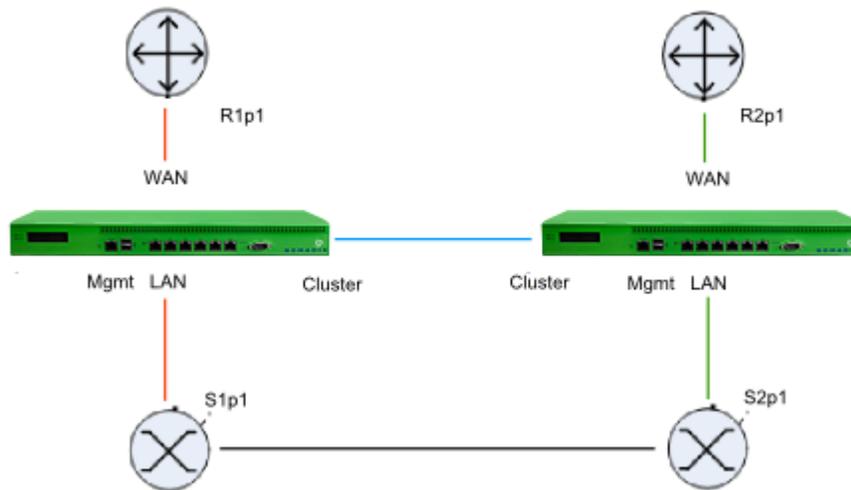


Clusters and High Availability

Cluster and High Availability

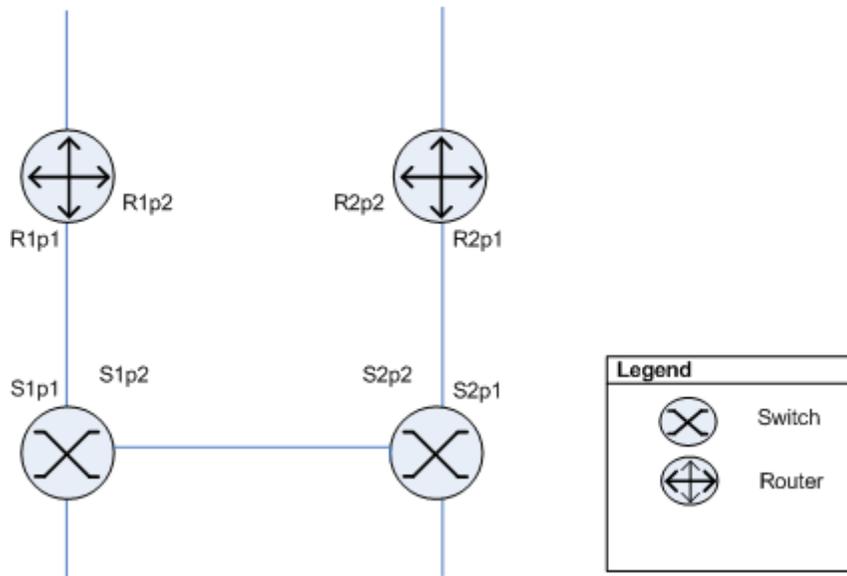
Clustering allows multiple Alloc8 appliances to operate as if they were a single appliance. This allows for seamless deployment into High Availability and Load Balanced environments. A typical deployment topology is illustrated below.



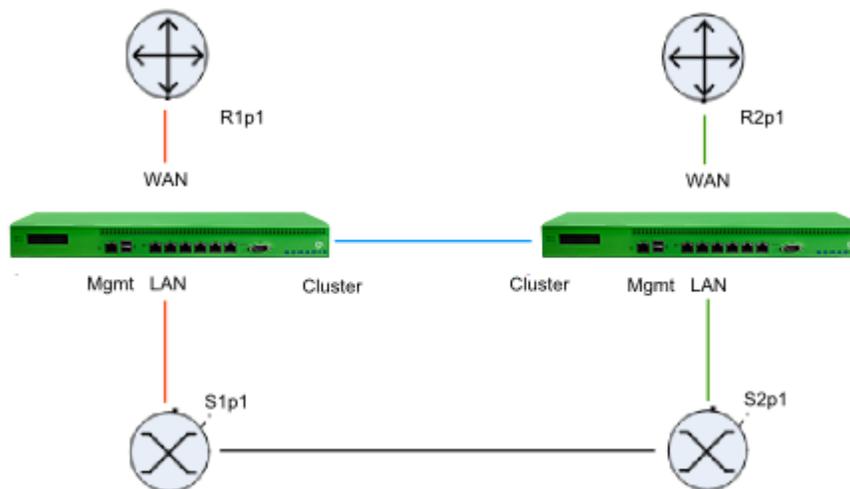
In this example, there are two physical links. An Alloc8 appliance is deployed between each switch and router, and a cable is connected between the two appliances for synchronization. The appliances share configuration, monitoring information, and optimizer and acceleration policies, as if they were a single appliance.

