

ADVANTECH

Advantech X-Ring Pro FW Upgrade Reminders

Enabling an Intelligent Planet

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Advantech X-Ring Pro

What is X-Ring Pro? How It Differ From Previous X-Ring?

- Both X-Ring and [X-Ring Pro](#) are Advantech's proprietary ring redundancy technology.
- Next generation ring technology => [X-Ring Pro](#)

Comparison Table:

| Functionality | | X-Ring Pro | Previous X-Ring |
|---------------|--|----------------------------|-----------------|
| | Max. Support Unit | 250 | 50 |
| | Recovery time | <20ms | < 20ms |
| | Auto Ring Master Selection | Not Required | Required |
| | Redundant Port | 2 | 1 |
| | "Dual-Ring" Topology Support | Yes | No |
| | Ring-Coupling & Dual-Homing Limitation | No | Yes (*) |

Distinguish EKI Switch Firmware Between Previous X-Ring and X-Ring Pro

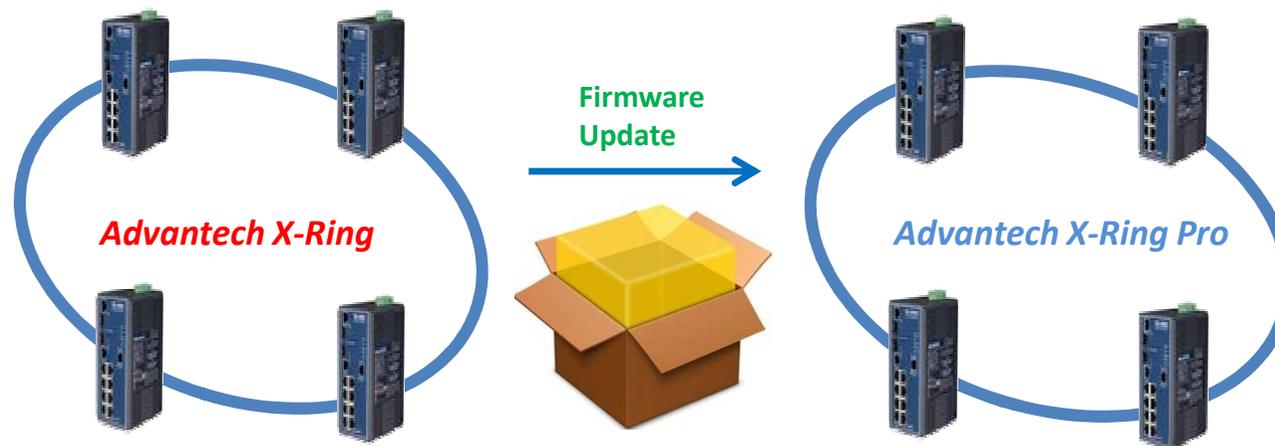
Distinguish Switch Firmware Between Previous X-Ring and X-Ring Pro

- Firmware/Kernel version tell the difference.
- For Example:
 - EKI-7659C with FW/Ker version **v1.14k367** (or earlier) => Previous X-Ring based FW
 - EKI-7659C with FW/Ken version **v1.00k5.03.12** (or later) => X-Ring Pro based FW

| Model | Previous X-Ring | X-Ring Pro | Remark |
|---------------|--------------------|----------------------|----------|
| EKI-7659C/CI | V1.14 K3.67 | v1.00k5.03.12 | Released |
| EKI-7554MI/SI | V1.02 K3.43 | v1.00k5.03.13 | Released |
| EKI-7657C | V1.06 K1.99 | v1.00k5.03.19 | Released |
| EKI-7659CPI | V1.01 K3.20 | v1.00k5.03.19 | Released |
| EKI-7656C/CI | V1.06 K3.25 | v1.00k5.03.17 | Released |
| EKI-7758F | V1.09 K3.23 | v1.00k5.03.19 | Released |
| EKI-7654C | V1.02 K3.23 | v1.00k5.03.19 | Released |
| EKI-7559MI/SI | V1.04 K3.43 | v1.00k5.03.19 | Released |
| EKI-2748FI | V1.01 K3.20 | v1.00k5.03.19 | Released |
| EKI-2748CI | V1.01 K3.20 | v1.00k5.03.19 | Released |
| EKI-7556MI | V1.01 K3.23 | v1.00k5.03.19 | Released |
| EKI-6558TI | V1.01 K3.23 | v1.00k5.03.19 | Released |
| EKI-6559TMI | V1.01 K3.23 | v1.00k5.03.19 | Released |

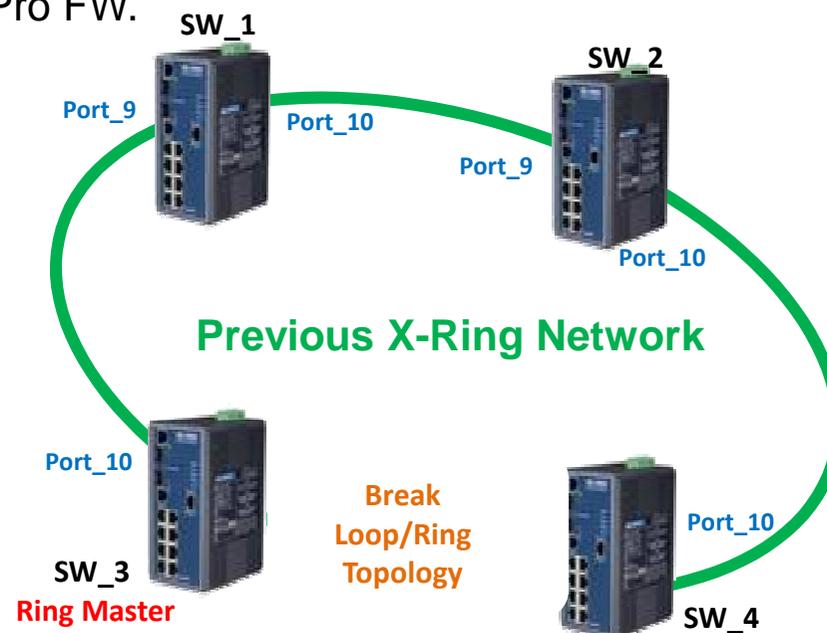
Reminder_1: Configuration Reset Back to Factory Default After Firmware Upgrading From Previous X-Ring to X-Ring Pro

- Users are allowed to upgrade firmware code from X-Ring to X-Ring Pro via firmware update process by using Web GUI or Console, without entering debug mode.
- However, current running configuration will be **reset back to default** after upgrading from previous X-Ring to X-Ring Pro based F/W switch.
- Therefore, you should note down the current configuration of your previous X-Ring FW switches before performing X-Ring Pro FW upgrading.



