

Resilient Networking with EPSR



the **solution** : the **network**



Introduction

IP over Ethernet is now a well-proven technology in the delivery of converged services. Ethernet-based Triple-Play services have become an established commercial reality world-wide, with service providers offering advanced voice, video and data packages to their customers. This requires a highly available network infrastructure for service providers to meet service level agreements, and meet the expectations of customers for a seamless multimedia experience.

Now, the convergence of services and applications in the enterprise has led to increasing demand for high availability in the Local Area Network (LAN). High bandwidth is also required for the multiple applications simultaneously using the network. For many businesses, real-time applications like surveillance, automated control, video streaming and voice over IP (VoIP) are used right alongside data and Internet access.

The key to providing maximum network uptime is extremely rapid failover in the event of link failure.



Allied Telesis's carrier-grade resiliency feature, Ethernet Protection Switching Ring (EPSR), ensures mission critical services are not interrupted in the event of link or node outages. EPSR provides failover times as low as 50ms, and can be coupled with today's maximum Ethernet standard of 10Gbps, to provide high bandwidth in multiples of 10GbE.

Equally at home in the enterprise network, or demanding service provider metro networks, EPSR provides a solution that meets the modern network requirements of high bandwidth and high availability. This advanced self-healing network technology provides 'always-on' access to online resources and applications.

Allied Telesis supports this technology on a wide range of sophisticated switching platforms, as well as advanced telecommunication chassis.

Ethernet Protection Switching Ring

EPSR is Allied Telesis' premier solution for providing extremely fast failover between nodes in a resilient ring. EPSR enables rings to recover within as little as 50ms, preventing a node or link failure from affecting customer experience, even with demanding applications such as IP telephony and streaming video.

The Technology

Putting a ring of Ethernet switches and/or iMAP (integrated Media Access Platform) chassis at the core of a network is a simple way to increase the network's resilience - such a network is no longer susceptible to a single point of failure. However, the ring must be protected from layer-2 traffic loops. Traditionally, Spanning Tree (STP)-based technologies were used to protect rings, but they are relatively slow to recover from link failure. This can create problems for applications that have strict loss requirements, such as voice and video traffic, where the speed of recovery is highly significant.

EPSR enables rings to recover rapidly from link or node failures within as little as 50ms, depending on port type and configuration. This is much faster than STP at up to 30 seconds, or even Rapid STP (RSTP) at 1 to 3 seconds. EPSR, much like STP, provides a polling mechanism to detect ring-based faults and failover accordingly. But unlike STP, EPSR uses a fault detection scheme to alert the ring that a break has occurred. The ring then takes immediate action, instead of going through an STP-like reconvergence.

Extremely low-latency signalling between the switches in the ring enables very rapid detection of lost connectivity. The simple

topology enables immediate remedial action by the master switch, with no requirement to spend any time exchanging further signalling to confirm the network status. This almost-instant decision making makes EPSR a powerful solution, with failover under fault conditions unnoticed by network and application users.

Allied Telesis EPSR solution is extremely robust; its patented technology providing the ability to handle unlikely complex fault situations, like multiple failures.

The key proof of technology is customer experience. The strong uptake of EPSR in demanding applications is testament it has provided a superior solution to service providers and their end users.

Diagram 1 shows a ring of switches that could be employed as a network core or distribution solution for an enterprise business, or service provider network. EPSR maintains 'always-on' network availability by monitoring the health of the ring, and utilizing a reverse path for traffic almost instantaneously in the event of a link or node failure.