Redundancy through multiple Alloc8 appliances

The clustering feature allows two Alloc8 appliances to be connected in a redundant topology.



With the Alloc8 appliances installed the above topology will appear as below:



The two appliances are directly connected to each other. Both appliances will capture the same data. The appliance that receives the data directly will forward the traffic to the other appliance which will monitor it the same way. However, the copied traffic will not be forwarded onto the LAN.

Alloc8's Clustering/HA framework is also responsible for automatically synchronizing configuration settings between the two appliances.

Installation

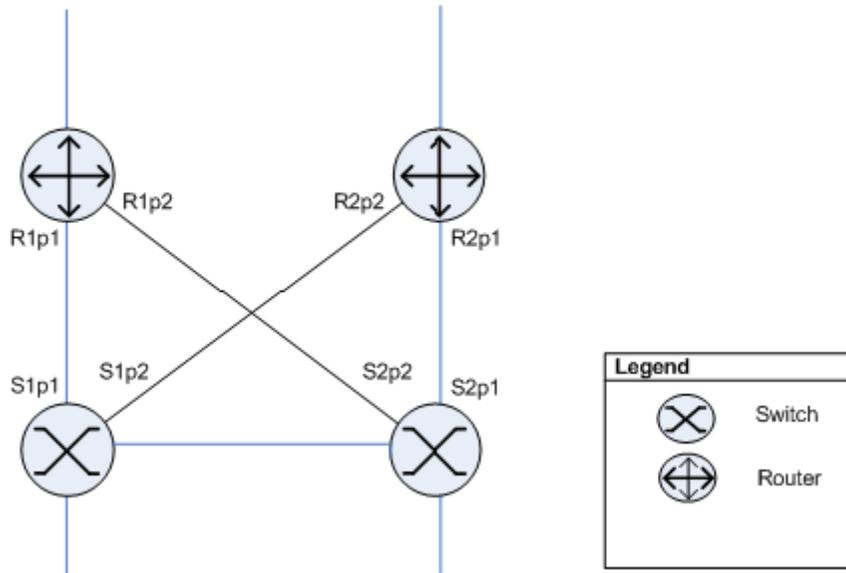
1. On each Alloc8, assign an interface for cluster internal use and an interface to manage the appliance.
2. Connect the cluster interfaces on each Alloc8 with a crossover cable.
3. Power up Alloc8 #1. After 1 minute power up Alloc8 #2.
4. Connect Alloc8 #1 LAN into switch #1 (S1p1).
5. Connect Alloc8 #1 WAN into router #1 (R1p1).
6. Connect Alloc8 #2 LAN into switch #2 (S2p1).
7. Connect Alloc8 #2 WAN into router #2 (R2p1).
8. Connect Alloc8 #1 management interface into switch #2 (S2p2)
9. Connect Alloc8 #2 management interface into switch #1 (S1p2)

Capabilities

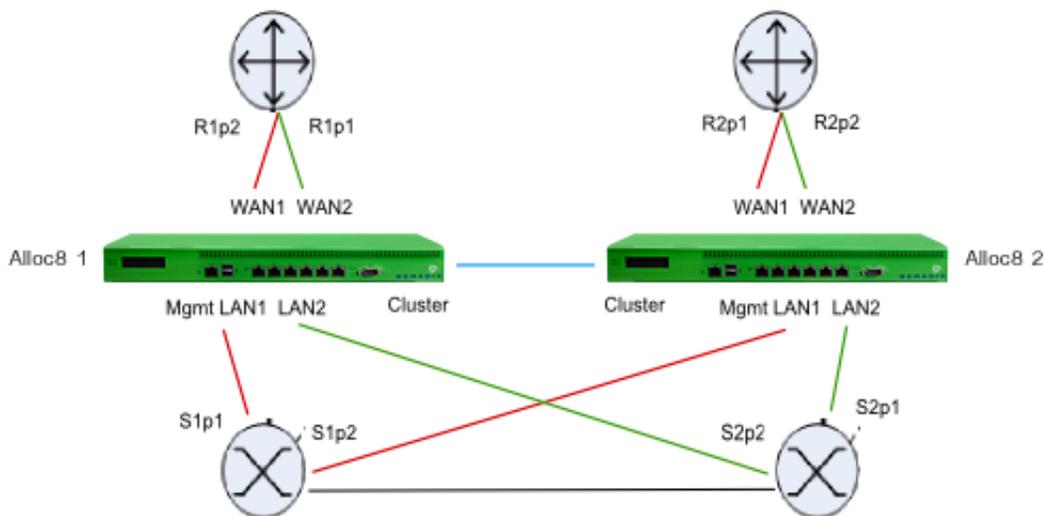
- Monitoring of both links.
- Optimization of both links.
- Redundancy of Alloc8 appliances.

