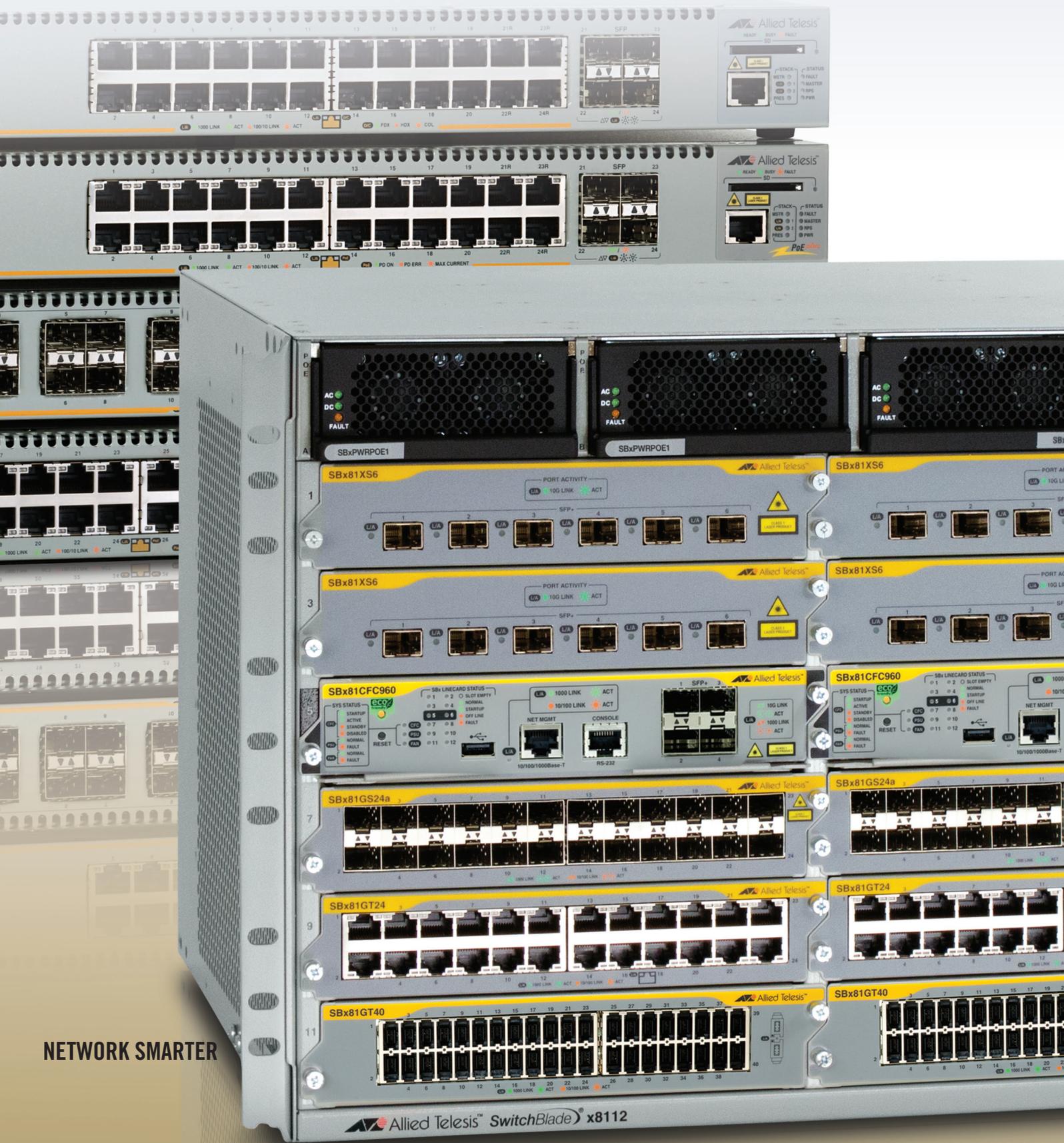


# Allied Telesis Tested Solution: Resilient Ring Network using EPSR



NETWORK SMARTER

# Introduction

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 a 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.



# 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
```

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
```

Create VLANs

```
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
```

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

```
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
```

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

```
interface eth0
ip address 10.10.45.1/24
```

```
ip route 0.0.0.0/0 10.10.45.254
```

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

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

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

```
no service telnet
service ssh
```

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

```
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
```

Create VLANs

```
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
```

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

```
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
```

Allocate other ports to the data VLANs

```
interface port1.4.1-1.4.6
switchport access vlan 20
interface port2.4.1-2.4.6
switchport access vlan 20
interface port1.4.7-1.4.12
switchport access vlan 30
interface port2.4.7-2.4.12
switchport access vlan 30
interface port1.5.1-1.5.12
switchport access vlan 40
interface port2.5.1-2.5.12
switchport access vlan 40
interface port1.6.1-1.6.6
switchport access vlan 50
interface port2.6.1-2.6.6
switchport access vlan 50
interface port1.6.7-1.6.12
switchport access vlan 60
interface port2.6.7-2.6.12
switchport access vlan 60
interface port1.7.1-1.7.6
switchport access vlan 70
interface port2.7.1-2.7.6
switchport access vlan 70
```

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

```
interface port1.7.7
switchport access vlan 100
switchport vlan-stacking customer-edge-port
```

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 10.10.45.254
```

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

```
epsr configuration
epsr Core mode transit controlvlan 10
epsr Core datavlan 20,30,40,50,60,70
epsr Core enhancedrecovery enable
epsr Core state enabled

epsr Wide mode transit controlvlan 11
epsr Wide datavlan 20,30,40,50,60,70,100
epsr Wide enhancedrecovery enable
epsr Wide state enabled
```

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

```
no service telnet
service ssh
```

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

```
ntp server 192.168.10.11
```

# iMAP providing voice and data services in accommodation

All log messages are sent to a syslog server. Higher-severity log messages are also displayed on a terminal attached to the iMAP

```
create log filter=all
create log output=syslog destination=192.168.10.11 format=full
add log filter=all output=syslog
enable log output=syslog

create log filter=critical severity=critical
create log output=terminal destination=cli format=summary
add log filter=critical output=terminal
enable log output=terminal
```

Allow read-only SNMP monitoring from one management station

```
enable snmp authenticate_trap

create snmp community=public v2ctrphost=192.168.10.13
manager=192.168.10.13 traphost=192.168.10.13
enable snmp community=public
enable snmp community=public trap
```

Apply a management IP address

```
add ip interface=mgmt ipaddress=10.10.45.10
subnetmask=255.255.255.0 card=actcfc gateway=10.10.45.254
```

Autoprovision cards that are installed into the iMAP

```
set system provmode=auto
```

Create VLANs

```
create vlan=vlan50 vid=50 forwardingmode=std
create vlan=control2 vid=11 forwardingmode=std
```

The ring ports are the two 10gig ports

```
add vlan=50 interface=0.0 frame=tagged
add vlan=50 interface=1.0 frame=tagged
add vlan=11 interface=0.0 frame=tagged
add vlan=11 interface=1.0 frame=tagged
delete vlan=1 interface=0.0
delete vlan=1 interface=1.0
```

```
create epsr=wide transit
add epsr=wide vlan=11 type=control
add epsr=wide vlan=50 type=data
add epsr=wide interface=0.0
add epsr=wide interface=1.0
enable epsr=wide
```

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

```
enable sntp
add sntp server=192.168.10.3
```

## 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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