

EKI-7700 Series X-Ring Pro Configuration SOP

- For EKI-7700/7428 series, and some for EKI- 9600 Series

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X-Ring Pro Configuration SOP

- General Approach to Configure X-Ring



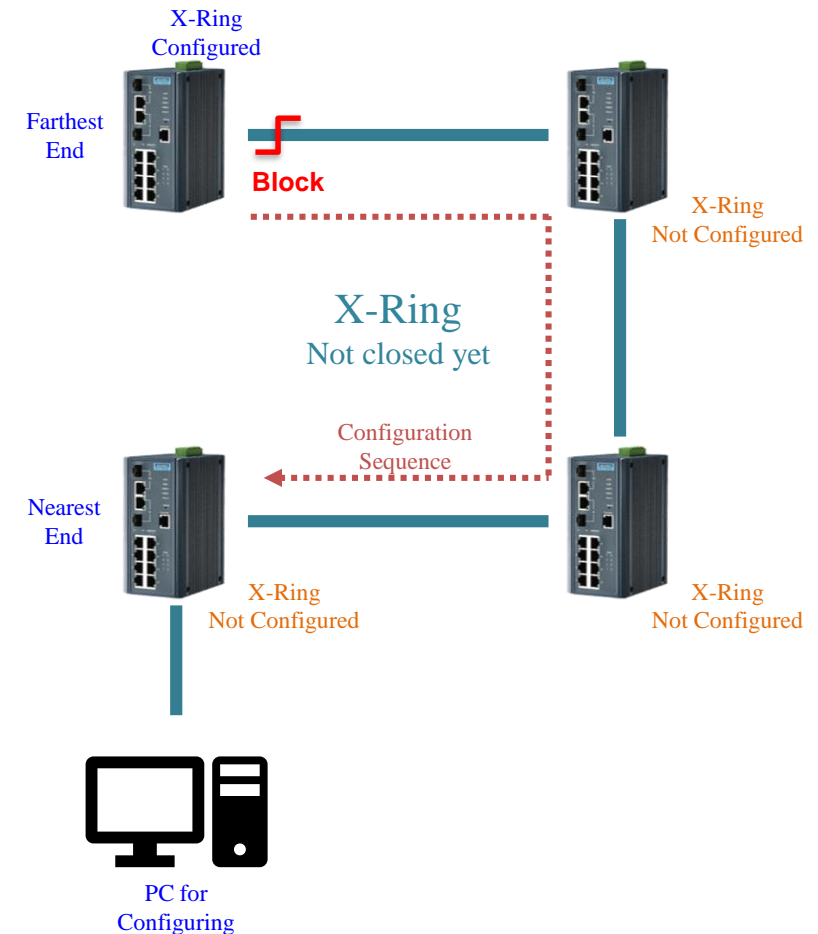
General Approach to Configure X-Ring

X-Ring only works as expected when all the switches in the ring are configured correctly.

If the X-Ring is not configured on all switches in the specified topology, that possibly cause unexpected Blocking on some ports, even when the ring is not closed.

Suggested Approach/Configuring Sequence:

1. Configure the X-Ring before connecting any of the links.
 - The best approach to avoid any potential problem. X-Ring will proceed the handshake when linked up.
2. If links has to be connected first: Synchronize the configuration through IXM.
 - The config synchronization is based on startup-config, so it will not take effect before switches are rebooted. Not going to cause Block during synchronization.
3. If links has to be connected first and not using IXM: Configure the X-Ring **from the farthest end to the nearest**.
 - The Blocking may possibly still shows up, but that doesn't affect the connection to the next switch. Will be unblocked after all the switches are configured with X-Ring.



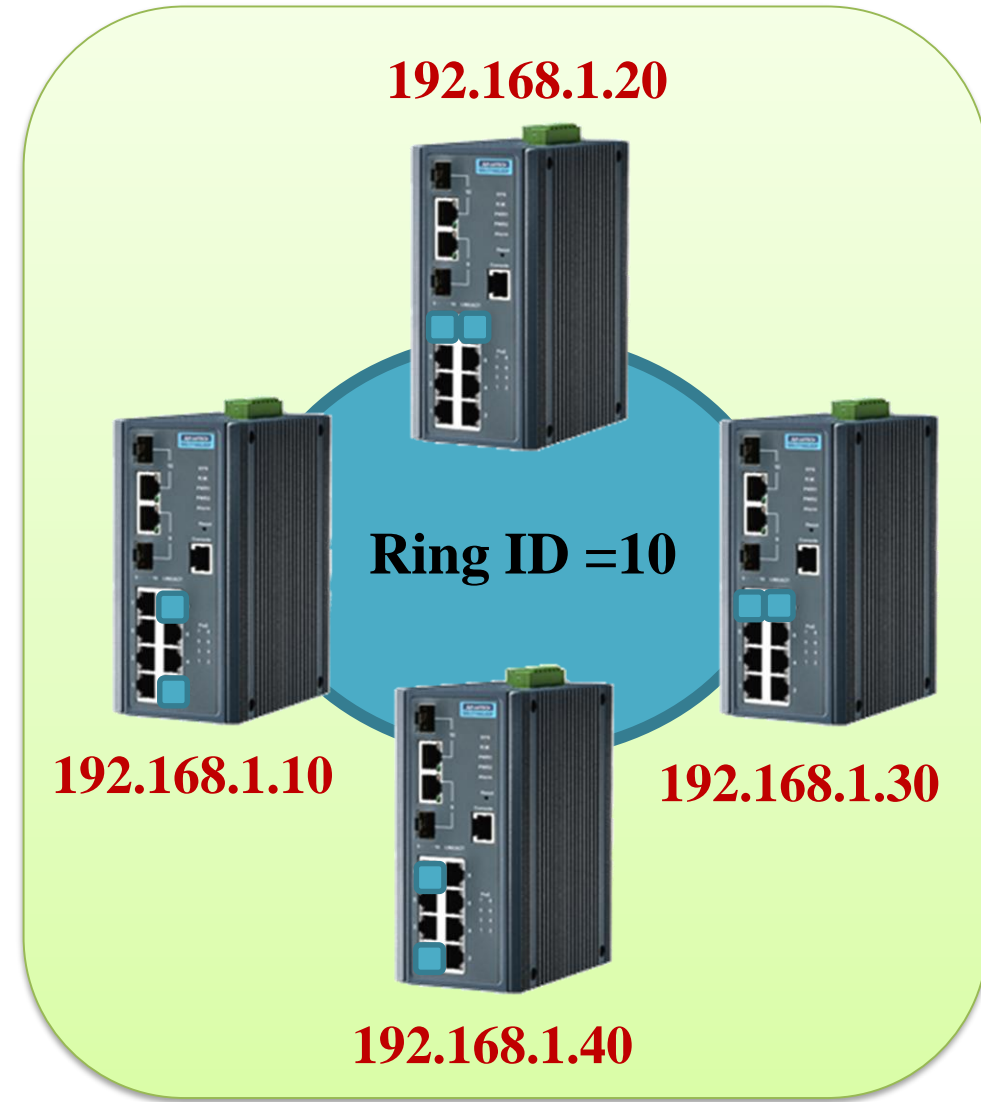
X-Ring Pro Configuration SOP

- **Single Ring**
- Dual Ring – p.10
- Couple Ring – p.18
- Dual Homing – p.27
- X-Chain – p.32
- X-pair – p.38
- R-pair – p.46

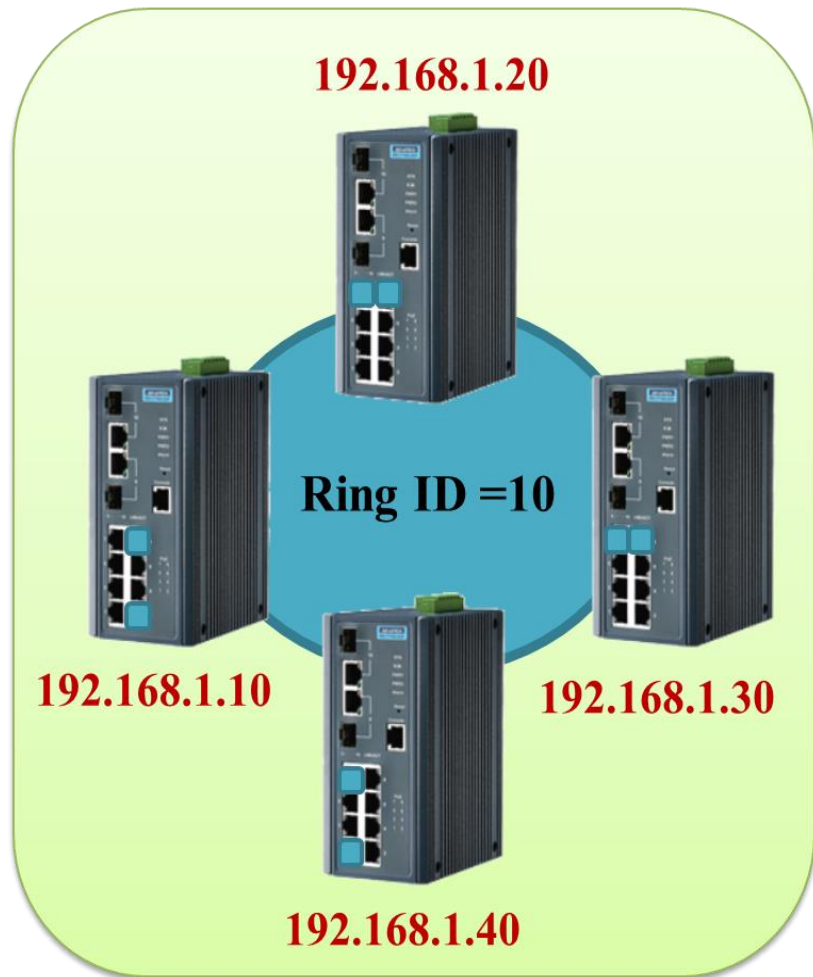


Single Ring Structure

- There are 3 steps in configuration.
 1. Enabled X-Ring Pro.
 2. Select X-Ring type.
 3. Set up Ring's ID by ports.
- Please find out the X-Ring status.
 1. Web GUI
 2. Command Line Interface (CLI)
 3. R.M. (Ring Master) LED
 4. WebAccess/NMS



Single Ring Configuration (1/2)



- For EKI-7710, the default X-Ring State is “Enabled”.

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Settings

X-Ring Pro Settings

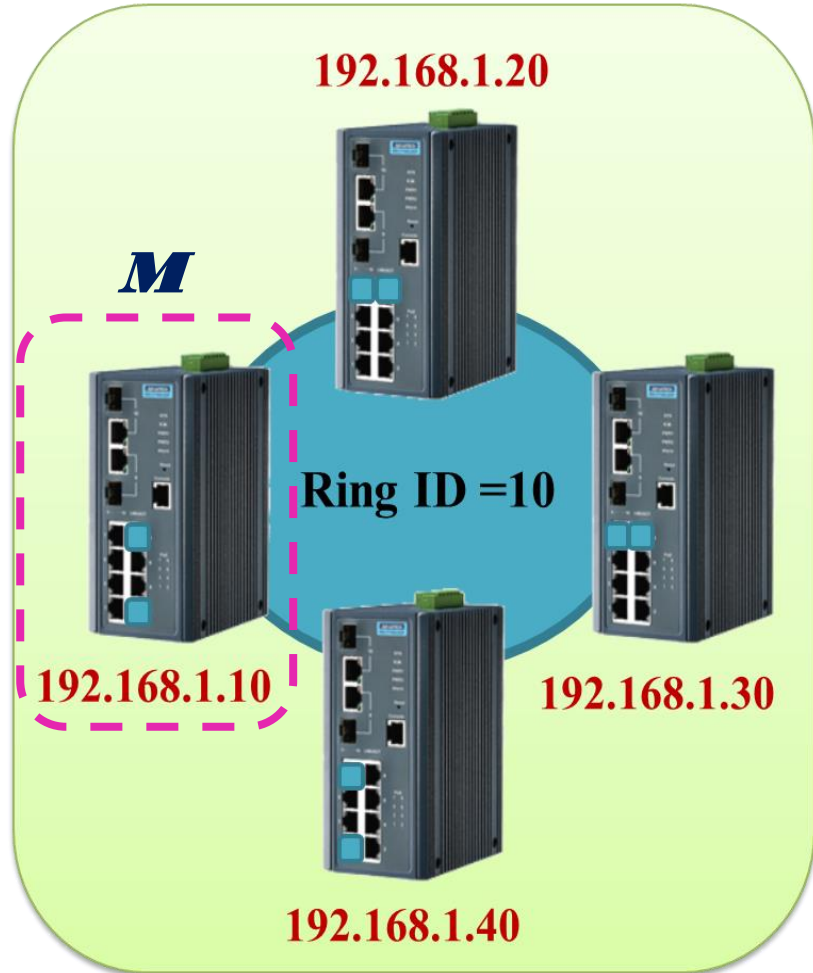
State ☒ Enabled ☐ Disabled

Apply

Information

Information Name	Information Value
X-Ring Pro State	Enabled

Single Ring Configuration (2/2)



- Assign two X-Ring member ports in the ring group.
- The **Ring ID** within the same **X-Ring Pro group** switch **MUST** be identical.

