Allied Telesis

Allied Telesis builds resilient enterprise networks

with Virtual Chassis Stacking

VCStack

VCStack | Resilient enterprise networks with Virtual Chassis Stacking

Today's enterprises rely on Information Technology resources and applications, for accessing business-critical information and for day-to-day work. A high availability infrastructure is no longer a luxury; maintaining resource availability and data security is now of paramount importance.

Productivity is adversely affected when any of the following occur:

- loss of access to the Internet
- loss of access to internal servers and intranet
- loss of IP telephony services
- loss of customer access to public servers

It is vital, even for a small enterprise, to keep high availability considerations at the center of network design. The availability of network resources is maximised with an Allied Telesis Virtual Chassis Stacking (VCS) solution, providing continuous and immediate access to information when it's required.

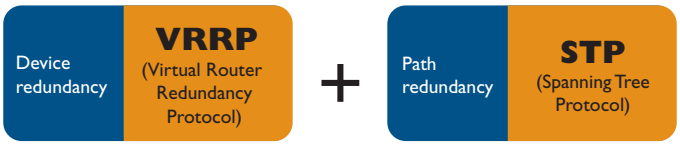
Technology comparison

To fully appreciate the benefits of the VCS solution offered by Allied Telesis, it is necessary to compare this technology with the standard high availability solution that it replaces.

Prior to the advent of the VCS solution, high availability in small-medium enterprise networks was achieved by provisioning redundant links and redundant routers. In normal operation, bandwidth and routing power would sit idle in the network.

Allied Telesis now provides a truly resilient network. In normal operation, all bandwidth and all routing power in the network is fully available for use all the time. If a link or device fails, some of the bandwidth or forwarding power will be lost, but the network will still be fully operational and will continue to fully utilize the remaining resources.

The early solution: Virtual Router Redundancy (VRRP) and Spanning Tree (STP)



Back-up data paths through the network have always been desirable in case of link or hardware failure. Before VCS, the standard solution was to provide redundant links in the network, with STP blocking switch ports to ensure that there were no active loops.

Over the years, STP has evolved to provide faster failover and to take better account of VLAN topologies by load-balancing network traffic. However, the fundamental operation of STP has remained the same for over 15 years.

Layer-2 path redundancy in the form of STP is often accompanied by Layer-3 device redundancy in the form of a virtual gateway. VRRP provides automatic backup, enabling multiple routers or switches to share a virtual IP address that serves as the default LAN gateway. If the master fails, the other devices take over the virtual IP address.

"Before Virtual Chassis Stacking (VCS), the standard solution was to provide redundant links in the network with STP..."

