

## Advantech AE Technical Share Document

Date	2017/10/02	Release Note	■External			
Category	∎SOP	Related OS	Windows OS			
Abstract	How to configure X-ring Pro					
Keyword	X-ring , X-ring Pro, Couple-ring, Dual-ring, X-ring-Elite, Legacy Mode					
Deleted Dreduct	EKI-7000, EKI-7700, EKI-7400 series, EKI-9200, EKI-9300 series, EKI-9500 series,					
Related Product	EKI-9600 series, EKI-9700 series, EKI-5500/EKI-5600 Protocol switch					

#### Problem Description:

- 1. What is X-ring Pro technology?
- 2. How to configure the X-ring feature?

#### Answer:

#### [Purpose]

- 1. The X-ring feature provides improvements to Spanning Tree (STP) and Rapid Spanning Tree (RSTP), and is quickly and automatically restored when a network is broken,
- 2. X-ring is designed for the specific environments of industrial applications. It provides high speed redundancy for the network, when anyone of the port failed, the recovery time will be under 20ms.

#### [Definition]

- 1. It's a network topology where each node is connected to two other odes.
- 2. To provide Ethernet networks with high-speed redundancy.
- 3. Both X-ring and X-ring Pro are Advantech's proprietary ring redundancy technology.
- 4. Advantech's 1st generation ring redundancy technology => X-ring
- 5. Advantech's 2nd generation ring redundancy technology => X-ring Pro



#### [Comparison Table for X-ring]

	X-ring Elite	X-ring Pro	X-ring Pro	<u>X-ring Pro</u>	X-ring
	NOS5.0	NOS5.0	NOS3.0	NOS2.0	NOS1.8
Max. Support Unit	250	250	250	250	50
Recovery time	<20ms	<20ms	<20ms	<20ms	< 20ms
Auto Ring Master Selection	Not Required	Not Required	Not Required	Not Required	Required
Couple-Ring Support	NO	Yes	Yes	Yes	YES
Dual-Ring Support	NO	Yes	Yes	Yes	No
Coupling-Ring & Dual-Homing Limitation	No	No	No	No	Yes <mark>(*)</mark>
Coupling Ring Control Port	Not Required	Not Required	Not Required	Not Required	Required
Chipset Solution	Realtek	Realtek	Broadcom	Marvell	Marvell

[Note] X-ring with NOS1.8 is phase out



#### [Support model list]

	X-ring Elite X-ring Pro		X-ring Pro	<u>X-ring Pro</u>	
	NOS5.0	NOS5.0	NOS3.0	NOS2.0	
	EKI-742	28-4CI			
	EKI-742	8-4CPI			
	EKI-7706 <mark>E</mark> -2F/	EKI-7706 <mark>G</mark> -2F			
	EKI-7708 <mark>E</mark> -4F(I)/	EKI-7708 <mark>E</mark> -4FP(I)			
	EKI-7708 <mark>G</mark> -4F(I)/ E	KI-7708 <mark>G</mark> -4FP(I)			
	EKI-7710 <mark>E</mark> -2C(I)/ E	EKI-7710 <mark>E</mark> -2CP(I)			
	EKI-7710 <mark>G</mark> -2C(I)/ E	EKI-7710 <mark>G</mark> -2CP(I)	EKI-9228		
	EKI-7712 <mark>E</mark> -4F(I)/ E	EKI-7712 <mark>E</mark> -4FP(I)	EKI-9312	EKI-7554M/S	
	EKI-7712 <mark>G</mark> -4F(I)/ E	EKI-7712 <mark>G</mark> -4FP(I)	EKI-9312P	EKI-7559M/S	
	EKI-7716 <mark>E</mark> -4F(I)/	EKI-7716 <mark>G</mark> -4F(I)	EKI-9316	EKI-7654C	
	EKI-7720 <mark>E</mark> -4F(I)/	EKI-7720 <mark>G</mark> -4F(I)	EKI-9316P	EKI-7659C	
	EKI-9	612	EKI-9512	EKI-7656C	
Max Support Unit	EKI-9	628	EKI-9512P	EKI-7657C	
	EKI-5528-PNMA		EKI-9512D	EKI-7659CPI	
	EKI-5528(I)-PN		EKI-9512D-P	EKI-2748FI	
	EKI-5526(I)-PN		EKI-9516	EKI-2748CI	
	EKI-5528(I)-EI		EKI-9516P	EKI-7758F	
	EKI-5526(I)-EI		EKI-9516D	EKI-6558TI	
	EKI-5528(I)-MB		EKI-9516D-P	EKI-6559TMI	
	EKI-5526(I)-MB		EKI-9728		
	EKI-5629C(I)-PN				
	EKI-5626C(I)-PN				
	EKI-5629C(I)-EI				
	EKI-5626C(I)-EI				
	EKI-5629C(I)-MB				
	EKI-5626C(I)-MB				



