

OcNOS Data Center (DC)

February 2025

1.0 OcNOS Data Center

1.1 OcNOS Data Center Key Features

Following are key features of the OcNOS Data Center:

- Comprehensive L2 switching and L3 routing
- EVPN-VxLAN with multihoming, IRB anycast gateway and E-Tree features
- Advanced QoS with PFC for RoCEv2 and Data Center Bridging
- IP multicast
- SNMP, Netconf, OpenConfig Yang data models
- ZTP
- sFlow and streaming telemetry

KEY BENEFITS:

- Deployment proven disaggregated networking solutions
- Open standards-based product, interoperable with existing deployments
- Small footprint resulting from an optimized design
- Scalable NOS with Terabits switching bandwidth support
- Simple, all-inclusive licensing

1.2 Data Center Use Cases

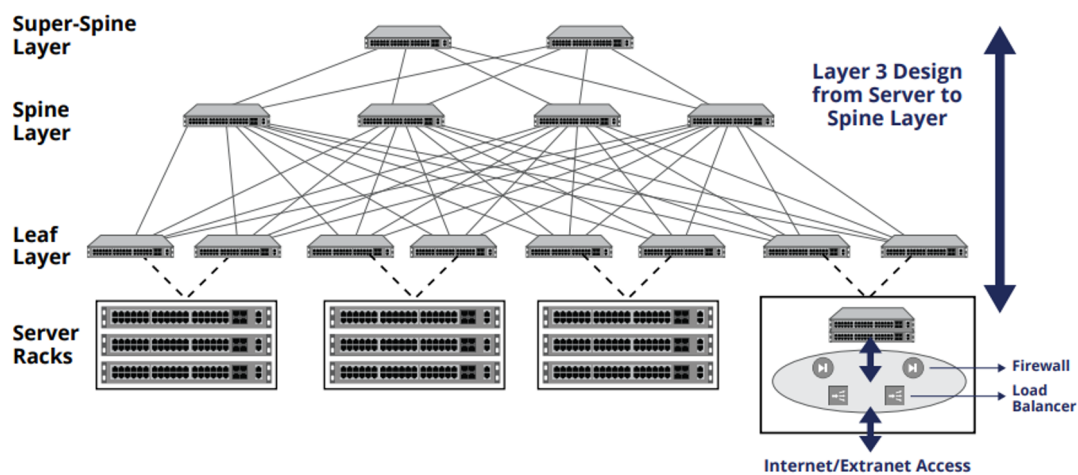
Following lists use cases for OcNOS Data Center:

- DC-CLOS
- Multi-tenant DC (Underlay + Overlay)
- Lossless fabric for AI/ML
- Data center devices out-of-band management

1.3 DATA CENTER OVERLAY NETWORKING

The design of data center with overlay networking uses a CLOS fabric based full L3 underlay network to provide a resilient and horizontally scalable network. eBGP is preferred in the underlay for its simplicity to configure and troubleshoot a large uniform topology such as CLOS, and high vendor interoperability. Typical network topology:

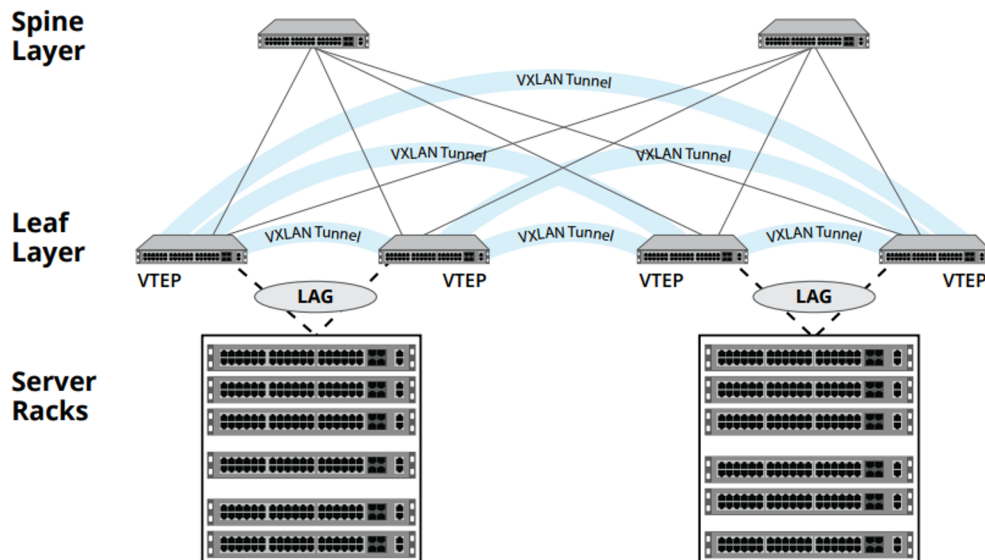
- Fully routed from leaf switch. A L3 only design simplifies the network design and the network operations.
- Redundant server connection to leaf switch.
- Build a large scale data center using uniform nodes.



