



Sangfor NSF V8.0.85 Professional

High Availability





1 Basic Elements of High Availability

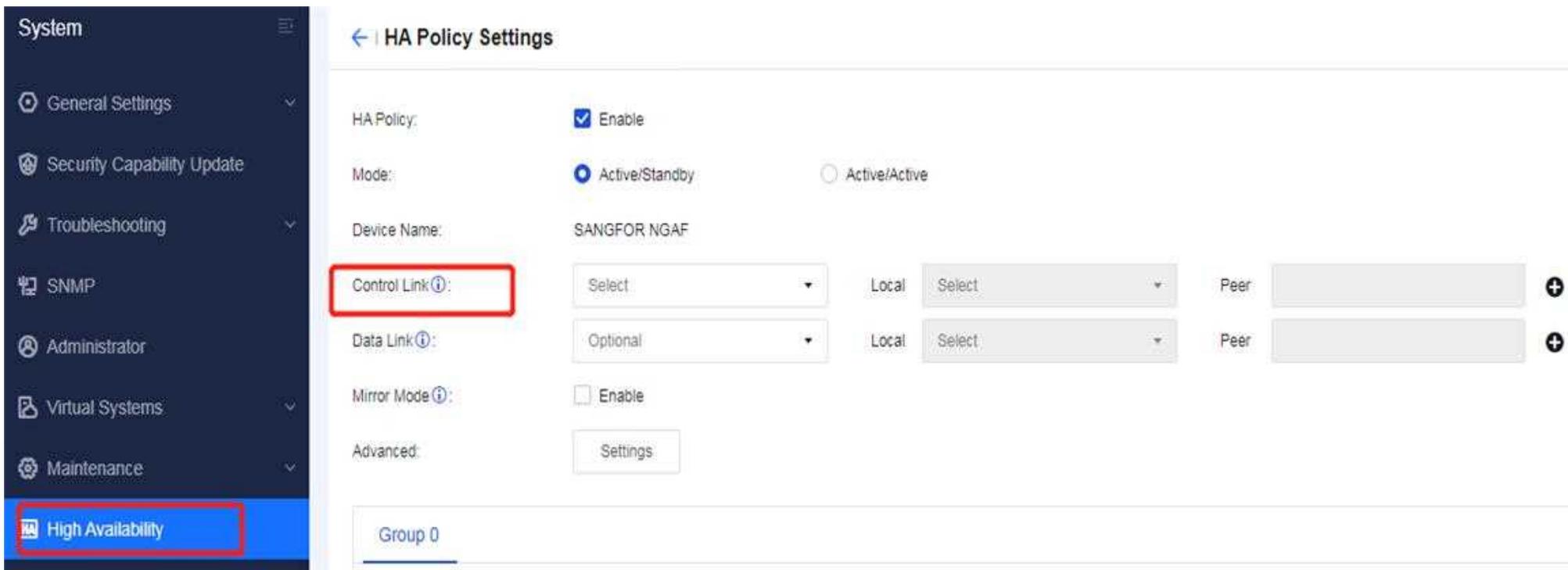
2 Types of High Availability

3 Case Study of High Availability

PART 1

Basic Elements of High Availability

The control link is in charge for synchronizing heartbeat packets, which include configuration and status information. Both remote and local sides have to appoint the same interface for control link interface. Control link is a mandatory setting which cannot be ignored.

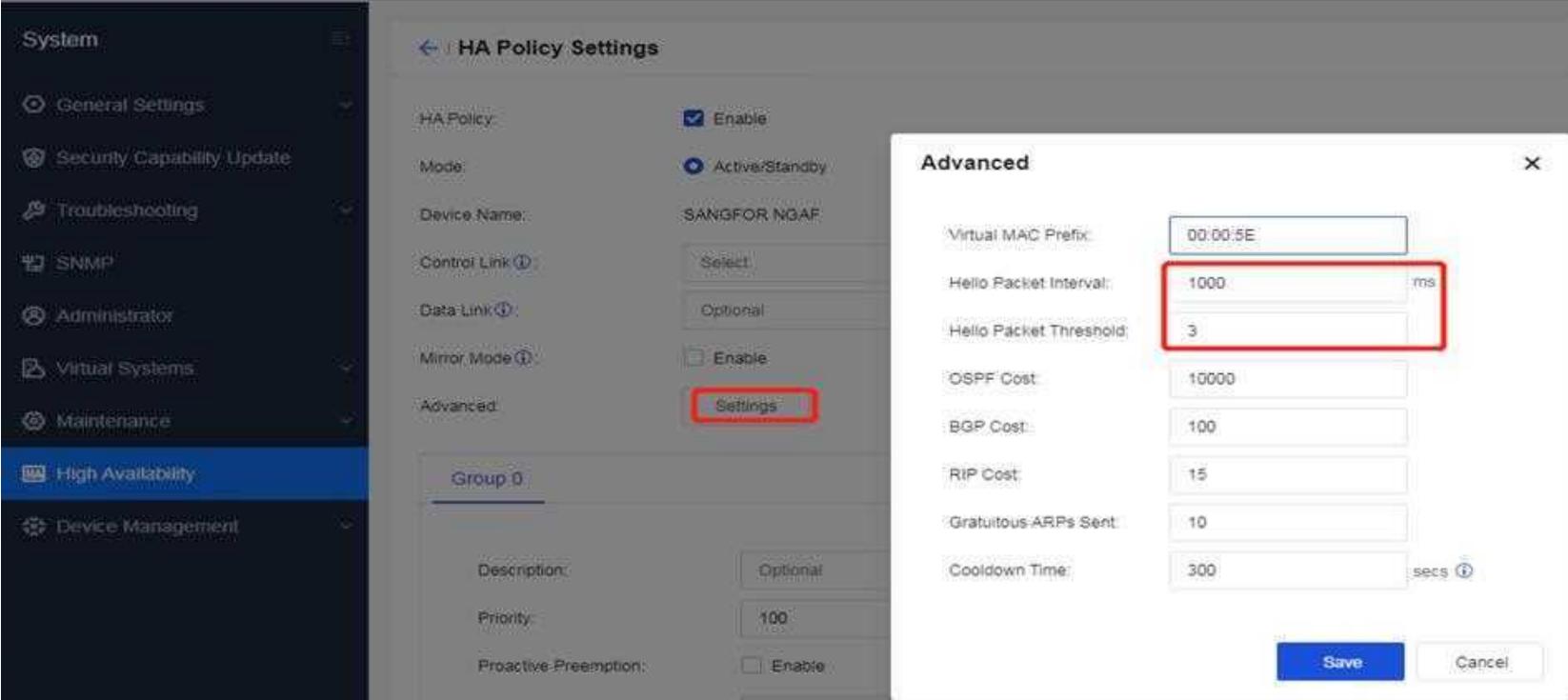


The screenshot displays the 'HA Policy Settings' configuration page. On the left, a dark sidebar menu contains 'System' and 'High Availability' (highlighted with a red box). The main content area shows the following settings:

- HA Policy: Enable
- Mode: Active/Standby Active/Active
- Device Name: SANGFOR NGAF
- Control Link: A red box highlights the 'Control Link' label and its dropdown menu, which is currently set to 'Select'. To its right are 'Local' and 'Peer' dropdowns, both also set to 'Select', and a '+' icon.
- Data Link: A dropdown menu set to 'Optional', with 'Local' and 'Peer' dropdowns set to 'Select' and a '+' icon.
- Mirror Mode: Enable
- Advanced: Settings button

At the bottom, a section for 'Group 0' is visible.

By default, a hello message is sent every 1000 ms. If more than 3 consecutive hello messages are not received by the other side, it is considered that the remote NSF has encountered a failure. Users can modify default settings in the advanced settings page.



The screenshot displays the 'HA Policy Settings' configuration page. On the left, a sidebar menu includes 'System', 'General Settings', 'Security Capability Update', 'Troubleshooting', 'SNMP', 'Administrator', 'Virtual Systems', 'Maintenance', 'High Availability', and 'Device Management'. The main content area shows 'HA Policy' settings: 'Enable' (checked), 'Mode' (Active/Standby), 'Device Name' (SANGFOR NGAF), 'Control Link' (Select), 'Data Link' (Optional), 'Mirror Mode' (Enable), and 'Advanced' (Settings, highlighted with a red box). Below these are 'Group 0' settings: 'Description' (Optional), 'Priority' (100), and 'Proactive Preemption' (Enable). An 'Advanced' dialog box is open, showing fields for: 'Virtual MAC Prefix' (00:00:5E), 'Hello Packet Interval' (1000 ms, highlighted with a red box), 'Hello Packet Threshold' (3), 'OSPF Cost' (10000), 'BGP Cost' (100), 'RIP Cost' (15), 'Gratuitous ARPs Sent' (10), and 'Cooldown Time' (300 secs). 'Save' and 'Cancel' buttons are at the bottom of the dialog.

Data link is in charge for synchronizing sessions, which is an optional setting. If you don't configure data link, control link will take over for synchronizing sessions. If data link is configured, it will represent control link for synchronizing heart-beats packets, only as control link fails.

← | HA Policy Settings

HA Policy: Enable

Mode: Active/Standby Active/Active

Device Name: SANGFOR Network Secure

Control Link ⓘ:	Select	Local	Select	Peer		+
Data Link ⓘ:	eth1	Local	192.168.1.2	Peer		+

ⓘ The data sync interfaces of the active and standby devices must be consistent. Otherwise, synchronization error may occur. x

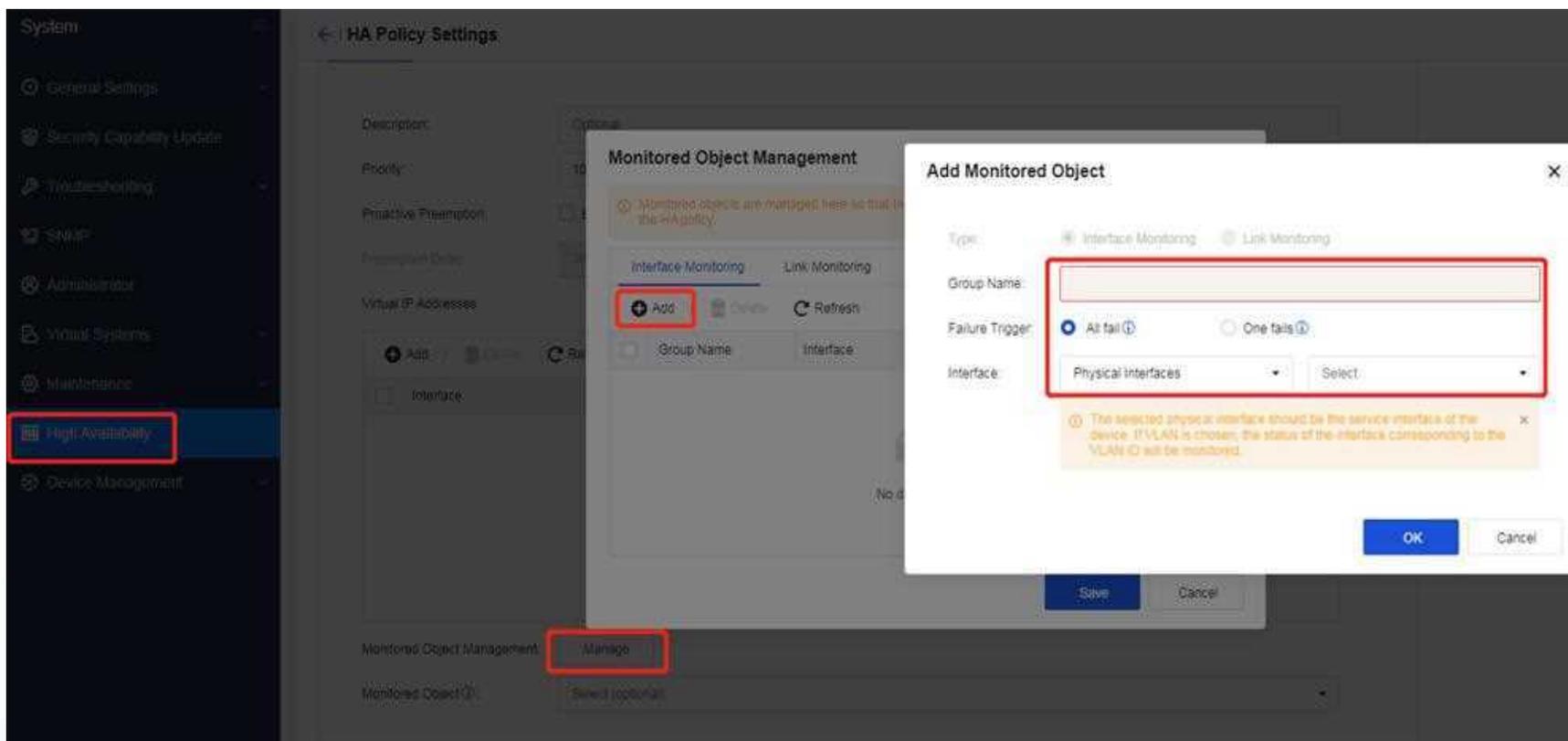
Mirror Mode ⓘ: Enable

Advanced: [Settings](#)