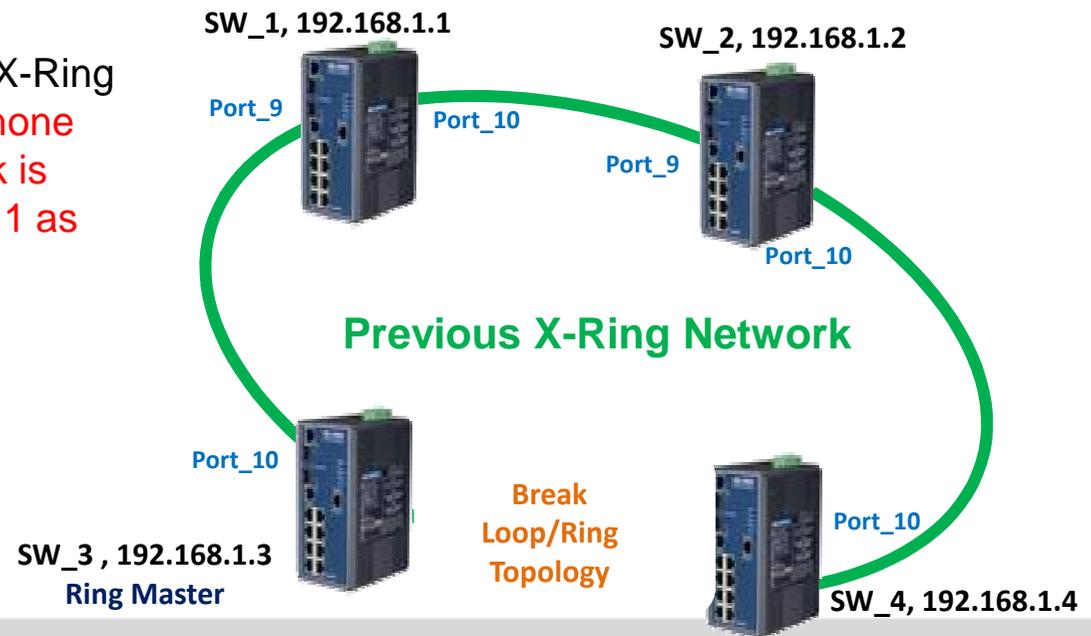
Reminder_2: Disconnect One of X-Ring Port to Break the Loop/Ring Topology Before Performing FW Upgrading From Previous X-Ring to X-Ring Pro

- As mentioned in Reminder_1, current configuration will be reset back to factory default after X-Ring Pro FW upgrade process completed.
- That means, there is possibility of network loop issue when one of EKI Switch without X-Ring function enabled after FW upgrade completed.
- For that reason, you must disconnect one of the connection between two EKI Switches to break the Ring/Loop topology into Linear topology before starting upgrade X-Ring Pro FW.



Reminder_3: Avoid IP Duplication Issue After X-Ring Pro FW Upgrading Process Completed

- As mentioned in Reminder_1, current configuration will be reset back to factory default after X-Ring Pro FW upgrade process completed. That means the management IP address of EKI switch will also be reset back to default IP 192.168.1.1 as well.
- In that case, you must avoid other switches in the network are using the same IP address of 192.168.1.1.
- For example, suppose you are now performing X-Ring Pro FW upgrade on SW2. After X-Ring Pro FW upgrading process completed, the management IP address of SW2 will be reset back to default IP 192.168.1.1, which is duplicated with SW1 with 192.168.1.1 as well. In that case, you will lost the network connection to both EKI SW1 and SW2.
- Therefore, before start upgrading X-Ring Pro FW, please making sure **that none of EKI switches in existing network is using the IP address of 192.168.1.1 as management IP address**



Reminder_4: Always Remember Click “Save” Every Time You Modified The Configuration.

- Always remember click “Save” every time you modified the configuration. Otherwise, the configuration will be lost after an power-cycle.