Leaf-Spine IP CLOS Underlay Network

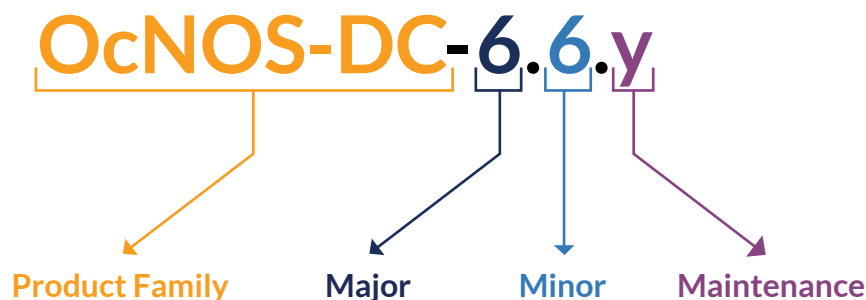
EVPN-VXLAN overlay runs on top of the L3 underlay network to provide both L2 and L3 virtual networks distributed and spread across a data center. EVPN overlay reuses BGP (can be internal or external) with only a separate address family thus keeping the protocol complexity to minimal.

Following EVPN Features are supported:



- EVPN multihoming ensures redundancy and optimal utilization.
- Route-types 1 to 5.
- VLAN-based, VLAN-bundle and VLAN-aware services.
- Auto-RT for L2 VPN's.
- Standard based all-active multihoming ensuring redundancy and optimal utilization.
- Layer 2 ARP/ND learning enables flood control in overlay.
- Layer 3, both interface-full (IRB) and interface-less models.
- Symmetric and Asymmetric IRB.
- Port+VLAN based access-port mapping.
- E-Tree Scenario-1

2.0 IP Infusion Product Release Version



Product Name: Refers to IP Infusion Product Family.

Major Version: A major release consists of major new features and/or large architectural changes.

Minor Version: A minor release includes some feature enhancement, functions and bug fixes.

Maintenance: Improvements and fixes to existing features enhancing stability of the product.

3.0 Features on OcNOS Data Center Release

The table below lists the features in OcNOS-DC. Note, the following mentioned features are only indicative and the detailed feature list may vary. Please refer to Feature Matrix for a complete feature list on supported ODM platforms.

3.1 Data Center Software Features

SOFTWARE FEATURE	SPECIFICATION
Layer 2 Switching	<ul style="list-style-type: none">• VLAN• Spanning Tree Protocol (STP)• Multiple Spanning Tree Protocol (MSTP)• Rapid Spanning Tree (RSTP)• Link Layer Discovery Protocol (LLDPv2)• Link Aggregation• Multi-Chassis Link Aggregation (MLAG)• MLAG with RSTP• Protected port on MLAG with RSTP• MLAG + Provider Bridging (PB) with RSTP• MLAG + VRRPv4 with RSTP• MLAG + VRRPv6 with RSTP• Provider Bridging• Data Center Bridging (DCB)• Static MAC address assignment• Bridge Protocol Data Unit (BPDU) Protect• Root Guard• MAC learning disable• Port-based authentication with RADIUS server• Port Security• Unidirectional Link Detection (UDLD)