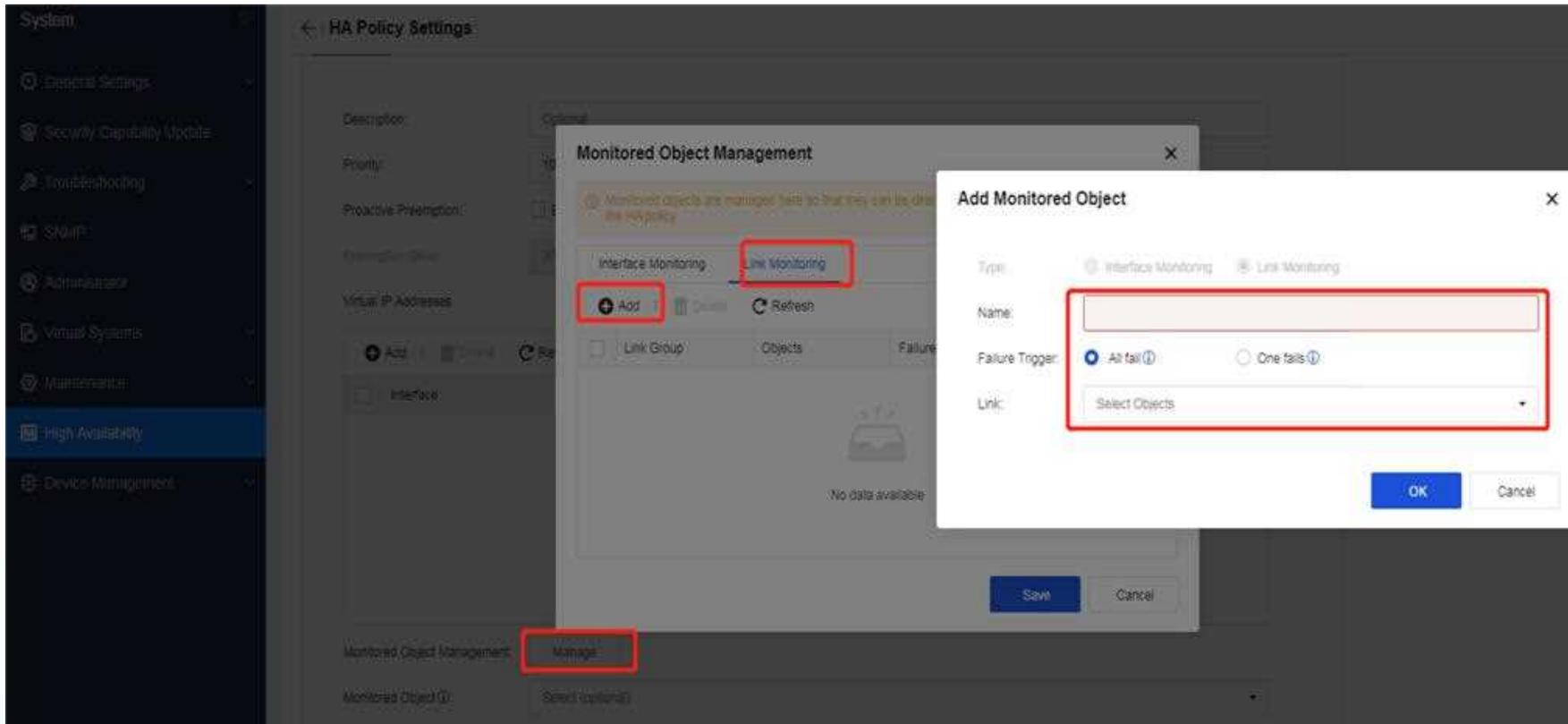
Interface Monitoring



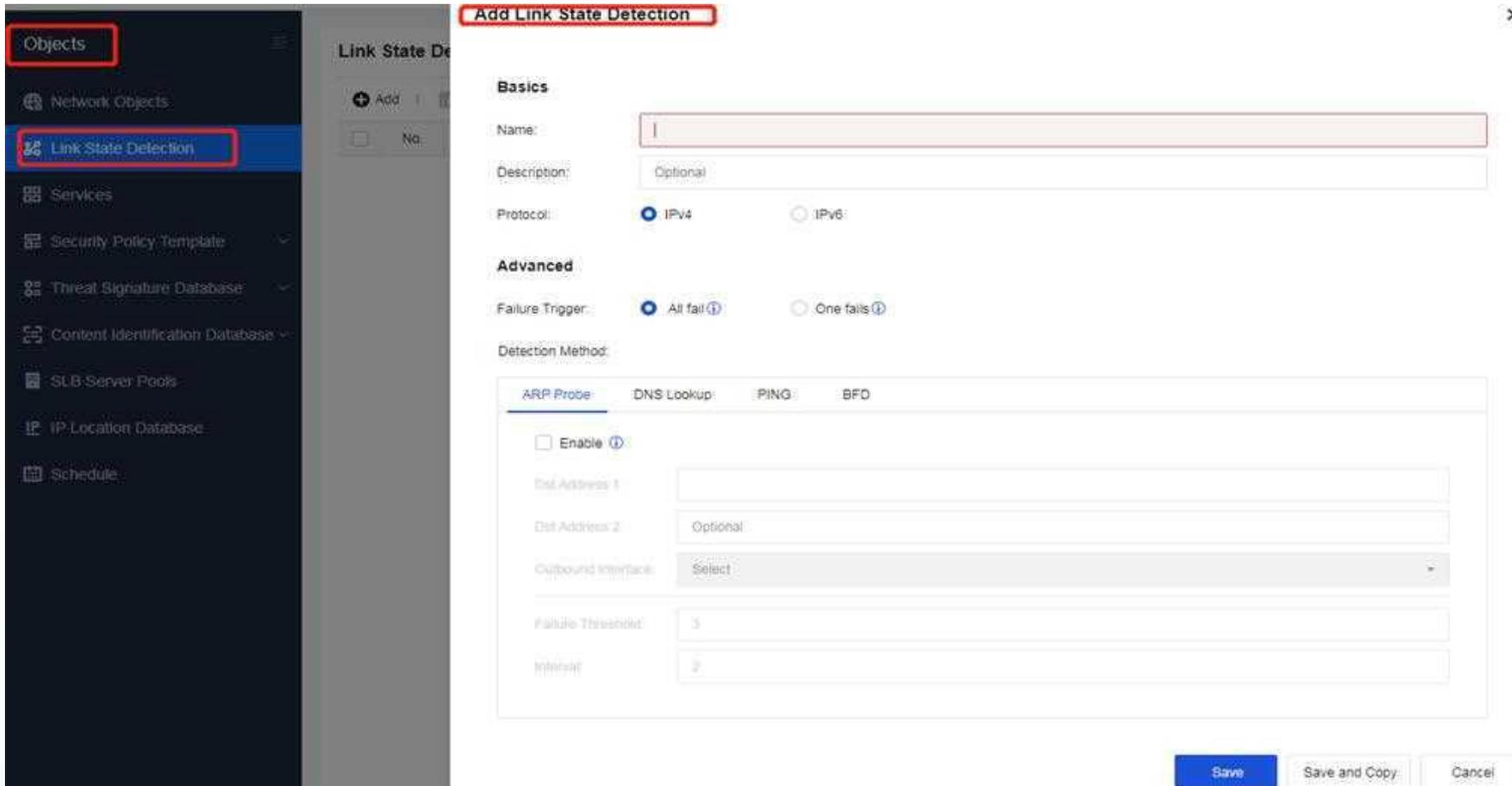
Interface monitoring is used to monitor the status of interfaces. An interface is considered to be in a "failure" state when it is either unplugged or in disabled status. The interface monitoring object can monitor multiple interfaces. If the trigger type is set to "All fail", the interface monitoring object become a "failure" status only when all the interfaces fail. If the trigger type is set to "One fails", the interface monitoring object become a "failure" status as long as one of the interfaces fails..



The link monitoring object is used for monitoring uplink and downlink devices. If uplink or downlink device suffer failure, the link monitoring object will become "failure" state. The link monitoring group can monitor multiple link monitoring objects. If the trigger type is set to "All fail", link monitoring object enters a "failure" status only when all the link monitoring objects fail. If the trigger type is set to "One fails", the link monitoring enters a "failure" status as long as one of the link monitoring objects fails.



When you want to monitor link objects in high availability settings, it is necessary to configure link state detection in advance. The path is **Objects > Link State Detection**. In this page you can select expected types of detection, such as ARP Probe, DNS Lookup, Ping and BFD.



The screenshot displays the Sangfor management console interface. On the left, a dark sidebar menu shows the navigation path: **Objects** (highlighted with a red box) > **Link State Detection** (highlighted with a red box). The main content area shows the 'Add Link State Detection' configuration window, which is also titled with a red box. The window is divided into 'Basics' and 'Advanced' sections.

Basics Section:

- Name:** A text input field.
- Description:** A text input field with the placeholder text 'Optional'.
- Protocol:** Radio buttons for **IPv4** (selected) and **IPv6**.

Advanced Section:

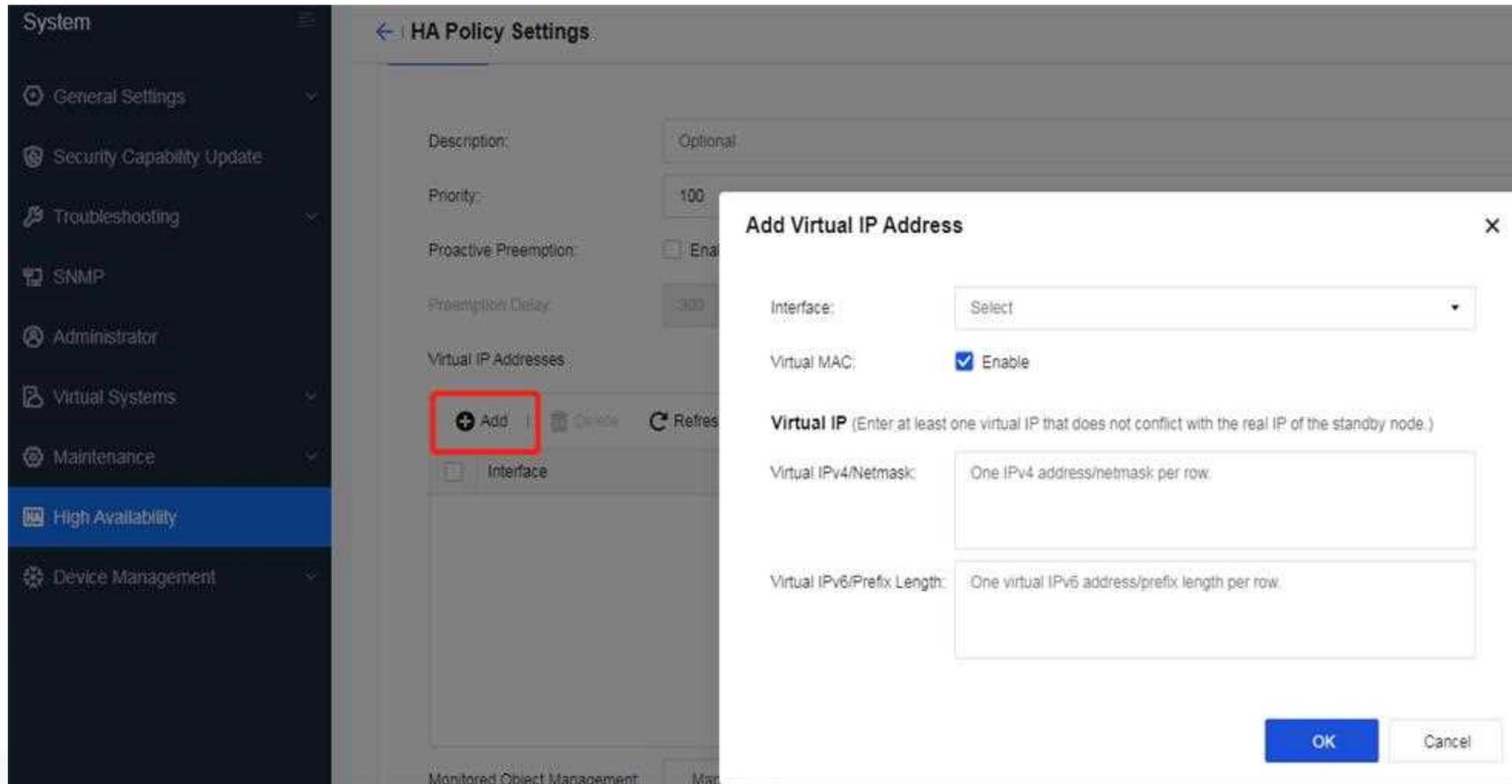
- Failure Trigger:** Radio buttons for **All fail** (selected) and **One fails**.
- Detection Method:** A tabbed interface with four tabs: **ARP Probe** (selected), **DNS Lookup**, **PING**, and **BFD**.

ARP Probe Configuration (under the selected tab):

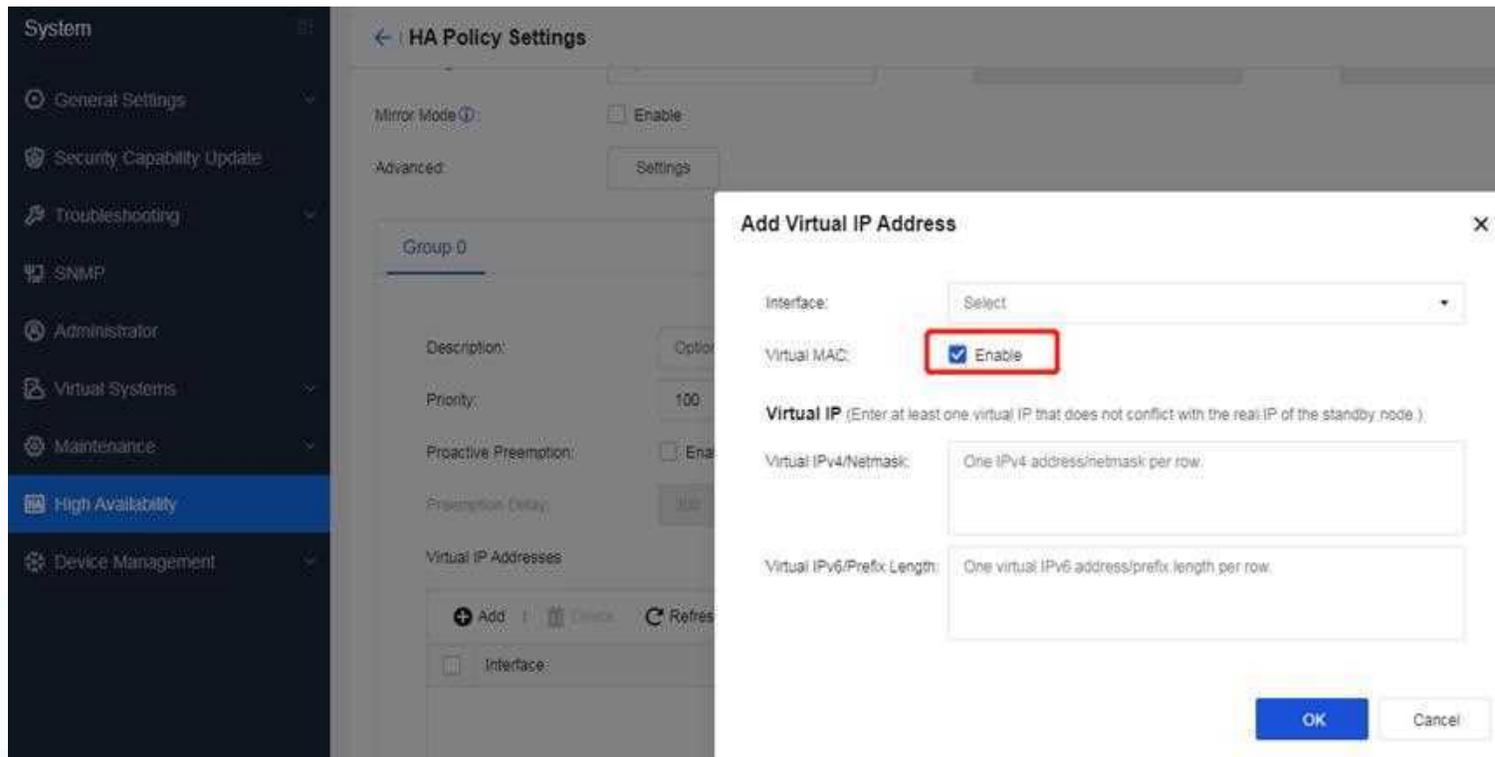
- Enable:** A checkbox with a help icon.
- Dest Address 1:** A text input field.
- Dest Address 2:** A text input field with the placeholder text 'Optional'.
- Outbound Interface:** A dropdown menu with the placeholder text 'Select'.
- Failure Threshold:** A text input field with the value '3'.
- Interval:** A text input field with the value '2'.

