

Product Assessment: **Ericsson - SM 480 Metro Ethernet Service Transport**
Report Date: June 29, 2009 Expected Update: December 2009
Analyst: **Hunt, Glen**
Market: **Carrier Infrastructure**
Class: **Carrier Ethernet**
Current Perspective: ★★★★★

Standard View

Summary

Buying Criteria



Current Perspective ★★★★★

Ericsson's SM 480 is threatening in the carrier Ethernet service router market segment, because it addresses the needs of service providers as they build out service-rich, large-scale metro Ethernet access and aggregation networks, which require cost-effective Ethernet aggregation and a rich set of Layer 2 services to support residential, business, and mobile services. The SM 480 couples the company's proven SmartEdge Multi-Service Edge Router software technology with new energy-efficient, high-scale hardware optimized to address demanding Layer 2 access and aggregation applications such as E-LINE and E-LAN. Ericsson has one publically announced service provider customer, Novotron, a multi-service competitive carrier located in Hungary, which shows some early market traction for the new platform.

The SM 480 is the first in a family of Metro Ethernet Service Transport platforms designed to simplify access and aggregation network architectures, lower network costs, and help service providers accelerate the convergence of fixed and mobile network infrastructures. Future chassis configurations are planned that will exceed one Terabit wire-speed throughput. The SM 480 delivers a combination of transport and subscriber services, allowing service providers to leverage the cost efficiencies of Ethernet while migrating to a packet-based infrastructure. The SM 480 leverages the proven SmartEdge Operating System (SEOS) to enable highly scalable and resilient Ethernet services. Additionally, the SM 480 enables the service provider to make a smooth transition from legacy connectivity such as ATM to IP over Ethernet without costly forklift upgrades. Key SM 480 differentiators include highly scalable metrics, such as: up to 240 GigE ports, 256,000 subscriber circuits for E-Line services (each with multiple SLAs), support for up to 1.5 million MAC addresses to support E-LAN multipoint services, and up to 2.3

million per-circuit queues (SLAs), enabling service providers to deliver more services per port. On the energy efficiency front, the SM 480 delivers E-Line services at less than 15 milliwatts per VLL and E-LAN services at less than 3 milliwatts per MAC address.

Service providers can leverage the service creation capabilities in SEOS to eliminate multiple legacy metro core and access networks to deliver a broad range of point-to-point and multipoint services with the service creation intelligence required to support a converged business, residential, and mobile access/aggregation infrastructure. Layer 2 services include features such as MPLS pseudowire support for frame relay, Ethernet, ATM and VPLS aggregation, ATM and channelized SONET/SDH aggregation (future) with sub 50 ms link and node failure protection, large-scale H-QoS, and legacy interworking with Ethernet. To address growing concerns over raising OpEx associated with migration to packet networks, the SM 480 supports a complete suite of OAM functionality based on key industry standards such as IEEE 802.1ag (CFM), VCCV ping, VPLS CPE ping, LSP ping/traceroute, and SNMP v1/v2/v3. The SM 480 supports a combination of protocol support and interworking which provides a highly deterministic packet transport foundation designed to meet the needs of current and future converged metro networks. The SM 480 is generally available for service provider deployments.

Strengths and Weaknesses

Strengths

- The SM 480 offers a service-centric architecture that enables service providers to establish a full-service broadband network designed to support wireless and fixed line services on a single platform. In addition, the SM 480 has been designed to meet stringent power consumption goals and to reduce the overall TCO with added software features that reduce ongoing maintenance costs.
- The SM 480 supports high-scale metro infrastructures that serve as the foundation for overall network convergence to deliver highly scalable Ethernet services such as E-LINE, E-LAN, and E-TREE as well as legacy ATM services to support 3G backhaul applications. To satisfy demanding subscriber requirements, the system supports up to 256,000 subscriber circuits for E-Line services with multiple SLAs, up to 1.5 million MAC addresses to support E-LAN multipoint services, and up to 2.3 million per-circuit queues (SLAs) to support more services per port.
- The SM 480 is designed for energy efficiency, with a fully loaded all-Ethernet configuration consuming a maximum of 3,840 VA. The system delivers E-Line services at less than 15 mWatt/VLL and E-LAN services at less than 3 mWatt/MAC. Factoring in the scalable point-to-point and multipoint Ethernet service features as well as in-service software upgrade (ISSU), the SM 480 helps service providers reduce overall energy consumption, which is increasingly becoming critically important in dealing with overall TCO.
- The SM 480 offers a service-centric solution for carriers, which leverages the company's proven

