

**PATTON**

# **Multi-Service Over SDH Solutions Guide**





# Patton's OnSite™ Multi-Services Provisioning Platform

Patton's OnSite™ next-generation transport solutions offer service providers a unique, simple, and economical migration path toward a converged IP service network. We deliver flexible, modular, and future-proof access systems for services carried over SDH and Ethernet networks.



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# The Case for Multi-Services Provisioning

## Simple and profitable migration toward a converged IP service network

### Introduction

Time Division Multiplexed Wide Area Networks (TDM WANs) have been around for generations. Originally designed to carry circuit-switched voice traffic, TDM WANs evolved to deliver data services over leased lines, including Virtual Private Network (VPN) service.

Ethernet is not new either. Having emerged in the 1970s, 95% of all enterprise data traffic now originates and terminates on Ethernet segments. Today, Ethernet is the industry's most widely used communications protocol. With the dramatic growth of Voice-over-IP (VoIP) in the past few years, Ethernet will soon be the preferred transport media for enterprise voice as well.

Ethernet is driving yet another transformation in telecom as the technology pushes its way beyond the enterprise and into carrier-provider networks. As carriers deploy core and metro networks based on IP, Ethernet backbone networks are emerging. While there is universal agreement that future networks will be "all IP", many service providers are struggling to find the optimum business model today. A key

question is how to ensure profitable growth with new Ethernet-based services as highly profitable legacy services are retired.

Moving step-by-step to this new "all IP" network is the critical path to maintaining competitive advantage. Getting to market quickly while reducing the capital expenditure (CapEx) required for new services are critical considerations for carriers working to manage expenditures and maximize returns on investment (ROI).

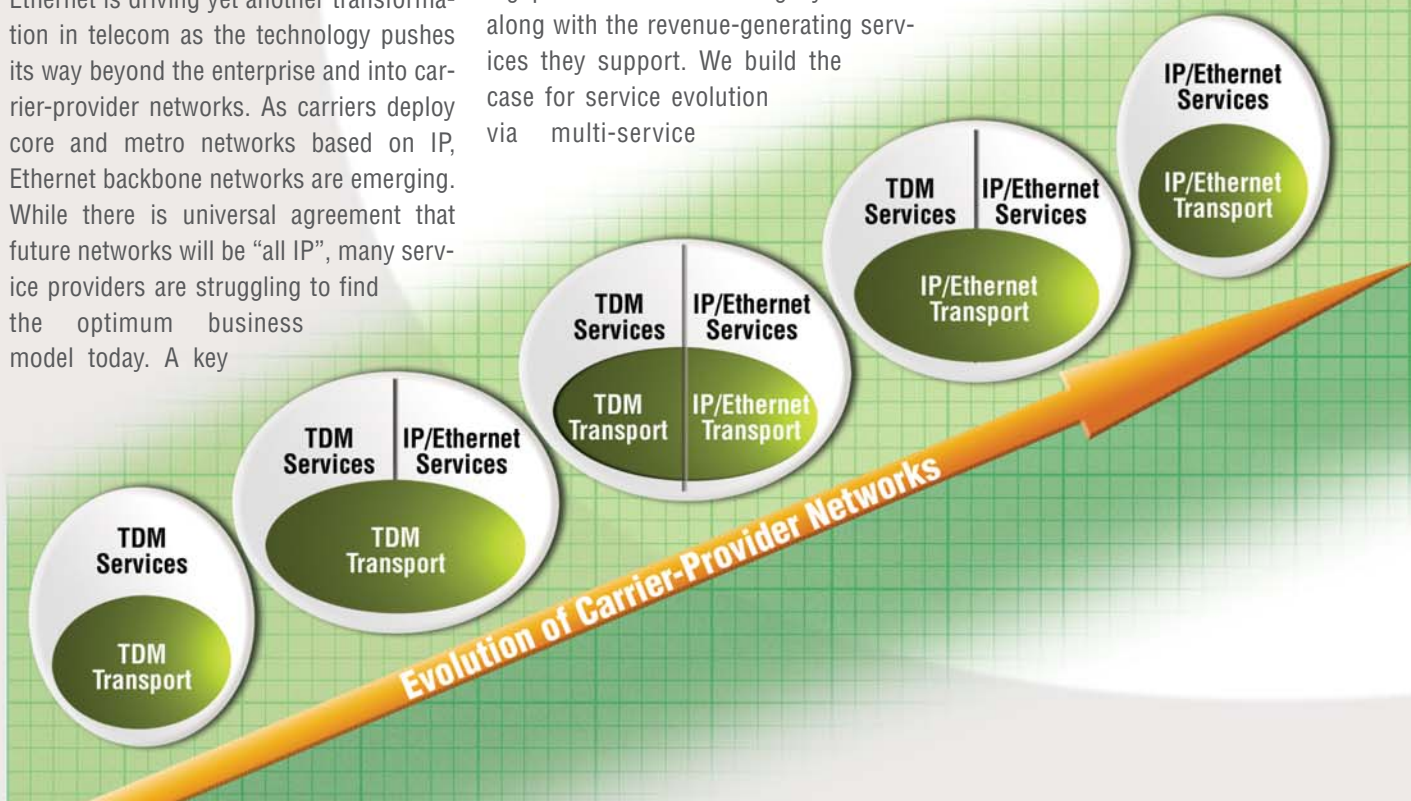
Patton's OnSite Multi-Service Provisioning Platform offers a **service evolution model** that maximizes ROI for service providers. This model reduces entry costs for new IP-based services by leveraging the reach of existing SDH networks, while preserving prior investment in legacy networks along with the revenue-generating services they support. We build the case for service evolution via multi-service

provisioning by discussing the following topics:

- Getting to market quickly
- Reducing CapEx by using prior investments in legacy networks
- Services evolution—not revolution
- Leverage the reach of SDH
- Simplify the provisioning of new services

### Getting to Market Quickly

As today's savvy subscribers demand faster delivery of new services, in more places for less money than ever before, rapid service deployment is an important





competitive advantage for any service provider. In order to increase revenues, providers must continuously add new customers by rolling out and selling new services, while expanding network reach more locations farther away.

Patton's OnSite MSPP system enables carriers to quickly and easily offer new high-speed Ethernet services through incremental investments. By utilizing pre-existing SDH network assets, carriers can create transitional hybrid networks built on converged packet and TDM technologies. This transitional approach makes it possible to offer a wider range of services immediately while speeding the time to market for new services. By quickly and easily provisioning new services from any node to any node across the entire network, providers can bring new customers online fast.

## Reducing CapEx for New Services

Constructing a dedicated Carrier Ethernet core over a fiber or DWDM transport network requires significant capital outlay. Numerous carrier-class L2/L3 Ethernet switches must be purchased, installed and provisioned in central offices throughout the geographical service area. Once the all-IP network is deployed, it provides sufficient capacity to handle new demand so only modest expenditures are required in subsequent years. The return on investment, however, comes much later, and only after a substantial infusion of capital. In heavily populated "Tier 1" cities, where demand for next-generation services is strong, such investments are justified and perhaps required. However, these investments are not justified in all locations—especially outlying suburbs or rural areas that are served by existing TDM infrastructure.

## Maximizing ROI

Leveraging already-deployed transport networks limits capital expense to the purchase and installation of MSPP units rather

than replacing the entire transport infrastructure. By significantly reducing upfront expenditures Patton's OnSite Multi-Service Provisioning systems produces rapid pay-back for new services and accelerates the time to profitability.

## Services Evolution—Not Revolution

SDH networks today are dominated by traditional TDM traffic consisting of TDM voice, private lines, Frame Relay, ATM, and other legacy services. Over time all those services will migrate to Ethernet-based services. As providers launch new service offerings and subscribers adopt them, the relative bandwidth allocated to TDM services will decrease as shown in figure 1.

Providers can then extend or migrate their traditional TDM-based leased-line services to Ethernet leased lines. As a result, subscribers have access to a wider range of tailored communications solutions while providers make more efficient use of their network infrastructures. So service evolution offers the following key benefits:

- Maximizes use of currently deployed transport infrastructure
- Enables new Ethernet service delivery

- Preserves ongoing revenue from traditional services
- Provides a smooth migration path toward converged all-IP networking

Patton's OnSite products allow carriers to manage the following service evolution issues, to be discussed later in this Solutions Guide:

- Transition and co-existence of 2G and 3G mobile networks (see page 8)
- Transition to "all Ethernet" WAN/Leased Line Services (see page 10)
- Co-existing legacy TDM and new-generation Ethernet services (see page 12)
- Integrating telecom and broadband services in MTUs (see page 16)

## Leveraging the Reach of SDH

Delivering Wide Area Network (WAN) services based on Metro Ethernet has become a new trend, widely considered to last for the foreseeable future. In the longer term, Metro-Ethernet services are likely to replace classical WAN services altogether.

The market demand for WAN services delivered with Ethernet interfaces is substantial. Ethernet technology dominates the market

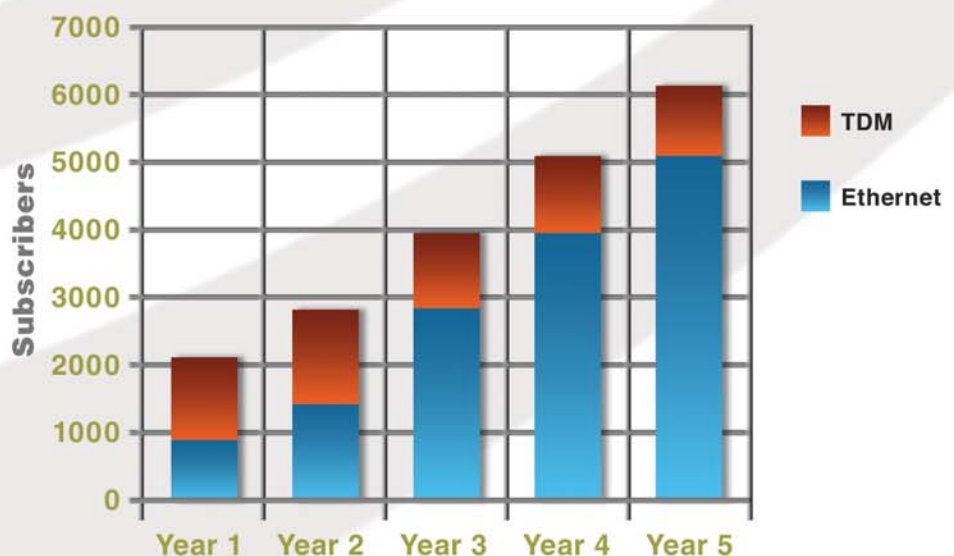


Figure 1. Services evolution

# The Case for Multi-Services Provisioning

## Simple and profitable migration toward a converged IP service network

for local area networks (LAN), and Ethernet interfaces are ubiquitous, inexpensive, reliable and well understood.

In the consumer market, DSL and cable services are gaining momentum, while in business markets IT applications such as voice-over-IP and storage area networks (SAN) are driving substantially increased demand for WAN services.

However, businesses are becoming more and more geographically diverse. Multiple branch locations interconnect with a small number of primary sites housing the company's core IT facilities. This scenario pushes carriers to maximize the reach of Ethernet WAN services.

Patton's OnSite Multi-Services Provisioning Platform leverages the reach of SDH to provide the following benefits:

- Ethernet-over-SDH offers an ideal mechanism to extend services into cities or outlying regions where the carrier has not yet built all-IP Metro Ethernets.
- Ethernet-over-SDH provides service extension to customer locations not close enough to the point-of-presence (PoP) of Metro Ethernet Networks to be reached with current access technologies. Legacy TDM networks provide almost universal connectivity to subscribers via a variety of access networks.
- An extensive existing SDH infrastructure provides an efficient long-range transport vehicle for Ethernet traffic (regional, national or international).

### Simplify the Provisioning of new Ethernet Services

Patton's OnSite Multi-Services Provisioning Platform enables service providers to offer customers new bundled services at the transport, switching and routing layers of the network. While dramatically decreasing the time it takes to provision new services, MSPP adds flexibility when adding, migrating or removing customers.

