
PATTON
ForeFront™ Access Infrastructure Guide
Multi-Service Access and Transport Solutions for NGN Migration
ForeFront™—Leading The Edge

Patton's ForeFront™

Multi-Services Access, Transport &

ForeFront™ brings Next Generation Network (NGN) evolution to legacy access networks delivering bundled broadband and multi-media services for Carriers.

The modular design delivers expandability, flexibility, and multi-service integration across a wide range of access interfaces.

Step up to the ForeFront and stay ahead of the curve when migrating subscribers to new revenue generating services.

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Aggregation Platform

Introduction

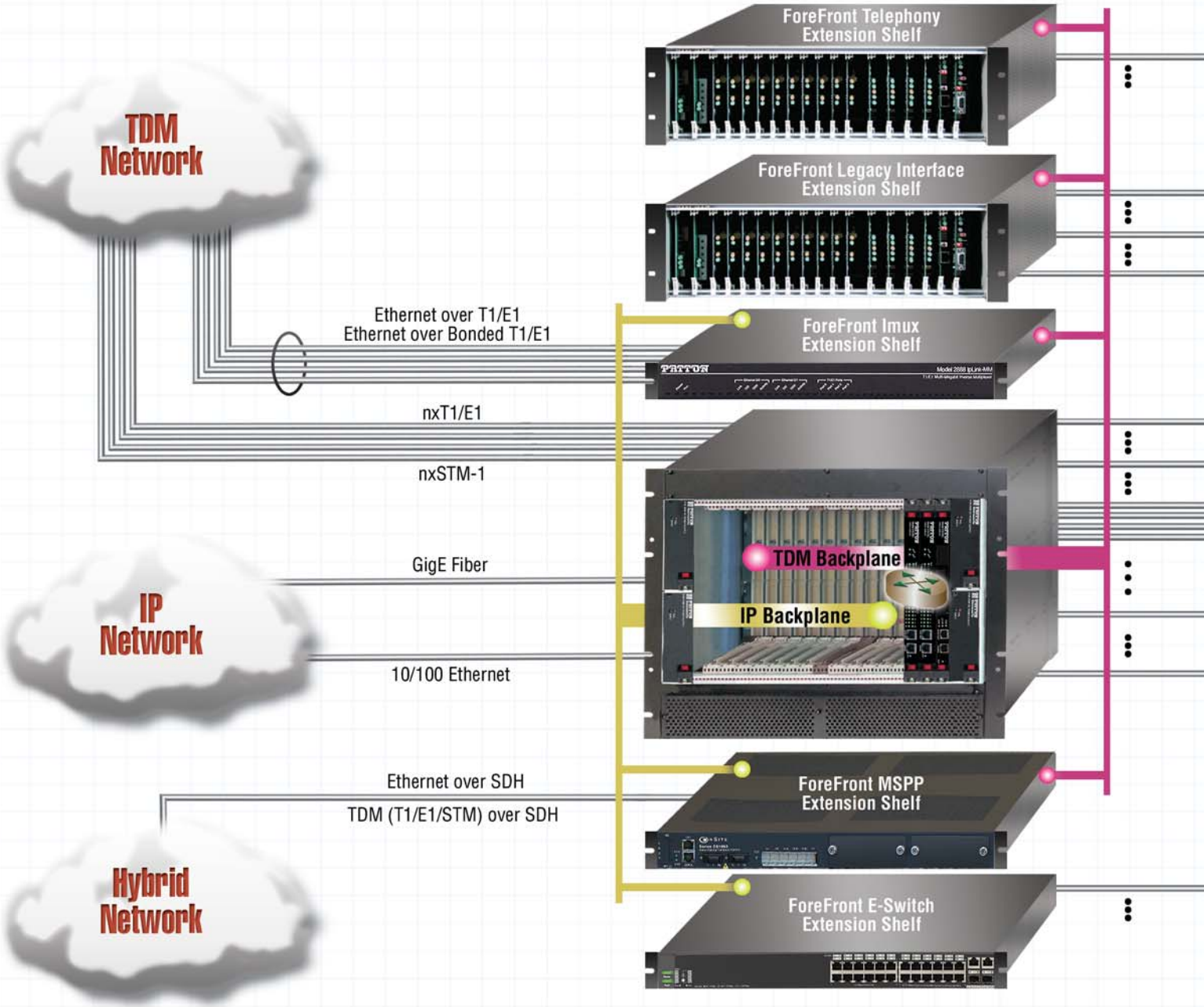
ForeFront Access Infrastructure

Multi-Service Transport & Aggregation

ForeFront™ brings non-disruptive Next Generation Network (NGN) evolution to access networks delivering bundled multimedia services.

With a modular design that provides expandability, flexibility and multi-service integration, ForeFront delivers standards-based connectivity and high speed trunking to voice, video, and data applications over a wide range of access interfaces.

Step up to the ForeFront and stay ahead of the curve when migrating subscribers to new revenue generating services.



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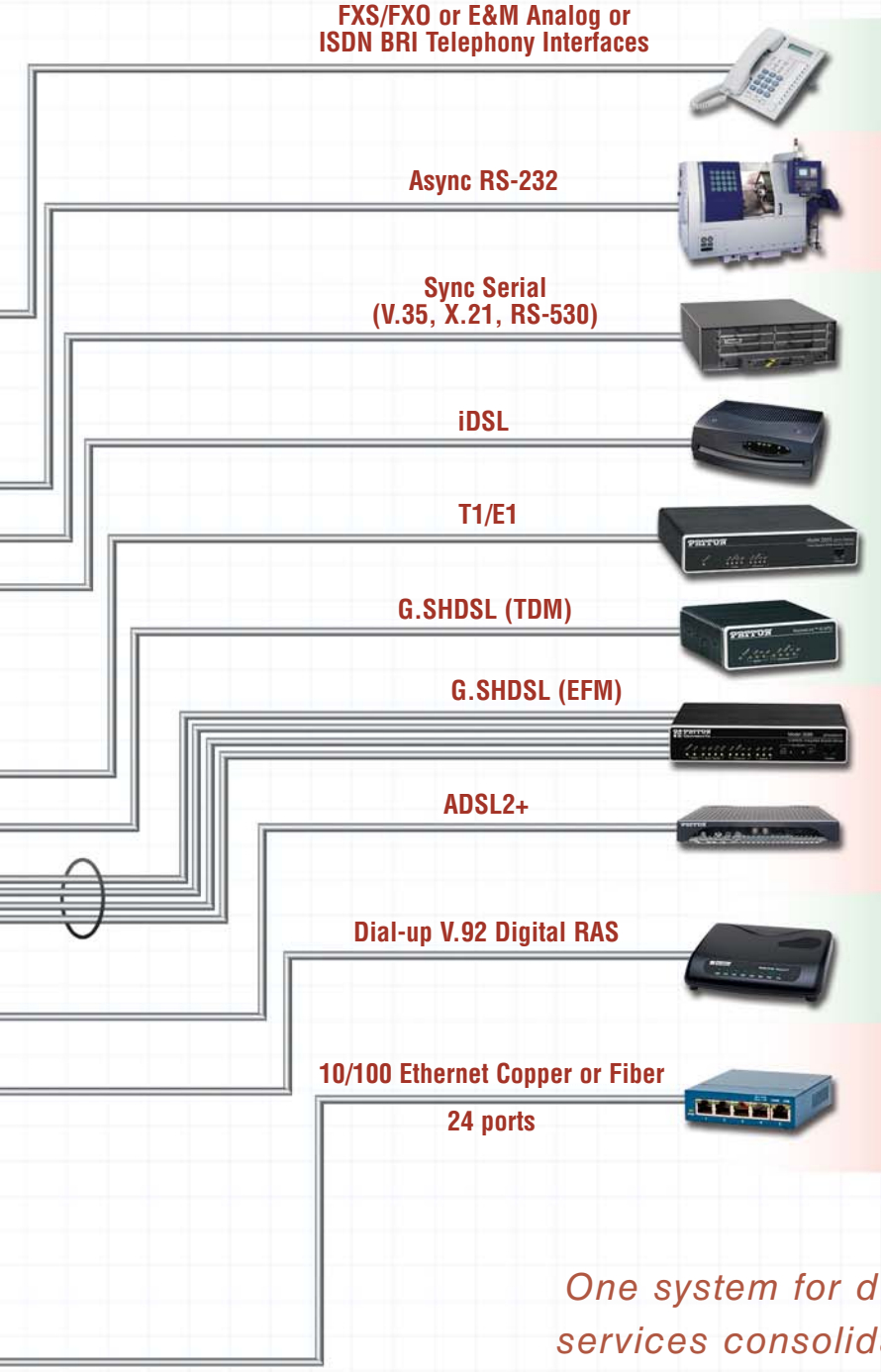
Solutions

Multi-Service Access



Service Type	Description
Analog POTS Services	Each extension shelf is capable of delivering up to 30 ports of analog voice or ISDN BRI per shelf.
Industrial Connectivity Services	The legacy interface extension shelves can deliver 15 ports of async RS-232 per shelf.
Leased Line Services	ForeFront™ chassis natively deliver over 200 ports of T1/E1 or G.SHDSL. Extension shelves deliver up to 30 ports of iDSL or co-directional 64K G.703 interfaces per shelf.
Next Generation IP Services	ForeFront™ chassis natively terminates up to 288 ports of G.SHDSL EFM or ADSL2+ circuits.
Dial-Up (V.92) Access Services	ForeFront™ can terminate up to 1,560 simultaneous dial-up modem calls using digital RAS blades.
Ethernet Services	Each E-Switch Extension Shelf delivers 24 ports of either copper or fiber 10/100 switched Ethernet ports.

One system for delivery of legacy and NGN services consolidated in a common platform for management and aggregation

Introduction

The Case for ForeFront Multi-Service

Benefits of ForeFront™

Cost Savings from Network Consolidation

- Multi-services, multi-technology system for both legacy and next generation services in a hybrid IP and TDM platform
- Delivers a wide range of services from POTS to Ethernet

Voice, Data, Access, & Edge Network Convergence

- Full support for analog voice & legacy data interfaces
  - Access: iDSL, T1/E1, G.SHDSL, EFM, ADSL2+, Ethernet
  - Voice: FXS, FXO, E&M, V.92 Modem
  - Data: Async. RS-232, V.35, X.21, RS-530
- Support for multiplexing, switching and routing, and Ethernet transport

Protects Infrastructure Investment & Enables Access Network Evolution

- Enables take up on emerging technologies through integration & network consolidation
- Easy migration to higher speed interfaces for existing customers
- Easy migration and integration of TDM to packet-based services

Simple Cost Effective Management and Operation

- Full FCAPS network management
- Easy to use html based GUIs and industry standard CLIs
- End-to-end management of many CPE and IAD types

Reliability

- Field proven performance with a large installed base around

Introduction

Today, network access infrastructures are evolving into high-speed multi-service highways that carry voice, data and video to subscribers. Ethernet is used as the bandwidth delivery interface and IP as the service demarcation interface. Customers will benefit from this evolution to IP by one day being able to select their service bundles à la carte while receiving one monthly consolidated bill. Service providers will benefit from this convergence by creating one common infrastructure to maintain. This new infrastructure will also increase customer retention through low-cost service bundling.

On the way out are the vertically integrated networks used to supply single services to specific customers. Also on the way out are slow-speed access networks incapable of meeting bandwidth requirements of modern application bundles.

To enable this evolution, service providers need the ability to easily migrate their subscribers away from TDM networks to the new NGN infrastructures. Many NGN solutions are available today, but few fully leverage the existing infrastructures being replaced to effect a smooth transition.

Also, few solutions today target the middle market—those areas of the network where multiple services, legacy TDM, mainstream TDM, ATM and IP NGN, need to be provided in moderate concentration. These areas typically cannot be served by monolithic "pizza box" designs due to the variety of services, technologies and interfaces that need to be supported.

What is ForeFront™?

The ForeFront™ AIS is a multi-service access platform that plugs the capabilities gap in service provider networks as they migrate from TDM infrastructures to NGN Ethernet/IP platforms—migration that requires co-existence between TDM and IP technologies in points of presence (POPs) and/or co-location facilities. It is specifically designed for moderate concentration network access points that have a greater variety of services and a larger concentration of users than a typical single purpose system solution can support.

On one end of the spectrum, ForeFront™ offers full and complete support for TDM based applications. This includes a complete array of TDM "user-facing" interfaces such as POTS, V.92 dial-up, V.35/X.21, T1/E1, iDSL and TDM G.SHDSL and STM-1 with built-in circuit cross-connect and non-blocking any-DS0-to-any-DS0 switching. It enables both grooming and aggregation at TDM levels or aggregation on IP based networks. ForeFront™ offers VPN frame relay, PPP and ML-PPP termination with the use of the Model 6081RC EdgeRoute Router Blade for easy trunking of Ethernet/IP traffic.

At the other end of the spectrum, ForeFront™ provides a complete NGN access solution for bonded G.SHDSL (EFM), ADSL2+ as well as copper or fiber based Ethernet based services. This includes Edge Aggregation to Switched Ethernet (Fast Ethernet and Gigabit), routed IP as well as "transport" of Ethernet over SDH.

Key packet switching technologies supported include IGMP Snooping for video multicast support, IP Routing, Ethernet Bridging, VLAN, IPsec VPN with strong encryption, active QoS with multiple hierarchical queues and multi-layer packet filtering.

Somewhere between TDM and NGN is where migration takes place. ForeFront offers a single platform that supports TDM to NGN migration by supporting NGN service delivery over TDM infrastructures.

Access, Transport and Aggregation

Key System Features

Using a modular approach, ForeFront™ includes all system components needed to provide Ethernet/IP and T1/E1 TDM access services over xDSL and other access technologies.

- No single points of failure and no limitations on which modular components can be field replaced.
- Up to four chassis level clock sources to ensure TDM traffic suffers no clock slips.
- Hot-swappable, fully redundant power provides maximum system availability.
- Integrated, field replaceable cooling enables operation in the widest of climate ranges.
- With management agents integrated into every system blade, the intelligence required for end-to-end service provisioning is distributed over the entire system for unparalleled redundancy. Each blade provides tools for fault detection and gathers the information needed for problem isolation and service level agreement (SLA) management.
- All blades and power supplies fit into all three sizes of ForeFront™.
- DSL line blades offer the latest ADSL2+ and G.SHDSL technology for true standards based connectivity.
- Grooming facilities and high speed cross-connect provide non-blocking any-to-any circuit switching between E1s, STM-1s and DSL interfaces.
- Legacy and sub-rate interfaces are aggregated using extension shelves

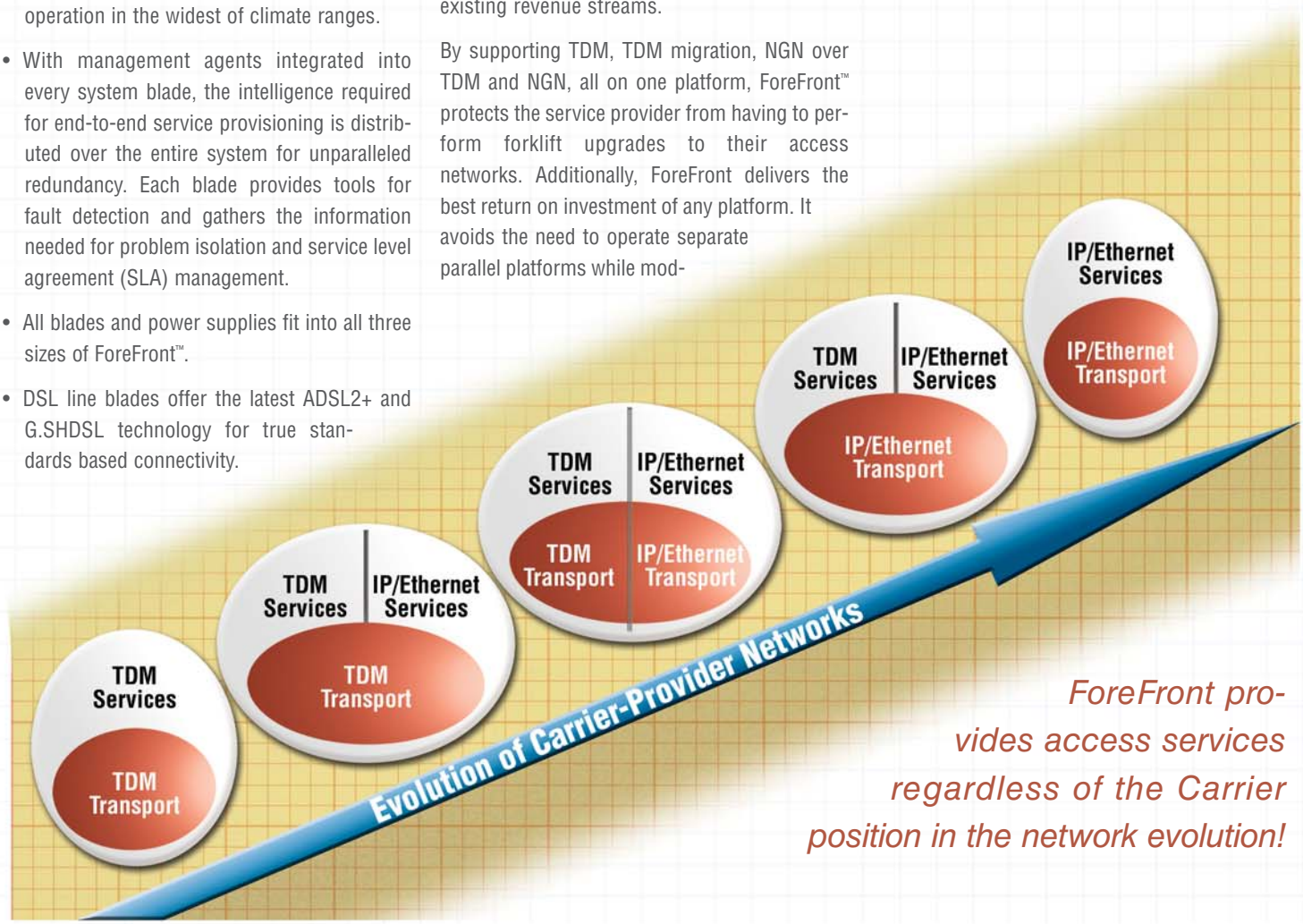
Problems Solved

ForeFront™ targets areas of the provider network that can benefit from both TDM and NGN support in moderate concentrations, in one chassis. This delivers to service providers an evolution path from circuit switching to packet switching while protecting their investment in existing revenue streams.

By supporting TDM, TDM migration, NGN over TDM and NGN, all on one platform, ForeFront™ protects the service provider from having to perform forklift upgrades to their access networks. Additionally, ForeFront delivers the best return on investment of any platform. It avoids the need to operate separate parallel platforms while modernizing networks to support new NGN bundled revenue streams.

Application Overview

ForeFront™ supports multiple applications across diverse TDM and NGN technologies. TDM applications focus on delivering TDM bandwidth to a customer premise. NGN applications focus on delivering Ethernet/IP bandwidth. Multi-service applications leverage the established TDM infrastructure to deliver multiple service bundles across Ethernet and TDM infrastructures.



ForeFront provides access services regardless of the Carrier position in the network evolution!

ForeFront™ Solutions

TDM Aggregation

T1/E1 Grooming and Cross-Connect

1. Each 2616RC comes with 16 T1/E1 ports; you select which timeslots connect to downstream or upstream lines.
2. Use the 2616RC GUI to map DS0s from ingress to egress lines. For example:
   - 4 DS0s from port 1
   - 8 DS0s from port 2
   - 16 DS0s from port 3
   - 3 DS0s from port 4
   - All mapped to upstream E1 port 5 (31 DS0s)
3. Based on customer requirements, assign nx64 kbps timeslots to ingress T1/E1 links, i.e 256 kbps (4 DS0s), 512 kbps (8 DS0s), 1024 kbps (16 DS0s), etc.

The ForeFront™ TDM-Digital Access Concentrator (T-DAC) blade provides grooming and cross connection of DS0 time slots from any-to-any function blade within a chassis. Patton combines 4, 8, 12, or 16 software-programmable T1/E1 ports that have integrated CSU/DSUs with a fully non-blocking, any-to-any DS0 switching fabric.

Each T1/E1 T-DACS port in the ForeFront chassis supports user-selectable data rates from 64 to 2048 kbps. With a built-in cross connect, each data channel or channel group can be multiplexed onto any other T1/E1 port—*even ports on other T-DACS*.

Using the flexible ForeFront™ DS0 switching matrix, service providers can easily consolidate, manage, and provision tens of T1/E1 links from a single chassis. Uplink access costs are thus significantly reduced by grooming and aggregating DS0 traffic from many partially used T1/E1 lines into fewer outgoing T1/E1 or STM-1 links. Additionally, the flexibility of the ForeFront switching matrix allows grooming of DS0s from DSL TDM blades onto any outgoing or cross connect T1/E1 port.

T1/E1 Extension (Repeaterless T1/E1)

Point to Point (or Multiple Points)

Leveraging symmetrical DSL technology, ForeFront™ solutions include seamless extension and conversion of E1/T1 circuits to distant subscribers.

Typical T1/E1 (1.544/2.3Mbps respectively) 4-wire circuits have a maximum reach of 1 mile (1.6 km) without repeaters. To serve customers beyond the typical T1/E1 reach, service providers are forced to use alternate solutions such as repeater or radio links, these solutions impacts the service provider in additional equipment costs, configuration, installation and maintenance, and the addition of more points of failures in the link.

With Patton's ForeFront infrastructure, T1/E1 extension is simple, and economical. A service provider can now extend more than 3 times the reach of T1/E1 lines to sites unreachable with standard range T1/E1 technology. At provider's POPs or Central Offices, Patton's G.SHDSL blades, equipped with up to 16 T1/E1 ports, map each T1/E1 transparently and convert for G.SHDSL transmission onto subscriber-bound, single-pair DSL lines. Typically, a DSL link will have a reach of 6 km (3.6 miles) at T1 speed, and a reach of 5 km (3.3 miles) at E1 speed over 24 AWG wire, low noise environments. At the subscriber site, a DSL Patton CPE will recover the G.SHDSL stream and reconvert to T1/E1 signals frame and format, complete with T1/E1 network timing and exact interface impedance (75 or 120 ohm). The conversion and extension of over 3 times the normal T1/E1 reach occurs completely transparent to the end user.

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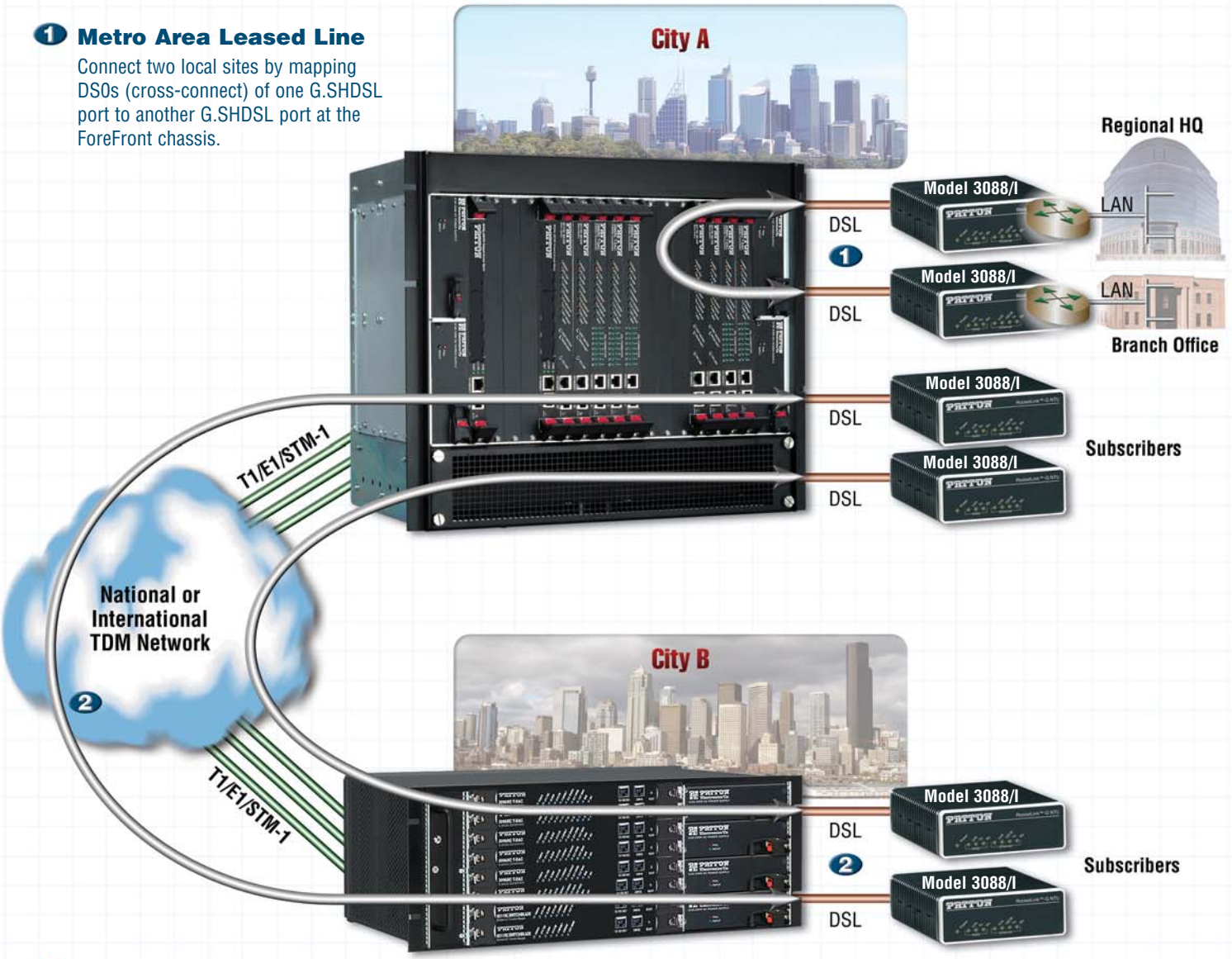
G.SHDSL Leased-Line Aggregation

ForeFront's G.SHDSL solution offers small to medium size symmetrical DSL leased-line deployments the most cost effective and scalable aggregation solution. Patton's G.SHDSL blades come in densities of 16 ports, and are housed in chassis with capacity for 4, 8, or 13 blades, providing aggregation densities of up to 208 ports at speeds ranging from 192 kbps to 2.3 Mbps per line. The flexible switching fabric allows grooming, cross-connection, and aggregation of any DSL timeslots onto uplink E1/T1s or STM-1 connections.