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID	Port 1	Port 2	
<input type="text" value="10"/>	<input type="text" value="FE2"/>	<input type="text" value="FE8"/>	<input type="button" value="Add"/>

Find Out the X-Ring Status – Web GUI

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

1-255

FE1

FE1

Add

Chain Setting

Chain Ring ID

Role

Head Port

Member Port

1-255

Head

FE1

FE1

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

1-255

Select Port

10

Add

192.168.1.20

192.168.1.10

192.168.1.30

192.168.1.40

M

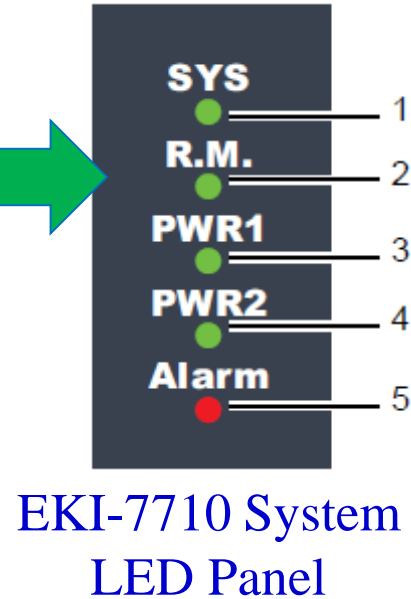
Ring ID = 10

Information

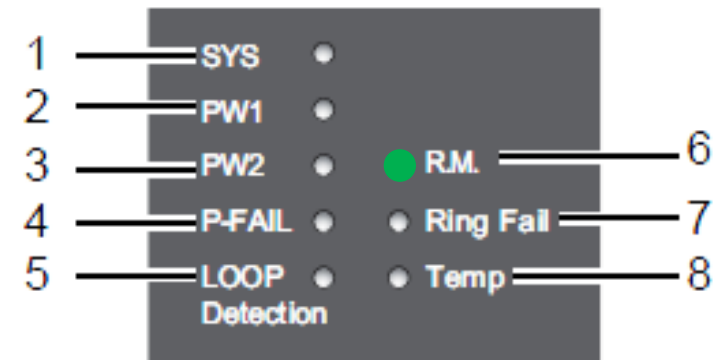
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	MASTER	FE2	BLK	FE8	FWD	Delete

Find Out the X-Ring Status – R.M. LED

- R.M. (Ring Master) LED: Ring Master Indicator
 - EKI-7710, EKI-7428



EKI-7710 System
LED Panel



EKI-7428 System
LED Panel

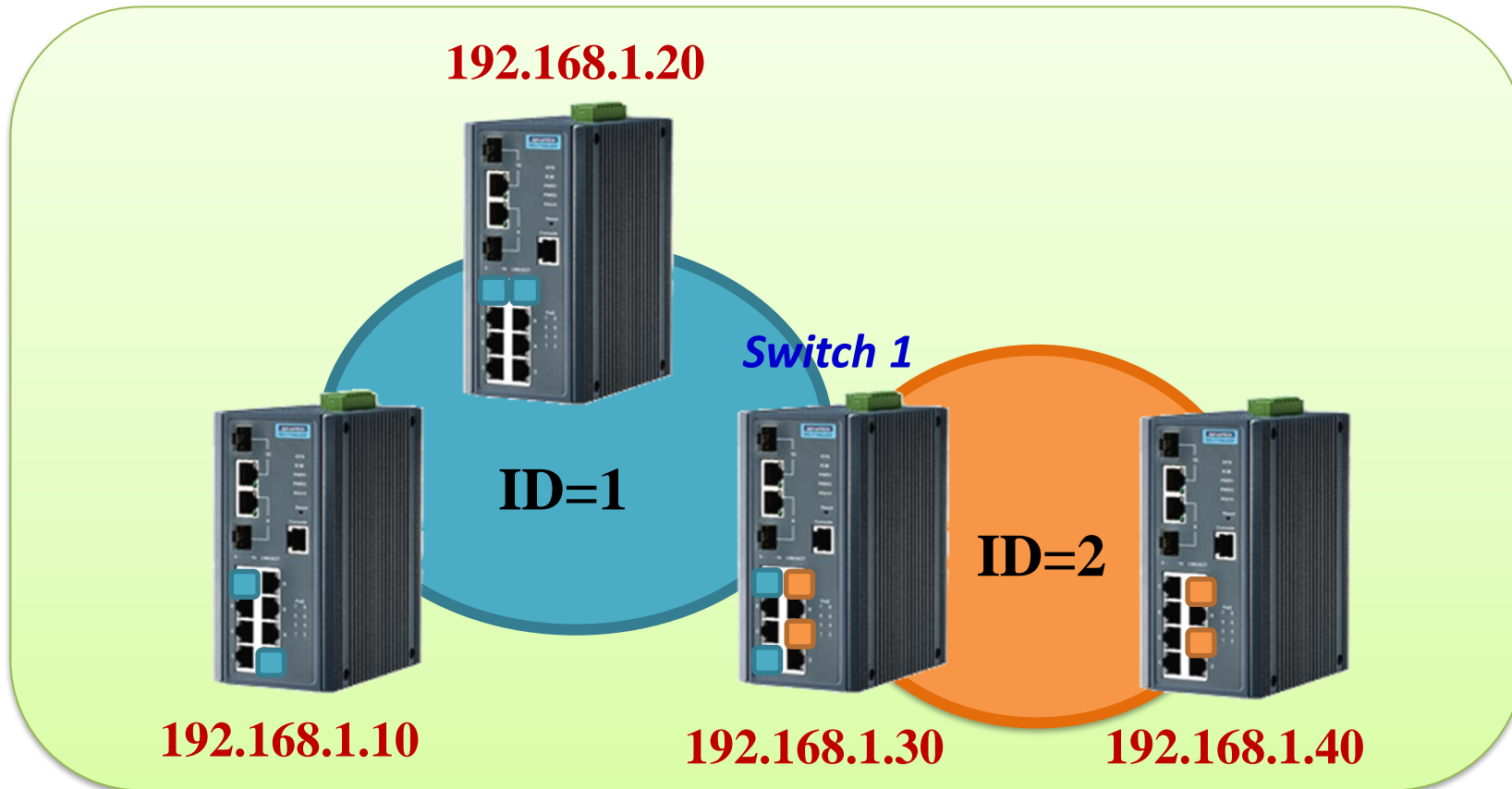
X-Ring Pro Configuration SOP

- Single Ring
- **Dual Ring**
- Couple Ring
- Dual Homing
- X-Chain
- X-pair
- R-pair



Dual Ring Structure

- There are 2 steps in Dual Ring .
 1. Enabled X-Ring Pro.
 2. Set up Ring's ID by ports.



Dual Ring Configuration (1/5)

ADVANTECH EKI-7710E-2CPI-AE Intelligent Industrial Switch

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Settings

X-Ring Pro Settings

State ☒ Enabled ☐ Disabled

Apply

Information

Information Name	Information Value
X-Ring Pro State	Enabled

1. L2 Switching -> X-Ring Pro Settings

2. Enabled X-Ring Pro

Dual Ring Configuration (2/5)

ADVANTECH

EKI-7710E-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

1

FE2

FE7

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

1-255

Select Port

1

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
1	Basic	TRANSIT	FE2	FWD	FE7	FWD	Delete

2. Set up 192.168.1.10 Ring's ID by ports

1. L2 Switching -> X-Ring Pro Groups

192.168.1.20

ID=1

192.168.1.10

192.168.1.30

ID=2

192.168.1.40

Dual Ring Configuration (3/5)

ADANTECH

EKI-7710G-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

1

GE7

GE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

1-255

Select Port

1

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
1	Basic	TRANSIT	GE7	FWD	GE8	FWD	Delete

2. Set up 192.168.1.20 Ring's ID by ports

1. L2 Switching -> X-Ring Pro Groups

Diagram illustrating the Dual Ring Configuration. It shows two rings, ID=1 (blue) and ID=2 (orange). Ring ID=1 contains three switches with IP addresses 192.168.1.10, 192.168.1.20, and 192.168.1.30. Ring ID=2 contains one switch with IP address 192.168.1.40. The switches are connected in a ring topology.

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Dual Ring Configuration (4/5)

ADANTECH

EKI-7710G-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

2

GE4

GE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

1-255

Select Port

2

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
2	Basic	TRANSIT	GE4	FWD	GE8	FWD	Delete
1	Basic	MASTER	GE1	FWD	GE7	BLK	Delete

2. Set up 192.168.1.30 Ring's ID by ports

Set up two Ring's ID, cause it is connection of two Rings.

1. L2 Switching -> X-Ring Pro Groups

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Dual Ring Configuration (5/5)

ADVANTECH

EKI-7710E-2C-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

2

FE8

FE4

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

1-255

Select Port

2

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
2	Basic	MASTER	FE8	FWD	FE4	BLK	Delete

