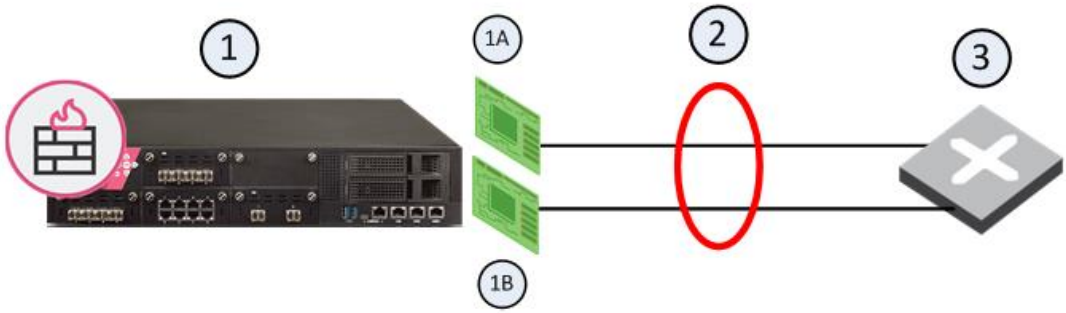
Bond Interfaces (Link Aggregation)

Check Point security devices support Link Aggregation, a technology that joins multiple physical interfaces into one virtual interface, known as a **bond interface**.

The bond interface share the load among many interfaces, which gives fault tolerance and increases throughput. Check Point devices support the IEEE 802.3ad Link Aggregation Control Protocol (LACP) for dynamic link aggregation.



Item	Description
1	**Security Gateway**
1A	Interface 1
1B	Interface 2
2	Bond Interface
3	Router

A **bond interface** (also known as a **bonding group** or **bond**) is identified by its **Bond ID** (for example: *bond1*) and is assigned an IP address. The physical interfaces included in the bond are called **subordinate interfaces** and do not have IP addresses.

You can configure a bond interface to use one of these functional strategies:

- **High Availability (Active/Backup)**: Gives redundancy when there is an interface or a link failure. This strategy also supports switch redundancy. Bond High Availability works in **Active/Backup** mode - interface Active/Standby mode. When an Active subordinate interface is down, the connection automatically fails over to the

primary subordinate interface. If the primary subordinate interface is not available, the connection fails over to a different subordinate interface.

- **Load Sharing (Active/Active)**: All subordinate interfaces in the UP state are used simultaneously. Traffic is distributed among the subordinate interfaces to maximize throughput. Bond Load Sharing does not support switch redundancy.

  Note - Bonding Load Sharing mode requires **SecureXL** to be enabled on Security Gateway or each **Cluster Member** .

- You can configure Bond Load Sharing to use one of these modes:
  - **Round Robin** - Selects the Active subordinate interfaces sequentially.
  - **802.3ad** (LACP) - Dynamically uses Active subordinate interfaces to share the traffic load. This mode uses the LACP protocol, which fully monitors the interface link between the Check Point Security Gateway and a switch.
  - **XOR** - All subordinate interfaces in the UP state are Active for Load Sharing. Traffic is assigned to Active subordinate interfaces based on the transmit hash policy: Layer 2 information (XOR of hardware MAC addresses), or Layer 3+4 information (IP addresses and Ports).

For Bonding High Availability mode and for Bonding Load Sharing mode:

- The number of bond interfaces that can be defined is limited by the maximal number of interfaces supported by each platform. See the *R81 Release Notes*.
- Up to 8 physical subordinate interfaces can be configured in a single bond interface.

Configuring Bond Interfaces in Gaia Clish

In **Gaia Clish** , bond interfaces are called **bonding groups**.

Step	Instructions
1	Make sure that the physical subordinate interfaces do not have IP addresses.
2	Add a new bonding group.

Step	Instructions
3	Set the state of the physical subordinate interfaces to **UP**.
4	Add subordinate interfaces to the bonding group.
5	Configure the bond operating mode.
6	Configure other bond parameters: primary interface, media monitoring, and delay rate.
7	Examine the bonding group configuration.
8	Save the configuration.

Important - After you add, configure, or delete features, run the "`save config`" command to save the settings permanently.