Weaknesses

- Ericsson is entering the metro Ethernet transport market with an optimized Layer 2 solution later than many of its competitors, such as Alcatel-Lucent, Juniper, and Huawei. The SM 480 will be challenged to leverage its key differentiation, such as subscriber scaling, low energy consumption, and legacy support, to garner market share.
- Support SONET/SDH interfaces for the SM 480 are currently on the roadmap. The ability to interface directly with existing SONET/SDH infrastructures would improve the appeal of the product, given the prevalence of the technology in the metro.

SEOS. Fifteen of the top 20 telecom service providers run SEOS in their fixed and mobile networks. SEOS capabilities include solutions for mobile 2G, 3G, and emerging LTE backhaul and packet backbones as well as WiMAX and LTE.

- The SM 480 provides a migration path from legacy to packet networks, enabling service providers to migrate to an all-IP/Ethernet network by consolidating multiple, disparate access networks based on legacy transport (e.g., ATM and frame relay) onto a unified packet infrastructure based on IP/MPLS. The SM 480 supports ATM OC-3 interfaces and frame relay and ATM pseudowires, enabling the migration to Ethernet in both fixed and mobile networks.
- From an operational perspective, the SM 480 provides rapid service provisioning, proactive fault monitoring, and comprehensive diagnostic capabilities. The NetOp management suite provides features such as automated provisioning workflows, monitored end-to-end services, and centrally provisioned end-to-end VPNs. Network features supported include strong Layer 2-based support to deliver multimedia services. OAM functionality includes IEEE 802.1ag (CFM), ping/traceroute capabilities, and SNMP v1/v2/v3 support.

Point and Counterpoint

Point

- Alcatel-Lucent will highlight the capabilities of its 7450 ESS and 7750 SR portfolio as having captured 25.1% of the Ethernet service router market as well as 12.8% of the carrier Ethernet access and aggregation markets, according to Synergy Research's 2008 router report. Alcatel-Lucent could also highlight its greater switching capacity (1 Tbps) port densities (400 GigE, 50/80 10GigE), its Triple Play Service Delivery Architecture 2 (TPSDA 2), its META framework for mobile backhaul, the recently launched Carrier Ethernet Framework for Ethernet transport, and end-to-end management via the 5620 SAM (and supported by numerous task-specific network appliances and capabilities).

Point

- Cisco would point out that it has multiple solutions for metro and Ethernet service edge such as the leading 7600 and its new ASR 9000, which touts high performance and scale that will be needed by service providers as they build out

Counterpoint

- Ericsson could counter by pointing out that Alcatel-Lucent would need to deploy the more expensive 7750 SR for situations that require legacy ATM support, where the SM 480 directly supports ATM interfaces if they required. Ericsson could also point out that the SM 480 is the first in a family of scalable metro Ethernet solutions designed to provide a range of scale and capacity solutions for mobile and fixed operators. Future SM series chassis configurations will exceed one terabit of wire-speed throughput without service compromise. The company could also assert that its high-scale per-circuit metrics (such as 1.5 million MAC addresses, 8,000 VPLS instances, 256,000 VLLs/VLANs) enable providers to deliver more services per port than competitors' routers.

Counterpoint

- Ericsson would counter with pointing out that the 7600 provides a full-service solution, but is not as energy-efficient as the SM 480, a factor that all service providers are highly concerned about today. Ericsson could also point out that

their next-generation solutions in support of continued growth in video and mobile data services. Cisco would point out its long-running support of network evolution and service enablement, which the 7600 fully supports with legacy interfaces and the Integrated Services Engine (ISE). Cisco would not hesitate to note that it maintains the number one market share position in both ESR and carrier Ethernet access and aggregation market segments at 58.8% and 67.5%, respectively, as reported by Synergy Research.