2. Set up 192.168.1.40 Ring's ID by ports

1. L2 Switching -> X-Ring Pro Groups

192.168.1.20

ID=1

192.168.1.10

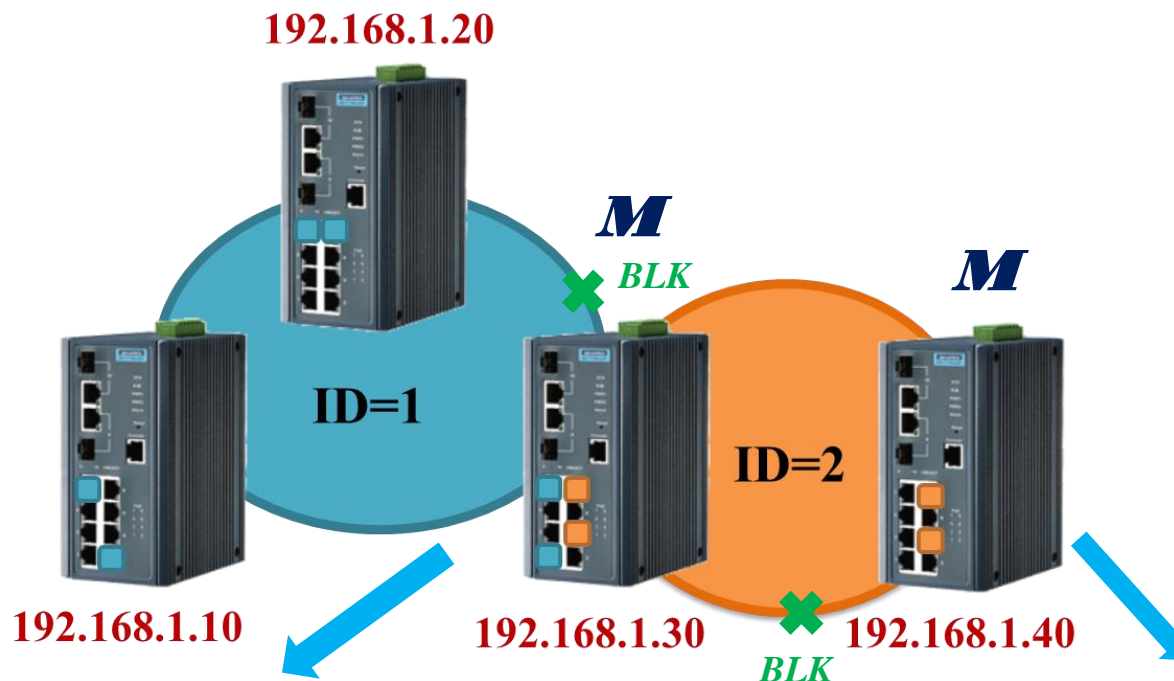
192.168.1.30

ID=2

192.168.1.40

Dual Ring Status

- CLI:
 - switch# show xring-plus



ID=2

ID=1

```
COM1 - PuTTY
switch# show ip
IP Address: 192.168.1.30
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 2
X-Ring Plus Ring Mode..... Basic
Operation State..... TRANSIT
Port GigabitEthernet4 Forwarding State..... FWD
Port GigabitEthernet8 Forwarding State..... FWD

X-Ring Plus Ring ID..... 1
X-Ring Plus Ring Mode..... Basic
Operation State..... MASTER
Port GigabitEthernet1 Forwarding State..... FWD
Port GigabitEthernet7 Forwarding State..... BLK
```

```
COM1 - PuTTY
switch# show ip
IP Address: 192.168.1.40
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 2
X-Ring Plus Ring Mode..... Basic
Operation State..... MASTER
Port FastEthernet8 Forwarding State..... FWD
Port FastEthernet4 Forwarding State..... BLK
```

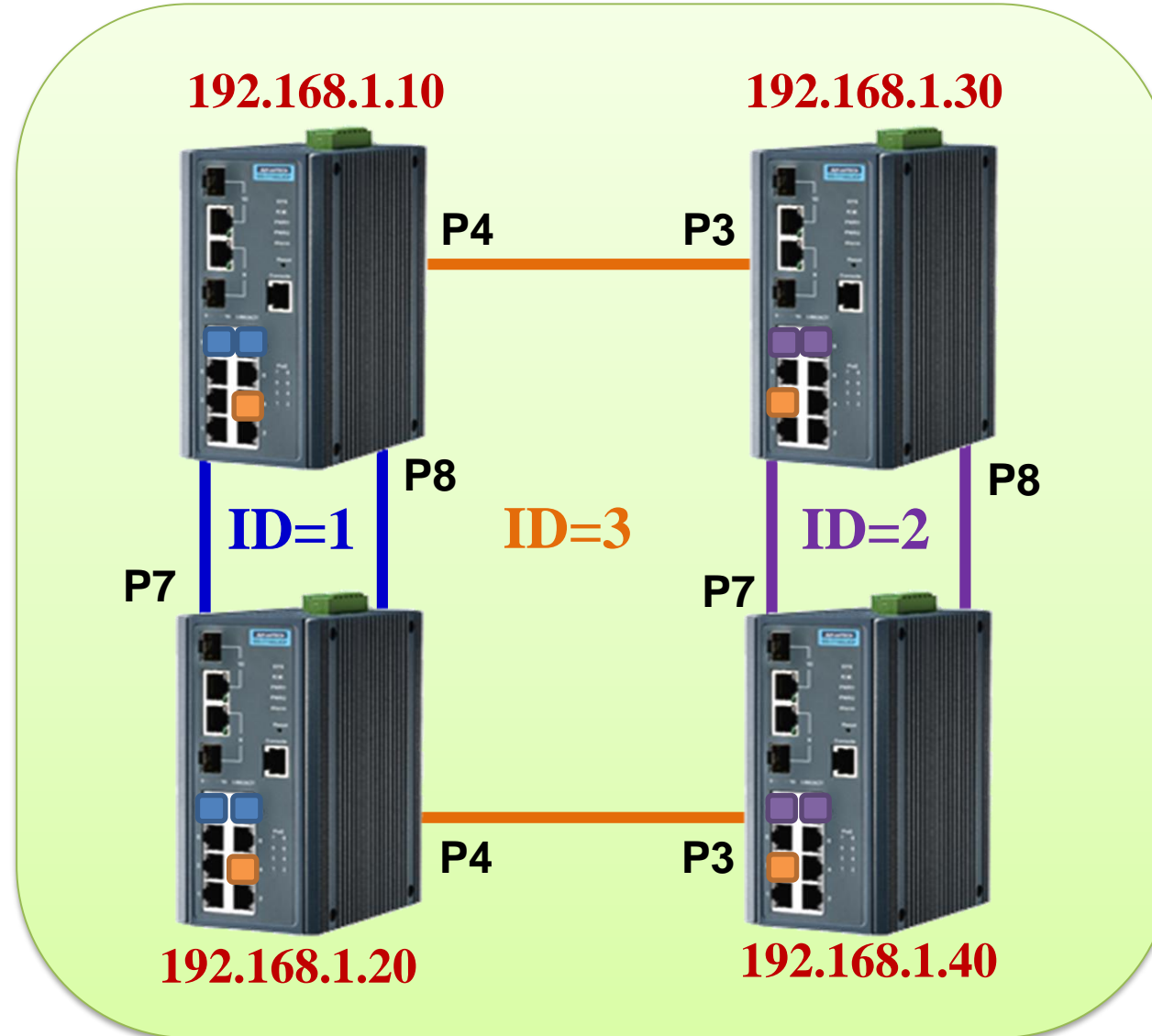
ID=2

X-Ring Pro Configuration SOP

- Single Ring
- Dual Ring
- **Couple Ring**
- Dual Homing
- X-Chain
- X-pair
- R-pair



Couple Ring Structure



Couple Ring Configuration (1/5)

The screenshot displays the web management interface of an Advantech EKI-7710E-2CPI-AE Intelligent Industrial Switch. The left sidebar contains a navigation menu with the following items: Monitoring, System, L2 Switching, Port Configuration, Port Mirror, Link Aggregation, 802.1Q VLAN, Q-in-Q, GARP, 802.3az EEE, Multicast, Jumbo Frame, Spanning Tree, X-Ring Elite, X-Ring Pro, X-Ring Pro Settings, and X-Ring Pro Groups. The 'X-Ring Pro Settings' item is highlighted with a red box and labeled '1. L2 Switching -> X-Ring Pro Groups'. The main content area shows the 'X-Ring Pro Settings' configuration page. At the top, the breadcrumb trail reads 'Switch / L2 Switching / X-Ring Pro / X-Ring Pro Settings'. The 'X-Ring Pro Settings' section includes a 'State' field with radio buttons for 'Enabled' (selected) and 'Disabled', and an 'Apply' button. This section is labeled '2. Enabled X-Ring Pro'. Below this is an 'Information' table with the following data:

Information Name	Information Value
X-Ring Pro State	Enabled

Couple Ring Configuration (2/5)

ADVANTECH

EKI-7710E-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

1

FE7

FE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

3

FE4

1

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
1	Basic	EDGE	FE7	FWD	FE8	DWN	Delete
3	Couple	Disconnect	FE4	DWN			Delete

192.168.1.10

192.168.1.30

192.168.1.20

192.168.1.40

ID=1

ID=3

ID=2

2. Set up 192.168.1.10 Ring's ID by ports

3. Couple Ring's ID

1. L2 Switching -> X-Ring Pro Groups

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Couple Ring Configuration (3/5)

ADVANTECH

EKI-7710G-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

1

GE7

GE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

3

GE4

1

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
1	Basic	EDGE	GE7	FWD	GE8	DWN	Delete
3	Couple	Disconnect	GE4	DWN			Delete

192.168.1.10

192.168.1.30

ID=1

ID=3

ID=2

192.168.1.20

192.168.1.40

2. Set up 192.168.1.20 Ring's ID by ports

3. Couple Ring's ID

1. L2 Switching -> X-Ring Pro Groups

ADVANTECH

Couple Ring Configuration (4/5)

ADVANTECH

EKI-7710G-2CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

2

GE7

GE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

3

GE3

2

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
2	Basic	EDGE	GE7	DWN	GE8	FWD	Delete
3	Couple	Disconnect	GE3	DWN			Delete

192.168.1.10

192.168.1.20

192.168.1.30

192.168.1.40

ID=1

ID=3

ID=2

2. Set up 192.168.1.30 Ring's ID by ports

3. Couple Ring's ID

1. L2 Switching -> X-Ring Pro Groups

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Couple Ring Configuration (5/5)

ADVANTECH

EKI-7710E-2C-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

X-Ring Elite

X-Ring Pro

X-Ring Pro Settings

X-Ring Pro Groups

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

2

FE7

FE8

Add

Couple Setting

Couple Ring ID

Port

Master Ring ID

3

FE3

2

Add

Information

Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
2	Basic	EDGE	FE7	DWN	FE8	FWD	Delete
3	Couple	Disconnect	FE3	DWN			Delete

2. Set up 192.168.1.40 Ring's ID by ports

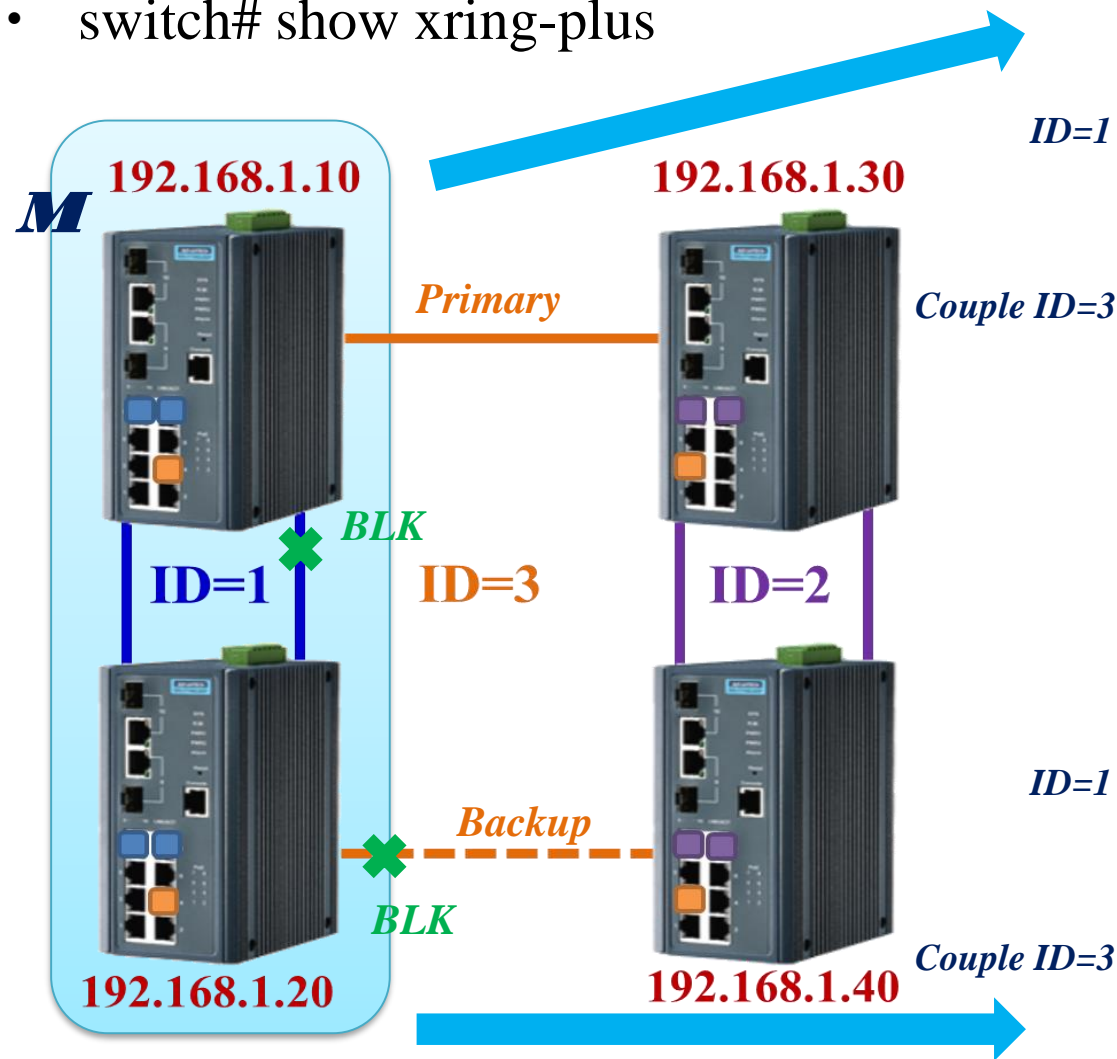
3. Couple Ring's ID

1. L2 Switching -> X-Ring Pro Groups

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Couple Ring Status (1/2)