At the bottom right of the configuration window, there are three buttons: **Save** (in a blue box), **Save and Copy**, and **Cancel**.

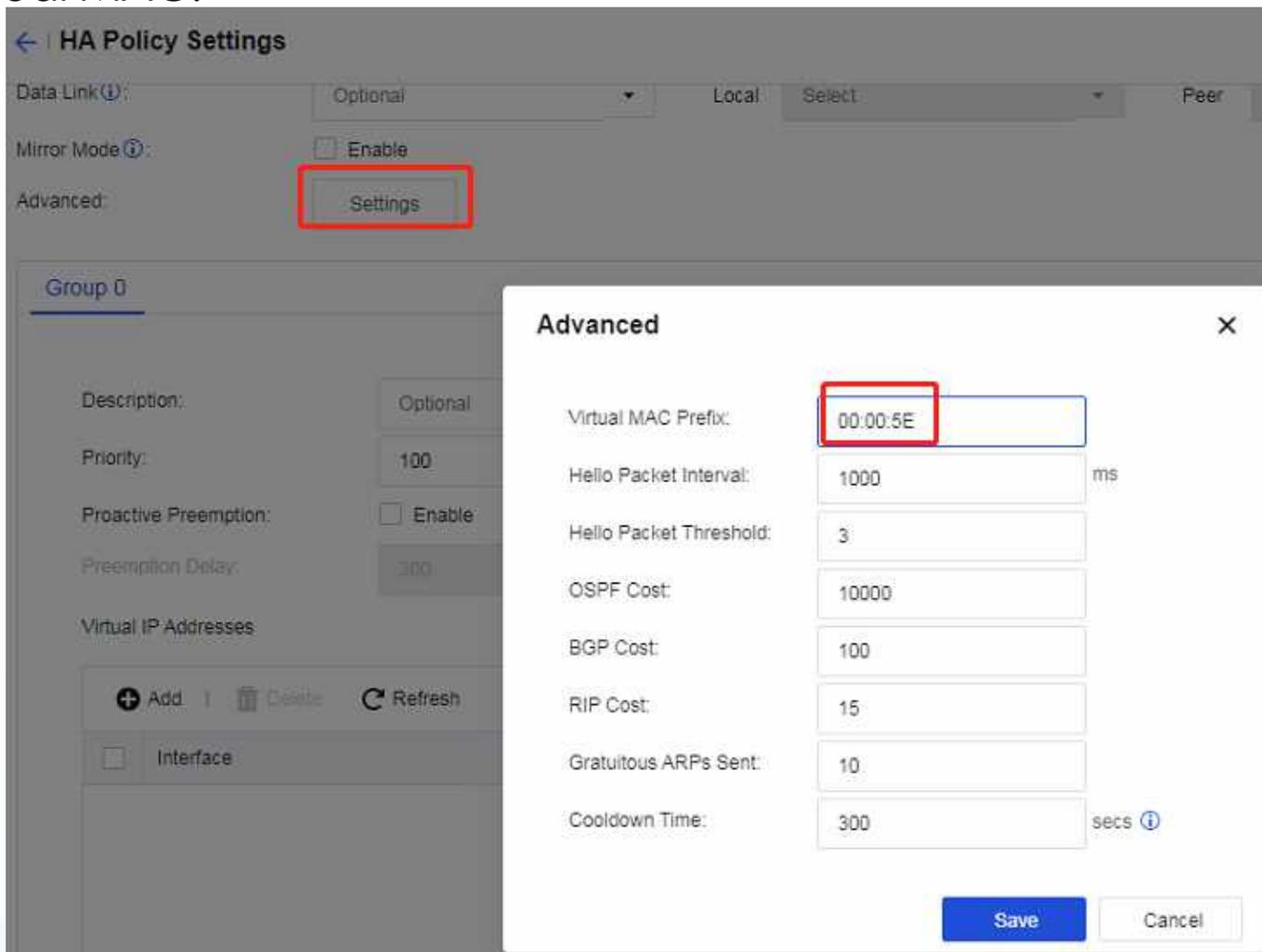
If an IP needs to be synchronized between active and standby NSF and forward business traffic, it is called the virtual IP. Compared to a real IP, the virtual IP is synchronized from active to standby NSF and only issued by the active NSF, rather than the standby NSF. When switchover occurs between active and standby NSF, the latest active NSF will issue the virtual IP.



When active and standby NSF perform a switchover, the latest active NSF sends gratuitous ARP packets to uplink and downlink devices to notify them of the MAC address. Since NIC MAC address (called real MAC address) in active and standby NSF is different. Either real MAC address or virtual MAC forwards traffic. When uplink and downlink devices receive gratuitous ARP, their MAC address table will refresh. Virtual MAC is born with virtual IP, while both in active and standby NSF, virtual MAC is same. To some extent virtual MAC address will be more efficient than real MAC address during switchover since to uplink and downlink devices the MAC address table will not be changed.



Virtual MAC can be generated automatically, while users are able to check or modify default prefix of virtual MAC.



The screenshot displays the 'HA Policy Settings' configuration page. The 'Advanced' section is highlighted with a red box, and a 'Settings' button is also highlighted with a red box. An 'Advanced' dialog box is open, showing various configuration parameters. The 'Virtual MAC Prefix' field is highlighted with a red box and contains the value '00:00:5E'. Other parameters include Hello Packet Interval (1000 ms), Hello Packet Threshold (3), OSPF Cost (10000), BGP Cost (100), RIP Cost (15), Gratuitous ARPs Sent (10), and Cooldown Time (300 secs). The dialog box has 'Save' and 'Cancel' buttons at the bottom.

Parameter	Value	Unit
Virtual MAC Prefix	00:00:5E	
Hello Packet Interval	1000	ms
Hello Packet Threshold	3	
OSPF Cost	10000	
BGP Cost	100	
RIP Cost	15	
Gratuitous ARPs Sent	10	
Cooldown Time	300	secs

Group 0 and Group 1



Either group 0 or 1 represents a set of high availability. In active/standby mode, only group 0 can be seen since there is only one set of high availability. Only in active/active as well as layer-3 mode, there are two sets of high availability, requiring two NSF respectively act as active node and standby node in two groups to forward business traffic. Therefore, only the active/active as well as layer-3 mode has group 0 and group 1 .

HA Policy Settings

HA Policy: Enable

Mode: Active/Standby Active/Active

Device Name: HQ-NGAF

Control Link: Select Local: Select Peer: [Add]

Data Link: Optional Local: Select Peer: [Add]

Mirror Mode: Enable

Advanced: Settings

Group 0

Description: Optional

Priority: 100

Proactive Preemption: Enable

Preemption Delay: 300 secs

Virtual IP Addresses

Interface	Virtual IP/Netmask	Virtual MAC	Operation

HA Policy Settings

HA Policy: Enable

Mode: Active/Standby Active/Active

Device Name: HQ-NGAF

Control Link: Select Local: Select Peer: [Add]

Data Link: Optional Local: Select Peer: [Add]

Layer 2 Mode: Enable

HA Traffic: Enable

Advanced: Settings

Group 0 **Group 1**

Description: Optional

Priority: 100

Proactive Preemption: Enable

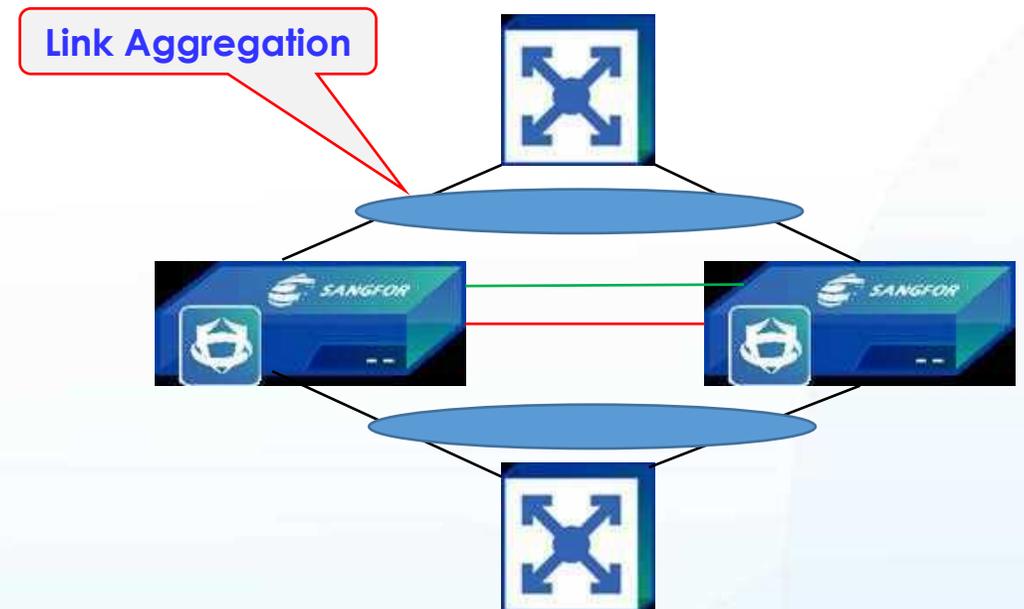
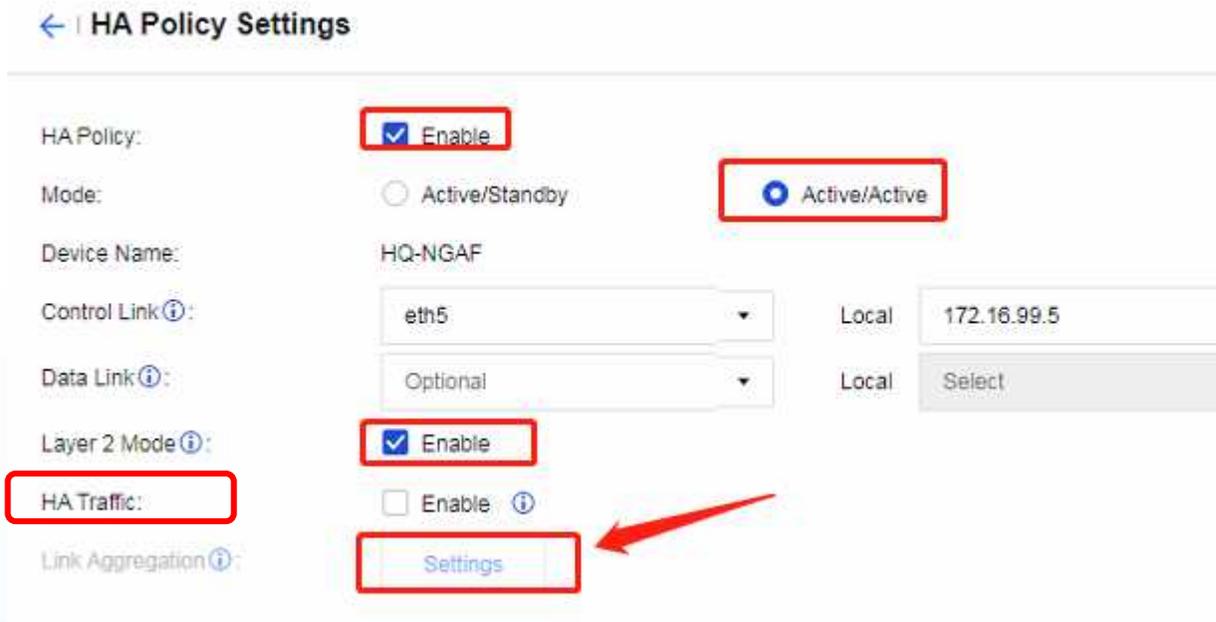
Preemption Delay: 300 secs

Virtual IP Addresses

Interface	Virtual IP/Netmask	Virtual MAC	Operation

Link Aggregation

- Link aggregation is mainly used in the active/active as well as layer-2 mode scenario, where link aggregation is performed on the uplink and downlink devices and traffic exists inconsistent path. After enabling this feature, each NSF will automatically generate identifier (either 0 or 1) in backend. This identifier is not visible on the web page.
- All traffic passing through the interfaces of the internal and external network areas in the NSF link aggregation configuration will be processed by an algorithm based on the source or destination IP addresses. The algorithm determines whether the computed value is 0 or 1, and forwards the corresponding data packet to specific NSF by corresponding identifier (e.g., if the computed value is 0, the data will be forwarded to the NSF with the identifier 0).



