

iConverter[®] Link Modes

iConverter Managed Fiber Media Converter Product Family

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1.0 OVERVIEW

Omnitron Systems has developed a system of Link Modes designed to aid Network Administrators with fault determination using a combination of LED indicators and SNMP alarms. Depending on the module type, it can support up to 8 different link modes.

2.0 CONFIGURATION

Unmanaged media converters can cause delay in identifying network problems because a fault condition on the converter will not get reported to the other converter. The end device connected to the media converter does not know there is a fault condition on the far side and continues to send data over a broken link.

Unmanaged media converters use LED indicators to display the condition of the link between devices. Utilizing Link Modes, Network Administrators have the flexibility in deciding how the fault condition is handled. Link Propagate (LP) and Remote Fault Detect (RFD) Link Modes provides a method of detecting the fault by propagating the outage towards the end devices. Symmetrical Fault Detect (SFD) will bring down the link towards the end devices when any link fault is detected.

Managed media converters use a combination of LED indicators and SNMP traps to notify the Network Administrator of fault conditions. Link Segment isolates the fault at the affected port, alerting the Network Management Station (NMS) by generating an SNMP alarm.

Omnitron's iConverter Network Interface Devices (NID) also support 802.3ah Operation, Administration and Maintenance (OAM). In the event of an unidirectional fiber link fault (only one of the two fiber strands is broken or a faulty transceiver), the NID will send a link fault trap back to the Core/Central Office.

Link Mode selection will depend on how the Network Administrator manages the connection and how the fault is handled.

3.0 RECOMMENDATIONS

1. Create a network diagram - It is important to have an accurate diagram of the overall network. Label model numbers, chassis numbers, module identifiers, IP address, interface speeds and link modes on the diagram. This information may be necessary in troubleshooting the network.
2. Program unique chassis numbers when applicable. Chassis numbers will be displayed when using an SNMP management system.
3. Program meaningful names for the module's identifier (a field available in the management software to identify the module). The module's identifier will be displayed when using a SNMP management system. This will help in localizing problems.
4. Use Link Segment link mode during the initial installation. After a fiber link has been established between the media converters and data between end devices have been verified, modify the link mode to the desired configuration.

4.0 SUPPORTED MODULES

2-PORT MODULES											
Module	Model	Port 1 (P1)	Port 2 (P2)	Link Modes							
				LS	LP	RFD (RFD+LS)	RFD (RFD+LP)	ALP P1-P2	ALP P2-P1	ARFD+LP	SFD
10FL/T	830X	MAN	MAN	X	X		X				
100FX/TX	836X	MAN	AN/MAN	X	X		X				
10/100	838X	MAN	AN/MAN	X	X		X				
TX/2FX	842X	MAN	AN/MAN	X	X		X				X
2FX	844X	MAN	MAN	X	X	X	X				X
GX	850X	MAN	AN/MAN	X	X		X				
GX AN	850XN	AN/MAN	AN/MAN	X	X		X				
GX/T	852X	AN/MAN	AN/MAN	X	X	X	X				X
GX/T2	852xN	AN/MAN	AN/MAN	X	X			X	X		
GX/X	854X	AN/MAN	AN/MAN	X	X	X	X				X
GX/F	856X	AN/MAN	MAN	X	X	X					X
10GXT	8580	AN/MAN	AN/MAN	X	X						
100FF	862X	MAN	MAN		X		X				
1000FF	864X	MAN	MAN		X		X				
OC3FF	866X	MAN	MAN		X		X				
OC12FF	868X	MAN	MAN		X		X				
10/100VT	88XX	MAN	AN/MAN	X	X	X	X				X
10/100M	890X	MAN	AN/MAN	X	X	X	X				X
10/100M2	890XN	MAN	AN/MAN	X	X	X	X	X	X	X	X
GXTM	892X	AN/MAN	AN/MAN	X	X	X	X				X
GXTM2	892XN	AN/MAN	AN/MAN	X	X	X	X	X	X	X	X
2FXM	8959	MAN	MAN	X	X	X	X				X
2FXM2	8959N	MAN	MAN	X	X	X	X	X	X	X	X
2GXM	8999	AN/MAN	AN/MAN	X	X	X	X				X
2GXM2	8999N	AN/MAN	AN/MAN	X	X	X	X	X	X	X	X
GM3	892XP	AN/MAN	AN/MAN	X	X	X	X	X	X	X	X
GM4	892XR	AN/MAN	AN/MAN	X	X	X	X	X	X	X	X
3-PORT MODULES											
Module	Model	All Ports (P1,P2,P3)	Link Modes								
			LS	ALP RU	ALP MT1	ALP MT2	RFD (RFD+LS)	ALP+RFD RU	ALP+RFD MT1	ALP+RFD MT2	
GM3	897XP	AN/MAN	X	X	X	X	X	X	X	X	X
GM4	897XR	AN/MAN	X	X	X	X	X	X	X	X	X
4-PORT MODULES											
Module	Model	Port 1 (P1) Port 2 (P2)	Port 3 (P3) Port 4 (P4)	Link Modes							
				LS	LP Copper to Fiber	LP Fiber to Copper					
2GXT	8484	AUTO/100	AN/MAN	X	X	X					

5.0 AUTO VS. MANUAL NEGOTIATION

The fault indications displayed by the media converter will depend on the negotiation mode of the fiber and RJ-45 port. Auto-Negotiation (AN) will only establish a link when both AN ports have exchanged negotiation values and resolved to a common configuration. Should the link be broken in one direction, the AN link will reset and attempt renegotiation. In manual negotiation, only one direction needs to be working to get a link. Data will not be transmitted until both ports have established a link, but the port will indicate if a signal is detected.

5.1 Fiber Port

The fault conditions will change depending on whether the mode of operation of the fiber link is auto or manual negotiation. Refer to the **Support Module Table** to verify the mode of operation of the fiber link, then use the appropriate auto or manual negotiation diagram for fault descriptions.