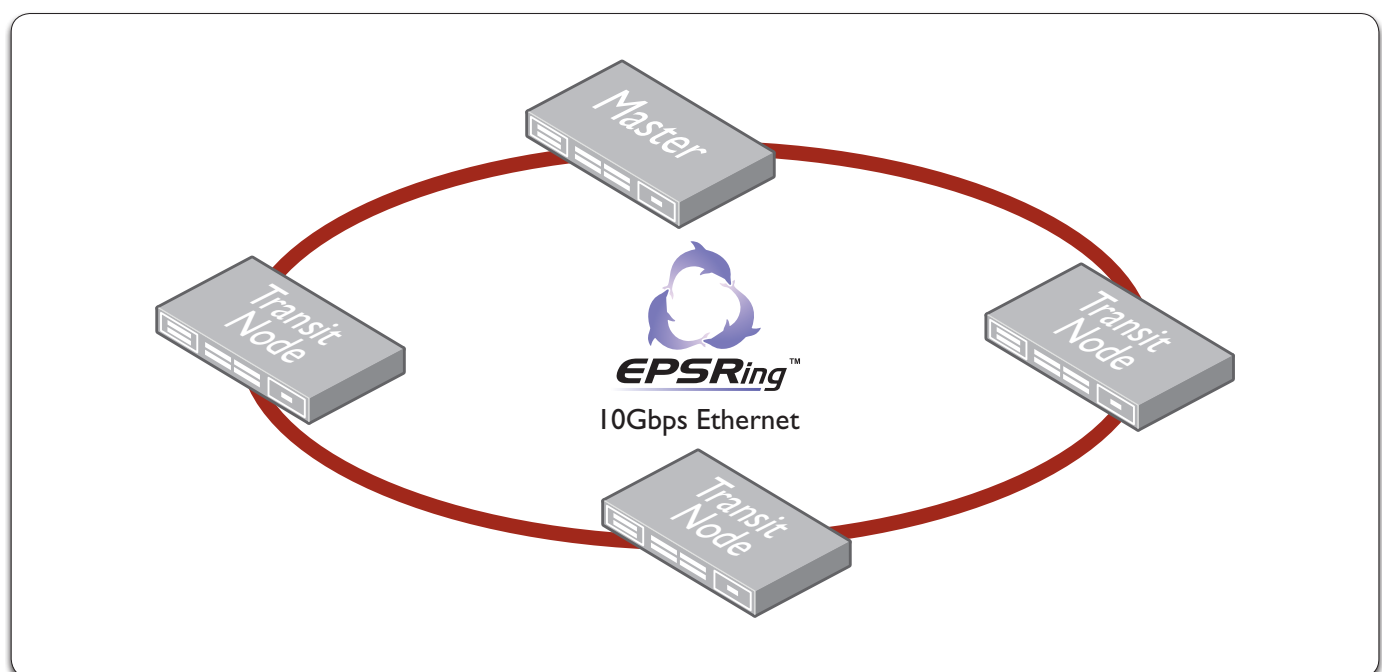


Diagram 1: EPSR in a ring of switches

In some scenarios it is useful to implement an EPSR multi-ring topology. For example, a service provider may have an access ring connecting customers, and a distribution ring connecting to services. A multi-ring topology is an excellent way to provide a broadly distributed network that is still high performing, and may require different bandwidth in different parts of the network.

The multiple EPSR rings are likely to share a set of protected VLANs. If these rings share a common segment, as shown in diagram 2 below, there is the possibility of an undesirable loop

forming out of both EPSR rings if the common segment was to fail – this is known as a SuperLoop. The resultant SuperLoop would leave a network storm state, with traffic circling the SuperLoop indefinitely causing performance issues and outages.

To prevent any possibility of a super-loop being formed, Allied Telesis EPSR solution provides Super Loop Prevention (SLP). EPSR-SLP ensures that multi-ring topologies are managed, and in the event of any common segment failure no network loop can be formed. The network gracefully handles any fault condition, and ensures access to online services is always maintained.