1 Metro Area Leased Line

Connect two local sites by mapping DSOs (cross-connect) of one G.SHDSL port to another G.SHDSL port at the ForeFront chassis.



2 National & International Leased LInes

Concentrate data from many DSL links into a few cost-effective uplinks by mapping the DSOs from multiple G.SHDSL ports into the DSOs of the WAN uplink ports.

ForeFront™ Solutions

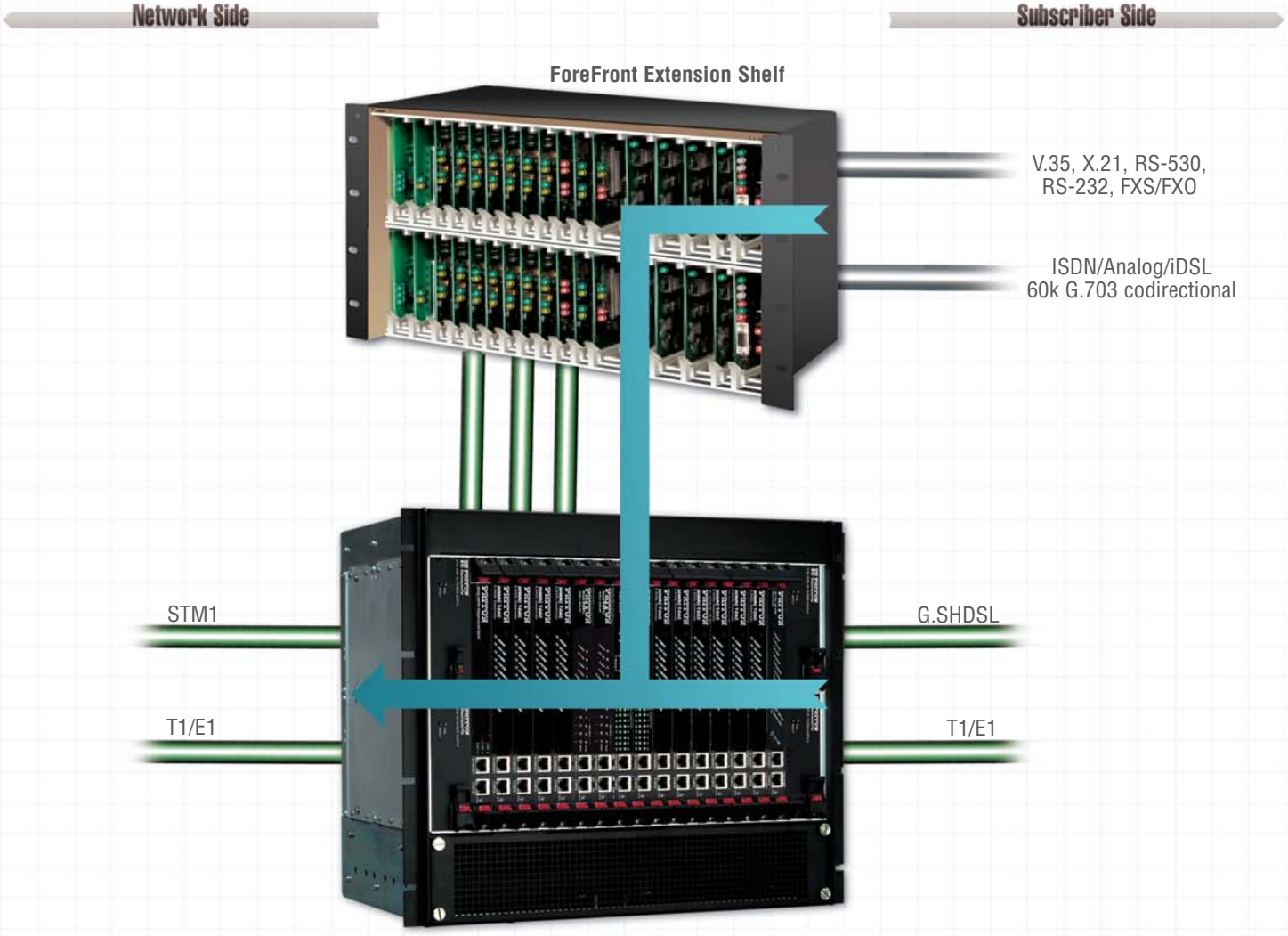
Multi-Service TDM Aggregation

Patton's ForeFront™ is the most versatile and powerful TDM access and aggregation hub.

In the subscriber loop, ForeFront TDM access technologies include G.SHDSL and T1/E1, in native cPCI blades. This offering is complemented with ForeFront's extension shelves which include ISDN BRI, analog, IDSL, and 64k G.703 co-directional interfaces. In addition, the extension shelves include a variety of nx64 kbps serial interfaces such as V.35, V.36, X,21, RS-422, RS-530, as well as 10Base-T interfaces. All traffic arriving from subscribers at the ForeFront shelf is aggregated and passed transparently to the ForeFront main chassis via E1 interfaces.

The ForeFront platform offers STM-1 and E1/T1 for TDM aggregation and uplink. The STM-1 model 6511/6512 card in the ForeFront chassis has access to all 4096 bi-directional DS0 slots in the chassis's H.110 compliant bus, providing aggregation and transport capacity of up to 63 E1s per card. The STM-1 card is available with network facing optical or electrical interfaces running at 155 Mbps.

For lower density core-facing links, service providers have the option of using ForeFront's T1/E1 cards with capacities of up to 16 E1/T1 ports per card. All subscriber traffic from ForeFront chassis as well as from extension shelves is handled at the DS0 level within the ForeFront chassis and mapped to network facing T1/E1 ports for transmission.



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ForeFront™ Solutions

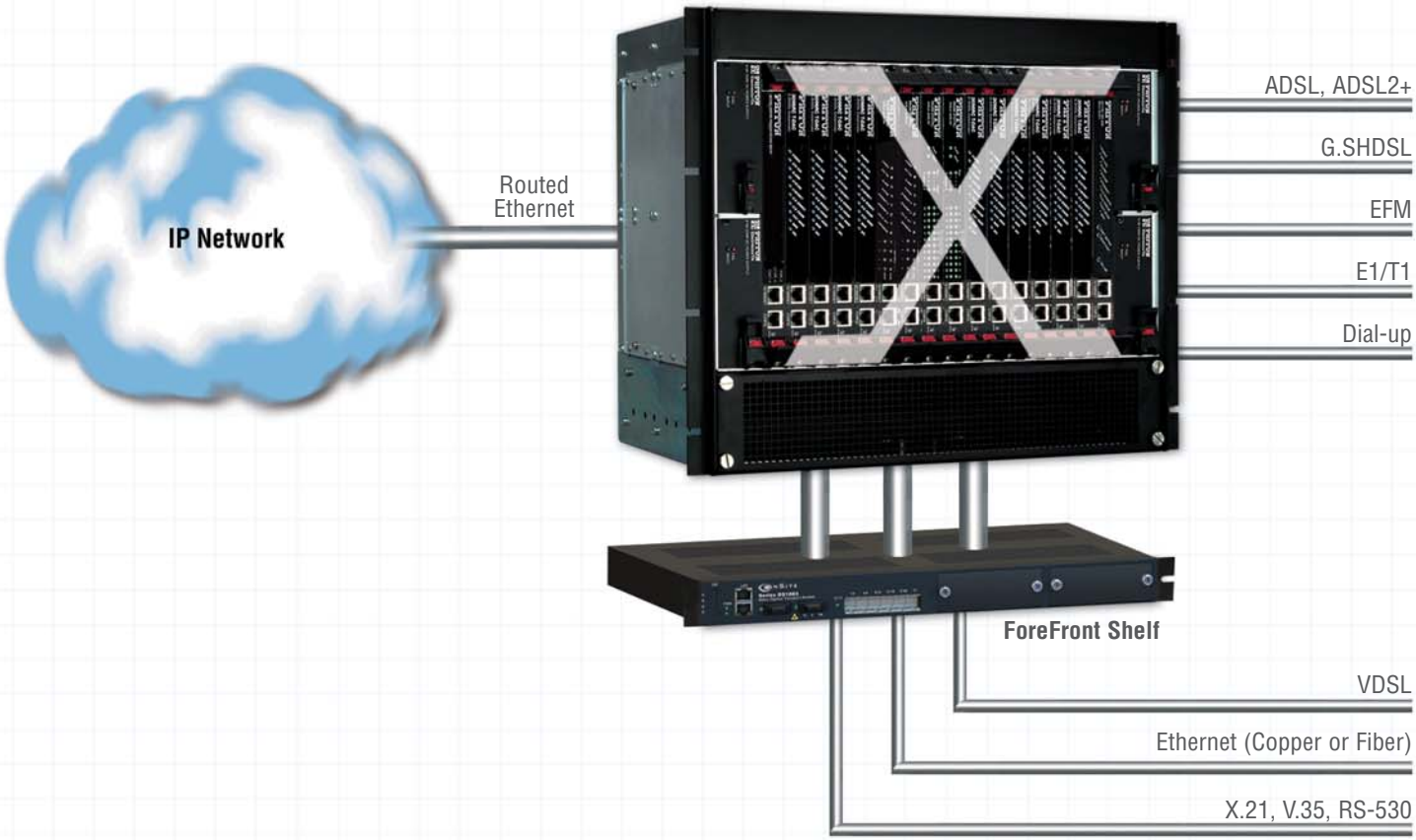
Multi-Service IP Aggregation

The ForeFront™ multi-service platform enables carriers and service providers to concentrate multiple TDM or IP last-mile technologies and services by processing and aggregating various traffic flows to an all IP/Ethernet network. With a potent chassis-based cPCI router card managing and routing TDM or native IP traffic flows becomes simple task.

The Model 6081RC access router and VLAN aggregator for the ForeFront AIS is optimized to process traffic from multiple sources through TDM or packet bus interfaces. Traffic from ADSL, G.SHDSL, T1/E1, legacy, or Ethernet interfaces arriving at the ForeFront chassis is sent via the TDM or packet busses to the model 6081RC router where traffic is de-encapsulated, processed at the IP level, and routed to any WAN interface for transmission to an all IP/Ethernet network. In this manner the EdgeRoute converts any ForeFront AIS chassis into a powerful IpDSLAM ready for next generation networks

- The 6081RC is a powerful router available with up to three 10/100/1000Base-T Ethernet ports and takes advantage of any port attached to a ForeFront system for servicing the most bandwidth hungry access applications.
- Up to three 10/100 Ethernet ports—Easily bridge the gap between the LAN and Core Network with differentiated service offerings
- Extensive IP routing support—Support for RIP and OSPF allows easy interoperability and integration
- IP user management—NAT, NAPT, IGMP, RADIUS make it easy to create and manage any service
- VLANs—Support the transparent passing of VLAN traffic or add VLAN tags to facilitate core switching
- VPN support with GRE, L2TP LAC, IPsec with AES/DES/3DES encryption
- SNMP/HTTP management—SNMP/HTTP manageable from anywhere in the world including attached CPE units
- NAT/PAT—Easily perform IP address and IP port translation on any interface

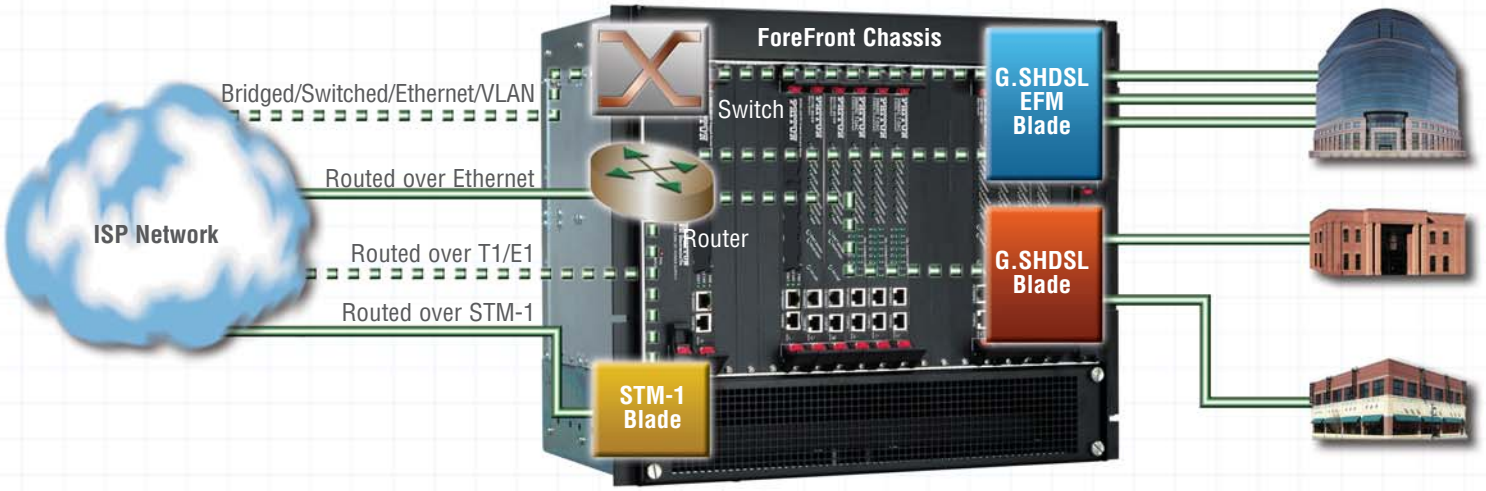
ForeFront Chassis with 6081RC Router



ForeFront™ Solutions

Ethernet/IP Aggregation

Symmetric Routed/Bridged/VLAN IP Internet Access

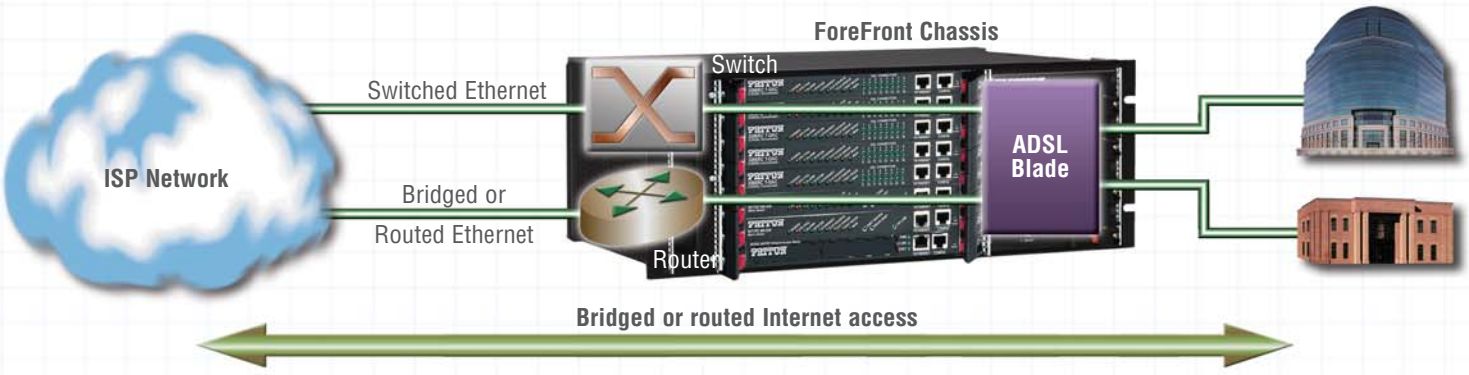


ForeFront™ G.SHDSL TDM and IP (EFM) DSLAMs offer the most robust and flexible business class access solutions. Symmetrical DSL allows simultaneous data and multimedia applications flows in both directions of the link.

ForeFront symmetrical solutions are offered in hybrid TDM/IP, and EFM based solutions. TDM/IP blades (Model 3096RC) transport TDM, mixed TDM and Ethernet/IP, and Ethernet/IP only traffic, all over a single copper pair. TDM traffic is either terminated and routed within the chassis, or simply cross connected and sent to TDM uplink ports, E1/T1 or STM-1. Ethernet/IP traffic is normally sent to a router blade within the chassis for bridging, routing, and further layer 3 processing.

EFM blades (Model 3296RC) transport native Ethernet traffic over one or multiple subscriber pairs (*n* x pair) enabling link data rates of up to 23 Mbps. EFM Ethernet traffic is either bridged, VLAN tagged and classified within the blade, or sent to the chassis router blade for further processing.

Asymmetric Switched or Routed High Speed Internet Access



Building on features such as Multicast support, IGMP, VLAN, and QoS, ForeFront IP DSLAM ADSL blades enable unlimited flexibility when delivering traffic in residential and small business Internet access applications.

Service providers have the option of offering either bridged or routed asymmetrical Internet access connections with speeds up to 24 Mbps downstream and 5 Mbps upstream.

Subscriber traffic is bridged at the DSLAM blade; VLAN tagging/Q&Q, and QoS are further applied as required.

Routed traffic is processed within the ForeFront chassis by a router blade (6081RC). Additional services such as VPN tunnels and IP QoS can be applied to traffic on a per customer basis.

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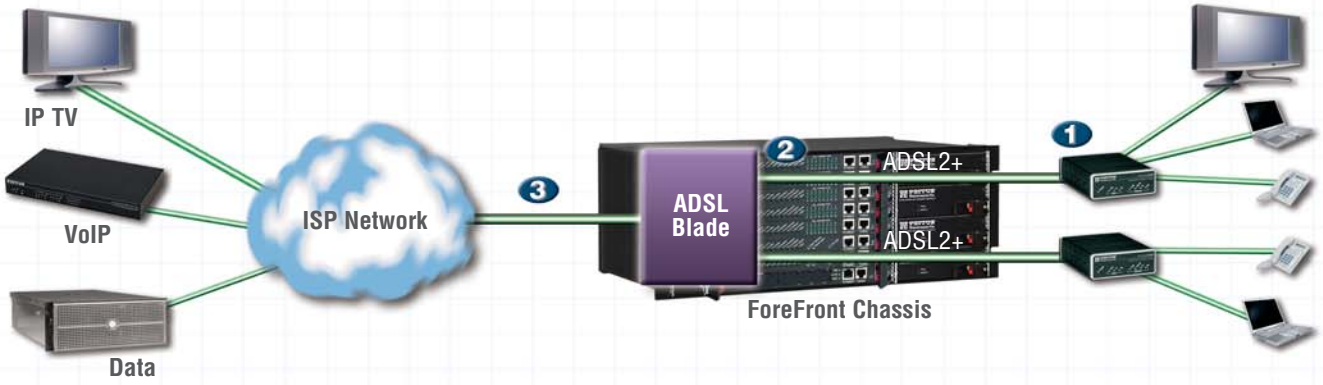
Asymmetric Triple-Play Service Delivery



1 • 5 Mbps upstream ADSL2+ Annexes A, B, L and M
• 23 Mbps downstream

2 • Hardware QoS offloads video packet processing for superior quality performance
• Multicast (IGMP)

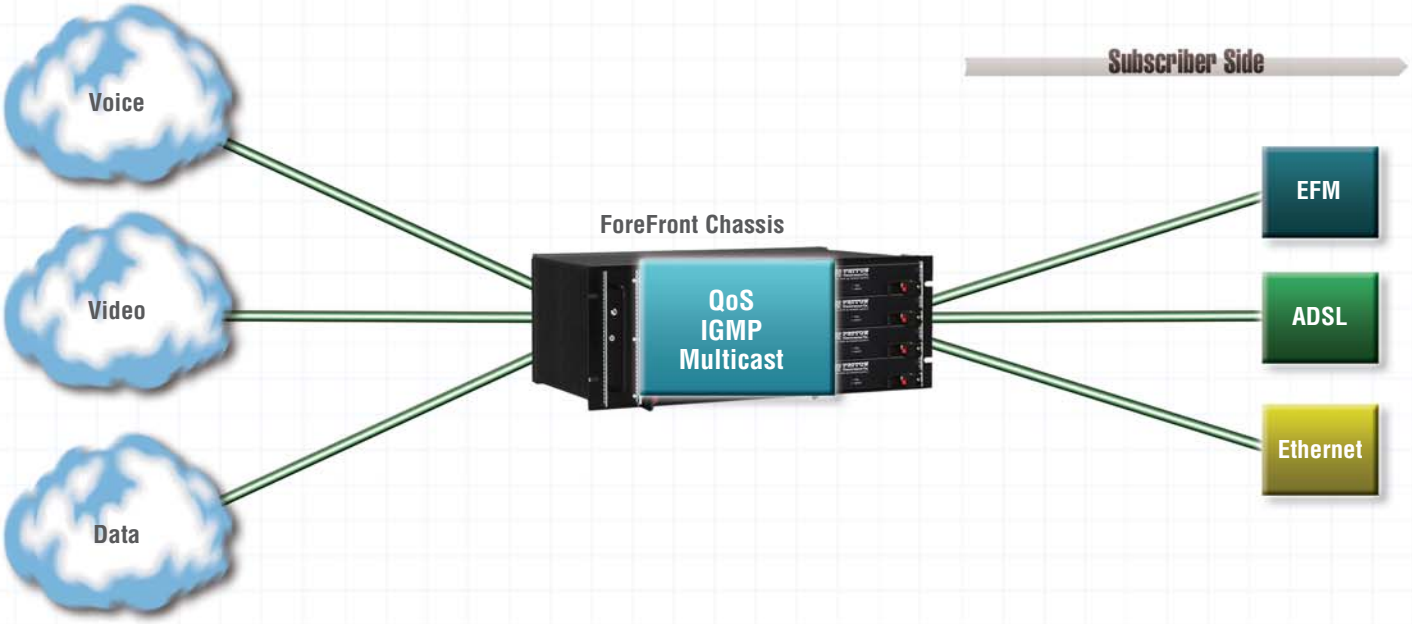
3 Multiple switched GigE egress ports

Patton's ADSL IP DSLAM solution comes ready with next-generation triple-play features, leveraging IGMP snooping, hardware based QoS, and ADSL2+ high bandwidth downstream with Multicast support. Now service providers can deliver data, voice and, IPTV over a single copper pair at downstream speeds of up to 23 Mbps.

Multi-Service IP Delivery

Patton's ForeFront infrastructure comes ready for next generation service deployments over all IP/Ethernet networks. From the customer site to the cloud Patton offers solutions which enable service providers to move seamlessly from TDM and hybrid networks to next generation networks.