- CLI:
 - switch# show xring-plus



```
COM1 - PuTTY
switch# show ip
IP Address: 192.168.1.10
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 1
X-Ring Plus Ring Mode..... Basic
Operation State..... MASTER
Port FastEthernet7 Forwarding State..... FWD
Port FastEthernet8 Forwarding State..... BLK

X-Ring Plus Ring ID..... 3
X-Ring Plus Ring Mode..... Couple
Operation State..... Primary
Port FastEthernet4 Forwarding State..... FWD
Master Ring ID..... 1
```

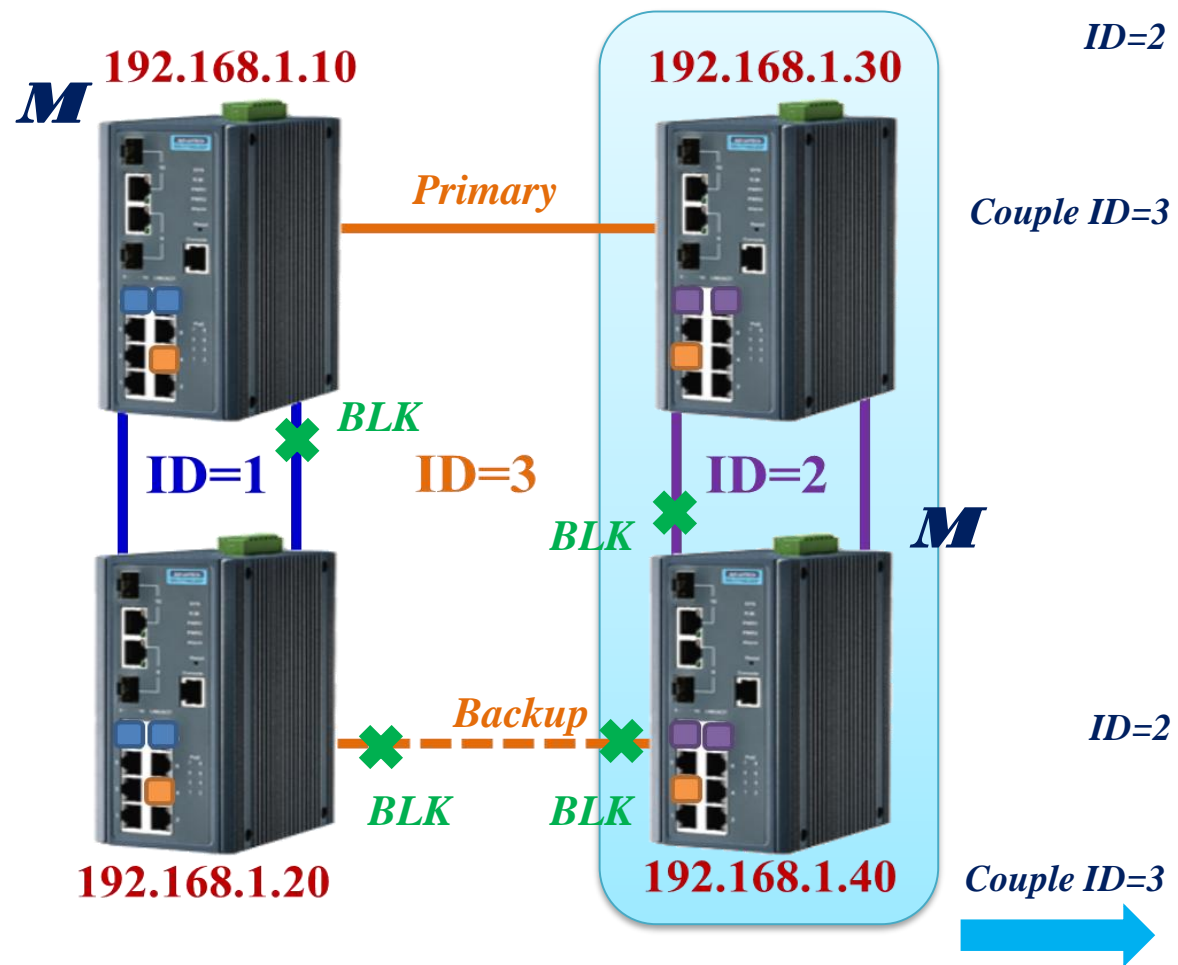
```
COM1 - PuTTY
switch# show ip
IP Address: 192.168.1.20
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 1
X-Ring Plus Ring Mode..... Basic
Operation State..... TRANSIT
Port GigabitEthernet7 Forwarding State..... FWD
Port GigabitEthernet8 Forwarding State..... FWD

X-Ring Plus Ring ID..... 3
X-Ring Plus Ring Mode..... Couple
Operation State..... Backup
Port GigabitEthernet4 Forwarding State..... BLK
Master Ring ID..... 1
```


Couple Ring Status (2/2)

- CLI:
 - switch# show xring-plus



```
COM1 - PuTTY
switch# show ip
IP Address: 192.168.1.30
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 2
X-Ring Plus Ring Mode..... Basic
Operation State..... TRANSIT
Port GigabitEthernet7 Forwarding State..... FWD
Port GigabitEthernet8 Forwarding State..... FWD

X-Ring Plus Ring ID..... 3
X-Ring Plus Ring Mode..... Couple
Operation State..... Primary
Port GigabitEthernet3 Forwarding State..... FWD
Master Ring ID..... 2
```

```
COM1 - PuTTY
switch# show i[
Unknown command
switch# show ip
IP Address: 192.168.1.40
Subnet Netmask: 255.255.255.0
Default Gateway: 192.168.1.254
switch# show xring-plus
X-Ring Pro Information
X-Ring Pro Version:3.02
X-Ring Pro State :ENABLED

X-Ring Plus Ring ID..... 2
X-Ring Plus Ring Mode..... Basic
Operation State..... MASTER
Port FastEthernet7 Forwarding State..... BLK
Port FastEthernet8 Forwarding State..... FWD

X-Ring Plus Ring ID..... 3
X-Ring Plus Ring Mode..... Couple
Operation State..... Backup
Port FastEthernet3 Forwarding State..... BLK
Master Ring ID..... 2
```

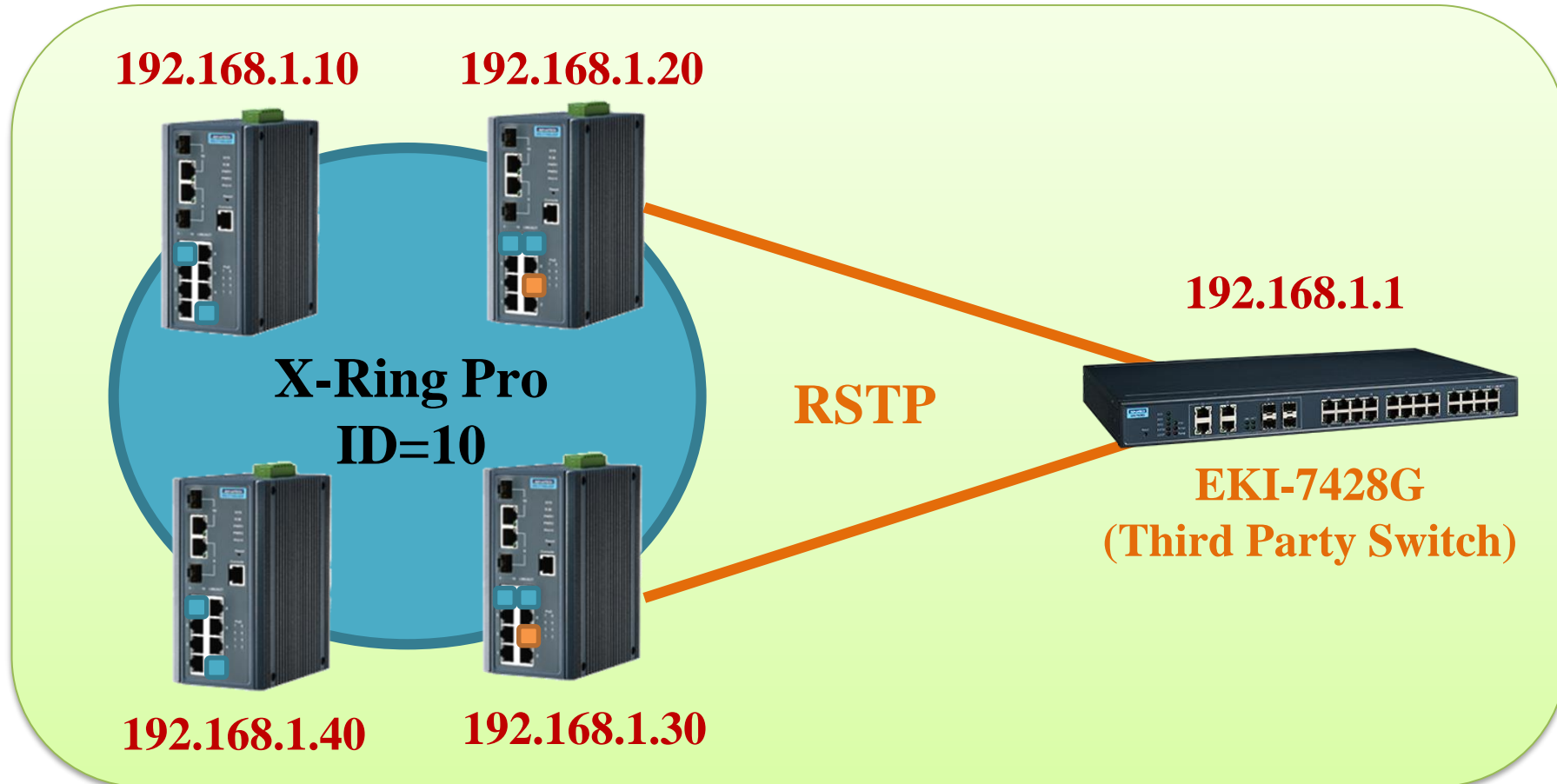

X-Ring Pro Configuration SOP

- Single Ring
- Dual Ring
- Couple Ring
- **Dual Homing**
- X-Chain
- X-pair
- R-pair



Dual Homing Structure

- Dual Homing = **X-Ring** + **RSTP (Third Party Switch)**
- Enabling X-Ring Pro and STP on same port is always forbidden.



Dual Homing Structure – X-Ring Single Ring Configuration



- For EKI-7710, the default X-Ring State is “Enabled”.

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Settings

X-Ring Pro Settings

State ☒ Enabled ☐ Disabled

Apply

Information

Information Name	Information Value
X-Ring Pro State	Enabled

*Please refer to the Single Ring part in this document for full configuration procedure.