5.2 RJ-45 Port

The condition of the RJ-45 port during a fault will depend on the mode of operation, auto or manual negotiation. In auto-negotiation, the LED indicator on the module will be OFF if the attached device is OFF. In manual negotiation, the LED indicator on the module will be ON even though the attached device is OFF (unless the cable is disconnected).

6.0 LINK MODE DESCRIPTIONS

6.1 2-PORT MODULES

6.1.1 Link Segment (LS)

When using LS, a loss of a receive link signal will only affect the port detecting the loss of signal. All the other ports will continue to generate a link signal. For example, a loss of link on the Port 2, only affects Port 2; the other ports remain unaffected. See diagram in section 7.1.1 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

6.1.2 Link Propagate (LP)

When using LP, a loss of a receive link signal will continue to propagate through to the next port in the network. For example, a loss of link on Port 2 will ‘propagate’ forward causing the attached device to Port 1 to drop its link due to the propagated fault. This setting allows the loss of a link to be detected by SNMP or other managed network devices. See diagram in section 7.1.2 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

6.1.3 Remote Fault Detect + Link Segment (RFD+LS)

When using RFD+LS, the loss of receive link signal is looped back in the opposite direction causing the transmitting device to drop its link. For example, a loss of link state on the Rx fiber will loop the fault back causing the port on the attached device to lose fiber link. See diagram in section 7.1.3 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

Note: It is not permitted to set both media converters to any RFD mode. A lockup condition will occur.

6.1.4 Remote Fault Detect + Link Propagate (RFD+LP)

When using RFD+LP, a loss of a receive link signal will continue to propagate through to the next port in the network and also be looped back towards the transmitting device. For example, a loss of link state on the Rx fiber (Port 1) will loop the fault back causing the port on the attached device to lose fiber link. It also propagates the fault forward towards Port 2 causing the port to lose link. See diagram in section 7.1.4 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

Note: It is not permitted to set both media converters to any RFD mode. A lockup condition will occur.

6.1.5 Asymmetrical Link Propagate – Port 1 to Port 2 (ALP P1-P2)

ALP P1-P2 limits the propagate effect of the standard LP mode. The P1-P2 notation indicates the direction the loss of link signal will propagate. For example, a loss of receive link on the Port 1 (P1) causes Port 2 (P2) to drop its link due to the propagated state (P1 to P2). However, a loss of link on the Port 2 (P2) does not cause the loss of link to propagate. The loss only propagates in the P1-to-P2 direction. See diagram in section 7.1.5 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

6.1.6 Asymmetrical Link Propagate – Port 2 to Port 1 (ALP P2-P1)

ALP P2-P1 limits the propagate effect of the standard LP mode. The P2-P1 notation indicates the direction the loss of link signal will propagate. For example, the loss of receive link on the Port 1 (P1) will not propagate towards the Port 2 (P2). However, the loss of link on the Port 2 (P2) will propagate towards the Port 1 (P1) causing the port to drop its link due to the propagated state (P2 to P1). The loss only propagates in the P2-to-P1 direction. See diagram in section 7.1.6 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

6.1.7 Asymmetrical RFD + LP – Port 1 to Port 2 (ARFD+LP P1-P2)

ARFD+LP P1-P2 generates a link signal only when a link signal is detected. When a fault is detected, the loss of link is looped back in the opposite direction and propagated in the direction of P1 to P2. For example, the loss of link on the Port 1 (P1) will propagate towards Port 2 (P2) causing the port to drop its link due to the propagated state (P2 to P1). The loss of receive link signal on the Port 1 (P1) is also looped back causing the attached device to lose link. See diagram in section 7.1.7 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

6.1.8 Symmetrical Fault Detect (SFD)

SFD link mode is used with SFD capable media converters at both ends of the fiber link.

The SFD mode generates a Link Loss signal on all ports on both media converters when a loss of link signal is detected by any of the ports. The port detecting the fault communicates the condition by looping its port back and transmitting a special SFD signal. A fiber port receiving the SFD signal directing, will start flashing its LED. Since all ports transmit a Link Loss signal all other indicator will be OFF. Port 2 will always flash their corresponding LED unless the fault is contributed to it local receive port. See diagram in section 7.1.8 for the complete operation of link mode.

Note: A loss of link or loss of signal is when the optical receiver on the media converter can no longer detect the presence of light.

Note: Both media converters must be configured for SFD.

6.2 3-PORT MODULES

6.2.1 Link Segment (LS)

LS transmits a link signal independently of any received link at any port. Utilizing this configuration, a loss of a receive link signal will only affect the port detecting the loss of signal. All the other ports will continue to generate a link signal. See diagram in section 7.2.1 for the complete operation of link mode.

6.2.2 Asymmetrical Link Propagate Redundant Uplink (ALP RU)

Port 1 + Port 2 -> Port 3

ALP RU requires the loss of receive link signal on both Port 1 and Port 2 for the fault to propagated to Port 3. If only one port (Port 1 or Port 2) detects a loss of receive link signal, the other ports remain unchanged. A loss of receive link signal on Port 3 does not affect the operation of Port 1 or Port 2. See diagram in section 7.2.2 for the complete operation of link mode.

6.2.3 Asymmetrical Link Propagate Multi-Tenant 1 (ALP MT1)

Port 3 -> Port 1 + Port 2

ALP MT1 requires a loss of receive link signal on Port 3 for the fault to propagate to both Port 1 and Port 2. A loss of receive link signal on Port 1 does not affect the operation of Port 2 or Port 3. A loss of receive link signal on Port 2 does not affect the operation of Port 1 or Port 3. See diagram in section 7.2.3 for the complete operation of link mode. See diagram in section 7.2.3 for the complete operation of link mode.