Carrier possess well-understood, reliable transport network infrastructure based on SDH technology for delivering a wide variety of data services as well as fixed and mobile voice services. With intrinsic OA&M and sub-50 ms resilience capabilities, these SDH systems ensure end-to-end, stringent SLA-based transport.

Patton's OnSite MSPP offers native Ethernet interfaces along with such new-generation SDH features as *generic framing procedure* (GFP), *virtual concatenation* (VCAT) and *link capacity adjustment scheme* (LCAS). These features enable standardized, flexible provisioning of the optical bandwidth to accommodate Ethernet flows.

The MSPP system allows service providers to simplify their edge networks. By consolidating the number of separate boxes needed to provide intelligent optical access, Patton's MSPP solution drastically improves the efficiency of SDH networks for transporting multiservice traffic. By reducing the number of network management systems needed, the MSPP solution decreases the resources needed to install, provision, operate and maintain the network.

### The Basics

#### Things You Really Need to Know

##### Generic Framing Procedure (GFP)

Defined by ITU-T G.704, GFP is a multiplexing mapping technique to efficiently transport packet data over voice-optimized SDH/SONET networks. GFP enables mapping of variable length, higher layer client signals such as IP/PPP or Ethernet onto the SDH/SONET payloads.

There are two modes of GFP: *Generic Framing Procedure-Framed* (GFP-F) and *Generic Framing Procedure-Transparent* (GFP-T). The OnSite Series OS-10 supports GFP-F

GFP-F is used where the client signal is framed or packetized by the client protocol. GFP-F maps each client frame (i.e. Ethernet) into a single GFP frame.

##### Virtual Concatenation (VCAT)

VCAT is an inverse multiplexing technique used to divide SONET/SDH bandwidth into logical groups. For example, in the case of STM-1 (155 Mbps) virtual containers such as VC-12 (2.17 Mbps) can be linked contiguously or non-contiguously to form a 10-Mbps virtual group optimizing transport of a 10-Mbps Ethernet link. VCAT groups may be transported or routed independently, and can significantly increase network utilization by effectively spreading the load across the whole network, at the same time enabling support of different customers and services. VCAT works in conjunction with LCAS and GFP.

##### Link Capacity Adjustment Scheme (LCAS)

LCAS is a method for dynamic bandwidth management of virtual concatenated containers without traffic loss or network errors. The LCAS mechanism automatically decreases bandwidth capacity if a virtual container in a VCAT group fails, and increases capacity when the fault disappears. The LCAS protocol is specified in ITU-T G.7042.



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## Network Access & Connectivity Solutions for Enterprise, Carrier & Industrial Applications

Patton Electronics—a leader in the production of network access and connectivity products—is building on its expertise in integrated network access, transmission, IP and Frame Relay technologies and leading in the development of right-priced products to simplify human and machine access to the global network.

The Patton brothers, Bobby and Burt, founded Patton Electronics in 1984, while students in college. Over the succeeding 20+ years, Patton has taken those simple beginnings and expanded into a multi-national manufacturing company that today employs more than 180 people and provides a product line in excess of 1000 items.

For your next project that needs to meet aggressive price points, while delivering high performance results, call on Patton. We're ready to deliver!



**Device Servers**  
Industrial Device Networking



**Ethernet Extenders**  
Going the Distance



**Baluns**  
Audio, Video and Data Baluns



**Routers**  
WAN Link-Up For Less



**Surge Protectors**  
Dateline Protectors & Isolators



**Industrial Computers**  
Ultra-Miniature Computers



**Hardened Networking**  
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# Converged 2G/3G Mobile Networks

## Managed transition and coexistence of 2G and 3G mobile networks

### Connectivity Requirements

For years, mobile network operators have relied on E1 leased lines to backhaul traffic from cellular base station sites to mobile switching centers. With the Patton OnSite series of  $\mu$ MSPP platforms, you can build and manage your own transmission network at a fraction of the cost of leasing E1 lines from another carrier.

An OS-10 Series STM-1 access ring is the perfect solution to connect between 8 to 12 base stations to a centralized BSC or RNC site. The STM-1 ring supports up to 63 E1 links—sufficient for typical 2G and 3G base station requirements of 4 to 8 E1s—and provides the required redundancy and protection against fiber cuts and station node failures.

From day one, the OS-10 access ring is ready for a managed transition and coexistence between 2G and 3G mobile networks. The OS-10 not only supports basic connectivity of voice and data traffic over E1 signals but also has built-in Ethernet

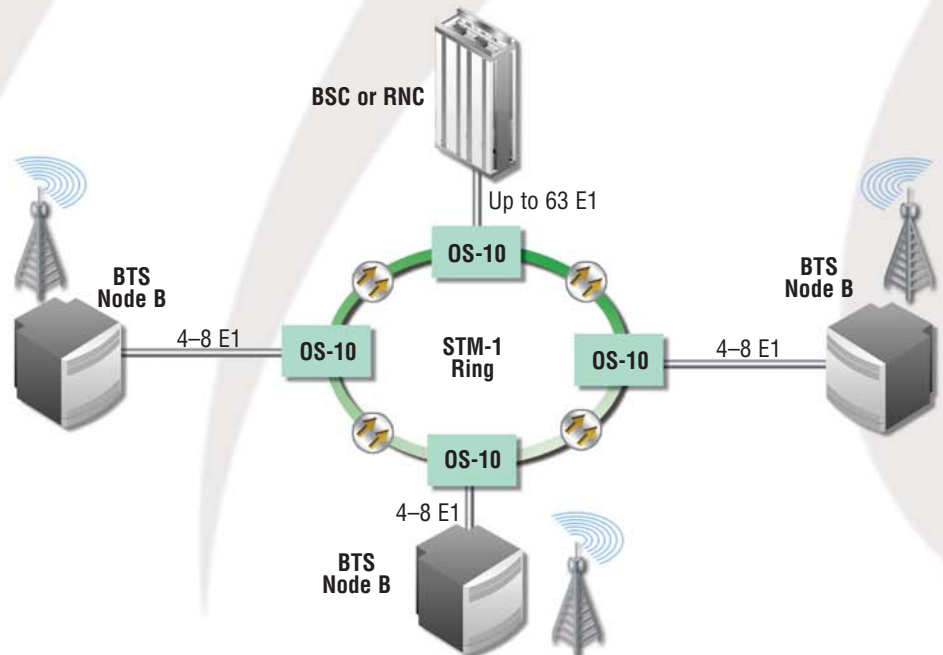


Figure 2. Cell site backhaul using an OS-10 Series STM-1 access ring

and packet intelligence for the emerging 4GIP-based mobile network.

The OS-10 Series platforms provide flexible scalability and superior cost-performance within limited space. The ultra-compact 1U

system is perfect for the constrained space of typical base station sites. Moreover, its low power consumption and use of natural convection cooling reduces operational costs and increases system reliability.

### Synchronization

In mobile network applications, reliable synchronization is critical for service quality. Without proper distribution of synchronization signals to the base stations, dropped calls and other service impairments may occur. With an OS-10 access ring, you can configure the OS-10 to retime E1 traffic signals to the recovered system clock from the STM-1 line. Retiming is an important feature to avoid the impairments associated to SDH pointer adjustments. You can also configure the OS-10 to provide redundant synchronization output signals at 2.048 MHz to the base station.

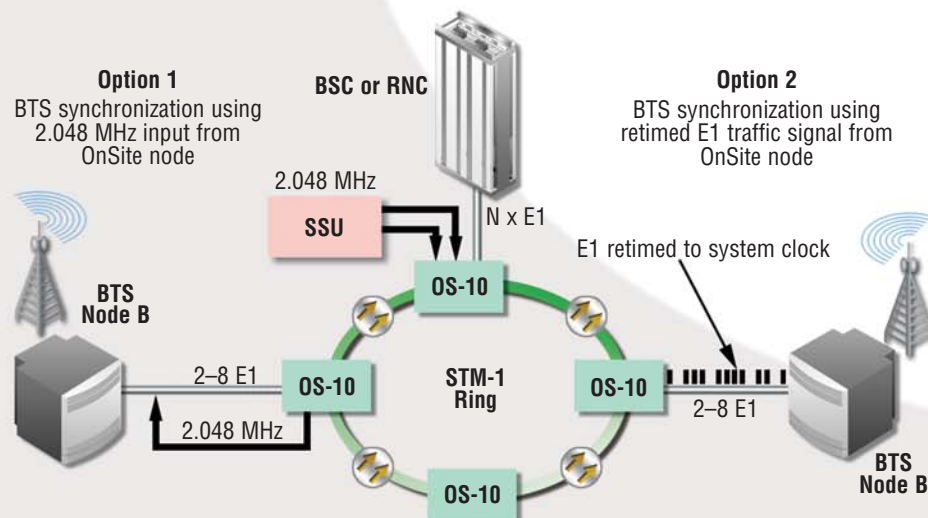
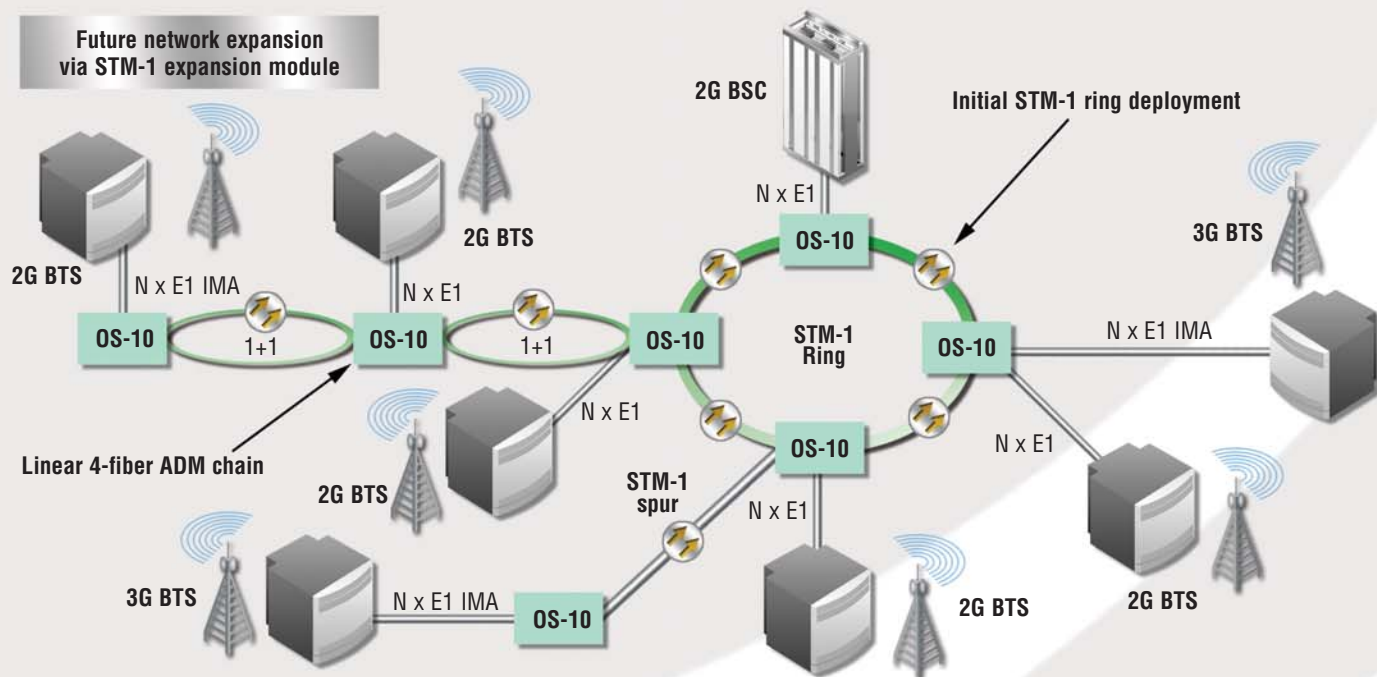


Figure 3. Synchronization of base stations using an OS-10 Series STM-1 access ring





# Converged TDM and IP-Based Broadband

## Managed transition to emerging Ethernet lease-line services

### Overview

Patton's OS-10 Series of  $\mu$ MSPP platforms enable you to meet the full range of leased line access network requirements for business users. The OS-10 Series is a family of high value access platforms designed to deliver current and emerging telecom and data communication services, addressing the changing requirements of service providers—both fixed line and wireless—and enterprise customers. Enterprise end users from government, financial, utilities and natural resource exploration industries, among others, all benefit from OS-10 solutions in their networks.

