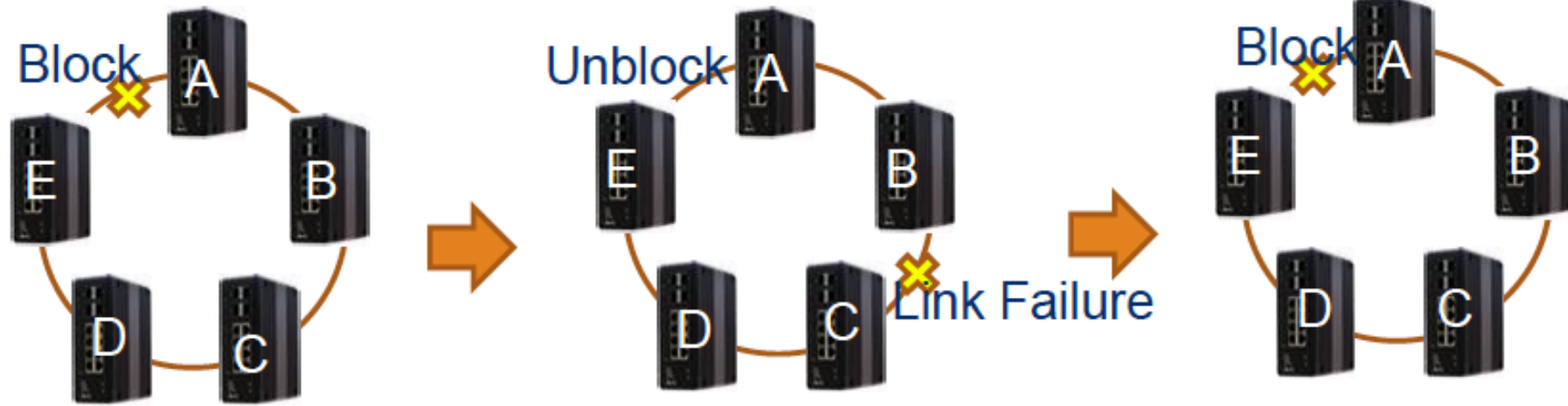


# What is Ring Protection



A. Normal condition , block the link between Switches A and E

B. Detect link failure between B and C, unblock the link between A and E

C. Detect link recovery between B and C, block the link between A and E again.

## **Goal:**

Ring protection is introduced to prevent network broken caused by link loss or network device error. It guarantees quick network reconfiguration after the loss of a network link.

## **Ring Methods:**

1. Single Ring
2. Dual Ring
3. Coupling
4. Dual Homing
5. Chain
6. Balancing Chain

# Before configuring the Ring Protection

- Since Ring protection is a media redundancy protocol, it should disable any other anti-loop protections firstly
- Disable Spanning Tree:
- Disable Loop Protection:

**Configuration**

- System
- Green Ethernet
- Ports
- DHCP
- Security
- Aggregation
- Loop Protection
- Spanning Tree**
  - Bridge Settings
  - MSTI Mapping
  - MSTI Priorities
  - CIST Ports**
  - Root Ports
- IPMC Profile
- MVR
- IPMC
- LLDP
- MAC Table
- VLANs
- Private VLANs
- VCL
- Voice VLAN
- QoS
- Mirroring
- GVRP
- sFlow
- RingV2
- Monitor
- Diagnostics

**STP CIST Port Configuration**

CIST Aggregated Port Configuration

Port	STP Enabled	Path
*	<input checked="" type="checkbox"/>	Auto

CIST Normal Port Configuration

Port	STP Enabled	Path
*	<input checked="" type="checkbox"/>	<>
1	<input type="checkbox"/>	Auto
2	<input type="checkbox"/>	Auto
3	<input type="checkbox"/>	Auto
4	<input type="checkbox"/>	Auto
5	<input type="checkbox"/>	Auto
6	<input type="checkbox"/>	Auto
7	<input type="checkbox"/>	Auto
8	<input type="checkbox"/>	Auto

Save Reset

**Configuration**

- System
- Green Ethernet
- Ports
- DHCP
- Security
- Aggregation
- Loop Protection**
- Spanning Tree
- IPMC Profile
- MVR
- IPMC
- LLDP
- MAC Table
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- QoS
- Mirroring
- GVRP
- sFlow
- RingV2
- Monitor
- Diagnostics
- Maintenance

**Loop Protection Configuration**

General Settings

Global Configuration	
Enable Loop Protection	Disable
Transmission time	5
Shutdown Time	180

Port Configuration

Port	Enable	Action
*	<input type="checkbox"/>	<>
1	<input type="checkbox"/>	Shutdown Port
2	<input type="checkbox"/>	Shutdown Port
3	<input type="checkbox"/>	Shutdown Port
4	<input type="checkbox"/>	Shutdown Port
5	<input type="checkbox"/>	Shutdown Port
6	<input type="checkbox"/>	Shutdown Port
7	<input type="checkbox"/>	Shutdown Port
8	<input type="checkbox"/>	Shutdown Port

Save Reset

- The redundancy link cannot be connected before configuration ready.