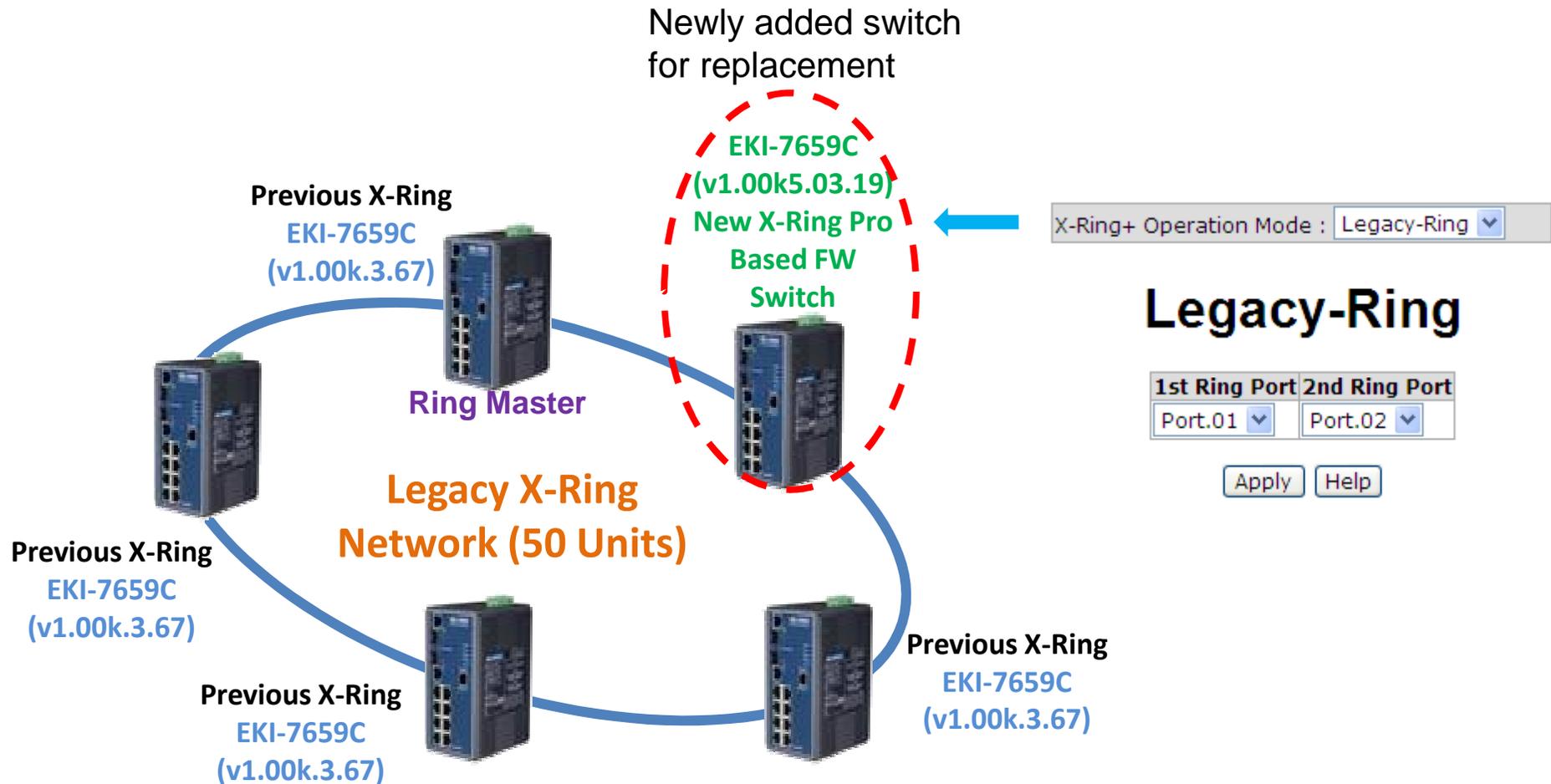
The screenshot shows the ADVANTECH Industrial Switch configuration interface. On the left, a navigation menu lists various configuration categories: Main Page, System, Port, Protocol, Security, Multicast, Power over Ethernet, Factory Default, Save Configuration, and System Reboot. The 'Save Configuration' option is highlighted with a red box. On the right, the 'Save Configuration' title is displayed above two buttons: 'Save' and 'Help'. The 'Save' button is also highlighted with a red box.

Co-existence Between Previous X-Ring & X-Ring Pro

Co-existence Between X-Ring Pro and X-Ring

- The **New X-Ring Pro Based FW Switch** is backwards compatible with Previous X-Ring in the **legacy X-Ring Network**.
- Use the figure in next slide as example, suppose this is where an application field site which already deployed by using 50 units of EKI switches based on Previous X-Ring FW.
- Maybe some other time later, one of unit is defective and need to be replaced. For replacement, suppose an brand new unit user received is bundled based on our latest **X-Ring Pro FW**.
- In that case, in order for this newly join unit of **X-Ring Pro FW** unit to be compatible with legacy X-Ring network, it must be configured as “X-Ring Legacy Mode”.
- So, to keep it simple and minimize the modification effort, instead of upgrading all 50 units to the latest **X-Ring Pro FW** , user may just configure this new newly join unit with “X-Ring Legacy Mode” setting.

Co-existence Between X-Ring Pro and X-Ring



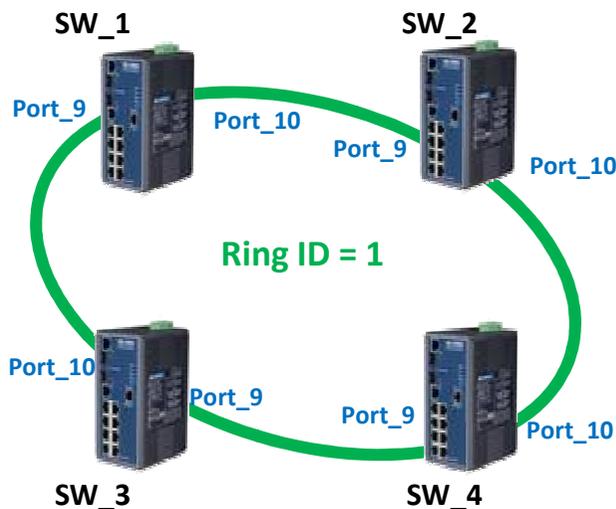
X-Ring Pro Configuration

- **Single Ring**
- **Ring-Coupling**
- **Dual Homing**
- **Dual Ring**

Single Ring

- Most common topology & Connected in series
- Enable X-Ring Pro function and assign two ring member ports in the ring group.
- The Ring ID within the same X-Ring Pro group switch MUST be identical.

X-Ring Pro



X-Ring Pro Operation Mode :

