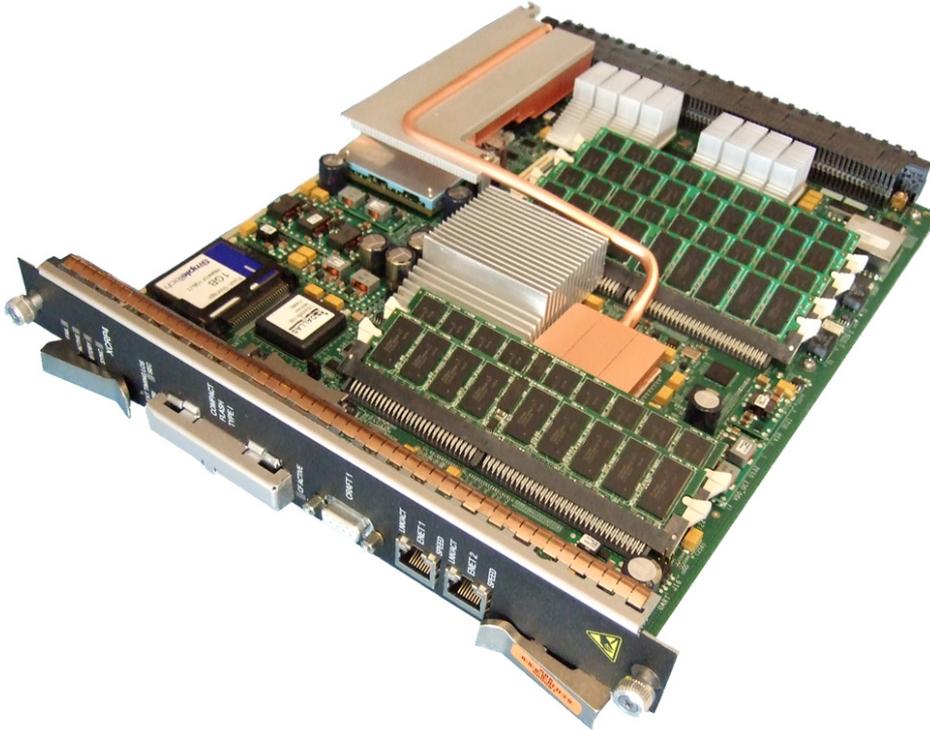# SMARTEDGE® 400/800/1200 CROSS-CONNECT ROUTING PROCESSOR CARD (XCRP4)

Empowers delivery of computational and bandwidth intensive applications:
HDTV, HD VoD, and Broadband Mobility

Key benefits

- Deployable in SmartEdge 400/800/1200

- Carrier-Grade Design: Engineered to standards for deployment in carrier networks worldwide

- Resilient software architecture: Modular design provides stability and protects against crashes and protocol errors

- Highly scalable to enable delivery of next generation applications

- 4 Gbps Control Plane Bandwidth to Line Cards

- Supports up to 256,000 active Multi-Play subscribers, 256,000 PPP/DHCP subscribers, 256,000 VLANs and 1.5 million MAC addresses

- Supports up to 8000 MPLS L2/L3 VPN, with 1,280 BGP, 1280 t-LDP peers and up to 4 million BGP routes

- Advanced services for VoIP with IMS/H.248 and Session Border Controller

The XCRP4 is a new generation of controller card that provides the necessary functionality for routing, signaling and management planes for the SmartEdge Multi-Service Edge Router. It is a technological leap forward relative to its predecessor – the XCRP3. It offers more of everything: more computation power, more subscribers, more IPv4 routes, more VPNs, etc. This increase in scalability directly translates into the ability to build an infrastructure that is capable of servicing a large population and delivering bandwidth and computation intensive application. It has six times more bandwidth to line cards, six times more processing power, and six times more memory than its predecessor, XCRP3. XCRP4 takes advantage of a new processor complex along with higher memory densities to dramatically improve key metrics such as subscriber activation rate, and RADIUS policy refresh rate. It can be deployed in a redundant fashion with the hot-standby card protecting the active in real-time. This card is deployable in SmartEdge 400, 800 and 1200.

Existing SmartEdge 800 and 400 XCRPs can be upgraded to XCRP4 to take advantage of its higher scalability, and capability to enable new applications and services, e.g., VoIP, IMS. Eventually, XCRP4 will become the primary control plane processor for the SmartEdge 1200/800/400.

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XCRP4 will continue to use the highly resilient, modular operating system, SEOS. The active XCRP4 is protected by the standby XCRP4 but a switchover does not necessarily occur in case of an application failure, e.g., OSPF. This provides a tremendous advantage in convergence time for the system's control plane as only the failed process requires convergence with its peers/neighbors. Only if the Operating System or the Process Manager fails is there an XCRP switchover. Under SEOS, all processes are restartable, individually, without the need to restart the entire system or board. Process restarts do not affect data forwarding or established subscriber sessions. SEOS has the necessary code extensions to support routing and MPLS signaling protocol "restart" and provide hitless operation. Each process is an independent task (thread) with its own local memory. This provides rapid process fault isolation, and recovery. Software patches are only introduced into the necessary process while all active subscriber sessions continue to stay up.

