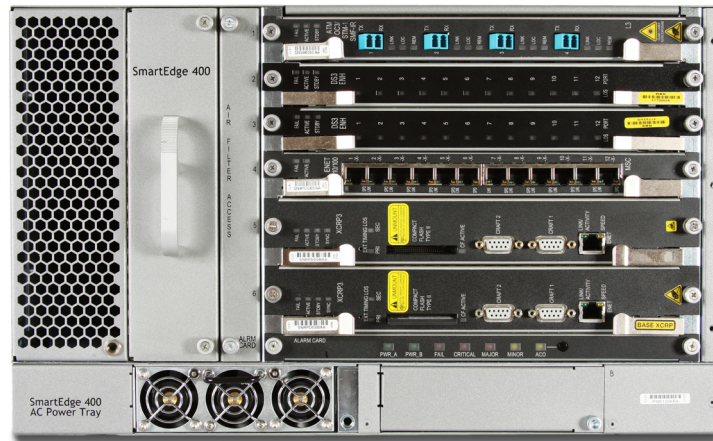# SMARTEDGE 400
MULTI-SERVICE EDGE ROUTER

Carrier-class, Scalable, Multi-Service Edge Router Reduces Network and Device Overylay by integrating Edge Routing, Subscriber Management, Advanced Applications, and Ethernet Aggregation. Key Component for the Edge of Multi-Service Access, and Delivery of Multiplay Services

Key benefits

• Carrier-Grade Design: Engineered to standards for deployment in carrier networks worldwide – NEBS and RoHS compliant

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

• High performance programmable packet forwarding: Based on a Packet Processing ASIC (PPA) developed by Ericsson

• Session level reliability: Supports Non-Stop Forwarding and keeps Subscriber Sessions running uninterrupted during a Route Processor fail-over

• Highly scalable routing platform with unmatched subscriber management and services

• Supports 128,000 active Multi-Play subscribers

• Supports up to 5000 VPLS, and 3000 MPLS L3 VPN instances, with 1,000 BGP, 1,000 t-LDP peers and more than 2.5 million BGP routes

• Advanced services for VoIP with SBC, security, and P2P applications

Ericsson's SmartEdge® 400 Multi-Service Edge Router (MSER) is a highly versatile platform, specifically architected and optimized to deliver Multi-Play services such as video, voice, data and interactive multimedia content. Powered by programmable ASICs, the SmartEdge MSERs support tens of thousands of users and sessions for a high physical and logical scalability. The SmartEdge 400 MSER delivers 80Gbps of throughput with up to four line cards. The innovative packet mesh architecture uses no central switching fabric, common connectivity modules, or active backplane components. As a result, there is no single point of failure. SmartEdge 400 MSER offers a diverse range of interface options: Ethernet, ATM, Packet over SONET (PoS) and channelized connections. All SmartEdge MSER interface modules are hot-swappable and highly resilient with full session and state redundancy in the event of a failure or replacement.

The SmartEdge 400 is an ideal platform to deliver Multi-Play services such as video (IPTV/HDTV), voice, data, interactive multimedia content, in addition to Layer 2/Layer 3 Virtual Private Networks (VPNs). By integrating the new controller card

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(XCRP4), the SmartEdge 400 can deliver SBC (Session Border Controller) functionality for IMS and VoIP applications. The SmartEdge 400 also enables advanced security functions to protect the network right at its edge, closer to subscribers, for maximum effect. With the ability to carry out Deep Packet Inspection, the SmartEdge 400 can identify and process P2P applications, and provide a more efficient and secure network operation. Example applications are detection of leading instant messaging (IM) services.

Support for new applications in the SmartEdge 400 enables service providers to architect their network with minimal number of devices and reduce network and device overlay resulting in simpler network topology and operation.

The SmartEdge 400 uses the same highly resilient operating system that is used in the entire SmartEdge product line. The SmartEdge operating system (SEOS) is modular and capable of hitless restart. This means that when a software task goes down the system will continue to operate as the task is restarted independently.