- Disable
- X-Ring Pro**
- Legacy-Ring

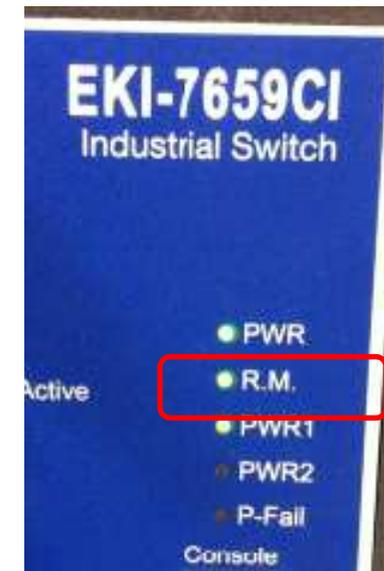
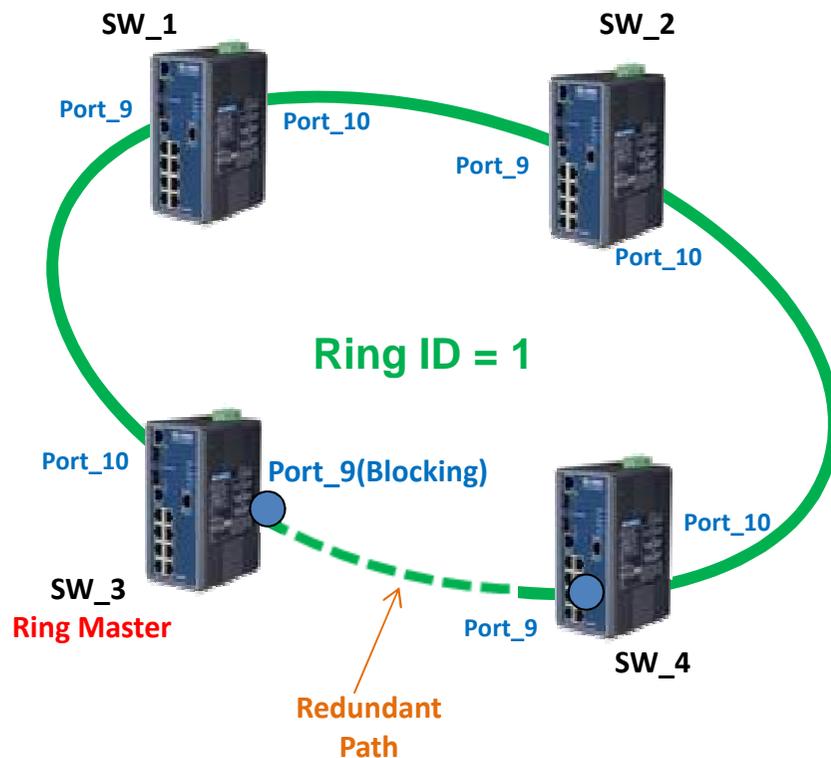
X-Ring Pro disabled

| Ring ID | 1st Ring Port | 2nd Ring Port |
|--------------------------------|--------------------------------------|--------------------------------------|
| <input type="text" value="1"/> | <input type="text" value="Port.09"/> | <input type="text" value="Port.10"/> |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|--------------------------------|--------------------------------------|--------------------------------------|
| <input type="text" value="1"/> | <input type="text" value="Port.09"/> | <input type="text" value="Port.10"/> |

Single Ring(Cont)

- Don't connect your switches in an ring topology before the configuration is done, otherwise it will cause a network loop.
- One of the EKI switch will be elect as "Ring Master" automatically.
- R.M. LED will turn on when a given switch is elect as the "Ring Master".
- The "Ring Master" switch will transferring one of its ring port into blocking status to break the loop.
- In this example, the Port_9 of SW_1 is transitioning into blocking status to determine the redundant path



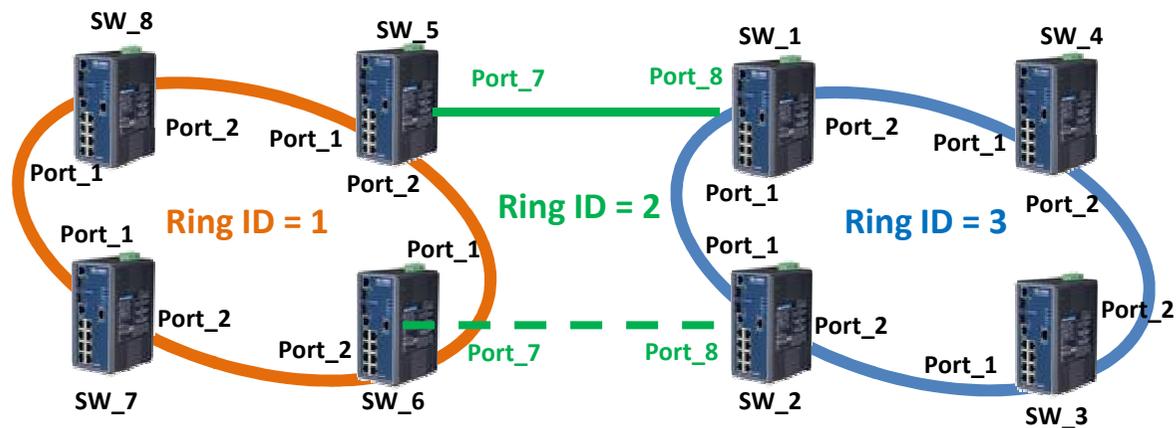
X-Ring Pro Ring Information

| X-Ring Pro Version | 3.00 | | |
|--------------------|--------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 1 | MASTER | Port.09_BLK | Port.10_FWD |

Advance Topology Ring-Coupling

Ring-Coupling

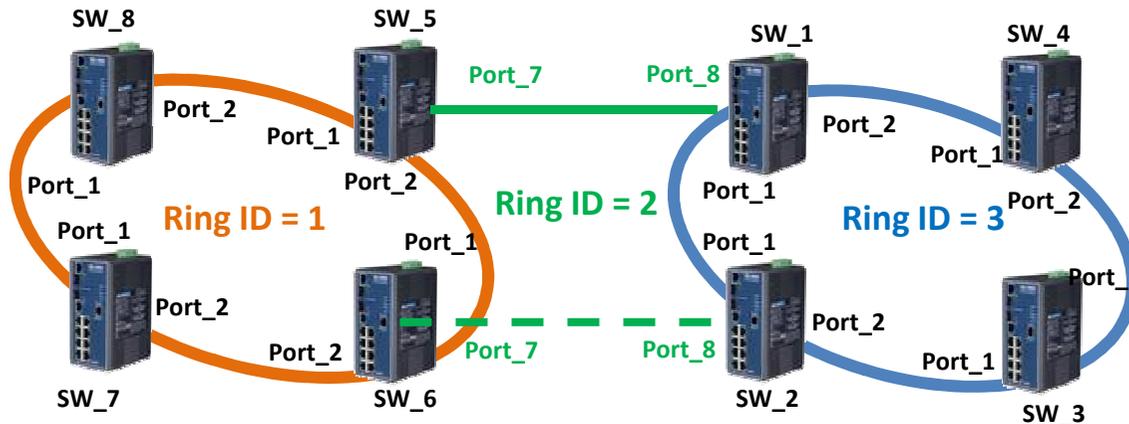
- Connect 2 or more X-Ring group for the redundant backup function
- Used most often in handling dual ring redundancy
- Treat Ring-Coupling as three different partitions
=> Each partition with identical ring ID



