OcNOS-MS-1Y	1-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for Severity 1 issues, normal business hours for all other issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.
OcNOS-MS-3Y	3-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for Severity 1 issues, normal business hours for all other issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.
OcNOS-MS-5Y	5-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for Severity 1 issues, normal business hours for all other issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.
OcNOS-MS-1Y-Premium	1-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for all issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.
OcNOS-MS-3Y-Premium	3-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for all issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.
OcNOS-MS-5Y-Premium	5-year Maintenance & Support with Upgrades - Includes Technical support resources, software updates & upgrades, email and phone support, access to Support web site including case management system. Access to technical support team 24 x 7 for all 1 issues. "Upgrade" means a version change for the licensed software with substantial improvements, enhancements and bug fixes.

### More Information

For more information about the OcNOS Service Provider solution, contact your IP Infusion sales representative.

#### ABOUT IP INFUSION

IP Infusion, a leader in disaggregated networking solutions, delivers enterprise and carrier-grade software solutions allowing network operators to reduce network costs, increase flexibility, and to deploy new features and services quickly. IP Infusion is headquartered in Santa Clara, Calif., and is a wholly owned and independently operated subsidiary of ACCESS CO., LTD. Additional information can be found at <http://www.ipinfusion.com>

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