SOFTWARE FEATURE	SPECIFICATION
Layer 3 Routing	<ul style="list-style-type: none"> • Ethernet ARP • 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 • Inter Virtual Routing and Forwarding (VRF) route leaking • Static inter VRF route leaking for IPv6 (between default and non-default instances) • Multiple loopback interfaces in same VRF • Static route tracking using object tracking (IP SLA) • Route advertisement for IPv6 • URPF • BGP • RIP • OSPF • ISIS • BFD • VRRPv3
Virtual Extensible LAN (VxLAN)	<ul style="list-style-type: none"> • Layer 2 EVPN for VXLAN • Layer 2 EVPN auto RT for VxLAN • Layer 2 EVPN multihoming for VXLAN • VxLAN EVPN with BGP unnumbered • VXLAN-EVPN L2CP on EVPN Access • VxLAN QoS • VxLAN IRB • VxLAN-IRB QoS • VXLAN IRB - Inter-VRF route leaking • Selectively enabling multiple IP addresses on IRB interface for anycast-gateway • DHCP Relay for VXLAN IRB • Static VXLAN • VXLAN Trunk as access port • VXLAN - Overlay Equal-Cost Multipath (ECMP) • EVPN ETREE with VxLAN transport • Ingress and egress IP ACL for IRB interface • BGP, OSPF and ISIS support on IRB interface
Multicast Features	<ul style="list-style-type: none"> • Protocol Independent Multicast – Sparse Mode (PIM-SM) for IPv4 and IPv6 • Protocol Independent Multicast – Dense Mode (PIM-DM) for IPv4 • PIM - Source Specific Multicast for IPv4 and IPv6 • MLD v1 and MLD v2 • PIM ECMP IPv4 • Internet Group Management Protocol (IGMP), Version 2 • Internet Group Management Protocol (IGMP), Version 3
Quality of Service (QoS)	<ul style="list-style-type: none"> • DiffServ field in IPv4/IPv6 headers • Assign matching traffic flow to a specific queue • 1/2/3 level queuing hierarchy • L2 and L3 QoS • Shaping per queue, per port • Multiple hardware queues per port • WFQ/SP scheduling per queue • WRED

SOFTWARE FEATURE	SPECIFICATION
Quality of Service (QoS) (cont'd)	<ul style="list-style-type: none"> • 802.1p remarking • Classification based on interface, ACL, DSCP, IP precedence, 802.1p, and VLAN • Trust IEEE 802.1p/DSCP • Police rate (SRTCM/TRTCM) • Minimum and maximum bandwidth per queue • Service queuing (mapping services to specific VLANs and shaping each VLAN based traffic) • IP SLA (ICMP Echo) • ToS based queue distribution over Layer 2 Interface • QoS with PFC for RoCEv2 • Explicit Congestion Notification (ECN)
Management	<ul style="list-style-type: none"> • Role based CLI management and access • CLI access via console, telnet and SSH • Authentication using TACAS+/RADIUS Client • Extended ping and traceroute • SNMP v1, v2, and v3 • DHCP client • DHCP Relay • DHCP Option 82 (IPv4) • NTP client • NTP server • Syslog • File Upload/Download using FTP/TFTP/SFTP/SCP • Management VRF • Ansible • Upgrade mechanism from ONIE prompt using ONIE NOS install and from OcNOS shell using sys-update • Zero Touch Provisioning (ZTP) (with IPv4) • Zero Touch Provisioning (ZTP) (with IPv6) • ACL support over Management, VTY and Loopback • sFlow • Debounce Timer • DHCPv6 prefix delegation • DNS Relay (v4 and v6) • Storing multiple images on platform • Fault Management System • DHCP Relay across VRFs • Infrastructure for pluggable OLT modules • DHCP Server (IPv4 and IPv6) • Network Configuration Protocol (NETCONF) <ul style="list-style-type: none"> – YANG 1.0 data modelling language – YANG 1.1 data modeling language – IP Infusion data models – OpenConfig data models – NETCONF protocol over Secure Shell (SSH) – NETCONF event notifications – YANG module for NETCONF monitoring – NETCONF base notifications – NETCONF access control model – Multiple simultaneous config sessions for CLI – Transaction based CLI – Netconf Call Home • Streaming Telemetry dial-in and dial-out • Configurable Password Policy • Event Manager

SOFTWARE FEATURE	SPECIFICATION
Security	<ul style="list-style-type: none"> • Secure interface login and password • Storm control • Flow control • DHCP Snooping • IP Source Guard • Dynamic ARP inspection • Access Control Lists (ACLs) based on <ul style="list-style-type: none"> – IP/Port/IP-ProtocolType/MAC/Ethertype – TCP Flags, Protocol type, IP fragment flags, DSCP, CoS, IP Precedence, VLAN – Rule prioritization and re-sequence – On-fly modification – Timed ACL
Hardware Monitoring Features	<ul style="list-style-type: none"> • Switched Port Analyzer (SPAN) • Remote Switched Port Analyzer (RSPAN) • Encapsulated Remote Switched Port Analyzer (ERSPAN) • Load balancing • PHY/MAC level interface loopback • TCAM space monitoring • Chassis monitoring <ul style="list-style-type: none"> – Temperature monitor – Fan control – CPU load monitoring – Board information (EEPROM) – Fan and PSU FRU information • Digital Diagnostics Monitoring (DDM) <ul style="list-style-type: none"> – Temperature monitoring – Power monitoring (power, current, voltage)