- Primary Path
- - - Backup Path (Dotted Line)

Ring-Coupling Configuration Example SW_7 & SW_8

- Port 1 and Port 2 of SW_7 and SW_8 belong to same partition with **Ring ID = 1**



X-Ring+

X-Ring+ Operation Mode : X-Ring+

X-Ring+ Configuration

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 1 | Port.01 | Port.02 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|----------------------|---------------------------------------|---------------------------------------|
| <input type="text"/> | NONE <input type="button" value="v"/> | NONE <input type="button" value="v"/> |

X-Ring+ Ring Information

| X-Ring+ Version | 3.00 | | |
|-----------------|---------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 1 | STANDBY | Port.01_DWN | Port.02_DWN |

Ring-Coupling Configuration Example SW_5 & SW_6

- Port 1 and Port 2 of SW_5 and SW_6 are also belong to same partition with **Ring ID = 1**
- Port 7 belong to different partition with **Ring ID = 2** and associating it to **Partition 1** by selecting “Ring 01” in the 2nd Ring Port

X-Ring+

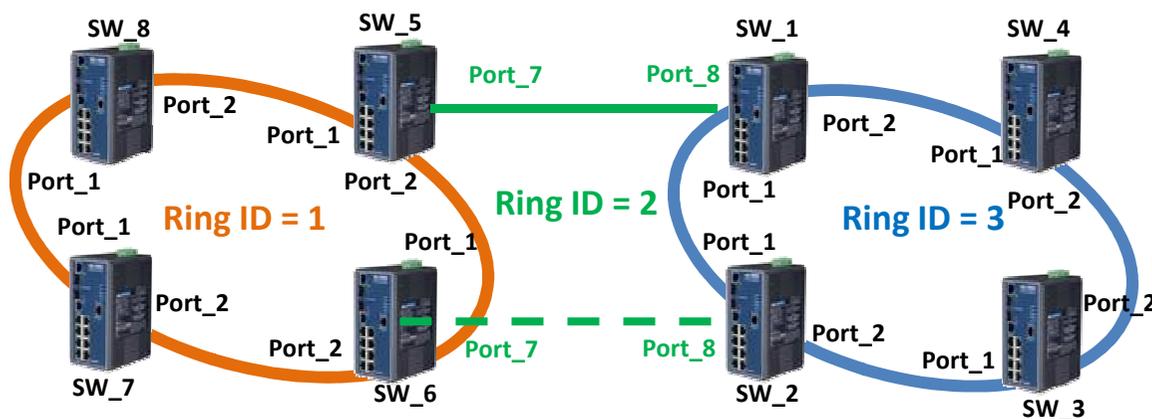
X-Ring+ Operation Mode : X-Ring+

X-Ring+ Configuration

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|--|--|
| 2 | Port.07 <input type="button" value="v"/> | Ring.01 <input type="button" value="v"/> |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 1 | Port.01 | Port.02 |
| 2 | Port.07 | Ring.01 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|----------------------|---------------------------------------|---------------------------------------|
| <input type="text"/> | NONE <input type="button" value="v"/> | NONE <input type="button" value="v"/> |



X-Ring+ Ring Information

| X-Ring+ Version | 3.00 | | |
|-----------------|---------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 1 | STANDBY | Port.01_DWN | Port.02_DWN |
| 2 | DISCONN | Port.07_DWN | Ring.01_FWD |

Ring-Coupling Configuration Example SW_1 & SW_2

- Port 1 and Port 2 of SW_1 and SW_2 are also belong to partition with **Ring ID = 3**
- Port 8 belong to different partition with **Ring ID = 2** and associating it to **Partition 3** by selecting **“Ring 03”** in the **2nd Ring Port**

X-Ring+

X-Ring+ Operation Mode : X-Ring+

X-Ring+ Configuration

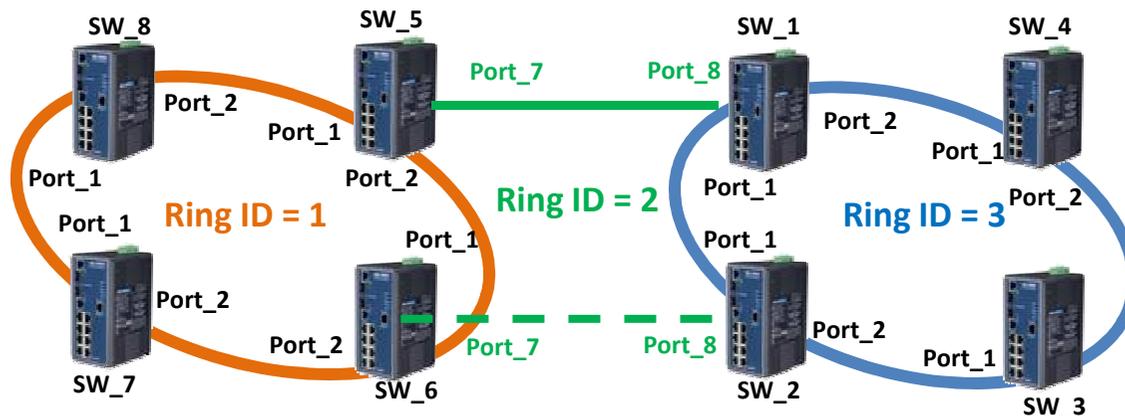
| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|--|--|
| 2 | Port.08 <input type="button" value="v"/> | Ring.03 <input type="button" value="v"/> |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 3 | Port.01 | Port.02 |
| 2 | Port.08 | Ring.03 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------------------------------|---------------------------------------|
| | NONE <input type="button" value="v"/> | NONE <input type="button" value="v"/> |