6.2.4 Asymmetrical Link Propagate Multi-Tenant 2 (ALP MT2)

Port 1 -> Port 2 + Port 3

ALP MT2 requires a loss of receive link signal on Port 1 for the fault to propagate to both Port 2 and Port 3. A loss of receive link signal on Port 2 does not affect the operation of Port 1 or Port 3. A loss of receive link signal on Port 3 does not affect the operation of Port 1 or Port 2. See diagram in section 7.2.4 for the complete operation of link mode.

6.2.5 Remote Fault Detect (RFD)

RFD transmits a link signal when a link signal is detected. When the port detects a loss of receive link signal, the loss of link is looped back in the opposite direction causing the attached equipment to loss link.

The ports must be configured for Manual operation for RFD to operate properly. When the port is configured for Auto, the auto-negotiation process causes the attached equipment to drop its link. See diagram in section 7.2.5 for the complete operation of link mode.

6.2.6 Asymmetrical Link Propagate + Remote Fault Detect Redundant Uplink (ALP + RFD RU)

Port 1 + Port 2 -> Port 3

ALP + RFD RU requires the loss of receive link signal on both Port 1 and Port 2 for the fault to be propagated to Port 3. If only one port (Port 1 or Port 2) detects a loss of receive link signal, the other ports remain unchanged. A loss of receive link signal on Port 3 does not affect the operation of Port 1 or Port 2.

The ports must be configured for Manual operation for RFD to operate properly. When the port is configured for Auto, use ALP RU. See diagram in section 7.2.6 for the complete operation of link mode.

6.2.7 Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 1 (ALP + RFD MT1)

Port 3 -> Port 1 + Port 2

ALP MT1 requires a loss of receive link signal on Port 3 for the fault to propagate to both Port 1 and Port 2. A loss of receive link signal on Port 1 does not affect the operation of Port 2 or Port 3. A loss of receive link signal on Port 2 does not affect the operation of Port 1 or Port 3.

The ports must be configured for Manual operation for RFD to operate properly. When the port is configured for Auto, use ALP MT1. See diagram in section 7.2.7 for the complete operation of link mode.

6.2.8 Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 2 (ALP + RFD MT2)

Port 1 -> Port 2 + Port 3

ALP MT2 requires a loss of receive link signal on Port 1 for the fault to propagate to both Port 2 and Port 3. A loss of receive link signal on Port 2 does not affect the operation of Port 1 or Port 3. A loss of receive link signal on Port 3 does not affect the operation of Port 1 or Port 2.

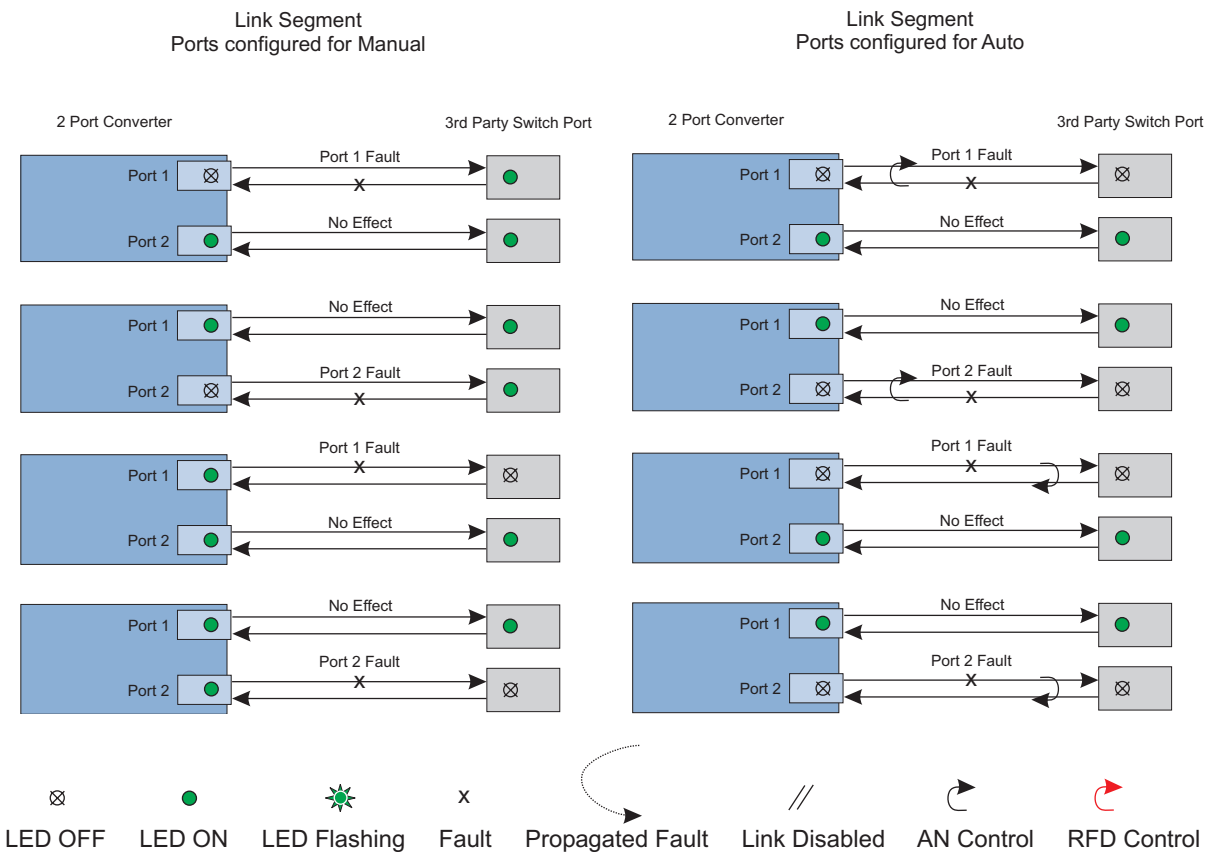
The ports must be configured for Manual operation for RFD to operate properly. When the port is configured for Auto, use ALP MT2. See diagram in section 7.2.8 for the complete operation of link mode.

7.0 LINK MODE DIAGRAMS

Refer to the section on Link Mode Description for an explanation on the operation of each of the link modes.