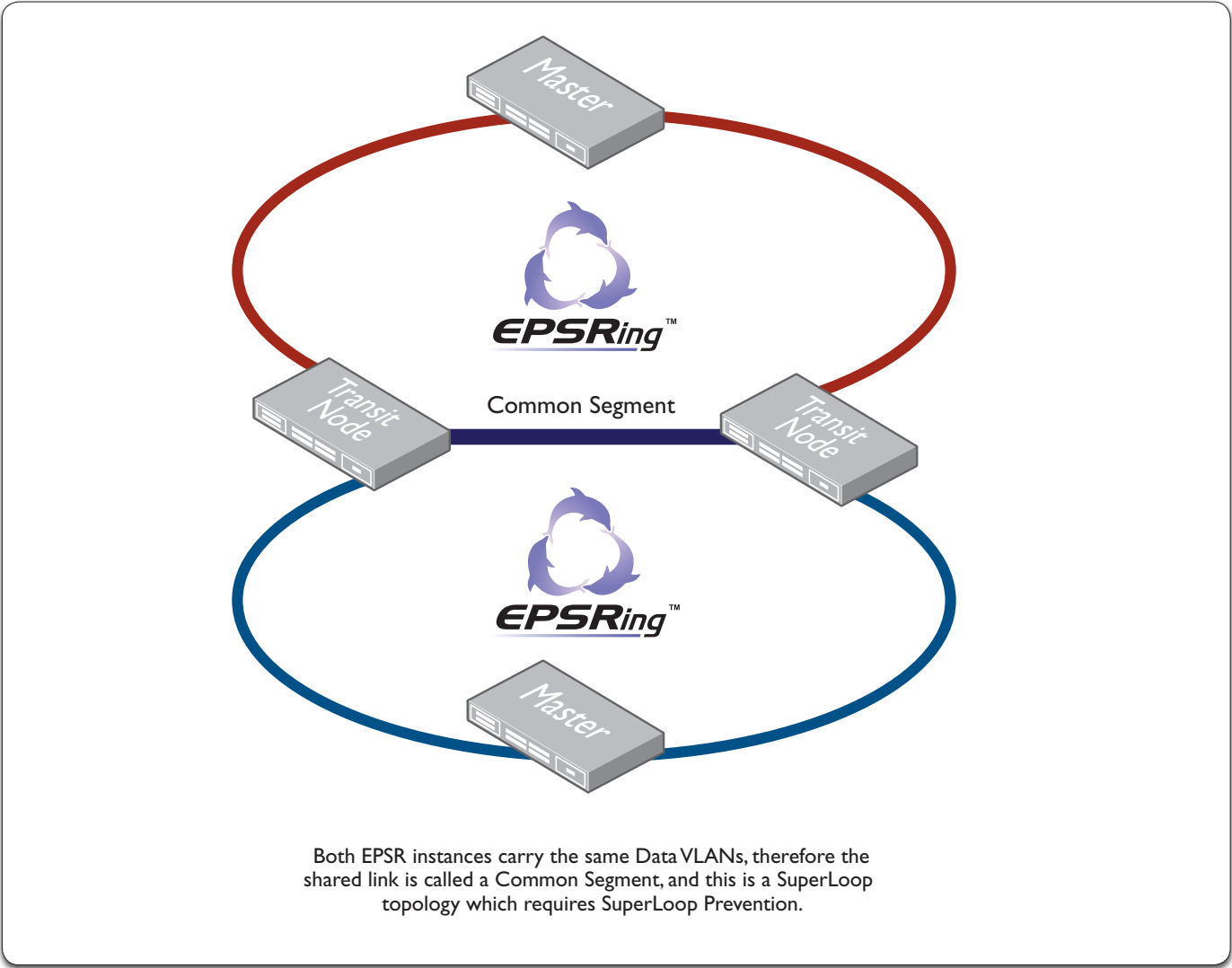


Diagram 2: Multi-ring topology using EPSR-SLP

EPSR in the Enterprise

EPSR in enterprise network solutions makes the benefits of this technology available for corporate, education, hospitality and other customers requiring maximum network uptime. The following enterprise networks showcase the many benefits of EPSR.

Corporate EPSR network

As the corporate world comes to rely more than ever on Information Technology resources and applications, a high availability infrastructure is vital. An EPSR ring at the core of the network provides the following key advantages:

- **High bandwidth:** An EPSR ring can run at up to 10Gbps, utilizing today's fastest Ethernet standard for maximum data throughput.
- **Immediate access:** Seamless connectivity via voice, video or email is maintained, and network servers are accessible with no delay.
- **High availability:** With no single point of failure, continuous access to critical business data and network resources is maintained.

■ **Application versatility:** High bandwidth and ultra-fast failover lend themselves to multiple applications simultaneously using the network. Real-time applications like surveillance, video streaming and voice over IP can be used right alongside data and Internet access.

■ **Easier troubleshooting:** Unlike STP, EPSR fails over with minimal changes to network topology. The simplicity of the ring structure, combined with useful log messages, makes it easy to determine the point of failure.

Diagram 3 shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis Virtual Chassis Stacking (VStack) technology at the core of the network adds a further layer of resiliency. A single virtual chassis comprised of two physical units increases the availability of critical resources.