# **1. Single X-ring Configuration**



#### 1. Topology Diagram

Below diagram is the example for the single ring application.





#### 2. Web screen shot

Below screen shot show you the X-ring Pro configuration on the web:

SW\_1~SW\_4

Basic

STANDBY

#### (Each Ring must assign unique ring id, the maximum ring id is 255)

Port 1 and Port 2 of SW\_1 to SW\_4 belong to same

#### partition with Ring ID = 1

■ Switch / L2 Sv	Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups									
X-Ring Pro Gr	oups Settings						1	•		
Ring ID		Port 1	Port 2	2						
1		GE1	GE2	Add						
		1								
Couple Setting	3									
Couple Ring ID		Port I	Master Ring ID							
1-255		Select Port		Add						
Information										
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete			
X-Ring Pro Gr	oups Settings							^		
Ring ID		Port 1	Port 2							
1-255		GE1	GE1	Add						
Couple Setting	1							~		
	,									
Couple Ring ID		Port	Master Ring ID							
1-255		Select Port	1	Add						
								_		
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	^		

GE2

DWN

Delete

DWN

GE1



# 2. Couple Ring Configuration



#### 1. Topology Diagram

Below diagram is the example for the couple ring application.







#### 2. Web screen shot

Below screen shot show you the X-ring Pro configuration on the web:

SW\_7, SW\_8

Port 1 and Port 2 of SW\_7 and SW\_8 belong to same

partition with Ring ID = 1

=	Switch / L2 Swi	itching / X-Rin	g Pro / X-Ring Pro Groups						
	X-Ring Pro Groups Settings								
	Ring ID		Port 1 Pro	ort 2 GE2	2 Add				
	1								
	Couple Ring ID		Port M.	aster Ring ID					
	1-255		Select Port		Add				
	Information							^	
	Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	

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X-Ring Pro Gr	oups Settings						^				
Ring ID 1-255		Port 1 F GE1 V	Port 2 GE1	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	STANDBY	GE1	DWN	GE2	DWN	Delete				

## 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 Master

Ring Port



Basic

1

STANDBY

GE1

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■ Switch / L2 Sw	Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups									
X-Ring Pro Gr	oups Settings						^			
Ring ID		Port 1	Port 2	2						
1		GE1	GE2	Add						
		1								
Couple Setting	I						^			
Couple Ring ID		Port I	Aaster Ring ID							
1-255		Select Port		Add						
Information							^			
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete			

X-Ring Pro Gr	oups Settings						^	
Ring ID		Port 1 GE1	Port 2 GE1	Add				
Couple Setting								
Couple Ring ID		Port	Master Ring ID	4				
2		× GE7	1	Add				
							•	
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	

GE2

DWN

Delete

DWN

Ena	Enabling an Intelligent Planet									
Linu	ning un tracing	ent i tunci								
X-Ring Pro Gr										
Ring ID	F	Port 1 Po	GE1	Add						
Couple Setting										
Couple Ring ID     Port       1-255     Select Port		Port M Select Port	aster Ring ID 1	Add						
Information							~			
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete			
1	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete			
2	Couple	Disconnect	GE7	BLK			Delete			

## SW\_1, SW\_2

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- Port 1 and Port 2 of SW\_1 and SW\_2 are also belong to same partition with Ring ID = 3
- Port 8 belong to different partition with Ring ID = 2 and associating

it to Partition 3 by selecting <u>"Ring 03" in the Master Ring Port</u>

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■ Switch / L2 Sw	Switch / L2 Switching / X-Ring Pro / X-Ring Pro Groups								
X-Ring Pro Gro	X-Ring Pro Groups Settings								
Ring ID 3	×	Port 1 GE1	Port 2 GE2	2 Add					
🌣 Couple Setting	1 * Couple Setting								
Couple Ring ID		Port	Master Ring ID						
1-255		Select Port		Add					
Information							^		
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete		

