Unlocking new revenue streams with Carrier Ethernet services

The value of intelligent service demarcation
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Contents

Abstract 3
Carrier Ethernet services market overview 3
  Carrier Ethernet retail services 3
  Growing wholesale opportunity 3
Carrier Ethernet services market opportunity 3
Carrier Ethernet service demarcation requirements 4
Intelligent service demarcation 4
  Nokia 7210 SAS demarcation 4
  Playing a vital role in an end-to-end solution 5
  Unlocking new revenue streams through service differentiation 6
Summary 9
Abstract

For service providers to gain a bigger piece of the rapidly growing retail and wholesale Carrier Ethernet services market, they must offer SLA-enabled services with value-added attributes that can be tailored to their customers’ needs rapidly and cost effectively. This requires an intelligent demarcation device to extend the service intelligence to the customer edge. This application note presents a) the value of using the fully managed Nokia 7210 Service Access Switch (SAS)-K as the service demarcation device; and b) the ways to innovate Carrier Ethernet VPN services for increased revenues and high customer impact.

Carrier Ethernet services market overview

Carrier Ethernet retail services

The Carrier Ethernet virtual private network (VPN) services market is undergoing a dramatic shift. To gain a competitive advantage, enterprises are increasing their reliance on high-bandwidth IP-based applications and moving them to the cloud to drive company strategies and carry out business operations. The performance of these applications and the underlying network has become critical to the life of the company. In addition, enterprise networking requirements are as unique and diverse as the products they deliver and the customers they serve. These factors are reshaping the enterprise communications landscape.

Enterprises are also under pressure to reduce capital expenditures (CAPEX), simplify operations and focus on their core strengths. To achieve these business objectives, they are seeking service providers with whom they can partner as they look to Carrier Ethernet services with enhanced service level agreements (SLAs), tailored to meet their networking requirements.

Growing wholesale opportunity

The demand for wholesale Carrier Ethernet transport services is growing as wholesale customers look to expand their network reach while reducing infrastructure costs. The wholesale Carrier Ethernet access market is driven by two things:

- An increasing number of mobile service providers are looking for Carrier Ethernet backhaul to expand their cell tower footprint
- Wireline service providers are looking to reach out-of-region enterprise customers

Wholesale customers also require Carrier Ethernet VPN services with enhanced SLAs so that they can ensure performance requirements to their customers with confidence.

Carrier Ethernet services market opportunity

These market realities are driving new revenue opportunities for retail and wholesale Carrier Ethernet services. Infonetics is projecting Ethernet service revenue to exceed US$60 billion by 2018, for a 9 percent compound annual growth rate (CAGR) over the forecast period. In the Infonetics analysis, Ethernet services

Application Note
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consist of wholesale and retail services, with retail composed of internet/WAN, E-LINE, and E-LAN. Each of the categories is growing strongly, but the growth rates are different for each. The wholesale figures include Ethernet transport services sold to mobile service providers for backhaul and to service providers selling Ethernet services to other service providers\(^1\).

**Carrier Ethernet service demarcation requirements**

The Carrier Ethernet services market segment is becoming highly competitive, with competitors from both in-region and out-of-region. As a result, Carrier Ethernet services are commoditizing.

At the same time, network operators are looking to expand revenue opportunities of their installed base organically and to attract new customers. This requires a Carrier Ethernet service portfolio with strategies to upsell enterprise customers from bandwidth-dimensioned connectivity services to value-added services with enhanced SLAs, and move customers off more costly legacy technology networks to highly available next-generation Carrier Ethernet services.

The commoditizing of Carrier Ethernet services in a crowded landscape drives the need for service differentiation. Bandwidth granularity, service quality, performance, availability, proactive management along with self-service monitoring, reporting and on-demand parameter changes are key service attributes that can be used to enhance SLAs and differentiate services.

To gain a larger piece of the retail and wholesale Carrier Ethernet services opportunity, a fully managed, intelligent service demarcation device is the next critical step. Enabling these service attributes requires intelligent service demarcation with the following capabilities:

- Hierarchical Quality of Service (H-QoS) with deep packet buffers
- Extensive OAM to simplify service activation, SLA management and fault analysis
- Network and service management with a comprehensive end-to-end view
- Self-service customer portals
- Plug-and-play for mass-market deployment
- Node, management and operations support system (OSS) integration

**Intelligent service demarcation**

**Nokia 7210 SAS demarcation**

The Nokia 7210 SAS-K is an intelligent Ethernet service demarcation device. It is designed to enable MEF Carrier Ethernet 2.0 certified E-LAN and E-Line business services with enhanced SLAs.