TDM is reliable, proven and understood, and it continues to deliver solid perform-

ance with guaranteed bandwidth for voice and data applications. Mission-critical services such as banking, highway control, defense and other government services continue to rely on TDM. When TDM is combined with Ethernet packet-switched technology on the same platform, as with Patton's OnSite series  $\mu$ MSPP, you have the flexibility to deliver reliable, revenue-generating leased line services while ensuring a smooth migration as the network evolves.

### Traditional TDM Leased-Line Services over SDH

E1/T1 leased-lines have been the workhorse of the public network access for the past two to three decades. Private networks are still being built, supporting

enterprise voice and data requirements. The growing popularity of corporate LANs and the need to connect these LANs across the WAN led to the deployment of multi-protocol routers which increased the need for low-cost, flexible accommodation of E1/T1 service offerings. These early PDH networks were built capable of offering E1 and E3 services and often used proprietary fiber solutions to obtain the distance to reach the nearest aggregation point in the network.

With the advent of the  $\mu$ MSPP over the past years, cost-effective SDH access could now be delivered to the network edge and the first fiber touch point in the access network have begun to transition

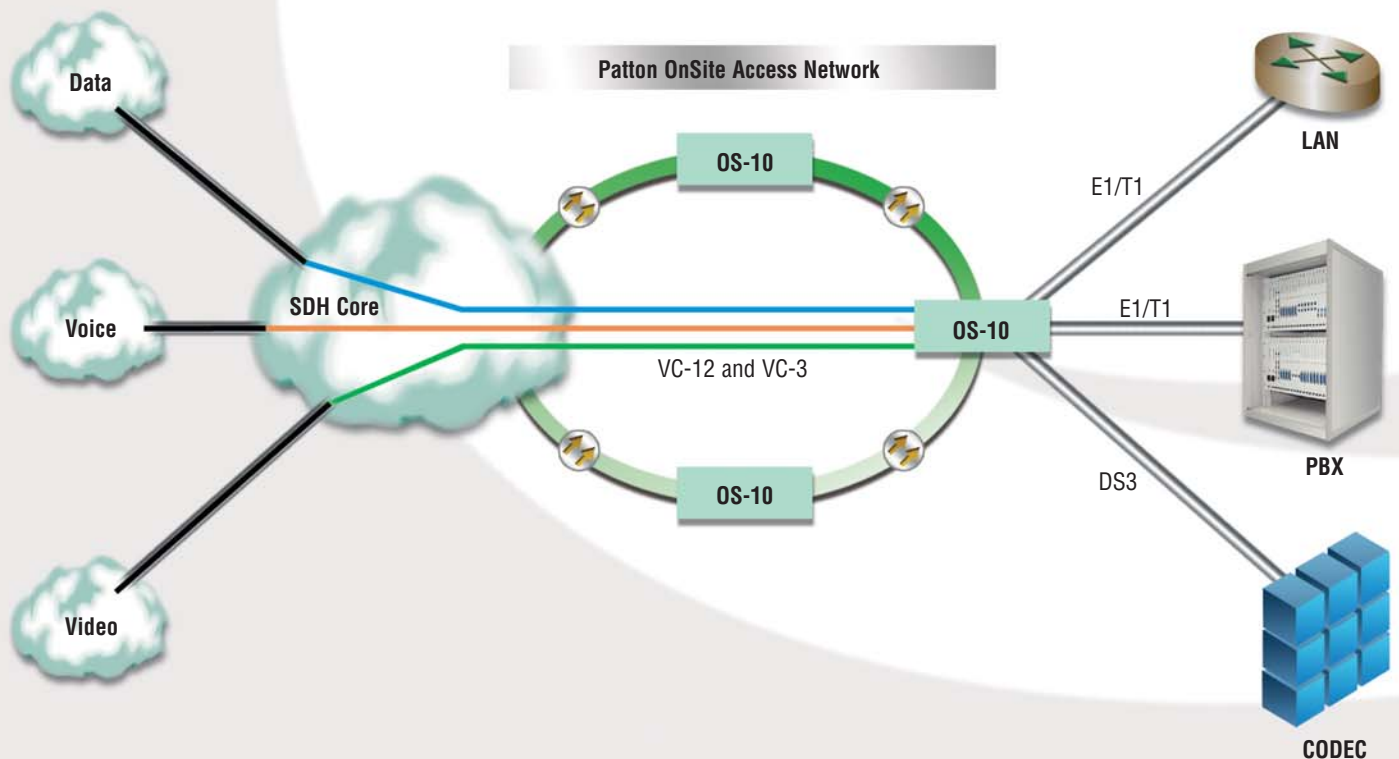


Figure 6. Example of PDH leased-line provisioning using the Patton OnSite



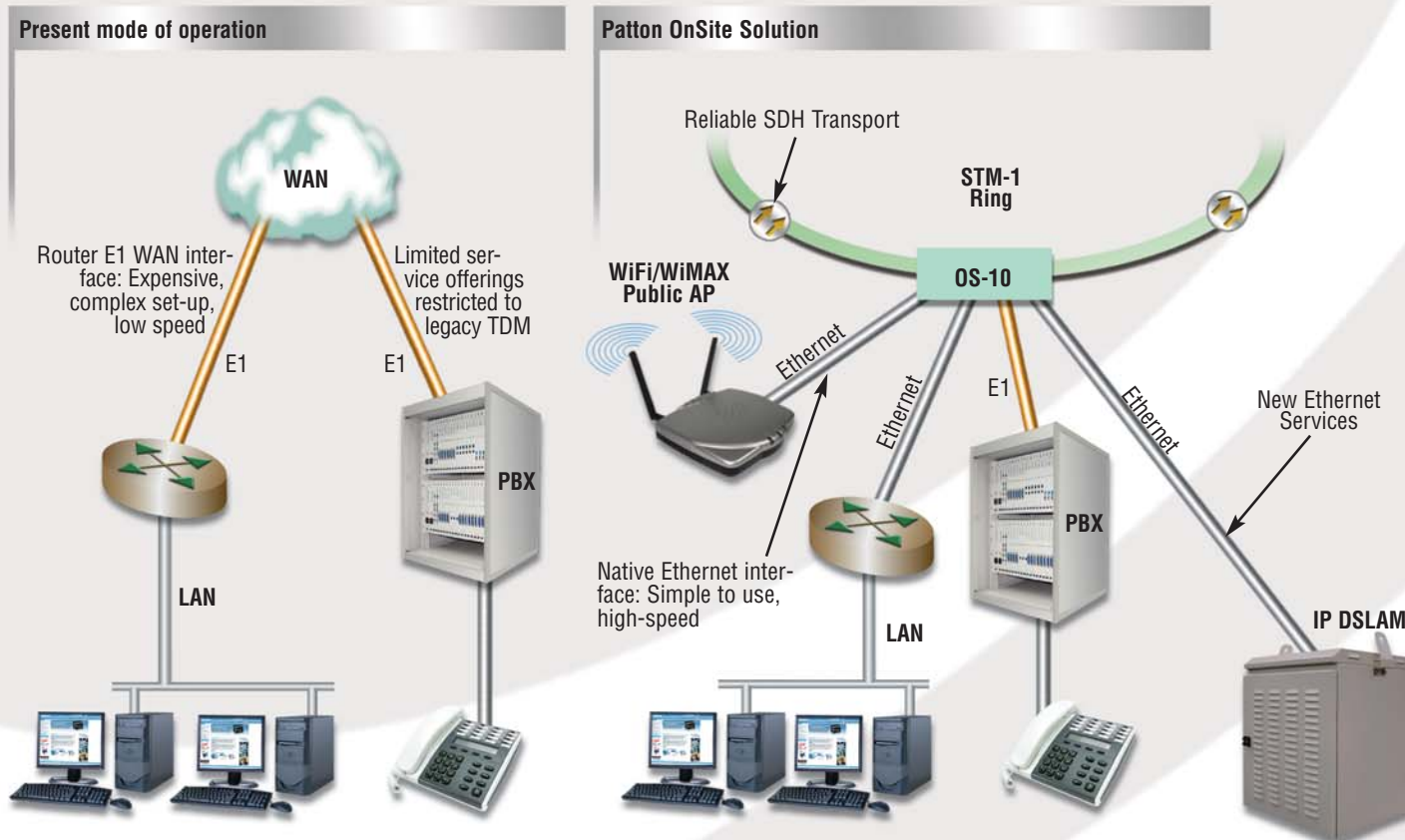


Figure 7. Migration from PDH to Ethernet leased-line services using an OS-10 Series STM-1 access ring

to PDH over SDH. Not only have these new platforms increased the scale and ability of service providers to roll-out revenue generating services more efficiently, but the underlying qualities of an SDH infrastructure have provided reliability and manageability benefits for greater operational results. Overall PDH/SDH benefits include:

- **Manageability**—easy to deploy, provision, manage, and maintain
- **Availability**—field-proven with >99.999 percent reliability
- **Profitability**—cost-effective and revenue-ready for today's TDM leased-line and tomorrow's Ethernet leased-line, Ethernet VPLS and similar applications

All platforms in the Patton OS-10 Series support interface access and transport of E1/T1 services over SDH.

The OnSite OS1063, in particular, is the platform of choice for applications that require a high count of E1 drop ports. The OS1063 is the industry's only  $\mu$ MSPP capable of delivering 63 E1 ports (in 120 and 75-ohm options) in a one rack-unit platform. You can deploy the OS1063 in hub or POP sites with a high concentration of E1 drop ports up to the full STM-1 trunk capacity of 63 E1. The OS-10 maps E1/T1 traffic into VC-12/VC-11 payloads for transparent connectivity across an existing SDH network interfaces that can deliver higher bandwidth capabilities at a fraction of the cost of scaling traditional PDH or SDH services.