Load balancing and fail-over with multiple Alloc8 appliances

Similar to the previous topology but in this case the routers are configured for load balancing. Both links in this topology act as fail-over and load balancing.



With Alloc8 appliances installed the above topology will appear as below:



In this topology both Alloc8 appliances are connected to both routers. As with the previous case, direct traffic reaching one appliance is copied to the second appliance for monitoring and optimization, but is not forwarded on.

Installation

1. On each Alloc8, assign an interface for cluster internal use and an interface for managing the appliance.
2. Connect the cluster interfaces on each Alloc8 with a crossover cable.
3. Power up Alloc8 #1. After 1 minute power up Alloc8 #2.
4. Connect Alloc8 #1 LAN2 into switch #1 (S1p2).
5. Connect Alloc8 #1 WAN2 into router #1 (R2p2).
6. Connect Alloc8 #1 LAN1 into switch #1 (S1p1).
7. Connect Alloc8 #1 WAN2 into router #1 (R1p1).
8. Connect Alloc8 #2 LAN2 into switch #2 (S2p1).
9. Connect Alloc8 #2 WAN2 into router #2 (R2p1).
10. Connect Alloc8 #2 LAN1 into switch #2 (S2p2).
11. Connect Alloc8 #2 WAN1 into router #2 (R1p2).
12. Connect Alloc8 #1 MGMT into switch #2.
13. Connect Alloc8 #2 MGMT into switch #1.

Capabilities

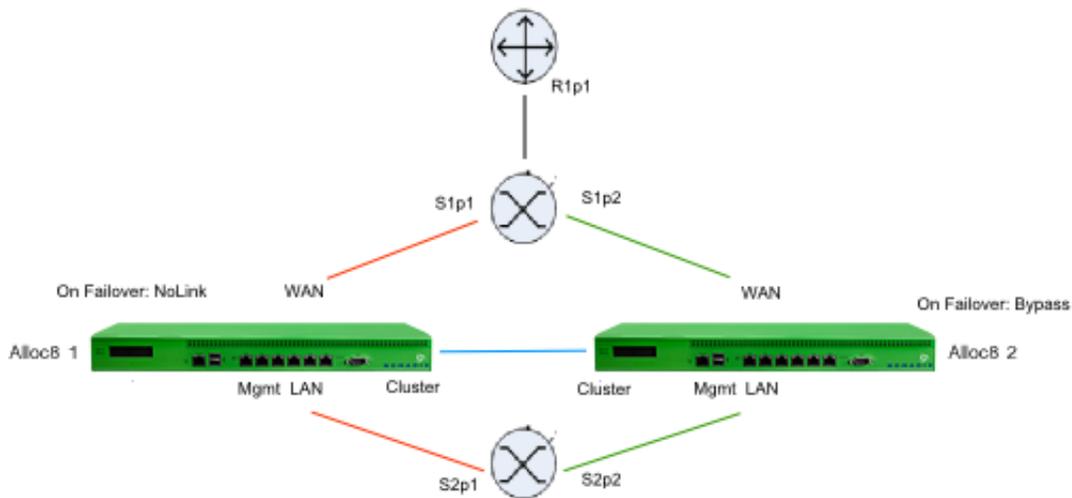
- Monitoring of both links.
- Optimization of both links.
- Redundancy of Alloc8 appliances.

High availability mode

When Router Redundancy is not present but you would still like to configure the Alloc8 solution in High Availability mode, use the configuration below.



With Alloc8 appliances installed the above topology will appear as below:



In this topology, both Alloc8 appliances are connected via a WAN switch. As with the previous case, direct traffic reaching one appliance is copied to the second appliance for monitoring, but is not forwarded.