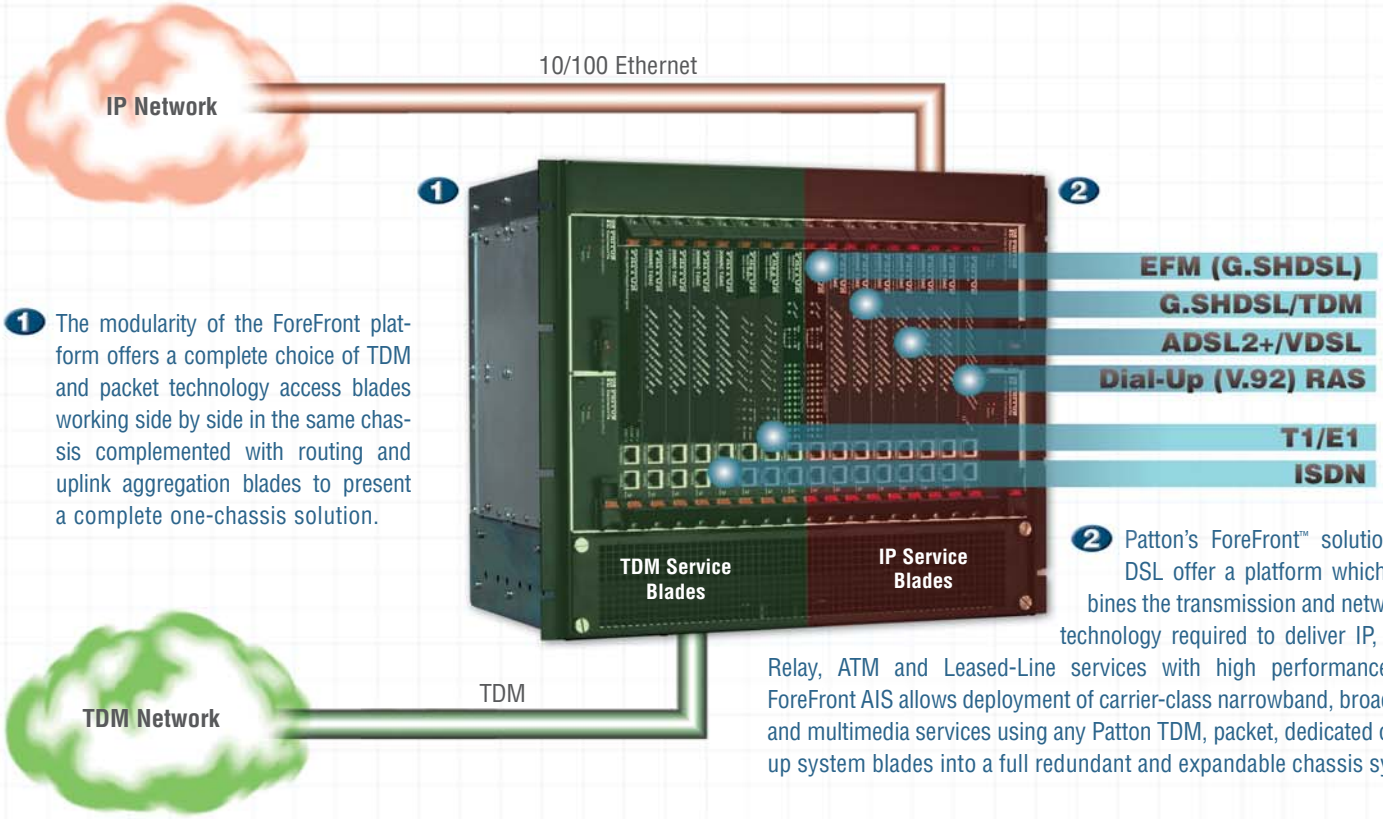
Data, voice, and video services are efficiently distributed to subscribers through a Patton powerful IP platform where the reliable delivery of IP-based voice, video, and data services are optimized with QoS metrics applied to traffic flows. In order to maximize WAN bandwidth, IGMP is supported to ensure that IP Multicast traffic is detected and forwarded accordingly.



ForeFront™ Solutions

Hybrid (Multi-Service) TDM and Packet

Blade-by-Blade TDM and IP Services Delivery



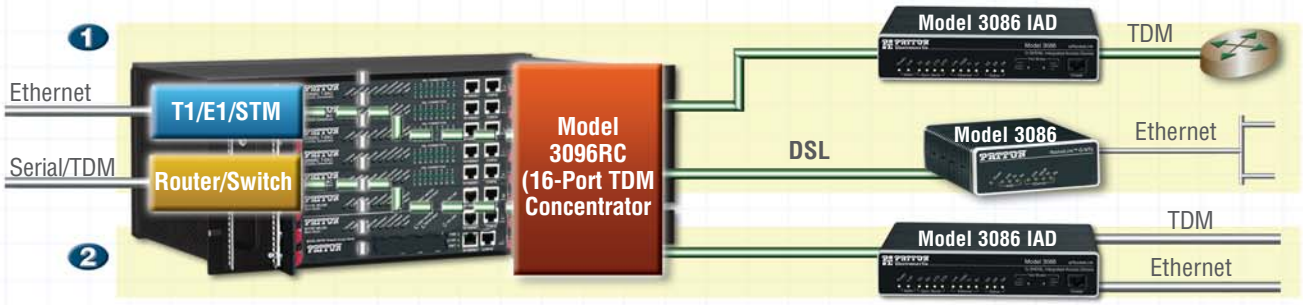
1 The modularity of the ForeFront platform offers a complete choice of TDM and packet technology access blades working side by side in the same chassis complemented with routing and uplink aggregation blades to present a complete one-chassis solution.

2 Patton's ForeFront™ solutions for DSL offer a platform which combines the transmission and networking technology required to deliver IP, Frame Relay, ATM and Leased-Line services with high performance. The ForeFront AIS allows deployment of carrier-class narrowband, broadband, and multimedia services using any Patton TDM, packet, dedicated or dial-up system blades into a full redundant and expandable chassis system.

Port-by-Port TDM & IP Service Delivery (TDM on some ports, IP on others)

1 Port-by-port TDM or IP service delivery

ForeFront's flexibility allows TDM or IP service delivery on a port-by-port basis. Blades such as the model 3096RC handles CPE originated Ethernet/IP and or TDM streams, providers can now commission ports to deliver distinct services on the same blade. At the 3096RC, TDM streams are mapped to outgoing TDM uplink ports, while Ethernet IP traffic is mapped to internal bus leading to on-chassis router or switch blades.



2 Concurrent TDM and IP service delivery port-by-port

In addition to blade-by-blade TDM/IP delivery choices, the ForeFront DSL blade model 3096RC offers the convenience of IP and TDM service delivery on the same port. The technology in these blades allows concurrent transport of TDM and Ethernet channels which travel together over the DSL link, at the 3096RC both streams are mapped to the corresponding uplink or processing blade within the chassis. This application requires a Patton IAD at the subscriber location.

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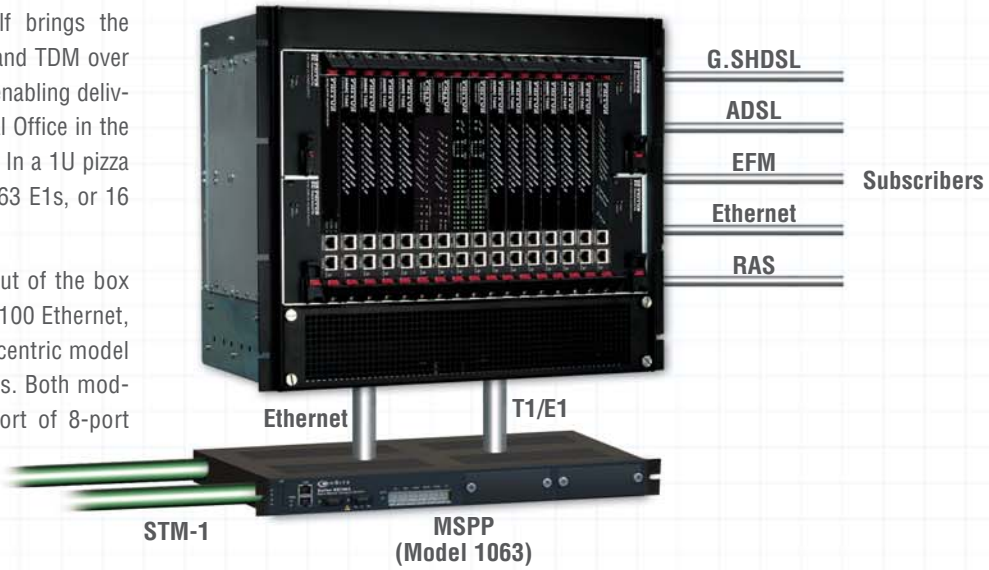
Aggregation

Multi-Service (Ethernet and TDM over SDH)

Patton's ForeFront™ MSSP extension shelf brings the power of next generation native Ethernet and TDM over SDH transport to hybrid carrier deployments, enabling delivery of advanced services to the POP or Central Office in the most compact and robust solution in industry. In a 1U pizza box design, the ForeFront MSPP packs up to 63 E1s, or 16 switched Ethernet ports, or 3 DS3 ports

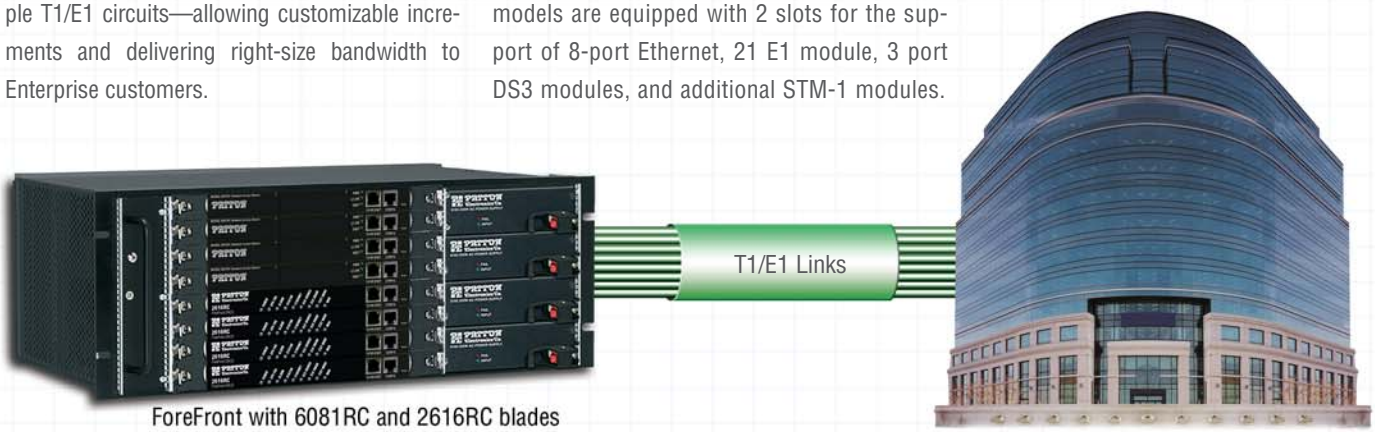
The modular MSSP extension shelf comes out of the box in two base unit: Model OS1052 with two 10/100 Ethernet, 8 T1/E1, and dual STM-1 ports, while the E1 centric model 1063 comes with 21 E1s and 2 x STM-1 ports. Both models are equipped with 2 slots for the support of 8-port Ethernet, 21 E1 module, 3 port DS3 modules, and additional STM-1 modules.



Bonded T1/E1 Channel Groups (Multiple T1/E1s)

By exploiting multilink PPP capabilities of the ForeFront Model 6081RC (router/bridge card) and Model 2616RC high density, T1/E1 multiport cards, Service Providers can create single "pipe" logical WAN links composed of multiple T1/E1 circuits—allowing customizable increments and delivering right-size bandwidth to Enterprise customers.

The modular MSSP extension shelf comes out of the box in two base units: Model OS1052 with two 10/100 Ethernet, 8 T1/E1, and dual STM-1 ports, while the E1 centric model 1063 comes with 21 E1s and 2 x STM-1 ports. Both models are equipped with 2 slots for the support of 8-port Ethernet, 21 E1 module, 3 port DS3 modules, and additional STM-1 modules.



ForeFront with 6081RC and 2616RC blades

ForeFront™ End-to-End System Elements

Infrastructure (Chassis & Power Supplies)

ForeFront™ Packet Access Infrastructure Solutions (AIS)

Models 6286 (2U, 4-Slot), 6486 (4U, 8-Slot), & 6686 (6U, 16-Slot) Chassis Systems

Patton's ForeFront™ Packet AIS offers enhanced flexibility, expandability, and multi-service integration. With these systems there are no boundaries…Packet, DSL, or Dial-up…

Know no boundaries. Patton's ForeFront™ Access Infrastructure Solutions delivers a scalable carrier-class access platform with next-generation network delivery of narrowband, broadband, and multimedia services. Using industry-standard CompactPCI open-systems architecture, the ForeFront AIS allows deployment of Patton's packet, dedicated, and dial-up system blades as well as third-party cPCI resources…all within the same chassis!

The ForeFront™ system offers a robust, reliable solution complete with power distribution, thermal management, and high-speed backplanes. The shelf fits into a standard 19-in. rack. Each shelf has integrated cooling and flexible power options, and boasts 1+1 or N+1 redundancy with AC or DC combinations. The high speed backplane supports a wide variety of multimedia—from nx64 to packet, IP, and cell traffic. Field serviceable hot-swappable components provide high availability while the advanced design avoids single points of failure.

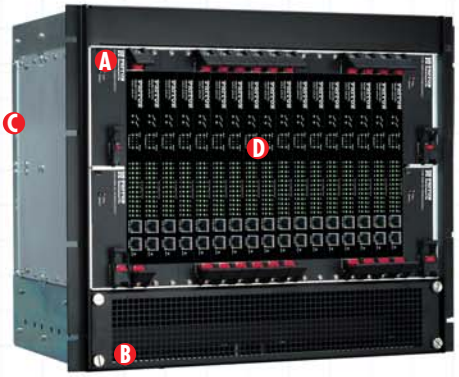
Select any combination of system, peripheral, media, trunking, and matrix blades for a total access solution. For network services, choose from a wide variety of system blades—from DSL to RAS; Packet/DSLAM to DACS. For complete flexibility, system blades can be mixed in any combination.

The ForeFront AIS system supports users with solutions that will grow as technology grows. The advantages of the ForeFront™ and ahead of the curve with Patton's ForeFront Access Infrastructure Solutions.

ForeFront 6286-P
2U-high, 4-slot cPCI-based access node

ForeFront 6486-P
4U-high, 8-slot cPCI-based access node

ForeFront 6686-P
9U-high (6+2+1U), 17-slot cPCI-based access node



A 1+1 or N+1 AC or DC power supplies with full redundancy

B Integrated thermal management with hot-swappable fan trays & NEBS compliant filters

C ForeFront Access Bus provides Packet, Ethernet/IP, management, and power connectivity

D All ForeFront platforms are cPCI open systems architecture and interchangeably receives Patton and other industry standard system elements

FEATURES & BENEFITS

- ✓ **Packet, DSL, and RAS**—Put it all together and enjoy true multi-service networking. Mix and match system blades and deliver DSL, RAS, and Packet/IP services.
- ✓ **CompactPCI Open System**—Flexible, rugged, and standards-compliance ensures it's a platform for now and the future.
- ✓ **2U, 4U, 6U Platforms**—Scale your service with a best-fit solution. Get 4, 8, or 16 slots for any system blade and scale your deployment.
- ✓ **High Availability Hot-Swap**—All components are field replaceable & hot-swappable, so you can perform maintenance without powering down the system
- ✓ **AC or DC Power Options**—Universal AC or Telco DC power modules offer high power with full 1+1 or N+1 redundancy, Mixed AC/DC options also available.
- ✓ **Integrated Alarm Management**—Integrated management module monitors fan tachometers, voltage, and temperature, and provides relay output.

SPECIFICATIONS

Height: 2U, 4U, or 9U

Width: 19 inch IEC rack-mount with rack-mounting ears

Depth: 11.75 in. (29.85) cm with transition module section

Mechanical: IEEE 1101.10 compliant. Designed to meet or exceed UL, CSA, FCC, NEBS G4 1089 Core & GR63 CORE; CE

Slot Configuration:
2U chassis—Front: 4 slots (6U x 160mm) with 4HP spacing; Rear: 4 slots (6U x 80mm) with 4HP spacing
4U chassis— Front: 8 slots (6U x 160mm) with 4HP spacing; Rear: 8 slots (6U x 80mm) with 4HP spacing
9U chassis—Front: 17 slots (6U x 160mm) with 4HP spacing; Rear: 17 slots (6U x 80mm) with 4HP spacing

Module Keying & Alignment: Card guides provide for keying and alignment pin in accordance with IEEE 1101.10, sec. 6

Mid-Plane: PICMG 2.0 R3.0 compliant mid-planes are available. PICMG 2.05 (Computer Telephony as per H.110) is an option

Module/Mid-plane Rails: AL extrusion

Card guides: Molded thermoplastic

Rear power interface panels: AL ALY 5052 Series

Hardware: MIL-Spec stainless steel

Card guides: Molded thermoplastic with snap-in ESD contacts for both plug in module and injector/ejector handle alignment pin.

Integrated Air Cooling:
2U chassis—Provided by front-mounted hot-swappable fan tray assembly with 3x axial 12VDC fans, powered by common chassis power supplies. Air circulation is side-to-side (left to right). Bellcore-compliant removable dust filter.
4U chassis—Provided by front-mounted hot-swappable fan tray assembly with 6x axial 12VDC fans (42.5 CFM per fan), powered by common chassis power supplies. Air circulation is side-to-side (left to right). Bellcore-compliant removable dust filter.
9U chassis—Dual redundant impeller, front hot swappable designed to reduce shadowing effect in the event of a fan failure. Front air intake; rear air exhaust. 800 CFM (at static pressure 0" H20) (max); 400 CFM (at static pressure 0.6" H20) (max). Requires separate input power, 36-72vDC.

Power Entry Modules: Provides AC (90–240 VAC) or DC (-36 to -72 VDC) power input.

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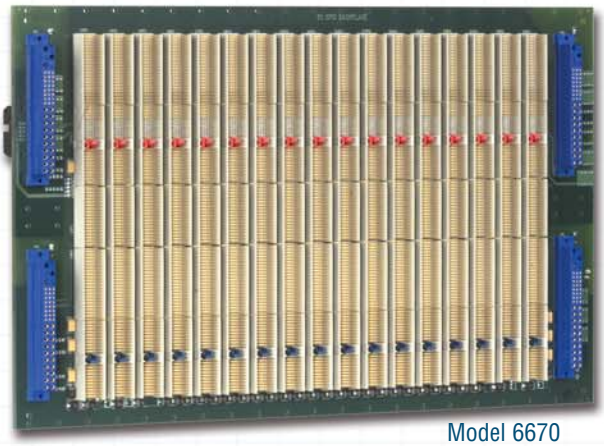
ForeFront™ Mid-Planes

Model 6270 Series, 6470 Series, & 6670 Series

Patton Mid-Planes feature PICMG 2.5 and 2.16 capability!

Patton offers a variety of standard CompactPCI mid-plane (or "backplane") implementations for the 6000-series chassis products. These mid-planes are designed to work with Patton power supplies, power input modules, fan modules, and alarm blades.

Our mid-planes are highly complex multi-layer designs developed using 2D and 3D electromagnetic modeling and simulation tools, that predict and evaluate the effects—cross talk, reflection, inter-symbol interference, emissions, etc.—of line impedance, stub length, and termination values. We use these simulations to determine signal behavior under different conditions such as variable rise times and variable loading conditions. The result is an optimized, highly reliable mid-plane solution.



Model 6670
(17-slot) backplane

FEATURES & BENEFITS

- ✓ H.110 Computer Telephony (PICMG 2.5), provides up to 4096 x DS0 (64 kbps) digital channels with anywhere-to-anywhere connectivity on the mid-plane
- ✓ Ethernet Packet-Switched Backplane (PICMG 2.16), provides 10/100/1000 Ethernet paths between blades in the cPCI chassis. Provision is also made for chassis-to-chassis Ethernet connectivity

Model 6270
(4-slot) backplane

Model 6470
(8-slot) backplane

Note: *CompactPCI* and *PICMG* are registered trademarks of the PCI Industrial Computers Manufacturing Group.

ForeFront™ Power Supplies

Model 6100 Series

Solid, reliable power supplies for all operational applications

The Patton Model 6100 Series cPCI 3U Plug-in Power Supply meets the demanding needs of the telecommunications industry. The Model 6100 family is a highly reliable power supply designed for N+1 redundant applications with full fault tolerance on all outputs. High current +5V and +3.3V outputs have active current sharing that maintains load balance within 5% between supplies. The supplies also provide +12V and -12V. Front panel LEDs provide the user with a visual indication of the condition of each individual on-board supply.

Patton provides a selection of both AC and DC power supplies to satisfy all operational environments.

FEATURES & BENEFITS

- ✓ Supplies may be used as a single power supply for CompactPCI chassis, or multiple supplies may be used in parallel to provide higher power capacity
- ✓ Supplies are compliant with PICMG Power Interface specification (PICMG 2.11, 10/1999)
- ✓ Failures are indicated to processor blades in the chassis through the FAL# mid-plane signal, indicating a failure such as over-temperature, over-current, or loss of incoming power.

SPECIFICATIONS

DC Supplies (Models 6150, 6152)

Physical: 3U x 160mm x 8HP cPCI module

Output current (maximum): Model 6150—+5 V, 30 A; +3.3 V, 20 A; +12 V, 1.5 A; -12 V, 0.5 A Model 6152—+5 V, 12.5 A; +3.3 V, 40 A; +12 V, 1.5 A; -12 V, 0.5 A

Input Power: -36 …-72 VDC

Op. Temp.: 32–122°F (0–50°C)

Humidity: 5–95%, non-condensing

Radiated Emissions: FCC Part 15 Class B; EN55022 Class B

Compliance: UL1950, EN60950

AC Supplies (Model 6185)

Physical: 3U x 160mm x 8HP cPCI module

Output current (maximum): +5 V, 25 A; +3.3 V, 30 A; +12 V, 5.5 A; -12 V, 0.5 A; 200 W aggregate maximum

Input Power: 90–264 VAC, 47–63 Hz

Op. Temp.: 32–122°F (0–50°C)

Humidity: 5–95%, non-condensing

Radiated Emissions: FCC Part 15 Subpart J, class A; EN55022 Class A

Safety: Designed to meet UL1950, EN60950

ForeFront™ End-to-End System Elements

Access Blades

G.SHSDL Line Card

Model 3096RC 16-Port G.SHDSL TDM Concentrator

Connect 16 G.SHDSL users and support nx64 kbps access up to 2.3 Mbps.

G.SHDSL front blade

Patton has combined G.SHDSL ports, DACS, and WAN functions into a powerful system operating on the ForeFront Access Platform. The Model 3096RC TDM-Digital Access Concentrator, or T-DAC, links 16 G.SHDSL circuits to multiple WAN uplink modules and offers completely flexible any-to-any grooming. Each port offers user-selectable nx64 (to 2.3 Mbps) data rates. With its built-in cross-connect, each data channel, or channel group, can be multiplexed onto any uplink or DSL port—even to ports on other 3096RC blades in the same chassis.

The entire system is easily managed through an integrated SNMP/HTTP-based NMS. Use the T-DAC in any Patton 2U, 4U, or 9U ForeFront Access System and scale-up density while reducing costs! Fully redundant power and integrated cooling enable these lightweight chassis to grow while accepting new technologies.

Harness the explosive growth of DSL with a tightly integrated, cost-effective solution to aggregate high speed traffic while gaining flexibility and protecting your investment. Choose the 3096RC for your next network rollout.

Rear transition modules with flexible interface capabilities

Any-to-any time slot mapping

With the 3096RC in the ForeFront AIS, users have total flexibility in mapping their data. Whether it is concentration, segmentation, metro mapping, WAN mapping, or pass-thru, the 3096RC can handle it. Choose an application or mix them all within the same card. The user has total flexibility.

SPECIFICATIONS

G.SHDSL: G.991.2 ITU G.SHDSL Annex A and Annex B G.994.1 G.hs nx64 kbps data rates up to 2.3 Mbps (n=1..36) over 2 wires, full-duplex, symmetrical TC-PAM encoding

G.SHDSL Distance: 32,000 feet (9,754 m) at 1.92 kbps; 18,000 feet (5,847 m) at 2.304 Mbps

G.SHDSL connection: 16 ports presented on a 50-pin Telco connector

Transition modules: Uplink module options include 4, 8 , 12, or 16 T1/E1 ports

Ethernet Port: Single 10/100Base-T (RJ-45 connector)

G.SHDSL modems: Patton 3201, 3086, and other standards-based G.SHDSL modems

WAN clocking: Internal, Network (from T1/E1 WAN port) or system via H.110

G.SHDSL clocking: Provides clocking to the remote NTUs/modems

Front panel indicators: LEDs for power, CPU, system, Ethernet, clock source, alarms, test mode, DSL, and WAN

Management services: HTTP, SNMP, TELNET Ethernet, RS-232 Console Port, SYSLOG Client, Remote Software Upgrade via FTP

Alarm Reporting: Configurable alarms; remote SNMP traps, front panel LEDs; 3-contact relay (3-pin terminal block)

Compliance: Safety UL/CSA per UL1950 (METS) Canadian cMET and CS-03. EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC (EN-60950), FCC Part 15, CE Mark, CTR12, CTR13 FCC Part 68

Op. Temp.: 14–140°F (-10–60°C)

Humidity: 5–90%, non-condensing

Dimensions

Front blade
0.75H x 10.5W x 6.3D in.
(1.9H x 26.7W x 16.0D cm)

Rear blade
0.75H x 10.5W x 3.15D in.
(1.9H x 26.7W x 8.0D cm)

Note: DSC and WAN cables sold separately.