At the E1/T1 level, you can connect the following equipment to the OS-10 platforms:

- PBX switches
- Routers
- Primary rate multiplexers
- DXC (digital cross-connect) 1/0 nodes
- Voice compression equipment
- Digital loop carriers

You can also equip the OS-10 platforms with a 3-port T3/E3 expansion module for interconnection of equipment such as:

- Legacy M13 multiplexers
- ATM switches
- Routers
- Video Codecs

# Converged TDM and IP-Based Broadband

## Managed transition to emerging Ethernet lease-line services

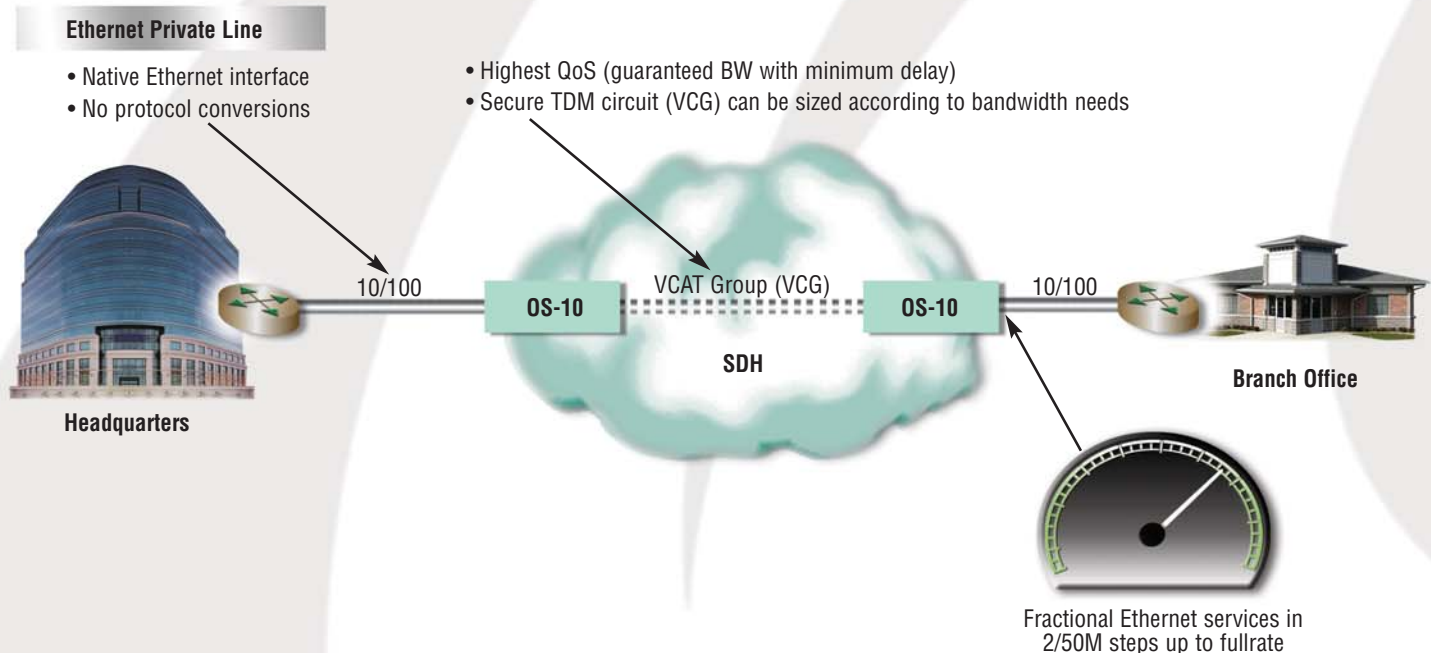


Figure 8. Ethernet private line services using the OnSite

### Transition to Emerging Ethernet Lease-Line Services

The deployment of small form factor, cost-effective  $\mu$ MSPPs at the network edge opens up a host of new capabilities for service providers to increase the revenue generating potential of the network. Patton OS-10 Series  $\mu$ MSPP solutions can significantly extend the life of the existing SDH network.

Traditional TDM lease-line services can now be extended or migrated to Ethernet-based leased-line services providing your subscribers with a range of tailored communications solutions while making more efficient use of the network infrastructure. One of the key advantages of Patton's OS-10 Series  $\mu$ MSPP solutions is the ability to migrate leased-line services to high-speed Ethernet interfaces that can deliver higher bandwidth capabilities at a fraction of the cost of scaling

traditional PDH/SDH services. Not only does this significantly lower your operating expenses, it also increases your competitiveness, since the resulting solution is cost-effective, flexible and extremely attractive to business subscribers.

**Network Efficiency**—with the OS-10 Ethernet private line capabilities, the bandwidth available to the customer is provided in increments of 2 Mbps. This means that a subscriber who needs a 10 Mbps leased-line service can receive exactly this capacity. The final result is better network utilization, and a service that matches the subscriber's demands. The OS-10 Series delivers this functionality through the use of standards-based virtual concatenation (VCAT). VCAT addresses the flexibility and scalability limitations in traditional SDH networks.

The Patton OS-10 leads the industry in the creation of VCAT groups (VCGs) for Ethernet leased-line services. You can create up to 34 VCGs in a single one rack-unit platform at the STM-1 level.

**Differentiated Services**—Patton's Ethernet services can be extended to provide multiple service offerings through a single customer interface. Through the use of VLAN technology, you can now offer your customers multiple services with different service level agreements and multiple connectivity paths across the SDH network.

Applications from corporate VPNs, to internet access, adoption of business VoIP services, and similar emerging requirements are all easily accommodated along-side the traditional business leased-line.



Offering leased-line services via Ethernet/IP transport on an OS-10 enabled network yields the following benefits:

- Preserve your investment in the existing TDM/SDH network
- Cost savings in equipment and leased-line consolidation
- Realize the benefits of IP over Ethernet as a more service-flexible transport medium
- Graceful migration to a converged IP network—opening up new profitable service opportunities with the addition of packet-switched technology.

## Summary

- **Protects investment in current infrastructure and services**—enables customer networks to take up emerging technologies, while supporting existing profitable services including TDM. Allows easy migration to higher speed interfaces and services from the current installed base—facilitating a seamless transition from TDM to packet services
- **Cost savings through network optimization**—a family of multi-service, multi-technology μMSPP platforms that deliver advanced capabilities for global carrier

and enterprise customers, including TDM, Ethernet, SDH and additional services

- **Simplified and cost effective operation**—fully network managed by the industry-leading OnSite Element Management System—a user-friendly support tool for end-to-end installation, maintenance and rapid service turn-up and delivery
- **Reliability**—Field-proven performance, with greater than 99.999 percent availability, letting service providers offer low-risk service level guarantees

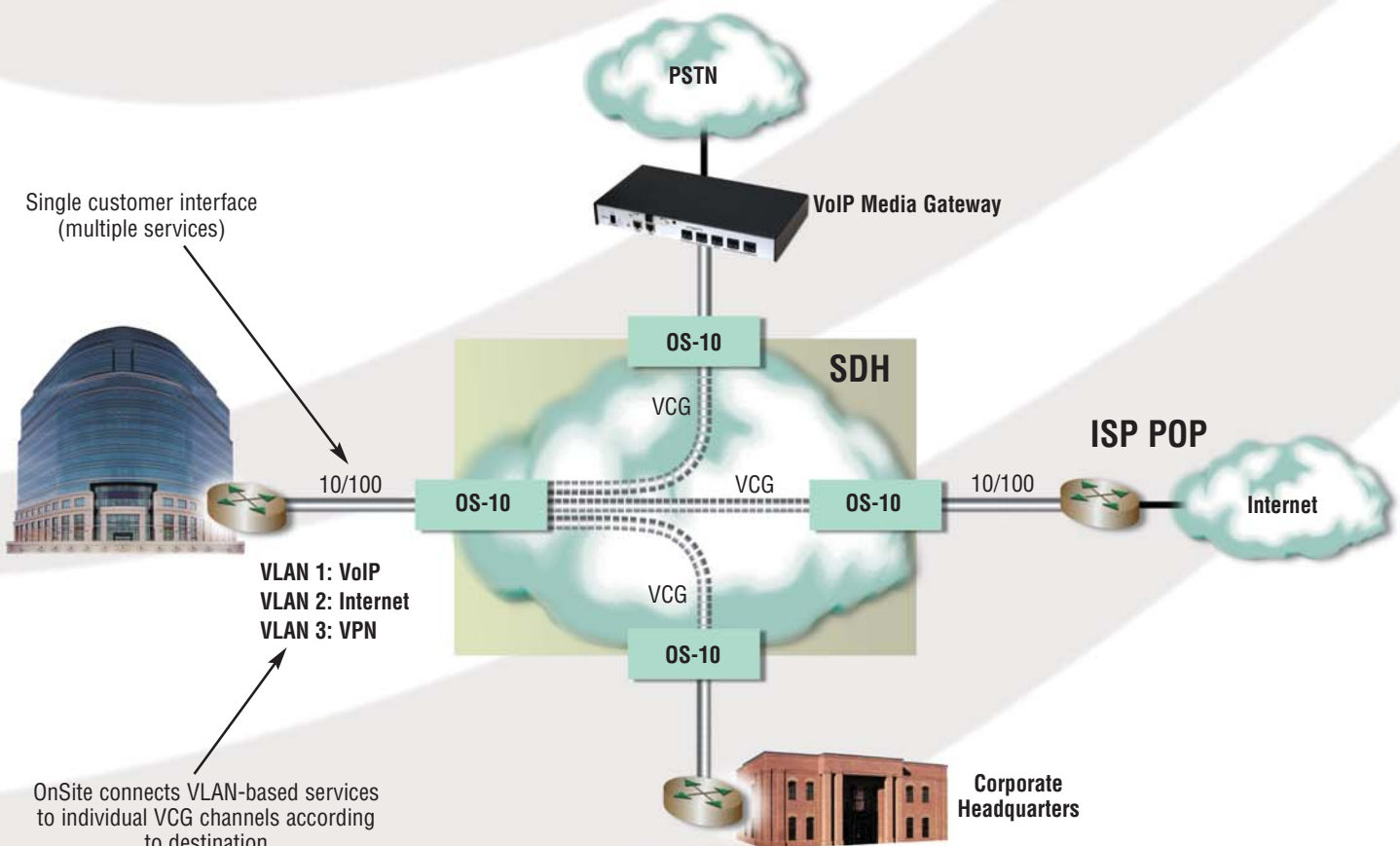
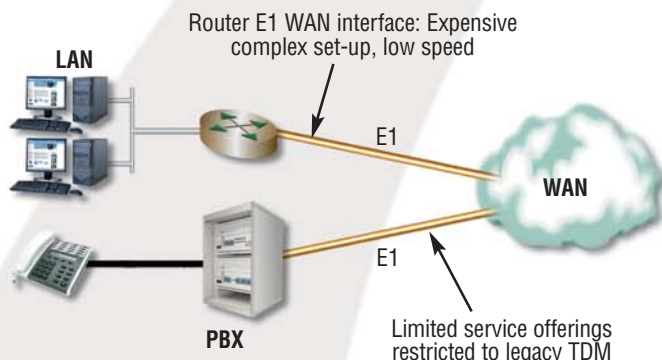


Figure 9. LAN extension service by mapping VLANs to VCAT groups

# Converged Optical Ethernet

## Managed coexistence of legacy TDM and Ethernet-based services

### Present mode of operation



### Patton OnSite Solution

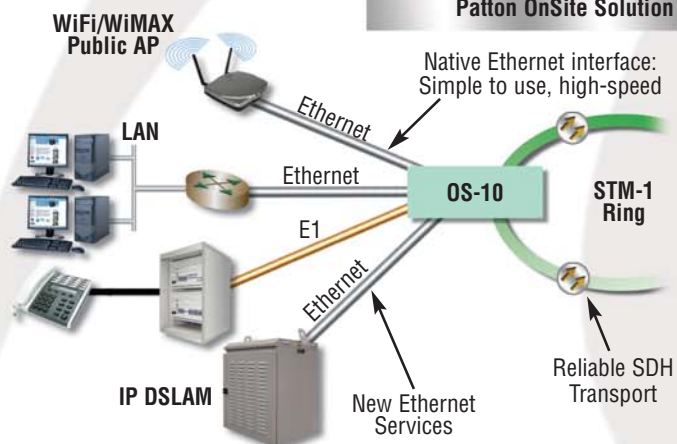


Figure 10. Migration from PDH to Ethernet leased-line services using the OnSite

### Introduction

Most service providers have existing SDH networks that have proven indispensable in serving revenue-critical TDM-based private line services. SDH is firmly established as the technology of choice for general-purpose transport in telecom networks because of its flexibility, reliability, ease of provisioning and multi-

vendor interoperability. The advancements of SDH technology, embodied in what is known today as  $\mu$ MSPPs, enable network providers to provide emerging packet-based services over existing SDH networks.

Network operators can substantially benefit from Patton OnSite Series  $\mu$ MSPP solu-

tion by offering enterprise customers with new, innovative services while extending the life of familiar operations methods and procedures.

The deployment of ultra-compact, cost-effective Patton  $\mu$ MSPPs at the network edge opens up a host of new capabilities for service providers to increase the revenue generating potential of the network.

### OnSite's Ethernet Solution

Traditional TDM leased-line services can now be extended or migrated to Ethernet-based leased-line services, providing your subscribers with a range of tailored communications solutions while making more efficient use of the network infrastructure and preserving the benefits of SDH networks' reliability, scalability and manageability.