Note - You configure an IP address on a Bonding Group in the same way as you do on a physical interface (see *Physical Interfaces*).

Syntax

Adding a new Bonding Group

Syntax

```
add bonding group <Bond Group ID>
```

Example

```
gaia> add bonding group 777
```

Note - Do **not** change the state of bond interface manually using the "`set interface <Bond ID> state`" command. This is done automatically by the bonding driver.

Adding a new subordinate interface to an existing Bonding Group

Syntax

```
add bonding group <Bond Group ID> interface <Name of Subordinate
Interface>
```

Important - Make sure that the subordinate interfaces, which you wish to add to the Bonding Group, do not have IP addresses.

Example

```
gaia> add bonding group 777 interface eth4
gaia> add bonding group 777 interface eth5
```

Notes:

- The subordinate interfaces must not have IP addresses assigned to them.
- The subordinate interfaces must not have aliases assigned to them.
- A bond interface can contain between two and eight subordinate interfaces.

Configuring an existing Bonding Group

Syntax

```
set bonding group <Bond Group ID>
      mode active-backup [primary <Name of Subordinate Interface>]
      mode round-robin
      mode xor xmit-hash-policy {layer2 | layer3+4}
      mode 8023AD
            [lacp-rate {slow | fast}]
            [xmit-hash-policy {layer2 | layer3+4}]
      [up-delay <0-5000>]
      [down-delay <0-5000>]
      [mii-interval <1-5000>]
```

Configuring the Bond Operating Mode

Bond operating mode specifies how subordinate interfaces are used in a bond interface.

Syntax

```
set bonding group <Bond Group ID> mode
      active-backup [primary <Name of Subordinate Interface>]
      round-robin
      xor xmit-hash-policy {layer2 | layer3+4}
      8023AD
            [lacp-rate {slow | fast}]
            [xmit-hash-policy {layer2 | layer3+4}]
```

Example

```
gaia> set bonding group 1 mode active-backup primary eth2
```

```
gaia> set bonding group 2 mode xor xmit-hash-policy layer3+4
```

Notes:

- The Active-Backup mode supports configuration of the primary subordinate interface.
- The XOR mode requires the configuration of the transmit hash policy.
- The 8023AD mode supports the configuration of the LACP packet transmission rate and the transmit hash policy.

Configuring the Up Delay Time

The **Up-Delay** specifies show much time in milliseconds to wait before enabling a subordinate interface after link recovery was detected.

Syntax

```
set bonding group <Bond Group ID> up-delay <0-5000>
```

Example

```
gaia> set bonding group 1 up-delay 100
```

Note - The default `up-interval` value is 200 ms.

Configuring the Down Delay Time

The **Down-Delay** specifies how much time in milliseconds to wait before disabling a subordinate interface after link failure was detected

Syntax

```
set bonding group <Bond Group ID> down-delay <0-5000>
```

Example

```
gaia> set bonding group 1 down-delay 100
```

Note - The default `down-interval` value is 200 ms.

Configuring the Media Monitoring Interval

The **Media Monitoring Interval** specifies how much time in milliseconds to wait before checking the link on subordinate interfaces for a failure.

Syntax

```
set bonding group <Bond Group ID> mii-interval <1-5000>
```

Example

```
gaia> set bonding group 1 mii-interval 100
```

Note - The default `mii-interval` value is 100 ms.

Configuring an IP address on the existing Bonding Group

```
set interface <Bond Group ID>
      comments "Text"
      ipv4-address <IPv4 Address> {subnet-mask <Mask> | mask-length <Mas
k Length>}
      ipv6-address <IPv6 Address> mask-length <Mask Length>
      ipv6-autoconfig {on | off}
      link-speed {10M/half | 10M/full | 100M/half | 100M/full | 1000M/fu
ll | 10000M/full}
      mac-addr <MAC Address>
```

Deleting a subordinate interface from an existing Bonding Group

Syntax

```
delete bonding group <Bond Group ID> [interface <Interface Name> |
force-ignore-routes]
```

Example

```
gaia> delete bonding group 777 interface eth4
```

Note - You must delete all non-primary subordinate interfaces before you remove the primary subordinate interface.