Point

- Juniper would point out the capabilities of its scalable 100 Gbps/slot MX Series Ethernet Service Router family that delivers a broad array of Layer 2 and full Layer 3 functionality. Juniper would also point out that the MX Series is a key member of its Intelligent Services Edge (ISE) architecture, which provides service providers with the tools required for rapid deployment of new service models based on JUNOS. Juniper could also note that the MX Series is highly scalable, as evidenced by its ability to support 1 million MAC addresses per chassis.

Point

- Competitors such as ECI, Nokia Siemens Networks, Tellabs, and Ciena would position their Ethernet service routers and aggregation solutions as being ahead of the SM 480 in terms of deployment and customer traction. All will point out their brand of service delivery and end-to-end management support.

the 7600 was designed as an edge router to deal with legacy interfaces (T1/E1, ATM, and POS) and later received Ethernet support, while the SM 480 was designed from inception to address the demands currently associated with subscriber-centric metro Ethernet networks by delivering the required performance, cost, and integrated service management features.

Counterpoint

- Ericsson would counter by noting that the MX Series is primarily a Layer 3 Ethernet router and that its Layer 2 support is not as optimized to deliver the broad range of metro Ethernet services offered by the SM 480, such as subscriber density as well as ATM support. Ericsson could point out that the MX Series has a flexible but complicated list of interface options to meet the cost points associated with pure Layer 2 transport requirements.

Counterpoint

- Ericsson would counter by noting that it has fully integrated the SmartEdge technologies into its overall offerings. The company could also note that the SM 480 is not just an Ethernet switch; it also offers significant differentiation over its competitors by offering legacy ATM and frame relay support and high circuit scaling that is critical to wireline and wireless operators in order for them to converge their multiple overlay networks onto a single metro network.

Buying/Selecting Criteria

Footprint and Density



- The maximum wire-speed 10GigE density is 24 ports, which supports converged and triple-play broadband network deployments. The maximum over-subscribed 10 GigE port density is 48 ports when using the four-port card (which can be over-subscribed of 2:1, with 20 Gbps full duplex forwarding capacity across the backplane).
- The maximum GigE port density is 480 ports with the existing chassis. This module can be used for subscriber connectivity, supporting hundreds of thousands users to deliver the access density required in the metro network.
- The SM 480 supports a combination interface, which delivers 60 ports of Fast Ethernet plus 2 GigE ports per module. Modules such as the combo module provide additional flexibility for service providers. This interface module is ideal for building highly optimized networks for DSLAM, CMTS, wireless or FTTx aggregation, and metro Ethernet aggregation. When used in conjunction with the ATM line card, operators can aggregate ATM and

Ethernet access lines and efficiently support migration from ATM to IP over Ethernet.

- In addition to the Ethernet support, the SM 480 offers an eight-port ATM OC-3/STM-1 line card. The system supports ATM services in two modes: native mode ATM to Ethernet (bridged and routed IP over ATM via RFC1483) or Ethernet over MPLS pseudowires.
- ATM support is required for those operators that wish to continue supporting their legacy ATM-based services. ATM is still prevalent in 3G data mobile backhaul, and it is also required for those carriers building their next-generation metro Ethernet networks while continuing to offer ATM services during migration. Support for native ATM is a differentiation for the SM 480 when compared with other products in the class, except the Cisco 7600.