7.1 2-PORT MODULES

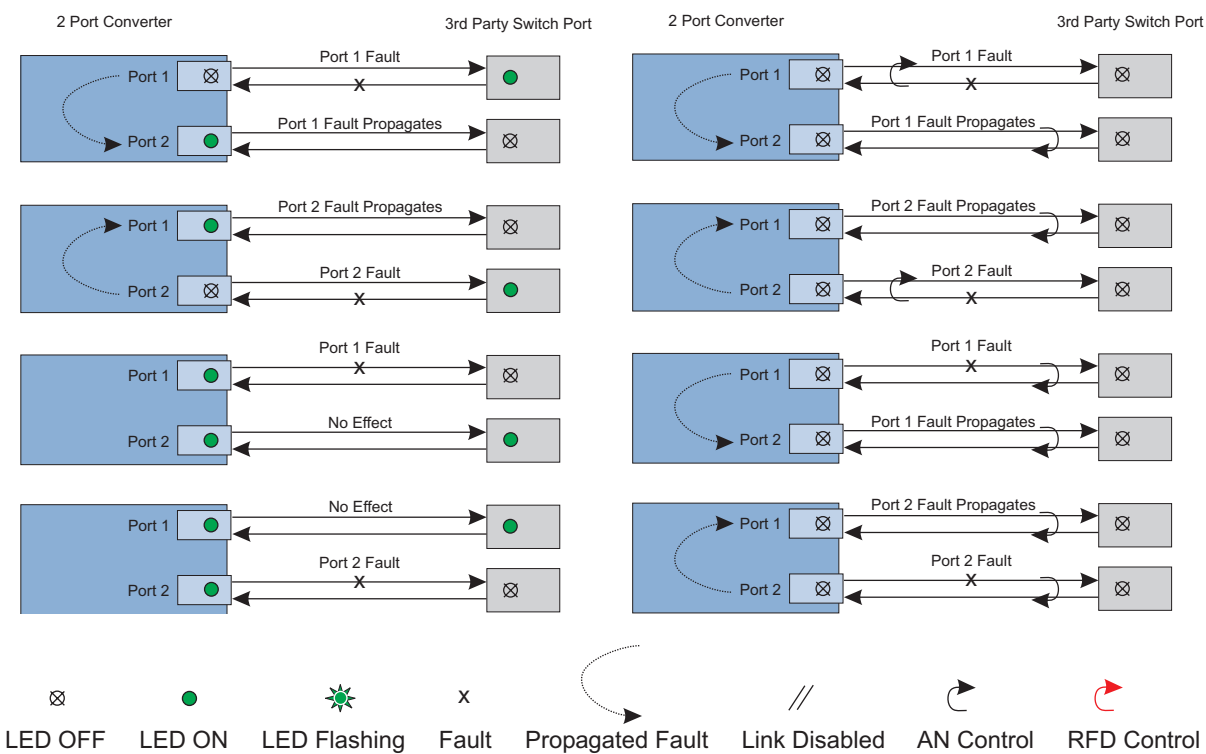
7.1.1 Link Segment (LS)



7.1.2 Link Propagate (LP)

Link Propagate
Ports configured for Manual

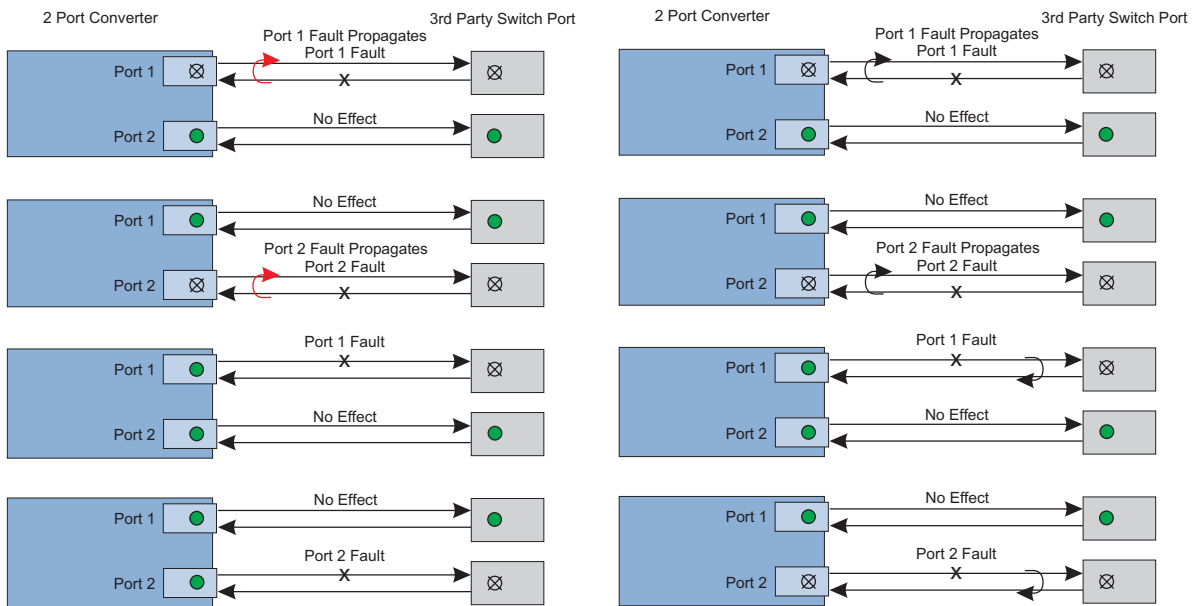
Link Propagate
Ports configured for Auto



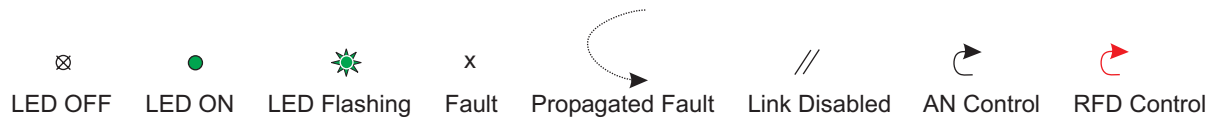
7.1.3 Remote Fault Detect + Link Segment (RFD+LS)