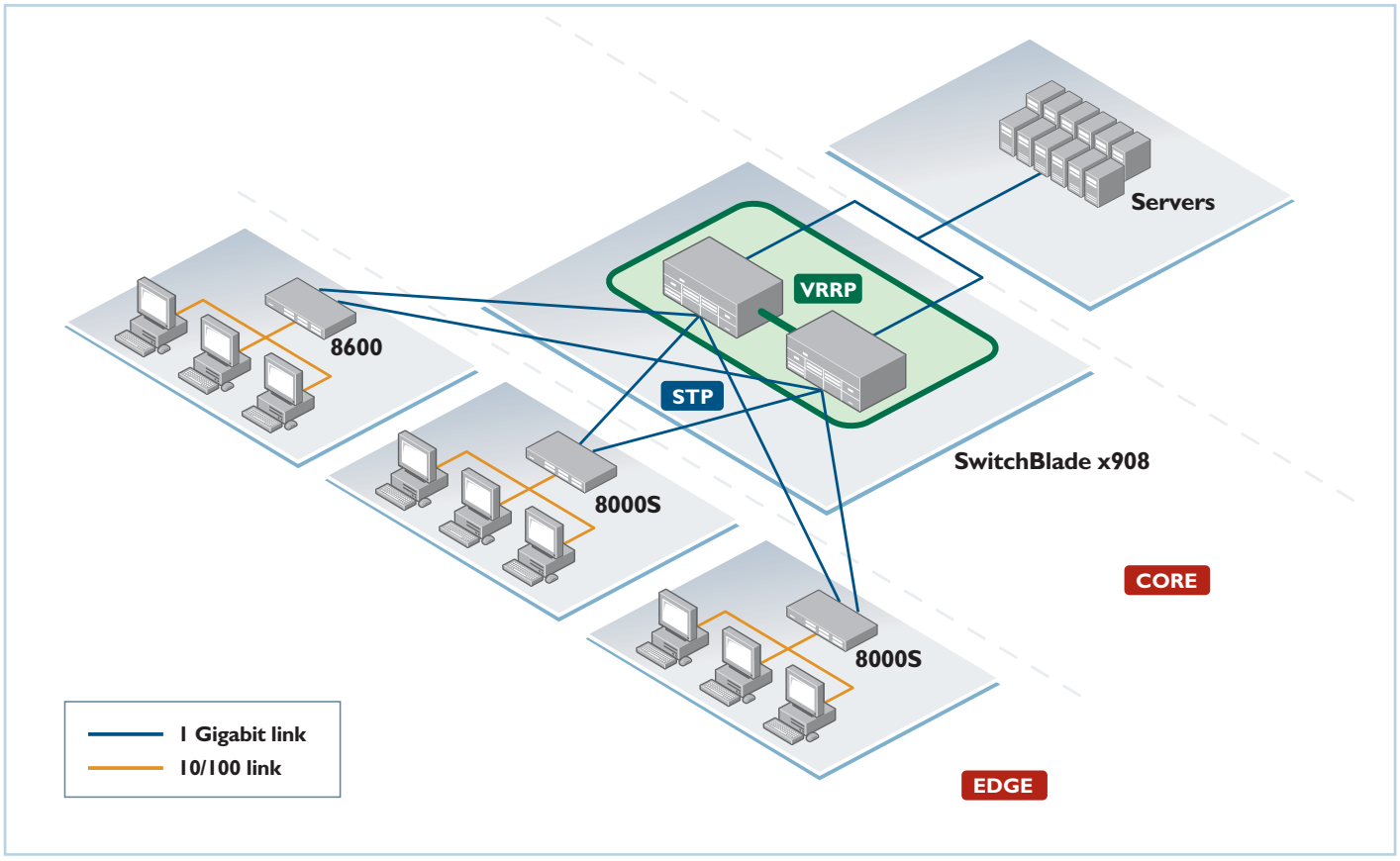


Figure 1: VRRP + STP diagram

This VRRP + STP solution (as seen in figure 1) has served a large number of enterprises very well for many years, but there are some significant drawbacks to it:

Inefficient use of resources:

- The VRRP standby router is greatly under-utilized while it is in standby mode
- STP puts many network links into a standby mode, so fails to utilize a significant amount of available network bandwidth

Some network disruption in the case of failure:

- Failover between the VRRP routers can take some seconds
- STP can take some seconds to reconverge when an active link fails

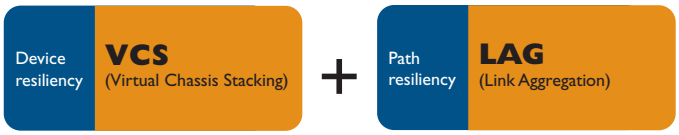
Security concerns:

- VRRP is vulnerable to malicious attacks, such as forcing a new VRRP election
- STP is vulnerable to many malicious attacks

Complexity of implementation and management:

- A VRRP and STP solution requires substantial design consideration and configuration to provide a reliable and well functioning network
- Problems in the operation of the spanning tree can be difficult to track down as spanning trees are inherently complex, depending on multiple negotiated agreements between switches throughout the network

A superior solution: Virtual Chassis Stacking (VCS) and Link Aggregation (LAG)



Allied Telesis now provides a superior solution for enterprise network resiliency.

In essence, the solution is very simple: the core of the network is a set of switches connected together to form a single virtual chassis. In normal operation, the virtual chassis acts as a single switch. The edge switches have dual connections to the virtual chassis using port aggregation (as seen in figure 2).

Resiliency in this network is delivered by the virtual chassis and the multiple links:

- Edge switches have dual connections to the virtual chassis. This provides resiliency in the case of broken links or failed ports.
- Each link from an edge switch connects to different virtual chassis members. This provides resiliency in the case of core switch failure.

"The virtual chassis acts as a single switch..."