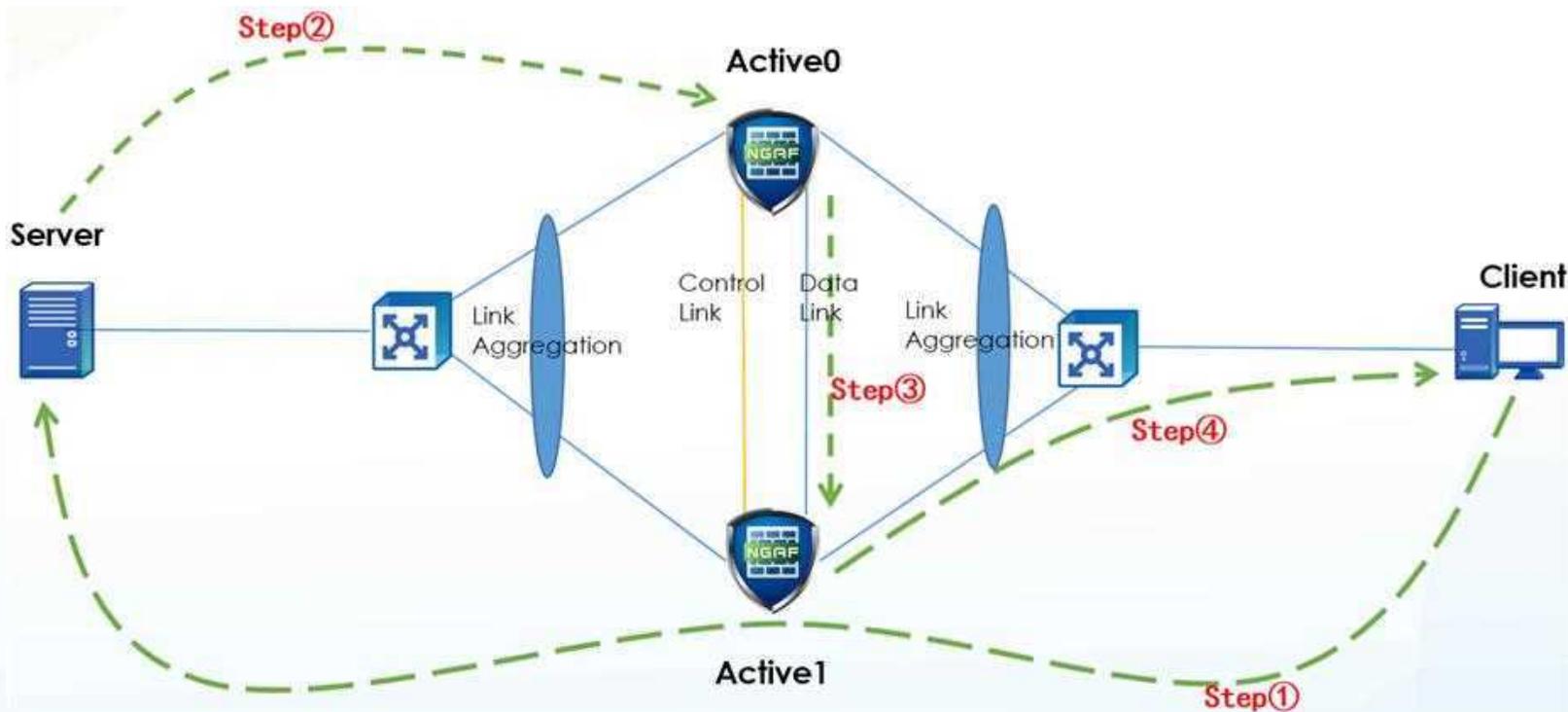
The work flow is as below:

Step① : Client traffic accessing the server passes through Active1 device. Active1 performs detection by hash algorithm. Once the detection is completed, the data packet is forwarded from Active1 to the server.

Step② : The server returns the data packet, which arrives at Active0 by link aggregation.

Step③ : Active 0 calculates the hash algorithm to determine it needs to be further checked by Active1. Same destination address yields the same calculation result as before, the data packet is forwarded to Active1 via the data link.

Step④ : Active 1 returns the data packet to the Client.



HA traffic function is only used for asymmetric traffic occasion, if not, there is no need to turn it on since this function will consume extra performance. HA traffic function is only applicable to below 2 deployment scenarios.

- **Scenario 1:** Active/Active with Virtual Wire Mode as well as enabling link aggregation function(if link aggregation function is not enabled, HA traffic will not take effect);
- **Scenario 2:** Active/Active with Layer-3 Mode;

HA Traffic

- The function is used when there exists inconsistency in wire mode. “HA Traffic”
- After enabling this function, some packets are sent to the peer device in one flow, and ineffective security policies are applied to these packets, which is not only ineffective security but also wastes network resources.
- Once the peer NSF is configured, the peer interface, and the local uplink device's layer 2 mode is set to wire mode, this function helps prevent network

The screenshot shows the 'HA Policy Settings' page in a Sangfor management console. The 'High Availability' menu item is selected in the left sidebar. The main settings are as follows:

- HA Policy: Enable
- Mode: Active/Standby Active/Active
- Device Name: HQ-NGAF
- Control Link: eth5 (Local: 172.16.99.5, Peer: 172.16.99.6)
- Data Link: Optional (Local: Select, Peer:)
- Layer 2 Mode: Enable
- HA Traffic: Enable (highlighted with a red box)
- Advanced: Settings

Below the main settings, there is a section for 'Virtual IP Addresses' with a table for Group 0 and Group 1. The table has columns for Interface, Virtual IP/Netmask, Virtual MAC, and Operation. The 'Add' button is visible above the table.



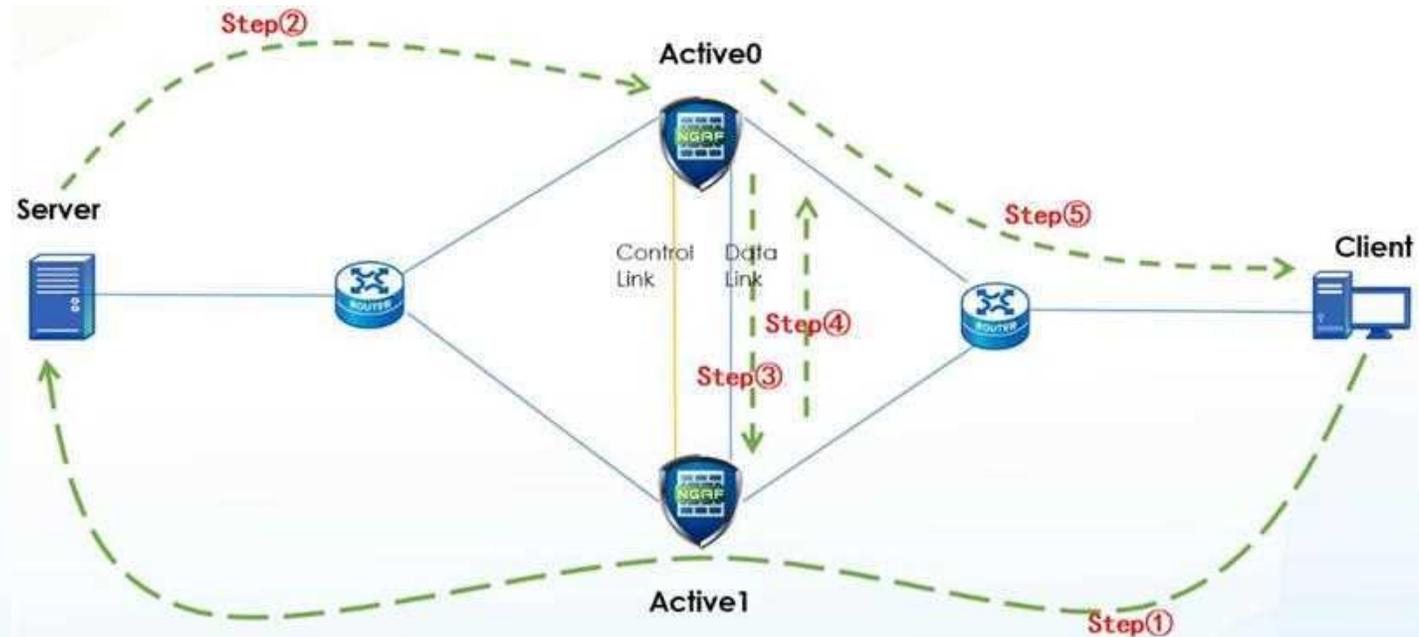
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The specific workflow when enabling both link aggregation and HA traffic features in active/active with virtual wire mode is as follows:

- Step①** : Client traffic accessing the server goes through Active 1. Active 1 performs detection by hash algorithm on the traffic, and upon completion of the detection, forwards it to the server.
- Step②** : The server returns the traffic, which reaches Active 0.
- Step③** : Active 0 applies the hash algorithm to determine that Active 1 should perform the detection (calculating the same result for the same address). It forwards the packets to Active 1 through the data link.
- Step④** : After receiving the packets, Active 1 completes the detection and forwards them back to Active 0 through the data link.
- Step⑤** : Active 0 returns the packets to the client..



Synchronization Objects



You are able to edit synchronization objects in the setting of "Auto Sync", and currently there is only sessions which can be selected.

The screenshot displays the 'High Availability' configuration page. At the top, it shows 'Settings', 'Refresh', 'Mode: Active/Active in L2 Mode', and 'Heartbeat Status: Normal'. Below this, there are two device icons: 'Local Device' and 'Peer Device', with an 'HA Status: Normal' indicator between them. The 'Local Device Information' section lists: Device Name: HQ-NGAF, Control Link: eth5, Control Link 1: -, Data Link: -, and Data Link 1: -. The 'Sync Options' section shows 'Current Device Role: Passive controller' and 'Auto Sync' with a 'Settings' button highlighted by a red box. An 'Auto Sync Settings' dialog box is open, showing 'Objects: Sessions' with a checked checkbox and 'Save' and 'Cancel' buttons.

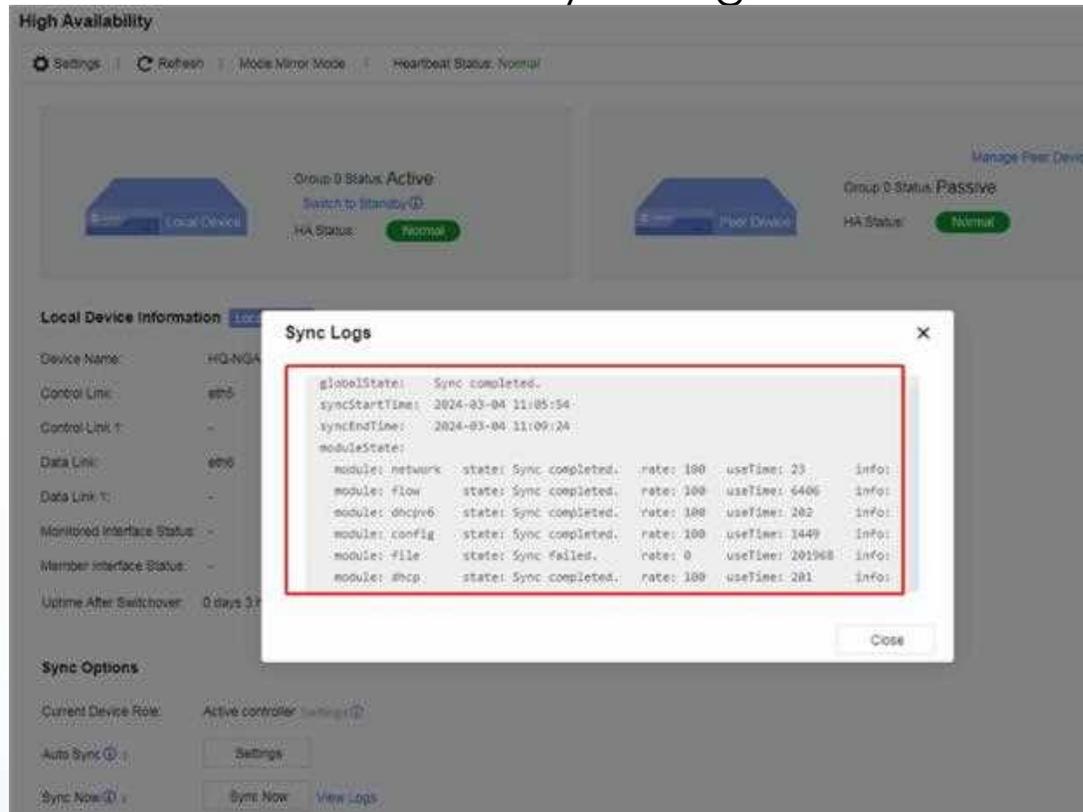
Sessions are synchronized by data link interface in usual, and if there is no data link, which can be synchronized by control link interface. There are several types of synchronization methods, they are respectively as below.

Types of Synchronization	Description
Real-time synchronization	This mainly contains sessions and is triggered as session establishment, deletion, modification and adding.
Manual synchronization	You are able to trigger it manually in web panel.
Scheduled synchronization	In backend, there exists scheduled synchronization from one NSf to another.
Full synchronization	This always happened when suffered switchover.

Note:

- As for parent-child link in the process of session synchronization, such as control channel and data channel in FTP application, parent link will be synchronized firstly and then child link.
- There are some exception which are not synchronized, such as local host sessions, sessions of ICMP, and deleted sessions when interfaces turned down.

- After both NSF have been configured control link and data link interfaces, “Hello” packet determine which one is active and which one is standby.
- After negotiation process finishes, active NSF will synchronize configuration information, such as business configuration, interfaces configuration etc. to standby NSF.
- If new configuration is executed in active NSF, it will automatically synchronize to standby one, however there is no chance to delivery configuration in reverse process.