X-Ring Pro Groups Settings				^
Ring ID 1-255	Port 1 GE1	Port 2 GE1	Add	
Couple Setting				^
Couple Ring ID	Port	Master Ring ID	4 Add	
	3		-	

Information								
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	
3	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete	

Αυτι	ПЕСП							
Enal	bling an Intellig	eent Planet						
X-Ring Pro Gr	roups Settings						^	
Ring ID 1-255	Ring ID         Port 1         Port 2           1-255         GE1         GE1         Add							
Couple Setting								
Couple Ring ID		Port N Select Port	aster Ring ID	Add				
Information							^	
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	
3	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete	
2	Couple	Disconnect	GE8	DWN			Delete	

## SW\_3, SW\_4

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## Port 1 and Port 2 of SW\_3 and SW\_4 belong to same

## partition with Ring ID = 3

_									
-	Switch / L2 Sw	itching / X-Rinę	g Pro / X-Ring Pro Groups						
	X-Ring Pro Gro	oups Settings						^	
(	Ring ID		Port 1 Po	ort 2	2				
1	3	×	GE1	GE2	Add				
ľ			1						
			1						
	Couple Setting							^	
	Couple Ring ID		Port M	aster Ring ID					
	1 255		Calast Dart		Add				
	1-200		Seleci Poli						
	Information							^	
1	Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete	



X-Ring Pro Gr	X-Ring Pro Groups Settings								
Ring ID 1-255		Port 1 GE1	Port 2 GE1 Add						
Couple Setting	]						^		
Couple Ring ID     Port       1-255     Select Port		Master Ring ID	Add						
Information							^		
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete		
3	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete		



# 3. Dual Ring Configuration



1. Topology Diagram

Below diagram is the example for the Dual Ring application

#### Dual-Ring:

- Two adjacent rings share one switch.
- Ideal for application that have inherent cabling difficulties.





#### 2. Web screen shot

SW\_1

SW\_1 Configuration:

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

■ Switch / L2 Sw	vitching / X-Rin	g Pro / X-Ring Pro Groups					
X-Ring Pro Gr	oups Settings						^
Ring ID   Port 1   Port 2     1   GE1   GE2							
Couple Setting	1	1					•
Couple Ring ID	,	Port	Master Ring ID				
1-255		Select Port		Add			
The last supervised							
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete

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X-Ring Pro Groups Setting	gs			^
Ring ID 2	Port 1 GE3	Port 2 GE4		
Couple Setting	3			~
Couple Ring ID	Port Select Port	Master Ring ID	Add	

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Information									
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete		
1	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete		

X-Ring Pro Groups Settings			^
Ring ID	Port 1	Port 2	
1-255	GE1 💌	GE1 Add	
Couple Setting			^
Couple Ring ID	Port	Master Ring ID	
1-255	Select Port	1 Add	

Information	Information										
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete				
1	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete				
2	Basic	STANDBY	GE3	DWN	GE4	DWN	Delete				



Basic

STANDBY

### SW\_2, SW\_3 and SW\_4

#### SW\_2, SW\_3 and SW\_4 Configuration:

## Port 1 and Port 2 => Ring ID 1

Switch 7 L2 Sw	niching / X-Rin	g Pro-/ X-Ring Pro Gro	ups						
X-Ring Pro Gr	oups Settings								^
Ring ID		Port 1	F	Port 2	2				
1		GE1		GE2					
		1							
Couple Setting	I								^
Couple Ring ID		Port	r	laster Ring ID					
1-255		Select Port			Add				
Information									^
Ring ID	Mode	Operation State		Port 1	Forwarding State	Po	ort 2	Forwarding State	Delete

X-Ring Pro Gr	oups Settings						^
Ring ID 1-255		Port 1 GE1	Port 2 GE1	Add			
🌣 Couple Setting	)						^
Couple Ring ID		Port Select Port	Master Ring ID	Add			
Information	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	^ Delete