Dual Homing Configuration

ADANTECH

EKI-7428G-4CPI-AE
Intelligent Industrial Switch

Monitoring

System

L2 Switching

Port Configuration

Port Mirror

Link Aggregation

802.1Q VLAN

Q-in-Q

GARP

802.3az EEE

Multicast

Jumbo Frame

Spanning Tree

STP Global Settings

STP Port Settings

Switch / L2 Switching / Spanning Tree / STP Global Settings

Global Settings

Enabled

☒ Enabled

☐ Disabled

BPDU Forward

☒ flooding

☐ filtering

PathCost Method

☐ short

☒ long

Force Version

RSTP-Operation

Apply

STP Information

Information Name	Information Value
STP	Enabled
BPDU Forward	flooding
Force Version	RSTP-Operation

192.168.1.10

192.168.1.20

192.168.1.40

192.168.1.30

X-Ring Pro
ID=10

RSTP

192.168.1.1

EKI-7428G
(Third Party Switch)

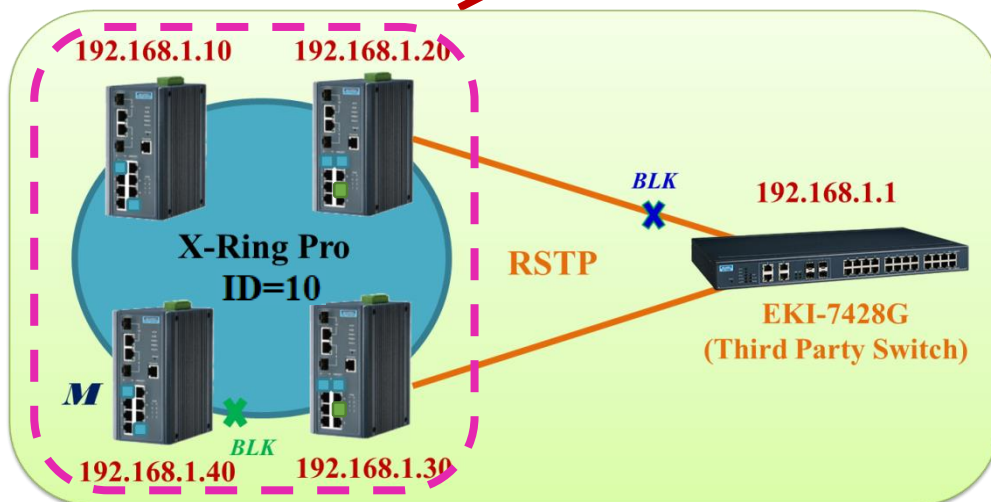
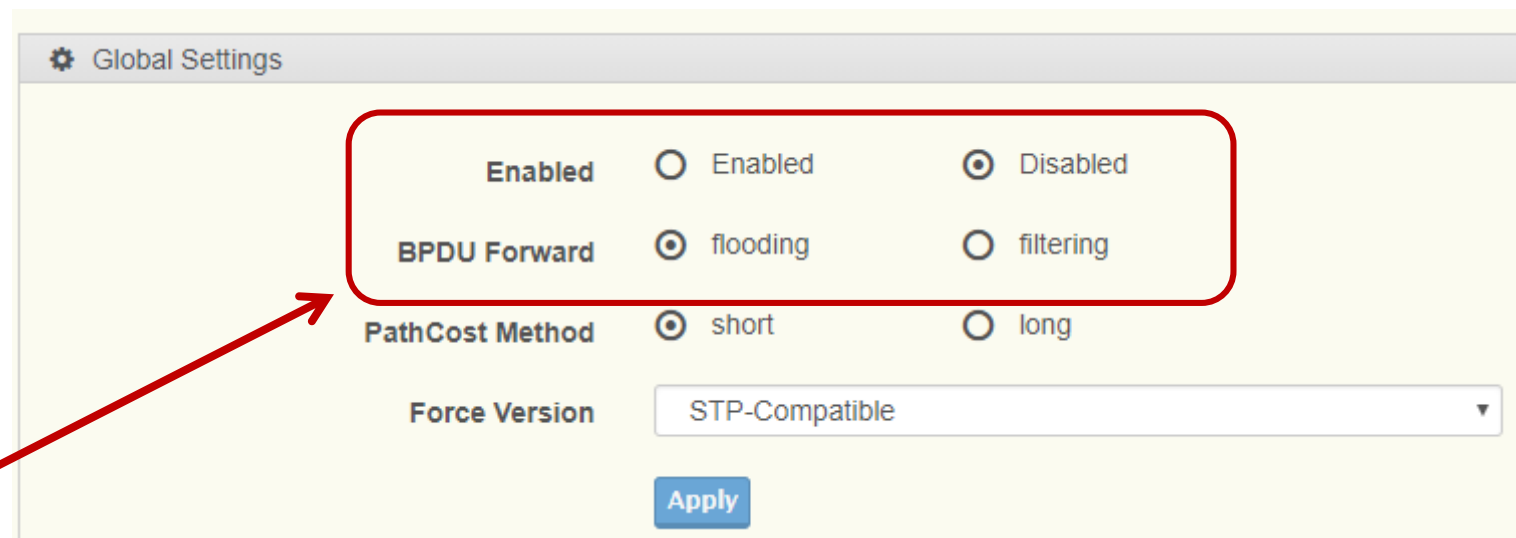
2. Enabled RSTP

1. L2 Switching -> Spanning Tree -> STP Global Settings

Dual Homing Discussion – BPDU Flooding

■ Main Concept:

- To allow the RSTP BPDU to flow through the X-Ring Single Ring



■ BPDU Flooding:

- Enabled: EKI-7710, EKI-7428
- Disabled: EKI-9316

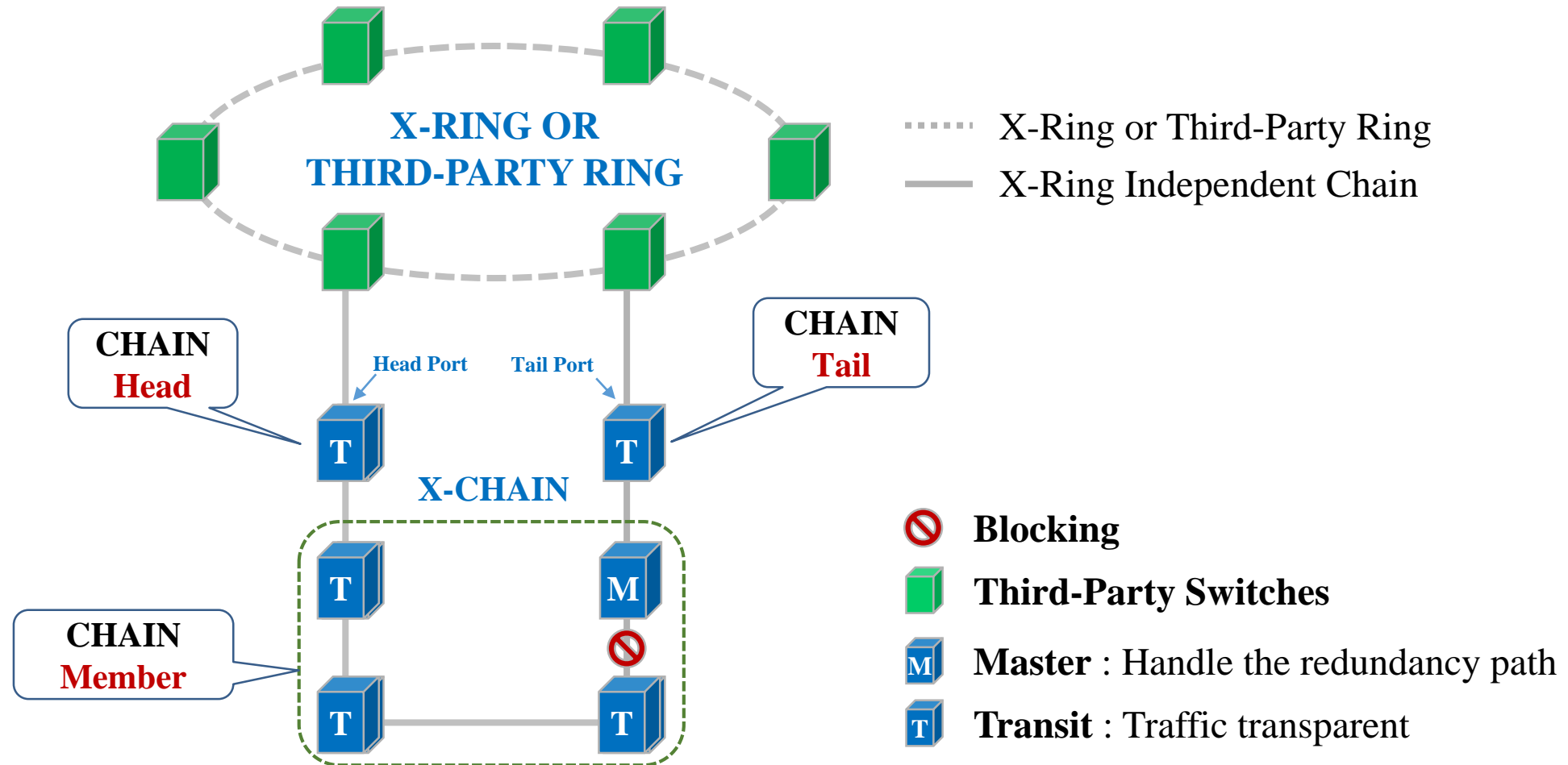
X-Ring Pro Configuration SOP

- Single Ring
- Dual Ring
- Couple Ring
- Dual Homing
- **X-Chain**
- X-pair
- R-pair



X-Chain Structure

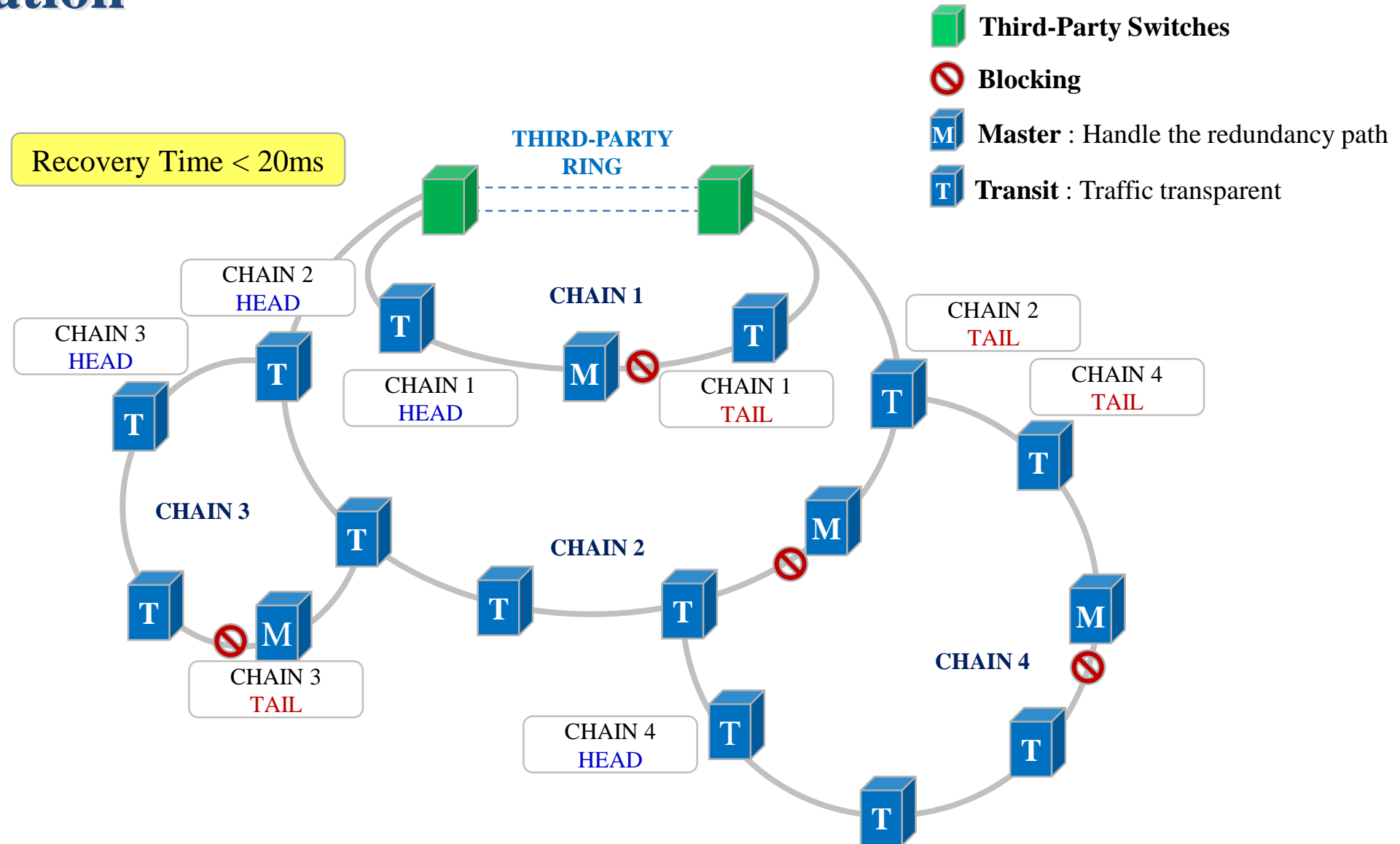
- Three roles in X-Ring: Head, Tail, Member
- “Master” would handle the redundancy path. Its election rule is the same as X-Ring.