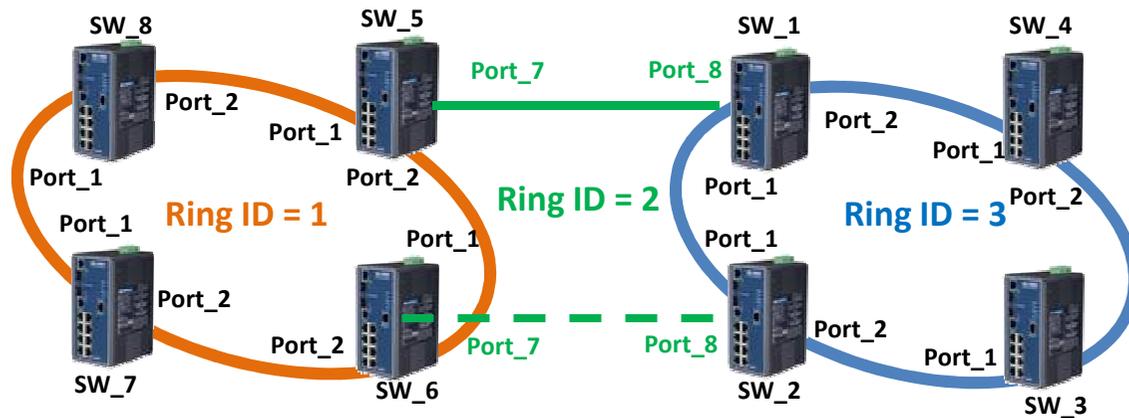
X-Ring+ Ring Information

| X-Ring+ Version | 3.00 | | |
|-----------------|---------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 3 | STANDBY | Port.01_DWN | Port.02_DWN |
| 2 | DISCONN | Port.08_FWD | Ring.03_FWD |



Ring-Coupling Configuration Example SW_3 & SW_4

- Port 1 and Port 2 of SW_3 and SW_4 belong to same partition with **Ring ID = 3**



X-Ring+

X-Ring+ Operation Mode : X-Ring+

X-Ring+ Configuration

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 3 | Port.01 | Port.02 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|----------------------|---------------------------------------|---------------------------------------|
| <input type="text"/> | NONE <input type="button" value="v"/> | NONE <input type="button" value="v"/> |

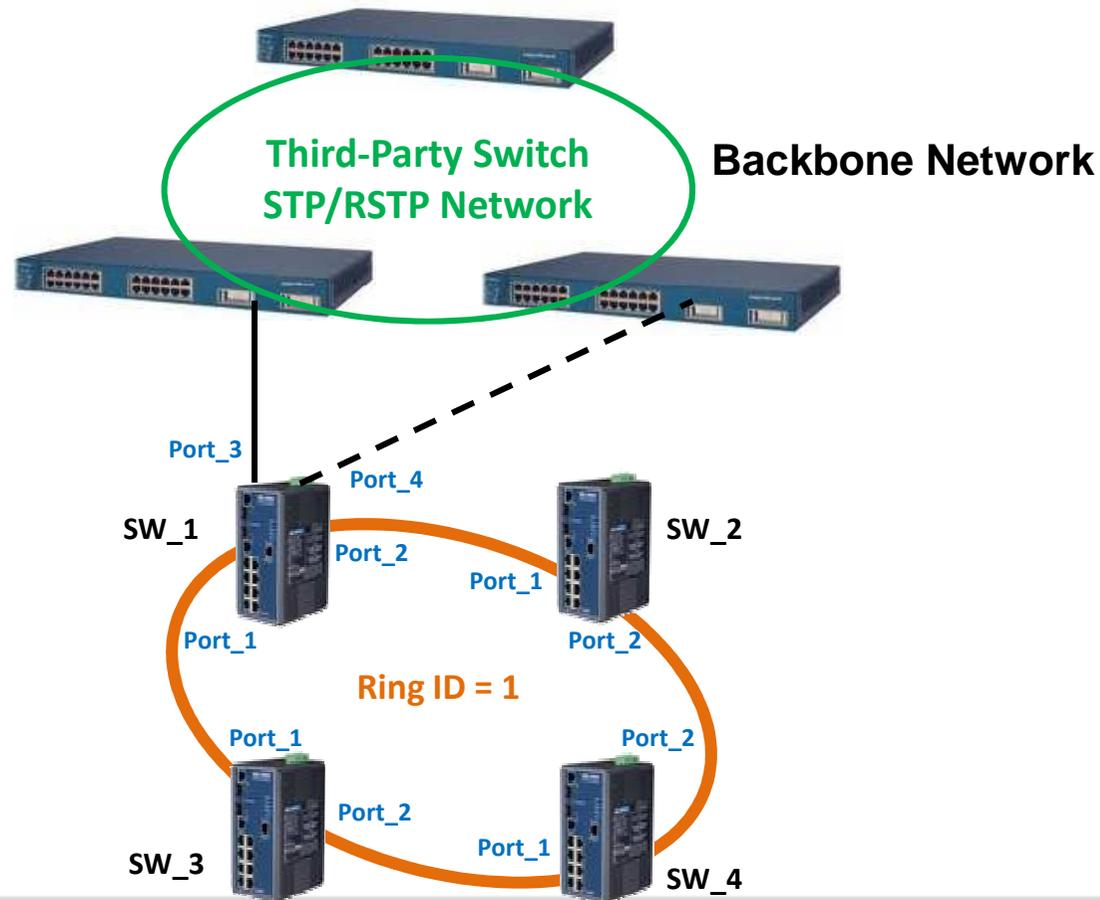
X-Ring+ Ring Information

| X-Ring+ Version | 3.00 | | |
|-----------------|---------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 3 | STANDBY | Port.01_DWN | Port.02_DWN |

Advance Topology Dual-Homing

Dual-Homing

- Handle connections between Advantech (X-Ring Pro) and Third-Party Switch(Standard STP/RSTP) running standard redundant protocols.
- Easy and flexible communication between Advantech and any third-party switches



Dual-Homing(Cont)

- Unlike legacy X-Ring, no manual configuration is required in X-Ring Pro
- Auto-Compatible to STP/RSTP network

Previous X-Ring Configuration:

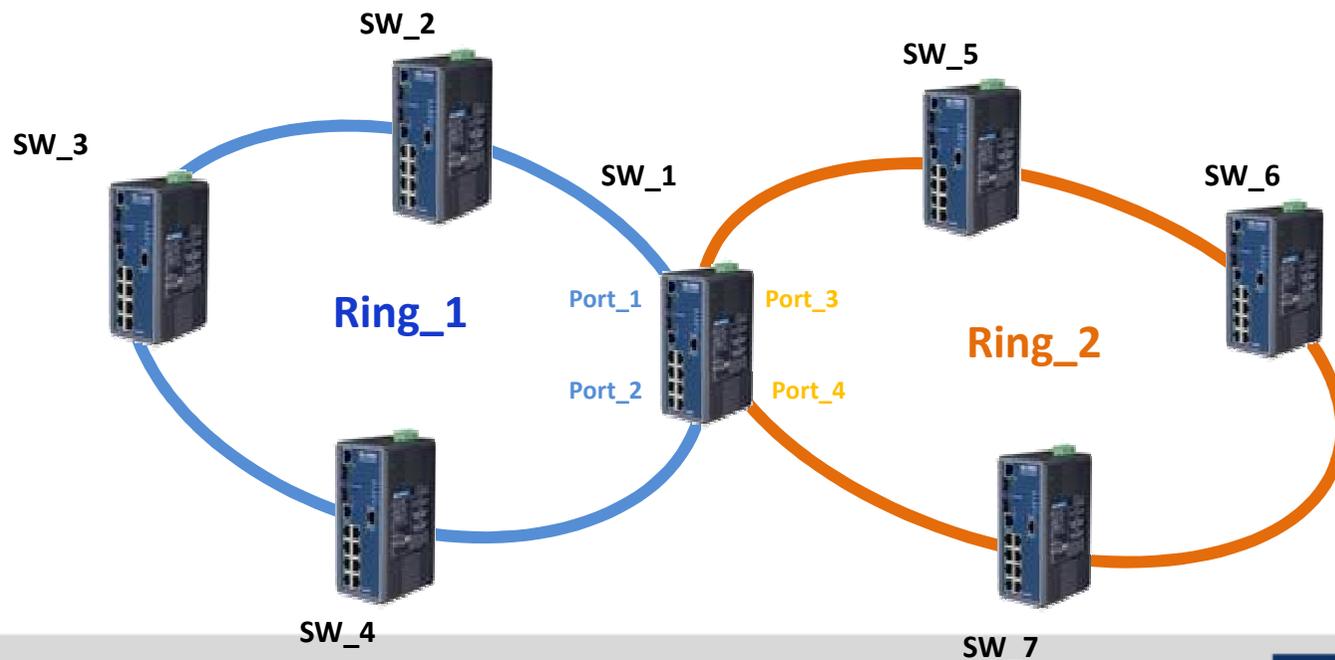
| | | | |
|-------------------------------------|---------------------------|-----------|------------|
| <input checked="" type="checkbox"/> | Enable Ring | | |
| <input type="checkbox"/> | Enable Ring Master | | |
| | 1st Ring Port | Port.01 ▼ | FORWARDING |
| | 2nd Ring Port | Port.02 ▼ | LINK DOWN |
| <input type="checkbox"/> | Enable Couple Ring | | |
| | Coupling Port | Port.03 ▼ | LINK DOWN |
| | Control Port | Port.04 ▼ | LINK DOWN |
| <input checked="" type="checkbox"/> | Enable Dual Homing | | |
| | Homing Port | Port.04 ▼ | LINK DOWN |

Advance Topology Dual-Ring

Dual-Ring

Dual-Ring:

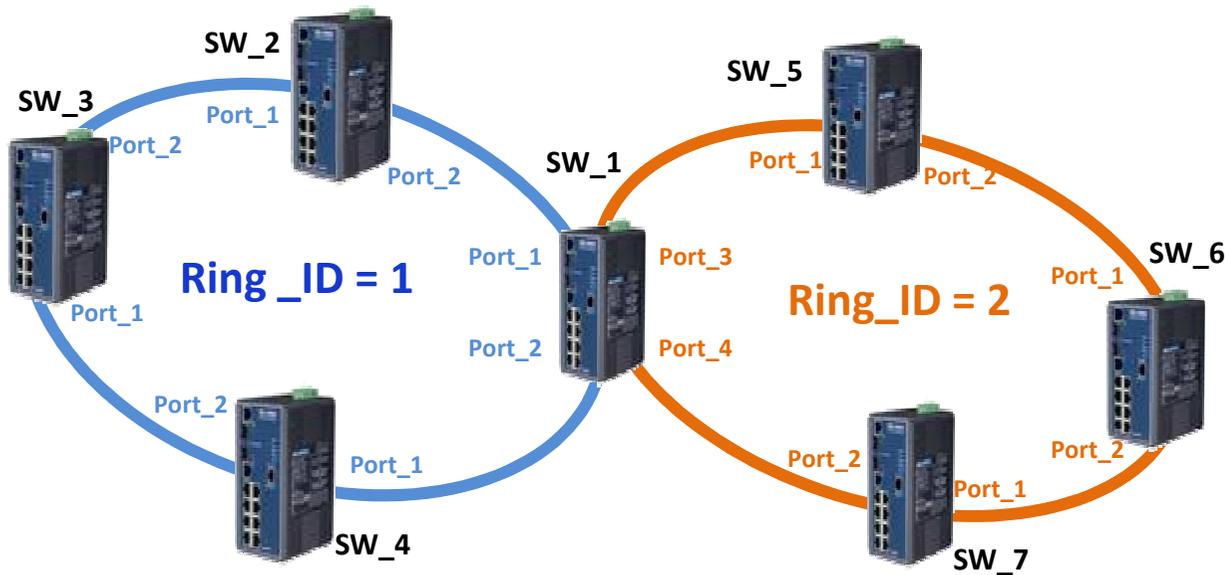
- Two adjacent rings shared by one switch.
- SW_1 belong to different X-Ring groups(i.e. Ring 1 and Ring 2)
- Left ring with Ring ID = 1, composed from SW_1 ~ SW_4
- Right ring with Ring ID =2, composed of SW_1, SW_5, SW_6 and SW_7.