# Guideline

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Master)	Forward Port : Port-1 Block Port : Port-2
2	Disable	Ring(Slave)	Forward Port : Port-5 Forward Port : Port-6
3	Disable	Chain(Member)	Member Port : Port-1 Member Port : Port-2

Save Reset

Note 1 - Group1 must be enabled before configuring group2 as coupling

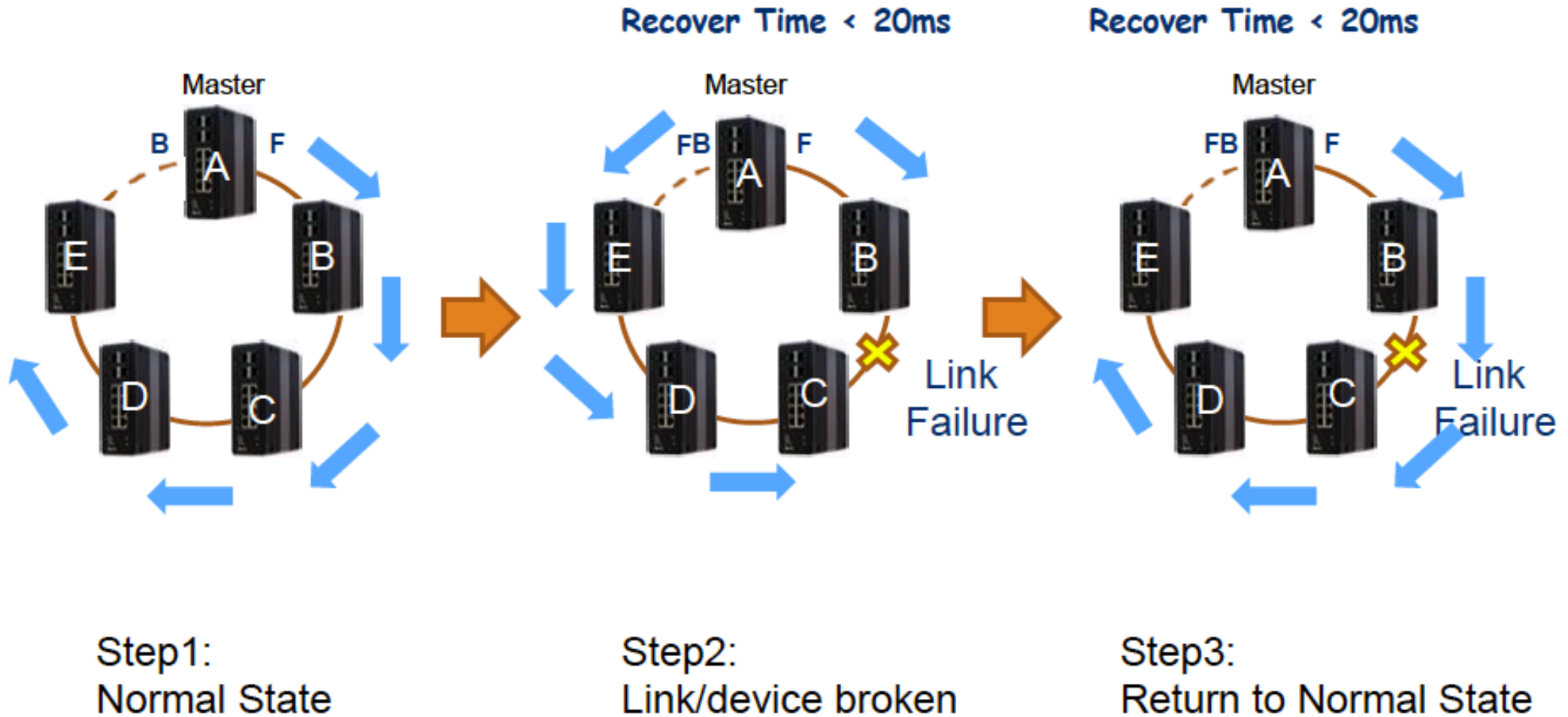
Note 2 - When group1 or group2 are enabled, group3 (Chain) can't be configured

Note 3 - When group3 is enabled, group1 and group2 are unable to be configured

# 1. Single Ring

- Single Ring is the most common used and easier configuration of ring protection method.
- Ring Port - Each device should select two ports for ring port.
- Ring Role -
  - Master: a forwarding port as the main path for traffic  
a blocking port for the protect path
  - Slave: two forwarding ports for communication in ring.

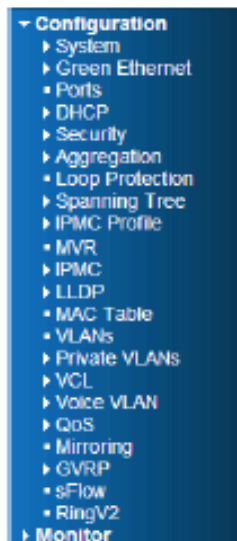
# 1. Single Ring Operation



# To Configure Single Ring

## Ring Master

1. Go to “Configuration→Ringv2” Web page
2. Enable Group1, and Select Role be “Ring(Master)”
3. Select one port link to neighbor devices be “Forward Port”, another is “Block Port”



### RingV2 Configuration

Ring Configuration			
Index	Mode	Role	Ring Port(s)
1	Enable	Ring(Master)	Forward Port : Port-3 Block Port : Port-4
2	Disable	Dual Homing	Primary Port : Port-7 Backup Port : Port-2
3	Disable	Chain(Member)	Member Port : Port-1 Member Port : Port-2

Save Reset

## Ring Slave

1. Go to “Configuration→Ringv2” Web page
2. Enable Group1, and Select Role be “Ring(Slave)”
3. Select two port link to neighbor devices be “Forward Port”.