3.2 OcNOS Data Center Software SKUs

SKU NAME	DESCRIPTION
OCNOS-DC-MGMT	Open Compute Network Operating System Data Center MGMT image with Layer 2 switching and Layer 3 routing (via OSPF, IS-IS, and BGP) support, with perpetual use license (1 license).
OCNOS-DC-IPBASE	Open Compute Network Operating System Data Center IPBASE image with Layer 2 switching, Layer 3 routing (via OSPF, IS-IS, and BGP), and EVPN-VxLAN support, with perpetual use license (1 license).
OCNOS-DC-PLUS	Open Compute Network Operating System Data Center PLUS image with Layer 2 switching, Layer 3 routing (via OSPF, IS-IS, and BGP), EVPN-VxLAN, and streaming telemetry support, with perpetual use license (1 license).

4.0 Solution Ordering Guide

4.1 OcNOS Data Center Supported Hardware Platforms

The following hardware platforms are supported.

Edgecore AS7326-56X SKU: IPBASE, PLUS Ports: 48 x 10/25 GE SFP28; 8 x 40/100 GE QSFP28 Switching capacity: 2 Tbps Switching chipset: Trident3-X7 	UfiSpace S9300-32D New SKU: IPBASE, PLUS Ports: 32 x 400 GE QSFP-DD Switching capacity: 12.8 Tbps Switching chipset: Trident4 			
Edgecore AS4625-54T SKU: MGMT Ports: 48 x 10/100/1000Base-T RJ45; 6 x 1/10G SFP+ Switching capacity: 128 Gbps Switching chipset: Trident3-X2 	UfiSpace S8901-54XC SKU: IPBASE, PLUS Ports: 48 x 10/25 GE SFP28; 6 x 40/100 GE QSFP28 Switching capacity: 1.8 Tbps Switching chipset: Trident3-X5 	UfiSpace S9110-32X SKU: IPBASE, PLUS Ports: 32 x 40/100 GE QSFP28 Switching capacity: 3.2 Tbps Switching chipset: Trident3-X7 	Edgecore AS9726-32DB SKU: IPBASE, PLUS Ports: 32 x 400 GE QSFP-DD Switching capacity: 12.8 Tbps Switching chipset: Trident4 	
Celestica DS1000 SKU: MGMT, IPBASE Ports: 48 x 10/100/1000Base-T RJ45; 8 x 1/10 GE SFP+ Switching capacity: 128 Gbps Switching chipset: Trident3-X2 	Edgecore AS5835-54T SKU: IPBASE, PLUS Ports: 48 x 1/10 GE RJ-45; 6 x 40/100GE QSFP28 Switching capacity: 1.08 Tbps Switching chipset: Trident3-X5 	Edgecore AS7726-32X SKU: IPBASE, PLUS Ports: 32 x 40/100 GE QSFP28 Switching capacity: 3.2 Tbps Switching chipset: Trident3-X7 	Edgecore AS9716-32D SKU: IPBASE, PLUS Ports: 32 x 400 GE QSFP-DD Switching capacity: 12.8 Tbps Switching chipset: Tomahawk3 	
UfiSpace S6301-56ST SKU: MGMT, IPBASE Ports: 48 x 10/100/1000Base-T RJ45; 8 x 1/10 GE SFP+ Switching capacity: 128 Gbps Switching chipset: Trident3-X2 	Edgecore AS5835-54X SKU: IPBASE, PLUS Ports: 48 x 1/10 GE SFP+; 6 x 40/100GE QSFP28 Switching capacity: 1.08 Tbps Switching chipset: Trident3-X5 	Edgecore AS7712-32X SKU: IPBASE, PLUS Ports: 32 x 40/100 GE QSFP28 Switching capacity: 3.2 Tbps Switching chipset: Tomahawk 	Edgecore AS7816-64X SKU: IPBASE, PLUS Ports: 64 x 40/100 GE QSFP28 Switching capacity: 6.4 Tbps Switching chipset: Tomahawk2 	Edgecore AS9736-64D SKU: IPBASE, PLUS Ports: 64 x 400 GE QSFP-DD Switching capacity: 25.6 Tbps Switching chipset: Tomahawk4 