X-Chain Application

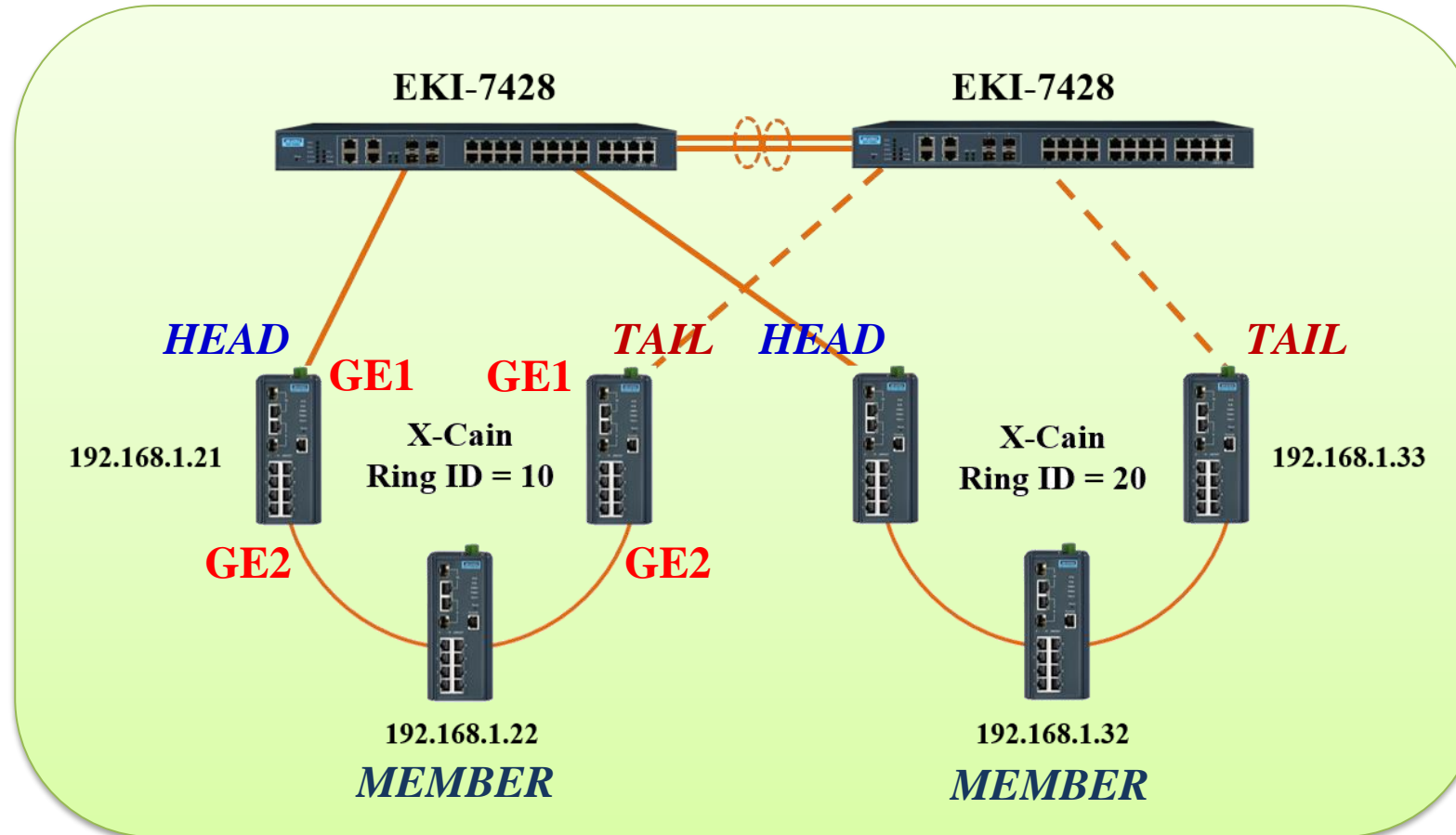
- Chain could be “hooked” on any other topology, as long as the 2 hooked ports are communicating well. Actually, Even a single switch could be there.

- X-Chain will maintain the blocking within its member ports, but careless of the status of the 3rd party part. Users need to make sure the 3rd party part is transparent.



X-Chain Configuration (1/3)

- In this example, we use EKI-7428 to mimic the 3rd party switches. Here the 2 EKI-7428 are connected using Static Trunk, no other protocol configured.



X-Chain Configuration (2/3)

ADVANTECH EKI-7710E-2C-AE Intelligent Industrial Switch

Chain Setting

Chain Ring ID: 10

Role: Head

Head Port: GE1

Member Port: GE2

Pair Setting

Pair Ring ID: 1-255

Port: Select Port

X-Ring Pro Settings

X-Ring Pro Groups

Loopback Detection

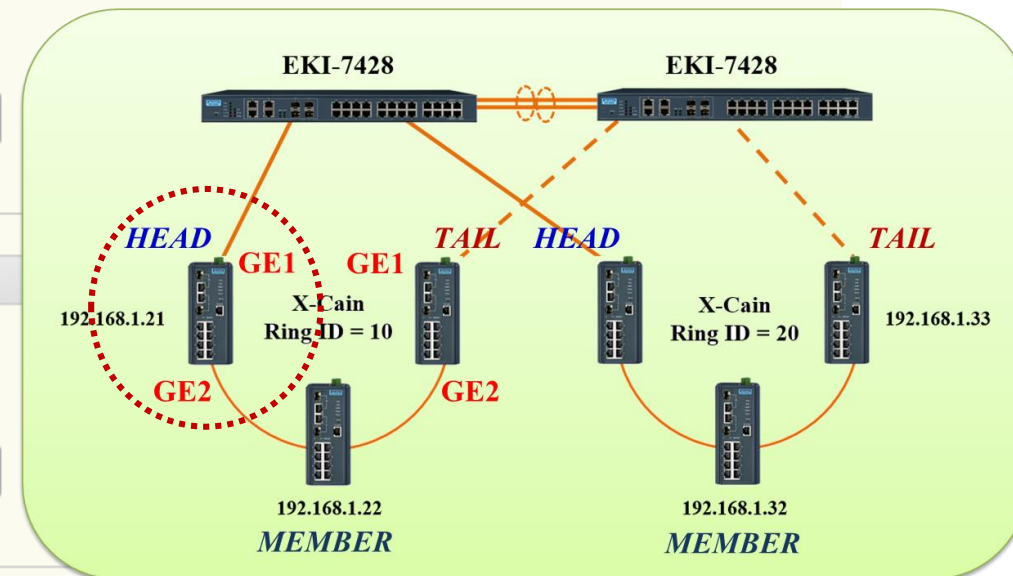
MAC Address Table

Security

1. Set the Ring ID for each Chain, not overlapped with any other rings.

2. Set the Role for this Switch. Head/Tail will have one Head/Tail Port, and the other one is Member Port. For Member Switch, both ports are Member Port.

3. The Head/Tail Port should connect to the 3rd party part.*



*If Head/Tail Switch using Member Port to connect to 3rd Party Switch, the algorithm will not work correctly and possibly no blocking at all.

X-Chain Configuration (3/3)

HEAD

Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Chain	Head	TRANSIT	GE1	FWD	GE2	FWD	Delete

MEMBER

Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Chain	Member	TRANSIT	GE1	FWD	GE2	FWD	Delete

TAIL

Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Chain	Tail	MASTER	GE1	BLK	GE2	FWD	Delete

4. After connected, the Blocking Port could be on Head Port, Tail Port, or Member Port.

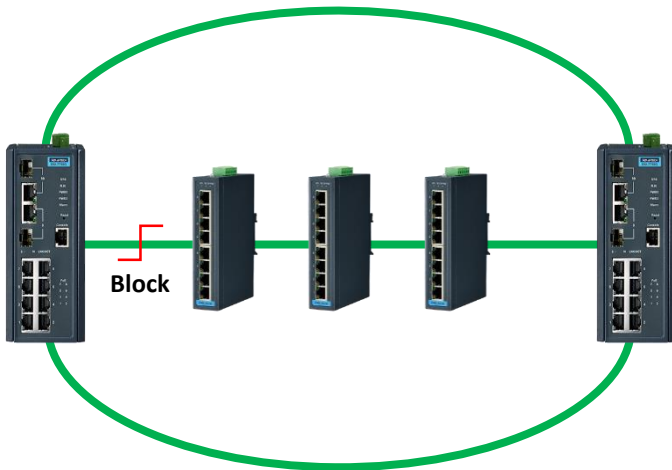
X-Ring Pro Configuration SOP

- Single Ring
- Dual Ring
- Couple Ring
- Dual Homing
- X-Chain
- **X-pair**
- R-pair

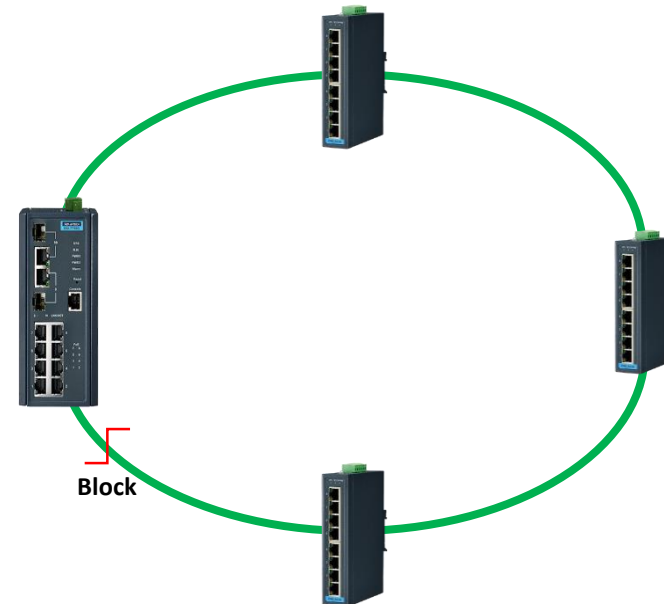


X-Ring: X-Pair

- The **Pair topology** is for **unmanaged** or **third-party switch** that do not have X-Ring function but still want to have link backup function to prevent link down.
- Need at least 1 or 2 switch that support X-Ring Pro.
- Note:
 - Only **X-Ring Pro Single Ring** could be set as master ring in Pair topology.
 - The Pair Ring will attach to a Master Ring – set Master Ring before setting Pair Ring.
 - Also occupies a ring ID – set it different to Master Ring ID.



