SYCAMORE NETWORKS

Integrated ADM/MSPP/DCS for Regional/Core Applications

Reduce Costs while Forming a Foundation for Future Growth

Consolidate Equipment and Reduce Costs

For fixed line and mobile network operators with SONET/SDH-based regional and core networks, growing stacks of add/drop multiplexers (ADMs), a maze of interconnects, and escalating network complexity impact operational stability and increase costs. Multiple network elements clog switching sites, each performing a single function: ADM and DWDM devices handle Layer 1 transport, and discrete wideband or broadband digital cross-connect systems (WB/BB-DCS) provide Layer 1 switching. Grooming and aggregating traffic this way wastes port capacity and underutilizes bandwidth. As the network continues to expand, ensuring non-blocking connectivity between Inter-Office Facilities (IOF) and network access rings becomes increasingly difficult.

So how can network operators break this cycle of operational complexity, inefficiency, and high cost? Sycamore Networks has a simple answer: stop stacking and start switching. Our integrated, edge-to-core portfolio of optical switching platforms combines grooming and transport with optical layer intelligence – in a single, flexible network element. Sycamore intelligent multiservice switches provide high-density aggregation for a range of service interfaces (from PDH and low-order SONET/SDH to OC-192/STM-64, Ethernet from 10/100/1000 Mbps to 10 GigE, and OTN), and full grooming capability, for efficient head-end ring termination and ring aggregation in access, metro, and regional applications.

Combining ADM, DCS, optical transport, and intelligent bandwidth management in one compact switching platform offers an extremely cost-effective alternative to traditional SONET/SDH equipment solutions – with scalability advantages that even next-generation MSPPs can't match. High-performance traffic routing between core networks and metro/edge, access, and regional networks – along with optical mesh resiliency benefits – delivers ongoing operational efficiencies, operational cost reductions of up to 70%, and maximum return on investment.

Enhance Scalability and Service Flexibility

A choice of fully interoperable, right-sized switching platforms for core, metro/regional, access and edge networks reduces upfront and recurring costs, simplifies operations and planning, and allows non-disruptive, just-in-time expansion. Sycamore switches also enable operators to:

- Increase service flexibility with any-service-to-any-port switching
- Enhance scalability and reduce operational complexity by eliminating elements, minimizing interconnects, and simplifying processes
- Improve resiliency with multiple, hierarchical protection and restoration options – including the ability to recover from second and third failure events

Features and Benefits

- Multiple Functions in One Element
- Reduce CapEx and OpEx up to 70%
- Simplify Operations and Management
- Enhance Scalability of Optical Networks
- Improve Resiliency with Mesh Restoration
- Increase Service Flexibility with SONET/SDH, Ethernet, and OTN Interfaces

Optional in-band or out-of-band control planes allow non-disruptive interworking with third party devices. In ring aggregation applications, for example, Sycamore switches support IP-based and OSI-based DCC interoperability by terminating a variety of ADMs – and hundreds of them can be terminated on a single SN 16000. This combination of integrated ADM functionality, remote (in-band) ADM management, and multi-vendor DCC interoperability enables equipment consolidation that reduces capital costs, streamlines network management, and significantly improves scalability as the network grows.

Network operators can also rely on modular, pay-as-you-grow architectures and support for a flexible mix of multirate Ethernet (from 10/100/1000 Mbps to 10 GigE), low-order and high-order SONET/SDH, and OTN interfaces to accommodate future network and service expansion. Unmatched scalability – from an economical 40 Gbps to an industry-leading 2.5 Terabit capacity at the core – ensures seamless growth and empowers innovative broadband services.

Simplify Operations and Traffic Engineering

At most network switching sites, the tributaries (e.g., DS1/E1/DS3, OC-x/STM-x) interconnecting ADMs use patch panels for administrative and test access functions essential to network operations (see Figure 1 - Before). Service failures resulting from human error or a single point of failure are often traced back to these patch panels.

In contrast, intelligent bandwidth management makes reconfiguring network traffic easier, less error prone, and significantly faster. Terminating rings directly on the Sycamore multiservice switch eliminates patch panels, forming a seamless juncture between access ring and IOF capacity (see Figure 1 - After).