The signaling plane of the XCRP4 has been extended to support the functionality of a Session Border Controller.

The multiprocessor, multi-core design enables the XCRP to offer high performance for all routing and signaling applications. It also enables for a high rate of call performance in IMS-based VoIP application. This is accomplished via H.248 protocols multimedia over IP (includes VoIP) applications under IMS framework. XCRP4's IMS-compliant SBC is available in H.248 based call setup.

XCRP4 is capable of supporting system modes to allow time stamping of log messages and tracking of system on a timed basis (time-of-day, free-running-clock for time-stamping, system uptime, and system-use time). It is capable of running diagnostic software that can verify data path integrity and normal system function. Its management interfaces are all backward compatible using two 10/100/1000 copper Ethernet ports and an asynchronous craft port (DB9) on faceplate and rear asynchronous (DB25) craft port on the rear of chassis. System access via management, i.e., NetOp, CORBA, is also backward compatible with its predecessors.

Technical specifications for SmartEdge XCRP4 card

Hardware

Route processor module (XCRP4)
- 2 per chassis (1:1 redundancy)
- 768 MB memory upgradeable to 8 GB memory (XCRP4)
- Compact Flash slot for secondary storage
- One craft port: DB-9/RS-232, Asynchronous modem port, two Ethernet 10/100/1000TX

High availability and redundancy
- 1+1 for all common CPUs, clock and independent power to each line card
- Hot standby route processors
- Restartable software processes (for example PPP, BGP, SNMP, etc.)
- In Service System Upgrade

Application services
- IMS/H.248
- Session Border Controller

Operating environment
- Temperature: 5 to 40 C degrees (long term)
- 5 to 55C (short term)
- Humidity: 5-85%
- RoHS-5 compliant

Software

Architectural features
- Modular Operating System, with separation of control, data and services planes; independent tasks with its own thread and memory space

Broadband subscriber management
- RADIUS Authentication, Authorization, and Accounting (AAA), dynamic circuit binding, CoA
- Diameter
- Subscriber level bridging
- Dynamic / Static Clientless IP (CLIPs)

Encapsulations
- PPP/HDLC, cHDLC, Ethernet, IEEE 802.1q, RFC 1490 routed IP over Frame Relay, MPLS, MLPPP, 802.3ad, MFLR
- PPP over Ethernet (RFC 2516), PPP over ATM, RFC 1483 bridged and routed IP over ATM

Multicast protocols
- PIM-SM (RFC 2362 + IETF Draft), PIM-DM (IEFT Draft), IGMPv1, v2, v3 (RFC 3376), SSM (RFC 3569), MBGP (RFC 2858), MSDP (RFC 3618), IGMP filtering
- RFC3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6; IPv6 Mstatic Support; Enhance PIM Static Joins for V6 Support and Enhanced PIM SSM for V6

Routing protocols
- BGP-4 (RFC 1771), IS-IS (RFC 1195 & ISO/IEC10589), OSPFv2/v3, RIP v2, RIPng, VRRP (RFC 2338), LDP, RSVP
- LDP tunneling over RSVP LSPs (RFC 3209); BFD for OSPF, ISIS, BGP, static routes and individual links in 802.3ad link group
- OSPF V3, RIPNG
- Mobile IP (Home and Foreign Agents)

Configuration and network management
- Command Line Interface (CLI) support via telnet or SSH
- RADIUS, Diameter, TACACS+
- SNMP v1/2/3
- L2 Control Protocol (L2CP) with suport for DSL Sync Rate with Dynamic QoS change and ATM Ping command to DSLAM
- NetOp EMS support for event logs, SNMP traps, interface statistics for troubleshooting and performance monitoring, port views and chassis views

MPLS features & virtual private networking
- Traffic Engineering, RSVP (RFC 3209), LDP (RFC 3036, 3478), L2 VPN (martini) VPLS, H-VPLS, Transport Independent (MPLS VPN over soft GRE), Multicast over MPLS VPN
- MPLS VPNs (RFC 4364 previously known as 2547bis), Carrier of carriers and Inter-AS, MPLS VPN (options A, B, C) MPLS FRR, EoMPLS.

Layer 2 non-MPLS VPN:
- GRE, Hard GRE
- L2TP (RFC 2661) LAC, LTS, LNS
- 802.1Q Virtual LAN (VLAN) support with 802.1QinQ - with CoS mutation, 802.1Q tunneling with VLAN mapping

Subscriber awareness
- Subscriber Name, Session, IP Address
- Address Management
- DHCP Relay, DHCP Proxy, IPCP parameter negotiation, IP pools, RADIUS

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