The Nokia 7210 SAS-K can also be used as a demarcation device for wholesale access services with enhanced SLAs. The wholesale customer can be a mobile service provider that requires Carrier Ethernet backhaul to expand cell-site deployments or another service provider that is selling retail business services and requires Carrier Ethernet backhaul to reach an out-of-region enterprise location.

The 7210 SAS-K, with an extended temperature range (ETR) variant option, is wirespeed with 2 x 10/100/1000BASE (SFP) ports, 2 x 10/100/1000BASE-TX (RJ-45) ports and 1 combination port (SFP or RJ-45). For enhanced SLAs, its highly flexible H-QoS capabilities support per-service ingress and egress queuing with hierarchical shaping and scheduling. In addition, it supports deep packet buffers to absorb traffic bursts ensuring better performance and bandwidth utilization for enterprise applications. Its comprehensive operations, administration, and maintenance (OAM) toolkit features ITU-T Y.1564 Test Head, IEEE 802.1ag, IEEE 802.3ah, service mirroring and auto-initialization to enable plug-and-play capabilities. To distribute accurate timing and synchronization, ITU-T Synchronous Ethernet (SyncE) and IEEE 1588v2 are supported. Ethernet protocol support includes ITU-T G.8032v2, IEEE 802.3ad LAG and IEEE 802.1D/Q/AD (QinQ).

As a member of the Nokia Service Router product portfolio, the Nokia 7210 SAS leverages the powerful Service Router Operating System (SR OS) to deliver advanced capabilities. The 7210 SAS-K has the service richness with advanced H-QoS and OAM features to deliver MEF CE 2.0 certified Ethernet services with enhanced SLAs.

The Nokia 7210 SAS product portfolio is managed by the industry-leading Nokia 5620 Service Aware Manager (SAM) for simplified management. The 5620 SAM integrates element, network and service management into one unified platform. The tight integration with SR OS reduces operating expenses (OPEX) with accelerated service activation, rapid troubleshooting with powerful visual analytics, end-to-end SLA management, cost-effective service portals and OSS integration.

Service providers can further enhance the 5620 SAM management capabilities with:

• Nokia self-service customer and operator service portals
• Nokia 5650 Control Plane Assurance Manager (CPAM)
• Nokia 5670 Reporting and Analysis Manager (RAM)
• Pre-certified OSS and customer premises equipment partner application integrations

The combination of a fully managed, feature-rich device at the enterprise location extends the service intelligence to the customer edge to give service providers the ability to differentiate services with enhanced SLAs and value-added enhancements. Now, service providers can unlock new revenue streams and lower customer churn with services tailored to meet enterprise application requirements and improve the user’s quality of experience (QoE).

### Playing a vital role in an end-to-end solution

The Nokia 7210 SAS product portfolio, including the 7210 SAS-K, is an integral part of a comprehensive IP/MPLS solution that delivers high customer impact through service innovation while minimizing the cost per bit. The Nokia Business Services Solution enables service providers to offer a choice of secure, scalable, flexible and always-on business VPN services, which meet enterprise business-critical communications requirements efficiently and cost effectively. It allows service providers to undertake Carrier Ethernet transformation projects and evolve to packet-based network architectures with converged IP voice, data and video running over Layer 2 business VPNs. The 7210 SAS is deployed as the service access and aggregation devices for Layer 2 MEF-based E-LAN and E-Line business services (see Figure 1).
Unlocking new revenue streams through service differentiation

As Carrier Ethernet services commoditize, service differentiation is the key to unlocking new revenue streams and protection against price erosion. As part of an end-to-end solution, the Nokia 7210 SAS-K, along with the Nokia 5620 SAM, enables compelling service attributes to enhance SLAs and differentiate services, while at the same time reducing the cost and simplifying service delivery. With the network becoming critical to the success of the company, value-added service enhancements will be compelling if they simplify operations and improve service and application performance as they look to focus on core strengths.

To lower WAN networking costs and minimize the complexity of dealing with multiple service providers for video, data, voice and internet services, enterprises are looking to converge services over a single uplink. The advanced H-QoS capabilities of the 7210 SAS-K apply differentiated treatment to each service (that is, class of traffic) in accordance with performance profiles to consolidate multiple services over a single uplink. Performance parameters include committed and peak information rates (CIR/PIR) along with delay, jitter, packet loss and availability. For further service differentiation, the H-QoS capabilities of the 7210 SAS-K allow individual services to burst up to line rate when aggregate bandwidth is available and its deep packet buffers absorb traffic, ensure the performance parameters of each individual service are met, and improve the performance and bandwidth utilization for enterprise applications. This enables service providers to bundle multiple services under one SLA and enhance SLAs with per-service QoS, bandwidth guarantees, and the ability to burst for higher margin services.

