Sub Second Inter Chassis Failover

SecGW support 3 modes of ICSR (intra chassis L2, inter chassis L2 ICSR and inter chassis L3 ICSR). based on the type of failure and ICSR mode.

BFD permits much more aggressive detection time compared to existing SRP protocols. This BFD monitoring is already implemented and integrated with SRP, which can be used in SecGW to reduce the SecGW switchover time to 1-3 seconds. This section will explain the configuration details for different modes.

The BFD configuration can be done for single-hop and multi-hop SRP links. In an L2 setup, the SRP link can be part of same network so a single hop configuration is valid. And for rest of the cases, a multi-hop BFD configuration needs to be used.

Single-hop config example:

```
context srp
    bfd-protocol
    #exit
    service-redundancy-protocol
      hello-interval 3
      configuration-interval 60
      dead-interval 15
      checkpoint session duration non-ims-session 30
      route-modifier threshold 10
      priority 10
      monitor bfd context srp 71.71.71.5 chassis-to-chassis
      monitor hsrp interface BVI1871 afi-type IPv4 hsrp-group 4
      peer-ip-address 71.71.71.5
      bind address 71.71.71.4
    #exit
    interface icsr
      ip address 71.71.71.4 255.255.255.0
      bfd interval 50 min_rx 50 multiplier 3
    #exit
    subscriber default
    exit
    aaa group default
    #exit
```

```
        ip route static bfd  icsr 71.71.71.5
     #exit
```

Multi Hop Config Example

```
context srp
    bfd-protocol
      bfd multihop-peer 81.81.81.4 interval 50 min_rx 50 multiplier 3
    #exit
    service-redundancy-protocol
      hello-interval 3
      configuration-interval 60
      dead-interval 15
      checkpoint session duration non-ims-session 30
      route-modifier threshold 10
      priority 10
      monitor bfd context srp 81.81.81.4 chassis-to-chassis
     monitor hsrp interface GigabitEthernet0/0/0/5 afi-type IPv4 hsrp-group 4
      peer-ip-address 81.81.81.4
      bind address 71.71.71.4
    #exit
    interface ifSRP
      ip address 71.71.71.4 255.255.255.0
    #exit
    ip route static multihop bfd  mbfd 71.71.71.4 81.81.81.4
    ip route 81.81.81.0 255.255.255.0 71.71.71.5 ifSRP
    #exit
  #exit
```

HSRP Switchover Improvement

Below are the changes to improve the HSRP Switchover:

- Bridge together the external and VSM interfaces for all the paths (ike and clear).

- Configure SRP activated loopback interfaces in both SecGWs and assign address from the same network (The loopback address will be up only in active SecGW.).

- Add RRI routes with nexthop as the loopback address.

- For encrypted traffic, forward the packets towards the loopback address from L2-Switch. This makes sure the packets are always forwarded to the chassis where SRP is active even if HSRP is not.

- For clear traffic, forward the packets towards the hsrp address from L2-Switch as the RRI routes are added in chassis (not forwarded to L2 switch). If SecGW is not active in that chassis (SRP-HSRP not in sync), packets will be forwarded towards the other chassis (towards the loopback address).