OR



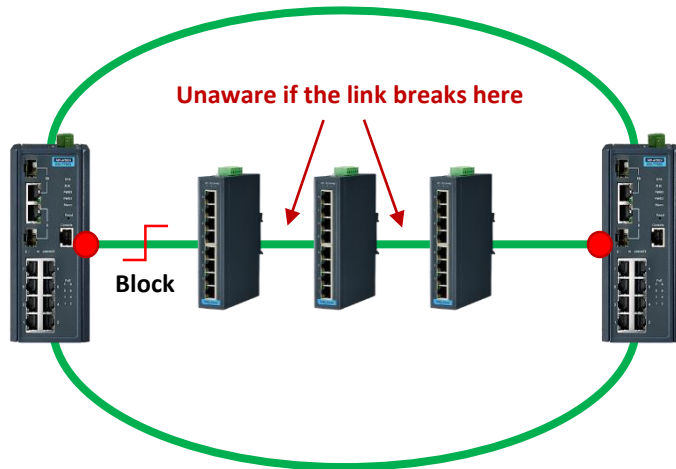
Blocking Maintenance of X-Pair

Master Ring ID

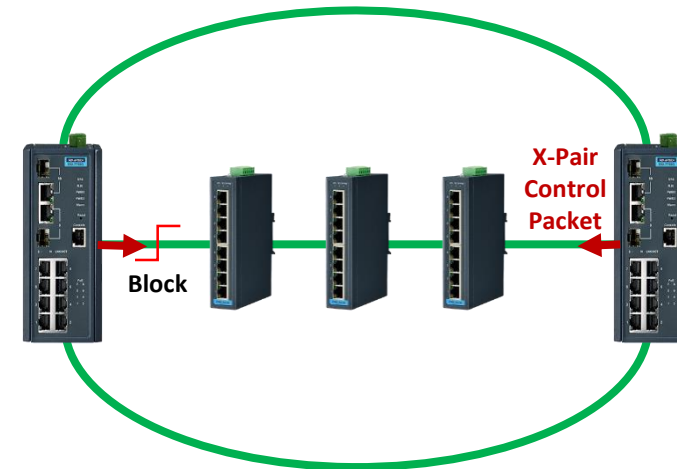
1

☐ detect-pair-link

- From Firmware v1.02.01, X-Pair supports 2 kinds of detection method to maintain the blocking.
 - No **Detect Pair Link**: The EKI Switch only **sense the link up/down state** of the configured X-Pair ports.
 - Faster recovery
 - Unaware of the link down in between unmanaged or 3rd party switch, if there're more than 2 switches.
 - With **Detect Pair Link**: The EKI Switch will **send out control packets** through the X-Pair ports, to check if the path is still alive.
 - Slower recovery
 - Aware of the link down in between unmanaged or 3rd party switch, if there're more than 2 switches.
 - Some 3rd party switch don't forward our control packet and cause unexpected unblock.



Without Detect Pair Link



With Detect Pair Link

X-Pair – Configuration

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

10

GE7

GE5

Add

Pair Setting

Pair Ring ID

Port

Master Ring ID

1

× GE2

10

Add

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Edge	GE7	FWD	GE5	DWN	Delete
1	Pair	N/A	Standby	GE2	DWN			Delete

X-Pair Configuration (1/4)

EKI-7710G
192.168.1.2

EKI-7710G
192.168.1.1

EKI-7710E
192.168.1.6

EKI-2528

Pair Ring ID: 1

EKI-2528

**Master Ring
Ring ID: 10**

192.168.1.4
EKI-7710E

192.168.1.3
EKI-7728

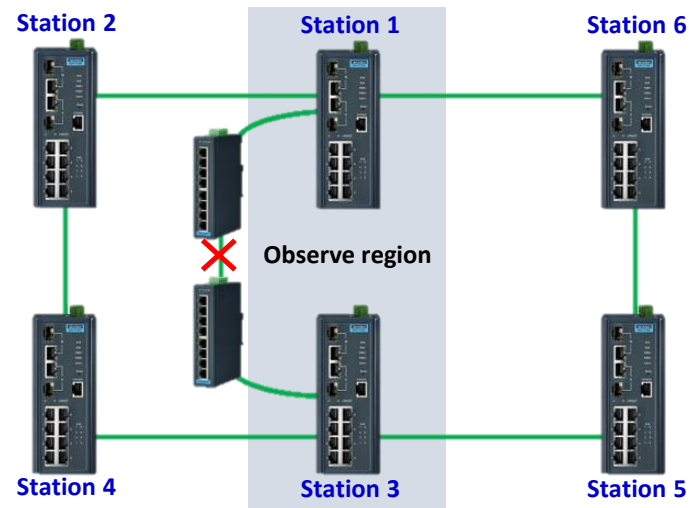
192.168.1.5
EKI-7728

X-Pair Configuration (2/4)

Pair set but not linked yet between EKI-2528

http://192.168.1.1/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92 搜尋...										http://192.168.1.3/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92 搜尋...									
nt Switch × Intelligent Switch Intelligent Switch Intelligent Switch Intelligent Switch Int Switch Intelligent Switch Intelligent Switch × Intelligent Switch Intelligent Switch																			
ANTECH EKI-7710G-2CPI-AE Intelligent Industrial Switch ⓘ										ANTECH EKI-7712G-4FI-AE Intelligent Industrial Switch ⓘ									
Information										Information									
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete		Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	
10	Basic	N/A	Transit	GE6	FWD	GE8	FWD	Delete		10	Basic	N/A	TRANSIT	GE7	FWD	GE5	FWD	Delete	
1	Pair	N/A	Primary	GE2	FWD			Delete		1	Pair	N/A	Primary	GE2	FWD			Delete	

Both sides of the pair link are present as Primary before linked up

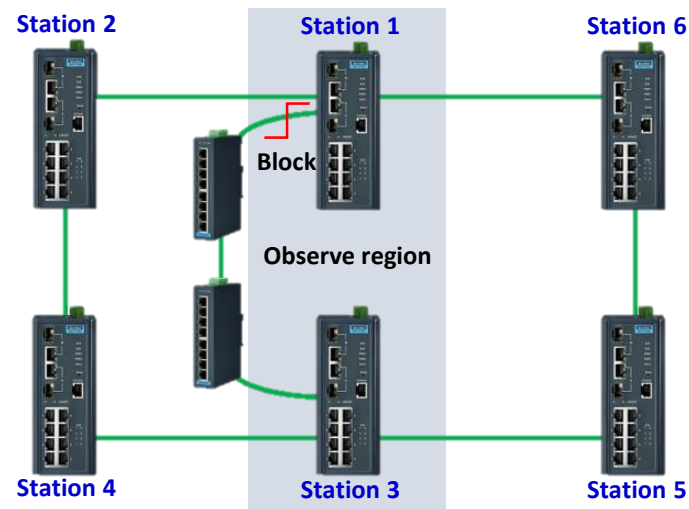


X-Pair Configuration (3/4)

Pair set and linked up between EKI-2528

http://192.168.1.1/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92 搜尋...									http://192.168.1.3/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92 搜尋...								
nt Switch x Intelligent Switch Intelligent Switch Intelligent Switch Intelligent Switch Int Switch Intelligent Switch Intelligent Switch x Intelligent Switch Intelligent Switch																	
ANTECH EKI-7710G-2CPI-AE Intelligent Industrial Switch ⓘ									ANTECH EKI-7712G-4FI-AE Intelligent Industrial Switch ⓘ								
Information									Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Transit	GE6	FWD	GE8	FWD	Delete	10	Basic	N/A	TRANSIT	GE7	FWD	GE5	FWD	Delete
1	Pair	N/A	Backup	GE2	BLK			Delete	1	Pair	N/A	Primary	GE2	FWD			Delete

One side of the pair link turned into Backup state and blocked after linked up



X-Pair Configuration (4/4)

Pair set and linked down between EKI-2528 and station 3: Seen at station 1 & 3

http://192.168.1.1/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Intelligent Switch

EKI-7710G-2CPI-AE
Intelligent Industrial Switch

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Transit	GE6	FWD	GE8	FWD	Delete
1	Pair	N/A	Primary	GE2	FWD			Delete

http://192.168.1.3/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Intelligent Switch

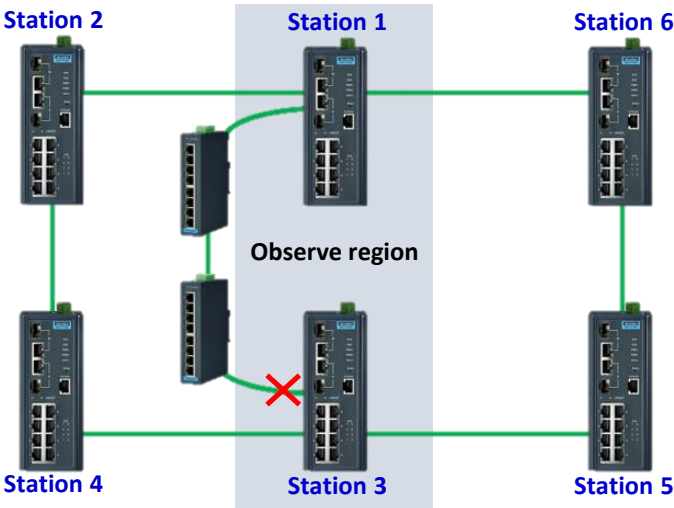
EKI-7712G-4FI-AE
Intelligent Industrial Switch

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	TRANSIT	GE7	FWD	GE5	FWD	Delete
1	Pair	N/A	Standby	GE2	DWN			Delete

The Pair link at station 1 turned into Primary state after link down

The Pair link at station 3 turned into Standby state after link down



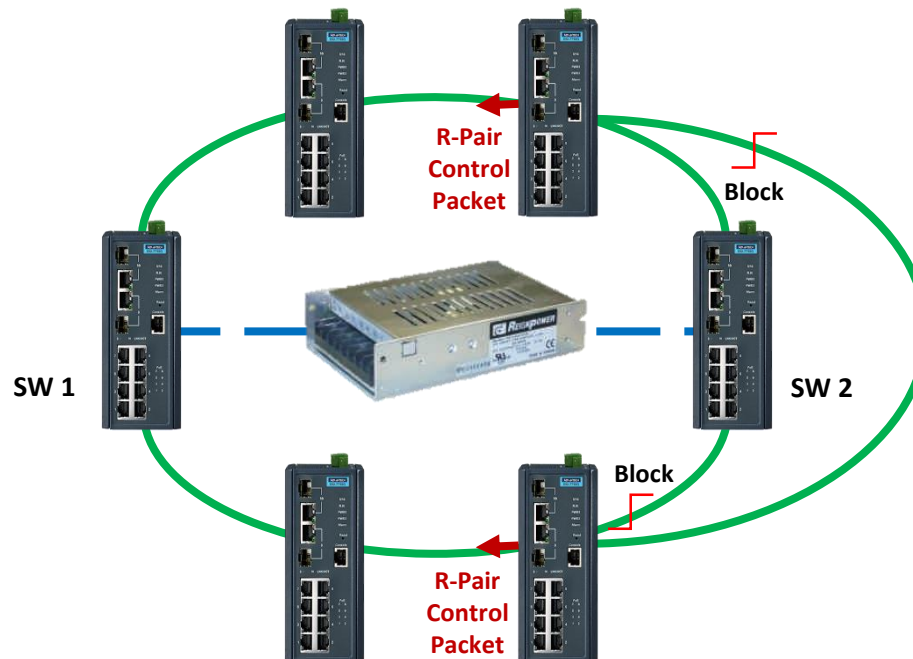
X-Ring Pro Configuration SOP

- Single Ring
- Dual Ring
- Couple Ring
- Dual Homing
- X-Chain
- X-pair
- **R-pair**



R-Pair

- The **R-Pair** is for **redundancy over X-Ring** while communication breaks down at more than one segment.
- Note:
 - Use only with **X-Ring Pro Single Ring**.
 - The Pair Ring will attach to a Master Ring – set Master Ring before setting Pair Ring.
 - Also occupies a ring ID – set it different to Master Ring ID.
 - Control Packets runs through the Master Ring. The blocking will be released only when the 2 switches with R-Pair Ring Port can't communicate with each other (Master Ring broke).