Interface Support



- The SM 480 delivers 10 GigE interface support through a single or four-port line card. The four-port card can be oversubscribed at a maximum rate of 2:1 (40 Gbps over four 10 GE physical ports with 20 Gbps full-duplex forwarding capacity across the backplane). The 1x 10 Gig module operates at wire-speed and delivers the functionality required for converged and triple-play broadband network deployments.
- GigE support is provided by a 20x1 GigE line card, which forms the basis of a high-speed metro Ethernet aggregation and/or transport network. This card occupies a single slot in the chassis and supports 100-FX ports (100 Mbps optical Ethernet). The module supports a broad range of interface types such as optical SX, LX, ZX, TX, bi-directional, CWDM and DWDM, and a copper interface.
- The SM 480 supports a combination interface, which delivers 60 ports of Fast Ethernet plus two GigE ports per module. Modules such as the combo module provide additional flexibility for service providers. This interface module is ideal for building highly optimized networks for DSLAM, CMTS, wireless or FTTx aggregation, and metro Ethernet aggregation. When used in conjunction with the ATM OC-3/STM-1 card, operators can aggregate ATM and Ethernet access lines and efficiently migrate from ATM to IP over Ethernet.
- ATM support is provided through an eight-port ATM OC-3/STM-1 module, which supports ATM to Ethernet interworking in native mode (bridged and routed IP over ATM via RFC1483) or Ethernet over MPLS pseudowires. ATM support is required for those mobile operators that wish to continue supporting their legacy ATM-based services such as 3G data backhaul while building their next-generation Ethernet-based access and aggregation networks.
- The SM 480 does not support SONET/SDH interfaces, which are still prevalent in many metro networks. Although waning in strategic importance, a certain level of direct SONET/SDH interconnection would be of interest to some service providers. Direct TDM traffic is not supported at this time; however, TDM traffic is often handled by legacy switches more cost effectively than burdening an Ethernet switch.

Routing and Service Features



- The SM 480 delivers services with secure, traffic-engineered tunnels such as MPLS pseudowires and VPLS. Other Ethernet-based services include VLL and MEF 9/14-compliant services over E-Line (EPL and EVPL) and E-LAN. Additional Layer 2 transport services supported include 802.1Q VLAN tagging, Q-in-Q, 802.1d VLAN stacking, port-based VLAN, and subscriber-based VLAN.
- The SM 480 offers MPLS and VPN network features, which include traffic engineering, RSVP, LDP, L2 VPN VPLS, H-VPLS, and transport-independent multicast over MPLS VPN (MPLS VPN over soft GRE and hard GRE). The system also provides cross-connect support for Layer 2 traffic to enable a level of local switching.
- The SM 480 supports a complete array of ATM services such as ATM to Ethernet interworking, bridged and routed IP over ATM, and cell mode AALx pseudowires. ATM services can be delivered to the subscriber across a UNI interface with full traffic management features.

- The SM 480 delivers scalable services, including support for up to five levels of H-QoS, 256,000 VLANs/VLLs or EoMPLS pseudowires, 1.5 million MAC addresses, and up to 8,000 VPLS instances. Support is also provided for protocol-independent tunneling for VPN and transport services.
- The system supports a comprehensive set of OAM capabilities such as IEEE 802.1ag, Connectivity Fault Management (CFM) protocol, and, for physical ports, VLANs and Q-in-Q – S-VLAN and C-VLANs. A single port or VLAN can support both the functionality of a maintenance domain intermediate point (MIP) and maintenance end point (MEP) simultaneously. In addition, multiple MEPs can be supported on a port or a VLAN. The benefits include flexibility in designing a hierarchical, scalable network to ease troubleshooting and fault detection.

Service Assurance



- The SM 480 runs under SEOS, where all processes are restartable, individually, without the need to restart the system. Process restarts do not affect data forwarding or established subscriber sessions. SEOS supports routing and MPLS signaling protocol “restart,” which provides hitless operation. Each process is an independent task (thread) with its own local memory, which provides rapid process fault isolation and recovery. In-service software upgrades (ISSU) are supported for software patches, the introduction of updated task(s), or new SEOS version updates.
- The SM 480 supports non-stop forwarding and keeps services running during a route processor failover. Mission-critical services need to be supported un-interrupted to preserve a high quality of customer experience.
- The SM 480 supports high-capacity, efficient multicast replication for high-performance, large-scale IP video deployments. Video traffic is projected to continue to rise in volume over the next five years, making this a critical capability for metro Ethernet routers.
- The SM 480 supports in-service software upgrades (ISSU) to minimize network downtime and revenue loss associated with on-going operations. In addition to an energy-efficient hardware platform, activities such as truck-rolls and on-site maintenance need to be reduced in order to lower TCO.