Ring Configuration			
Index	Mode	Role	Ring Port(s)
1	Enable	Ring(Slave)	Forward Port : Port-3 Forward Port : Port-4
2	Disable	Dual Homing	Primary Port : Port-1 Backup Port : Port-2
3	Disable	Chain(Member)	Member Port : Port-1 Member Port : Port-2

Save Reset

## 2. Dual Ring

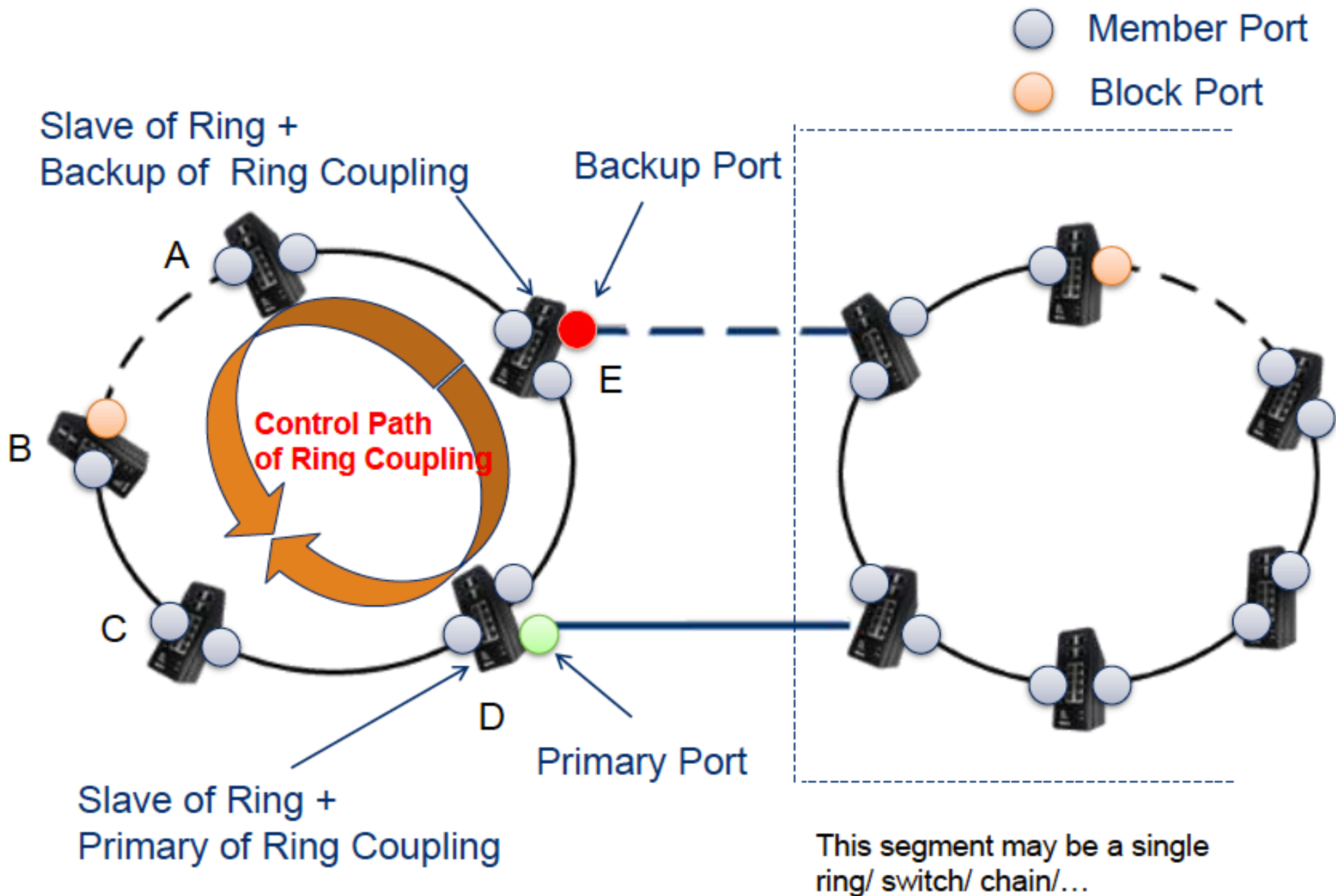
- Use two Single Ring in a single device, and these two single ring works independently.
- Ring Port - The dual ring device should select two ports for each single ring. (total 4 ring ports in this device)
- Ring Role -
  - Master: a forwarding port as the main path for traffic  
a blocking port for the protect path
  - Slave: two forwarding ports for communication in ring.



### 3. Coupling

- Coupling is using 2 link paths connect 1 Ring to another Ring / Switch/ Chain ...etc.
- Coupling mode only can enable in the switch which already configured one Single Ring. (When a switch already have configured Dual Ring, then this switch do not allow to have coupling settings.)
- These 2 links run as redundant path between each other.  
When 2 link path are in link up status, the Backup of Ring Coupling switch will set it's Backup port to Blocked state.
- Ring Port -
  - Primary: in the primary of ring coupling
  - Backup: in the backup of ring coupling

### 3. Coupling cont.



# To configure Ring Coupling

- 1.Go to “Configuration→Ringv2” Web page
- 2.Enable Group1, and Select Role be “Ring(Slave)”
- 3.Select two port link to neighbor devices be “Forward Port”.
- 4.Enable Group2, and Select Role be “Coupling(Primary)”
- 5.Select one port link to above ring be “Primary Port”.