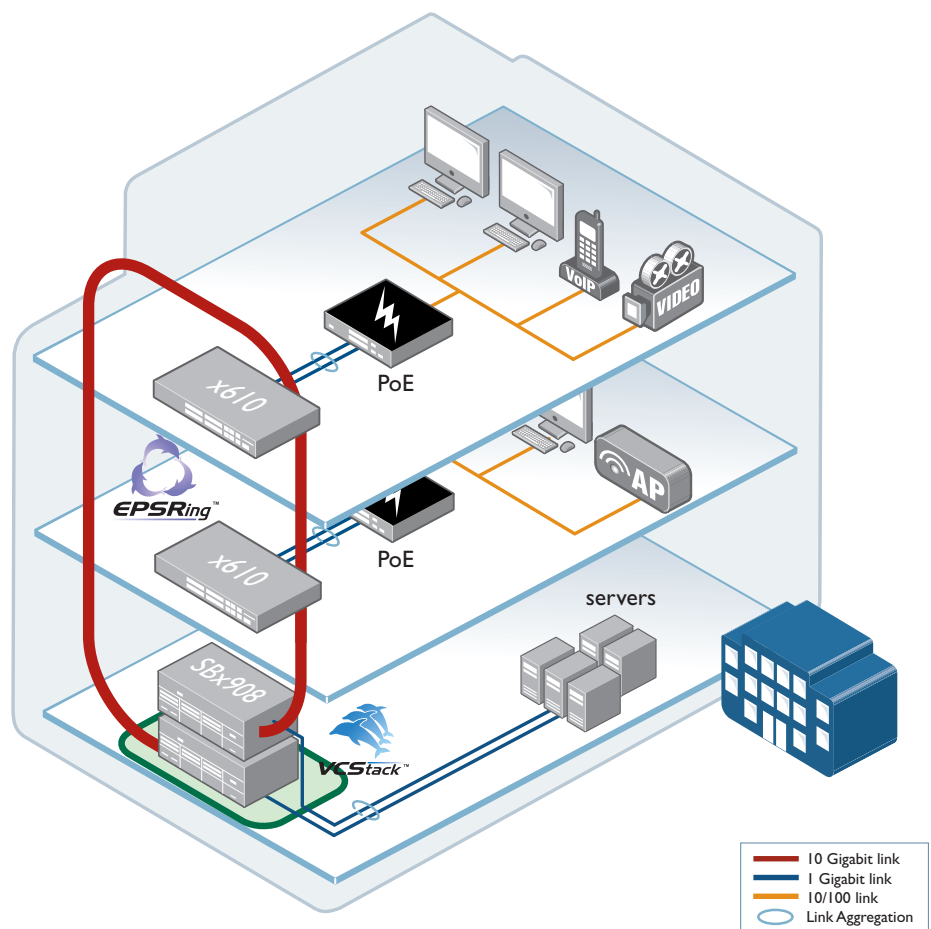


Diagram 3: Corporate EPSR network

Campus EPSR network

Some characteristic requirements in a campus network are:

- Ability to roam (at least within certain zones of the campus)
- Security against network attacks and virus outbreaks
- A design for scalable growth
- Support for converged services
- Flexibility to allow different sets of users to operate in the way that best suits their needs

A design that supports these requirements is shown in diagram 4. In this design, the Campus is partitioned into a set of layer-2 switching domains, each of which is centred on its own EPSR ring. To travel from one ring into another, traffic is layer-3 switched. For example, Art department traffic is layer-3 switched when moving to Science or Administration.

The key advantages of this design are:

- **Roaming:** Users can easily roam within the zone covered by any one of the layer-2 domains.
- **Efficient use of bandwidth:** The layer-3 switching between domains will reduce the proliferation of broadcast traffic through the network.
- **Security:** Strict rules can be established for which traffic may pass between domains, and these rules can be enforced by the layer-3 switches.

- **High availability:** Dual points of connection between neighbouring domains provides resiliency in the inter-domain connectivity.
- **Easier maintenance:** Clear demarcation between zones simplifies troubleshooting, and facilitates staged network upgrades.
- **Fast failover:** Use of EPSR throughout the network ensures ultra fast recovery from link failures, as demanded by converged services.
- **High bandwidth:** The core servers can be provisioned with a dedicated ring of extremely high bandwidth with high resiliency.