FEATURES & BENEFITS

- ✓ 16 G.SHDSL ports per card
- ✓ Standards based DSL is interoperable with third party G.SHDSL modems
- ✓ Speed to 2.3 Mbps on a single twisted pair
- ✓ Distance to 32,000 feet (9,754 meters)
- ✓ Built-in timeslot DACS for any-to-any mapping of DS0 timeslots
- ✓ Flexible WAN Egress: 4, 8, 12 or 16 T1/E1 Rear Transition module
- ✓ WEB/SNMP manageable from anywhere in the world via the Internet
- ✓ Hot-swappable front and rear cards
- ✓ Complete alarm facilities
- ✓ Uses standard copper twisted pair
- ✓ Integrated line protection circuitry on rear transition module protects your investment
- ✓ User selectable G.SHDSL (TCPAM line coding) or HDSL (2B1Q line coding)

ORDERING INFORMATION

16-port G.SHDSL T-DAC front/rear card sets

3096RC/16G0E: 16 DSL, No E1/T1 ports

3096RC/16G4E: 16 DSL, 4 E1/T1 ports

3096RC/16G8E: 16 DSL, 8 E1/T1 ports

3096RC/16G12E: 16 DSL, 12 E1/T1 ports

3096RC/16G16E: 16 DSL, 16 E1/T1 ports

16-port G.SHDSL T-DAC front card

3096RC: 16 E1/T1 ports; no rear transition module

T-DAC rear cards

3096RCT/0E: 50-pin Telco for 16 G.SHDSL ports (no E1/T1 ports)

3096RCT/4E: 50-pin Telco for 16 G.SHDSL ports; 68-pin SCSI for 4 E1/T1 WAN ports.

3096RCT/8E: 50-pin Telco for 16 G.SHDSL ports; 68-pin SCSI for 8 E1/T1 WAN ports.

3096RCT/12E: 50-pin Telco for 16 G.SHDSL ports; 68-pin SCSI for 12 E1/T1 WAN ports.

3096RCT/16E: 50-pin Telco for 16 G.SHDSL ports; 68-pin SCSI for 16 E1/T1 WAN ports.

Cables

10-3096TM68/64-6 & 10-3096TM64-6: Cable combination for T1/E1 to punch down block

10-3096TM50-20: Cable for DSL to punch down block

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G.SHSDL EFM/IP DSLAM Line Card

Model 3296RC 24-Port G.SHDSL EFM DSLAM Blade

Connect up to 24 users and bind multiple DSL pairs using EFM for higher bandwidth links.

G.SHDSL EFM DSLAM blade

Patton's new 3296RC uses the latest Ethernet in the First Mile (EFM) technology to provide Enterprise access at symmetric speeds ranging from 5.7 Mbps over one copper pair to up to 22 Mbps over multiple pairs with standards-based EFM bonding.

The Model 3296RC is the next-generation EFM/DSL Patton Solution that continues the trend to simpler all-Ethernet, all-IP networks from access to core. The 3296RC comes equipped with all features required for providing such advanced Ethernet/IP services as VLAN, traffic prioritization, VLAN stacking (Q-in-Q), IP multicast and IGMP, link aggregation, and many others.

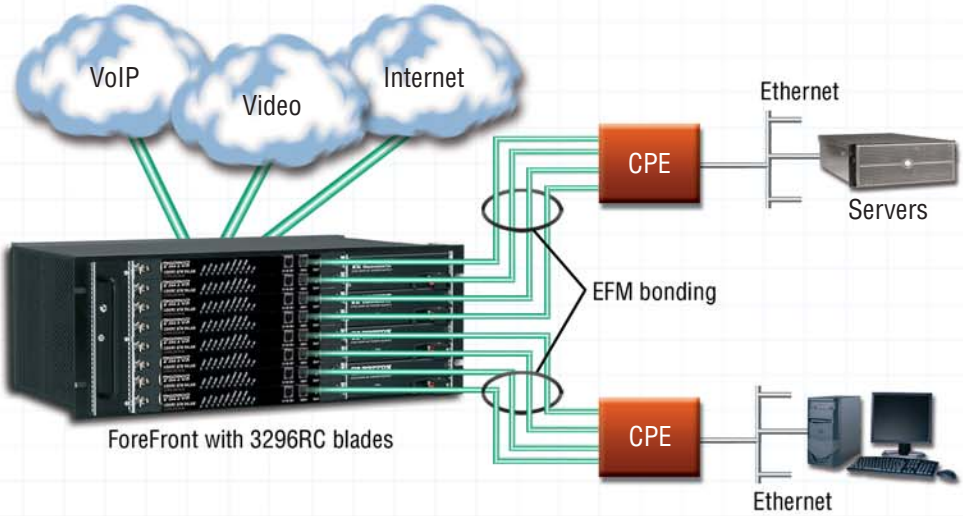
Each 3296RC can operate independently by providing within the card all DSL/Ethernet/IP features, and aggregation and uplink via dual Gig Ethernet ports—or the card can route all or partial traffic internally, within the chassis, to an aggregation card (router or switch) for further traffic processing and uplink.

The 3296RC boasts complete management access via SNMP/HTTP based NMS, telnet, or local console. For further flexibility remote management is offered trough both in-band and out-of-band connections. Remote firmware upgrades are accomplished via standard FTP/TTFP connections.

Rear transition modules with flexible interface capabilities

The 3296RC can be housed in any of Patton's ForeFront™ chassis, providing convenient scalable solutions in 2U, 4U, and 6U sizes. The 2U chassis houses four 3296RC DSLAMs (96 ports), the 4U chassis handles up to 8 3096RCs (192 ports), while the 6U chassis handles up to 13 cards (312 ports). The 3296RC is completely hot swappable, allowing for quick hardware issue resolutions in the field without chassis power downs

EFM Enterprise Access



FEATURES & BENEFITS

- ✓ 24 ports per card
- ✓ Standards base DSL compatible with third-party CPEs
- ✓ Speeds from 5.7 to 23 Mbps
- ✓ Web/SNMP manageable from anywhere in the world
- ✓ In-band and out-of-band management
- ✓ Easy software upgrade via FTP
- ✓ Uses standard copper twisted-pair
- ✓ Dual Gigabit Ethernet uplink ports
- ✓ Distances up to 9000 feet (2.7 kilometers) at 5.7 Mbps
- ✓ Hot swappable front and rear cards
- ✓ Complete alarm facilities
- ✓ Integrated line protection circuits

SPECIFICATIONS

G.SHDSL: G.991.2 bis ITU G.SHDSL Annex A and Annex B G.994.1 Full duplex, symmetrical TC-PAM encoding

EFM: IEEE standard 802.3ah-2004 2Base-TL 5.69Mbps per copper pair

G.SHDSL connection: Up to 24 ports presented on high density Telco connector

Ethernet Ports: Dual Gigabit Ethernet uplink ports, one 10/100 Base-T management port

WAN Clocking: Internal, Building Integrated Timing System (BITS), or via the system back-plane from any other card.

G.SHDSL Clocking: Provides clocking to the remote NTUs/Modems

Front Panel Indicators: LEDs for power, CPU, system, Ethernet, clock source, alarms, test mode, DSL, and WAN

Management Services: HTTP, SNMP, TELNET Ethernet, RS-232 Console Port, SYSLOG Client,

Software upgrade: Remote Software Upgrade via FTP.

Alarm Reporting: Configurable alarms; Remote SNMP Traps; Front Panel LEDs; 3-Contact Relay (3-pin terminal block)

Compliance: Safety: UL/CSA per UL1950 (METS) Canadian cMET and CS-03. EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC (EN 60950), FCC Part 15, CE Mark.

Environment:

Operating temperature: 14 to 140°F (-10 to 60°C);

Humidity: 5 to 90%, non-condensing

Dimensions:

Front blade: 0.75 H x 10.5 W x 6.3 D in. (1.9 H x 26.7 W x 16.0 D cm)

Rear blade: 0.75 H x 10.5 W x 3.15 D in. (1.9 H x 26.7 W x 8.0 D cm)

ORDERING INFORMATION

3296RC/24/2GE: EFM DSLAM with 24 G.SHDSL ports and 2 Gigabit Ethernet ports.

3296RC/24/0GE: EFM DSLAM with 24 G.SHDSL ports and 0 Gigabit Ethernet ports

ForeFront™ End-to-End System Elements
Access Blades

ADSL2+ 3Play Access

Model 3101RC ADSL2/2+ 3Play IpDSLAM Blade

The Patton Model 3101RC provides up to 48 ADSL2/2+ ports of triple-play access, supporting extended reach and higher downstream bandwidth up to 24 Mbps.

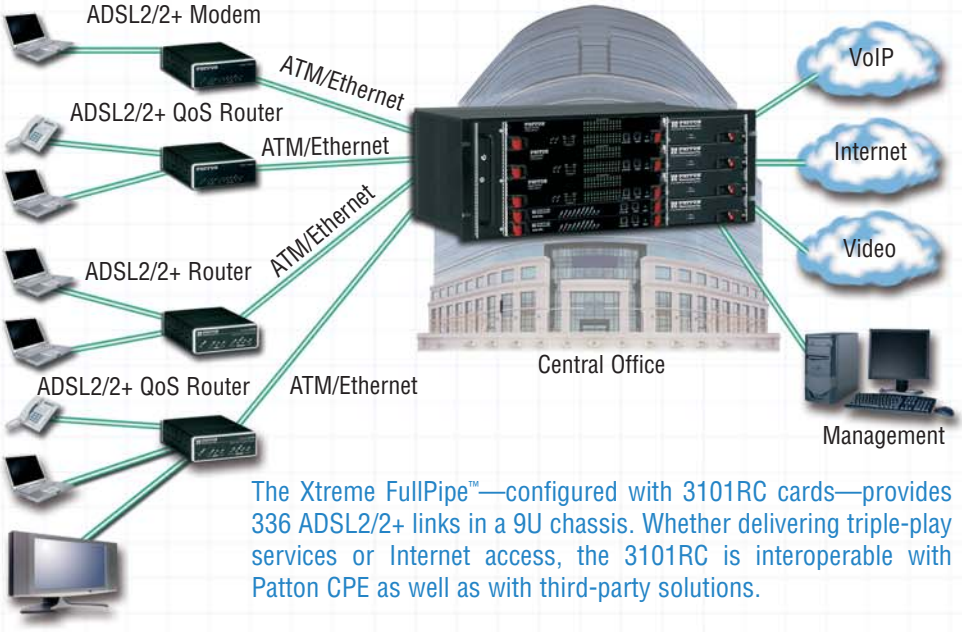
The Model 3101RC delivers affordable ADSL/ADSL2/2+ network access for triple-play ready ADSL service. The ADSL2+ IpDSLAM module, together with Patton's ForeFront Access Platform, is the premier solution for fault tolerant triple-play enabled network deployments.

The Model 3101RC offers complete ADSL, ADSL2 and ADSL2+ support including extended range operation, and enhance speeds. Each 3101RC IpDSLAM Module includes all the intelligence necessary to function as a complete single card IpDSLAM thereby providing unparalleled redundancy and fault tolerance in network deployments. The Model 3101RC includes redundant 10/100/1000 Ethernet uplink ports as well as redundant mid-plane connections to ensure non-stop operation.

The Model 3101RC is designed for triple-play networks where the reliable delivery of IP-based voice, video and data services depends on the QoS metrics that are assigned to the flows. Consequently, the Model 3101RC supports the mapping of ATM CBR/UBR/VBR traffic types and cell rates to IEEE 802.1p/Q VLAN priority classes. VLAN stacking or "Q-in-Q" is likewise supported to ensure transparent extension of subscriber VLAN networks. In order to maximize WAN bandwidth, IGMP Snooping is supported to ensure that IP Multicast traffic is detected and forwarded accordingly.

24-port, 1-slot version available!

Why use our 3101RC?



The Xtreme FullPipe™—configured with 3101RC cards—provides 336 ADSL2/2+ links in a 9U chassis. Whether delivering triple-play services or Internet access, the 3101RC is interoperable with Patton CPE as well as with third-party solutions.

FEATURES & BENEFITS

- ✓ Built-in Triple-Play Support—ADSL2+ high-bandwidth downstream with Multicast support and QoS included.
- ✓ QoS—Per PVC traffic classification with shaping and policing; 802.1p VLAN priority; ToS/DiffServ stripping and priority queuing
- ✓ 24–48 ADSL2/2+ Ports—"Right size" the deployment with the best port-per-card ratio. Easily scale by adding cards.
- ✓ Per-Port Configuration—To facilitate the provisioning and tailoring of services, ports are independently selectable to the individual DSL standard and required port speeds.
- ✓ SNMP/HTTP Management—SNMP/HTTP manageable from anywhere in the world including attached CPE units.
- ✓ Management Features—Configurable alarm reporting with SNMP Traps, RMON for performance monitoring, Dying Gasp support on ADSL ports, I.610 OA&M, F5 loopback support, G.PLOAM, embedded HTTPS web server for easy configuration via a browser.
- ✓ Annex M and Annex L support.

ORDERING INFORMATION

3101RC/24A/2GE: ADSL IPDSLAM with 24 ADSL Annex A Ports and two Gigabit Ethernet ports occupying one ForeFront slot

3101RC/48A/2GE: ADSL IPDSLAM with 48 ADSL Annex A Ports and two Gigabit Ethernet ports occupying two ForeFront slots

3101RC/24B/2GE: ADSL IPDSLAM with 24 ADSL Annex B Ports and two Gigabit Ethernet ports occupying one ForeFront slot

3101RC/48B/2GE: ADSL IPDSLAM with 48 ADSL Annex B Ports and two Gigabit Ethernet ports occupying two ForeFront slots

SPECIFICATIONS

ADSL Ports: 24 or 48 ports configurable as ANSI T1.413i2, G.992.1 (G.DMT) Annex A/B with UR-2, G.992.2 (G.Lite), G.992.3 (ADSL2) Annex A/B/L/M, G.992.5 (ADSL2+) Annex A/B/L/M supporting G.997.1 (G.PLOAM) and G.994.1 (G.HandShake)

Ethernet Ports: Two 10/100/1000 backplane-facing, auto-negotiating ports; Two 10/100/1000 auto-negotiating rear card ports with SFP interface for easy media selection; Single 10/100 auto-negotiating, full/half duplex front card; 802.1ad Link Aggregation and LACP

ATM Support: 12 PVCs per port including per PVC traffic classification; RFC 1483/2684; PPPoE forwarding; AAL5 per I.363.5; Traffic classes: UBC, CBR, VBR-rt, VBR-nrt; UNI 3.1/4.0; I.610 OA&M with F5 loopback

VLAN & bridging support: IEEE 802.1Q including per interface tagging; IEEE 802.1p priority queuing and re-striping; VLAN stacking or "Q-in-Q"; Spanning Tree (802.1D); RSTP (802.1w); MSTP (802.1s/Q); IGMP Snooping; MAC address filtering (8 per VLAN)

Management Service: HTTP/HTTPS, SNMP, Telnet Ethernet, RS-232 Console Port, SYSLOG Client, Software upgrade via TFTP

Alarm Reporting: Configurable alarms; Remote SNMP traps; front panel LEDs

Compliance: UL-1950; CSA per 22.2-No. 950; FCC Part 15 Class A; CE Mark; EN55022; EN61000; RoHS Compliant

Operating temp.: 0–60°C (14–104°F)

Humidity: 5–90% non-condensing

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Digital Cross Connects

2616RC 16-Port T1/E1 TDM Cross-Connect Blade

Highest density, scalable DACS solution for Telco and carrier environments

The Model 2616RC is the answer for high density T1/E1 digital cross connection and grooming in carrier and telco environments. Offering any-to-any DS0 mapping, the Model 2616RC comes with 16 T1/E1 user-programmable ports in a 6U-high card. Up to 13 cards can be housed in Patton's 19-in. ForeFront chassis system, giving you a staggering 208 T1/E1 ports!

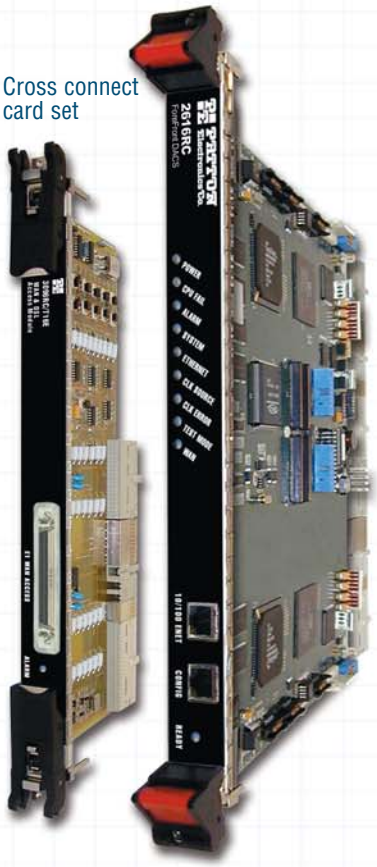
Using a robust hardware platform and a rich set of software features—including an intuitive, graphical SNMP/HTTP user interface—the 2616RC can be used in a series of applications ranging from non-blocking cross connection; to multiplexing; to transport of E1 over T1 lines, or vice versa.

The Model 2616RC features an RS-232 console port and a 10/100Base-T port. The RS-232 port provides access to VT-100 configuration menus, while the 10/100Base-T port allows remote configuration and monitoring via Internet connection from any location in the world. For remote configuration, the Model 2616RC comes with a built-in web server, which provides intuitive drop-down menus for simple configuration testing and monitoring. For complete flexibility, The Model 2616RC can also be managed using any standard SNMP software tool.

The Model 2616RC works with Patton's 4, 6, and 13-slot ForeFront system chassis. Twisted- pair connections provide standard T1 and E1 interfaces, while RS-232 console and 10/100Base-T ports enable complete command and control of the card. Dual-redundant powers supplies—with choices of DC or AC inputs—ensure uninterrupted operation and service. Front panel LEDs provide at-a-glance status of system and network signals, while a comprehensive set of diagnostics features and alarms enable network personnel to quickly isolate failures and minimize downtime.

The 2616RC DACS rack card can also be used in conjunction with Patton DSL, T1/E1 NTUs, fiber optics T1/E1 multiplexers, and network extenders to provide a complete geographical solution to enterprise costumers with wide area network deployments.

Cross connect card set



FEATURES & BENEFITS

- ✓ Any-to-any DS0 mapping across single or multiple cards
- ✓ 16 T1/E1 ports—switch up to 480/64 kbps channels
- ✓ Universal DACS card for use in ForeFront systems
- ✓ DACS, multiplexer, and T1/E1 converter—all in one box
- ✓ Hot-swappable front and rear resource cards
- ✓ Complete local and remote alarm facilities
- ✓ Full suite of T1/E1 diagnostics
- ✓ SNMP/HTTP management

SPECIFICATIONS

T1/E1 Ports: 16 T1/E1 ports: E1 (HDB3/AMI line coding), T1 (AMI/B8ZS line coding)
Ethernet Port: One 10/100Base-T (RJ-45 connector)
Clocking: Internal, Network, System (from T1/E1 WAN port)
Front Panel Indicators: LEDs for power, CPU, system, Ethernet, clock source, clock error, test mode, and WAN ports frame and error status
Management Services: HTTP, SNMP, TELNET Ethernet, RS-232 Console Port, SYSLOG Client, Remote Software Upgrade via FTP
Alarm Reporting: Configurable alarms; Remote SNMP Traps; Front Panel LEDs; 3-Contact Relay for local alarm (3-pin terminal block)
Compliance: Safety: UL/CSA per UL1950 (METS) Canadian cMET and CS-03. EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC (EN 60950), FCC Part 15, CE Mark, CTR12, CTR13, FCC Part 68.
Op. Temp.: 0–50°C (32–122°F)
Humidity: 5–90% non-condensing
Dimensions:
Front blade:
0.75H x 10.5W x 6.3D in.
(1.9H x 26.7W x 16.0D cm)
Rear blade:
0.75H x 10.5W x 3.15D in.
(1.9H x 26.7W x 8.0D cm)

ORDERING INFORMATION

2616RC: T-DACS, Front Card, T1/E1 Only
2616RC/12E: 12 port T1/E1 ForeFront T-DACS
2616RC/16E: 16 port T1/E1 ForeFront T-DACS
2616RC/4E: 4 port T1/E1 ForeFront T-DACS
2616RC/8E: 8 port T1/E1 ForeFront T-DACS

ForeFront™ End-to-End System Elements

Access Blades

ForeFront™ Remote Access Server (RAS)

ForeFront™ 3125RC

The ForeFront RAS is the all-new carrier-class addition to Patton's dial-up access solutions.

The ForeFront RAS provides the ILEC/IOC, CLEC and PTT with a powerful and scalable access solution.

Building upon Patton's award-winning 2900 series of remote access servers, the ForeFront RAS offers increased port density, enhanced performance, and expanded service capabilities. Scaling from 96/120 ports per blade, a single chassis can support up to 1,560 calls. Through its unique distributed processing architecture, each blade operates independently of other system cards for maximum uptime. With support for enhanced data systems such as remote access services, the ForeFront RAS supports future multi-service access capabilities such as VoIP and DSL.

Designed to ensure no single point-of-failure for maximum uptime and high availability, the ForeFront RAS's modular platform incorporates redundant AC or DC power supplies and hot-swappable/field-upgradable network resource cards providing a versatile, scalable, and complete remote access solution.

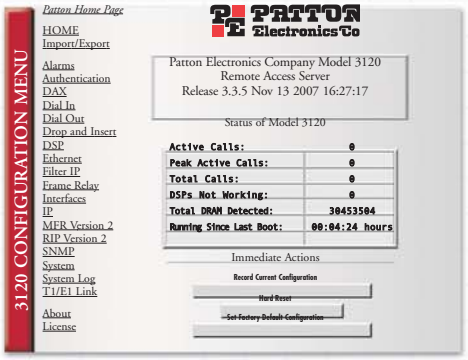
FEATURES & BENEFITS

- ✓ High density scalable architecture for easy expansion
- ✓ 96/120 ports per resource card—up to 1,560 calls
- ✓ Dual redundant Hot-Swap architecture
- ✓ Dual 10/100 Ethernet ports per resource card with multiple routing
- ✓ On-board expansion port for additional services and VPN processing
- ✓ V.92/V.44 and legacy modem support
- ✓ Complete SNMP/HTTP management

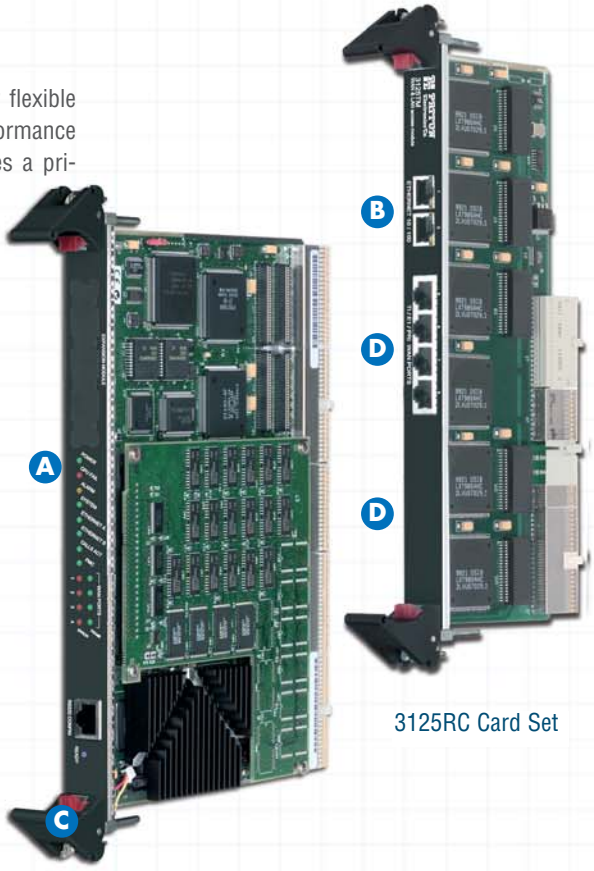
A Status at-a-glance—The 3125RC includes 16 LEDs indicators that detail system and T1/E1 ports status.