## Coupling Primary

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Enable ▾	Ring(Slave) ▾	Forward Port : Port-3 ▾ Forward Port : Port-4 ▾
2	Enable ▾	Coupling(Primary) ▾	Primary Port : Port-6 ▾
3	Disable ▾	Chain(Member) ▾	Member Port : Port-1 ▾ Member Port : Port-2 ▾

Save Reset

- 1.Go to “Configuration→Ringv2” Web page
- 2.Enable Group1, and Select Role be “Ring(Slave)”
- 3.Select two port link to neighbor devices be “Forward Port”.
- 4.Enable Group2, and Select Role be “Coupling(Backup)”
- 5.Select one port link to above ring be “Backup Port”.

## Coupling Backup

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Enable ▾	Ring(Slave) ▾	Forward Port : Port-3 ▾ Forward Port : Port-4 ▾
2	Enable ▾	Coupling(Backup) ▾	Backup Port : Port-5 ▾
3	Disable ▾	Chain(Member) ▾	Member Port : Port-1 ▾ Member Port : Port-2 ▾

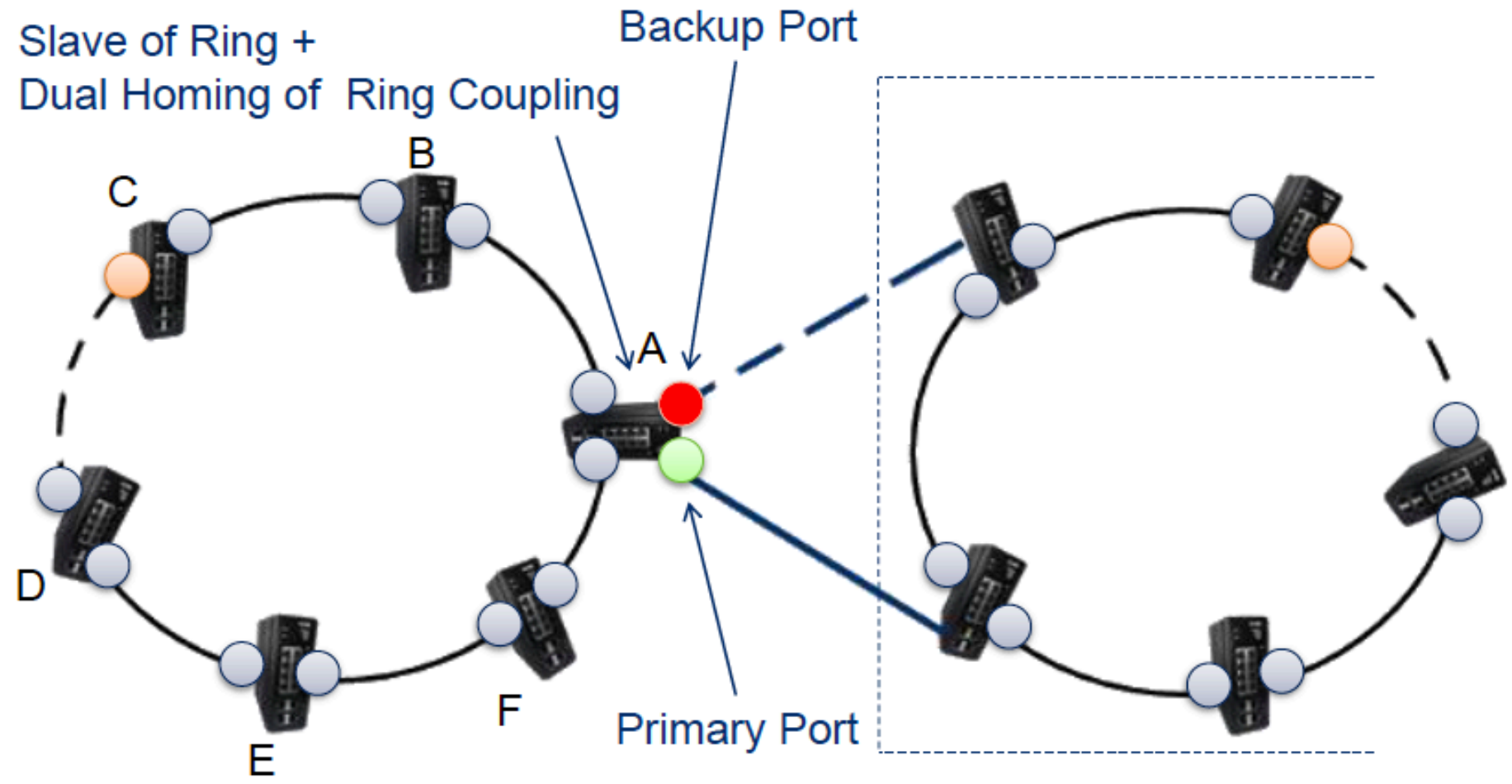
Save Reset

## 4. Dual Homing

- Dual Homing is a special case of coupling, use only 1 device to connect another Ring / Switch/ Chain ...etc.
- Dual Homing mode only can enable in the switch which already configured one Single Ring.
- These 2 links run as redundant path between each other.  
When 2 link path are in link up status, the Backup port of the switch will set to Blocked state.
- Ring Port - Primary & Backup port.  
Both in the dual homing switch

