Allied Telesis Tested Solution: Resilient Ring Network using EPSR
A resilient ring is a network design that is applicable to multiple environments. It is equally as suited to the core of a medium Enterprise as it is to a large campus or even a Metropolitan Area network. The Allied Telesis advanced layer-3 switches and Multi-Access Platforms (iMAPs) provide an extremely high performance resilient ring solution based on the EPSR (Ethernet Protected Switched Ring) loop protection technology. This solution enables very high network up-times, with traffic flow being restored within tens of milliseconds from a link failure being detected.

EPSR is an extremely robust protocol that is available over every Ethernet standard from 10Mbps to 10Gbps. It is agnostic to the underlying physical layer – being equally as effective over copper as it is over fibre. It can be implemented over aggregated links, is compatible with Q-in-Q VLAN nesting, and is highly scalable.

SOLUTION OVERVIEW

This solution (shown in figure 1) illustrates a network infrastructure for a distributed education campus.

The network consists of two EPSR rings

- A large 10-gigabit ring connecting the various campus buildings.
- A smaller 20-gigabit ring connecting the core network equipment

There are some specific functionality being provided on these rings.

- The core ring is provided with increased bandwidth and resiliency by the use of link aggregation.
- One of the buildings attached to the large ring is a student accommodation building that uses an iMAP as a concentrator for in-room voice and data services, providing voice, video and internet access to students.
- Two of the buildings on the large ring contain two sections of the Art department, which tunnel their own internal VLAN structure across the ring using Q-in-Q.
- To provide device resiliency at the junction point between the two rings, a stacked pair of x908 switches are used to provide the inter-ring connection.
- Where ever possible, EPSR enhanced recovery is enabled, to ensure the quickest possible return to service after an outage involving more than one broken link in a ring.
More information about using EPSR in Enterprise network applications can be found on our Allied Telesis website: www.alliedtelesis.com
Configurations

x908 switch on the core 20GbE Ring

All log messages are sent to a syslog server. Higher-severity log messages are also buffered on the switch itself.

log buffered level errors
log host 192.168.10.11
log host 192.168.10.11 level debugging

access-list 1 permit 192.168.10.13
snmp-server enable trap auth nsm epsr
snmp-server community public ro 1
snmp-server host 192.168.10.13 version 2c public

vlan database
  vlan 10 name Control
  vlan 20 name Data20
  vlan 30 name Data30
  vlan 40 name Data40
  vlan 50 name Data50
  vlan 60 name Data60
  vlan 70 name Data70

Cook: VLANs

The 10gig ports port1.1.1, port1.2.1, port1.3.1, port1.4.1 are the ports connected to the EPSR ring. They must be tagged members of the Control VLAN and all the Data VLANs. And, they are aggregated as two separate static aggregations.

interface port1.1.1
  switchport mode trunk
  switchport trunk allowed vlan add 10,20,30,40,50,60,70
  switchport trunk native vlan none
  static-channel-group 1

interface port1.2.1
  switchport mode trunk
  switchport trunk allowed vlan add 10,20,30,40,50,60,70
  switchport trunk native vlan none
  static-channel-group 1

interface port1.3.1
  switchport mode trunk
  switchport trunk allowed vlan add 10,20,30,40,50,60,70
  switchport trunk native vlan none
  static-channel-group 2

interface port1.4.1
  switchport mode trunk
  switchport trunk allowed vlan add 10,20,30,40,50,60,70
  switchport trunk native vlan none
  static-channel-group 2
Allocate other ports to the data VLANs

Apply a management IP address to the out-of-band management eth0 interface

Configure EPSR. This is a master node, so it is necessary to indicate which ring port is the primary port. EPSR enhanced recovery is also enabled

Insecure remote management access via Telnet is disabled. Remote CLI access is only available via SSH

Configure NTP (Network Time Protocol) with the IP address of the NTP server

interface port1.5.1-1.5.6
switchport access vlan 20
interface port1.5.7-1.5.12
switchport access vlan 30
interface port1.6.1-1.6.6
switchport access vlan 40
interface port1.6.7-1.6.12
switchport access vlan 50
interface port1.7.1-1.7.6
switchport access vlan 60
interface port1.7.7-1.7.12
switchport access vlan 70

interface eth0
ip address 10.10.45.1/24
ip route 0.0.0.0/0 10.10.45.254

epsr configuration
epsr Core mode master control vlan 10 primaryport port1.1.1
epsr Core datavlan 20,30,40,50,60,70
epsr Core enhancedrecovery enable
epsr Core state enabled

no service telnet
service ssh

ntp server 192.168.10.11
Stacked pair of x908 Switches connecting the Rings

All log messages are sent to a syslog server. Higher-severity log messages are also buffered on the switch itself:

- log buffered level errors
- log host 192.168.10.11
- log host 192.168.10.11 level debugging

Allow read-only SNMP monitoring from one management station:

- access-list 1 permit 192.168.10.13
- snmp-server enable trap auth nsm epsr
- snmp-server community public ro 1
- snmp-server host 192.168.10.13 version 2c public

A resiliency link backs up the dedicated stacking link. If the stacking link fails, communication is maintained to allow graceful reconfiguration:

- stack resiliencylink eth0
- vlan database
  - vlan 10 name Control1
  - vlan 11 name Control2
  - vlan 20 name Data20
  - vlan 30 name Data30
  - vlan 40 name Data40
  - vlan 50 name Data50
  - vlan 60 name Data60
  - vlan 70 name Data70
  - vlan 100 name nested

Create VLANs:

- interface port1.1.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 10,20,30,40,50,60,70
  - switchport trunk native vlan none
  - static-channel-group 1

- interface port2.1.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 10,20,30,40,50,60,70
  - switchport trunk native vlan none
  - static-channel-group 1

- interface port1.2.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 10,20,30,40,50,60,70
  - switchport trunk native vlan none
  - static-channel-group 2

- interface port2.2.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 10,20,30,40,50,60,70
  - switchport trunk native vlan none
  - static-channel-group 2

- interface port1.3.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 11,20,30,40,50,60,70,100
  - switchport trunk native vlan none

- interface port2.3.1
  - switchport mode trunk
  - switchport trunk allowed vlan add 11,20,30,40,50,60,70,100
  - switchport trunk native vlan none

The 10gig ports port1.1.1, port2.1.1, port1.2.1, port2.2.1 are the ports connected to the Core ring. Ports 1.3.1,2.3.1 are the ports connected to the wide ring.
Allocate other ports to the data VLANs:

- Port 1.7.7 is a connection-point for the Q-in-Q VLAN 100 that tunnels across the Wide ring, the VLANs within the department that is split over 2 buildings.
- Apply a management IP address to the out-of-band management eth0 interface:
  - `interface eth0`
  - `ip address 10.10.45.3/24`
  - `ip route 0.0.0.0/0 10.10.45.254`

Configure EPSR. This switch is a transit node in both EPSR domains. EPSR enhanced recovery is enabled on both domains:

- `no service telnet`
- `service ssh`
- `ntp server 192.168.10.11`

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- Port 1.4.1-1.4.6
- Port 1.5.1-1.5.12
- Port 1.6.7-1.6.12
- Port 1.7.1-1.7.6
- Port 1.7.7

- Interface port2.4.1-2.4.6
- Interface port2.5.1-2.5.12
- Interface port2.6.1-2.6.6
- Interface port2.7.1-2.7.6

- Switchport access vlan 20
- Switchport access vlan 20
- Switchport access vlan 20
- Switchport access vlan 40
- Switchport access vlan 40

- Configuration:
  - EPSR Core mode transit control vlan 10
  - EPSR Core datavlan 20, 30, 40, 50, 60, 70
  - EPSR Core enhanced recovery enable
  - EPSR Core state enabled
  - EPSR Wide mode transit control vlan 11
  - EPSR Wide datavlan 20, 30, 40, 50, 60, 70, 100
  - EPSR Wide enhanced recovery enable
  - EPSR Wide state enabled
All log messages are sent to a syslog server. Higher-severity log messages are also displayed on a terminal attached to the iMAP.

Allow read-only SNMP monitoring from one management station.

Apply a management IP address.

Autoprovien cards that are installed into the iMAP.

Create VLANs.

The ring ports are the two 10gig ports.

Configure NTP (Network Time Protocol) with the IP address of the NTP server.

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About Allied Telesis
For nearly 30 years, Allied Telesis has been delivering reliable, intelligent connectivity for everything from enterprise organizations to complex, critical infrastructure projects around the globe.

In a world moving toward Smart Cities and the Internet of Things, networks must evolve rapidly to meet new challenges. Allied Telesis smart technologies, such as Allied Telesis Management Framework™ (AMF) and Enterprise SDN, ensure that network evolution can keep pace, and deliver efficient and secure solutions for people, organizations, and “things”—both now and into the future.

Allied Telesis is recognized for innovating the way in which services and applications are delivered and managed, resulting in increased value and lower operating costs.

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