While the ability to offer Ethernet access services over the existing SDH infrastructure provides an immediate benefit to network

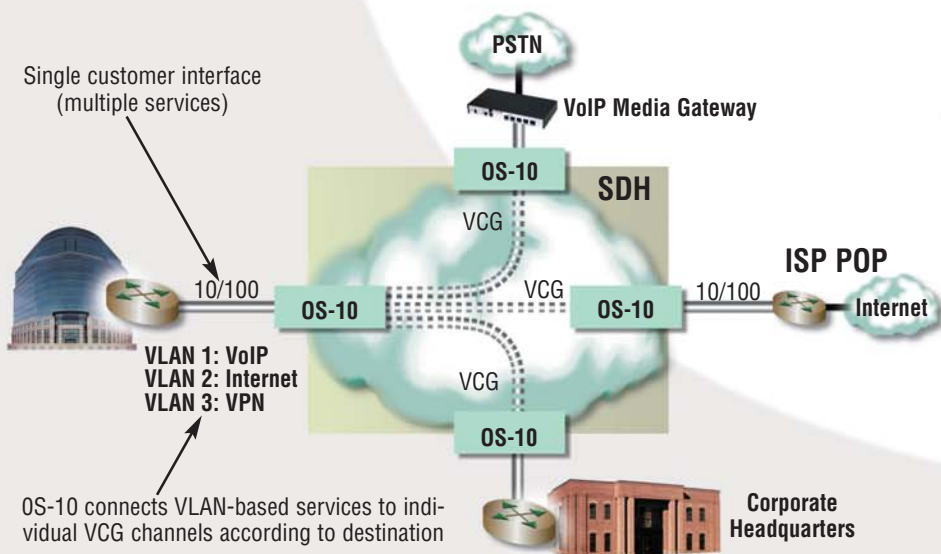


Figure 11. LAN extension service by mapping VLANs to VCAT groups



providers, a larger opportunity lies in offering value-added Ethernet services such as:

- Point-to-point as well as point-to-multi-point Ethernet services
- Variable access rates with fine granularity and QoS
- Support for customer and service provider VLAN schemes
- Performance and scalability, and carrier-class reliability

Using the Patton OnSite platforms, service providers can offer simple point-to-point LAN extension services by mapping Ethernet traffic at the port or VLAN level to VCAT groups (VCGs). For example, a service provider could configure Ethernet ports as VLAN access ports, and map customer VLANs to VCGs to extend VLAN traffic between two customer sites, as shown in figure 11.

Service providers can also provide VLAN trunking across the SDH network by configuring an Ethernet service provider tag (S-tag) to carry traffic for multiple VLANs between two customer sites, as shown in figure 12.

The OnSite solution allows service providers to support multiple customers, each with multiple LANs, and each with different access rate and QoS requirements for their specific applications. The Patton OnSite Series supports:

- **Rate limiting function** that enables service providers to define for each LAN connection (port or VLAN) sustained and peak information rates with very fine granularity (64 kbps).
- **8 classes of service (CoS)** to set up a service class for a particular VLAN or application by mapping Ethernet port or

VLAN or IEEE 802.1p to a specific CoS. For example, a video conferencing application for a particular VLAN could be mapped to the high class of service category with sustained information and peak information rate set to 1 Mbps.

- **VLAN tag adding, striping and change**, enabling service providers to offer a flexible VLAN scheme to their customer. Furthermore, support for conversion of tagged to untagged Ethernet frames and vice versa provides LAN connectivity between sites that supports VLAN and sites that do not support VLANs.

Ethernet service evolution is assured by the OS-10's hybrid packet and SDH switching architecture. Ethernet services are supported by an on-board network processor that can process IP packet and its content in addition to Ethernet frames. Network processor solution enable network operator to set up advanced security and traffic management policies based on IP header information and user application content itself.

## Ethernet over SDH Features

- Native Ethernet interfaces
- 8 classes of service with per port, VLAN or p-bit classifications
- Per port or VLAN traffic shaping and policing
- VLAN stacking (Q-in-Q)
- VCAT and LCAS

## Summary

Patton OnSite Series platforms enable network operators to significantly lower operating expenses, while increasing their competitiveness. The resulting solution is cost-effective, flexible and attractive to business subscribers. One of the key advantages of the Patton OnSite μMSPP solution is the ability to migrate legacy TDM leased-line services to high-speed Ethernet interfaces that can deliver higher bandwidth capabilities at a fraction of the cost of scaling traditional PDH or SDH services.

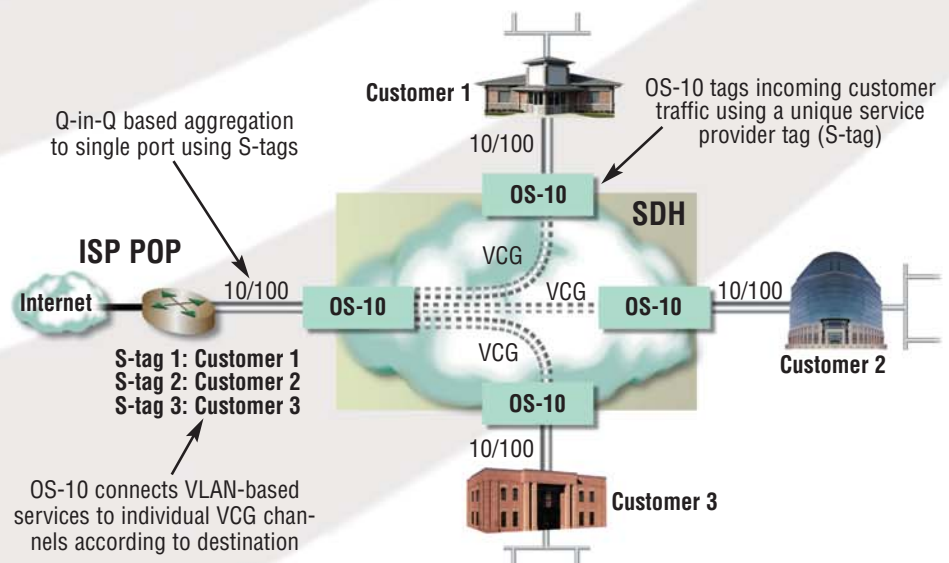


Figure 12. LAN extension service using VLAN trunking

# Converged MDU/MTUs

## Delivery of basic telecom and broadband services to multi-tenants

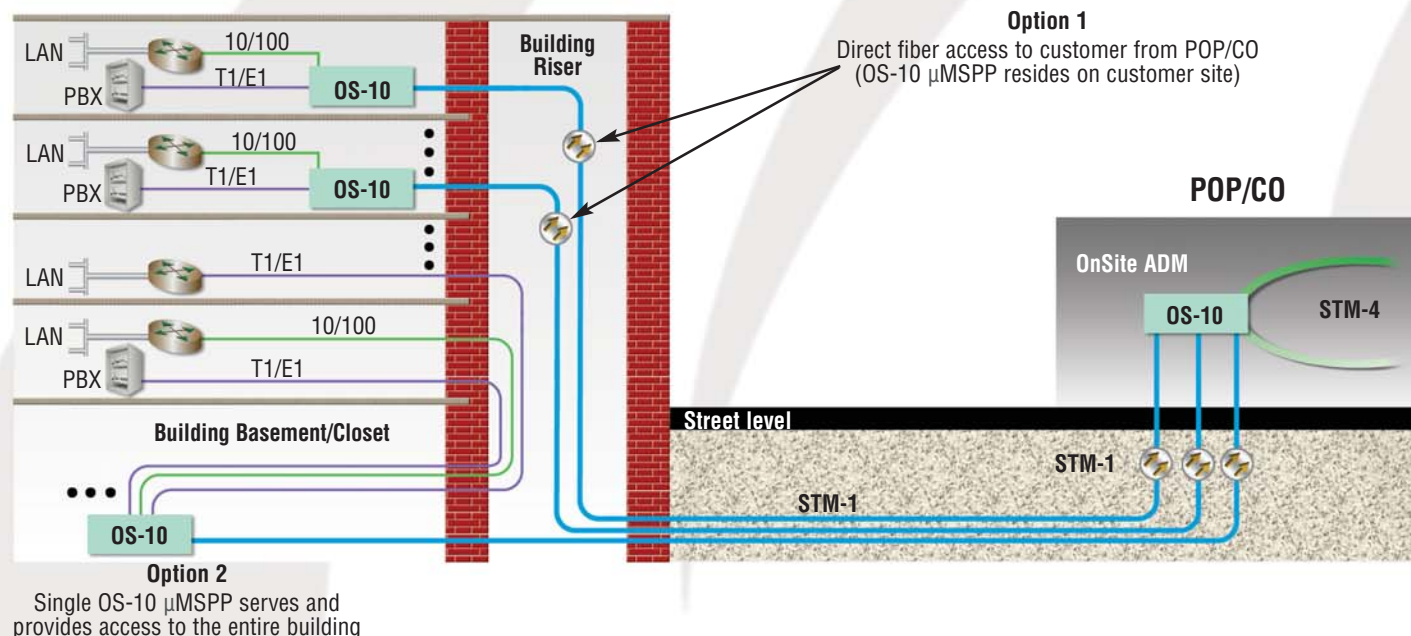


Figure 13. Deployment options 1 and 2: In-building connectivity using the OS-10

### Building Connectivity Using the Patton OnSite Series

Over the years, the number of buildings with fiber connectivity is increasing at a very fast pace. Fiber-to-the building opens new and exciting possibilities for carriers and services providers that wish to address the growing multi-tenant unit (MTU) market.

With the basic fiber optic infrastructure in place, you can use the Patton OnSite Series of μMSPP platforms to provide reliable connectivity and profitable delivery of basic telecommunications and broadband services to business and residential building tenants.

The ultra-compact design and superior cost-performance of the Patton OnSite Series allows easy and cost-effective deployment in space-constrained building environments, while enabling service diversity and flexible expansion options.

### Intra-building Connectivity

Depending on customer needs and available fiber, you can place the OS-10 in strategic locations within a building, as shown in figure 13.

- **Option 1:** The OS-10 is located directly on the floor where the customer resides. This option provides direct fiber access to the customer from the carrier or service providers' point-of-presence (PO) or central office (CO). Customer E1 or Ethernet traffic is directly connected to the OS-10 for reliable transport over the dedicated fiber optic SDH link. Government and financial institutions with strict security requirements would benefit from this configuration. For this application, the OS1052 platform meets the required port density and price point for cost-effective deployment of E1 and Ethernet services over high-performance SDH links.

- **Option 2:** A single OS-10 serves as an in-building POP and provides access to the entire building. Customer traffic from each floor connects to the OS-10 through the building riser using intra-building copper cabling. For this application, the modular OS1052 and OS1063 platforms are ideal for access to up to 63 E1 or 18 Ethernet client ports.
- **Option 3:** All OS-10s within the building are interconnected to form an intra-building ring, as shown in Figure 13. For maximum reliability and protection, you can connect the OnSite ring elements using fiber routes along different riser conduits, if the building structure permits. All platforms in the Patton OnSite Series support interconnection using ring, linear and point-to-point topologies.