# 4. Dual Homing cont.

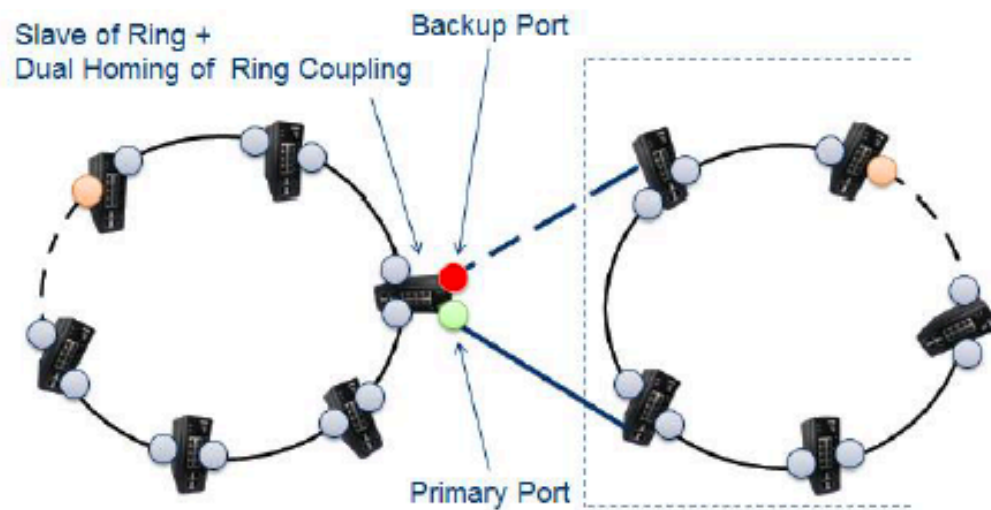
- Member Port
- Block Port



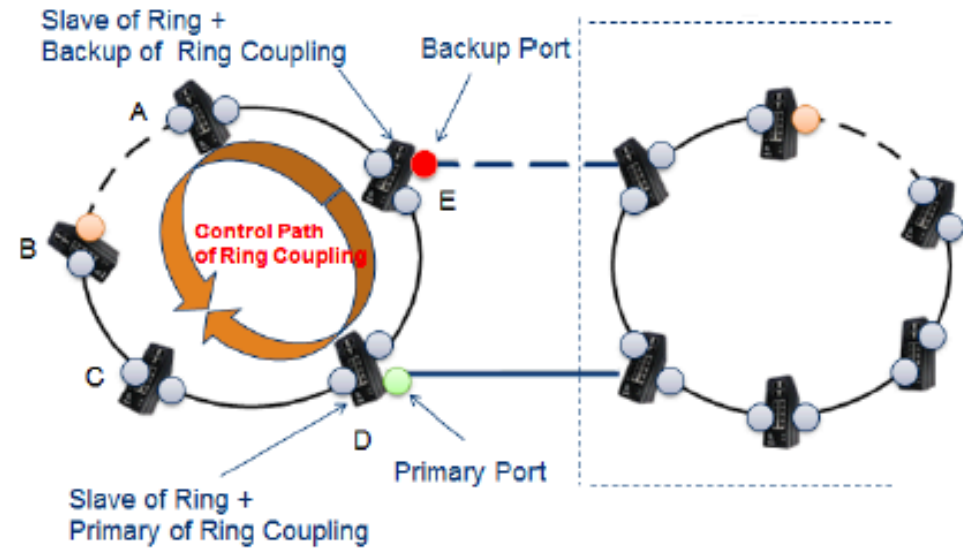
This segment may be a single ring/ switch/ chain/...

# 4. Dual Homing Characteristic

- Only 1 device is near the connected segment can use dual homing.
- Recovery time is better than coupling.
- Disadvantage: Dual Homing switch cannot occur error.