System and Service Management



- The SM 480 provides management and control features, which include a full CLI command set to aid in provisioning and troubleshooting; an embedded SNMP agent with support for SNMP v1, v2c, and v3; and bulk statistics to provide an efficient alternative to SNMP as a means of gathering network accounting statistics. In addition, the SM 480 is fully supported by the NetOp series of management solutions.
- The SM 480 leverages NetOp Element Management System (EMS), which manages the SM 480 using a GUI-based, scalable, and open element management platform designed to reduce operations costs through automated configuration, provisioning, alarm, and fault management. NetOp EMS supports multiple management methods and protocols, such as Telcordia’s NCON system. The system also provides a gateway into existing and higher-level operations support systems (OSS) through CORBA interfaces.
- The NetOp Network Service Manager (NetOp NSM) supports point-to-point and multipoint VPN modules, such as: L2 MPLS Virtual Leased Line (VLL), L2 MPLS Virtual Private LAN Services (VPLS), L3 MPLS BGP VPN (2547 bis), site-to-site IPsec and VLAN, or Q-in-Q circuits to ATM PVC interworking. NetOp NSM was developed to reduce the carriers’ need to create custom IP VPN circuit management solutions.
- In addition, NetOp NSM offers additional network planning and customer monitoring tools with the ease of template-based, Web-based GUI interfaces for intuitively simple operations. NetOp NSM helps carriers reduce costly tools development and shortens OSS integration time.
- The SM 480 also leverages the NetOp Policy Manager (NetOp PM), which provides policy management and control across the SmartEdge and SM 480 product families. Using RADIUS as the basis for subscriber provisioning, NetOp PM provides a variety of time-based, time-of-day-based, and volume-based services.

Working in conjunction with the unique architectures of the products, NetOp PM allows a carrier to provision value-added services without having to change its operational model.

System Performance and Architecture



- The SM 480 provides as backplane switching capacity of 480 Gbps full-duplex, 240 Gbps half-duplex. Each interface slot provides 20 Gbps of forwarding capacity. The SM 480 chassis consists of 14 slots: 12 for interface modules and two to accommodate the SM Route Processor Module 2 (SMRP2). Service providers can install up to three chassis in a standard 19" or 23" telecommunication rack (15 RU per chassis).
- The system's resiliency features include a modular operating system (SEOS), separate control/data/service planes, dual route processors that support 1:1 redundancy (hot standby), and hot swappable modules to allow in-service removal and insertion. In addition, the SM Route Processor Module 2 (SMRP2) supports 1+1 redundancy for all common CPUS, clock, and line card power.
- The SM 480 is designed to operate in accordance with major industry standards such as NEBS Level III and RoHS-5, which eliminates six substances known to be harmful to human health and the environment such as lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE) flame retardants.
- The SM 480 consumes a maximum of 3,840 VA, which, along with extensive OSM capabilities, contributes to lowering the ongoing OpEx for the product. As service providers seek to lower their overall operational costs, factors such as power consumption and cooling requirements become key concerns, especially in high-density PoPs. Up to three SM 480 chassis can be installed in a standard telco rack.
- For class comparisons based on a fully loaded rack with 44 RU of mounting space, excluding power considerations, the SM 480 can provide a total switching capacity equivalent to 1.44 Tbps per rack, which is below average for the class (2.178 Tbps). However, the SM 480 delivers on high-scale metrics such as support for 1.5 million MAC addresses (4.5 million/rack), 256,000 VLL/VLANs, and up to 2.3 million per circuit queues (SLAs), offsetting traditional port density and switching comparisons.

Metrics

Architecture

Switch Fabric	Modular Operating System, with separation of control, data and services planes; independent tasks with its own thread and memory space
Distribution of Intelligence	Redundant SM Route Processors (SMRPs). The packet processing, queuing, and buffering is distributed on the line cards, custom ASICs provide for local switching
Queuing, Buffering	Up to 2.3 million per circuit queues per system

Performance

Switching Capacity	480 Gbps
Full Duplex Switching Capacity	240 Gbps
Routing/Switching Performance	20 Gbps of throughput per slot at any packet size
Service Performance	20 Gbps/slot

