Allied Telesis builds resilient enterprise networks with Ethernet Protection Switching Ring
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.

Highly reliable video and voice over ethernet are no longer the preserve of these specialised service networks. The cost and usability of this technology has reached the point where it is well within the range of a much wider market. This is opening up new applications in diverse industries:

- Video information feeds
- Closed-circuit video for security surveillance and operation monitoring
- Networked multimedia learning resources within educational campuses
- On-demand entertainment channels in-room (hospitality sector) and to the bedside (medical sector)
- Network-based industrial process control
- IP telephony services

The key to accelerating the uptake of these applications is reliability. To become ubiquitous, these systems must achieve the “five nines” uptime that has long been a reliability benchmark for Telcos. This level of uptime requires an extremely rapid failover in the event of link failure.

Technology that achieves such reliability has been developed and matured in the demanding Service Provider environment. Allied Telesis now makes this technology available to the enterprise network. Now, IP-over-ethernet equipment can provide extremely rapid failover to the broad networking market.

Allied Telesis’s carrier-grade resiliency feature, Ethernet Protection Switching Ring (EPSR), ensures mission critical services are not interrupted in the event of facility or node outages. EPSR, which provides failover times as low as 50ms, is now standard in Allied Telesis SwitchBlade x908 and x900-series switches.
The Technology

Putting a ring of ethernet switches 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 making an STP-like calculation.

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 premium solution, with failover under fault conditions unnoticed by network and application users.

Press ‘play’ in Figure 1 to see a ring of switches using EPSR. The Master switch continually monitors the health of the ring with ‘health-check’ messages, and alerts the ring if a break occurs. The ring then automatically heals itself by sending traffic over a protected reverse path.

Figure 1: EPSR Ring
EPSR in the enterprise
With EPSR now available in enterprise network solutions, the many benefits of this tried and tested technology are 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.

The diagram illustrated in Figure 2 shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis Virtual Chassis Stacking (VCSStack) technology at the core of the network adds a further layer of resiliency, increasing the availability of critical resources.

Figure 2: Corporate 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 illustrated in Figure 3. 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 highly resiliency.

The always-on network
Now that technology has made high-availability and high-bandwidth so accessible; corporate business, education providers and other enterprise network users can enjoy the benefits that EPSR has to offer. By ensuring always-available online applications and resources, this advanced self-healing network technology meets the insatiable demand for information at the fingertips.

EPSR products
The following Allied Telesis products support EPSR.

SwitchBlade® x908
Advanced Layer 3 Modular Switch
- 8 x 60Gbps expansion bays

The Allied Telesis SwitchBlade® x908 industry leading modular switch incorporates eight high speed 60Gbps expansion bays, delivering a new generation of high performance. The SwitchBlade x908 provides scalable and versatile switching solutions including Virtual Chassis Stacking, for today’s Enterprise networks.

x900 Family

x900-12X and 24X Series
Advanced Gigabit Layer 3+ Expandable Switches

x900-24XT
- 2 x 60Gbps expansion bays
- 24 x 10/100/1000BASE-T (RJ-45) copper ports

x900-24XT-N
NEBS Compliant
- 2 x 60Gbps expansion bays
- 24 x 10/100/1000BASE-T (RJ-45) copper ports

x900-24XS
- 2 x 60Gbps expansion bays
- 24 x 100/1000BASE-X SFP ports
x900-12XT/S
- 1 x 60Gbps expansion bay
- 12 x combo ports (10/100/1000BASE-T copper or SFP)

The x900-12X and 24X Layer 3+ switches have high-speed 60Gbps expansion bays which provide a high level of port flexibility and application versatility unmatched by any other 1RU Gigabit Ethernet switch on the market.

x900-48 Series
Enhanced Fast Ethernet Layer 3+ Switches

x900-48FE
- 48 x 10/100BASE-T copper ports
- 4 x 1000BASE-X SFP uplinks

x900-48FS
- 48 x 100BASE-X SFP ports (Fiber only)
- 4 x 1000BASE-X SFP uplinks

x600 Family
Intelligent Gigabit Layer 3+ Switches

x600-24Ts
- 24 x 10/100/1000BASE-T (RJ-45) copper ports
- 4 x 1000BASE-X SFP combo ports

x600-24Ts/XP
- 24 x 10/100/1000BASE-T (RJ-45) copper ports
- 4 x 1000BASE-X SFP combo ports
- 2 x XFP ports

x600-48Ts
- 44 x 10/100/1000BASE-T (RJ-45) copper ports
- 4 x 1000BASE-X SFP ports

x600-48Ts/XP
- 44 x 10/100/1000BASE-T (RJ-45) copper ports
- 4 x 1000BASE-X SFP ports
- 2 x XFP ports

AT-9900 series
Multilayer IPv4 and IPv6 Gigabit switches

AT-9924T
- 24 x 10/100/1000BASE-T copper ports
- 4 x 1000BASE-X SFP combo ports

AT-9924SP
- 24 x 100/1000BASE-X SFP ports
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.

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