Dual Homing



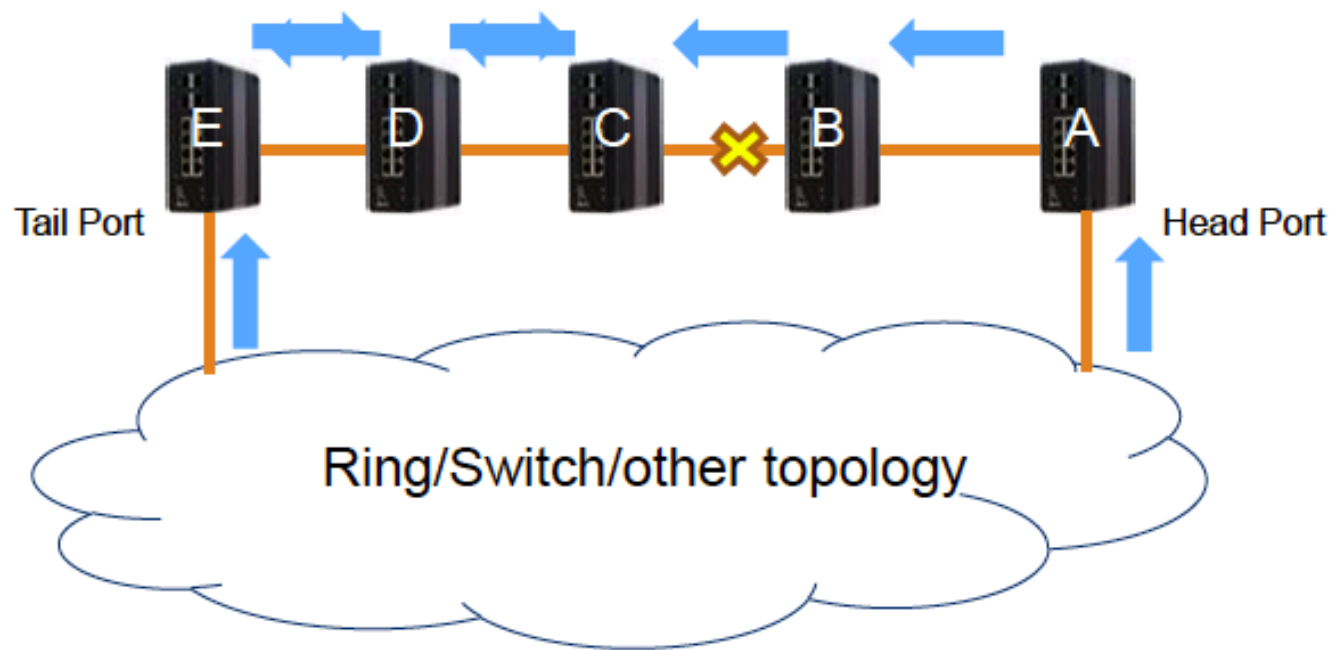
Coupling

## 5. Chain

- Before using chain for redundancy protection, disable ring1 and ring2.
- Chain use 2 link paths with one head and one tail switch nodes , which connect chain to another Ring / Switch/ Chain ...etc.
- These 2 links run as redundant path between each other.  
When 2 link path are in link up status, the tail port of the switch will set to Blocked state.
- Ring Port -  
Head Port: a ring port in head of chain switch.  
Tail Port: a ring port in tail of chain switch.  
member port: the other ring ports join chain topology

## 5. Chain Operation

- Normally, tail port is a blocking port. (data cannot pass through)
- Tail port will change to forwarding port when a link failure between the chain.





# To Configure Chain

1. Go to "Configuration→Ringv2" Web page
2. Enable Group3, and Select Role be "Chain(Head)"
3. Select one port link to other ring or networks be "Head Port",  
Click "Save" bottom

1. Go to "Configuration→Ringv2" Web page
2. Enable Group3, and Select Role be "Chain(Tail)"
3. Select one port link to other ring or networks be "Tail Port",  
Click "Save" bottom

1. Go to "Configuration→Ringv2" Web page
2. Enable Group3, and Select Role be "Chain(Member)"
3. Select one port link to other ring or networks be "Member Port",  
Click "Save" bottom

## Chain Haed

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Slave)	Forward Port : Port-1 Forward Port : Port-2
2	Disable	Ring(Slave)	Backup Port : Port-1
3	Enable	Chain(Head)	Member Port : Port-1 Head Port : Port-2

Save Reset

## Chain Tail

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Slave)	Forward Port : Port-1 Forward Port : Port-2
2	Disable	Ring(Slave)	Backup Port : Port-1
3	Enable	Chain(Tail)	Member Port : Port-1 Tail Port : Port-2

Save Reset

## Chain Member

Ring Configuration

Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Slave)	Forward Port : Port-1 Forward Port : Port-2
2	Disable	Ring(Slave)	Backup Port : Port-1
3	Enable	Chain(Member)	Member Port : Port-1 Member Port : Port-2

Save Reset

Chain(Member)  
Chain(Head)  
Chain(Tail)  
Balancing Chain(Control Block)