Remote Fault Detect + Link Segment
Ports configured for Manual

Remote Fault Detect + Link Segment
Ports configured for Auto



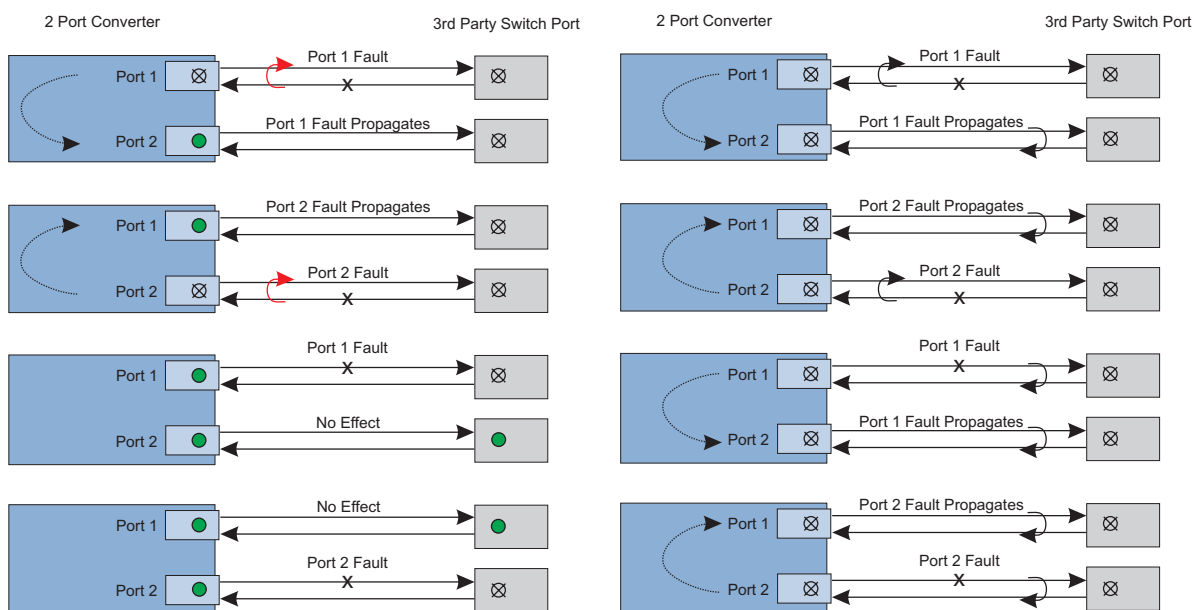
Note: Setting both converters to any RFD mode is not permitted and will cause a lockup condition.



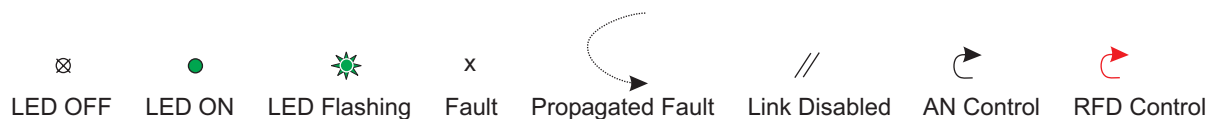
7.1.4 Remote Fault Detect + Link Propagate (RFD+LP)

Remote Fault Detect + Link Propagate
Ports configured for Manual

Remote Fault Detect + Link Propagate
Ports configured for Auto



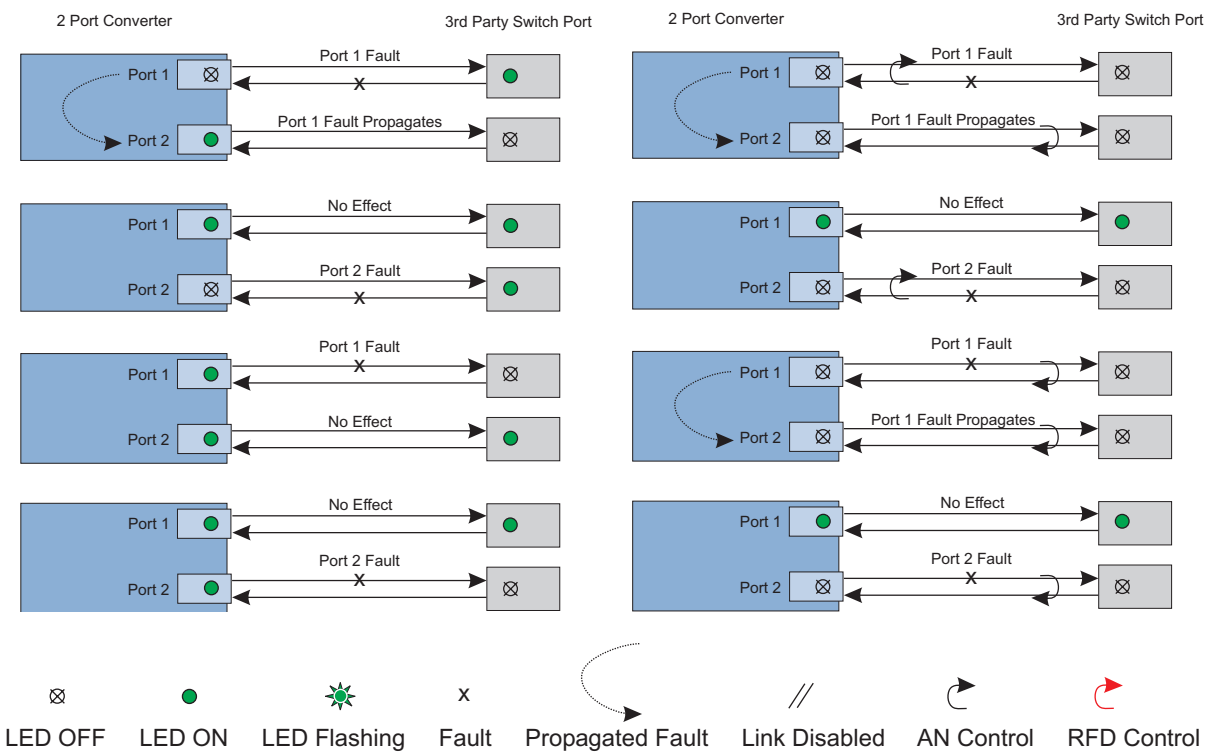
Note: Setting both converters to any RFD mode is not permitted and will cause a lockup condition.