To expand revenue opportunities across a wide range of enterprise market segments and provide a strategy to move customers up the value chain, the advanced 7210 SAS-K capabilities enable tiered service models. To move customers from simple on/off bandwidth-dimensioned services without QoS, service providers can enhance the SLA with tiered QoS profile options into gold, silver and bronze QoS category options that align with new service and application performance requirements. Redundant uplinks with
end-to-end resiliency protect services against link, nodal and path failures for highly available services and higher customer satisfaction. In these ways, QoS and high-availability mechanisms enable service providers to enhance SLAs with tiered service models for higher margin services.

To create further service differentiation and deepen customer engagement, the simple addition of the Nokia Multiservice Integrated Module (MS-ISM) and Multiservice Integrated Service Adapter (MS-ISA) into the 7750 SR or 7450 ESS — along with reporting and analysis capabilities of the Nokia 5670 RAM — enables advanced business service options for enterprises, such as:

- Extensive per-application policy enforcement and charging with granular bandwidth shaping, policing and prioritization, defined on a per-subscriber or per-VPN site to intelligently categorize application traffic based on policy
- Delivery of deterministic end-to-end application behavior through application performance optimization, application-based QoS, application admission control and application-level mirroring
- Per-protocol, per-application, and per-application group volume statistics accounting for all subscribers and Layer 2 and Layer 3 VPNs (every byte, every packet, every flow for every application counted)
- End-to-end application volume statistics available between subscribers, VPN sites and servers and aggregated snapshot of IP flows provided per subscriber and per VPN site

Proactive SLA enforcement is an important component to enhanced SLAs. As enterprises partner with the service provider to offload the day-to-day management of the network, service assurance becomes critical. The service test manager of the 5620 SAM proactively monitors SLAs using scheduled OAM tests that trigger threshold crossing alerts to identify problems before they become service affecting. The 5620 SAM uses the ITU-T Y.1731 and IEEE 802.1ag OAM tools and the SR extensive accounting framework along with support for MEF 35-based tools to continuously monitor and measure traffic end to end. Performance measurement metrics include one-way and two-way frame delay, frame loss ratio and connectivity check messages and availability.

The extensive SR accounting framework, which provides all the necessary information to store and track detailed customer performance metrics on a per-port, per-service or per-application basis, can also be used to develop tiered service offerings with flexible billing models.

Self-service customer portals are becoming a must-have service option for enterprises. As the service provider assumes more of the daily management tasks, enterprises want the ability to make changes to service parameters (for example, bandwidth, QoS attributes), a real-time view into SLA metrics, request application or service diagnostics, and the ability to archive reports. These capabilities and more are easily integrated into the 5620 SAM to offer enterprises customized on-demand management capabilities for improved QoE.

The cohesive integration of the SR OS and the Nokia 5620 SAM helps reduce the operational cost of service delivery. The 5620 SAM accelerates network configuration and service provisioning through an easy-to-use GUI and preset service templates. The service test manager of the 5620 SAM uses IEEE 802.1ag and IEEE 802.3ah OAM to verify connectivity, and ITU-T Y.1731 and ITU-T Y.1564 Test Head to perform SLA verification.

Further OPEX efficiencies can be achieved through operator service portals. SLA management, service
provisioning, service changes, service assurance, application assurance, and bulk service provisioning for order entry systems are examples of operator tasks that can be easily automated into service portals and integrated into the 5620 SAM to simplify internal workflows and processes and improve service quality.

The plug-and-play capabilities of the Nokia 7210 SAS-K, along with the Nokia 5620 SAM, deliver unmatched service velocity and service turnup without a truck roll. The auto-initialization feature dynamically boots the system and uses the network to retrieve the necessary IP address and required files to bring it online without any manual intervention. The enterprise needs only to power up the unit and plug in the uplink fiber. To expedite time to market and streamline operational processes, an operator service portal can be used to automate the entire process. These capabilities significantly reduce the deployment cost of mass-market services and time to revenue for new service additions.