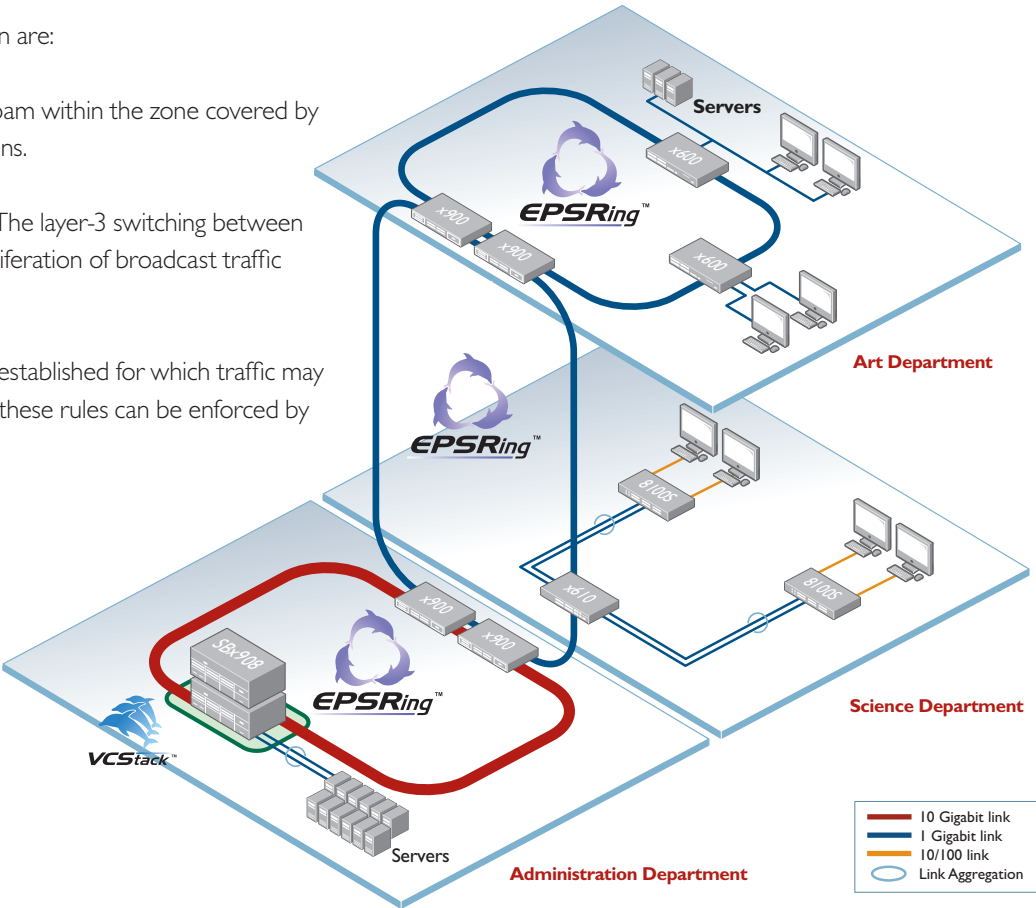


Diagram 4: Campus EPSR network

EPSR in Metro networks

Service Provider Metro networks require extremely high reliability, as these city-wide networks provide online access to many businesses, and multi-media Triple-Play services (data, voice and video) to many homes. With service level agreements to meet, any outage is both costly to the service provider, and disruptive for customers.

EPSR is an ideal solution for the delivery of converged services in the Metro environment with the following key advantages:

- **Long Distance:** Geographically spread out nodes are supported as fibre allows long distance connectivity.
- **High availability:** With no discernible outage in the event of a link or node failure, EPSR provides the perfect solution for service providers meeting service level agreements.
- **High performance:** Connectivity to voice, video and data services is always maintained for a seamless customer experience.

- **Multi-speed support:** The distribution and access rings can run at different speeds appropriate to the amount of network traffic.

- **Network protection:** The use of EPSR SuperLoop Prevention (SLP) ensures there is no chance of a loop forming, and subsequent network storm in this multi-ring environment.

A multi-ring EPSR-SLP protected design is shown in diagram 5. This city-wide Metro network provides high performing online access for businesses, and advanced Triple-Play services to residential customers.