7.1.5 Asymmetrical Link Propagate – Port 1 to Port 2 (ALP P1-P2)

Asymmetrical Link Propagate Port 1 to Port 2
Ports configured for Manual

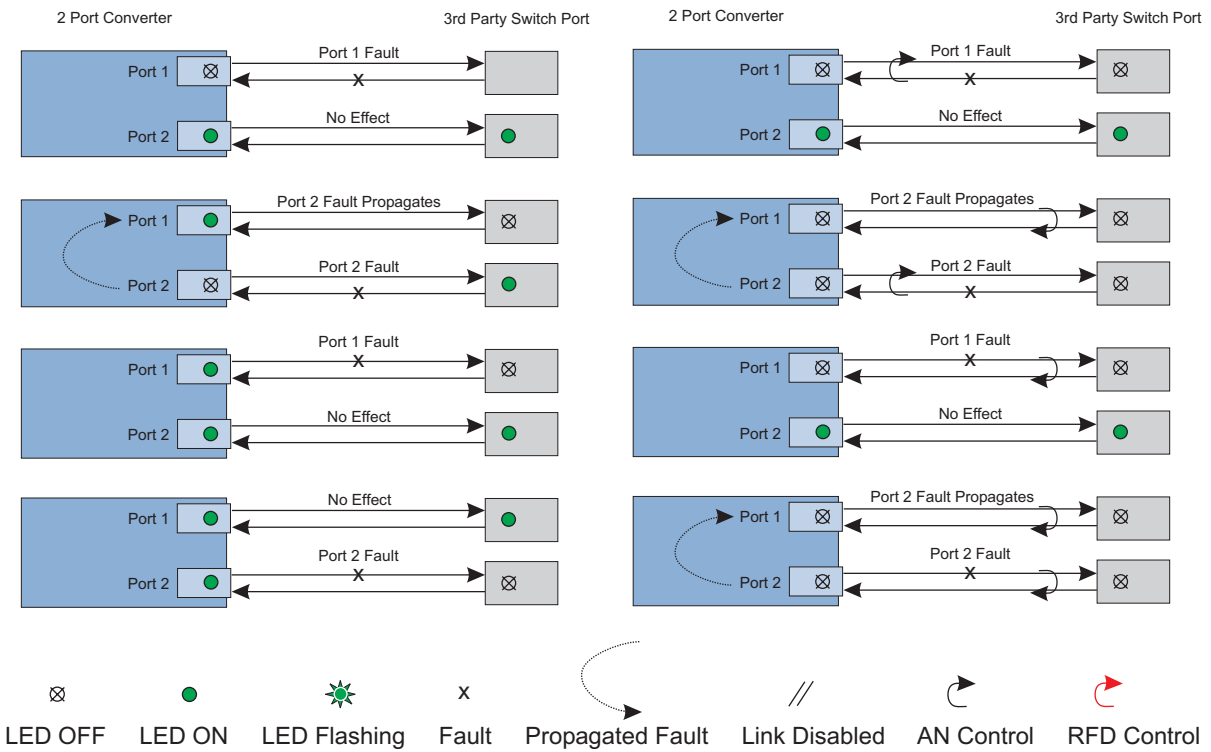
Asymmetrical Link Propagate Port 1 to Port 2
Ports configured for Auto



7.1.6 Asymmetrical Link Propagate – Port 2 to Port 1 (ALP P2-P1)

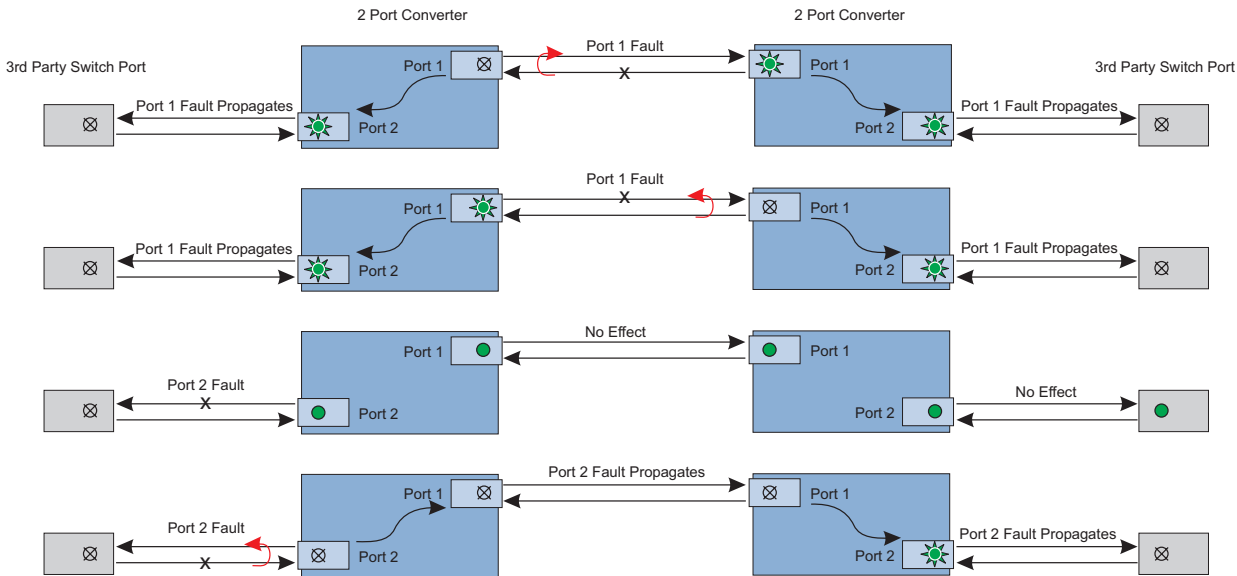
Asymmetrical Link Propagate Port 2 to Port 1
Ports configured for Manual