Dual-Ring Configuration Example SW_1

SW_1 Configuration:

- Port 1 and Port 2 => Ring ID 1
- Port 3 and Port 4 => Ring ID 2



X-Ring Pro

X-Ring Pro Operation Mode : X-Ring Pro

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 1 | Port.01 | Port.02 |
| 2 | Port.03 | Port.04 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| | NONE | NONE |

Add Delete Help

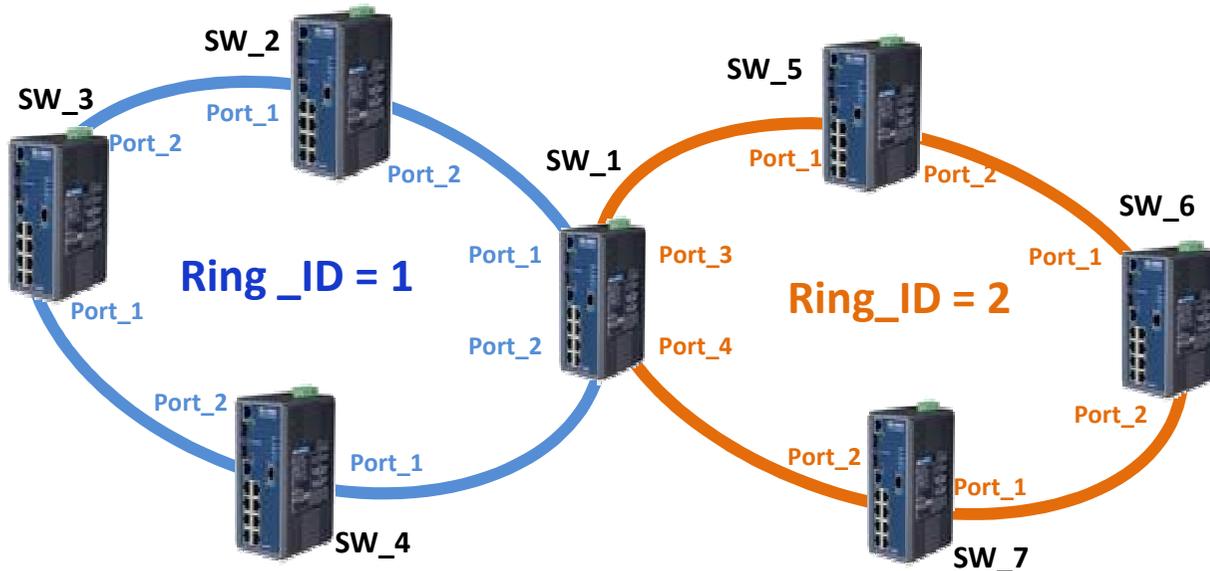
X-Ring Pro Ring Information

| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
|---------|---------|---------------|---------------|
| 1 | STANDBY | Port.01_DWN | Port.02_DWN |
| 2 | STANDBY | Port.03_DWN | Port.04_DWN |

Dual-Ring Configuration Example SW_2, SW_3 & SW_4

SW_2, SW_3 and SW_4 Configuration:

- Port 1 and Port 2 => Ring ID 1



X-Ring Pro

X-Ring Pro Operation Mode : X-Ring Pro

X-Ring Pro Configuration

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 1 | Port.01 | Port.02 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| | NONE | NONE |

Add Delete Help

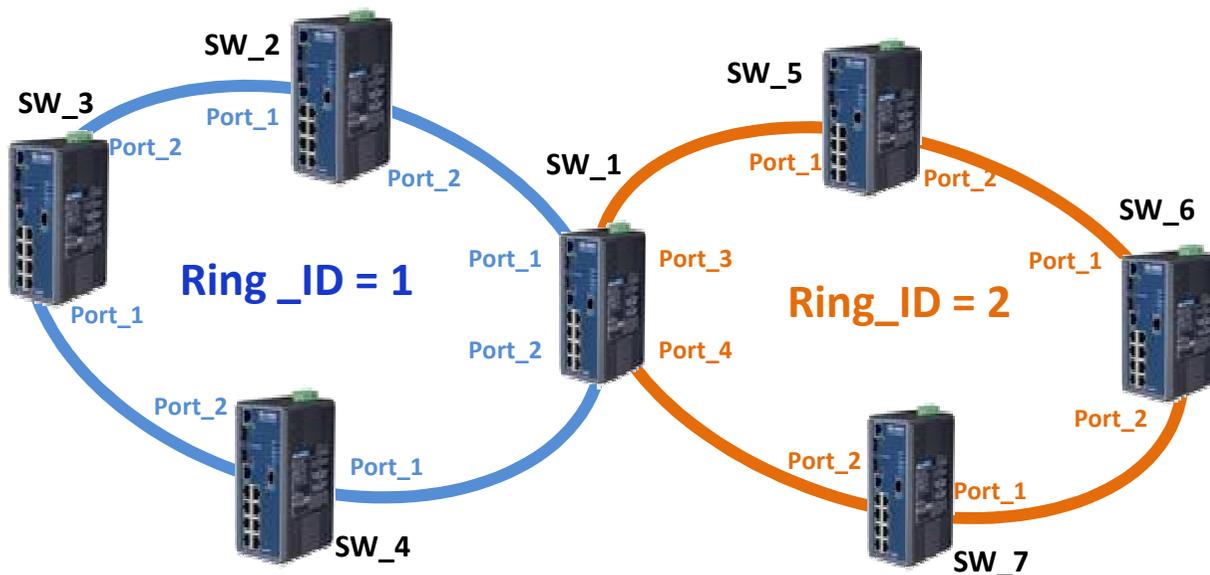
X-Ring Pro Ring Information

| X-Ring Pro Version | 3.00 | | |
|--------------------|---------|---------------|---------------|
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 1 | STANDBY | Port.01_DWN | Port.02_DWN |

Dual-Ring Configuration Example SW_5, SW_6 & SW_7

SW_5, SW_6 and SW_7 Configuration:

- Port 1 and Port 2 => Ring ID 2



X-Ring Pro

X-Ring Pro Operation Mode : X-Ring Pro

X-Ring Pro Configuration

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| 2 | Port.01 | Port.02 |

| Ring ID | 1st Ring Port | 2nd Ring Port |
|---------|---------------|---------------|
| | NONE | NONE |

Add Delete Help

X-Ring Pro Ring Information

| | | | |
|--------------------|---------|---------------|---------------|
| X-Ring Pro Version | 3.00 | | |
| Ring ID | Role | 1st Ring Port | 2nd Ring Port |
| 2 | STANDBY | Port.01_DWN | Port.02_DWN |