Powerful visual troubleshooting tools of the Nokia 5620 SAM provide rapid fault detection with detailed root cause and alarm analysis. When a fault occurs, the operator receives immediate service impact information with alarms that provide real-time root-cause analysis and OAM trace results on topology maps. The 5620 SAM uses IEEE 802.1ag and IEEE 802.3ah to detect and locate faults to reduce the mean time to repair (MTTR). For improved customer satisfaction, the operator can be alerted of service degradation using threshold crossing alerts, so as to rectify the problem before the customer calls.

Finally, the cohesive software integration and alignment between the 7210 SAS-K, the provider edge device (that is, 7750 SR or 7450 ESS) and 5620 SAM streamlines upgrades. Node and management software are solution-tested and validated. Common SR OS ensures coherent QoS and OAM capabilities for optimal and consistent performance and measurement end to end with seamless metro, regional and global service reach. This level of coordination reduces costs, simplifies upgrades and test cycles, and reduces overall deployment risk. The Nokia 5620 SAM also features open northbound interfaces to ensure seamless operational fit into OSSs and business support systems (BSSs).

Table 1 summarizes ways to innovate Carrier Ethernet services for increased revenues and high customer impact as well as reduce the cost of service delivery.

Table 1. Innovating Carrier Ethernet services with Nokia

<table>
<thead>
<tr>
<th>Service enhancement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service convergence</td>
<td>Consolidates multiple video, voice, data and internet services over one uplink, with burst and resiliency capabilities</td>
</tr>
<tr>
<td>Tiered service models</td>
<td>Differentiates services based on bandwidth, QoS parameters and availability, with seamless service enhancements to Application Assured VPNs</td>
</tr>
<tr>
<td>SLA management</td>
<td>Extensive service assurance to proactively monitor, measure and store SLA performance parameters end to end</td>
</tr>
<tr>
<td>Self-service</td>
<td>Flexible options for customers, including the ability to change service parameters (for example, bandwidth, QoS profile), a real-time view into SLA metrics, request application or service diagnostics, and the ability to archive reports on a per-port, per-service or per-application basis</td>
</tr>
<tr>
<td>Flexible billing models</td>
<td>Leverages accounting statistics to track detailed customer usage on a per-port, per-service or per-application basis</td>
</tr>
<tr>
<td>Deployment velocity</td>
<td>Accelerates network and service provisioning with plug-and-play demarcation device and automates service activation for reduced deployment costs</td>
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</tbody>
</table>
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<table>
<thead>
<tr>
<th>Service enhancement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplified management</td>
<td>Provides powerful troubleshooting tools for rapid fault detection, isolation and problem resolution with per-service and network-wide root cause analysis</td>
</tr>
<tr>
<td>Node management</td>
<td>Cohesive software integration and alignment between SR OS and 5620 SAM provides coherent QoS and OAM capabilities, simplifies upgrades and test cycles, provides seamless OSS integration, and reduces overall deployment risk</td>
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</table>

Summary

The fully managed Nokia 7210 SAS-K, as part of an end-to-end Service Router solution, uniquely overcomes the issues that service providers face with the commoditization of retail and wholesale Carrier Ethernet VPN services. By extending the service intelligence to the customer edge, service providers have a number of ways they can innovate Carrier Ethernet services while reducing the costs.

Service providers can offer converged services, supporting multiple services under one SLA with per-service QoS and bandwidth guarantees, and the ability for each service to burst up to line rate. Tiered service models with flexible billing options allow the service provider to tailor service packages based on the performance and availability requirements of the enterprise. For further differentiation, service providers can leverage the intelligence in their network to offer advanced services such as application assured VPN services. Extensive service assurance with proactive SLA enforcement gives the service provider the ability to continuously monitor, measure and store performance metrics. Finally, self-service customer portals with customized on-demand management capabilities add an intangible service dimension to improve the overall QoE.

To minimize the cost of service delivery and improve customer satisfaction, the Nokia 5620 SAM with tight SR OS integration offers powerful management capabilities. Service providers gain unmatched deployment velocity through accelerated service activation techniques and the ability to turn up a new enterprise site without a truck roll. Powerful visual troubleshooting tools provide simplified management with rapid fault detection and with detailed root cause analysis. Cohesive node management integration provides coherent end-to-end QoS and OAM capabilities, simplified upgrades and test cycles, and seamless OSS integration.

With these powerful service attributes, service providers can deliver enhanced SLAs to unlock new revenue streams and combat price erosion, while at the same time reduce the cost and simplify end-to-end service delivery.

Nokia is a leading global network solutions provider with the full-breadth of business services solutions. Market momentum and success includes more than 225 7210 SAS customers globally, with the Nokia Service Router portfolio deployed in more than 650 service provider networks in over 130 countries since 2004.