B Dual 10/100 Ethernet Ports—Allow flexible integration options for your high-performance network. Each 10/100 Ethernet provides a primary and secondary port

C SNMP/HTTP management—Embedded HTTP server provides complete configuration and control using a web browser, as well as standard tools



D Quad T1/E1 ports for 120 ports of RAS or uplink services—Terminate any combination of modems/ISDN connections, or expand into remote locations and use the 3120 as a complete PoP solution



3125RC Card Set

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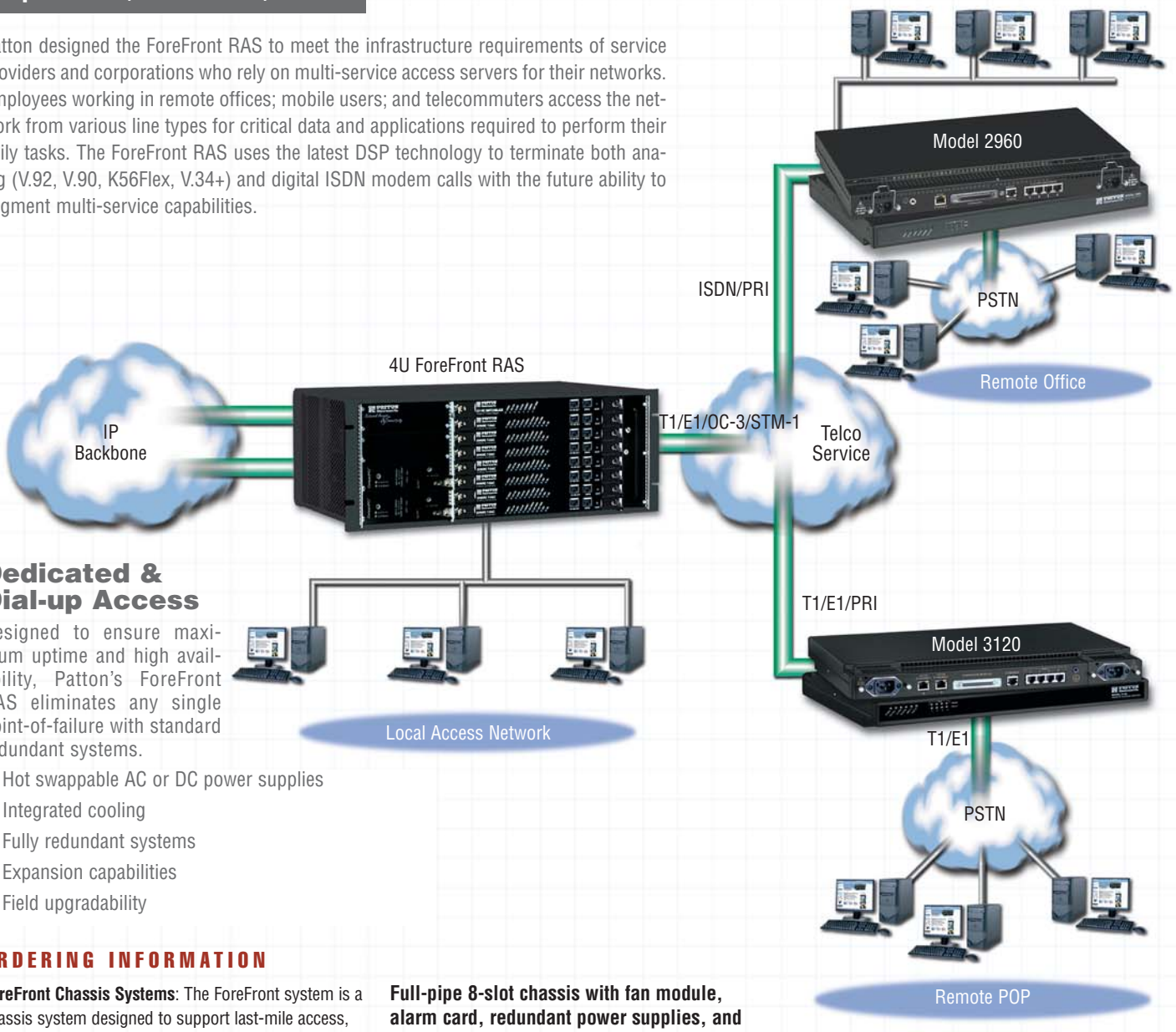
Corporate site/remote office/POP

Patton designed the ForeFront RAS to meet the infrastructure requirements of service providers and corporations who rely on multi-service access servers for their networks. Employees working in remote offices; mobile users; and telecommuters access the network from various line types for critical data and applications required to perform their daily tasks. The ForeFront RAS uses the latest DSP technology to terminate both analog (V.92, V.90, K56Flex, V.34+) and digital ISDN modem calls with the future ability to augment multi-service capabilities.



Dedicated & Dial-up Access

Designed to ensure maximum uptime and high availability, Patton's ForeFront RAS eliminates any single point-of-failure with standard redundant systems.

- Hot swappable AC or DC power supplies
- Integrated cooling
- Fully redundant systems
- Expansion capabilities
- Field upgradability

ORDERING INFORMATION

ForeFront Chassis Systems: The ForeFront system is a chassis system designed to support last-mile access, digital cross connect, and remote access services. The models below are for RAS applications only. For combination systems, consult a Patton Systems Engineer.

Remote access server card set

3125RC/96: 96-port RAS card with T1/E1 transition module

3125RC/120: 120-port RAS card with T1/E1 transition module

Half-pipe 4-slot chassis with fan module, alarm card, redundant power supplies, & H.110 backplane

6286/RUI: Universal AC supplies

6286/R48: Universal DC supplies

Full-pipe 8-slot chassis with fan module, alarm card, redundant power supplies, and 2.16 backplane

6486/RUI: Universal AC supplies

6486/R48: Universal DC supplies

Xtreme 17-slot chassis with fan module, alarm card, redundant power supplies, and 2.16 backplane

6686/RUI: Universal AC supplies

6686/R48: Universal DC supplies

Note: For additional options associated with these chassis refer to page 68.

ForeFront™ End-to-End System Elements

Aggregation Blades

Matrix Switch Line Card

Model 6511 Matrix-SW/155

Get non-blocking any-to-any TDM access, packet-switched Ethernet, and high speed trunking—all in a single card.

The Model 6511's flexible channel switching fabric allows non-blocking switching from any input to any output. The channelized STM-1 interface integrates into a SDH/SONET network, enabling users to channelize an STM-1 down to 64 kbps timeslots. With full grooming capability, the Model 6511 DACs allows any-to-any TDM mapping and can place any channel from any card onto any port.

Combined with the ForeFront AIS 40-Gig Packet-Switched Backplane, the Model 6511 Matrix Switch redundantly interconnects every slot—at wire-speed—and aggregates traffic from each system card onto dual-switched uplink Ethernet ports. With increased performance and throughput, the packet backplane allows non-blocking access to the Matrix Switch, other system cards, and the uplink ports.

With the ForeFront architecture, TDM and packet can be used simultaneously and to full capacity. In a system loaded with dual Matrix Switches, the high speed channel switching and packet backplane on the Model 6511 offers 1+1 redundancy.

Management is a *snap* with VT-100, TELNET, SNMP and WEB options. Connect to any card out-of-band or route management traffic through available timeslots in-band. Complete switching database allows easy building of circuits end-to-end.

Master time and space with the Model 6511 Matrix Switch and realize an unequaled level of density and control over the new convergent network.

FEATURES & BENEFITS

- ✓ Non-blocking I/O fabric
- ✓ Get dedicated connectivity to every input and every output port while grooming TDM or switching packet data
- ✓ Use dual 6511s and get 1+1 redundancy.
- ✓ Hot swappable cards for fast maintenance and quick upgrades.
- ✓ Integrated STM-1 DACS
- ✓ Resolve traffic down to 64-kbps timeslots, with any-to-any mapping.
- ✓ WWW/SNMP manageable—Use the embedded HTTP/SNMP agent to manage the Model 6511 from anywhere in the world.
- ✓ Optical or electrical egress: electrical BNC or optical SC connectors
- ✓ Redundant packet switching

SPECIFICATIONS

Line Framing: DS1-SF, SLC-95, ESF, E1–G.704 basic, CRC-4 multiframe (G.706 framing), DS3–M23, C-bit parity formats, E3–G.751, G.832 E3, STM-1–G.707, SONet/STS-3–Per ANSI T1.105-2001

Mapping: DS1–VT1.5 → STS-1 SPE, TU-11 → STM1/VC3, TU-11 → TUG3 → STM1/VC4, TU12 → STM1/VC3, TU-12 → TUG3 → STM1/VC4; E1–VT2 → STS1 SPE, TU-12 → STM-1/VC3, TU-12 → TUG3 → STM-1/VC4; DS3–DS3 → VC3 → AU3 → STS-1 SPE; STM-1–G.707; SONet/STS3– Per ANSI T1.105.02-2001

Clocking: STM-1–G.813; STS-3 - ANSI T1.101-1999, T1.105.09-1995, G4-1244

Error Counts: G.821 & G.826 (ES, SSES, US, EB, and BBE; T1.231 & GR-253-CORE ES, SES, US and SEFS

Line Testing: PRBS per ITU-T 0.151 & 0.152; DS3/E3 Diagnostic & Line Loopback; DS2 Demux Loopback; T1/E1 Diagnostic & Loopback

Ethernet Ports: Dual 10/100Base-T (RJ-45 connector)

STM-1/STS-3 Ports: Single mode dual SC fiber (20km) per G.957 using 1300 nm lasers per G.652 or Dual 75-Ohm BNC per G.703

LED Indicators: LEDs for power, CPU, Dual Ethernet, test mode, egress synchronization, egress trunk status

Management Services: HTTP, SNMP, TELNET Ethernet, RS-232 Console Port, SYSLOG Client, Remote Software Upgrade via FTP

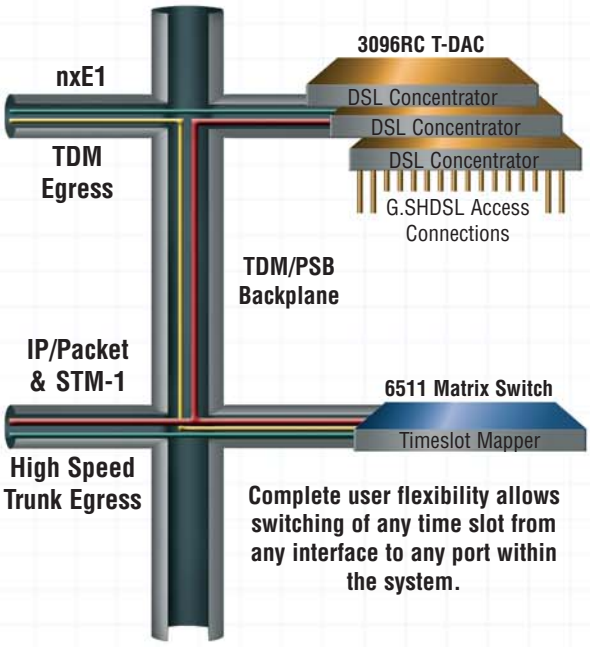
Alarm Reporting: Configurable alarms; Remote SNMP Traps; Front Panel LEDs

Compliance: Safety: UL/CSA per UL1950 (METS) Canadian cMET and CS-03. EMC Directive 89/336/EEC, FCC Part 15, CE Mark, CTR12, CTR13 FCC Part 68. Laser Safety: Class 1, IEC-825-1, 1993

Op. temp.: 14 to 43°F (-10 to 60°C);

Humidity: 5–90%, non-condensing

Any-to-any time slot mapping



Complete user flexibility allows switching of any time slot from any interface to any port within the system.

The Matrix Switch architecture guarantees total non-blocking operation for any TDM application and for Packet switching applications over the redundant Packet Switching Bus (PSB). With the ability to simultaneously transmit and receive on both full-duplex 10/100 Ethernet up-link ports, the Matrix Switch offers unparalleled switching to any DSL, E1, STM-1 media as well as redundant PSB and TDM buses.

Rear card options include electrical (BNC) and optical (SC) physical connections.

ORDERING INFORMATION

6511RC/SST/SC20: OC-3/STM-1 TDM and Packet Switch, with SC optical interface

6511RC/SST/EBNC: OC-3/STM-1 TDM and Packet Switch, with BNC electrical interface

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Router Line Card

Model 6081RC EdgeROUTE™

This feature-rich IP service module for ForeFront AIS addresses the demanding deployment needs of service and enterprise organizations.

The Patton Model 6081RC is a Packet Access Server for ForeFront AIS that is optimized to process IP traffic from multiple access and uplink cards. The Packet Access Server converts any ForeFront chassis into a powerful IpDSLAM or modular Access Router. The 6081RC comes standard with dual 10/100Base-T Ethernet ports, while at the same time, it has access to any port on any card attached to the ForeFront system for up-linking traffic. With its powerful feature set, service providers can deploy new IP services while retaining the ability to support their TDM infrastructure investment.

The 6081RC supports MAC Address filtering, VLAN priority, and VLAN tagging to facilitate the transition from traditional IP router-based networking to modern-day VLAN/MPLS networks. Regardless of whether the customer traffic comes in via DSL or T1/E1, the EdgeROUTE can terminate and tag the stream, making it transparent to core/edge networks.

Easily tailor and manage the level of service to the needs of the subscriber with traffic shaping and policing. Filter by IP address, IP port or by physical port in either ingress or egress directions. The extensive filtering capabilities of the 6081RC turns this access router into a capable edge firewall. NAT is likewise supported for either masquerading applications or for simple address translation. Customize security for each end user or use a standard configuration for all. Use the built-in traffic filtering features of the 6081RC and SSH to secure your management connection.

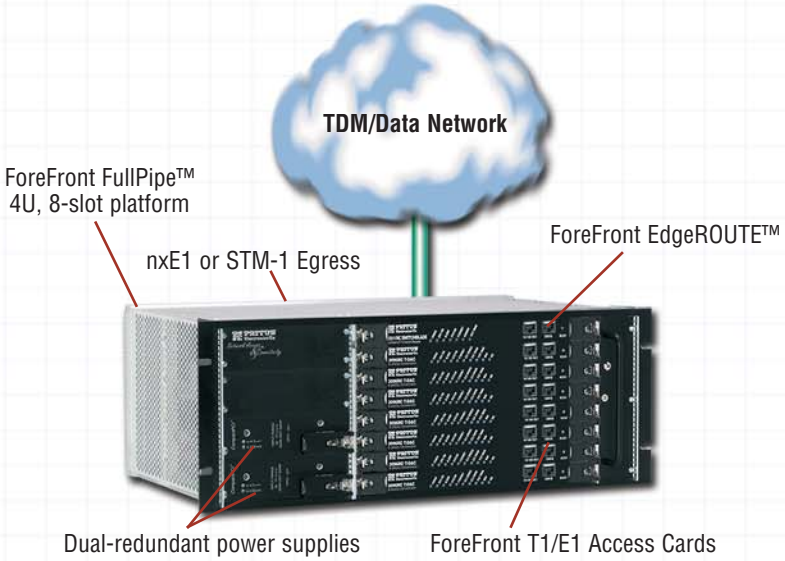
VPN applications, including access service wholesaling, can be deployed with L2TP providing standards-based tunneling of IP traffic and easy interconnection with existing VPN networks. Use RIP or OSPF to route traffic between any WAN, LAN or DSL port.

FEATURES & BENEFITS

- ✓ Dual 10/100 Ethernet easily bridges the gap between the LAN and Access Network with differentiated service offerings
- ✓ Built-in IP address, IP port, and MAC address filtering
- ✓ Perform IP address and port translation for any ForeFront port
- ✓ Extensive IP Routing with RIP and OSPF allows easy interoperability and integration.
- ✓ Create layer 2 and layer 3 VPNs with PPTP and IPsec
- ✓ SNMP/HTTP manageable from anywhere in the world including attached CPE units.

SPECIFICATIONS

Routing: RIPv1 (RFC 1058), RIPv2 (RFC 2453), OSPFv2 (RFC 2328), VLSM (RFC 1878)
RADIUS client: Authentication (RFC 2865 & 2868), Accounting (RFC 2866 & 2867), PAP (RFC 1332), CHAP (RFC 1334 & 1994)
VPN Services: L2TP (RFC 2661 with RFC 2809 & 2888) - LAC & LNS, PPTP, IPsec
IP Services: (RFC1701/2784), IP-within-IP (RFC 2003), ARP (RFC0826), Proxy-ARP (RFC1027), ICMP (RFC0950, RFC1256), NTPv3 (RFC1305), IGMP & IGMPv2 (RFC2236), DiffServ (RFC2474), NAT (RFC 1631/2663/2766/2993); DHCP (RFC2131/2132/2563)
Ethernet Ports: Dual 10/100Base-T (RJ-45 connector); auto-negotiating; half or full duplex operation
Management Service: HTTP, SNMP, Telnet Ethernet, RS-232 Console Port, SYSLOG Client, Software upgrade via FTP, SSH, SNTP
Alarm Reporting: Configurable alarms; Remote SNMP Traps; Front Panel LEDs
Compliance: Safety: UL/CSA per UL1950 (METS) Canadian cMET and CS-03. EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC (EN60950), FCC Part 15, CE Mark, CTR12, CTR13, FCC Part 68
Op. temp.: 0–40°C (32–104 °F)
Humidity: 5–90% non-condensing
Dimensions:
Front blade: 0.75 H x 10.5 W x 6.3 D in. (1.9 H x 26.7 W x 16.0 D cm)
Rear blade: 0.75 H x 10.5 W x 3.15 D in. (1.9 H x 26.7 W x 8.0 D cm)



ORDERING INFORMATION

6081RC/800H/FE2P: IP Router, 800-MHz with 3 10/100 Front Access Ethernet Ports

6081RC/800H/FE2T: IP Router 800-MHZ with 1 front 10/100 Ethernet ports & 2 rear 10/100 Ethernet ports

6081RC/800H/GE2P: IP Router, 800-MHz with 1 10/100 & 2 Gigabit Ethernet Ports

6081RC/800H/GE4P: IP Router, 800-MHz with 1 10/100 & 4 Gigabit Ethernet Ports

ForeFront™ End-to-End System Elements

Access Extension Shelves

Telephony Extension Shelf

Model 2652 FXO/FXS POTS and ISDN Card

The Model 2652 Telephony Extension Shelf adds a complete analog and digital voice solution to the extensive line of ForeFront xDSL, dial-up, T1/E1 and STM access and concentration solutions.

The 2652 E1 interface operates at a primary rate of 2.048 Mbps and provides a host of features including, channel drop and insert facility over a network of 2654s, E1 multiplexers, for voice and data applications.

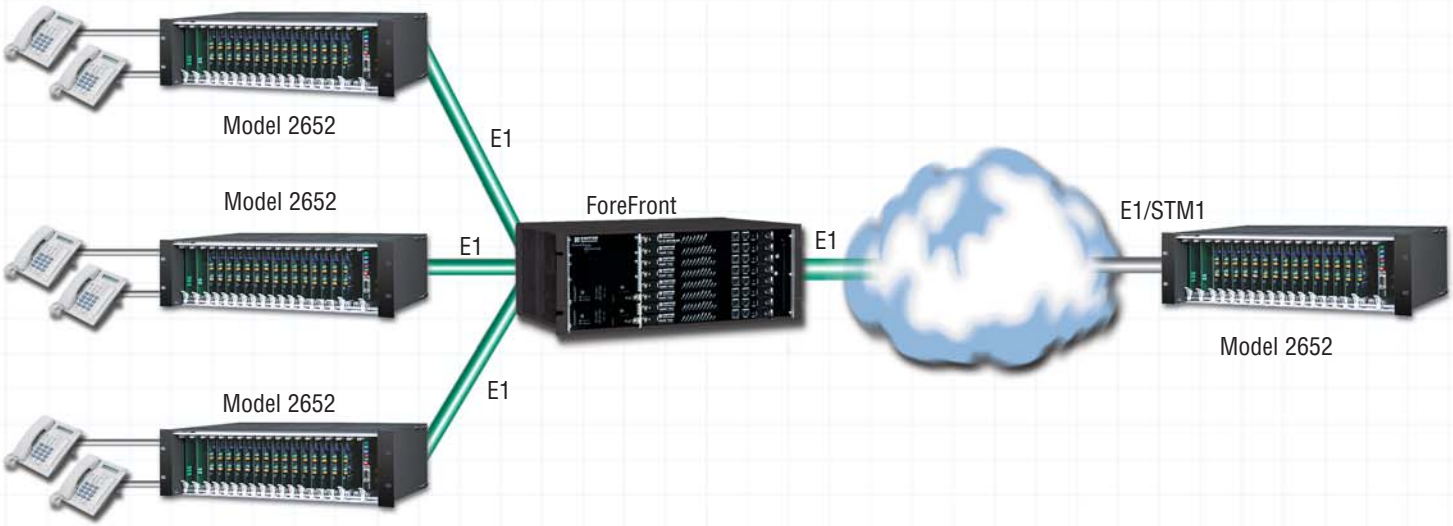
The 2652 connects to the ForeFront chassis via E1 links to the ForeFront DACS T1/E1 card.

The 2652 has an effective, CLI (text-based) Network Management System for configuring the system, subsequent remote monitoring and management of the inter-connected systems in the network. An extensive set of alarms, for easy maintenance are provided in the system.

Voice and data drop-and-insert multiplexer without in-band management interface.

FEATURES & BENEFITS

- ✓ Complete offering of analog and digital voice interfaces: FXO/FXS/E&M/ISDN BRI
- ✓ Easy configuration and management
- ✓ Seamless integration with ForeFront access and transmission circuits
- ✓ Compact dual port voice card allow for easy expansion of up to 15 cards per chassis
- ✓ Complete set of alarms for essay maintenance and troubleshooting
- ✓ Maximum flexibility with drop-and-insert facilities in the extension shelf or ForeFront chassis



SPECIFICATIONS

E1 Interface (Main Link)

Number of Interfaces: 2

Conformity (Electrical): G.703

Frame Structure: As per ITU (CCITT) G.704

Signaling: Channel Associated Signaling

PCM Sampling Rate: 8000 samples per second

Encoding Law: A Law as per ITU(CCITT)

Bit Rate: 2048 kbps ± 50 ppm

Code: HDB3

Nominal Impedance: 120 ohm balanced/75 ohm unbalanced (75 ohm option)

2 Wire/4 Wire—Voice Frequency Interfaces

Number of Channels per Card: 2

Interface Type: FXO, FXS, 2W / 4W E&M

Maximum Number of Channels: 30

Transmission performance: Fully Compliant to ITU (CCITT) G.712 specification

Line Impedance: 600 ohm (900 ohm optional)

Voice Channel Frequency: 300–3400Hz

Insertion Loss: -2.0dB Nominal (User adjustable)

Idle Channel Noise: -65dB

Return Loss: 300Hz – 600Hz–12dB • 600Hz–3400Hz–15dB

Longitudinal Balance: 46dB between 300 to 3400Hz

Ring Frequency: 25 Hz (20Hz, Optional)

Ring Voltage: 75 volts RMS into a load of 5 R.E.N. with a 0.30 Erlang traffic pattern

Subscriber Loop Current: 23mA into a subscriber loop of 1000 ohms

Overload Level: +3.14dBm ± 0.5dBm

Battery Reversal: All channels

Dial Pulse Speed: 8–12 pps–Pulse Dialing/DTMF Dialing

ORDERING INFORMATION

2652R: 19-inch Shelf and Backplane, 3U high

PSM-2652/48: Power Supply Card

IM2652/Ringer: Ringer Card

IM2652/Vxx: 15 User Configurable Voice & Data Interface(s)

IM2652/I: 10BaseT - LAN Management Card

IM2652/CC1: Control Card 1

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Legacy Interface Extension Shelf

Model 2655 12xE1 Sub-rate Multiplexer

The Model 2655 12xE1 Sub-rate Multiplexer complements the Patton's Forefront solutions with a wide variety of legacy interfaces and offers carrier class and cost-effective bandwidth provisioning designed to manage and deliver services from the network core to the access.

Patton's Legacy Interface Shelf offers *n*x64 kbps solutions for common connectivity interfaces such as V.35, X.21, RS-232, RS-485, RS-530, voice FXS/FXO and many others in compact, high speed 3U cards. The Model 2655 is a high density chassis with capacity for up to 24 data or voice interface cards. All traffic from legacy interfaces is concentrated and groomed into any of the multiple outgoing E1s.

The Model 2655 is ideal for use in inter-connecting legacy voice and data networks, provisioning and managing bandwidth on an E1 channelized level as well as 64 kbps, DS0 time-slot level and as a DACS. The multiplexer can be used in point-to-point, point-to-multipoint, add/drop (drop-and-insert), tree and star topology applications.

The Model 2655 12xE1 Interface operates at a primary rate of 2.048 Mbps and provides a host of features including, channel drop and insert facility over a network with multiple E1 multiplexers, for voice and data applications.

Patton's Model 2655 has an effective CLI (text-based) Network Management System, that can be used to configure the system. Subsequent remote monitoring and management of the inter-connected systems in the network.