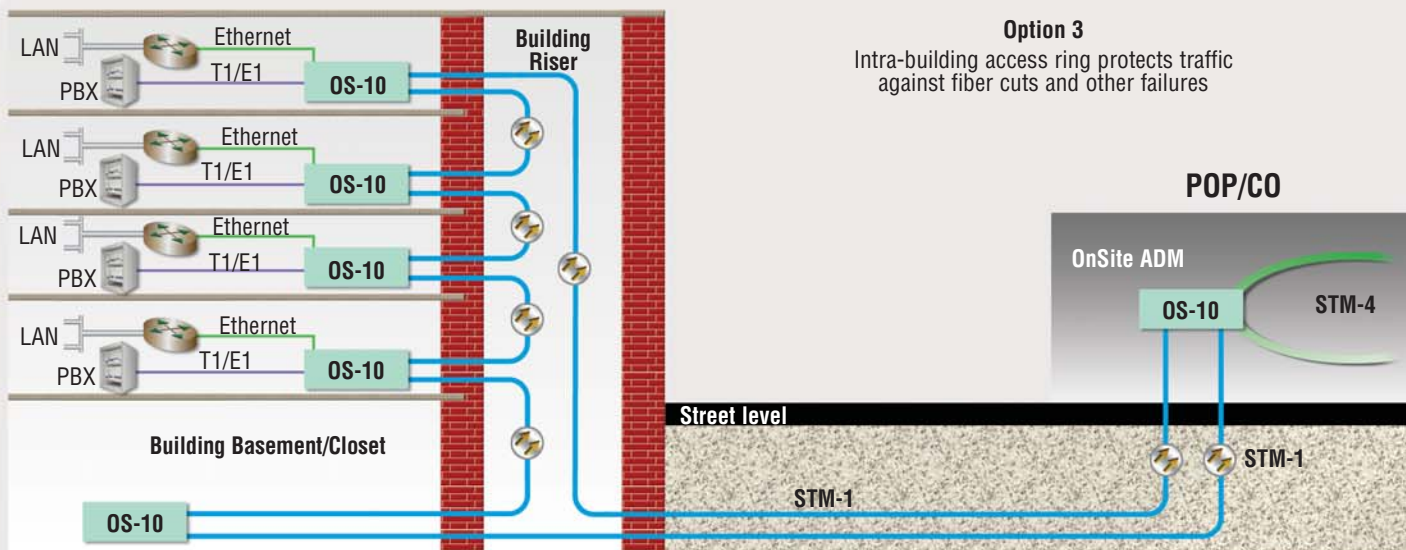


Figure 14. Deployment option 3: Intra-building ring using the OS-10

## Inter-building Connectivity

The OS-10 also allows the interconnection of multiple buildings into a ring access network. For buildings where fiber access is not yet available, it is still possible to interconnect the OnSite elements in a ring topology.

Figure 15 shows an example where one of the buildings without fiber access is con-

nected to the OnSite ring with a wireless link using SDH radio.

You can use an OnSite ring, linear or point-to-point network to interconnect buildings in the following applications:

- Central business districts
- Business parks
- Campus networks

## OnSite Benefits for MTU Application

- Survivability
- Native Ethernet interfaces and connectivity
- Legacy TDM connectivity
- Secure SDH transport with packet intelligence

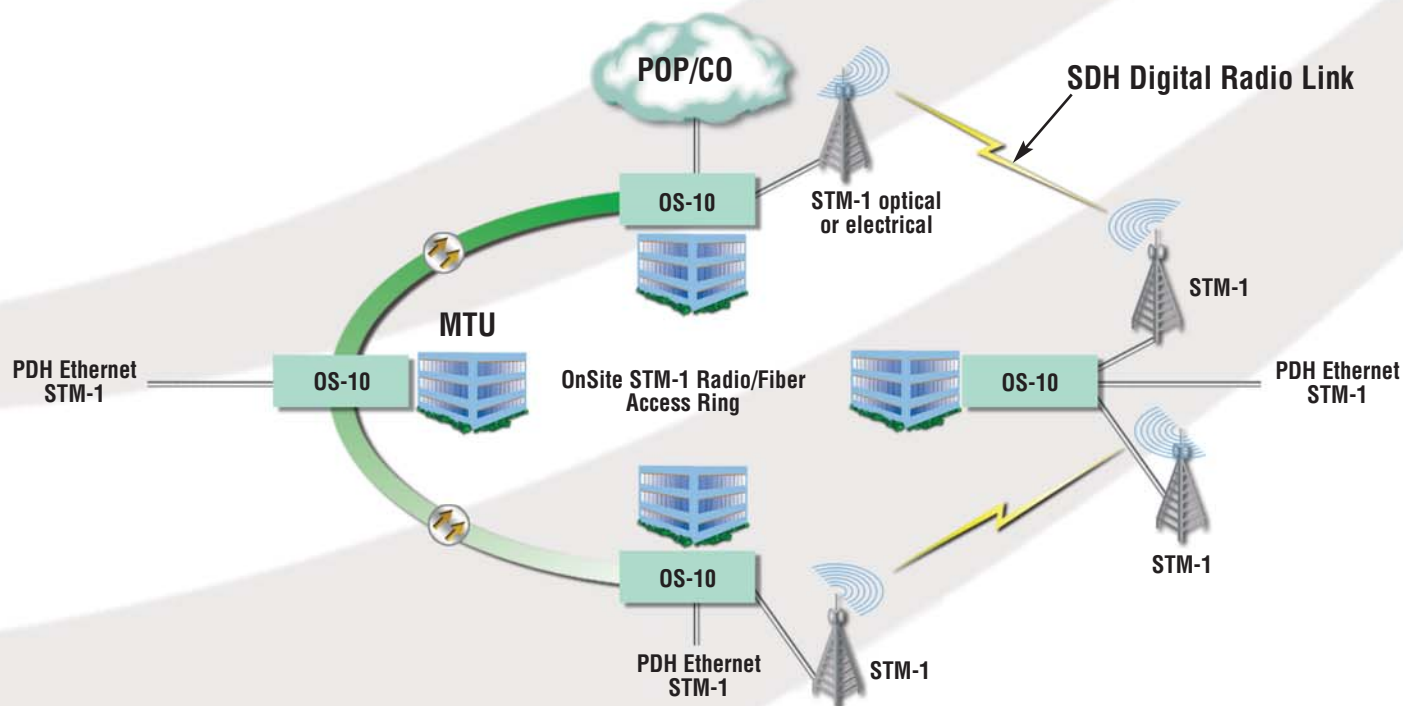


Figure 15. Inter-building interconnection using the OnSite

# OS-10 Series Overview

## OnSite OS-10 Series

### Flex Access Node

The OnSite OS-10 Series is a family of ultra-compact flex access nodes that provide a unique, simple and economical migration path toward a converged IP service network.



OnSite™ Series Model OS1052



OnSite™ Series Model OS1063



STM-1 Module



HD-ENET Module



DS3-E3 Module



HD-E1 Module

The OS-10 Series are the ideal platforms for 3G/4G mobile network backhaul, secure and scalable carrier Ethernet transport, multi-service aggregation, quad-play connectivity (voice, data, video and mobility), and technology mediation among TDM, ATM and Ethernet.

The advanced modular design of the OS-10 Series platforms provides unequalled flexibility in their class in terms of service offerings, capacity and functional upgrades.

For each platform, the base system is configured with:

- OS1052: 2 STM-1, 8 E1/T1 and 2 Ethernet
- OS1063: 2 STM-1 and 21 E1/T1

Two expansion slots on the modular OS1052 and OS1063 platforms allow increasing system capacity beyond the initial base configuration. Additional ports and features only require simple insertion of

one of the many available types of TDM and packet data modules.

In only one RU, the OS-10 Series supports expansion up to:

- 63 E1 or 18 Ethernet 10/100 ports
- 6 STM-1 ports

The following figure shows various combinations of service and port capacity expansions:

The OS-10 Series incorporates next-generation SDH features such as virtual concatenation (VCAT), link capacity adjustment scheme (LCAS) and generic framing procedure (GFP) for efficient packet data transport. The platforms also incorporate Layer 2 features such as VLAN tagging, rate limiting, and statistical multiplexing with multi-level QoS control.

The OS-10 Series platforms are easily configured and managed through a simple Web-based GUI interface or the scalable OnSight™ NMS.

## FEATURES & BENEFITS

- ✓ **Ultra-compact design (1 RU)**—STM-1 trunks • Built-in E1/T1 and Ethernet client ports • Integrated, non-blocking cross-connect • Dual expansion slots • Multiple TDM and packet data modules
- ✓ **Highly flexible configurations**—Terminal Mux and ADM • Linear MSP 1+1 protection • Point-to-point • Linear ADM (two and four-fiber) • Ring ADM • SNCP/I and SCNP/N
- ✓ **Next-generation SDH features**—GFP encapsulation • Virtual Concatenation (VCAT) • LO/HO • LCAS
- ✓ **Layer 2 packet intelligence**—Ethernet MAC with flow control • VLAN • Q-in-Q • Rate limiting • QoS
- ✓ Seamless transition from TDM to Packet Data
- ✓ Compatibility with existing SDH network
- ✓ Modular service and capacity upgrades
- ✓ Simple HTTP Web-based GUI
- ✓ Reduced CAPEX and OPEX
- ✓ Simplified network planning
- ✓ Full-rate and fractional Ethernet services
- ✓ AC and DC power options
- ✓ Passive cooling design (no fans)

### OS-10 Series Configuration and Port Capacity with the HD-E1 module

OnSite Platform	Base Ports	Max E1 capacity with...	
		Single Module	Dual Modules
OS1052	8	29	50
OS1063	21	42	63

### OS-10 Series Configuration and Ethernet Port Capacity with the HD-ENET module

OnSite Platform	Base Ports	Max Ethernet capacity with...	
		Single Module	Dual Modules
OS1052	2	10	18
OS1063	—	8	16



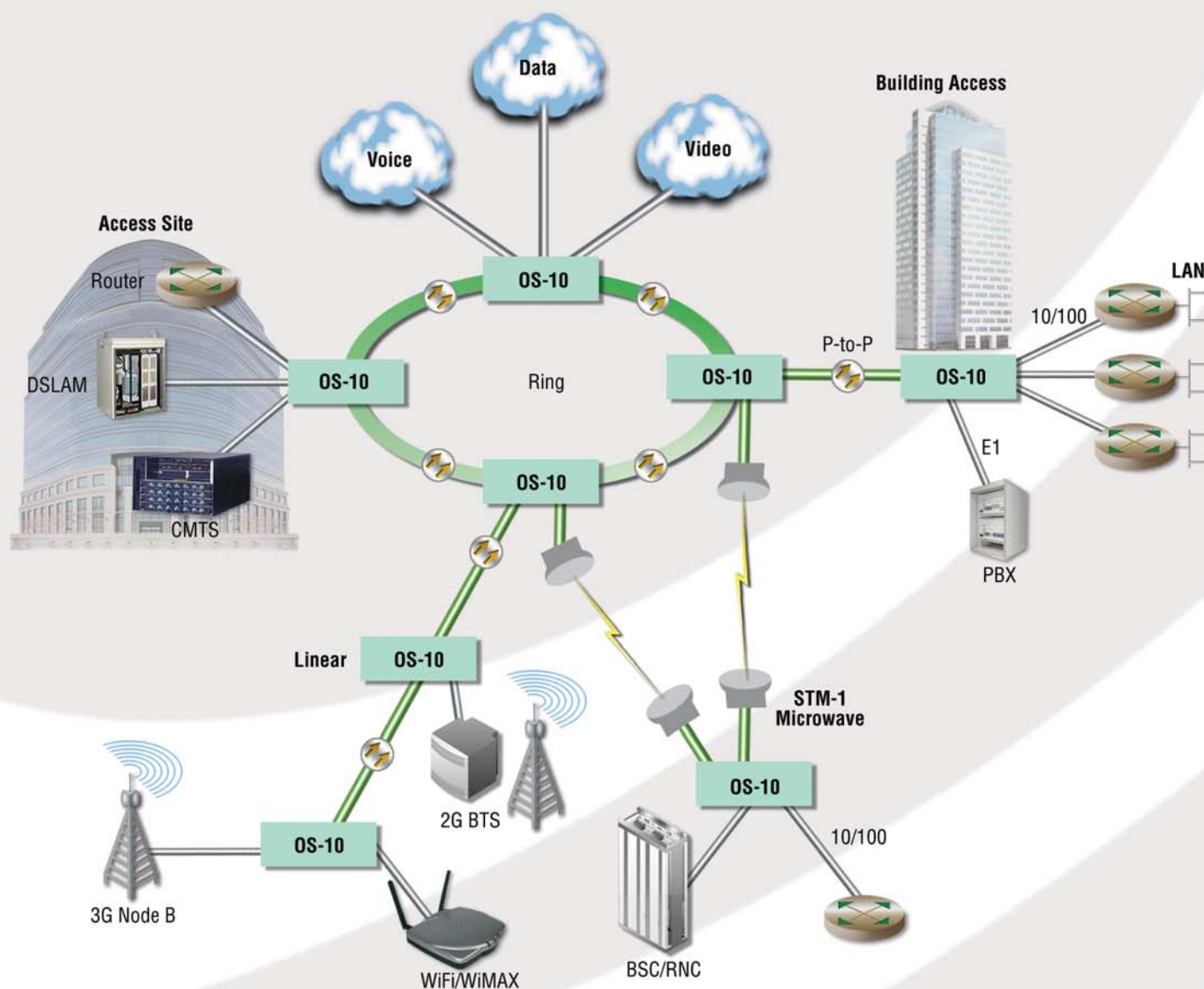


Figure 16. Typical Patton OnSite OS-10 Series application

## SPECIFICATIONS

**Trunk Interfaces:** STM-1G.707, G.783 • Optics: G.957 S-1.1, L-1.1 and L-1.2 options

**Client Interfaces:** E1: G.703, 75-ohm and 120-ohm options • T1: G.703, 100-ohm • Ethernet 10/100Base-TX: 802.3u

**Bandwidth Connectivity and Provisioning:** Connectivity: VC-12, VC-3 levels • One-way, two-way, drop-and-continue, and multicast connections • VCAT: VC-12-Xv and VC-3-Xv • LCAS:

G.7042 • Packet encapsulation: GFP-F (G.7041)

**Protection:** Linear MSP 1+1 • SNCP/I and SNCP/N

**Timing & Synchronization:** Internal: Stratum 3 clock (G.813) • Line timing: STM-1 and E1/T1 • External timing: Dual Sync In/Out ports at 2 or 1.5 Mbps/MHz • SSM support: G.781

**System Access:** Serial RS-232 and Ethernet LAN management ports • IP over

DCCr and DCCm options • IP over E1 signal mapped into selected VC-12 channel • DCC transparency (any subset of DCC rows) • Telnet

**Operations:** Local and remote software download and upgrade (FTP/TFTP) • Loopbacks: facility and terminal • ALS (automatic laser shutdown): G.958 • Alarm Contacts (optional) • Ordewire: 2-wire interface using E1 or E2 byte (optional)

**Management:** Web-based GUI management interface • SNMPv2 and XML • Command line interface (CLI)

**Packet Intelligence:** Ethernet MAC: 802.3 • VLAN: 802.1Q and Q-in-Q • Service provider VLAN (SP-VLAN) using S-Tag: 802.1ad • Tagging operations: C-Tag and S-Tag add/strip • Flow Control: 802.3x • Rate Limiting: Sustained and peak rates with 64 kbps granularity for ports and VLANs • QoS: 4 levels with strict priority, WFQ and WRED support

**Dimensions:** 1.75H x 17.25W x 11.54D in. (44.45H x 438.2W x 293.0 mm) 1RU

**Weight:** 11 lbs (5 kg)

**Front access**

**Cooling:** Natural convection cooling (no fans)

**Mounting:** 19-inch EIA/TIA or ETSI 300 mm racks, or desktop and wall-mounting options

**Power:** AC input: 100 to 245 V at 50 to 60 Hz • DC input: -36 to -72 V (-48V nominal), dual inputs • Consumption: 60 W maximum

**Temperature:** 0 to +50 °C (+32 to +122 °F)

**Humidity:** 5 to 95%, non-condensing  
EMC: EN 55022 Class A, FCC part 15 Class A

**Safety:** EN 60950, UL 60950  
CE Mark

\* Specifications subject to change without notice.

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# OS1052 and OS1063 Base Systems and

## Metro-Optical Transport Access

### OnSite™ Series Models OS1052 & OS1063

*The Patton Models OS1052 and OS1063 deliver flexible and modular multiservice solutions for 2G/3G backhaul, fixed-line networks, and private and utility networks.*

The OnSite Series Models OS1052 and OS1063 are ultra-compact next-generation flex access nodes.

The Model OS1052 is the platform of choice for economical deployment of access points with low initial count of E1 and Ethernet ports.

The Model OS1063 is ideal for deployment of access points with an initial count of 21 E1 ports.

Both access nodes are designed for flexible capacity expansion and simple migration toward converged IP service networks.

The access nodes support 3G/4G mobile network backhaul, secure and scalable carrier Ethernet transport, multi-service aggregation, quad-play connectivity (voice, data, video and mobility), and technology mediation among TDM, ATM, and Ethernet.

The advanced modular design of the OnSite access nodes provide unequalled flexibility in its class in terms of service offerings, capacity and functional upgrades.

Both access nodes incorporate next-generation SDH features such as virtual concatenation (VCAT), link capacity adjustment scheme (LCAS) and generic framing procedure (GFP) for efficient packet data transport. The platforms also incorporate Layer 2 features such as VLAN tagging, rate limiting and statistical multiplexing with multi-level QoS control. The nodes are easily configured and managed through a simple Web-based GUI interface or the scalable Patton OnSight NMS.

### Model OS1052 base system

The base OS1052 system is configured with 2 STM-1, 8 E1/T1 and 2 Ethernet 10/100Base-TX.

Two expansion module slots are included for increasing system capacity beyond the initial base configuration. Additional ports and features only require simple insertion of one of the many available types of TDM and packet data modules. OS1052 supports expansion up to 50 E1 ports and 18 Ethernet 10/100 ports.

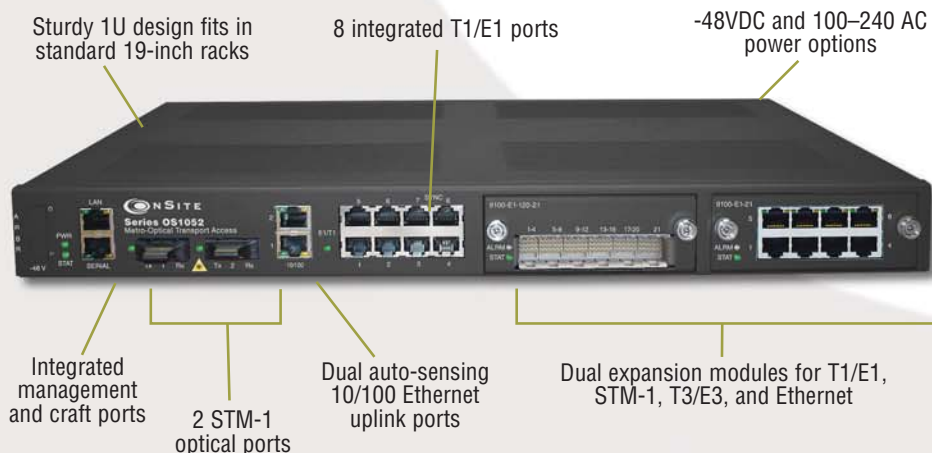
## FEATURES & BENEFITS

- ✓ **Ultra-compact design (1 RU)**—STM-1 trunks, built-in E1/T1 and Ethernet client ports, and integrated non-blocking cross-connect.
- ✓ **Highly flexible configurations**—Terminal mux and ADM, linear MSP 1+1 protection, point-to-point, linear ADM, ring ADM, and SNCP/I and SNCP/N
- ✓ **Next-generation SDH features**—GFP encapsulation, virtual concatenation (VCAT), LO/HO, LCAS
- ✓ **Layer 2 packet intelligence**—Ethernet MAC with flow control, VLAN, rate limiting, Q-in-Q, and QoS

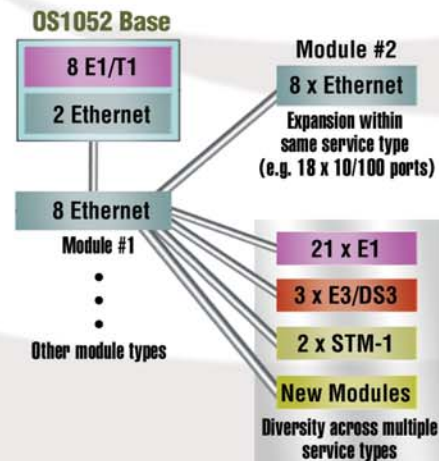
## OS-10 Series Base Systems Overview

Ports	OS1052	OS1063
Management	2	2
STM-1	2	2
Ethernet	2	—
T1/E1	8	21

### OnSite™ Series Model OS1052



Example combinations of Model OS1052 service and port capacity expansions





# Capabilities

## Metro-Optical Transport Access (Continued)

## Model OS1063 base system

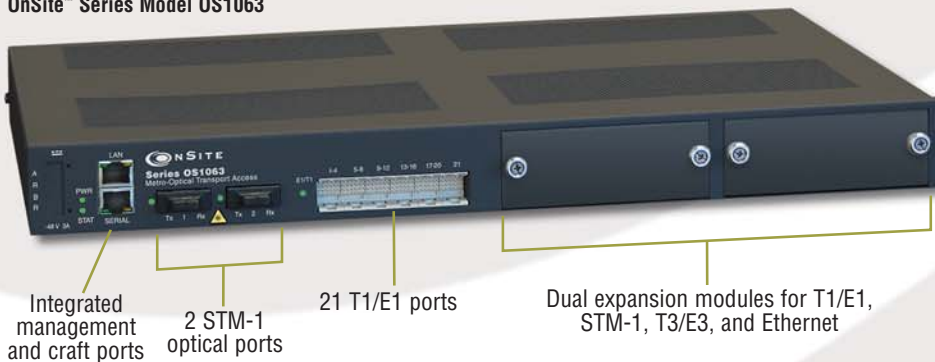
The base OS1063 system is configured with 2 STM-1 and 21 E1/T1.

Two expansion module slots are included for increasing system capacity beyond the initial base configuration. Additional

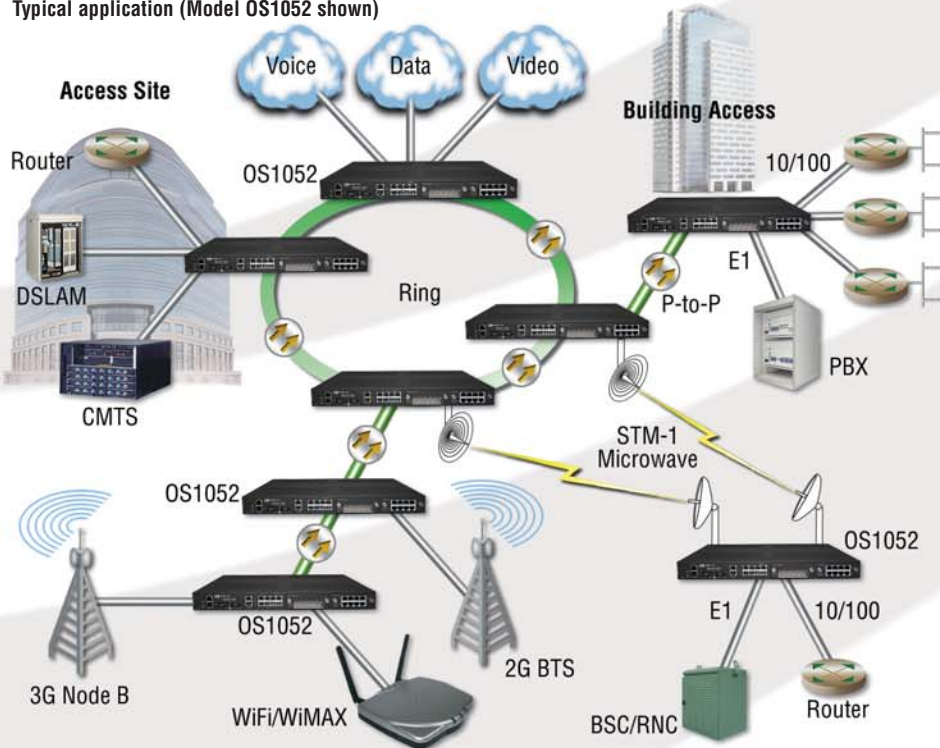
ports and features only require simple insertion of one of the many available types of TDM and packet data modules.