ASR9K RSP configuration example

```
interface GigabitEthernet0/0/0/5
      transceiver permit pid all
      dot1q tunneling ethertype 0x9200
    !
interface GigabitEthernet0/0/0/5.1259 l2transport
 description "External port for SRP Traffic"
```

```
 encapsulation dot1q 1259
 rewrite ingress tag pop 1 symmetric
!
interface GigabitEthernet0/0/0/18
 transceiver permit pid all
 dot1q tunneling ethertype 0x9200
!
interface GigabitEthernet0/0/0/18.1871 l2transport
 description "External port for IKE and ESP Traffic"
 encapsulation dot1q 1871
 rewrite ingress tag pop 1 symmetric
!
interface GigabitEthernet0/0/0/19
 transceiver permit pid all
 dot1q tunneling ethertype 0x9200
!
interface GigabitEthernet0/0/0/19.1881 l2transport
 description "External port for Clear Traffic"
 encapsulation dot1q 1881
 rewrite ingress tag pop 1 symmetric
!
interface TenGigE0/5/1/0
!
interface TenGigE0/5/1/0.1871 l2transport
 description "VSM port for IKE and ESP Traffic"
 encapsulation dot1q 1871
 rewrite ingress tag pop 1 symmetric
!
interface TenGigE0/5/1/1
!
interface TenGigE0/5/1/1.1259 l2transport
 description "VSM port for SRP Traffic"
 encapsulation dot1q 1259
 rewrite ingress tag pop 1 symmetric
!
interface TenGigE0/5/1/1.1881 l2transport
 description "VSM port for Clear Traffic"
 encapsulation dot1q 1881
 rewrite ingress tag pop 1 symmetric
!
interface BVI1259
 description "BVI for SRP Traffic"
 ipv4 address 71.71.71.9 255.255.255.0
!
interface BVI1871
 description "BVI for IKE and ESP Traffic"
 ipv4 address 187.0.1.12 255.255.255.0
 ipv6 address 1871::12/64
!
interface BVI1881
 description "BVI for Clear Traffic"
 ipv4 address 188.0.1.12 255.255.255.0
 ipv6 address 1881::12/64
!
      router static
       address-family ipv4 unicast
       35.35.35.35/32 187.0.1.20
      #exit
l2vpn
 bridge group secgw
  bridge-domain ike
    interface TenGigE0/5/1/0.1871
    !
    interface GigabitEthernet0/0/0/18.1871
```

```
 !
 routed interface BVI1871
 !
bridge-domain srp
 interface TenGigE0/5/1/1.1259
 !
 interface GigabitEthernet0/0/0/5.1259
 !
 routed interface BVI1259
 !
bridge-domain clear
 interface TenGigE0/5/1/1.1881
 !
 interface GigabitEthernet0/0/0/19.1881
 !
 routed interface BVI1881
 !
 !
 !
```

SecGW Configuration Example

```
context wsg
  ……..
  interface clear      ───────────────> VSM Clear interface
    ip address 188.0.1.10 255.255.255.0
  #exit
  interface clear-active loopback    ───────────────> Clear interface active SecGW only
    ip address 188.0.1.20 255.255.255.255 srp-activate
  #exit
  interface ike      ───────────────> VSM IKE and ESP interface
    ip address 187.0.1.10 255.255.255.0
  #exit
  interface ike-active loopback    ───────────────> IKE and ESP interface active SecGW only

    ip address 187.0.1.20 255.255.255.255 srp-activate
  #exit
  interface ike-loop loopback    ───────────────> ipv4 SecGW ip
    ip address 35.35.35.35 255.255.255.255 srp-activate
  #exit
  interface ike-loop-v6 loopback    ───────────────> ipv6 SecGW ip
    ipv6 address 2035::35/128 srp-activate
  #exit
  wsg-service ipv4
    deployment-mode site-to-site
    ip access-group acl1
    bind address 35.35.35.35 crypto-template foo
  #exit
  wsg-service ipv6
    deployment-mode site-to-site
    ipv6 access-group acl1
    bind address 2035::35 crypto-template foo-1
  #exit
  ip route 65.65.0.0 255.255.0.0 188.0.1.100 clear
  ip route 92.0.0.0 255.0.0.0 187.0.1.11 ike
  ip rri next-hop 188.0.1.20 interface clear-active
#exit
context srp
  bfd-protocol
  #exit
  service-redundancy-protocol
          hello-interval 3
```

```
                configuration-interval 60
                dead-interval 15
                checkpoint session duration non-ims-session 30
                route-modifier threshold 10
                priority 10
      monitor bfd context srp 71.71.71.5 chassis-to-chassis
      monitor hsrp interface BVI1871 afi-type IPv4 hsrp-group 4
      peer-ip-address 71.71.71.5
      bind address 71.71.71.4
    #exit
    interface icsr
      ip address 71.71.71.4 255.255.255.0
      bfd interval 50 min_rx 50 multiplier 3
    #exit
    ip route static bfd  icsr 71.71.71.5
  #exit
  port ethernet 1/10
    no shutdown
    vlan 1871
      no shutdown
      bind interface ike wsg
    #exit
  #exit
  port ethernet 1/11
    no shutdown
    vlan 1259
      no shutdown
      bind interface icsr srp
    #exit
    vlan 1881
      no shutdown
      bind interface clear wsg
    #exit
  #exit
```