FEATURES & BENEFITS

- ✓ Complete offering of data and voice interfaces
- ✓ Seamless integration with ForeFront access and transmission circuits
- ✓ Multiple topologies possible with E1 drop and insert facilities
- ✓ Compact cards with one or two ports allow for easy expansion of up to 24 cards per chassis
- ✓ Complete set of alarms for essay maintenance and troubleshooting
- ✓ Easy configuration and management, supports for telnet, SNMP V2, GUI, in-band and out-of-band management options.
- ✓ Redundant -48V power supply option available

SPECIFICATIONS

E1 Interface (Main Link)
Number of E1 Interfaces: 12
Conformity (Electrical): G.703
Frame Structure: As per ITU (CCITT) G.704
Signaling: Channel Associated Signaling
PCM Sampling Rate: 8000 samples per second
Encoding Law: A Law as per ITU (CCITT)
Bit Rate: 2048 kbps ± 50 ppm
Code: HDB3
Nominal Impedance: 120 ohm balanced/75 ohm unbalanced (75 ohm option)

High Speed Sync *n*x64 Data Interface Type: V.35
Interface: V.35
Number of Interfaces per Card: 1, (*n*x64 kbps per Card)
Maximum Number: (*n*x64 kbps Interface maximum value of *n* = 31)—User Selectable
Conformity: V.35
Mode: Synchronous
Bit Rate: 64 to 1984 kbps
User Interface: DCE

High Speed Synchronous *n*x64 Data Interface Type: X.21
Interface: X.21
Number of Interfaces per Card: 1, (*n*x64 kbps per Card)
Bandwidth: (*n*x64 kbps Interface maximum value of *n* = 31)—User Selectable
Conformity: X.21
Mode: Synchronous
Bit Rate: 64 to 1984 kbps
User Interface: DCE

High Speed Sync *n*x64 Data Interface Type: RS530
Interface: RS530
Number of Interfaces per Card: 1, (*n*x64 kbps per Card)
Bandwidth: (*n*x64 kbps Interface maximum value of = 31)—User Selectable
Conformity: RS530
Mode: Synchronous
Bit Rate: 64 to 1984 kbps
User Interface: DCE

Low Speed Async Data Interface: RS232
Interface: RS232
Number of Interfaces per Card: 2
Maximum Number: 30
Conformity: RS232
Mode: Asynchronous
Bit Rate: 50 bps to 19.2 kbps

Environmental
Temperature and Humidity: 0 to +50°C
Relative Humidity: 90% R.H. (Non-condensing)
Altitude: up to 9,000 feet

Power Supply
Input DC voltage: -48VDC (nominal)
Range of input: -40 to -60 VDC
Input Voltage Reversal Protection: Provided in the Card
Over Current Protection: 10 A for +5V, 0.5 A for -5V
Short Circuit Protection: Current limit: 6 A. Recovers on removal of short

ORDERING INFORMATION

IM2655/CC1: Control Card 1, 30 Channel E1 Interface

IM2655/CC2: Control Card 2, 30 Channel E1 Interface

IM2655/NMS: In-Band Management NMS Card (available with versions 2, 3 & 4)

2655R/1: 19-inch Shelf, 3U High (Sub-rack), Version 1, accommodates 30 Voice & Data Channels,

2655R/2: 19-inch Shelf, 3U High (Sub-rack), Version 2, accommodates 30 Voice & Data Channels

2655R/3: 19-inch Shelf, 3U High (Sub-rack), Version 3, accommodates Voice, 64 kbps Data Channels & *n*x64 kbps Data Channels

2655R/4: 19-inch Shelf, 6U High (Sub-rack), Version 4, accommodates Voice, 64 kbps Data Channels & *n*x64 kbps Data Channels

IM2655/I: 10Base-T NMS Management Card for connecting the multiplexer to a LAN; Versions 2, 3, & 4 (Optional), Enables user to assign a unique IP address to each multiplexer connected to the LAN so they can be managed,

PSM-2655/R48: -48 VDC Input Power Supply Card, Compatible with Versions 1, 2 & 3, Dual Supply 30 Channel Power Supply Card (+5 VDC, -5VDC),

PSM-2655/48: -48VDC Input Power Supply Card, Compatible with Version 4, +5 VDC (8 A), -5 VDC (0.5 A) Output Power Supply Card

ForeFront™ End-to-End System Elements

Access Extension Shelves

24-Port 10/100 Ethernet Extension Shelf

Model 3385 24-port Gigabit Layer 2 Managed Switch

The Model 3385 is a high capacity Ethernet switch that works seamlessly with ForeFront's xDSL router, DACS, and STM cards, enabling external concentration, switching, and high speed uplink of customer and management traffic.

Patton's Model 3385/20G/4TPSFP 24-port Gigabit Layer 2 Plus Managed Switch, is a standard switch that meets all IEEE 802.3/u/x/z Gigabit, Fast Ethernet specifications. The switch includes 20-port 10/100/1000Mbps twisted pair and 4-port Gigabit TP/SFP fiber dual-media management Ethernet switch.

The switch can be managed through RS-232 serial port, or through Ethernet port using CLI or Web-based management unit, associated with SNMP agent. With the SNMP agent, the network administrator can logon the switch to monitor, configure and control each port's activity in a friendly way.

The overall network management is enhanced and the network efficiency is also improved to accommodate high bandwidth applications. In addition, the switch features comprehensive and useful functions such as QoS (Quality of Service), Spanning Tree, VLAN, Port Trunking, Bandwidth Control, Port Security, SNMP/RMON, IGMP Snooping capability via the intelligent software. It is suitable for metro-LAN *and* office applications.

FEATURES & BENEFITS

- ✓ Apply QoS with 4 priority queues
- ✓ Port mirroring on any port
- ✓ Q-in-Q VLAN for performance & security
- ✓ Isolated group, provide secure for certain ports
- ✓ Mac-based 802.ad Lacp with automatic link fail-over
- ✓ 802.1x access control improve network security
- ✓ 802.1d compatible & 802.1w Rapid Spanning Tree
- ✓ 4 dual media for flexible fiber connection
- ✓ Broadcast/Multicast/unknown-unicast Storm Control
- ✓ IP-MAC-port binding
- ✓ Access control list (ACL)
- ✓ SNMP management

ORDERING INFORMATION

3385/20G/4TPSFP: 20-Port 10/100/1000Mbps twisted pair and 4-Port Gigabit TP/SFP Fiber

SPECIFICATIONS

Switching capacity: 24 Gigabit Ethernet ports with non-blocking wise speed performance • 8 K MAC addresses • Supports Jumbo frame support, up to 9K • Unknown Unicast/Broadcast/Multicast Storm Suppression • Port Mirroring

VLAN: Supports SVL/IVL configuration to meet your VLAN requirement • Port-base VLAN • IEEE802.1q tag-base VLAN, 4094 max, up to 256 active VLANs included static plus dynamic entry • IEEE802.1q tag-base VLAN • Flooding unknown vlan frame setting, can flood packet with some vlan tag associated to a invalid/inactive vlan • In tag-base VLAN, supports egress/ingress packet filter • Q-in-Q is an efficient method for enabling Subscriber Aggregation

QoS: Port Based, 802.1p , TOS and Diffserv(IPv4/IPv6) based QoS packet classification • Supports four level priority queues to prioritize in-bound and out-bound traffic • Supports two scheduling, WRR and Strict • Supports priority in a Q-in-Q tag

Broadcast Storm: Multicast/Broadcast/Unknown-Unicast Storm suppression

Port Mirroring: Support 1: N RX port mirroring

Isolated Group: Provide one group allows certain ports to be designated as protected.

Rate Limit: Ingress rate limit—Port 1~24: 64K up to 100Mbps; Port 25, 26: 64K up to 1000Mbps • Egress rate limit— Port 1~24: 64K up to 100Mbps; Port 25, 26: 64K up to 1000Mbps

VSM (Virtual Stacking Management): Up to 16 switches can be managed via single IP to any specific models • Virtual stacking, no extra stacking hardware is required • Distributed stacking, no physical central wiring closet is needed

LACP: 2 Fast Ethernet +1 Gigabit Ethernet groups • Per-group max 4 member • Provides DA, SA and DA+SA Mac-based trunking with automatic link fail-over

GVRP/GARP: 802.1q with GVRP/ GARP

Multicasting: Supports IGMP snooping including active and passive mode

STP/RSTP: 802.1d/1w/1s STP

Network Security: 802.1x access control • Isolated group • Management Access Policy Control • Static mac, to limit which mac addresses can pass through or not • Mac addresses learning limit, to set up the maximum amount of mac that each port can learn • Access control List • IP-mac-port binding DHCP option 82

SNMP V1,V2C Network Management

Voltage: 100 ~ 240 VAC

Frequency: 50 ~ 60 Hz

Power Consumption: 40W

Ambient Temperature: 0 to 45°C

Humidity: 5% to 90%

Dimensions: 44(H)x442(W)x 209(D) mm

Safety: Comply with FCC Part 15 Class A & CE Mark Approval

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ForeFront™ End-to-End System Elements

Aggregation Extension Shelves

Ethernet over E1 Extension Shelf

Model 2888

The Patton IPLink™ Multi-Megabit Inverse Multiplexer facilitates the bonding of up to 4 T1/E1 ports into a transparent high-bandwidth WAN link to feed the most bandwidth hungry NGN applications.

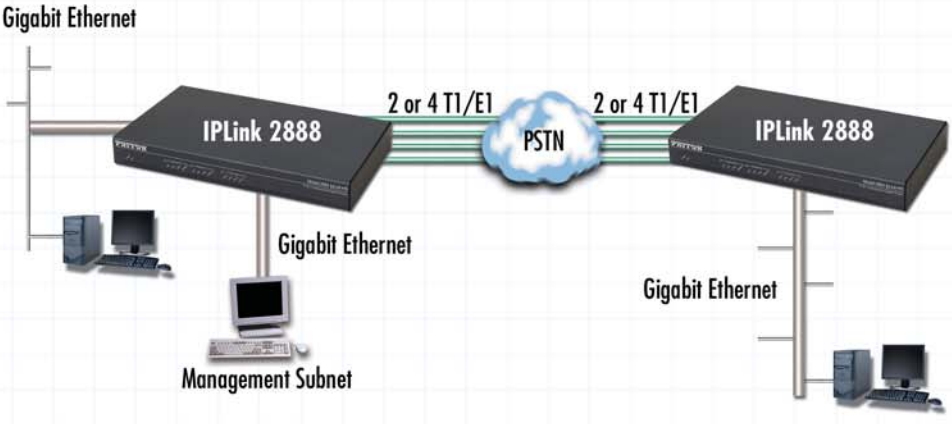
The Model 2888 Four-Port T1/E1 Multi-Megabit Inverse Multiplexer provides transparent L2 point-to-point high-bandwidth Ethernet/IP connectivity over TDM-based T1/E1 circuits. Dual 10/100/1000 Ethernet ports ensure easy connection to any LAN infrastructure.

In order to maximize the bandwidth utilization over the T1/E1 links, the Multi-Megabit Inverse Mux uses Multi-Link PPP to bond the individual circuits into one high bandwidth WAN link, guaranteeing minimal protocol overhead. Ethernet/IP traffic is transparently bridged over the link using PPP/BCP which adds minimal encapsulation overhead when compared to ATM.

Key features make the Multi-Megabit Inverse Mux an ideal solution for VLAN trunk extension. The Inverse Mux supports IEEE 802.1p/Q VLAN tagging and priority. VLAN tagged traffic that is received on any of the Gigabit Ethernet interfaces is transparently transported over the WAN to the matching Inverse Mux on the other side. The VLAN priority bits are inspected and the QoS of the individual Ethernet frames are preserved end-to-end. The Multi-Megabit Inverse Mux likewise supports VLAN tagging of Ethernet traffic as well as rate limiting per VLAN ID.

ACLs allow Layer 3 filtering and Layer 3 based QoS of the VLAN and bridge connections. Filter by IP address, IP port or even protocol. Use the ACL to force an inspection of the ToS/DiffServ bits and preserve end-to-end QoS.

The 2888 Model Series boasts easy installation, offering CLI configuration via Console/VT-100 or Telnet/SSH, HTTP web based management, and SNMP. Patton's series of high-speed access routers offer the versatility and reliability demanded for business-class applications at the most affordable price.



The IPLink Multi-Megabit Inverse Mux comes standard with Dual Gigabit Ethernet ports and is perfect for satisfying the need of bandwidth-hungry applications supporting Layer 2 bonding of T1/E1 WAN interfaces into high bandwidth logical ports.

FEATURES & BENEFITS

- ✓ 4-port T1/E1 Inverse Mux—Using ML-PPP bond from 2-4 T1/E1 ports to create a high bandwidth WAN link over TDM.
- ✓ Transparent to Transport Protocol—With support for Jumbo Ethernet Frames, the inverse mux transparently passes VLAN trunks, MPLS stacked labels, and more.
- ✓ Dual Gigabit Ethernet Ports—With Dual 10/100/1000, auto-MDI ports easily connect to any LAN infrastructure.
- ✓ End-to-end QoS—Inspect, set, and preserve VLAN priority to maintain end-to-end QoS.
- ✓ VLAN Trunk Extension—Tag untagged traffic, preserve VLAN QoS, or simply transparently forward VLAN traffic.
- ✓ VLAN Tagging—VLAN tagging and processing is configurable on any T1/E1 channel or Ethernet port.
- ✓ Easy Management—Easily manage the 2888 router via an HTTP/web interface, a CLI accessible via the VT100 console or through Telnet/SSH, or via SNMP.

SPECIFICATIONS

WAN ports: Four software-configurable channelized ports. E1 – G.703/G.704 with HDB3 and AMI encoding support. T1 – ANSI T1.403 & AT&T TR54016 with AMI coding/D4 framing or B8ZS coding/ESF framing.

Ethernet Ports: Two-port 10/100/1000Base-T (RJ-45 connector); auto-negotiating; half or full duplex operation with built-in MDI-X support for Jumbo Ethernet Frames (2072 current/9196 planned)

Management: HTTP/SNMP, Telnet/SSH Ethernet, RS-232 Console Port, SYSLOG Client, Software upgrade via TFTP

Protocols: IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826); IGMP v1 and v2, Ethernet Bridging.; PPP/BCP, IEEE 802.1p/Q VLAN Tagging and Priority

Security: Password protected system management with a username/password for console and virtual terminal, Packet filtering firewall for controlled management access. ACL rule and profiles; SSH for secure remote access.

Power Supplies: Internal universal 100–240 VAC input (50/60 Hz). Less 15W power consumption.

Compliance
EMC Compliance: EB55022 and EN55024
Safety Compliance: EN 60950
FCC Part 15A, CE Mark, FCC part 68, CS-03

Environment
Operating temperature: 32–122°F (0–50°C)
Humidity: up to 90% non-condensing

Dimensions
11 x 1.5 x 7 in. (280 x 39 x 180 mm)

ORDERING INFORMATION

2888/2E/UI: Gigabit Inverse Mux (2-port T1/E1); internal 100–240 AC power

2888/4E/UI: Gigabit Inverse Mux (4-port T1/E1); internal 100–240 AC power

Internal, external, and DC power supply options available. Please call for details.

ForeFront™ End-to-End System Elements

Aggregation Extension Shelves

Multi-Service Provisioning EoSDH Extension Shelf

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 unequaled 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.

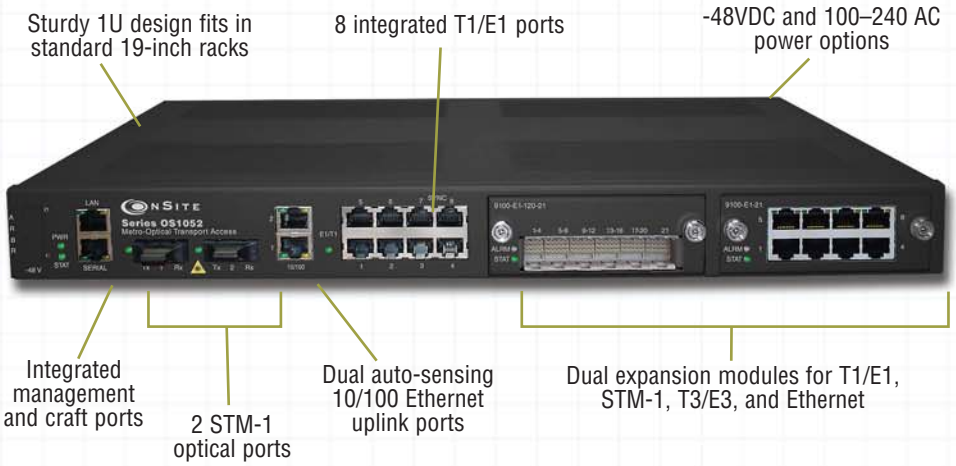
FEATURES & BENEFITS

- ✓ 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

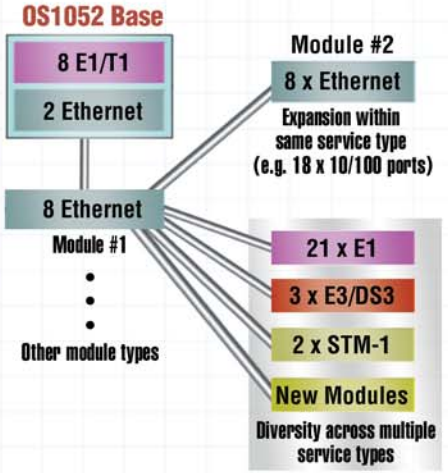
OS-10 Series Base Systems Overview

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



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Multi-Service Provisioning EoSDH Extension Shelf (Continued)

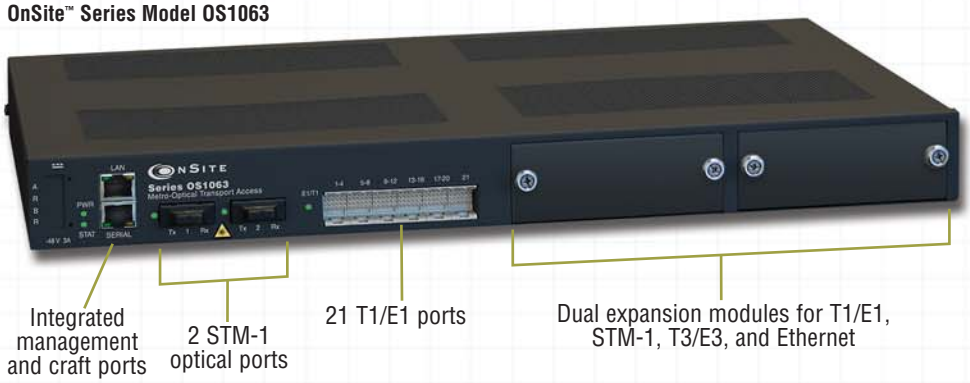
Model OS1063 base system

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

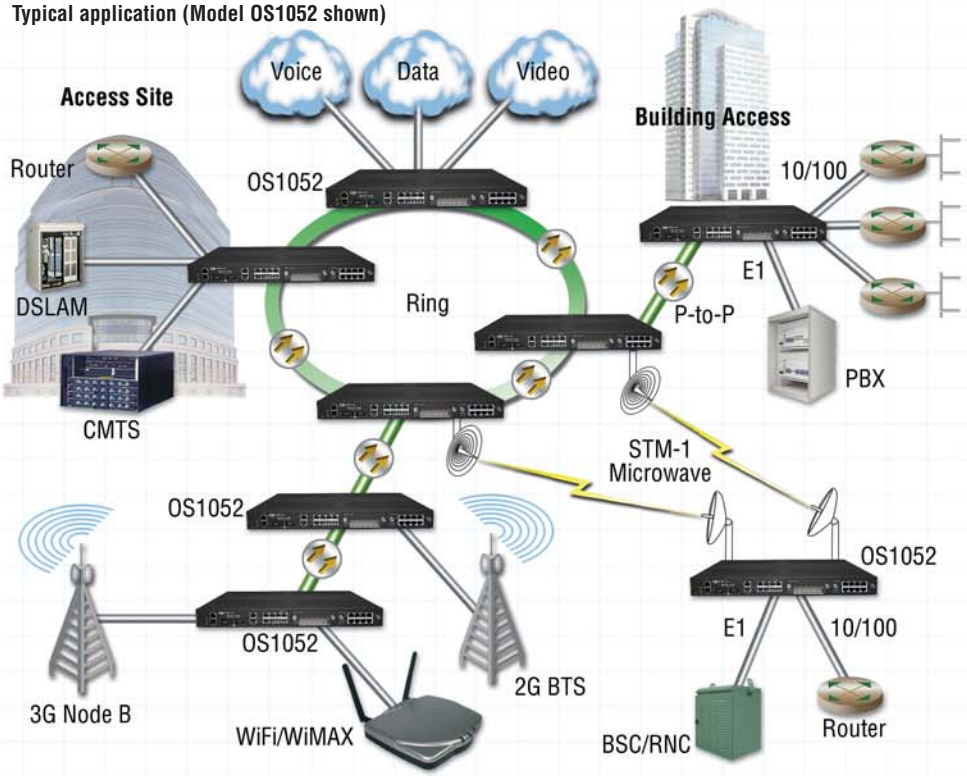
Two expansion module slots are included for increasing system capacity beyond the initial base configuration. Additional ports and features only require simple insertion of one of the many available types of TDM and packet data modules.

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)

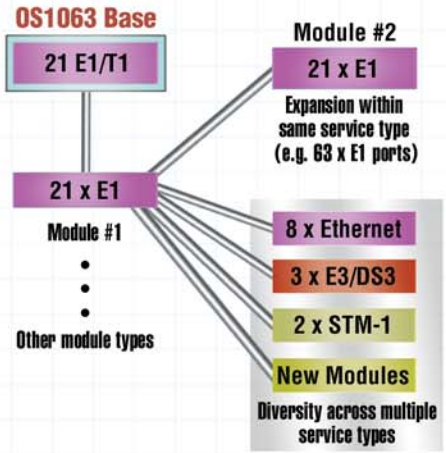
Humidity: 5 to 95%, non-condensing

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



ForeFront™ End-to-End System Elements
Management Platform

ForeSight™ NMS
Model 6300 FCAPS EMS

The ForeSight™ Model 6300 is a scalable Element Management System for full life-cycle network management of user services in TDM and routed networks.

The Model 6300 NMS offers integrated FCAPS element management features on a stable Linux platform for full life-cycle network management. The FS6300 scales from a single local server to a distributed, hierarchical multi-station plan with complete redundancy for fail-safe operation. Full life-cycle network management begins with planning the network provisioning to analyzing performance for timely extension of network infrastructure and services. The hierarchical topology of networks is traversed visually via the network tree and main graphical display. Administrators and operators can roam from the top-level *network* through *areas*, *nodes*, *chassis*, and *cards* down to the port level, as the management task dictates. By dividing the networks into separate management domains, the operators are given credential-based visual access.

The integration and design of the FS6300 exceeds the simple aggregation of FCAPS features. The modular management falls under the standardized categories of FCAPS to manage faults, configuration, administration/accounting, performance, and security. These five categories are integrated to function as more than independent units, but to enforce the discipline of properly documented planning and provisioning directly in the NMS. A major advantage with the integration into a single system minimizes the errors and inefficiencies from duplicate efforts.

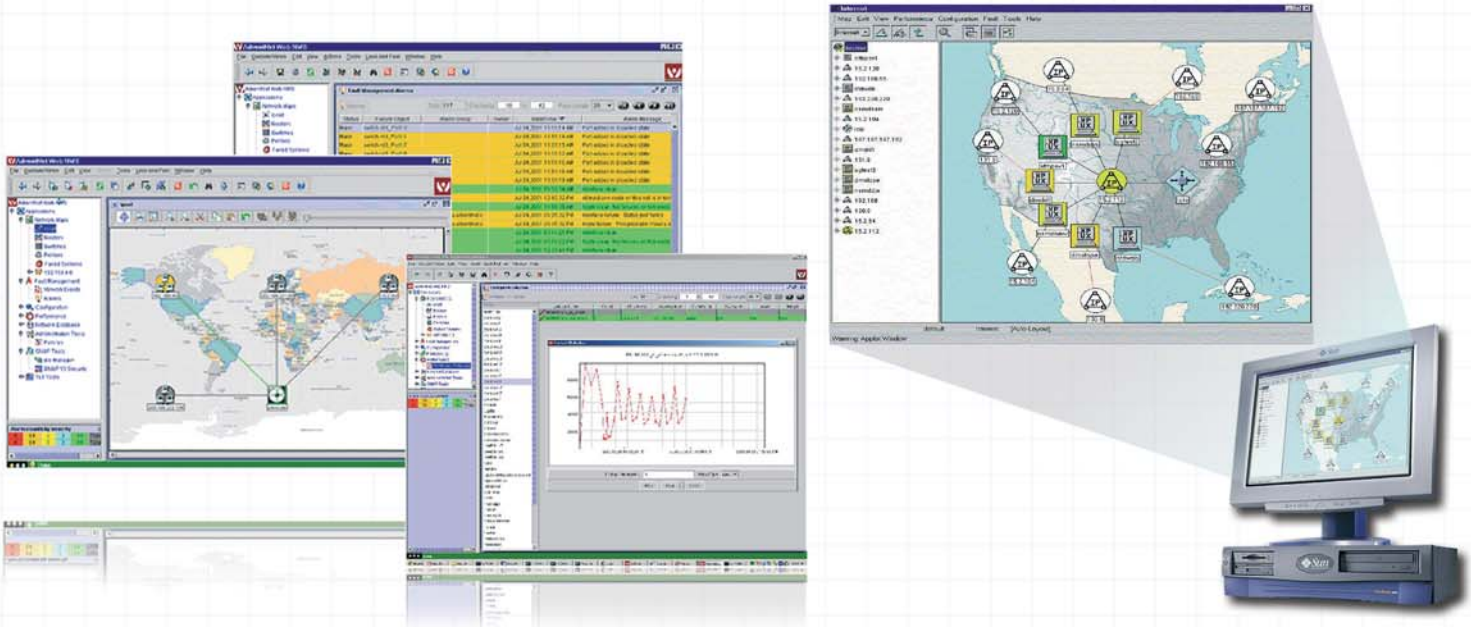
Configuration Management begins with planning resource provisioning, then the deployment of equipment, and subsequently auto-discovery of installed nodes. Schedule automatic software upgrades at low traffic times for selective sites or network areas without having to reconfigure each card again. Configuration changes can be executed at any authorized network station to upgrade a client's service or disconnect for clients not maintaining their service contract.

"FCAPS+" Management

Accounting/Administration Information is secured in the network database. Resource administration and client accounting can be grouped into domains for easing these management tasks and increasing the security level of protection. A containment tree view enables an operator to quickly browse the entire inventory.