X-Ring: R-Pair – Configuration

Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups

X-Ring Pro Groups Settings

Ring ID

Port 1

Port 2

10

GE7

GE5

Add

RPair Setting

RPair Ring ID

Port

Master Ring ID

2

GE2

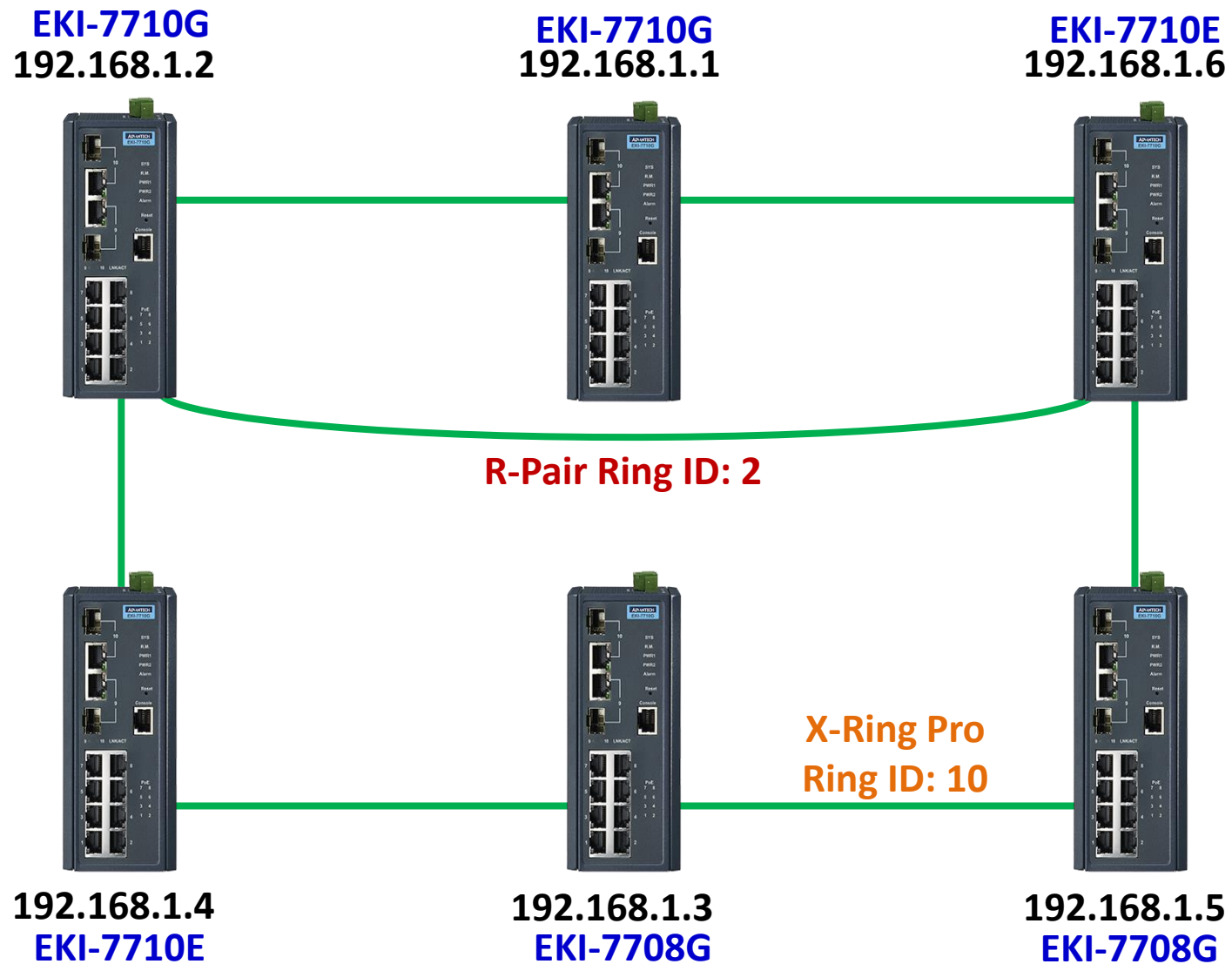
10

Add

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Edge	GE7	DWN	GE5	FWD	Delete
2	R-Pair	N/A	Standby	GE2	DWN			Delete

R-Pair Configuration (1/5)



R-Pair Configuration (2/5)

R-Pair set but not linked yet between station 2 & 6

http://192.168.1.2/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Intelligent Switch

EKI-7710G-2CI-AE
Intelligent Industrial Switch

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Transit	GE1	FWD	GE8	FWD	Delete
2	R-Pair	N/A	Standby	GE7	DWN			Delete

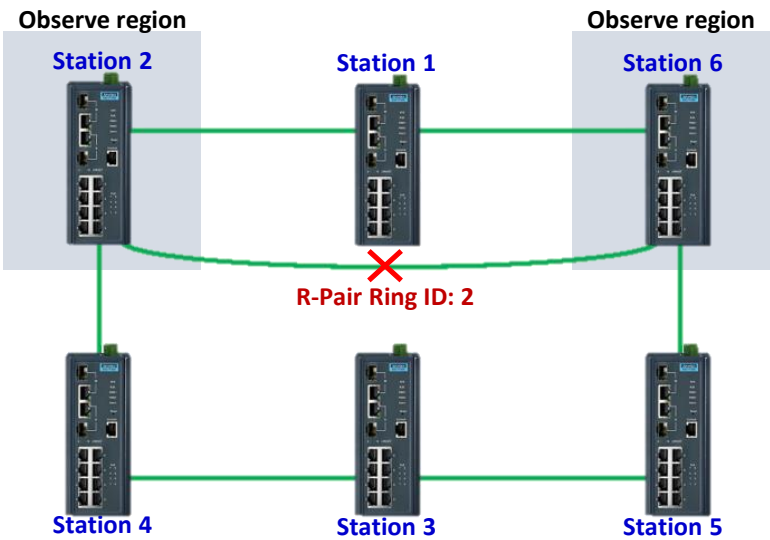
http://192.168.1.6/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Intelligent Switch

EKI-7710E-2C-AE
Intelligent Industrial Switch

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Master	FE7	BLK	FE8	FWD	Delete
2	R-Pair	N/A	Standby	FE1	DWN			Delete

Both sides of the R-Pair link are present as Standby before linked up

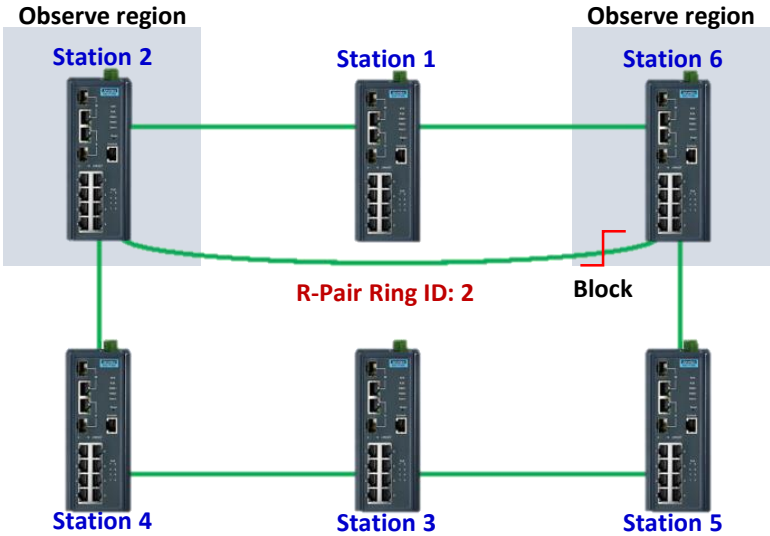


R-Pair Configuration (3/5)

R-Pair set and linked up between station 2 & 6

<div>http://192.168.1.2/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92</div> <div>Int Switch Intelligent Switch Intelligent Switch Intelligent Switch Int Switch Intelligent Switch Intelligent Switch Intelligent Switch</div> <div>EKI-7710G-2CI-AE Intelligent Industrial Switch</div>									<div>http://192.168.1.6/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92</div> <div>Int Switch Intelligent Switch Intelligent Switch Intelligent Switch Int Switch Intelligent Switch Intelligent Switch Intelligent Switch</div> <div>EKI-7710E-2C-AE Intelligent Industrial Switch</div>								
Information									Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Transit	GE1	FWD	GE8	FWD	Delete	10	Basic	N/A	Master	FE7	BLK	FE8	FWD	Delete
2	R-Pair	N/A	Primary	GE7	FWD			Delete	2	R-Pair	N/A	Backup	FE1	BLK			Delete

One side of the R-Pair link turned into Backup state and blocked after linked up, and the other one turned into Primary.

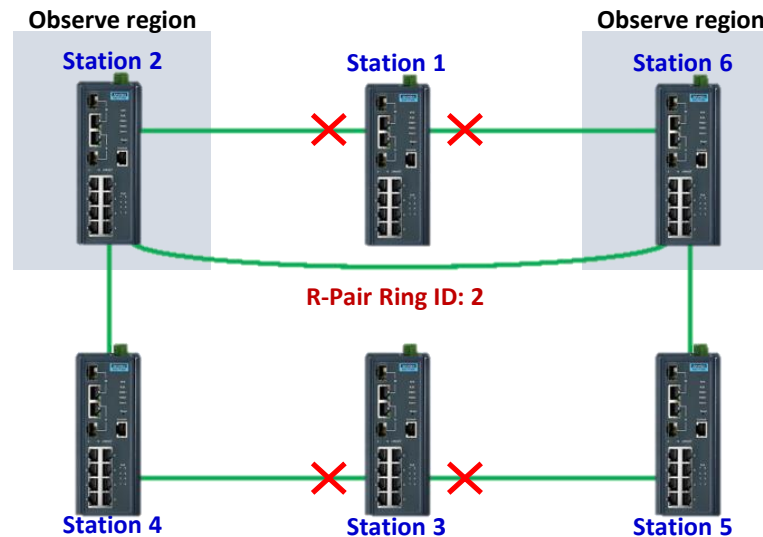


R-Pair Configuration (4/5)

R-Pair set and linked down at station 1 & 3: Seen at station 2, 6

<div>http://192.168.1.2/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92</div> <div>Int Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Int Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div>									<div>http://192.168.1.6/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92</div> <div>Int Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Int Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div> <div>Intelligent Switch</div>								
ANTECH EKI-7710G-2CI-AE Intelligent Industrial Switch									ANTECH EKI-7710E-2C-AE Intelligent Industrial Switch								
Information									Information								
Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Edge	GE1	FWD	GE8	DWN	Delete	10	Basic	N/A	Edge	FE7	FWD	FE8	DWN	Delete
2	R-Pair	N/A	Primary	GE7	FWD			Delete	2	R-Pair	N/A	Primary	FE1	FWD			Delete

Both sides of the R-Pair link are present as Primary after station 1 & 3 link down; X-ring ports in Edge state.



R-Pair Configuration (5/5)

R-Pair set and linked down at station 1 & 3: Seen at station 4, 5

http://192.168.1.4/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Int Switch Intelligent Switch Intelligent Switch x Intelligent Switch

ANTECH EKI-7710E-2C-AE Intelligent Industrial Switch

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	Edge	FE1	DWN	FE3	FWD	Delete

http://192.168.1.5/cgi-bin/dispatcher.cgi?cmd=1#/cgi-bin/dispatcher.cgi?cmd=92

Int Switch Intelligent Switch Intelligent Switch Intelligent Switch x Intelligent Switch

ANTECH EKI-7708G-4F-AE Intelligent Industrial Switch

Information

Ring ID	Mode	Role	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
10	Basic	N/A	EDGE	GE1	DWN	GE2	FWD	Delete

Both stations' X-ring port are in Edge state.