Service Assurance

Hardware Redundancy

Redundant Power, Fans, Feeds	Yes
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Redundant Switch Fabric/Forwarding Engines	Yes
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Interface Redundancy 1:1	Link Agg (802.3ad) for L2 interfaces; IP ECMP for routed interfaces
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Interface Redundancy, 1:N	Link Agg (802.3ad) for L2 interfaces; IP ECMP for routed interfaces
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Redundant Hot Swappable Components	Yes
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SONET APS	Future with Channelized SONET/SDH support for Circuit Emulation Services
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RPR, Standard/Proprietary	Not Supported
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Resilience/Availability	Fast failover on link failures with MPLS fast reroute (FRR), up to 4,000 simultaneous LSPs, each with fast reroute support
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Control, Data, and Management Plane Separation	Yes
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Graceful Restart	Yes
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50 ms Link Failover	Yes
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MPLS Fast Reroute	Yes
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Non-Stop Switching/Hitless Layer 2 Failover	Yes
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Non-Stop Routing/Hitless Layer 3 Failover	Yes
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Non-Stop Services/Hitless Layer 4 Failover	Yes
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Hitless Software Upgrade	Supported
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Capacity

10 Gbps Ports/Chassis (non-blocking)	24
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10 Gbps Ports/Chassis (over-subscribed)	48
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1 Gbps Ports/Chassis (non-blocking)	240
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1 Gbps Ports/Chassis (over-subscribed)	240
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10/100 Mbps Ports/Chassis	720 + 24 GigE
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100 Mbps Ports/Chassis	720 + 24 GigE
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T3/E3 Ports/Chassis	Not Supported
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ATM Ports/Chassis (OC-3)	96
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ATM Ports/Chassis (OC-12)	Not Supported
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ATM Ports/Chassis (OC-48)	Not Supported
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ATM Ports/Chassis (OC-192)	Not Supported
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POS Ports/Chassis (OC-3/STM-1)	Future with Channelized SONET/SDH support for Circuit Emulation Services
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POS Ports/Chassis (OC-12/STM-4)	Future with Channelized SONET/SDH support for Circuit Emulation Services
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POS Ports/Chassis (OC-48/STM-16)	Not Supported
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POS	Not Supported
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**Ports/Chassis
(OC-
192/STM-
48)**

WDM Lambdas/Chassis	Not Supported
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Interfaces

10/100 Mbps Ethernet	Not Supported
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100 Mbps Ethernet	60-port single slot – all line cards can be 60-port FEs, if required; 2880 Fast Ethernet ports per seven foot rack; 2 x Gigabit Ethernet (100/1000) using 2 x RJ-45 copper ports and 60 x Fast Ethernet (10/100) using 5 x Mini RJ-21connectors
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100/1000 Mbps Ethernet	20-port 100/1000 Ethernet line card benefits from all of the existing features that are available in SM 480 - same card as GigE.
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1 Gbps Ethernet	20-port Gigabit Ethernet line card benefits from all of the existing features that are available in SM 480, also supports 100/1000.
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10 Gbps Ethernet	1x10 Gigabit Ethernet line card can, full line rate with all features enabled.; 4x10GE, 2:1 over-subscribed. XFP Optical interfaces supported; SR, LR, ER, ZR, and DWDM, supports a maximum of 20 Gbps throughput on all packet sizes
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DS-1/DS- 3/HSSI	Not Supported
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ATM	8 port OC-3/STM-1 ATM, delivers all standard ATM functionality, including support for ATM traffic classes: Constant Bit Rate (CBR), Variable Bit Rate-Real-Time (VBR-RT), VBR-NRT, Unspecified Bit Rate (UBR) and UBR-Plus.
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POS	Future with Channelized SONET/SDH support for Circuit Emulation Services
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Features

CoS/QoS	Granular Layer 2 H-QoS to guarantee services within a VPN or VLAN
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Hardware- based QoS	Yes
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Forwarding Classes/Port	Dynamically configurable queue sizes with up to 8 queues per port; each port can be programmed to support up to 8 different classes
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Service- based QoS	Yes
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Interface- based QoS	Yes
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Subscriber- based QoS	Yes, 2.3M per circuit
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Rate	Yes
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Shaping/Limiting/Marking