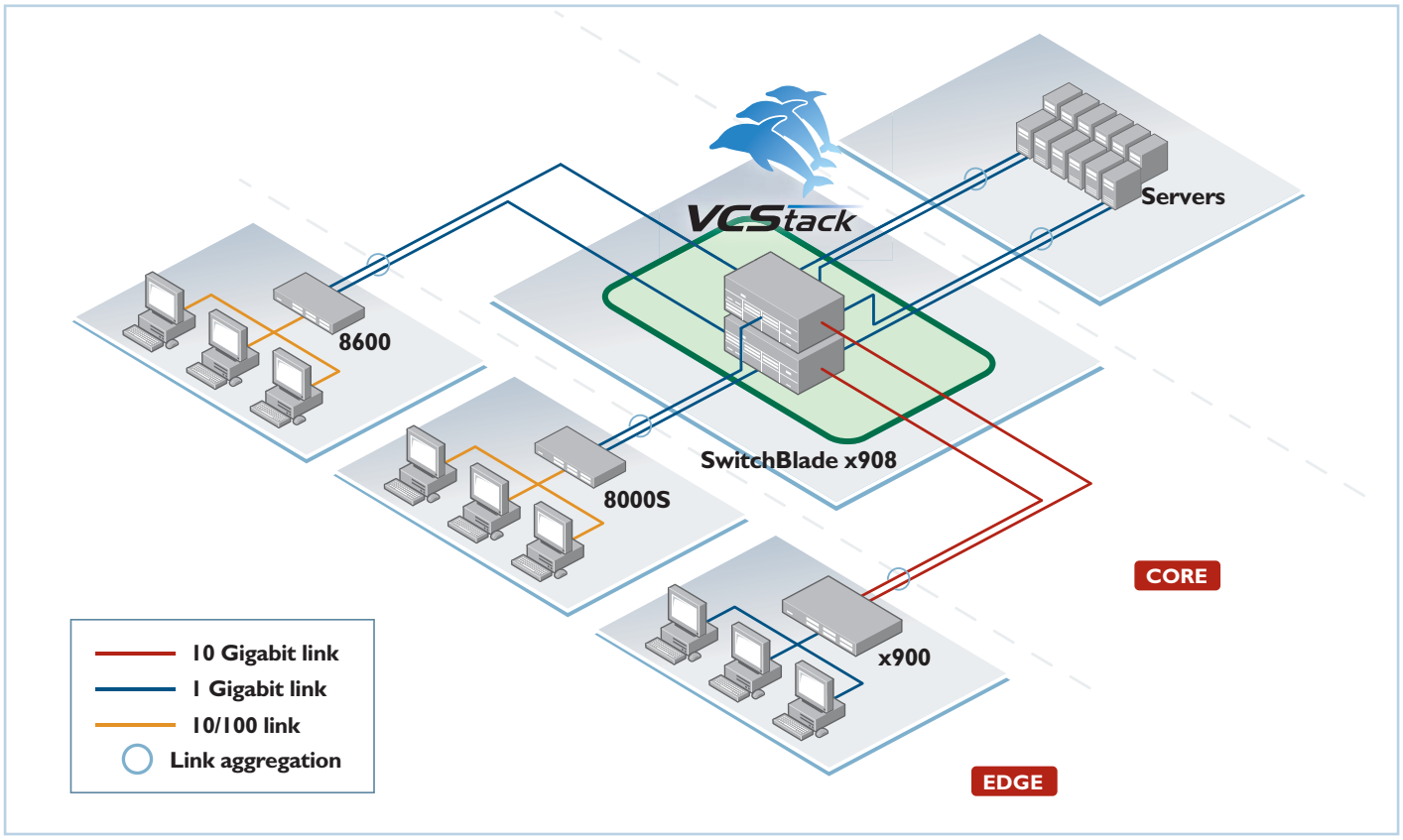


Figure 2: Virtual Chassis Stacking

The key benefits: full bandwidth utilization and maximum availability

The key advantage of the solution comes from configuring the links from the edge switches to the core as an 802.3ad link aggregation. This is possible because VCS supports link aggregation on ports across different virtual chassis members.

When these ports are aggregated:

- The full bandwidth of the network is available as both ports are active; no links are blocked as some would be with spanning tree.
- There is little network disruption if a link fails. The decision within a switch when an aggregated link fails is very simple and the virtual chassis almost instantly adapts its data forwarding process on the loss of the link.

This solution effectively overcomes two of the main drawbacks of spanning tree.

Further benefits

- Simpler network management - the virtual chassis is managed as a single unit.
- Layered resiliency - the dedicated stacking link is backed up by a further resiliency link. If the stacking link fails, communication between the stack members is maintained to enable graceful reconfiguration.
- Seamless integration with server-based load sharing and high availability mechanisms.
- The virtual chassis still supports xSTP, if required for redundancy at the edge of the network.
- Easier troubleshooting - each link can be dealt with separately. The aggregated connection from an edge switch to the core virtual chassis operates independently of the links from other edge switches. The loss of a link in no way affects the connections to the other edge switches. This is in contrast to spanning tree, where the loss of any link sends a message to every other switch in the network and can cause recalculations throughout the network.

A superior solution

Device and path resiliency are provided as Virtual Chassis Stacking and Link Aggregation provide a solution where network resources are spread across the virtual chassis members. Virtualization of the network core ensures access to information when you need it.

With the benefits of high availability, increased capacity and ease of management, Virtual Chassis Stacking makes networking reliable and simple.

Virtual Chassis Stacking products

The following Allied Telesis products support Virtual Chassis Stacking:

SwitchBlade x908

SBx908 rear stack

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 for today's Enterprise networks.

Stacking between two units is supported via fixed stacking connectors on the rear of the chassis, providing 160Gbps of stacking bandwidth. Stacking of more than two units is via expansion modules (XEMs) on the front panel.

x900-12X and 24X Series

Advanced Gigabit Layer 3+ Expandable Switches

x900-24 stack

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 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. The expansion modules can be used in a variety of configurations to provide tailored solutions that meet wide-ranging physical networking requirements.

Multiple units can form a Virtual Chassis Stack with the XEM-STK expansion module.

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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