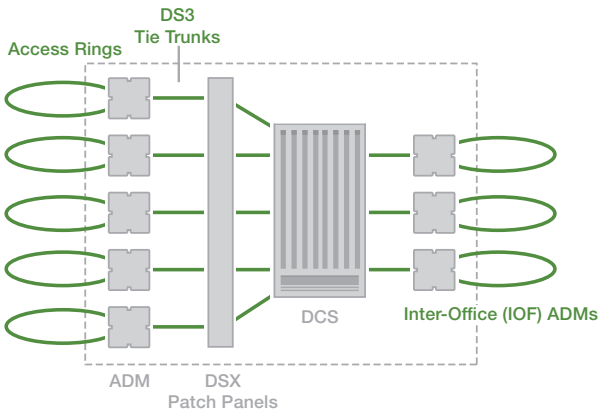

Figure 1 - Before
Stacked ADMs and patch panels at switch sites require extensive manual provisioning, lack scalability, and waste port capacity. Traditional architectures also make it difficult to provide non-blocking connectivity between access ring nodes and IOF nodes.

STOP STACKING AND START SWITCHING

THE NEED

Network operators are challenged to contain or reduce costs and improve profitability, even as they struggle to accommodate relentless growth in high-bandwidth traffic. Racks of stacked equipment (ADM/MSPP/DCS) in Central Offices make it increasingly difficult to control operational expenditures (floor space, DC power, labor), complicate ring interconnection and facility provisioning, and compound overall network complexity and cost.

THE SOLUTION

One intelligent multiservice switch can replace stacks of legacy equipment – and dramatically reduce CapEx and OpEx – by combining integrated ADM/MSPP/DCS functionality with remote (in-band) ADM management and multi-vendor DCC interoperability. Multiservice switches also groom traffic more efficiently, which eliminates wasted ports and stacked rings and improves capacity utilization. Best of all, operators gain the benefits of optical mesh network resiliency.

THE RESULT

Network operators realize immediate and substantial savings in floor space, power and HVAC expenses, and technician labor, along with faster provisioning and simplified traffic engineering and network management. Just one switch can deliver significant cost savings, performance advantages, and intelligent bandwidth management capabilities – in one reliable platform – while providing seamless scalability and a cost-effective foundation for future growth.

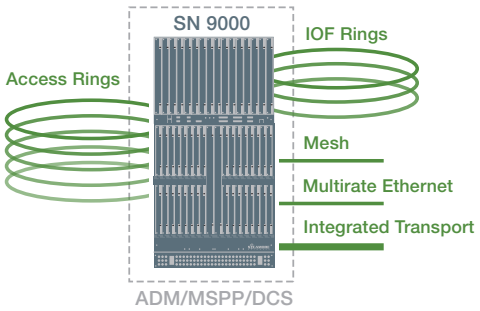

Figure 1 - After
Sycamore switches integrate ADM/MSPP/DCS functions, conserving space and power and reducing operational complexity. Intelligent bandwidth management improves capacity utilization, enhances network resiliency, and simplifies ring interconnection.

Sophisticated circuit management capabilities allow for both automated and manual provisioning in all topologies (ring, mesh, hybrid), with user-selectable, port-by-port support for traditional and emerging OAM&P, and a range of protection and restoration options to simplify operations.

Increase Network and Service Resiliency

With a network of Sycamore switches, an operator can realize the additional benefits of optical mesh resiliency. The distributed intelligence of BroadLeaf® networking software, embedded across all Sycamore switching platforms, protects mission-critical applications across the network. Rapid recovery – even from second and third simultaneous failures – ensures superior network and service survivability.

Simultaneous support for SONET/SDH ring (APS/MSP, UPSR/SNCP, 2F/4F-BLSR/MS-SPRing) and bandwidth-efficient optical mesh (1+1 Path Protected, Dynamic Source Reroute, or Unprotected) protection – in multiple combinations and in a hierarchical fashion – also creates unique deployment options.

Network operators can interoperate standards-based rings and mesh-based restoration within the same network, layer protection types to prevent multiple points of failure, and satisfy service demands with least-cost solutions and maximum operational efficiency. Interworking further enhances resiliency by allowing full restoration of working traffic with no loss of ring capacity.