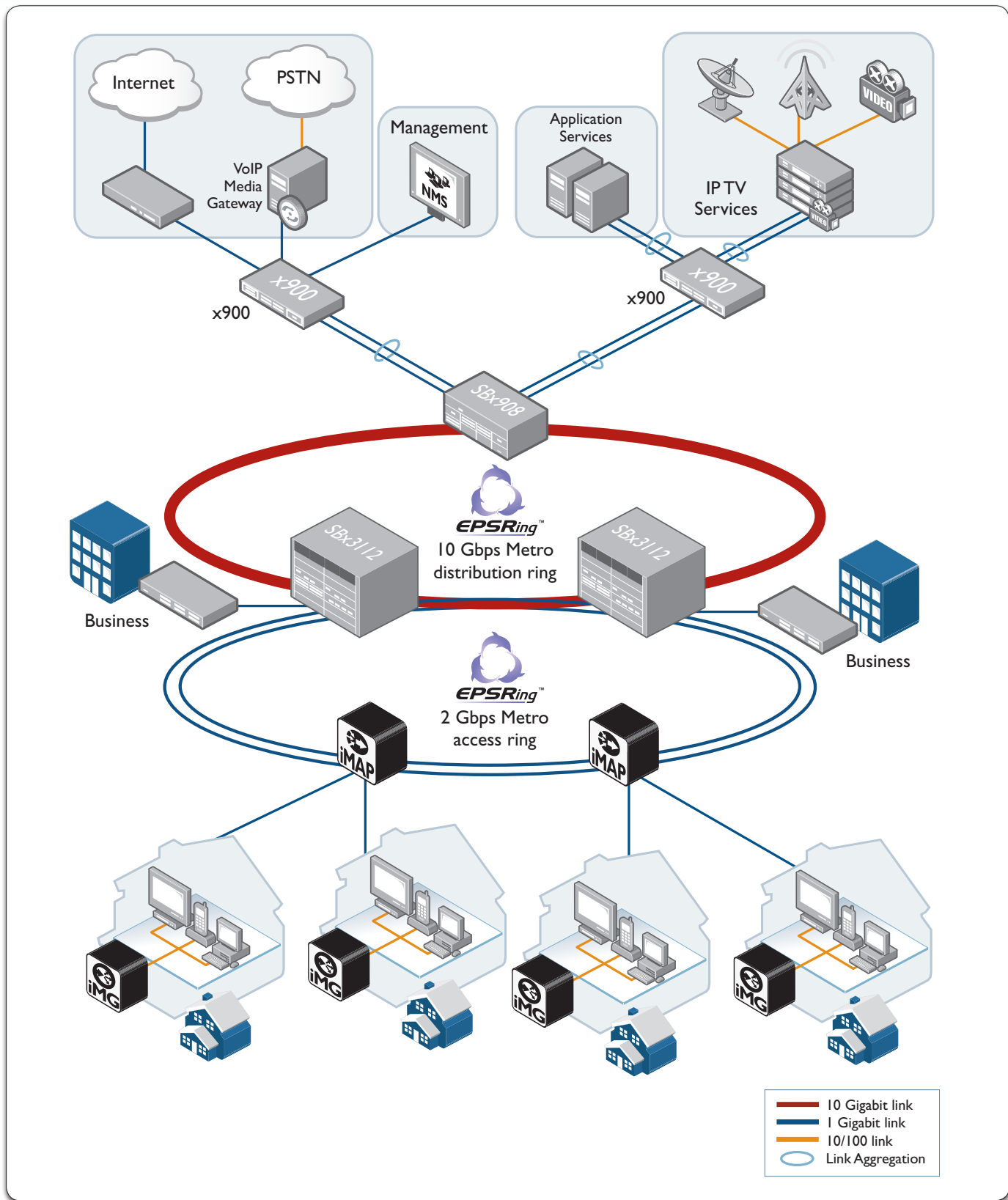


Diagram 5: Service Provider Metro network using EPSR-SLP

The 'always-on' network

The proven benefits of EPSR have been widely deployed in both enterprise and service provider networks. Advanced solutions provide high bandwidth and maximum uptime.

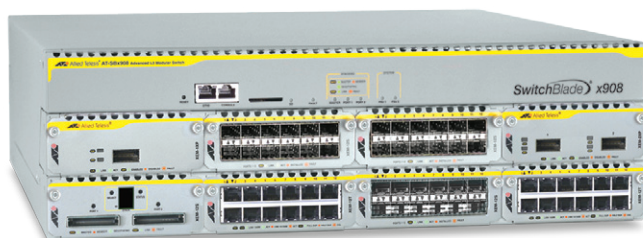
Business owners can be sure that their network infrastructure is always available for the many online activities that are part of the modern work place. Service providers can confidently meet the demanding requirements of a converged environment, and provide a superior customer experience.