GE2

DWN

Delete

DWN

GE1



### SW\_5, SW\_6 and SW\_7

## SW\_5, SW\_6 and SW\_7 Configuration:

### Port 1 and Port 2 => Ring ID 2

■ Switch / L2 Sw	vitching / X-Rin	g Pro / X-Ring Pro Groups					
X-Ring Pro Gr	oups Settings						^
Ring ID		Port 1	Port 2	2			
2		GE1	GE2	Add			
<b>`</b>		1					
Couple Setting	)						^
Couple Ring ID		Port	Master Ring ID				
1-255		Select Port		Add			
Information							^
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete

		^
Port 1	Port 2	
GE1	GE1 Add	
		^
Port	Master Ring ID	
Select Port	2 Add	
	Port 1  GE1  Port  Select Port	Port 1 Port 2   GE1 GE1     Add     Port Master Ring ID   Select Port 2   1 Add

Information							^
Ring ID	Mode	Operation State	Port 1	Forwarding State	Port 2	Forwarding State	Delete
2	Basic	STANDBY	GE1	DWN	GE2	DWN	Delete



# 4. X-ring Elite Configuration



1. Topology Diagram

Below diagram is the example for the X-ring Elite application for a single ring. You may extend the topology to dual ring, multi ring.

[Note: X-ring Elite is support Dual Ring, Multi Ring. But X-ring Elite do not support couple ring]





#### 2. Web screen shot

Below screen shot show you the X-ring Elite configuration on the web:

## SW\_1~SW\_4

### (Each Ring must assign unique ring id, the maximum ring id is 255)

Port 1 and Port 2 of SW\_1 to SW\_4 belong to same

partition with Ring ID = 1

■ Switch / L2 Switchin	ng / X-Ring Elite / X-Ring Elite	Groups			
X-Ring Elite Groups	s Settings				^
Ring ID	Role Basic	Port 1 GE1	Port 2 GE2		
		1			
Ring ID	Role	Port	1	Port 2	Delete

X-Ring Elite Groups Settings							
Ring ID     Role       1-255     Basic	P	GE1 GE1	Add				
III Information							
Ring ID	Role	Port 1	Port 2	Delete			
1 (Standby)	Basic	GE1 (Down)	GE2 (Down)	Delete			



## APPENDIX



# 5. Compatible with previous X-ring Configuration (X-ring Pro Legacy Mode) EKI-7000



- 1. Topology Diagram
  - The New X-ring Pro Based FW Switch is backwards compatible with previous X-ring in the existing legacy X-ring network.
  - Co-existence Requirement Between X-ring Pro and X-ring:
    - "Legacy Ring" must be manually enabled under X-ring Elite Based FW Switch.
    - Making sure at least one switch from the existing legacy
       X-ring group configured as "Ring Master"

Below diagram is the example to add a new EKI-7700 and EKI-7400 switch into X-ring (EKI-7000) as a ring member application.



### [Purpose] Adding new EKI-7700 and EKI-7400 switches into original

### EKI-7000 X-ring





- 2. [Process]
- Step1: Configure new switch SW-5 as legacy mode and setting the ring port is port9, and port 10.
- Step2: Disconnect the link between SW-3 and SW-4
- Step3: Link SW-3 port9 to SW-5 port10 and SW-4 port9 to SW-5 port9

#### 3. Web screen shot

Below screen shot show you the X-ring Elite configuration as Legacy Mode on the web, after the setting, you can connect SW5 into the X-ring environment.

#### SW-5

≡ Switch / L2 Switching / X-Ring Elite / X-Ring Elite Groups							
X-Ring Elite Group	ps Settings					^	
Ring ID	Role	Port 1	Port 2	2			
1	Legacy	GE9	GE10				
		1					
Information						^	
Ring ID		Role	Port 1	Port 2	Delete		

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Enabling an Intelligent Planet								
X-Ring Elite Groups Settings								
Ring ID Role	isic 🔽	GE1 GE1	Add					
Information								
Ring ID	Role	Port 1	Port 2	Delete				
1 (Legacy)	Legacy	GE9 (Down)	GE10 (Down)	Delete				

#### **Contact Window and File Link:**

If you have any questions, please contact with local technical support