A high-performance, full-function multi-service edge router

The SmartEdge 400 MSER unifies high-performance edge routing, Ethernet aggregation, advanced subscriber management, and advanced services. The SmartEdge 400 can be deployed in many applications, e.g., as a critical edge device for a medium size network providing security, subscriber management and high speed routing. The SmartEdge 400 provides the scalability that is required to support up to 128,000 PPP/DHCP subscribers, 1 million MAC addresses and 128,000 VLANs. Its routing scales to 2 million IPv4 and 1 million IPv6 routes. For its size, the SmartEdge 400 has the highest feature density with high availability that can provide continuous network operation.

Device specifications for SmartEdge 400

Hardware

Chassis
- 8.75" (H) x 17.5" (W) x 16" (D) for 5 RU DC version)
- 10.5" (H) x 17.5" (W) x 16" (D) for 6 RU AC version;
- 19" and 23" rack mountable
- 6 slots, 2 for XCRP; 4 slots for line cards
- Front to side airflow for optimum cooling
- Connectors on chassis: Power A, B; dual BITS synchronization inputs and outputs; alarm ouput, status input
- Front and rear cable management
- Backplane capacity of 80 Gbps

Route processor module
- Two models: XCRP3/4 with 1:1 redundancy with 768MB of on board memory upgradeable to 1.25GB (XCRP3), or 8GB (XCRP4)
- 1GB Compact Flash for media storage
- 2 craft ports: DB-9/RS-2332, async modem port, 10/100TX [1000TX for XCPR4 as well] Line Cards
- Dual Packet Processing ASICs (PPA2); 1 for ingress, 1 for egress
- Fully meshed backplane – no slots used for switch fabric card

Card types
- 1 port Channelized OC-12 to DS3 or DS1/DS3
- 12 port Channelized DS3 (336 channels)
- 12 port Clear Channel DS3
- 3 port Channelized STM-1 (336 channels)
- 24 port Channelized E1 (336 channels)
- 6 port Clear Channel E3
- 4 port OC-12c/STM-4 (POS)
- 8 port OC-3c/STM-1 (POS)
- 1 port OC-48c/STM-16 (POS)
- 1 port OC-12c/STM-4 (ATM)
- 4 port OC-3c/STM-1 (ATM)
- 12 port DS3 (ATM)
- 12 port 10/100TX Ethernet
- 4 or 10 or 20 (2-slot) port Gigabit Ethernet
- 1 port 10 Gigabit Ethernet

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

Application services
- SBC (Session Border Controller)
- Heuristic based P2P Application Detection

Operating environment
- Temperature: 5 to 40 ° C degrees (long term)
- 5 to 55 ° C (short term)
- Humidity: 5-85% RH
- Power: -48 V DC
- Maximum system power = 700 W
- Power consumption is dependent on the type and number of line cards.

Software

Architectural features
- Modular Operating System, with separation of control, data and services planes; independent tasks with 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), GMPv1, v2, v3 (RFC 3376), SSM (RFC 3569), MBGP (RFC 2858), MSDP (RFC 3618), IGMP snooping, IGMP filtering
- 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), OS PFv2/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, TACACS+
- SNMP v1/2/3
- L2 Control Protocol (L2CP) with support 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

Quality of service
- 802.1p Class of Service (CoS), Differentiated Services Code Point (DSCP) ToS, IP Precedence, and MPLS EXP bits
- Packet classification (RFC 2474, 2475, 2597, 2598); DiffServ packet marking by ACL, ingress policing, or BGP attribute based QoS; class-based ingress policing and egress shaping; priority queuing and EDRR; RED and WRED; Hierarchical Scheduling aligned with DSL forum's WT-92 and TR-59 specifications.

Security
- Reverse Path Forwarding (RPF), Secure ARP, MD5 support for routing protocols, key rollover, RADIUS, Diameter, TACACS+; Administrative ACLs, packet mirroring and sampling, Secure Shell (SSH) Protocol, Kerberos, SNMPv3, IGMP filtering, SSHv2, VLAN ACLs, IP security router ACLs, subscriber-based ACLs
- IPSec
- Lawful Intercept (CALEA)

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

Advanced features
- H.248 MGCP
- Multiple contexts with inter-context routing
- Premium Service Insertion
- Cross connect support (for L2 traffic)
- Bulk stats
- Network Address Translation (NAT)
- Dynamically Verified Static Routing
- Policy routing
- Traffic mirroring with CALEA support

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