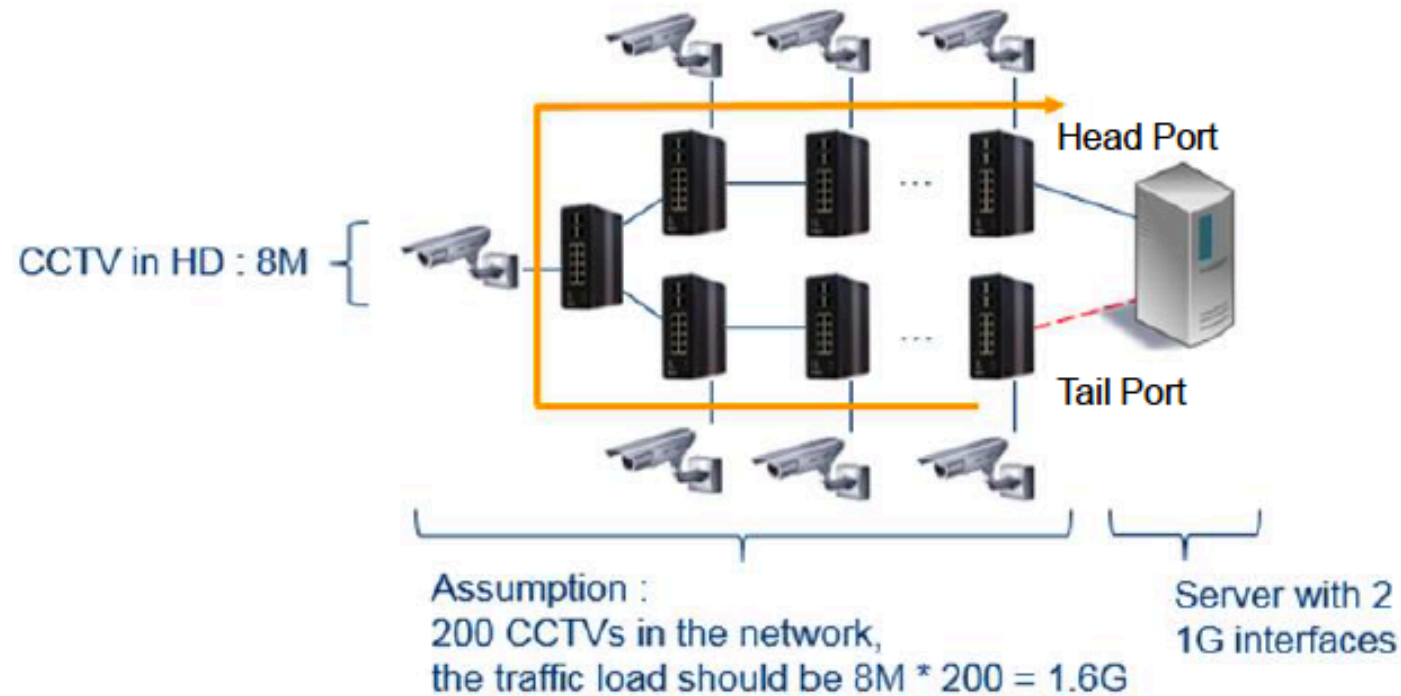
## 6. Balancing Chain

- Motivation:

It takes much time to transmit data to the tail of the chain.

And head of chain must transmit all traffic of the chain. (too heavy)

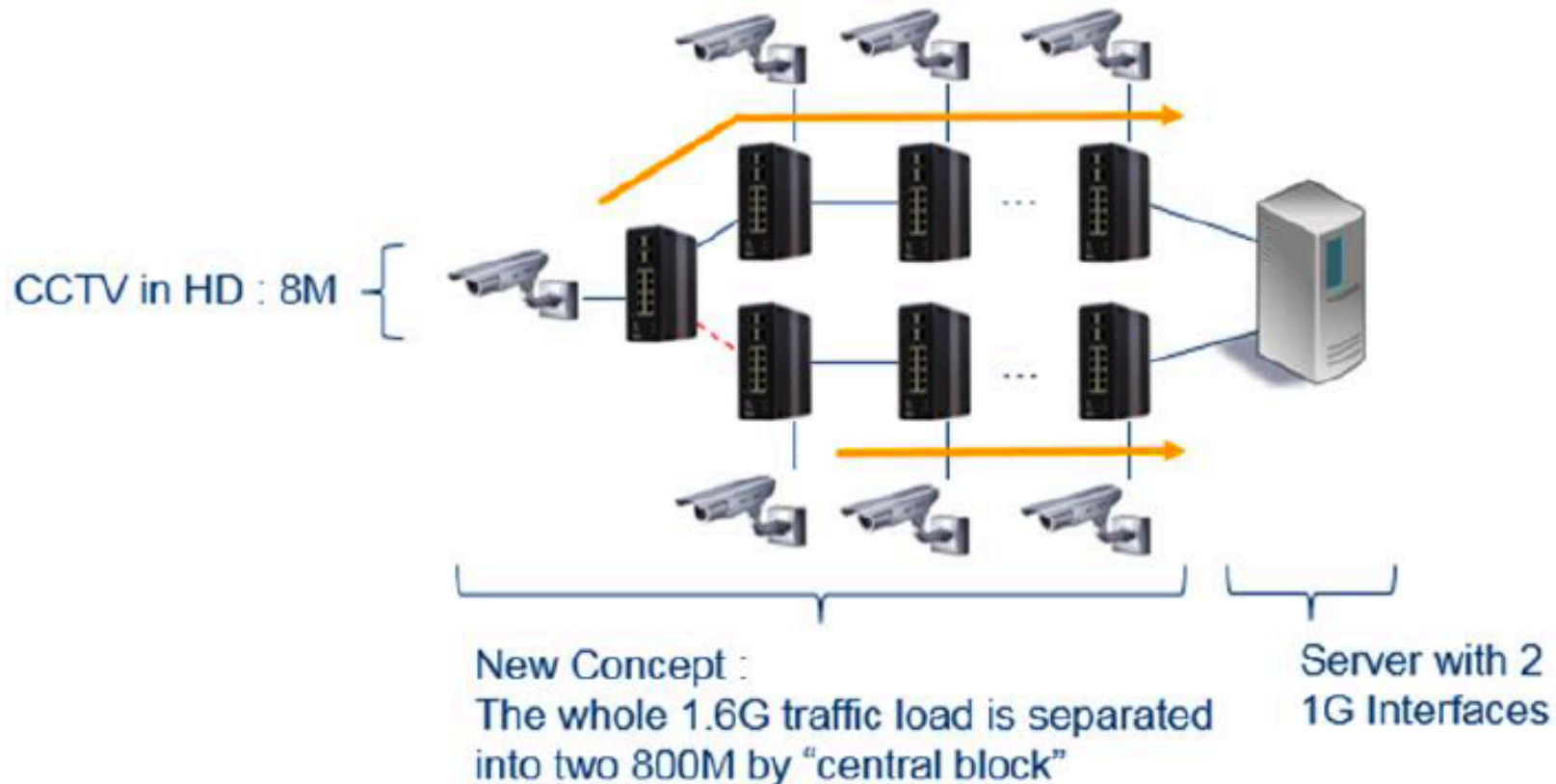
→ To select a device of the chain to share the traffic and save time.



**A fast sender from overwhelming a slow receiver**

## 6. Balancing Chain cont.

- Modified of chain:
  - To select a device of the chain to share the traffic and save time.