EPSRs advanced self-healing technology provides 'always-on' access to online resources and applications.



EPSR Products

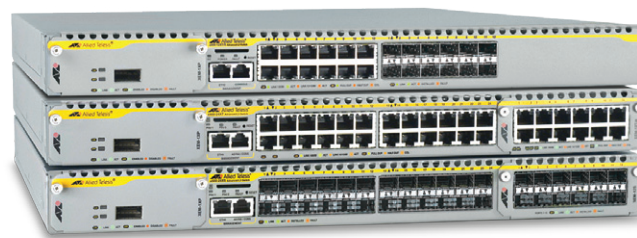
The following products all support EPSR.



SwitchBlade® x908

ADVANCED LAYER 3 MODULAR SWITCHES

The Allied Telesis SwitchBlade™ x908 advanced Layer 3 modular switch offers high flexibility and port density in a small physical size, providing scalable and versatile switching solutions for today's Enterprise networks. Each chassis supports eight high-speed 60Gbps expansion bays, and can also be paired in a VCStack.



x900 12 & 24

ADVANCED LAYER 3 SWITCHES

The Allied Telesis x900 series is one of our most advanced series of switches and is unmatched in performance, flexibility and reliability. This series provides fine service provisioning granularity, high availability, and advanced QoS. All x900 switches incorporate a switching core that yields wire speed IPv4 and IPv6 routing and most switches feature robust hardware with dual hot swappable power supplies. The x900 series switches share the same expansion modules (XEMs) as the SwitchBlade x908.

EPSR Products



x610 Series

ADVANCED LAYER 3 GIGABIT ETHERNET STACKABLE SWITCHES

The Allied Telesis x610 series is the high performing and scalable solution for today's networks, providing an extensive range of port-density and uplink-connectivity options. 24-port and 48-port versions are available with optional 10 Gigabit uplinks and PoE+ ports. The ability to stack up to eight units includes using fiber for long distance stacking. The x610 Series can connect anything from a small workgroup right up to a large business.



x600 Series

ADVANCED LAYER 3 GIGABIT STACKABLE EDGE SWITCHES

The Allied Telesis x600 series is an advanced series of stackable switches providing high performance, flexibility and reliability. The x600 series provides high levels of Network Access Control (NAC) security making them ideal for the entry point into a corporate network. High speed 10Gbps uplinks and high speed stacking of up to four switches ensures excellent performance, while optional redundant power supplies can ensure network availability.



SwitchBlade® x3112

ACCESS EDGE CHASSIS SWITCH

The Allied Telesis SwitchBlade x3112 is a 12 Slot access edge chassis switch primarily targeted for service provider fiber access networks, and equally at home at the enterprise network edge and the data center. The switch was designed to deliver high availability, maximum performance with wire speed non-blocking backplane performance, and high port count.



iMAP 9000 series

INTEGRATED MULTISERVICE ACCESS PLATFORM (IMAP™)

The Allied Telesis iMAP is the only carrier-grade, IP/Ethernet networking solution in the industry that effectively supports IP Triple Play services simultaneously over copper and fiber infrastructure. Deploy high-bandwidth IP Video, POTS, VoIP and data services over copper or fiber using a variety of access technologies. Allied Telesis iMAPs are available in different sizes and densities and offer many plug-and-play access capabilities.

About Allied Telesis Inc.

Allied Telesis is a world class leader in delivering IP/Ethernet network solutions to the global market place. We create innovative, standards-based IP networks that seamlessly connect you with voice, video and data services.

Enterprise customers can build complete end-to-end networking solutions through a single vendor, with core to edge technologies ranging from powerful 10 Gigabit Layer 3 switches right through to media converters.

Allied Telesis also offer a wide range of access, aggregation and backbone solutions for Service Providers. Our products range from industry leading media gateways which allow voice, video and data services to be delivered to the home and business, right through to high-end chassis-based platforms providing significant network infrastructure.

Allied Telesis' flexible service and support programs are tailored to meet a wide range of needs, and are designed to protect your Allied Telesis investment well into the future.

For further information visit us online at alliedtelesis.com



the solution : the network

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