In only one RU, the OS1063 supports expansion up to 63 E1 ports and 18 Ethernet 10/100 ports.

## OnSite™ Series Model OS1063



### Typical application (Model OS1052 shown)



## SPECIFICATIONS

**Trunk Interfaces:** STM-1: G.707, G.783 • Optics: G.957 S-1.1, L-1.1 and L-1.2 options

**Client Interfaces:** E1: G.703, 75-ohm and 120-ohm options • T1: G.703, 100-ohm • Ethernet 10/100Base-TX: 802.3u

**Expansion Modules:**  
**SDH:** STM-1 optical (2 ports) • STM-1 electrical (2 ports)  
**PDH:** E1 (21 ports) • E3/DS3 (3 ports)  
**Packet Data:** 10/100Base-TX (8 ports)

### Configuration & Port Capacity for 2 Expansion Slots:

**Model OS1052**  
STM-1: Base: 2 • Max: 6  
E1: Base: 21 • Max: 63  
E3/DS3: Base: — • Max: 6  
10/100Base-TX: Base: — • Max: 18

**Model OS1052**  
STM-1: Base: 2 • Max: 6  
E1: Base: 8 • Max: 50  
E3/DS3: Base: — • Max: 6  
10/100Base-TX: Base: 2 • Max: 18

**Protection:** Linear MSP 1+1 •  
SNCP/I and SNCP/N

**Bandwidth Connectivity and Provisioning:** Connectivity: VC-12, VC-3 levels • One-way, two-way, drop-and-continue and multicast connections • VCAT: VC-12-Xv and VC-3-Xv • LCAS: G.7042 • Packet encapsulation: GFP-F (G.7041)

**Timing & Synchronization:**  
Internal: Stratum 3 clock • Line timing:  
STM-1 and E1/T1 • External timing:  
Dual Sync In/Out ports at 2 or 1.5  
Mbps/MHz • SSM support: G.781

**System Access:** Serial RS-232 and Ethernet LAN management ports • IP over DCCr and DCCm options • IP over E1 signal mapped into selected VC-12 channel • DCC transparency (any subset of DCC rows) • Telnet

**Operations:** Local and remote software download and upgrade (FTP/TFTP)  
• Loopbacks: facility and terminal • ALS (automatic laser shutdown): G.958 • Alarm Contacts (optional) • Orderwire: 2-wire interface using E1 or E2 byte (optional)

**Management:** Web-based GUI  
management interface • XML • SNMP  
v1/v2

**Packet intelligence:** Ethernet  
MAC: 802.3 • VLAN: 802.1Q and Q-in-Q  
• Service provider VLAN (SP-VLAN) using  
S-Tag: 802.1ad • Tagging operations: C-  
Tag and S-Tag add/strip • Flow Control:  
802.3x • Rate Limiting: Sustained and  
peak rates with 64 kbit/s granularity for  
ports and VLANs • QoS: 4 levels with  
strict priority, WFQ and WRED support

**Dimensions:**  
1.75H x 17.25W x 11.54D in.  
(44.45H x 438.2W x 293D mm)  
1RU

**Weight:** 11 lbs (5 kg)

**Cooling:** Natural convection cooling  
(no fans)

**Mounting:** 19-inch EIA/TIA or ETSI 300 mm racks, or desktop and wall-mounting options

**Power:** AC input: 100 to 245 V at 50 to 60 Hz • DC input: -36 to -72 V (-48V nominal), dual inputs

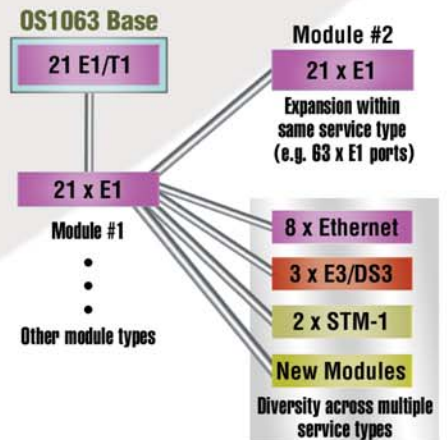
**Consumption:** 60 W maximum

**Temperature:** 0 to +50 C  
(+32 to +122°F)

**Humidity:** 5 to 95%, non-condensing  
**EMC:** EN 55022 Class A, FCC part 15 Class A

**Safety:** EN 60950, UL 60950  
**CE Mark**

### Example combinations of Model OS1063 service and port capacity expansions



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# S-10 Series Modules

## 21-port HD-E1 Module

### OnSite™ Series Model HD-E1

The high-density 21-port E1 module allows configuring the Patton OnSite OS-10 Series of STM-1  $\mu$ MSPB platforms for direct access to high counts of E1 client signal ports.



The high-density (HD)-E1 module inserts into an expansion slot in the modular OS1052 and OS1063 platforms. Using two modules, you can configure the OS1063 system for full access to the STM-1 capacity of 63 E1 ports in only 1U of rack space.

The port density and expansion capability of the HD-E1 module makes it ideal for use in mobile networks, E1 leased-line networks, and basic telephony applications.

For mobile network applications, the HD-E1 module can backhaul E1 traffic from multiple BTS or Node B sites to a centralized BSC or RNC.

You can also use the module at a service provider point-of-presence (POP) to connect E1 traffic from multiple building sites using an OnSite SDH ring.

The transparent, clear-channel transport capability of the module simplifies the connectivity of E1 G.703 signals (2.048 Mbps  $\pm$  50 ppm) across an SDH network.

The HD-E1 module provides physical access to E1 signals through a high-density cable that plugs directly into the front panel of the module using a Future Bus connector.

The module is configured and managed through a Web-based GUI interface or a scalable EMS.

## FEATURES & BENEFITS

- ✓ **High port density**—21 E1 ports (G.703 compliant)
- ✓ **Flexible termination options**—75-ohm • 120-ohm
- ✓ **Simple connectivity**—Clear-channel transport over SDH • High density cable interconnection
- ✓ **Flexible timing and synchronization**—E1 line timing • E1 retiming option
- ✓ **Low Power**—Less than 6 watts; Natural convection cooling (no fans)

## OS-10 Series Configuration and Port Capacity with the HD-E1 module

OnSite Platform	Base Ports	Max E1 capacity with...	
		Single Module	Dual Modules
OS1052	8	29	50
OS1063	21	42	63

## 8-port Ethernet Module

### OnSite™ Series Model HD-ENET

This high density 8-port Ethernet module provides industry-leading, flexible expansion of Ethernet services for the Patton OnSite OS-10 Series of flex access platforms.



The high-density Ethernet (HD-ENET) module inserts into an expansion slot in the modular S1052 and S1063 platforms. By adding two modules, the system can support up to 18 Ethernet ports in only 1U of rack space (including the two Ethernet ports on the base OS1052 system).

The module supports flexible encapsulation of data services into SDH tunnels using generic framing procedure (GFP) and virtual concatenation (VCAT).

With the HD-ENET module, the system can connect Ethernet traffic flows at the port and VLAN levels to any of up to 16 VCAT groups (VCGs) in the module. Each VCAT group has access to the full SDH trunk capacity of the OS10 series system and supports configuration at the VC-3 and VC-12 levels. With two modules, you can configure up to 34 VCGs for the provisioning of Ethernet services in 64 kbit/s increments up to full rate.

Advanced Layer 2 functions in the module permit the connection of selected VLAN flows from any port to any provisioned VCG. Each VLAN flow may consist of a single VLAN or a range of VLAN IDs.

The module is ideal for use at a service provider point-of-presence (POP) to concentrate Ethernet traffic from multiple sites in an OnSite network.

The module is configured and managed through a Web-based GUI interface or a scalable EMS.

## FEATURES & BENEFITS

- ✓ **High port density**—8 Ethernet 10/100Base-TX ports
- ✓ **VCAT support**—16 groups (VCGs) per module • VC-12-Xv • VC-3-Xv
- ✓ **Packet Intelligence**—Rate Limiting (64 kbps increments) • VLAN • Service Provider Tags (Q-in-Q) • QoS • Performance Statistics
- ✓ **Flexible Mappings**—Port to VCG • VLAN to VCG
- ✓ **Low Power**—Less than 9 watts; Natural convection cooling (no fans)

## OS-10 Series Configuration and Ethernet Port Capacity with the HD-ENET module

OnSite Platform	Base Ports	Max Ethernet capacity with...	
		Single Module	Dual Modules
OS1052	2	10	18
OS1063	—	8	16



## 2-port STM-1 Module

### OnSite™ Series Model STM-1

*The 2-port STM-1 module allows configuring the OS-10 Series of  $\mu$ MSPP platforms for direct access, cross-connection, and transport of STM-1 signals over SDH networks.*



The STM-1 module plugs into either of the two expansion slots in the modular OnSite OS1052 and OS1063 platforms. Using one expansion module, you can configure the S10 system with 2 additional STM-1 ports that can be configured as a protected pair using SNCP or 1+1 MSP, or as dual unprotected ports. Two modules provide access to 6 STM-1 ports at a hub site.

The module provides flexibility to configure the S10 as an ultra-compact digital cross-connect for connectivity between 6 STM-1 ports at a hub site.

The module also provides the option of supporting such network topologies as linear 4-fiber ADM chain, subtending ring, and tree/star

For applications that require interconnection using electrical interfaces, the STM-1e module provides physical access to G.703-compliant 155 Mbit/s signals for transmission over coaxial cables. The STM-1e module finds application for intra-office connectivity to higher-order SDH equipment and also for connection to STM-1 digital microwave radio equipment.

The STM-1 expansion module opens multiple network expansion possibilities and delivery of direct STM-1 (full or fractional) services.

The module is configured and managed through a Web-based GUI interface or a scalable EMS.

### FEATURES & BENEFITS

- ✓ **High port density**—2 STM-1 ports
- ✓ **Flexible interface options**—STM-1 optical
  - STM-1 electrical
- ✓ **Simple connectivity**—VC-12 and VC-3 payloads
  - One-way, two-way and drop-and-continue
- ✓ **Highly flexible configurations**—Dual unprotected
  - Linear MSP 1+1 protection
  - SNCP/I and SNCP/N
- ✓ **Flexible monitoring**—G.826 and G.829 performance monitoring
- ✓ **Low Power**—Less than 6 watts; Natural convection cooling (no fans)

## 3-port DS3/E3 Module

### OnSite™ Series Model DS3-E3

*The 3-port DS3/E3 module allows configuring the OnSite OS-10 Series of  $\mu$ MSPP platforms for direct access and transport of DS3 and E3 signals over SDH networks.*



The DS3/E3 module plugs into either one of the two expansion slots in the modular OnSite S1052 and S1063 platforms. Using one module, you can configure the system with 3 DS3/E3 ports for transport over a protected STM-1 link. Two modules provide access to 6 DS3/E3 ports at a hub site in a linear ADM network.

The module provides flexibility to set individual port speeds to DS3 or E3.

The transparent, clear-channel transport capability of the module simplifies the connectivity of DS3/E3 G.703 signals across an SDH network. The module also provides the option of monitoring the DS3 or E3 path in a non-intrusive manner in both directions of transmission.

The module provides physical access to DS3/E3 signals using DIN 1.0/2.3 connectors that support individual coaxial cable terminations for each direction of transmission.

The module is configured and managed through a Web-based GUI interface or a scalable EMS.

### FEATURES & BENEFITS

- ✓ **High port density**—3 DS3/E3 ports (G.703 compliant)
- ✓ **Flexible configuration options**—E3 or DS3 rate per port
  - LBO settings per port
- ✓ **Simple connectivity**—Clear-channel transport over VC-3 payload
- ✓ **Flexible monitoring**—Non-intrusive monitoring of DS3/E3 paths
  - M23 and C-bit framing options for DS3
  - G.751 and G.832 framing options for E3
- ✓ **Low Power**—Less than 6 watts; Natural convection cooling (no fans)

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