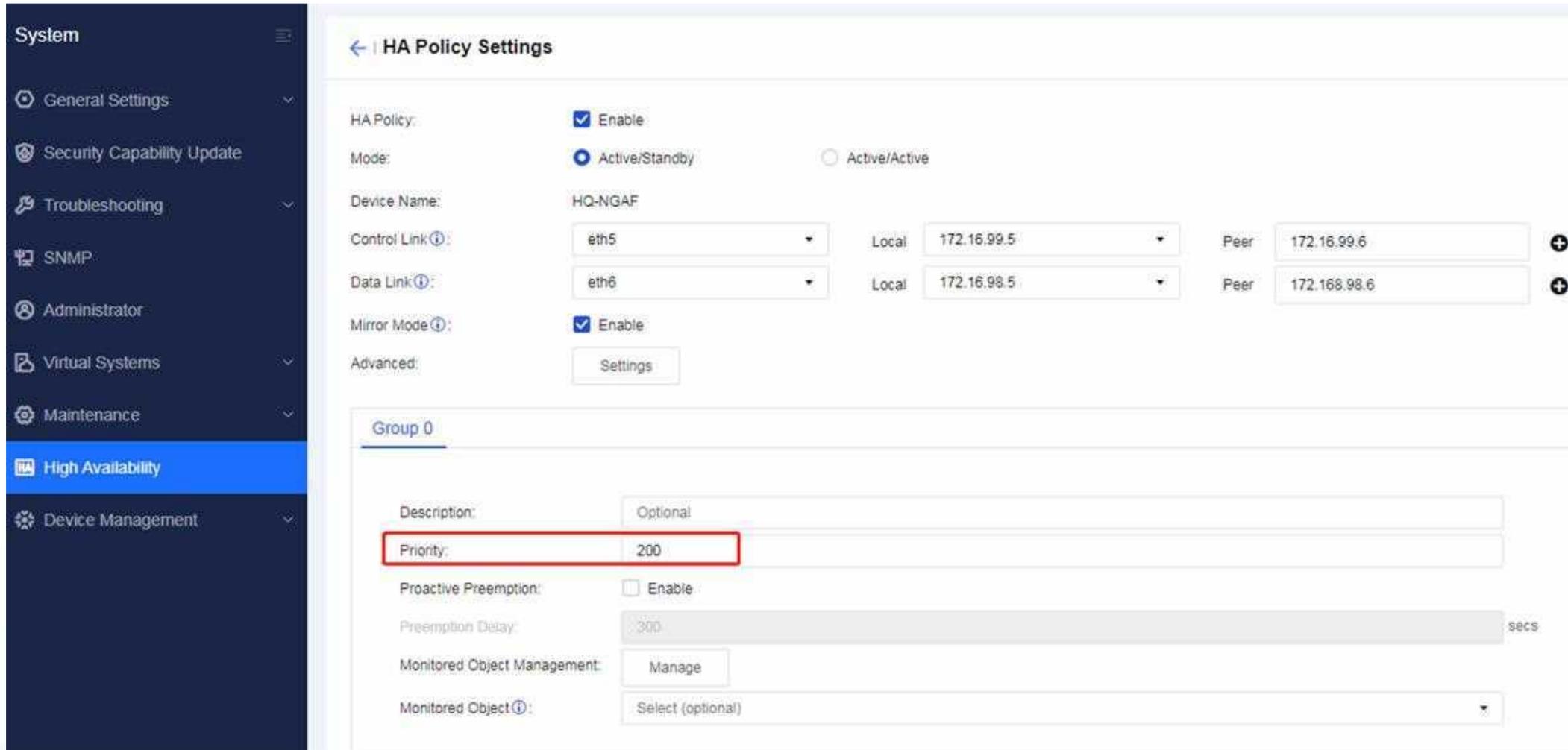
The screenshot displays the 'High Availability' configuration page. At the top, it shows 'Settings', 'Refresh', 'Mode: Mirror Mode', and 'Heartbeat Status: Normal'. Below this, there are two device icons: 'Local Device' (Group 0 Status: Active) and 'Peer Device' (Group 0 Status: Passive). The HA Status is 'Normal'. A 'Sync Logs' window is open, showing the following details:

```
globeState: Sync completed.
syncStartTime: 2024-03-04 11:05:54
syncEndTime: 2024-03-04 11:09:24
moduleState:
  module: network state: Sync completed. rate: 100 useTime: 23 info:
  module: flow state: Sync completed. rate: 100 useTime: 6406 info:
  module: dhcpv6 state: Sync completed. rate: 100 useTime: 202 info:
  module: config state: Sync completed. rate: 100 useTime: 1449 info:
  module: file state: Sync failed. rate: 0 useTime: 201968 info:
  module: dhcp state: Sync completed. rate: 100 useTime: 281 info:
```

High availability switchover depends on a serial of elements, such as proactive preemption, device failure value, monitoring objects failure value, configuration priority, and real-time priority. Details of switchover delay can be referred as below.

Cause of Switchover	Switchover Delay
Modify NSF priority in proactive preemption mode	1 heartbeat cycle
Break down of monitoring interfaces	no delay
Link monitoring detection failure	no delay
NSF power off or whole NSF break down	3 heartbeats cycle

Configuration Priority: Configure in web panel



The screenshot displays the 'HA Policy Settings' configuration page in the Sangfor web panel. The left sidebar shows the navigation menu with 'High Availability' selected. The main content area is divided into two sections: 'HA Policy Settings' and 'Group 0'.

HA Policy Settings:

- HA Policy: Enable
- Mode: Active/Standby Active/Active
- Device Name: HQ-NGAF
- Control Link: eth5 (Local: 172.16.99.5, Peer: 172.16.99.6)
- Data Link: eth6 (Local: 172.16.98.5, Peer: 172.168.98.6)
- Mirror Mode: Enable
- Advanced: Settings

Group 0:

- Description: Optional
- Priority: 200 (highlighted with a red box)
- Proactive Preemption: Enable
- Preemption Delay: 300 secs
- Monitored Object Management: Manage
- Monitored Object: Select (optional)

■ Device failure value and monitoring objects failure value

By default the failure value of interface monitoring and link monitoring are 255 and device failure value is 0. Either interface monitoring or link monitoring happened to failure, device failure value will increase from default 0 to 255.

■ Real-time Priority

Real-time priority = configuration priority - device failure value

Note: The minimal value of real-time priority is “0”, and never be a negative number. For example if configuration priority is 100, and currently device failure value is 255, real-time priority value then is “0”

■ Proactive Preemption

Group 0

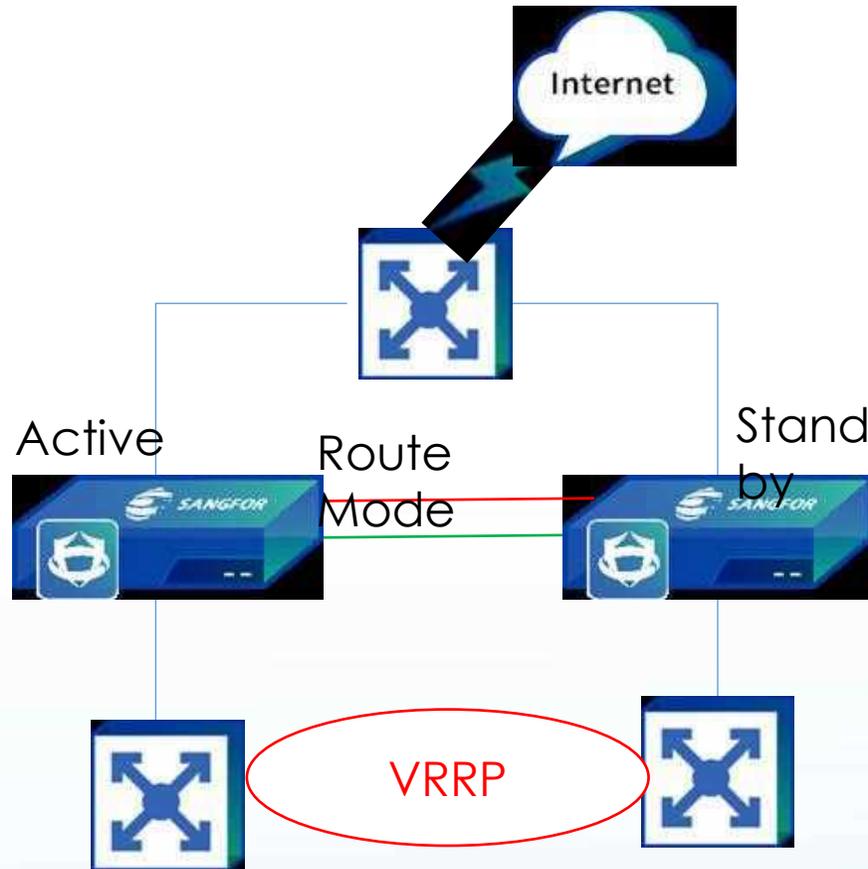
Description:	Optional	
Priority:	200	
Proactive Preemption:	<input checked="" type="checkbox"/> Enable	
Preemption Delay:	300	secs
Monitored Object Management:	Manage	
Monitored Object ⓘ:	Select (optional)	

PART 2

Types of High Availability

Active/Standby Mode

Only active NSF forwards traffic, standby NSF doesn't in Active/Standby mode. Only active NSF will issue virtual IP to uplink and downlink devices. When active NSF suffers failure, there will trigger switchover, and then virtual IP will be issued by latest active NSF. The configuration cannot be edited once NSF is elected as standby role.



Active/Standby with Mirror Mode



The real IP forwards traffic replacing virtual IP, when compared with Active/Standby mode. Except from OOBM interface, control link interface and data link interface, the rest interfaces information will be synchronized from active NSF to standby NSF, including MAC addresses.

The screenshot displays the 'HA Policy Settings' configuration page. On the left, a table lists physical interfaces. On the right, the HA Policy settings are configured for 'Active/Standby' mode with 'Mirror Mode' enabled.

Interface Name	Interface Status	WAN Attribute	Type
eth0 OOBM		No	La
eth1		Yes	La
eth2		No	La
eth3		No	La
eth4		No	La
eth5		No	La
eth6		No	La

HA Policy Settings

HA Policy: Enable

Mode: Active/Standby Active/Active

Device Name: HQ-NGAF

Control Link: eth5 Local: 172.16.99.5 Peer: 172.16.99.6

Data Link: eth6 Local: 172.16.98.5 Peer: 172.168.98.6

Mirror Mode: Enable

Advanced: Settings

Group 0

Description: Optional

Priority: 200

Proactive Preemption: Enable

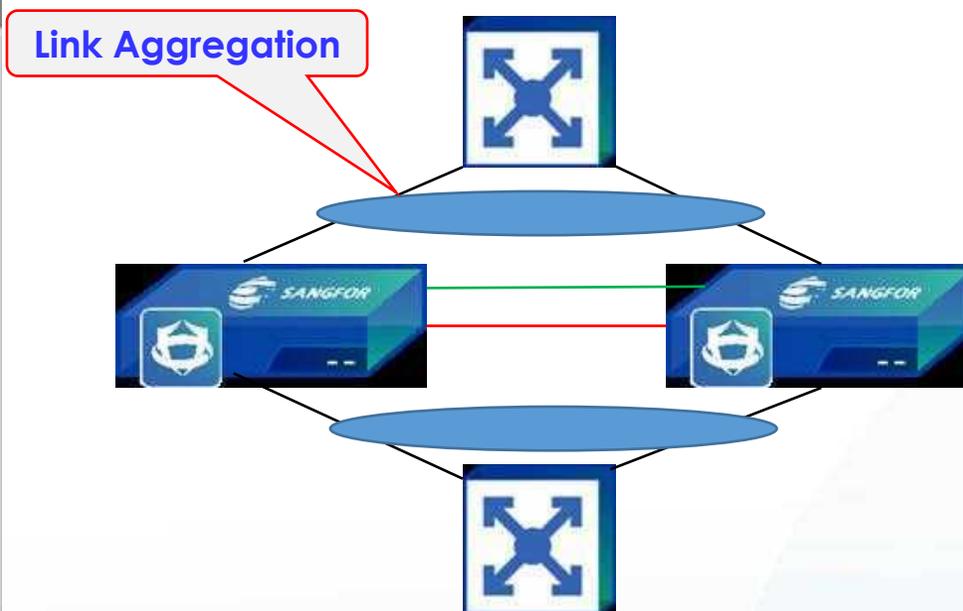
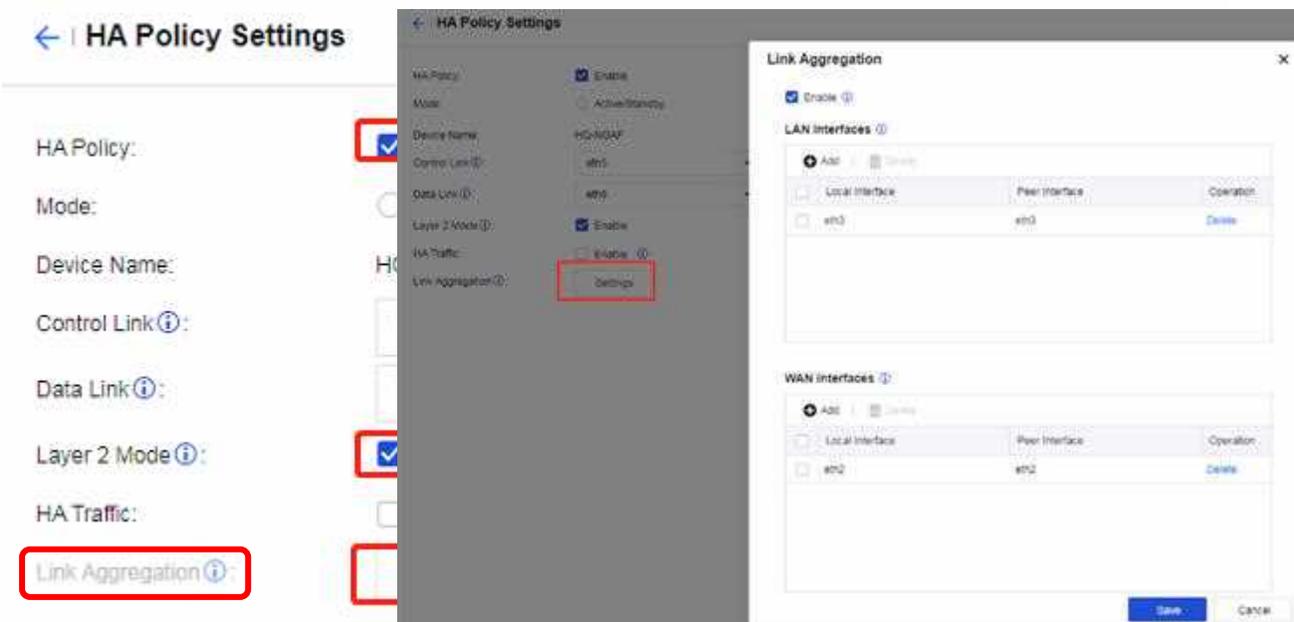
Preemption Delay: 300 secs

Monitored Object Management: Manage

Monitored Object: Select (optional)

Active/Active with Virtual Wire Mode

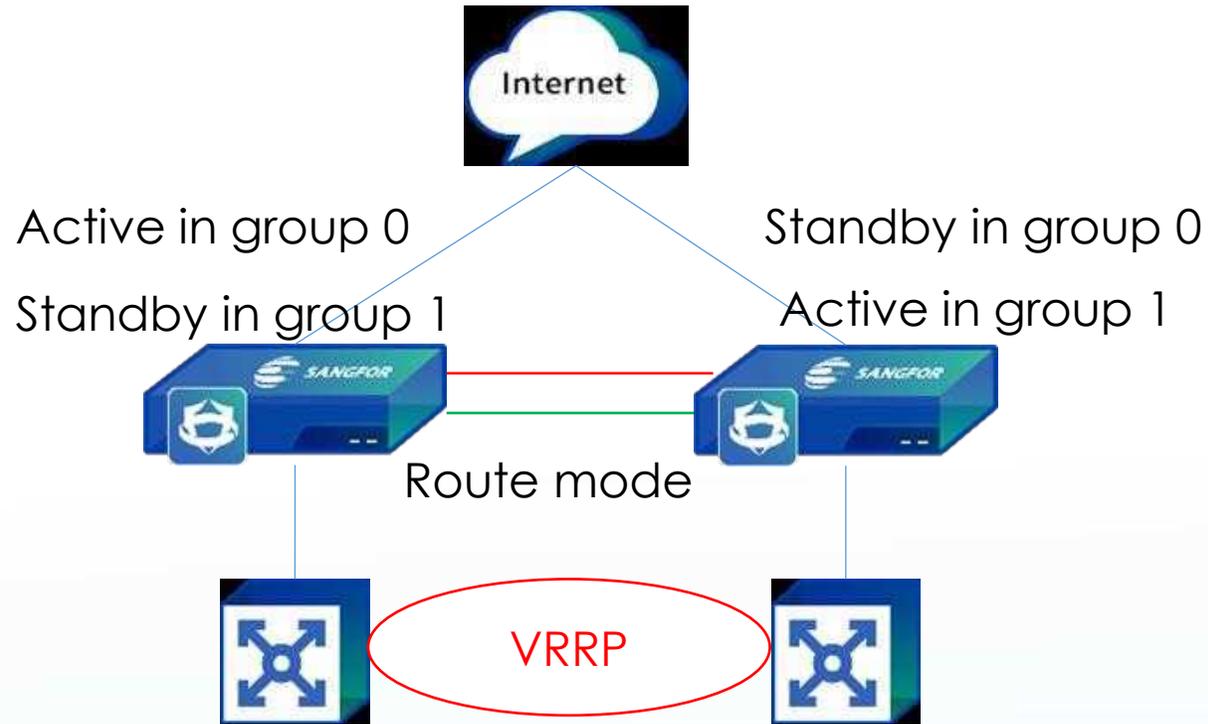
There is no group 0 nor group 1 in Active/Active with layer-2 mode. If there exists inconsistent traffic, you are required to turn on “**Link Aggregation**” function to guarantee normal forwarding.