Note Your WAN switch and LAN switch must support the Spanning Tree Protocol (STP) Configure STP with S2p1 higher priority than S2p2. If the link at S2p1 goes down (e.g. Alloc8 #1 loses power) then the switch will enable S2p2. Alloc8 #1 should configure NoLink as the bridge failover option, Alloc8 #2 should configure Bypass.

Active Path: S2p1 to S1p1
Standby Path: S2p2 to S1p2

Installation

1. On each Alloc8, assign an interface for cluster internal use and an interface for managing the appliance.
2. Connect the cluster interfaces on each Alloc8 with a crossover cable.
3. Power up Alloc8 #1. After 1 minute power up Alloc8 #2.
4. Connect Alloc8 #1 LAN into switch #1 (S1p1).
5. Connect Alloc8 #1 WAN into switch #2 (S2p1).
6. Connect Alloc8 #2 LAN into switch #1 (S1p2).
7. Connect Alloc8 #2 WAN into switch #2 (S2p2).
8. Connect the management interface of Alloc8 #1 into switch #1.
9. Connect the management interface of Alloc8 #2 into switch #1.
10. On Alloc8 #1, select "NoLink" for the LAN/WAN bridge failover mode.
11. On Alloc8 #2, select "Bypass" for the LAN/WAN bridge failover mode.

Note S2p2 should have the highest STP priority.

Capabilities

- Monitoring data available on both Alloc8 appliances.
- Optimization available via Alloc8 1 or Alloc8 2.
- Redundancy of Alloc8 appliances.

Cluster Interfaces

Before configuring clustering, the Alloc8 appliances must be correctly cabled. It is recommended that each appliance in the cluster be connected and configured with a dedicated management port.

In addition, clustering requires a dedicated interface for cluster internal traffic. Any interface that is not bridged or in use for another role (e.g. Mirror) may be used.

The table below lists the suggested cluster interface for each hardware series.

Hardware Series	Cluster Interface
X4000	eth2
X6000	eth2
X8000	eth2
X10000	eth2

Where there are two appliances in a cluster, the cluster interfaces may be connected directly to each other with a CAT 5 cross-over cable.

Where there are more than two appliances in a cluster, each appliance's cluster interface must be connected to a single, dedicated switch - such that each appliance can communicate with every other appliance without requiring a route (must be on the same Layer 2 LAN segment).

Cluster Failover

In the event that a node in the cluster fails, is rebooted or powered off, it will enter bypass mode and traffic will pass through unaffected. When the appliance is brought back online, the node will be updated with the latest configuration settings from the Cluster Master and normal operation will continue. Monitoring and reporting information during the downtime will not be synchronized retrospectively.

In the event that the Cluster Master fails, is rebooted or powered off, a new Cluster Master will be automatically elected and the offline node will be treated as a regular offline node. When it is brought back online, it won't necessarily become the Cluster Master again.

Cluster Terminology

Cluster— A group of Alloc8 appliances (cluster nodes) configured to operate as a single Alloc8 appliance.

Cluster External IP— An IP address assigned to the management port of the cluster master. Whichever node is the cluster master has this IP address assigned to its management port.

Cluster Node— An Alloc8 appliance that is a member of a cluster.

Cluster Interface— The physical interface that a node in the cluster uses to connect to other cluster nodes (also referred to as the HA or AUX interface).

Cluster Internal IP— A private IP address assigned to each cluster node's, cluster interface for the purposes of communicating with other nodes in the cluster.

Cluster Master— The node responsible for synchronizing configuration changes with all other cluster nodes. Configuration changes should only be made from the cluster master.

ID— The node's cluster assigned unique identifier.

Management IP— The clusters management (alias) address. The cluster is always reachable at this address as long as at least one node is online.

Role— The current 'role' of node within the cluster (master or standby).

State— The node state (online or offline)

Create a cluster of Alloc8 appliances

Configuring the appliances in the network to behave as a cluster, allowing for high availability and failover, involves two steps:

1. Add Alloc8 appliances to the cluster
2. Specify what data is synchronized between cluster members

After the appliances have been configured, all appliances in the cluster can be monitored.

Add Alloc8 appliances to the cluster

Configure the appliances with an internal IP address used within the cluster, as well as the IP address of the cluster master.

1. Click **System > Network > IP Address**.
2. In eth1, type the management port IP address of the appliance in the **Static Addresses** field.
3. In eth2, select **Cluster**, and type the internal IP address for this node of the cluster in the **Static Addresses** field.