Line Rate Yes

Forwarding

Layer 2, IEE Yes

802.1p

Traffic

Prioritization

Policy-based Yes

Traffic

Mangement

Hierarchical QoS Yes, 5 Levels of H-QoS

Load Balancing Link Agg (802.3ad) for L2 interfaces; IP ECMP for routed interfaces

Link Yes

Aggregation

MPLS Layer 2 MPLS VLAN, 256,000; MPLS pseudowires

Network Mgt. Via NetOp

Provisioning Via NetOp

Routed IPv4, IPv6 future

Protocols

Routing Protocols IS-IS, OSPFv2/v3, RIP v2, RIPng, VRRP (RFC 2338), LDP, RSVP, RIPNG, LDP tunneling over RSVP LSPs; BFD

Route Scalability MAC Addresses, 1.5M for E-LAN; 100k subscriber circuits w/multiple SLAs E-Line; 100s of MPLS-enabled ports

VLANs/Multicast VLL/VLAN, 256K; 8K VPLS instances, Q-in-Q, and GRE.

Advanced

Service

Modules/Capabilities

Network Management

EMS NetOp EMS is a GUI-based, scalable, and open element management platform with automated configuration, provisioning, alarm and fault management.

Fault Management Event logs, SNMP traps, interface statistics for troubleshooting and performance monitoring, port views and chassis

Configuration Management Transaction-based configuration against a configuration database including commits, aborts, and ability to roll back unintended changes. NetOps gateway into existing and higher-level Operations Support Systems (OSS) through CORBA interfaces; NetOp Network Service Manager (NetOp NSM) supports point to point and multipoint VPN modules

Accounting SmartEdge offers bulkstats to provide alternative to SNMP for gathering network accounting

statistics and intervals.

Performance Management	Interface statistics for troubleshooting and performance monitoring, port views and chassis, packet mirroring and sampling
Security	User authentication via RADIUS, TACACS+, SSH, multiple user groups or ACLs; Reverse Path Forwarding (RPF) check, SSH, MD5 support for routing protocols, key rollover, RADIUS, TACACS+.

Physical Specifications

Slots/Chassis	14
I/O Slots	12
Dimensions	21.2"(H) x 17.3" (W) x 22.7" (D); 54cm(H) x 43.8cm(W) x 57.7cm(D)
MTBF	Not Supplied
NEBS Compliance	NEBS Level III, CE Mark, SR-3580, UL 1950, GR-63 Core, GR-1089 Core, ETS 300 386-2, FCC Part 15, EN55022 class A, ETS 300 386-2, RoHS-5 compliance
Power Requirements	-48VDC nominal
Power Draw & Thermal Load	3,840 VA
Chassis Options	14 slot
System Applications	Fixed mobile convergence, Ethernet service routing, metro Ethernet aggregation, Legacy to All-IP migration
RU	15
Chassis/Rack	3
Terms & Conditions	
Price (List)	
Availability	General Availability; April 2009

Additional Info.

Customers	Novotron, Hungary, deploying for Ethernet-based business services and inter-carrier connections
Partners	OSS/Billing partners: Concord, Micromuse, NARUS, Portal, Quallaby, Visonael, XACCT
Special Notes	OAM/Management: SNMP v1/2/3, NetOP EMS, Stats, 802.1ag (CFM), VCCV, BFD, CPE Ping, LSP Ping/Traceroute, IP Ping/Traceroute, VCCV Ping
Special Notes	Redundant SM Route Processors (SMRPs). The packet processing, queuing, and buffering is distributed on the line cards, custom ASICs provide for local switching
Special Notes	Address Explosive Service Growth in Metro Ethernet services; 100s of MPLS-enabled ports, 100s of 1000s of subscriber circuits to support E-

LINE services, 1.5M MAC addresses to support E-LAN services, 2.3 million of SLA queues

**Special
Notes**

Green design provides low power consumption based on comprehensive Ericsson defined per service metrics; 10-15 mWatts/VLL (E-LINE) and 2-3 mWatts/MAC address (E-LAN) services.

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