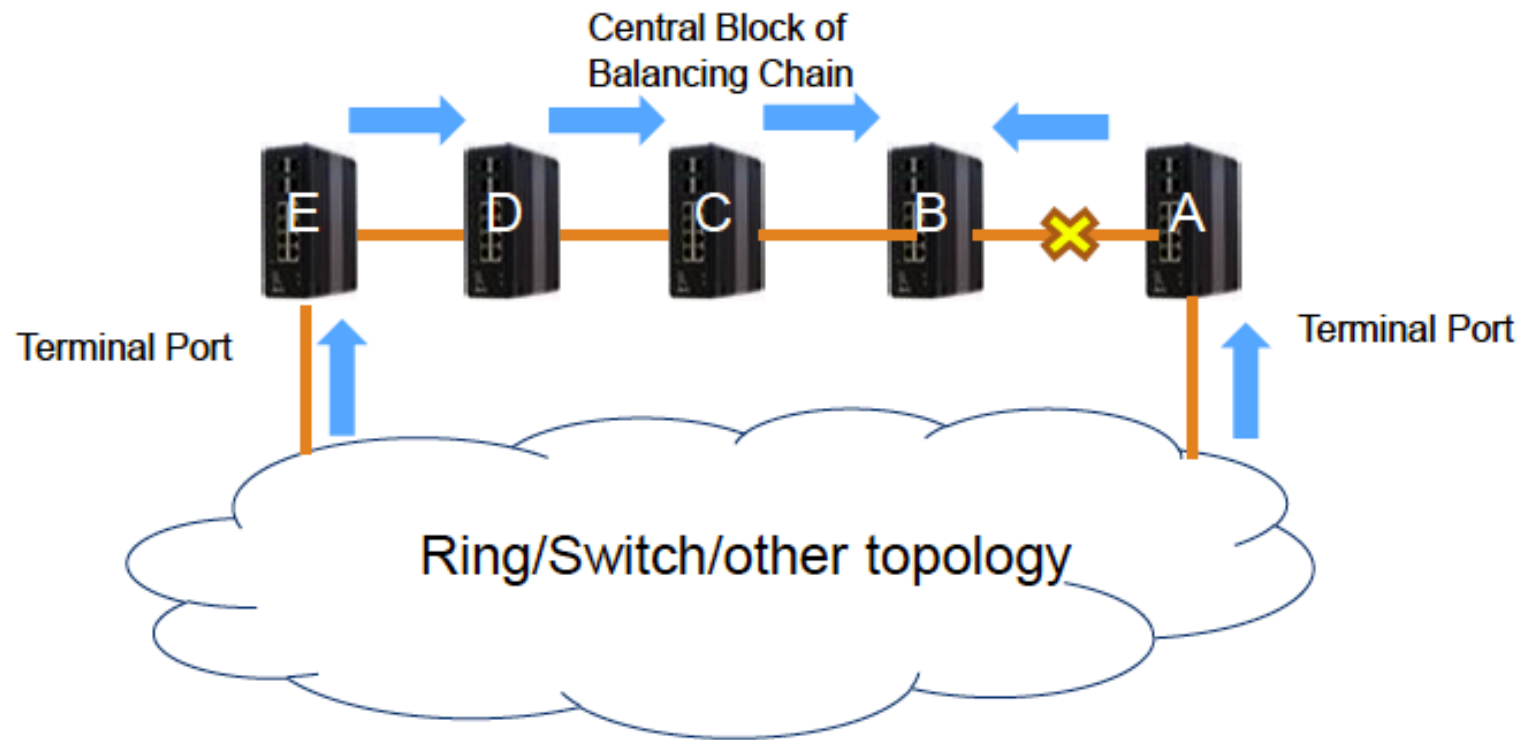
**Balancing Chain : A better chain for extreme situation**

## 6. Balancing Chain cont.

- Before using balancing chain for redundancy protection, disable ring1 and ring2.
- Balancing Chain use 2 link paths with Primary & secondary terminal switch, which connect chain to another Ring / Switch/ Chain ...etc.
- Ring Port -
  - Terminal Port: a ring port connect between chain & other segment
  - Central Block Port: a ring port in central block of balancing chain
  - Member port: the other ring port join balancing chain topology

## 6. Balancing Chain Operation

- First, disable ring 1 and ring2.
- Then, enable ring ports of each switch in the balancing chain.



# To configure Balancing Chain

- 1.Go to “Configuration→Ringv2” Web page
  - 2.Enable Group3, and Select Role be “Balance Chain(Central Block)”
  - 3.Select one port be “Block Port” which could distribute traffic loading
- Click “Save” bottom

## Balance Chain(Central Block)

Ring Configuration			
Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Slave)	Forward Port : Port-1 Block Port : Port-2
2	Disable	Ring(Slave)	Primary Port : Port-3 Backup Port : Port-4
3	Enable	Balancing Chain(Central Block)	Member Port : Port-1 Block Port : Port-2

Save Reset

- 1.Go to “Configuration→Ringv2” Web page
- 2.Enable Group3, and Select Role be “Balance Chain(Terminal-1(or2))”
- 3.Select one port be “Terminal Port” which connect to other ring group.
- 4.Click “Save” bottom

## Balance Chain(Terminal)

Ring Configuration			
Index	Mode	Role	Ring Port(s)
1	Disable	Ring(Slave)	Forward Port : Port-1 Forward Port : Port-2
2	Disable	Ring(Slave)	Backup Port : Port-1
3	Enable	Balancing Chain(Terminal-1)	Member Port : Port-1 Terminal Port : Port-2

Save Reset

- Chain(Member)
- Chain(Head)
- Chain(Tail)
- Balancing Chain(Central Block)
- Balancing Chain(Terminal-1)
- Balancing Chain(Terminal-2)
- Balancing Chain(Member)