Optimize Network Migration and Future Growth

Collapsing stacks of traditional equipment into one intelligent multiservice switch decreases costs and complexity and increases scalability. Reducing the number of network elements required for intra-switch site connectivity achieves CapEx, real estate, and power savings. Equipment consolidation and less need for manual reconfigurations combine to reduce OpEx. Eliminating wasted ADM ports and improving capacity utilization provide additional cost savings.

Most importantly, network operators can now groom traffic and consolidate backbone and metro rings with one network element that looks forward as well as backward. Concurrent support for ring and mesh protection options, and multirate Ethernet and SONET/SDH service interfaces, greatly enhances operational and cost efficiency and simplifies network evolution. Similar solutions for legacy equipment consolidation can reduce costs today but offer little or no path to the future.

By delivering substantial cost savings and rapid ROI, performance advantages, and powerful new bandwidth management capabilities in one platform, Sycamore switches provide a reliable and cost-effective foundation for fixed line and mobile networks in transition.

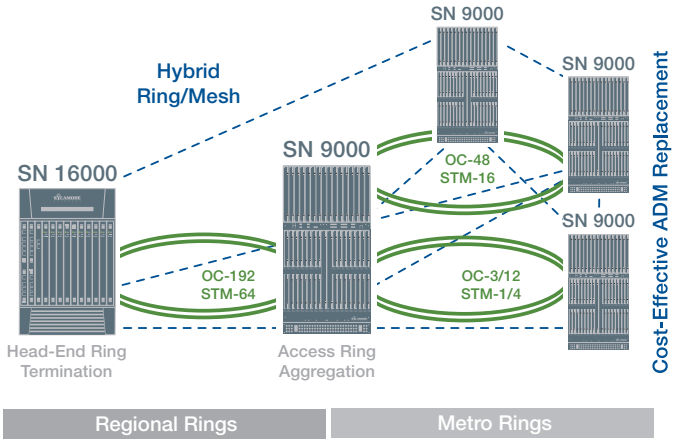

Figure 2: Go Beyond Equipment Consolidation – to the Added Value of Resilient Optical Mesh

Equipment consolidation delivers new operational efficiencies, from head-end ring termination at core switching sites, to access ring aggregation in regional networks, and replacing stacks of ADMs in overcrowded metro/edge COs. And the best part? Sycamore intelligent multiservice switches go beyond that, to enable resilient optical mesh survivability – even from multiple simultaneous failures – and form a scalable foundation for future expansion.

Optical Switching Portfolio

Intelligent Multiservice Switching from Edge to Core

SN 16000, SN 9000, and SN 3000 intelligent optical switches share the same optical signaling, routing, and management software across every platform. This empowers high-density, multiservice aggregation and diverse, resilient protection options, from the metro edge to the optical core.

- **SN 16000** – Unmatched capacity, scalability, and proven reliability in a flexible, modular architecture for switching at the optical core
- **SN 9000** – Exceptional configuration flexibility and intelligence in an economical, pay-as-you-grow switching platform optimized for evolving metro and regional core networks
- **SN 3000** – High-performance, multiservice aggregation and grooming for the network edge

Industry-Leading Networking, Management, and Planning Software

Standards-based, network-aware management systems and interfaces ensure seamless integration and interoperability while enabling intelligent bandwidth management.

- **BroadLeaf®** networking software and ASON/GMPLS-powered control plane (I-NNI) simplifies provisioning and enhances capacity utilization.
- **SILVX®** management software empowers comprehensive performance management, in-service scalability, and dynamic service delivery without compromising existing systems.
- **SILVX InSight®** software offers state-of-the-art ring and mesh network modeling, configuration, and capacity planning – all fully integrated with SILVX network management.

For more information about our intelligent networking products and solutions, please contact your Sycamore Sales Representative.

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Sycamore Networks, Inc. (NASDAQ: SCMR) is a leading provider of intelligent bandwidth management solutions for fixed line and mobile network operators worldwide. From multiservice access networks to the optical core, Sycamore products enable network operators to lower overall network costs, increase operational efficiencies, and rapidly deploy new revenue-generating services.

Certified System ISO 9001:2000