Asymmetrical Link Propagate Port 2 to Port 1
Ports configured for Auto

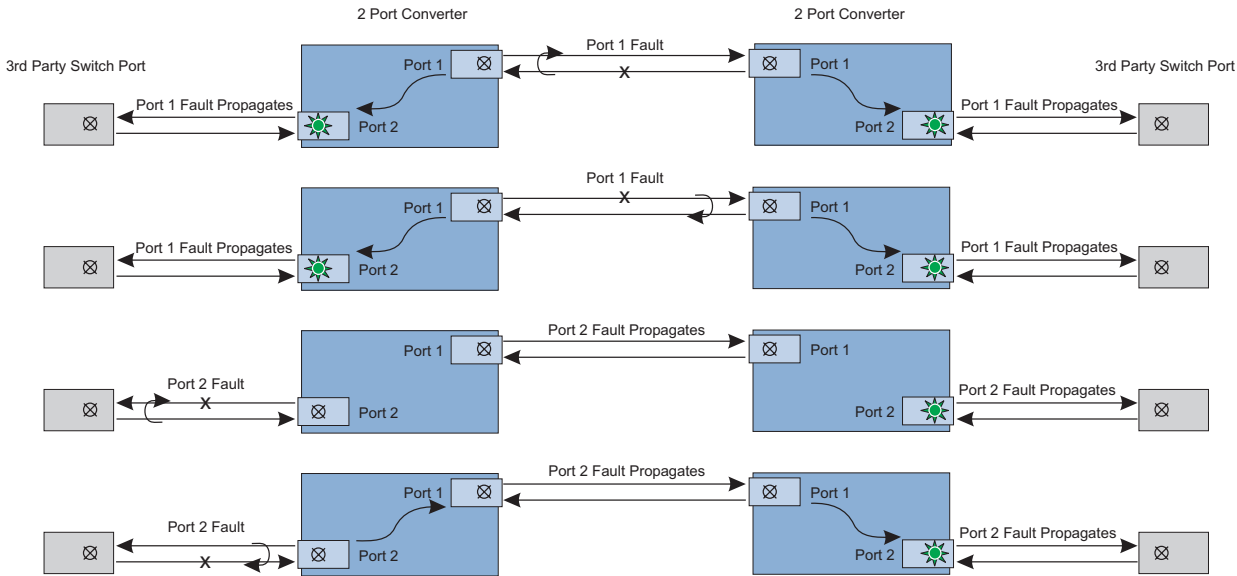


7.1.8 Symmetrical Fault Detect (SFD)

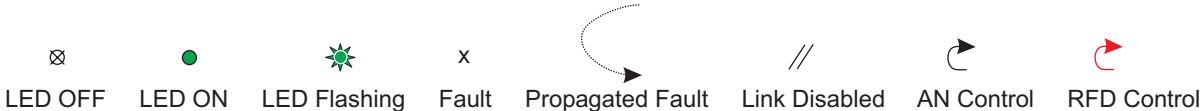
Symmetrical Fault Detect
Ports configured for Manual



Symmetrical Fault Detect
Ports configured for Auto



Note: Both media converters must be configured for SFD.