128 Gbps

1.08 – 2.0 Tbps

3.2 Tbps

6.4 - 12.8 Tbps

25.6 Tbps

4.2 Platforms Supported per SKU Solution Ordering Guide

S. NO.	VENDOR PLATFORM	CHIPSET	SPEED/INTERFACE	CPU	OCNOS-DC SKU
1	UfiSpace S6301-56ST	Trident III BCM56277	48 x 1 GbE RJ45, 8 x 10 GbE SFP+	Intel Atom	OCNOS-DC-MGMT, OCNOS-DC-IPBASE
2	Celestica DS1000	Trident III BCM56277	48 x 1 GbE RJ45, 8 x 10 GbE SFP+	Intel Atom	OCNOS-DC-MGMT, OCNOS-DC-IPBASE
3	Edgecore AS4625-54T	Trident III BCM56277	48 x 1GbE RJ45, 6 x 10GbE SFP+	Intel Atom	OCNOS-DC-MGMT
4	Edgecore AS5835-54T	Trident III BCM56771_A0	48 x 1/10 GbE RJ45, 6 x 40/100 GbE. 2 x 40/100GbE ports are splittable into 4 x 10/25GbE	Intel Atom	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
5	Edgecore AS5835-54X	Maverick 2 BCM56771	48 x 1/10 GbE SFP+, 6 x 40/100 GbE. 2 x 40/100 GbE ports are splittable into 4 x 10/25 GbE	Intel Atom	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
6	UfiSpace S8901-54XC	Trident III BCM56770	48 x 1/10/25 GbE, 6 x 40/100GbE. Each 40/100 GbE port is splittable into 4 x 10/25 GbE	Intel Atom	OCNOS-DC-IPBASE, OCNOS-DC-PLUS

S. NO.	VENDOR PLATFORM	CHIPSET	SPEED/INTERFACE	CPU	OCNOS-DC SKU
7	Edgecore AS7326-56x	Trident III BCM56873	48 x 1/10/25GbE, 8 x 40/100GbE. Each 100 GbE port is splittable into 4 x 10/25 GbE	Intel Xeon D-1518	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
8	UfiSpace S9110-32X	Trident III BCM56870	32x 40/100 GbE. Each 40/100 GbE port is splittable into 4 x 10/25 GbE or 2 x 50 GbE	Intel Atom	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
9	Edgecore AS7712-32X	Tomahawk BCM56960	32 x 40/100 GbE. Each 40/100 GbE port is splittable into 4 x 10/25 GbE or 2 x 50 GbE	Intel Atom	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
10	Edgecore AS7726-32X	Trident III BCM56870	32 x 40/100 GbE. Each 40/100 GbE port is splittable into 4 x 10/25 GbE or 2 x 50 GbE	Intel Xeon D-1518	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
11	Edgecore AS7816-64x	Tomahawk II BCM56970	64 x 40/100 GbE. Each 40/100 GbE port is splittable into 4 x 10/25 GbE or 2 x 50 GbE	Intel Xeon D-1518	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
12	Edgecore AS9716-32D	Tomahawk III BCM56980	32 x 100/400 GbE. Each 100/400 GbE port is splittable into 4 x 100GbE or 4 x 25 GbE	Intel Xeon D-1518	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
13	Ufispace S9300-32D	Trident IV BCM56880	32 x 100/400GbE, Each 100/400GbE port is splittable into 4 x 100GbE	Intel Xeon D-2145NT	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
14	Edgecore AS9726-32DB	Trident IV BCM56880	32 x 100/400 GbE. Each 100/400 GbE port is splittable into 4 x 100GbE	Intel Pentium D1519	OCNOS-DC-IPBASE, OCNOS-DC-PLUS
15	Edgecore AS9736-64D	Tomahawk IV BCM56990	64 x 100/400 GbE. Each 100/400 GbE port is splittable into 4 x 100GbE	Intel Xeon D-1518	OCNOS-DC-IPBASE, OCNOS-DC-PLUS

4.3 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.

SKU	MAINTENANCE & SUPPORT
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	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.

5.0 Relevant Links

Additional information about the following documents is available on the IP Infusion website (<https://www.ipinfusion.com/products/ocnos/>)

- Feature Matrix
- Hardware Compatibility List
- Supported Optical Transceivers & Cables
- NETCONF Support

For More Information

Contact us today to learn more about the OcNOS Data Center.

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ABOUT IP INFUSION

IP Infusion is a leading provider of open network software and solutions for carriers, service providers and data center operators. Our solutions enable network operators to disaggregate their networks to accelerate innovation, streamline operations, and reduce Total Cost of Ownership (TCO). Network OEMs may also disaggregate network devices to expedite time to market, offer comprehensive services, and achieve carrier grade robustness. IP Infusion network software platforms have a proven track record in carrier-grade open networking with over 500 customers and over 10,000 deployments. 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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