FEATURES & BENEFITS

- ✓ Integrated FCAPS—By integrating 5 modular FCAPS management tasks, network management efficiency increases while easily enforcing good network management techniques.
- ✓ Configuration Management—Support good network planning techniques and efficient deployment of new sites and client services. Includes resource provisioning, auto-discovery, and scheduled software image upgrades.
- ✓ Alarm Management—Simplify event and alarm management with alarm correlation, filtering and triggers for specific actions, like sending a page or email.
- ✓ Security Management—Increase security by dividing the network into mutually exclusive domains assigned to specific operators. credential-based visual access. Management sessions are secured locally or via remote clients.
- ✓ Administration Management—Keep client information in a secured database. Manage equipment resources and client services which can be grouped into domains. Back-up and restore configurations.



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6300 ForeSight Web NMS Editions

	FS6300/LX (Local)	FS6300/DX (Regional)	FS6300/EX (Regional)
Size of managed networks	10,000 managed interfaces	≤ 100,000 managed interfaces	100,000 managed interfaces
Maximum number of concurrent clients	5	10 per Front End Server	10 per front end server
Supported Databases*	MySQL	MySQL	MySQL

* Contact marketing if other databases must be supported.

The ForeSight 6300 Network Management System scales from small enterprise networks to large carrier networks. Providing *a la carte* selection of the NMS components gives the network managing organization the maximum in planning and growing the NMS. As more front-end servers and application clients are added, the NMS can expand from a flat to a multi-tiered hierarchical, mutually exclusive domain-oriented architecture. Distributed and redundant databases implement robustness in operation and also in failure scenarios to avoid the loss of data and management capability.

Supported Features

	FS6300/LX	FS6300/DX	FS6300/EX
Topology maps	Yes	Yes	Yes
Auto-discovery	Yes	Yes	Yes
Configuration Management	Yes	Yes	Yes
Fault (Alarm/Event) Management	Yes	Yes	Yes
Security Management	Standard (limited) Full (optional)	Yes	Yes
Admin/Accounting Management	No	Yes	Yes
Performance Management	No	Yes	Yes
Reports	Yes	Yes	Yes
Provisioning	No	Yes	Yes
Fail-over	No	Yes	Yes
Database redundancy	No	Yes	Yes
Distributed Front-End Server/Load Balancing	No	Yes	Yes
Backup & Restore	Yes	Yes	Yes
SNMP	Yes	Yes	Yes
CORBA	Yes	Yes	Yes
CLI	Yes	Yes	Yes

Use the NMS to support the pre-planning phase through deployment of network elements and client network services to future planning of anticipated network growth. By integrating these phases, the NMS goes well beyond standard FCAPS management as it covers the network management's entire life-cycle. A further benefit is to ease the enforcement of good network discipline in designing, provisioning, monitoring and extension of the network and its management features. Network management includes more than fault detection, port configuration, etc., but also the deployment and performance monitoring of client services.

When moving beyond the size of a local enterprise network, NMS backup and restoration for network elements is critical for continual offering of network services. ForeSight supports fail-over servers as hot standbys for the NMS and database servers.

The ForeSight 6300's graphical maps, auto-discovery, integration of independent FCAPS modules, scalability, and stable operation create the solution for full life-cycle management of your network.

Supported Operating Systems

	FS6300/LX	FS6300/DX	FS6300/EX
NMS Server	Fedora Core 6,	Fedora Core 6,	Fedora Core 6,
Remote Application Clients	Windows NT4 / 2000 / XP	Windows NT4 / 2000 / XP	Windows NT4 / 2000 / XP

ORDERING INFORMATION

FS6300/LX: FS6300 Management Station. Supports up to 10,000 managed interfaces. Includes database commercial license, rackmount workstation, RAM, HD, backup device, 17-in. monitor, and pre-installed FS6300 software per preceding "Supported Feature" table.

FS6300/DX: FS6300 Management Station. Supports up to 100,000 managed interfaces. Includes database commercial license, rackmount workstation, RAM, HD, backup device, 17-in. monitor, and pre-installed FS6300 software per preceding "Supported Feature" table.

FS6300/EX: FS6300 Management Station. Supports more than 100,000 managed interfaces. Includes database commercial license, rackmount workstation, RAM, HD, backup device, 17-in. monitor, and pre-installed FS6300 software per preceding "Supported Feature" table.

FS6300/WRAC: FS6300 Windows Remote Application Client includes Windows-based PC with WRAC software to operate remotely with the FS6300/LX, -/DX, or -/EX Management Stations

ForeFront™ End-to-End System Elements

Customer-Premises Equipment (CPE)

Low-Cost, High-Speed G.SHDSL Modem

Model 3088 RocketLink™ G.SHDSL NTU

Use Patton's RocketLink G.SHDSL Modem for fast, dedicated, always-on access.

The Model 3088 RocketLink Modem drives profitability back into leased-line data services with standards-based G.SHDSL technology. The Model 3088 provides low cost, full-duplex network termination or extension at nx64 rates to 4.6 Mbps. The Model 3088 connects routers, switches, and other access devices, and is available in G.703/G.704, co-directional G.703, T1/FT1, X.21, and V.35 interfaces. Plus, it is available in a rack card for the Model 1001 universal access rack.

The Model 3088 excels in manageability with built-in loop-back and pattern generators that allow quick verification of DSL lines. Additionally, with software upgradability via the console port, the unit is ready for the next feature upgrade. Lastly, with remote console support, a centrally located unit can be used to take control of a remote unit via the console port, using an out-of-band management channel.

For true flexibility, the Model 3088 is also compatible with any of Patton's G.SHDSL modems, including the Model 3201 router and ForeFront DSL solutions.

FEATURES & BENEFITS

- ✓ Speeds to 4.6 Mbps over just a single twisted pair of wires
- ✓ Distances up to 32,800 feet (10 km)
- ✓ Software upgradable
- ✓ G.SHDSL ITU/ETSI interoperability with third-party TDM DSLAMs
- ✓ G.703/G.704, X.21, V.35, and co-directional interfaces available
- ✓ Built-in testing and diagnostics for quick network turn-up and troubleshooting
- ✓ ForeFront plug-and-play operation

Remotely configure ALL Patton G.SHDSL CPE through the 3096RC!

CPE for ForeFront

Using ForeFront with the Model 3088 allows deployment of hundreds of DSL circuits from a single low profile chassis. The Model 3088 can be used on the customer premise to deliver T1/E1 co-directional G.703, X.21, or V.35 interfaces.

T1/E1 extension over copper wires

Use the Model 3088 units back-to-back to extend T1 or E1 channels across copper wires. These units are ideal for local loop, Campus, and multi-dwelling/multi-tenant applications.

SPECIFICATIONS

DSL: G.991.2 ITU G.SHDSL Annex A and Annex B, G.994.1 G.hs. nx64 data rates over 2-wire full-duplex to 2.3/4.6 Mbps, symmetrical, TC-PAM encoding. Distance of 32,800 ft (10 km) at 192 kbps to 18,800 ft (5.75 km) at 2.312 Mbps.
DSL Connection: Shielded RJ-45F isolation per IEC 950

DTE Interface: G.703/G.704, V.35, X.21/V.11, T1/FT1, G.703 Co-Directional
DTE Rates: From 64 kbs to 2.3/4.6 Mbps in user definable increments
Diagnostics: V.54 Loops (LLB, RDL); V.52 compliant BER pattern generator and detector (511/511E)

Management: EIA-561 RJ-45 RS-232, VT-100 CLI, TELNET, Embedded WEB/HTTP, SNMP
Power Supply: External 230 VAC, Universal 90–260 VAC, or -48 VDC input
Compliance: FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC

Op. Temp.: 32–122°F (0–50°C)
Humidity: 5–90%, non-condensing
Dimensions: 4.17W x 1.52Hx5.0L in. (10.6W x3.9H x12.7L cm)

ORDERING INFORMATION

3088/C/EUI: G.SHDSL RocketLink V.35 with DB-25 interface & M/34F adapter; 100–240 VAC power

3088/D/EUI: G.SHDSL RocketLink X.21 with DB-15F interface; 100–240 VAC power

3088/K/EUI: G.SHDSL RocketLink G.703/G.704 with dual BNC and/or RJ-48 Interface; 100–240 VAC power

3088/T/EUI: G.SHDSL RocketLink T1 with dual BNC and/or RJ-48 interface; 100–240 VAC power

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Low-Cost, Interoperable ADSL2/2+ Bridge/Router

Model 3101 ipRocketLink™ ADSL2/2+ with WiFi

The Model 3101 is a line of low cost interoperable ADSL2/2+ bridge/routers with extended reach and data rates up to 24 Mbps offering integrated Ethernet, USB, and WiFi ports.

Patton's Model Series 3101 ipRocketLink™ ADSL2/2+ bridge/routers are the perfect choice for users or service providers who need triple-play ready ADSL CPE with advanced routing functionality. Based on International Telecommunications Union (ITU) and American National Standard Institute (ANSI) standards G.992.1, G.992.2, G.992.3, G.992.5 and ANSI T1.413 Issue 2, the Patton ipRocketLink bridge/routers enable providers to deliver scalable bandwidth, up to 24 Mbps, to the most demanding voice, video and data applications. The ipRocketLink likewise supports G.Handshaking per ITU G.994.1.

The ipRocketLink are designed specifically to be compatible with the most popular DSLAMs in the market. Just set the units to their default mode, send them to the remote location and plug them in. The ipRocketLink will use the ADSL-aware CAC and automatically detect the ATM PVCs and start working.

The ipRocketLink line of ADSL bridge/routers come standard with support for IPoA, PPPoA, PPPoE, and multi-protocol encapsulation over ATM. Up to eight PVCs can be configured and ATM QoS applied via a simple traffic class configuration. In addition to supporting standard RIPv1 and v2 routing, the ipRocketLink can be configured with static routes. Bridging, including Spanning Tree is supported, as well as the ability to log into standard service provider networks with PPPoE using PAP/CHAP authentication. ipRocketLink routers support many advanced firewall features including ACLs and intrusion detection with blacklisting of offenders. Common features such as DHCP and NAT/PAT with application level gateway (ALG) also come standard.

ForeFront with 3101RC

3101 CPE

The ipRocketLink excels in manageability:

- ✓ NetLinkPlug-and-play automatically facilitates remote unit configuration using standard ADSL CAC.
- ✓ Ethernet/USB/WiFi ports facilitates local management
- ✓ uPnP makes unit discovery a snap.
- ✓ With SNMP and HTTP/web management, the ipRocketLink can be managed from virtually any location in the world.
- ✓ RocketLink™ bridges/routers are software upgradable with TFTP/FTP

FEATURES & BENEFITS

- ✓ ADSL2/2+ —Support bandwidth hungry multimedia applications up to 24 Mbps at extended distances.
- ✓ QoS Bridge/Router—Support for advanced routing with QoS and bridging including Spanning Tree and 802.1p/Q.
- ✓ Unmatched Connectivity—The 3101 comes standard with USB and WiFi interfaces and with an Ethernet or 4-port Ethernet switch.
- ✓ Software upgradable—Software upgrades make it easy to keep the ipRocketLink™ in service for years.

SPECIFICATIONS

Ethernet Interface: Model 3101: One 10/100 Base-TX Ethernet port, IEEE 802.3/3u, RJ-45 connector; One USB 2.0 device port, type B connector • Model 3101/4: 4-port 10/100 Base-TX Ethernet port, IEEE 802.3/3u, RJ-45 connector; One USB 2.0 device port, type B connector

WiFi Interface: IEEE 802.11b/g; WEP: 64 or 128 bits key length; WPA (Wi-Fi Protected Access) in PSK mode or using EAP with RADIUS; Access control list based on MAC address

ADSL Interface: One pair (2-wire) loop, 100 Ohm line impedance with RJ-11 connector; ITU-T G.992.1, G.992.2, G.992.3, G.992.5 & ANSI T1.413 Issue 2, G.992.3, G.992.5 & ANSI T1.413 Issue 2

OAM&P: Local: Telnet or WWW management via Ethernet; Remote: Telnet or WWW management

ATM: ATM cells over ADSL, AAL5; 8 PVCs in bridge mode & 5 PVCs in router mode; UBR, CBR, rt-VBR, nrt-VBR and GFR traffic classes; ADSL-aware CAC (Connection Admission Control); F5 AIS, RDI, & loopback cells; Payload encapsulation: RFC2684/RFC1483—Multiprotocol Encapsulation over ATM Adaptation Layer 5, FC2225/RFC1577—Classical IP & ARP over ATM (IPoA), RFC2364—PPP over AAL5 (PPPoA)

Bridging: RFC2684/RFC1483 bridged PDU encapsulation; IEEE 802.1D transparent bridging & spanning tree; ZIPB (Zero Installation PPP Bridge)

Routing: RFC2684/RFC1483 routed PDU encapsulation; Point-to-Point Protocol (including PPPoA & PPPoE) & user authentication via PAP or CHAP; TCP, UDP, ARP, RARP, IPCP, ICMP, IGMP; IP routing: static route, RIP v1 & v2; NAT/PAT with extensive ALG supports; DNS relay agent; Layer 2 tunneling protocol (L2TP)

Security: Built-in firewall with protection against DOS attacks with blacklisting, IP spoofing, & other common types of attacks; Packet filtering at MAC layer (raw filter) & IP layer, including stateful inspection

Configuration & Management: TR037-compliant auto-configuration using ILMI; SNMP v1 agent—over IP, ILMI VCC or HDLC/EOC; DHCP client, server & relay for IP management; Universal Plug & Play (UPnP) support (Model 3101U); Telnet with CLI (command line interface) or Web/HTTP; TP/TFTP or HTTP for firmware upgrade & configuration

LEDs: PWR, WLAN, LAN, USB, WAN

AC adapter: Input 110/220VAC, 50/60Hz; Output 15VAC 1A; Power consumption: Less than 6 Watts

Operating Temp. & Humidity: 0 to 45°C, 5 to 95% (non-condensing)

Storage Temp. & Humidity: -20 to 85°C, 5 to 95% (non-condensing)

Physical Dimensions: 6.3W x 4.5D x 1.4H in. (160W x 115D x 35H mm)

Compliance: CE, CB Scheme

USB Drivers: Driver support for Microsoft Windows 98, 98SE, ME, 2000, XP, Linux, MAC OS 8, 9 and OS X

ORDERING INFORMATION

3101/1IX/EUI-EU: ADSL2+ Modem, 1 Ethernet port, external power

3101/4IX/EUI-EU: ADSL2+ Modem, 4 Ethernet ports, external power

3101/4IWUX/EUI-EU: ADSL2+ Modem, 4 Ethernet ports, 802.11b/g WiFi, USB, external power

Note: In the model codes above, "X" = "A" for Annex A, "B" for Annex B, and "M" for Annex M.

ForeFront™ End-to-End System Elements

Customer-Premises Equipment (CPE)

G.SHDSL Integrated Access Device

Model 3086 ipRocketLink™ IAD

Combines FRF.5 and FRF.8's Frame Relay/ATM conversion with G.SHDSL technology in a compact, high performance subscriber unit for multi-service, revenue generating, DSL deployment.

The Patton Model 3086FR IAD combines the latest advances in high speed DSL technology, G.SHDSL, with a potent IP, FR, PPP and ATM core facilitating seamless connection of legacy frame relay devices as well as routed IP services to high speed ATM networks.

Based on the European Telecommunications Standardization Institute (ETSI) and International Telecommunications Union (ITU) G.SHDSL G.991.2 standard, the Patton 3086FR enables 2.3 Mbps speeds at nx64 (n=1..36) over a single pair of wires. The 3086FR boasts a dual subscriber interface with a standard 10/100 Ethernet and a choice of Synchronous-Serial V.35, X.21 or T1/E1 ports. Together, these interfaces can be concurrently configured for FR-to-ATM conversion as well as IP routing or Ethernet bridging—all in one compact package.

FR data from the serial interface is converted to ATM according to FRF.5 or FRF.8 Interoperability Agreements. The IP services module routes data between any port or interface, including the G.SHDSL interface using Frame Relay, PPP, Ethernet, or ATM. All protocols and ports operate simultaneously. The 3086FR connects seamlessly and transparently to any third party DSLAM or it can be configured to work in back-to-back applications.

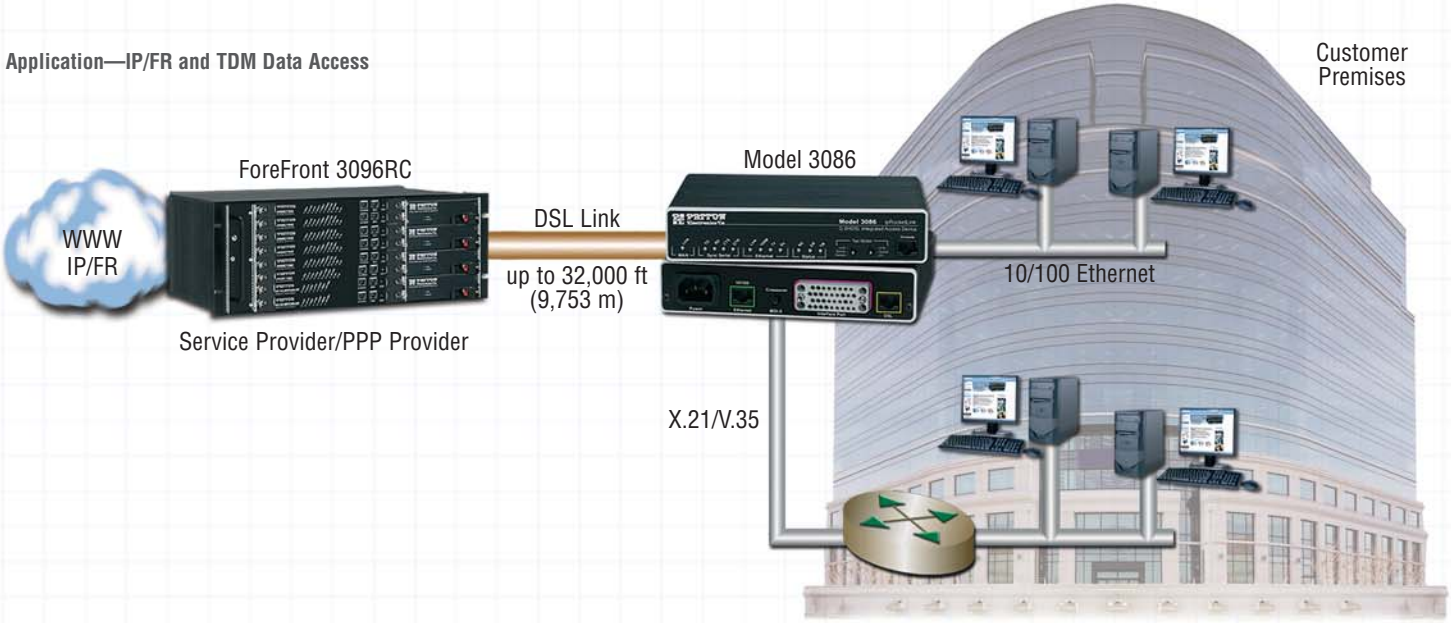
The 3086FR boasts easy installation with console, Telnet, and WWW/SNMP management. It provides bridging and routing functionality, along with advanced IP features such as DHCP and Firewall (IDS, Filtering, NAT). As part of Patton's family of IpDSL products, the Model 3086FR offers a complete, managed, end-to-end system.

FEATURES & BENEFITS

- ✓ Frame Relay to ATM Conversion—Connect FRADS, routers or any Frame Relay devices to high speed ATM core networks using inexpensive DSLAM ports
- ✓ Built-in Ethernet/IP Router Standard—With Patton's FlexIP architecture, route from any to any port using FR, PPP, Ethernet, and ATM
- ✓ Firewall—The 3086FR comes standard with Intrusion Detection (IDS), Access Control Lists (ACL), IP & port filtering and NAT/PAT
- ✓ Flexible Interface options—V.35, X.21, or T1/E1 fulfills most interconnection needs. 10/100 Ethernet comes standard on all units
- ✓ WWW/SNMP Manageable—Built-in VT-100 console port makes setup a snap. Use the embedded HTTP/SNMP agent to manage the Model 3086FR from anywhere in the world.

Remotely configure ALL Patton G.SHDSL CPE through the 3096RC!

Application—IP/FR and TDM Data Access



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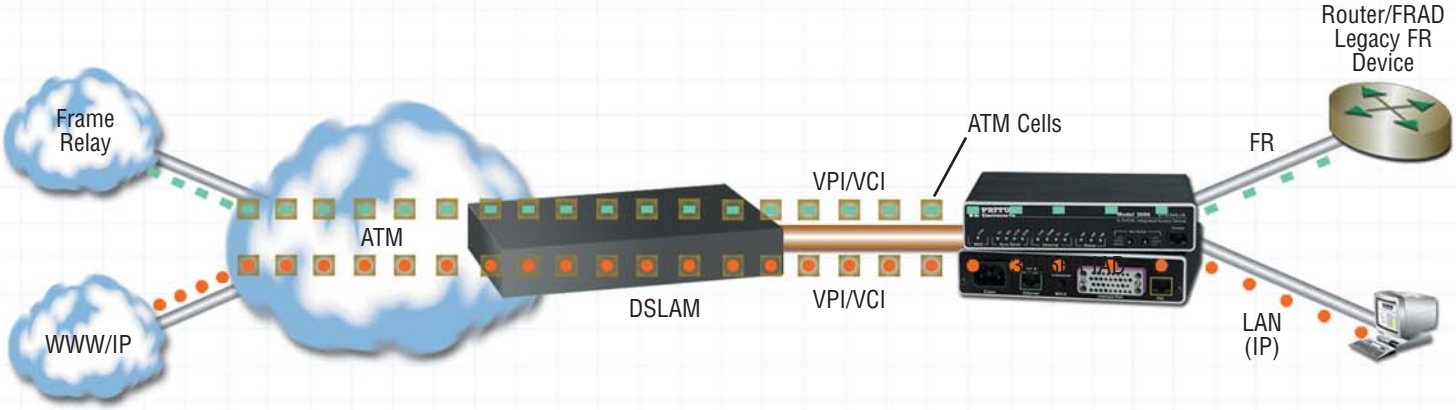
Application—FR and IP traffic over ATM

The 3086FR converts FR from the serial port to ATM over the DSL link making the DSLAM/DSL CPE network transparent to the frame relay service being offered. Additionally, the 3086FR provides a full fledged routed or bridged connection between the LAN, through the 10/100 Ethernet port, and the supporting DSLAM/ATM network.

In the scenario below, the 3086FR located at a branch office takes FR traffic, via its serial port, and converts it to ATM cells—in this case, the conversion is done using FRF.8. Simultaneously, the 3086FR routes or bridges traffic from the Ethernet LAN and encapsulates into ATM cells. Traffic from both the serial and Ethernet ports are concurrently sent over the DSL link using separate VPI/VCIs. This allows the core ATM network to switch the IP bearing traffic to the Internet via a core router—even through an authentication server since PPPoE and PPPoA is supported. The frame relay traffic is switched by the ATM network to a separate ATM or frame relay termination point.



ORDERING INFORMATION

G.SHDSL IAD router with FRF.5 and FRF.8 support

3086FR/RIC/EUI: Ethernet V.35 M34F port, IP Access Feature Set, and external AC power supply

3086FR/RICA/EUI: Ethernet V.35 DB-25 port, IP Access Feature Set, and external AC power supply

3086FR/RID/EUI: Ethernet X.21 DB-15F port, IP Access Feature Set, and external AC power supply

3086FR/RID/EUI: Ethernet Selectable X.21/V.35 on DB-25F port, IP Access Feature Set, and external AC power supply

3086FR/RIK/EUI: Ethernet T1/E1 D&I port, IP Access Feature Set, and external AC power supply

G.SHDSL IAD router without FRF.5 and FRF.8 support

3086/RIC/EUI: Ethernet V.35 M34F port, IP Access Feature Set, and external AC power supply

3086/RICA/EUI: Ethernet V.35 DB-25 port, IP Access Feature Set, and external AC power supply

3086/RID/EUI: Ethernet X.21 DB-15F port, IP Access Feature Set, and external AC power supply

3086/RICD/EUI: Ethernet Selectable X.21/V.35 on DB-25F port, IP Access Feature Set, and external AC power supply

3086/RIK/EUI: Ethernet T1/E1 D&I port, IP Access Feature Set, and external AC power supply

Internal, external, and DC power supply options available. Please call for details.

SPECIFICATIONS

DSL: G.991.2 ITU G.SHDSL Annex A and Annex B, G.994.1 G.hs Handshaking. nx64 data rates over 2-wire full-duplex to 2.3 Mbps, symmetrical, TC-PAM encoding. Distance of 32,000 ft (9.8 km) at 192 kbps to 18,000 ft (5.6 km) at 2.304 Mbps.

DSL Connection: Shielded RJ-11F isolation per IEC 950, two-wire, 135-Ohm

Ethernet Connection: 10/100Base-T, auto-sensing, full/half-duplex operation, built-in MDI-X

Serial Connection: V.35—M/34F, X.21—DB15F (DTE/DCE selectable), T1—RJ48C, E1—RJ48C and Dual BNC, 64 kbps – 2.304 Mbps (interface dependent)

FR to ATM Support: FRF.5 (Frame Relay Network Interworking), FRF.8 (Frame Relay Service Interworking). LMI with ITU Q.933, ANSI T1.617, and Cisco LMI implementation.