Deleting the bonding group

Syntax

```
delete bonding group <Bond Group ID> interface <Name of Subordinate
Interface 1>
```

```
delete bonding group <Bond Group ID> interface <Name of Subordinate Interface 2>
delete bonding group <Bond Group ID> interface <Name of Subordinate Interface ...>
delete bonding group <Bond Group ID> interface <Name of Subordinate Interface N>
delete bonding group <Bond Group ID>
```

Example

```
gaia> delete bonding group 777
```

Notes:

- You must delete all non-primary subordinate interfaces before you remove the primary subordinate interface.
- You must delete all subordinate interfaces from the bonding group before you remove the bonding group.
- Do **not** change the state of bond interface manually using the "`set interface bondID state`" command. This is done automatically by the bonding driver.

Viewing the Bonding Group configuration

Syntax

```
show bonding {group <Bond Group ID> | groups}
```

Parameters

CLI Parameters

Parameter	Description
<Bond Group ID>	Configures the Bond Group ID. ▪ **Range:** 0 - 1024 ▪ **Default:** No default value
<Name of Subordinate Interface>	Specifies the name of the subordinate physical interface, which you add to (or remove from) the bond group. Make sure that the subordinate interfaces do not have any IP addresses or aliases configured.

Parameter	Description
`mode <Mode>`	Configures the Bond operating mode (see *Bond Interfaces (Link Aggregation)*): ▪ `round-robin` Bond uses all subordinate interfaces sequentially (High Availability + Load Sharing). This is the default mode. ▪ `active-backup` Bond uses one subordinate interface at a time (High Availability) ▪ `xor` Bond uses subordinate interfaces based on a hash function (High Availability + Load Sharing) ▪ `8023AD` Dynamic bonding according to IEEE 802.3ad - LACP (Load Sharing)
`primary <Name of Subordinate Interface>`	Specifies the name of the *primary* subordinate interface in the bond. By default, the first subordinate interface added to the bond group, becomes the primary. **Important** - You must **not** configure the primary subordinate interface explicitly in ClusterXL when you configure the Sync interface on a bonding group for redundancy. For more information, see the *R81 ClusterXL Administration Guide* > Chapter *ClusterXL Requirements and Compatibility* > Section *Supported Topologies for Synchronization Network*. **Note** - Applies only to the Active-Backup bond mode.
`up-delay <0-5000>`	Specifies the time in milliseconds to wait before enabling a subordinate interface after link recovery was detected. ▪ **Range:** 0 - 5000 ms ▪ **Default:** 200 ms
`down-delay <0-5000>`	Specifies the time in milliseconds to wait before disabling a subordinate interface after link failure was detected. ▪ **Range:** 0 - 5000 ms ▪ **Default:** 200 ms

Parameter	Description
`lacp-rate {fast | slow}`	Specifies the Link Aggregation Control Protocol (LACP) packet transmission rate: ▪ `slow`- LACPDU packets are sent every 30 seconds ▪ `fast`- LACPDU packets are sent every second **Note** - Applies only to the 802.3AD bond mode.
`mii-interval <1-5000>`	Specifies the time in milliseconds to wait before checking the link on subordinate interfaces for a failure. ▪ **Range:** 1 - 5000 ms ▪ **Default:** 100 ms
`xmit-hash-policy {layer2 | layer3+4}`	Specifies the algorithm to use for assigning the traffic to Active subordinate interfaces: ▪ `layer2` - Based on the XOR of hardware MAC addresses ▪ `layer3+4` - Based on the IP addresses and Ports **Note** - Applies only to the XOR and the 802.3AD bond modes.

Example 1 - Configuring Bond in "Active-Backup" mode with default settings

```
gaia> add bonding group 1
gaia> add bonding group 1 interface eth2
gaia> add bonding group 1 interface eth3
gaia> set bonding group 1 mode active-backup primary eth2
gaia> show bonding group 1
Bond Configuration
    xmit-hash-policy Not configured
    down-delay 200
    primary eth2
    lacp-rate Not configured
    mode active-backup
    up-delay 200
    mii-interval 100
    Bond Interfaces
        eth2
        eth3
gaia>
```