Note The Cluster Internal IP for each appliance in the cluster must be in the same subnet and should be an isolated and unused subnet within the network. The cluster subnet is used exclusively for communications between cluster nodes so should be private and not publicly routable.

4. In the Cluster Master Settings area, select eth1 and type the external address used to access the appliances.
5. Repeat these steps all each Alloc8 appliance joining the cluster.

Once these settings are saved, the appliances will auto-discover each other and one will be elected as the Cluster Master. All configurations must be done on the Cluster Master, so when accessing the cluster, it is best to use the Cluster Master IP address when managing a cluster.

Cluster configuration through the CLI

Configuration using the CLI is very similar to that of the Web UI.

1. Configure a Cluster Internal address. Any interface not bound to a bridge or used in another role (e.g. Mirror) may be used. This command will need to be run on each node in the cluster, and each with a unique Cluster Internal address.

```
(config) # cluster interface eth2
```

```
(config)# interface eth2 ip address 192.168.1.1 /24
```

This command will need to be run on each node in the cluster, and each with a unique Cluster Internal IP.

2. Configure, the Cluster External IP. This command should be executed on all cluster nodes.

```
(config) # cluster master interface eth1
```

```
(config) # cluster master address vip 192.168.0.160 /24
```

The same Cluster External IP should be configured on each cluster node.

3. Enable the cluster.

```
(config) # cluster enable
```

4. As with the Web UI, the role of the node currently logged into will be displayed in the CLI prompt as shown below. Configuration changes should only be made on the Cluster Master node.

```
Alloc8-091cf4 [Alloc8-cluster: master] (config) #
```

5. It is possible to view the status of the cluster from the CLI by issuing the following command.

```
(config)# show cluster global brief
```

```
Global cluster state summary
```

```
=====
```

```
Cluster ID: Alloc8-default-cluster-id Cluster name: Alloc8-cluster
```

```
Management IP: 192.168.0.160/24 Cluster master IF: eth1
```

```
Cluster node count: 2
```

ID	Role	State	Host	External Addr	Internal Addr
1*	master	online	Alloc8-A	192.168.0.161	192.168.1.1
2	standby		Alloc8-B	192.168.0.162	192.168.1.2

Specify what data is synchronized between cluster members

As part of normal cluster operations, the Cluster Master synchronizes parts of the system configuration to all other nodes in the cluster. Some configuration is specific to an individual appliance (for example IP addressing and licensing), however, most of the system configuration is synchronized throughout the cluster, including:

- Optimizer Policies (see note below)
- Network Objects
- Protocol and VLAN Objects
- Applications and Application Groups
- Optimizer Schedules
- Monitoring and Reporting Settings
- SDP and Remote SQL Settings
- Time-zone and NTP Settings
- Logging Settings
- Email and SNMP Notification Settings

Similarly, most monitoring information is shared across the cluster. Some reports don't make sense to share (e.g. Interface reports); however, most reports are synchronized, including:

- Realtime
- Network
- AQS
- Applications and URLs
- Hosts
- Conversations
- Subnets

Note Optimizer policies are also implemented globally across all cluster nodes. For example, if there were a single policy to restrict all traffic to 1Mbps, this would be applied across all cluster nodes. So, the sum of all traffic through all cluster nodes would not exceed 1Mbps.

The following CLI commands can be used to control how data is synchronized between cluster members:

```
(config)# [no] cluster sync {all|acceleration|monitor|optimizer}
```

All - Acceleration, monitor and optimizer data are synchronized. This is disabled by default.

acceleration- Synchronize acceleration data only

monitor- Synchronize monitor data only

optimizer- Synchronize optimizer data only

View the status of all members of the cluster

Identify the roles of each appliances in the cluster, and see basic statistics about the appliances in the Alloc8 WebUI.

1. Click **System > Maintenance > Clustering**. All appliances in the cluster are displayed.

Clustering State								
Host ID	External IPv4 Address	Internal IPv4 Address	Status	Role	Uptime	Version	Memory	Operation
0024e83dcaed	192.168.0.161	192.168.1.1	✔	Master	1h 1m 23s	6.1.0.16836	2050.5MB	Shutdown Reboot
bc305bd453a8	192.168.0.162	192.168.1.2	✔	Standby	1h 1m 25s	6.1.0.16836	2050.5MB	Shutdown Reboot

2. To identify the cluster master, the role is displayed in the list of all appliances.

When logged into the Web UI of a cluster node, the role of the node is also shown in the header of the user interface.