- Requirements:
1. HA policy is enabled.
 2. The HA mode is active/active and Layer 2 mode is enabled.
 3. Data sync interface is configured.
 4. At least 2 available Layer-2 interfaces are required.

Active/Active with Layer-3 Mode

Active/Active with layer-3 mode is mainly used for scenario that one NSF undertakes too much due to large size of traffic, requiring another NSF to load balance. In this mode, both NSF forward traffic as well as behave the relation between active and backup in different group.

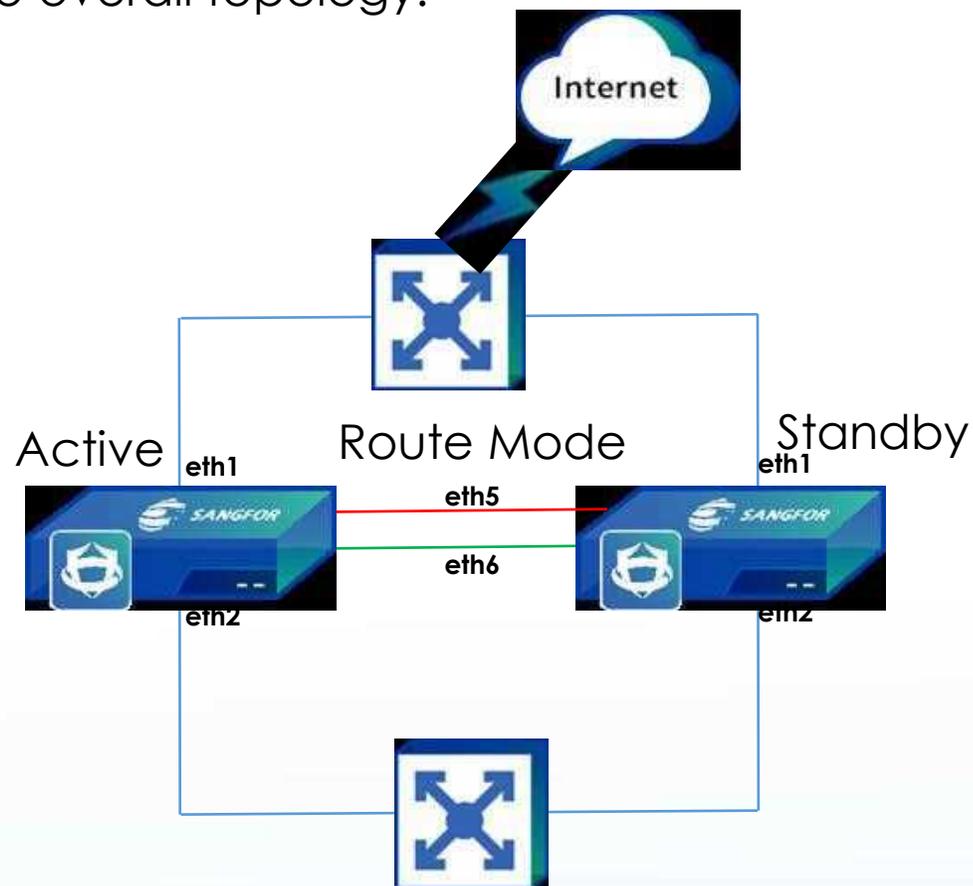


PART 3

Case Study of High Availability

Case 1: Active/Standby with Mirror Mode

A customer now purchase 2 NSF to deploy current network and require NSF provide high availability. Below is the overall topology.



Case 1: Active/Standby with Mirror Mode



In expected active NSF, configure network and interfaces(ignore security policy and deployment related)

The screenshot displays the Sangfor network configuration interface. At the top, there are three overlapping 'Edit Physical Interface' windows. The main interface shows a table of network interfaces:

Interface	Icon	Yes/No	Layer	Port	IP Assignment	IP Address	Speed	MTU	Status	Action
eth1		Yes	Layer 3	Internet	Static IPv4/Static IPv6	172.168.60.122/24	Full-duplex 1000Mbps	1500/1500	✓	Edit
eth2		No	Layer 3	LAN	Static IPv4/Static IPv6	192.168.77.2/24	Full-duplex 1000Mbps	1500/1500	✓	Edit

Below the table, two detailed configuration windows are shown:

- Left Window (IPv4 Advanced):** Shows 'Jumbo Frame' checked and highlighted with a red box. Other settings include Link Mode, IPv4/IPv6 MTU (1500), and MAC Address (fa:fc:fa:67:38:2e).
- Right Window (IP Assignment):** Shows 'Jumbo Frame' checked and highlighted with a red box. Other settings include Link Mode, IPv4/IPv6 MTU (1500), MAC Address (fa:fc:fa:6f:88:48), and Management Service options (WEBUI, PING, SNMP, SSH).

Case 1: Active/Standby with Mirror Mode



In expected standby NSF, configure network and interfaces.

Edit Physical Interface [Close]

Basics

Name: eth5

Status: Enabled Disabled

Description: Optional

Type: Layer 3

Zone: Control-Link

Basic Attributes: WAN attribute

Reverse Routing: Enabled

IPv4 | IPv6 | Advanced

IP Assignment: Static DHCP PPPoE

Static IP: 172.16.99.6/24

Default Gateway:

Link Bandwidth: Outbound 1000 Mbps Inbound 1000 Mbps

Management Service

Allow: WEBUI PING SNMP SSH

OK **Cancel**

Edit Physical Interface [Close]

Basics

Name: eth6

Status: Enabled Disabled

Description: Optional

Type: Layer 3

Zone: Data-Link

Basic Attributes: WAN attribute

Reverse Routing: Enabled

IPv4 | IPv6 | Advanced

IP Assignment: Static DHCP PPPoE

Static IP: 172.16.98.6/24

Default Gateway:

Link Bandwidth: Outbound 1000 Mbps Inbound 1000 Mbps

Management Service

Allow: WEBUI PING SNMP SSH

OK **Cancel**

Case 1: Active/Standby with Mirror Mode



In expected active NSF, configure setting of high availability.

← HA Policy Settings

HA Policy: Enable

Mode: Active/Standby Active

Device Name: HQ-NGAF

Control Link: eth5

Data Link: eth6

Mirror Mode: Enable

Advanced: Settings

Group 0

Description: Optional

Priority: 200

Proactive Preemption: Enable

Preemption Delay: 300

Monitored Object Management: Manage

Monitored Object: Select (optional)

Monitored Object Management

Monitored objects are managed here so that they can be directly referenced when the user configure the HA policy.

Interface Monitoring | Link Monitoring

+ Add | Delete | Refresh

<input type="checkbox"/>	Group Name	Interface	Failure Trigger	Operation	...
<input type="checkbox"/>	business interface	eth1,eth2	One fails	Edit Delete	

Save Cancel

Case 1: Active/Standby with Mirror Mode



In expected standby NSF, configure setting of high availability.

← HA Policy Settings

HA Policy:

Enable

Mode:

Active/Standby

Active/Active

Device Name:

NSF

Control Link ⓘ:

eth5

Local

172.16.99.6

Peer

172.16.99.5

Data Link ⓘ:

eth6

Local

172.16.98.6

Peer

172.16.98.5

Mirror Mode ⓘ:

Enable

Advanced:

Settings

Group 0

Description:

Optional

Priority:

100

Proactive Preemption:

Enable

Preemption Delay:

300

secs

Monitored Object Management:

Manage

Monitored Object ⓘ:

Select (optional)

Case 1: Active/Standby with Mirror Mode



After high availability is established successfully, it will display below status.

High Availability

Settings | Refresh | Mode: Mirror Mode | Heartbeat Status: Normal

This node is in secondary sync role and configurations cannot be changed via it.

Group 0 Status: **Active**
Switch to Standby ⓘ
HA Status: **Normal**

Local Device Information Local Device

Device Name:	HO-NGAF
Control Link:	eth5
Control Link 1:	-
Data Link:	eth6
Data Link 1:	-
Monitored Interface Status:	-
Member Interface Status:	-
Uptime After Switchover:	0 days 6 hrs 21 mins View Switchover Information

Active NSF

High Availability

Settings | Refresh | Mode: Mirror Mode | Heartbeat Status: Normal

Group 0 Status: **Passive**
HA Status: **Normal**

Local Device Information Local Device

Device Name:	NSF
Control Link:	eth5
Control Link 1:	-
Data Link:	eth6
Data Link 1:	-
Monitored Interface Status:	-
Member Interface Status:	-
Uptime After Switchover:	0 days 6 hrs 10 mins View Switchover Information

Standby NSF

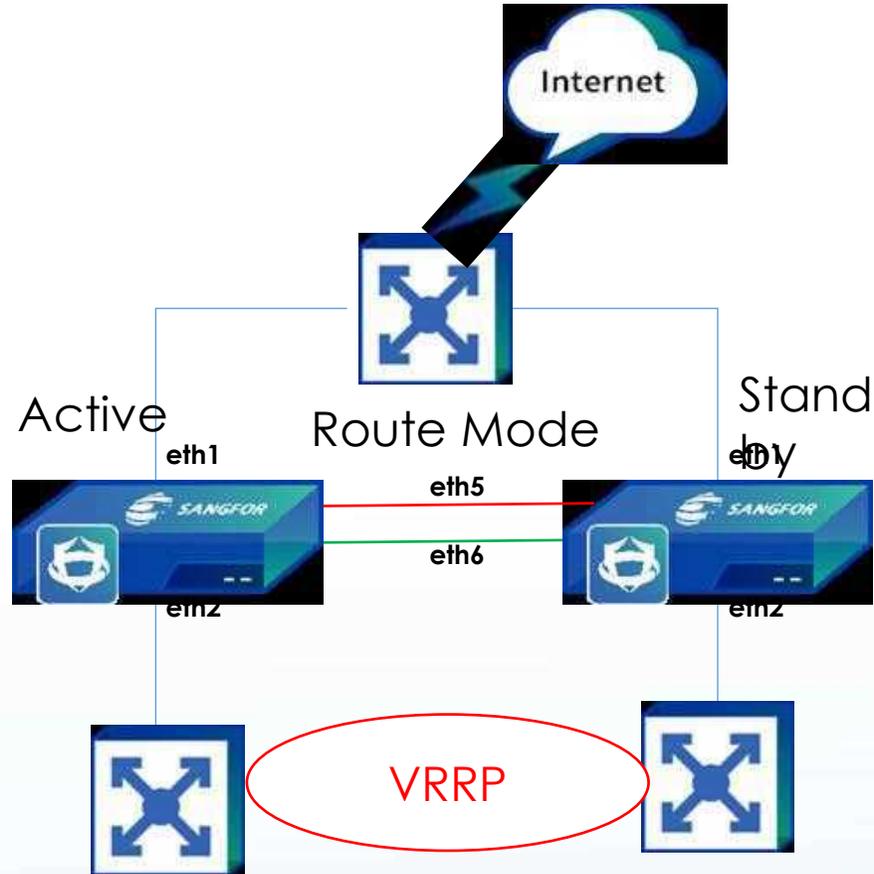
Manage Peer Device

Group 0 Status: **Active**
HA Status: **Normal**

Peer Device

Case 2: Active/Standby Mode

A customer's internal network is based on VRRP protocol, now customer purchased 2 NSF to deploy current network and require NSF provide high availability. Below is the overall topology.



Case 2: Active/Standby Mode



In expected active NSF, configure network and interfaces(ignore security policy and deployment related)

The screenshot displays the 'Edit Physical Interface' configuration window for two interfaces: eth1 and eth2. The interface settings are as follows:

Interface	Name	Status	Description	Type	IP Address	Speed	MTU	Link Mode
eth1	eth1	Enabled	Optional	Layer 3	172.168.60.122/24	Full-duplex 1000Mbps	1500	Auto-negotiation
eth2	eth2	Enabled	Optional	Layer 3	192.168.77.2/24	Full-duplex 1000Mbps	1500	Auto-negotiation

Below the interface list, two detailed configuration windows are shown:

- Advanced Tab (Left):** Shows 'Jumbo Frame' set to Enable. Other settings include Link Mode, IPv4 MTU (1500), IPv6 MTU (1500), and MAC Address (fe:fc:fe:67:38:2e).
- Advanced Tab (Right):** Shows 'Jumbo Frame' set to Enable. Other settings include Link Mode, IPv4 MTU (1500), IPv6 MTU (1500), and MAC Address (fe:fc:fe:8f:88:48).

The Management Service section for both interfaces has the following settings:

- Allow: WEBUI, PING, SNMP, SSH

Case 2: Active/Standby Mode



In expected standby NSF, configure network and interfaces.

The screenshot displays two 'Edit Physical Interface' configuration windows side-by-side. The left window is for interface 'eth5' and the right is for 'eth6'. Both are set to 'Enabled' status, 'Optional' description, and 'Layer 3' type.