Management: EIA-561 (RJ-45) RS-232, VT-100 CLI, TELNET, Embedded WEB/HTTP, SNMP, Logging or SMTP on events: POST, POST errors, line/DSL, PPP/DHCP, IP MPOA AAL5 and Bridged encapsulation RFC 2684 and RFC 1577 IPoATM. LLC/VC Mux support.

ATM Support: UNI 3.0, 3.1, and 4.0 ATM QoS with UBR/CBR/nrt-VBR/rt-VBR and per- VC queuing and shaping. Peak cell rate shaping on a per-VCC basis up to 32 active VCCs I.610 OAM network management including AIS/RDI, loop-back and performance monitoring.

Protocol: Enhanced ILMI 4.0 for auto-configuration of ATM PVCs, IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826). IP Router with RIP (RFC 1058), RIPv2 (RFC 2453), OSPF (RFC 2328) Integrated relay agent (RFC 2132/RFC 1542) with 8 address pools. DNS Relay. IGMP v1 and v2. IP-in-IP (RFC-2003) encapsulation, Ethernet Bridging. NAT/NAPT with integrated application support, MultiNat with 1:1 mapping, Many:1, Many:Many mapping, NAT Port/IP redirection and mapping.

Security: DoS Detection/protection. Intrusion detection, Logging of session, blocking and intrusion events and Real-Time alerts, Password protected system management with a username/password for console and virtual terminal, Packet filtering firewall for controlled access to and from LAN/WAN. Support for 255 rules in 32 filter sets. 16 individual connection profiles. Access list determining up to 5 hosts/networks which are allowed to access management system SNMP/HTTP/TELNET

Indicators: 13 LEDs: Power, DSL Link; Sync Serial: TD, RD, CTS, DTR; LAN: TX, RX, 100M Link; Status: NS, ER, TM

Power Supply: Internal universal 100–240 VAC ±10% input or 48 VDC input. Optional external power available.

Compliance: FCC Part 15A, FCC Part 68 (3086FR/RIT and /RIK), CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC, EN60950, EN55022 (CISPR 22)

Op. Temp.: 32–122°F (0–50°C)

Humidity: 5–90%, non-condensing

Dimensions: 4.17W x 1.52Hx5.0L in. (10.6W x3.9H x12.7L cm)

Customer-Premises Equipment (CPE)

G.SHDSL High-Speed Routers

Model 3201 and 3241 DiamondLink Routers

Combine ITU/ETSI standards-based transmission with high speed networking, and deliver broadband IP access with Patton's DiamondLink™ G.SHDSL Routers.

Combining standards-based ITU/ETSI G.SHDSL transmission with high speed IP routing, the DiamondLink routers are perfect for bandwidth intensive applications such as LAN-to-LAN networking, multimedia services, and network gateway access.

Based on the International Telecommunications Union (ITU) and European Telecommunications Standardization Institute (ETSI) G.SHDSL G.991.2 standard, the Patton 3201 DiamondLink router enables providers to extend their reach-and-range by delivering rate-adaptive nx64 symmetrical speeds from 192 kbps to 2.3 Mbps, and the 3241 DiamondLink router offers speeds of up to 4.6 Mbps—all over a single pair of wires.

The routers offer easy installation and turn-up. With G.hs support for auto-line configuration and ATM, PPP, or Frame Relay, the DiamondLink routers offer simple interfacing to any network. The standard IP feature sets provide bridging and routing functionality along with advanced IP features like NAT, firewall and intrusion detection (IDS). Get point-and-click control with the built in HTTP/SNMP management interface.

As part of Patton's family of ipDSL products, the Model 3201 offers a complete, managed, end-to-end system when used either back-to-back or with Patton's central site IpDSLAM equipment. With these features the DiamondLink routers offer the clear and easy choice for mission-critical networking.

Why use our Model 3201/3241?

Patton DiamondLink broadband routers deliver advanced features for secure, reliable, and high speed Internet data connections. It cost-effectively combines ease-of-use with powerful data routing to make shared Internet connectivity simple and easy.

With NAT support, the routers offer convenient operation by using a single IP address while the integrated DHCP server automates IP address assignment for connected LAN computers. Built-in firewall and intrusion detection features protect the network from would-be intruders.

Patton stands behind our products—we are the only company in the industry offering free configuration support, free technical services, and a minimum of a one-year warranty on all our products.

Competitive Positioning

		Patton 3201/3241	Cisco 828	ZyXel 782
Connectivity	Line Type	G.SHDSL	G.SHDSL	G.SHDSL
	ATM Encapsulation	YES	Yes	YES
	Native PPP/Frame Relay	YES	NO	NO
	Bridging/PPPoE/IPoATM	YES	Yes	Yes
	NAT/MultiNAT/DHCP	YES	Yes	Yes
	Stateful Firewall/ACL	YES	Yes	Yes
	Security Alerts	YES	Yes	NO
Ease of Use	Status LEDS	8	10	6
	ENET Cross-Over Switch	YES	Yes	NO
	10/100 Ethernet	YES	NO	Yes
	Built-In Web Mgmt	YES	NO	NO
	Tech Support	FREE	$$$	Included
	Software Upgrades	FREE	$$$	Included
	Compact Unit	Compact	Large	Large
	Value	YES	$$$	$$$

FEATURES & BENEFITS

- ✓ G.SHDSL speeds to 2.3/4.6 Mbps—Get broadband single-pair connectivity with TC-PAM full-duplex symmetric rates and distances exceeding 30,000 feet (9.4 km)
- ✓ ATM, PPP, and Frame Relay—Versatile interface options enable simple deployment into any network
- ✓ NAT/NAPT, Firewall, IDS, ACL—Powerful security features simplify Internet connectivity
- ✓ 10/100 Ethernet with MDI-X—Easily connect to any computer or LAN—the built-in crossover switch eliminates messy configuration cables
- ✓ WWW/SNMP Manageable—Built-in VT-100 console port makes setup a snap, and you can use the embedded HTTP/SNMP agent to manage the unit from anywhere in the world.

SPECIFICATIONS

DSL: G.991.2 ITU-T G.SHDSL Annex A and Annex B, G.994.1 G.hs. nx64 data rates over 2-wire full-duplex to 2.3/4.6 Mbps symmetrical, TC-PAM encoding. Distance of 30,000 ft (9.4 km) at 192 kbps to 18,000 ft (5.6 km) at 2.304 Mbps.

DSL Connection: Shielded RJ-11F isolation per IEC 950; RJ-45 available

Ethernet: 10/100Base-T, Auto-Sensing, Full/Half-Duplex operation; built-in MDI-X

Management: EIA-561 RJ-45 RS-232, VT-100 CLI, TELNET, Embedded WEB/HTTP, SNMP, Logging or SMTP on events: POST, POST errors, line/DSL, PPP/DHCP, IP MPOA AAL5 and Bridged encapsulation RFC 2684 and RFC 1577 IPoATM. LLC/VC Mux support.

ATM Support: UNI 3.1, and 4.0 ATM QoS with UBR/CBR/nrt-VBR/rt-VBR and per-VC queuing and shaping. • Peak cell rate shaping on a per-VCC basis up to 32 active VCCs • I.610 OAM network management including AIS/RDI, loop-back and performance monitoring.

Protocol: Enhanced ILMI 4.0 for auto-configuration of ATM PVCs, IP (RFC 741), TCP (RFC 793), UDP (RFC 768), ICMP (RFC 950), ARP (RFC 826). IP Router with RIP (RFC 1058), RIPv2 (RFC 2453), Integrated DHCP Server (RFC 2131). Selectable IP leases and MAC/IP pairings. DHCP relay agent (RFC 2132/RFC 1542) with 8 address pools. DNS Relay. IGMP v1 and v2. IP-in-IP (RFC-2003) encapsulation, Ethernet Bridging.

NAT/NAPT with integrated application support, MultiNat with 1:1 mapping, Many:1, Many:Many mapping, NAT Port/IP redirection and mapping.

Frame Relay (Keyed feature): Frame Relay over DSL. Encapsulates IP traffic from Ethernet port into Frame Relay according to RFC-1490.

Security: DoS Detection/protection. Intrusion detection, Logging of session, blocking of intrusion events and Real-Time alerts, Password protected system management with a username/password for console and virtual terminal, Packet filtering firewall for controlled access to and from LAN/WAN. Support for 255 rules in 32 filter sets. 16 individual connection profiles. Access list determining up to 5 hosts/networks which are allowed to access management system SNMP/HTTP/TELNET

Power Supply: External universal 100-240 VAC input or -48 VDC

Compliance: FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC

Temperature: 32–122°F (0–50°C)

Humidity: 5–90%, non-condensing

Dimensions: 4.17W x 1.52Hx5.0L in. (10.6W x3.9H x12.7L cm)

ORDERING INFORMATION

3201/R/48: 2.3 Mbps, G.SHDSL Router

3201/R/UI: 2.3 Mbps, G.SHDSL Router

3241/R/UI: 4.6 Mbps, G.SHDSL Router

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"No Boundaries on Access Platforms"

ForeFront™ AIS
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At the forefront of Access Platforms there are no boundaries...

One platform for TDM, Packet, Leased Lines, Multi-Services and IP...

Patton is a global manufacturer of voice and data-communications equipment for carrier, enterprise, and industrial networks worldwide.

Though DSL delivers reach-and-range, often the infrastructure delivering the services lack integration, requiring additional specialized equipment. Patton has combined xDSL ports, DACS, and WAN functions onto one powerful system operating on Patton's ForeFront Access Platform.

Using CompactPCI (cPCI) open-systems architecture, the ForeFront family offers a service delivery platform that includes subscriber access equipment, as well as central office modular 2U high (4 slot), 4U high (8 slot) and 6U high (17 slot) chassis.

ForeFront platform cards can share up-link ports resident in any slot or take advantage of a dedicated up-link and processor blade. ForeFront central office chassis support dual TDM and Ethernet buses for redundancy and efficiency of service delivery, as well as redundant power and cooling systems. When used with Patton's subscriber premise end-points, ForeFront offers a complete managed end-to-end service delivery platform. In addition to xDSL (iDSL or G.SHDSL), STM-1 resource cards, the ForeFront family of products accepts E1, ADSL, VDSL, IpDSLAM, and router resource cards.

ForeFront Chassis

Model 6276	CompactPCI 2U (4 Slot) System
Model 6476	CompactPCI 4U (8 Slot) System
Model 6676	CompactPCI 8U (17 Slot) System

ForeFront DACS

Model 2616RC	15-Port Digital Cross Connect (DACS)
Model 6511	Matrix Switch with Gigabit Ethernet

ForeFront DSL

Model 3096RC	16-Port G.SHDSL TDM Concentrator
Model 3196RC	16-Port iDSL TDM Concentrator
Model 6081RC	IP Router/VLAN Aggregator
Model 3101RC	ADSL2/2+ Triple-Play Access IpDSLAM Module

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Email: sales@patton.com

ForeFront™ End-to-End System Elements

Customer-Premises Equipment (CPE)

RocketLink™ Model 3200 Series

2Base-TL Ethernet First Mile G.SHDSL Modem

Patton's Model 3200 offers the reliability, reach, and rates essential for today's high speed, broadband Ethernet first-mile services and remote office connectivity.

The Patton RocketLink™ Model 3200 simplifies and provides cost effective network extension by utilizing pre-existing twisted pair infrastructure enables service providers to offer broadband or data backhaul services to businesses, governments, and various institutions over existing last-mile, copper infrastructure. Today, more than ever, operators are finding the business case for leveraging their existing copper networks to be highly attractive from an ROI and initial investment perspective over fiber roll-outs.

The Model 3200 is Ethernet First Mile (EFM) compliant. EFM—also called pure Ethernet—lowers OPEX and CAPEX by resolving one of the biggest deficiencies in carrier networks, the lack of interworking arrangements among different protocols such as Frame Relay, TDM, ATM, and of course DSL. Using EFM allows for more efficient and trouble-free networking environments. Service providers can concentrate on providing differentiated services instead of concentrating on resolving their latest issue of protocol conversions.

Patton's 3200 G.SHDSL.bis modem incorporates next-generation SHDSL technology with multi-pair bonding to offer unmatched rate, reach and reliable Ethernet connectivity, providing symmetrical 22.8 Mbps of bandwidth over 4-pair (8-wire) at distances up to 1.8 miles (2.9 km). The RocketLink 3200 comes standard with a 4-port fast Ethernet switch with full QoS and CoS features. VLAN (802.1q) capabilities include 4 levels of priorities, traffic flow control, and rate control. These traffic management and QoS features enable service providers to provision for differentiated services and/or SLAs.

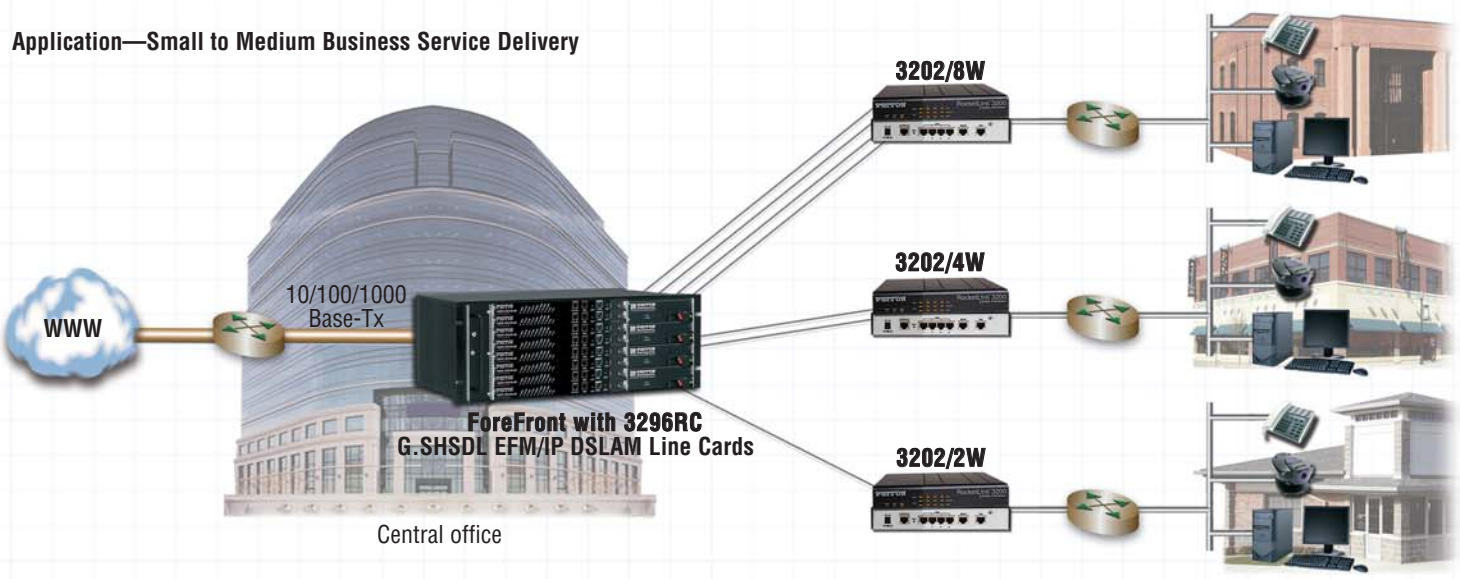
The RocketLink 3200 is a complete, managed, end-to-end system when used either back-to-back or with a 3rd party ipDSLAM. The 3200 is the clear and easy choice for mission-critical networking.

FEATURES & BENEFITS

- ✓ G.SHDSL speeds to 22.8 Mbps—Get reliable broadband connectivity with TC-PAM full-duplex symmetric rates and distances exceeding 24,000 feet (7,300 meters)
- ✓ EFM—Pure Ethernet solution provides seamless integration into today's and future networks.
- ✓ QoS, CoS, and VLAN Support—Make the most out of your service offerings or ensure top quality network connections with advanced traffic management features.
- ✓ 4 x 10/100 Ethernet Switch—Make up to 4 network connections easily. Built in MDI-X auto cross over switches eliminates messy and confusing cable configurations.
- ✓ WWW/SNMP Manageable—Built-in VT-100 console port makes setup a snap, and you can use the embedded HTTP/SNMP agent to manage the Model 3200 from anywhere in the world.

Remotely configure Patton G.SHDSL EFM CPE through the 3296RC!

Application—Small to Medium Business Service Delivery



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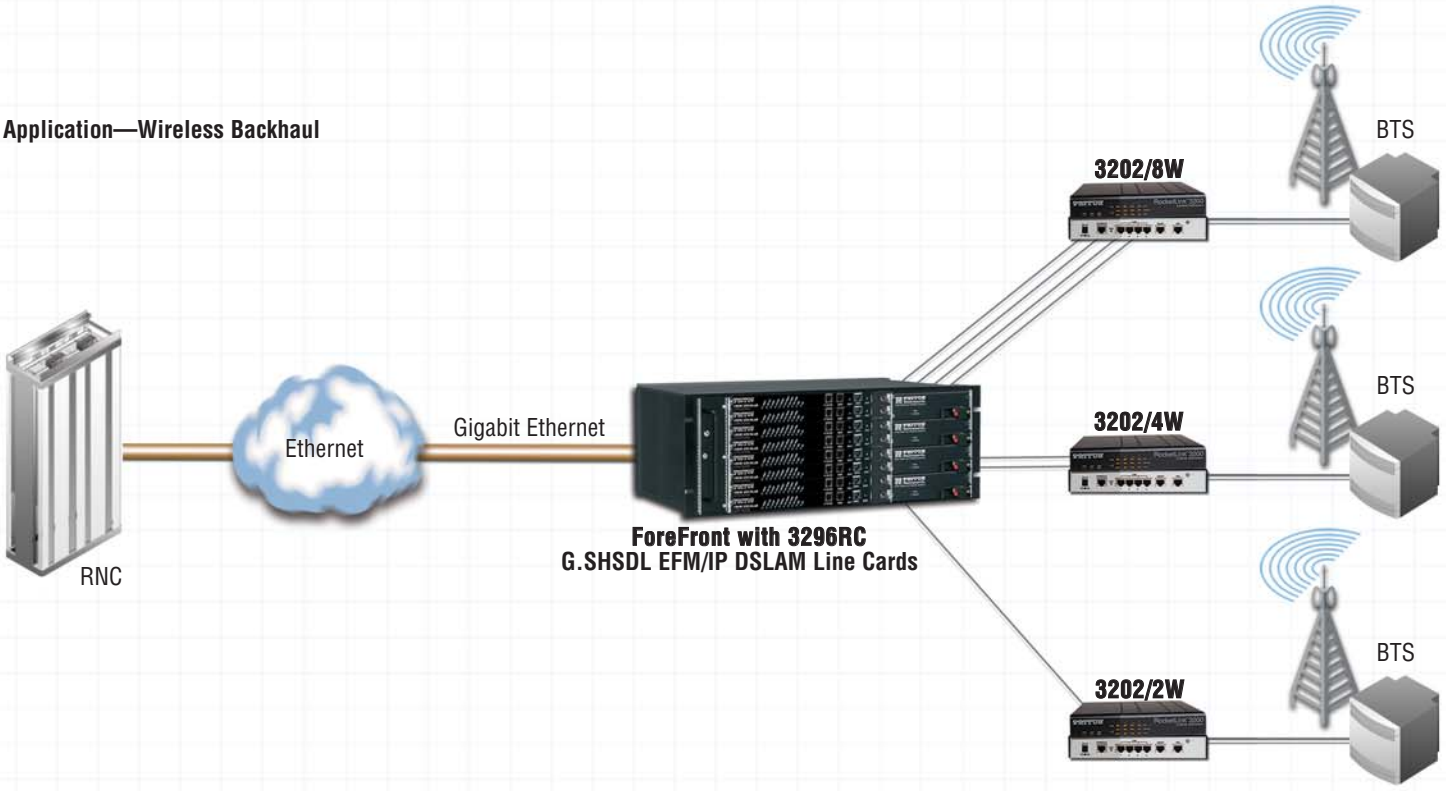
Application—Wireless Backhaul



The Model 3200 G.SHDSL EFM modems are ideal for delivering remote network access for inter-office connectivity. Businesses can take advantage of the already installed copper infrastructure and pass up to 22.8 Mbps of symmetrical data reliably at distances of up to 1.8 miles (2.9 km).

Utilize pre-existing copper infrastructure for mobile backhaul to reduce Last Mile transport costs and to connect to new packet-switched networks.

3200 Series Distance Chart (Per Wire Pair)

DSL Line Rate		26 AWG/0.4mm		24 AWG/0.5mm		22 AWG/0.65mm	
N	kbps	kft	km	kft	km	kft	km
3	192	21.5	6.6	27.2	8.3	34.8	10.6
4	256	19.5	5.9	24.7	7.5	31.5	9.6
8	512	17.5	5.3	22.1	6.7	28.3	8.6
12	768	16.5	5	20.9	6.4	26.7	8.1
16	1024	16	4.9	20.2	6.2	25.9	7.9
20	1280	15	4.6	19	5.8	24.3	7.4
24	1536	14.5	4.4	18.3	5.6	23.5	7.2
32	2048	13.5	4.1	17.1	5.2	21.8	6.6
36	2304	13	4	16.4	5	21	6.4
60	3840	10	3	12.6	3.8	16.2	4.9
72	4608	9.5	2.9	12	3.7	15.4	4.7
89	5696	8.5	2.6	10.8	3.3	13.8	4.2

SPECIFICATIONS

G.SHDSL Connector: Shielded RJ-45

G.SHDSL Specifications: ITU-T G.991.2.(2004); 2Base-TL; EFM Bonding (IEEE 802.3ah PAF)

DSL Modulation: TC-PAM 32; 16

LAN Protocols: 802.1d Transparent Bridging, 2K MAC address learning bridge

Ethernet Connector: 4 x 8-position shielded RJ-45. Auto-sensing 10/100Base-TX with half or full-duplex operation.

VLAN Support: IEEE 802.1q VLAN Tagging; Port Based VLAN, up to 4K VLANs; VLAN Stacking (Q-in-Q)

QoS Support: Rate limiting rule-based/port-based; Traffic classification based on port/802.1p/DSCP (Differentiated Services Code Point); WRR (Weighted Round Robin)/SPQ (Strict Priority Queuing) scheduling algorithm

Management Connector: WEB: Shielded RJ-45; Console: Shielded RJ-45

Management Interface: Web based GUI; CLI for local and console access; password protected; SNMP v1/v2 (RFC 1157/1901/1905) agent and MIB (RFC 1213/1493); EFM OAM (IEEE 802.3af); Software upgradable via web-browser/TFTP

Front Panel Indicators: Power, Alarm, Diagnostic, WAN Link (x4), Ethernet Link (x4), Ethernet 100M (x4)

Power Supply: AC: Universal Input (UI)—90–240 VAC (50~60Hz)

Compliance: FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC

Environment: Operating Temp.: 0 to 50°C Storage Temp.: -40 to 85° C

Dimensions: 7.67L x 1.89W x 6.61D in. (195L x 48H x 168D mm)

Weight: 2.86 lbs (1300 g) without power supply

ORDERING INFORMATION

3202/2W/EUI: G.SHDSL 2Base-TL EFM Modem (2-wire), 5.7 Mbps

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3202/8W/EUI: G.SHDSL 2Base-TL EFM Modem (8-wire), 22.8 Mbps

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Patton Electronics Company

Corporate Headquarters
7622 Rickenbacker Drive
Gaithersburg, Maryland, 20879 USA
tel: +1 301 975 1000 • fax: +1 301 869 9293
web: www.patton.com • e-mail: sales@patton.com

Patton-Inalp Networks AG
EMEA
Meriedweg 7
CH-3172 Niederwangen, Switzerland
tel: +41 31 985 25 25 • fax: +41 31 985 25 26
web: www.patton-inalp.com • e-mail: europe@patton.com

An Associate of
Electronics Co., USA
PE-Inalp Networks Private Ltd
India Headquarters
Old No. 14 and New No.6
Brahadambal Road, Nungambakkam High Road
Chennai: 600 034, India
tel: +91 44 45490395/6/7 • fax: +91 44 4549.0394
web: www.patton.co.in • e-mail: sales@patton-india.com

Regional Contacts

USA & Canada
tel: +1 301 975 1000 • fax: +1 301 869 9293
e-mail: sales@patton.com

Australia/New Zealand
tel: +61 2 9620 8164 • fax: +1 413 803 6235
e-mail: australia@patton.com

Western Europe/United Kingdom
tel: +41 31 985 25 25 • fax: +41 31 985 25 26
e-mail: europe@patton.com

Central Europe/CIS
tel: +1 240 912 1218 • eFax: +1 240 597 8442
e-mail: ce@patton.com

MENA
tel: +961 4 712 691 or 2 • fax: +1 413 832 9194
e-mail: mena@patton.com

Asia/Pacific
tel: +84 9090 21213 • fax: +1 208 728 1210
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Latin America/Caribbean
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7622 Rickenbacker Drive
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