<input checked="" type="checkbox"/>	eth1		Yes	Layer 3	Internet	Static IPv4/Stati...	172.168.60.123/24	Full-duplex 1000Mbps Auto-negotiation	1500/1500	✓
<input type="checkbox"/>	eth2		No	Layer 3	LAN	Static IPv4/Stati...	192.168.77.3/24	Full-duplex 1000Mbps Auto-negotiation	1500/1500	✓

Below the table, the configuration details for eth5 and eth6 are shown. Both have a Static IP of 172.16.99.6/24 and a Default Gateway field. Link bandwidth is set to 1000 Mbps for both directions. Management services (WEBUI, PING, SNMP, SSH) are enabled for both.

Case 2: Active/Standby Mode



In expected active NSF, configure setting of high availability.

← HA Policy Settings

HA Policy: Enable

Mode:

Device Name:

Control Link Ⓞ:

Data Link Ⓞ:

Mirror Mode Ⓞ:

Advanced:

Group 0

Description:

Priority:

Proactive Preem

Preemption Del

Virtual IP Address

Virtual IP Addresses

Enable

+ Add | Delete | Refresh

<input type="checkbox"/>	Interface	Virtual
<input type="checkbox"/>	eth1	172.16
<input type="checkbox"/>	eth2	192.16

Monitored Object Management: Manage:

Monitored Object ⓘ: **business interface**

Save Cancel

Monitored Object Management

Monitored objects are managed here so that they can be directly referenced when the user configure the HA policy.

Interface Monitoring | Link Monitoring

+ Add | Delete | Refresh

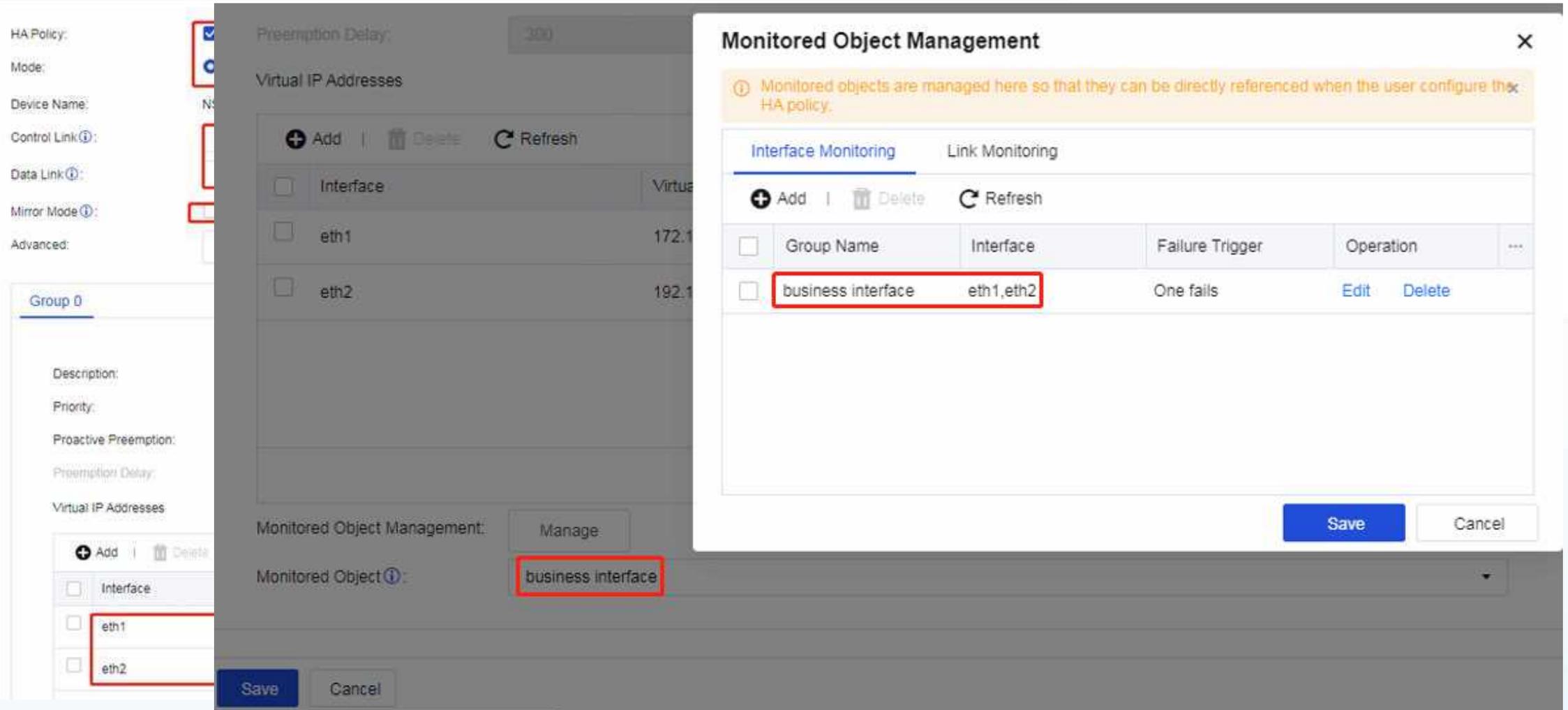
<input type="checkbox"/>	Group Name	Interface	Failure Trigger	Operation	...
<input type="checkbox"/>	business interface	eth1,eth2	One fails	Edit Delete	

Save Cancel

Case 2: Active/Standby Mode

In expected standby NSF, configure setting of high availability.

← | HA Policy Settings



HA Policy:
Mode:
Device Name: NS
Control Link:
Data Link:
Mirror Mode:
Advanced:
Group 0
Description:
Priority:
Proactive Preemption:
Preemption Delay:
Virtual IP Addresses
+ Add | Delete
 Interface
 eth1
 eth2
Monitored Object Management: Manage
Monitored Object: business interface
Save Cancel

Monitored Object Management ×

Monitored objects are managed here so that they can be directly referenced when the user configure the HA policy.

Interface Monitoring | Link Monitoring

+ Add | Delete | Refresh

<input type="checkbox"/>	Group Name	Interface	Failure Trigger	Operation	...
<input type="checkbox"/>	business interface	eth1,eth2	One fails	Edit Delete	

Save Cancel

Case 2: Active/Standby Mode

The successful high availability status is shown as below.

High Availability

Settings | Refresh | Mode: Active/Standby | Heartbeat Status: Normal

This node is in secondary sync role and configurations cannot be changed via it.



Group 0 Status: **Active**
Switch to Standby ⓘ
HA Status: **Normal**

Local Device Peer Device

Local Device Information Local Device

Device Name: HQ-NGAF
Control Link: eth5
Control Link 1: -
Data Link: eth6
Data Link 1: -
Monitored Interface Status: Normal
Member Interface Status: -
Uptime After Switchover: 0 days 0 hrs 5 mins [View Switchover Information](#)

Sync Options

Current Device Role: Active controller [Settings ⓘ](#)

Auto Sync ⓘ: [Settings](#)

Sync Now ⓘ: [Sync Now](#) [View Logs](#)

Active NSF

Settings | Refresh | Mode: Active/Standby | Heartbeat Status: Normal



Group 0 Status: **Passive**
HA Status: **Normal**

Local Device Peer Device

Local Device Information Local Device

Device Name: NSF
Control Link: eth5
Control Link 1: -
Data Link: eth6
Data Link 1: -
Monitored Interface Status: Normal
Member Interface Status: -
Uptime After Switchover: 0 days 0 hrs 6 mins [View Switchover Information](#)

Sync Options

Current Device Role: Passive controller [Settings ⓘ](#)

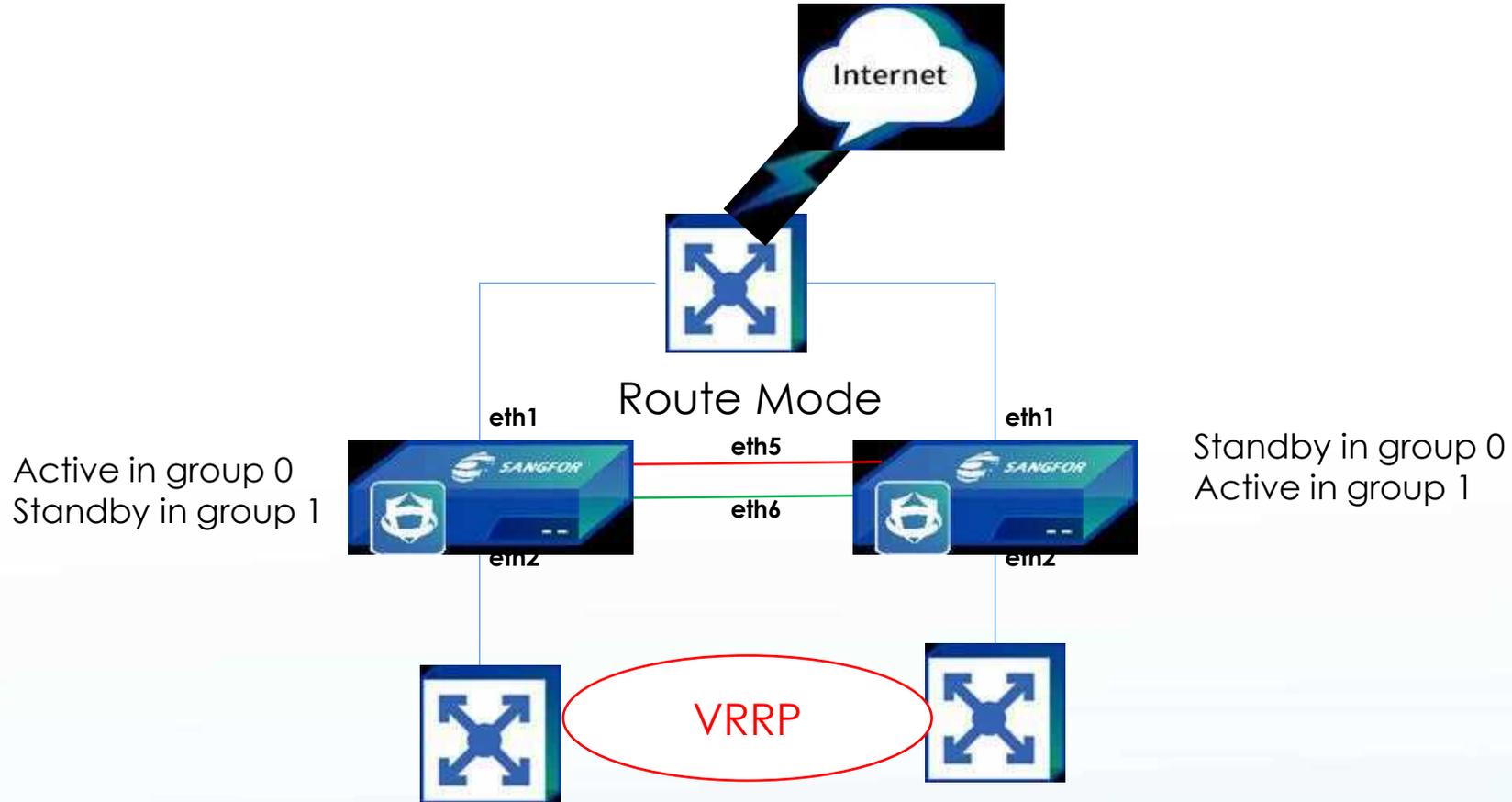
Auto Sync ⓘ: [Settings](#)

Sync Now ⓘ: [Sync Now](#) [View Logs](#)

Standby NSF

Case 3: Active/Active with Layer-3 Mode

A customer purchase 2 NSF to be deployed in egress of enterprise network and they require to achieve active/active mode for traffic load balance, besides downlink core switches is based on VRRP protocol.



Case 3: Active/Active with Layer-3 Mode



The first NSF business and high availability interfaces are configured as below.

The screenshot displays the network configuration interface for two physical interfaces, eth1 and eth2. The interface settings are as follows:

Interface	Status	Mode	Environment	IP Configuration	IP Address	Speed	MTU	Link Mode
eth1	Enabled	Layer 3	Internet	Static IPv4/Static IPv6	172.168.60.122/24	Full-duplex 1000Mbps	1500/1500	Auto-negotiation
eth2	Enabled	Layer 3	LAN	Static IPv4/Static IPv6	192.168.77.2/24	Full-duplex 1000Mbps	1500/1500	Auto-negotiation

Below the table, detailed configuration windows for eth1 and eth2 are shown. In both windows, the **Advanced** tab is selected, and the **Jumbo Frame** checkbox is checked and highlighted with a red box. The **Management Service** section shows **WEBUI**, **PING**, and **SSH** are enabled, while **SNMP** is disabled.

Case 3: Active/Active with Layer-3 Mode



It is necessary to configure link state propagation.

Physical Interfaces | Subinterfaces | VLAN Interfaces | Aggregate Interfaces | Local Loopback Interfaces | GRE Tunnels | **Link State Propagation**

Enable link state propagation

+ Add | Delete | Refresh

<input type="checkbox"/>	Physical Interfaces	Operation
<input type="checkbox"/>	eth1, eth2	Edit Delete

Case 3: Active/Active with Layer-3 Mode



In first NSF, configure setting of high availability.

← HA Policy Settings

HA Policy: **Group 0** | Group 1

Mode: **Group 0** | **Group 1**

Device Name: Description: Optional

Control Link ⓘ Priority: 200

Data Link ⓘ Proactive Preemption: Enable

Layer 2 Mode Preemption Delay: 3

HA Traffic: Virtual IP Addresses

Advanced: + Add | Delete | Refresh

Interface	Virtual IP/Netmask
<input type="checkbox"/> eth1	172.168.60.121/24
<input type="checkbox"/> eth2	192.168.77.1/24

Monitored Object Management: Manage

Monitored Object ⓘ: business interface

Device Name: Description: Optional

Priority: 100

Proactive Preemption: Enable

Preemption Delay: 3

Virtual IP Addresses

+ Add | Delete | Refresh Search

Interface	Virtual IP/Netmask	Virtual MAC	Operation	...
<input type="checkbox"/> eth1	172.168.60.124/24	00-00-5e-90-00-01	Edit Delete	
<input type="checkbox"/> eth2	192.168.77.4/24	00-00-5e-90-00-02	Edit Delete	

Total: 2 < 1 > Entries Per Page 50 Go To Page 1

Monitored Object Management: Manage

Monitored Object ⓘ: business interface

Case 3: Active/Active with Layer-3 Mode



The second NSF business and high availability interfaces are configured as below.

The screenshot displays the configuration interface for two groups, Group 0 and Group 1. Both groups are configured with the following settings:

- Description: Optional
- Priority: 100 (Group 0) and 200 (Group 1)
- Proactive Preemption: Enable
- Preemption Delay: 3
- Virtual IP Addresses:

Group 0 Virtual IP Addresses:

Interface	Virtual IP/Netmask
<input type="checkbox"/> eth1	172.168.60.1
<input type="checkbox"/> eth2	192.168.77.1

Group 1 Virtual IP Addresses:

Interface	Virtual IP/Netmask	Virtual MAC	Operation
<input type="checkbox"/> eth1	172.168.60.124/24	00-00-5e-90-00-01	Edit Delete
<input type="checkbox"/> eth2	192.168.77.4/24	00-00-5e-90-00-02	Edit Delete

Additional configuration details include:

- Monitored Object Management: Manage
- Monitored Object: business interface
- Buttons: Save, Cancel

Case 3: Active/Active with Layer-3 Mode

The successful high availability status is shown as below.

High Availability

Settings Refresh Mode: Active/Active Heartbeat Status: Normal



Group 0 Status: Active
Switch to Standby ⓘ
Group 1 Status: Passive
HA Status: Normal

Local Device

Local Device Information Local Device

Device Name: HQ-NGAF
Control Link: eth5
Control Link 1: -
Data Link: eth6
Data Link 1: -
Monitored Interface Status: Normal
Member Interface Status: -
Uptime After Switchover: 0 days 0 hrs 7 mins [View Switchover Information](#)

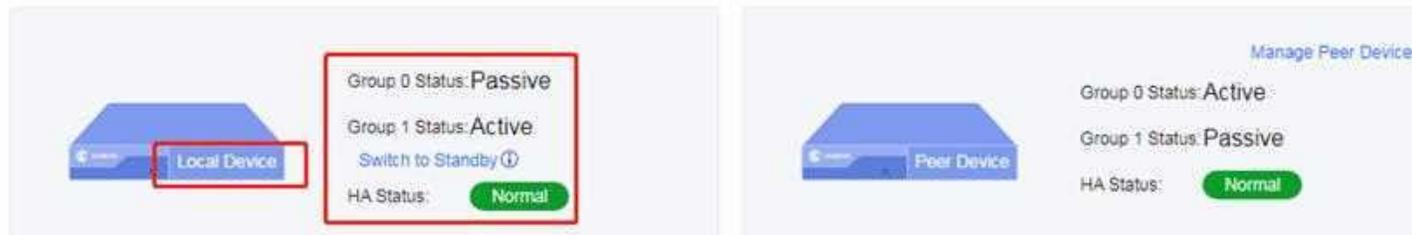
First NSF

Sync Options

Current Device Role: Active controller [Settings ⓘ](#)
Auto Sync ⓘ : [Settings](#)
Sync Now ⓘ : [Sync Now](#) [View Logs](#)

High Availability

Settings Refresh Mode: Active/Active Heartbeat Status: Normal



Group 0 Status: Passive
Switch to Standby ⓘ
Group 1 Status: Active
HA Status: Normal

Local Device

Peer Device

Manage Peer Device

Group 0 Status: Active
Group 1 Status: Passive
HA Status: Normal

Local Device Information Local Device

Device Name: NSF
Control Link: eth5
Control Link 1: -
Data Link: eth6
Data Link 1: -
Monitored Interface Status: Normal
Member Interface Status: -
Uptime After Switchover: 0 days 0 hrs 8 mins [View Switchover Information](#)

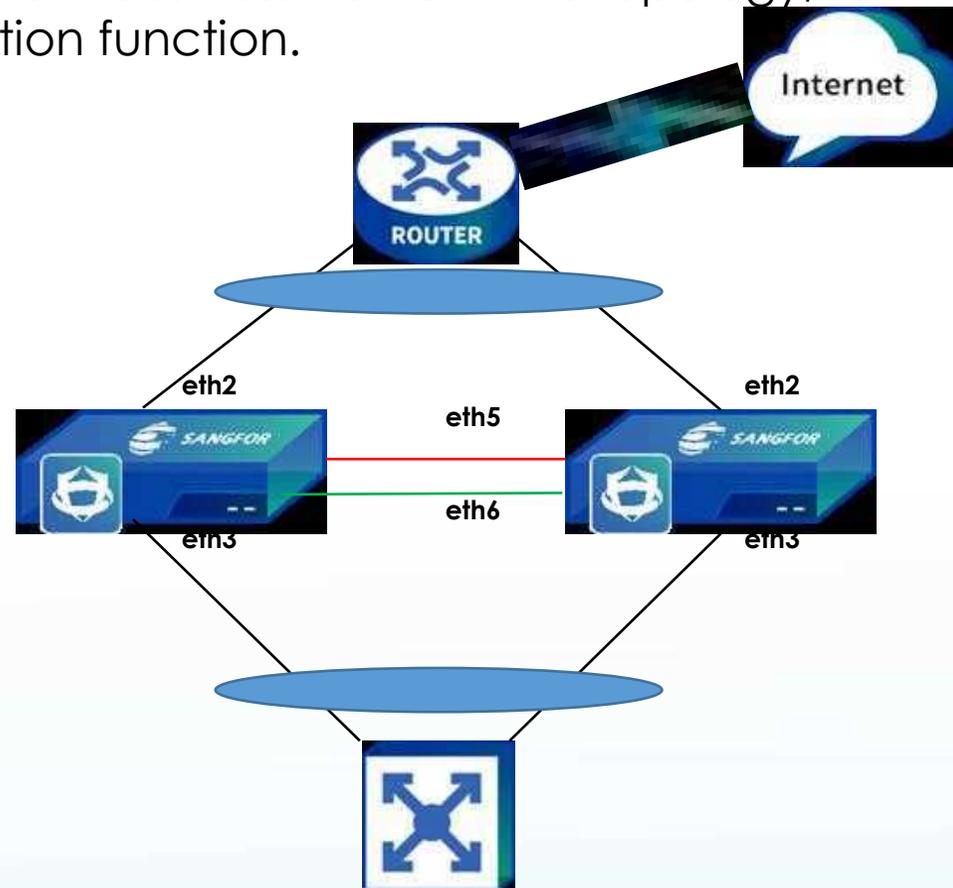
Second NSF

Sync Options

Current Device Role: Passive controller [Settings ⓘ](#)
Auto Sync ⓘ : [Settings](#)
Sync Now ⓘ : [Sync Now](#) [View Logs](#)

Case 4: Active/Active with Virtual Wire Mode

A customer's internal is connected by link aggregation from core switch to router. Now they purchase 2 NSF to be deployed in virtual wire mode between router and switch. Besides, 2 NSF need to work as active/active high availability mode. Given that there probably exists inconsistent business traffic in this topology, for 2 NSF it is necessary to configure link aggregation function.



Case 4: Active/Active with Virtual Wire Mode



In expected active controller NSF, business and high availability interfaces are configured as below.

The screenshot displays the 'Edit Physical Interface' configuration window for interface 'eth6'. The interface is set to 'Enabled' and 'Virtual wire' mode. Below the main configuration, a table lists other interfaces:

Name	Status	Type	Virtual wire	Virtual_untrust_A	Speed	MTU	Mode	Link Mode
eth2	Enabled	Virtual wire	Yes	-	1000Mbps	1500	Full-duplex	Auto-negotiation
eth3	Enabled	Virtual wire	No	-	1000Mbps	1500	Full-duplex	Auto-negotiation

The 'Advanced' tab for the selected interface shows the following settings:

- Link Mode: [Dropdown]
- IPv4 MTU: 1500
- IPv6 MTU: 1500
- Jumbo Frame: Enable
- MAC Address: fe:fc:fe:8f:88:48
- Link Bandwidth: Outbound 1000 Mbps, Inbound 1000 Mbps
- Management Service: Allow WEBUI, PING, SSH

Case 4: Active/Active with Virtual Wire Mode



In expected passive controller NSF, business and high availability interfaces are configured as below.

The image displays four screenshots of the 'Edit Physical Interface' configuration page, arranged horizontally. Each screenshot shows the configuration for a specific interface: eth5 (Control-Link) and eth6 (Data-Link). The configuration is divided into 'Basics' and 'Advanced' sections. In the 'Advanced' section, the 'Jumbo Frame' option is checked and highlighted with a red box. The 'Management Service' section shows 'WEBUI' and 'PING' checked. The 'Link Bandwidth' is set to 1000 Mbps. The 'Link Mode' is set to 'Optional'. The 'Static IP' is set to 172.16.98. The 'MAC Address' is fe.fc.fe.b5:be:48. The 'Management Service' section shows 'WEBUI' and 'PING' checked. The 'Link Bandwidth' is set to 1000 Mbps. The 'Link Mode' is set to 'Optional'. The 'Static IP' is set to 172.16.98. The 'MAC Address' is fe.fc.fe.b5:be:48.

Case 4: Active/Active with Virtual Wire Mode



In expected active controller NSF, business and high availability interfaces are configured as below.

← | HA Policy Settings

HA Policy: Enable

Mode: Active/Standby

Device Name: HQ-NGAF

Control Link ⓘ: eth5

Data Link ⓘ: eth6

Layer 2 Mode ⓘ: Enable

HA Traffic: Enable ⓘ

Link Aggregation ⓘ: Settings

Link Aggregation

Enable ⓘ

LAN Interfaces ⓘ

+ Add | Delete

Local Interface	Peer Interface	Operation
<input type="checkbox"/> eth3	eth3	Delete

WAN Interfaces ⓘ

+ Add | Delete

Local Interface	Peer Interface	Operation
<input type="checkbox"/> eth2	eth2	Delete

172.16.99.6 +

172.168.98.6 +

Save Cancel

Case 4: Active/Active with Virtual Wire Mode



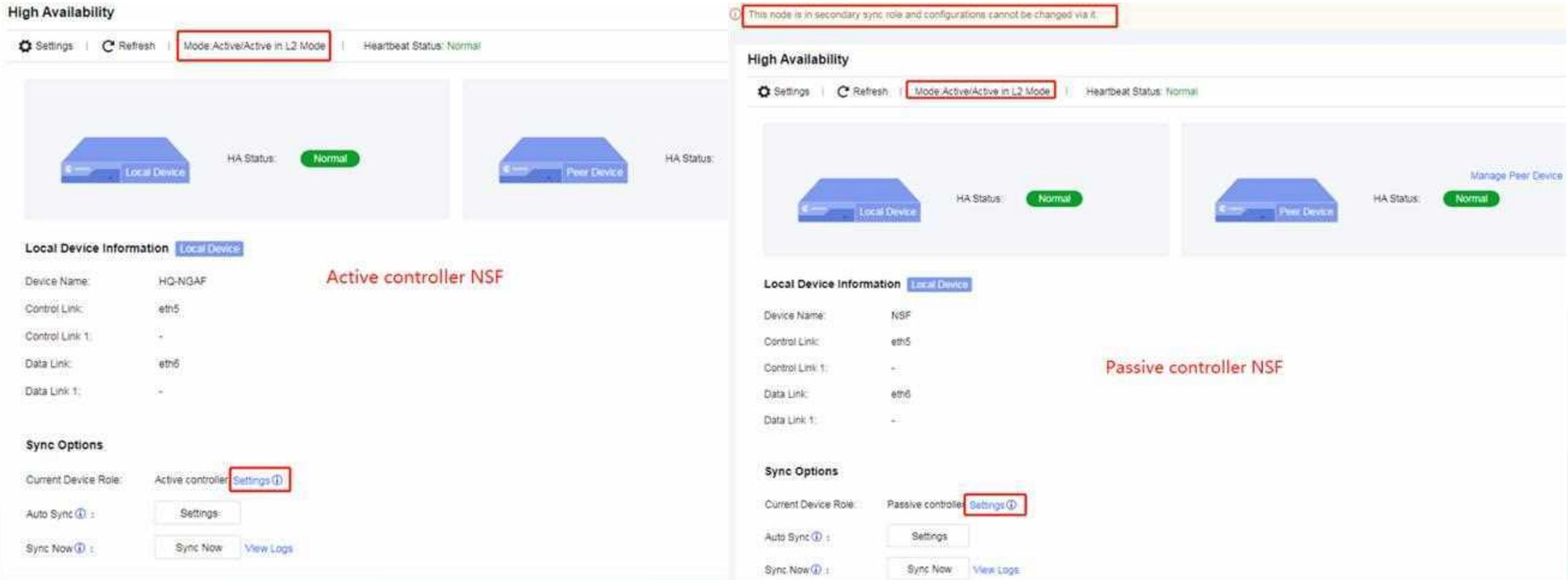
In expected passive controller NSF, business and high availability interfaces are configured as below.

← HA Policy Settings

HA Policy:	<input checked="" type="checkbox"/> Enable						
Mode:	<input type="radio"/> Active/Standby <input checked="" type="radio"/> Active/Active						
Device Name:	NSF						
Control Link ⓘ:	<table><tr><td><input type="text" value="eth5"/></td><td>Local</td><td><input type="text" value="172.16.99.6"/></td><td>Peer</td><td><input type="text" value="172.16.99.5"/></td><td>+</td></tr></table>	<input type="text" value="eth5"/>	Local	<input type="text" value="172.16.99.6"/>	Peer	<input type="text" value="172.16.99.5"/>	+
<input type="text" value="eth5"/>	Local	<input type="text" value="172.16.99.6"/>	Peer	<input type="text" value="172.16.99.5"/>	+		
Data Link ⓘ:	<table><tr><td><input type="text" value="eth6"/></td><td>Local</td><td><input type="text" value="172.16.98.6"/></td><td>Peer</td><td><input type="text" value="172.16.98.5"/></td><td>+</td></tr></table>	<input type="text" value="eth6"/>	Local	<input type="text" value="172.16.98.6"/>	Peer	<input type="text" value="172.16.98.5"/>	+
<input type="text" value="eth6"/>	Local	<input type="text" value="172.16.98.6"/>	Peer	<input type="text" value="172.16.98.5"/>	+		
Layer 2 Mode ⓘ:	<input checked="" type="checkbox"/> Enable						
HA Traffic:	<input type="checkbox"/> Enable ⓘ						
Link Aggregation ⓘ:	<input type="text" value="Settings"/>						

Case 4: Active/Active with Virtual Wire Mode

The successful high availability status is shown as below.



The image displays two screenshots of the Sangfor High Availability configuration interface. The left screenshot shows the configuration for the 'Local Device' (HQ-NGAF) in 'Active/Active in L2 Mode'. The right screenshot shows the configuration for the 'Peer Device' (NSF) in the same mode. Both screenshots show the 'HA Status' as 'Normal' and the 'Current Device Role' as 'Active controller NSF' and 'Passive controller NSF' respectively. The 'Settings' button is highlighted in red in both screenshots.

Note:

In active/active with virtual wire mode, you are able to manually shift device role by clicking above "Setting".

THANK YOU

Technical Support Service

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