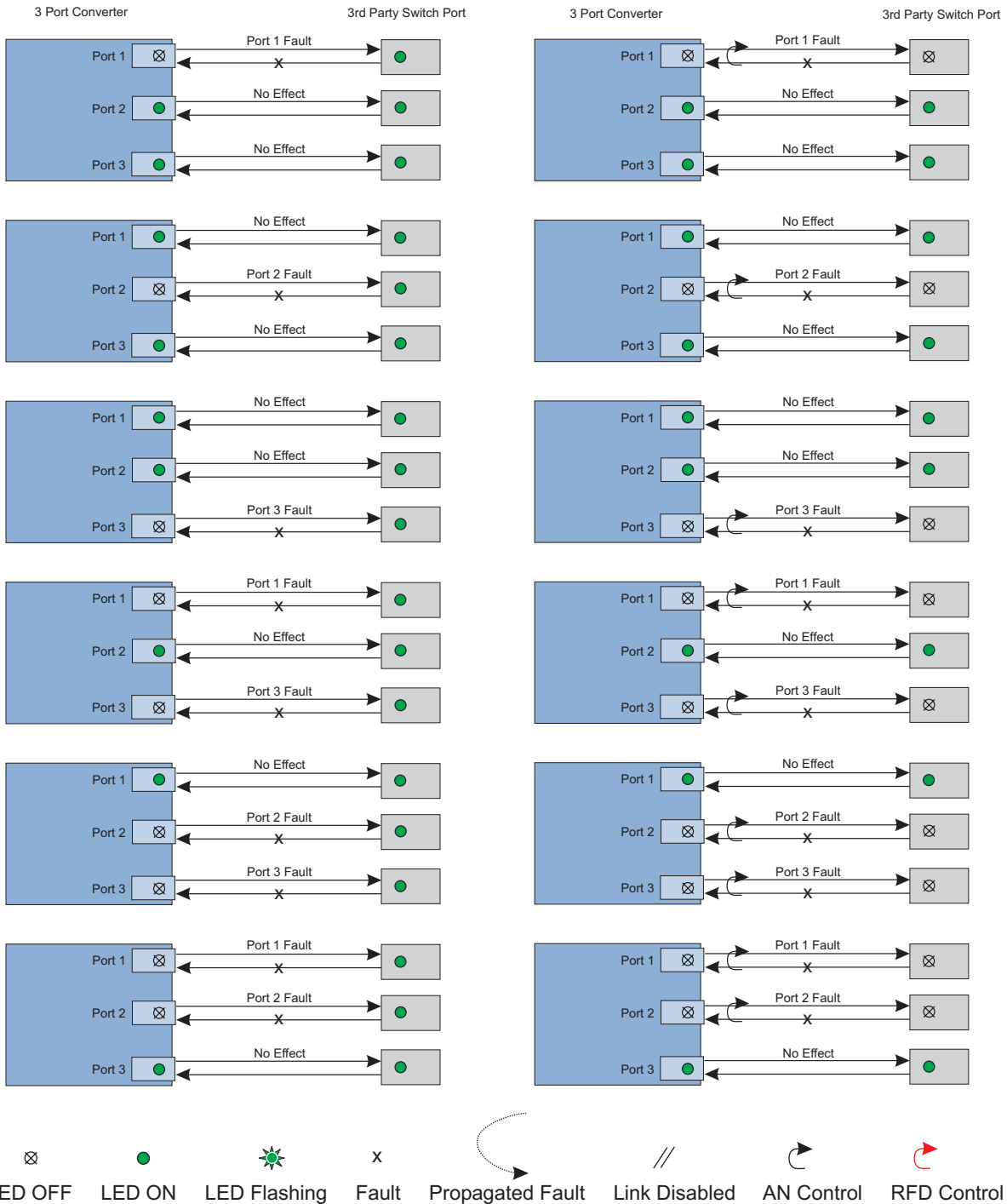


7.2 3-PORT MODULES

7.2.1 Link Segment (LS)

Link Segment
Ports configured for Manual

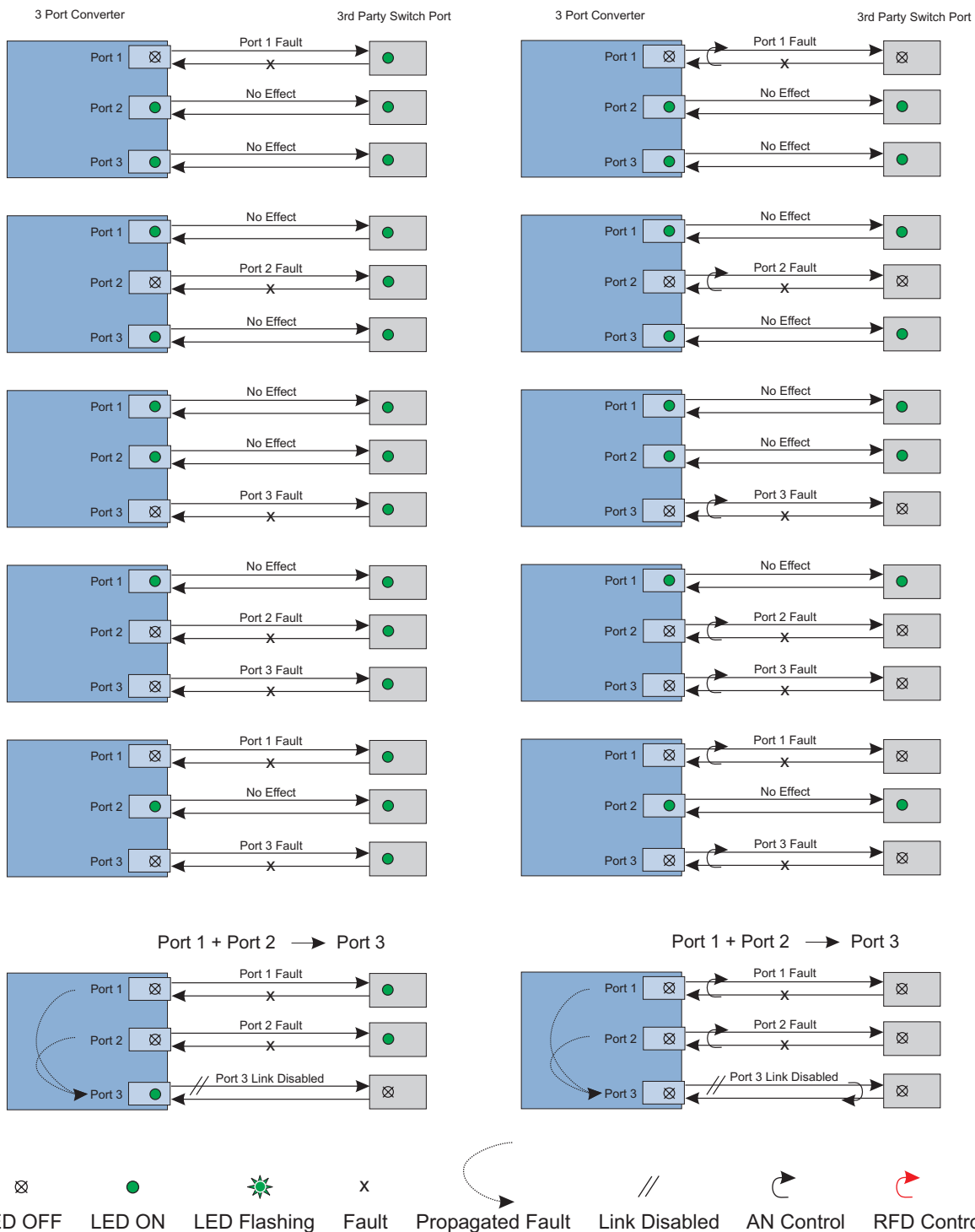
Link Segment
Ports configured for Auto



7.2.2 Asymmetrical Link Propagate Redundant Uplink (ALP RU)

Asymmetrical Link Propagate Redundant Uplink (ALP + RU)
Ports configured for Manual

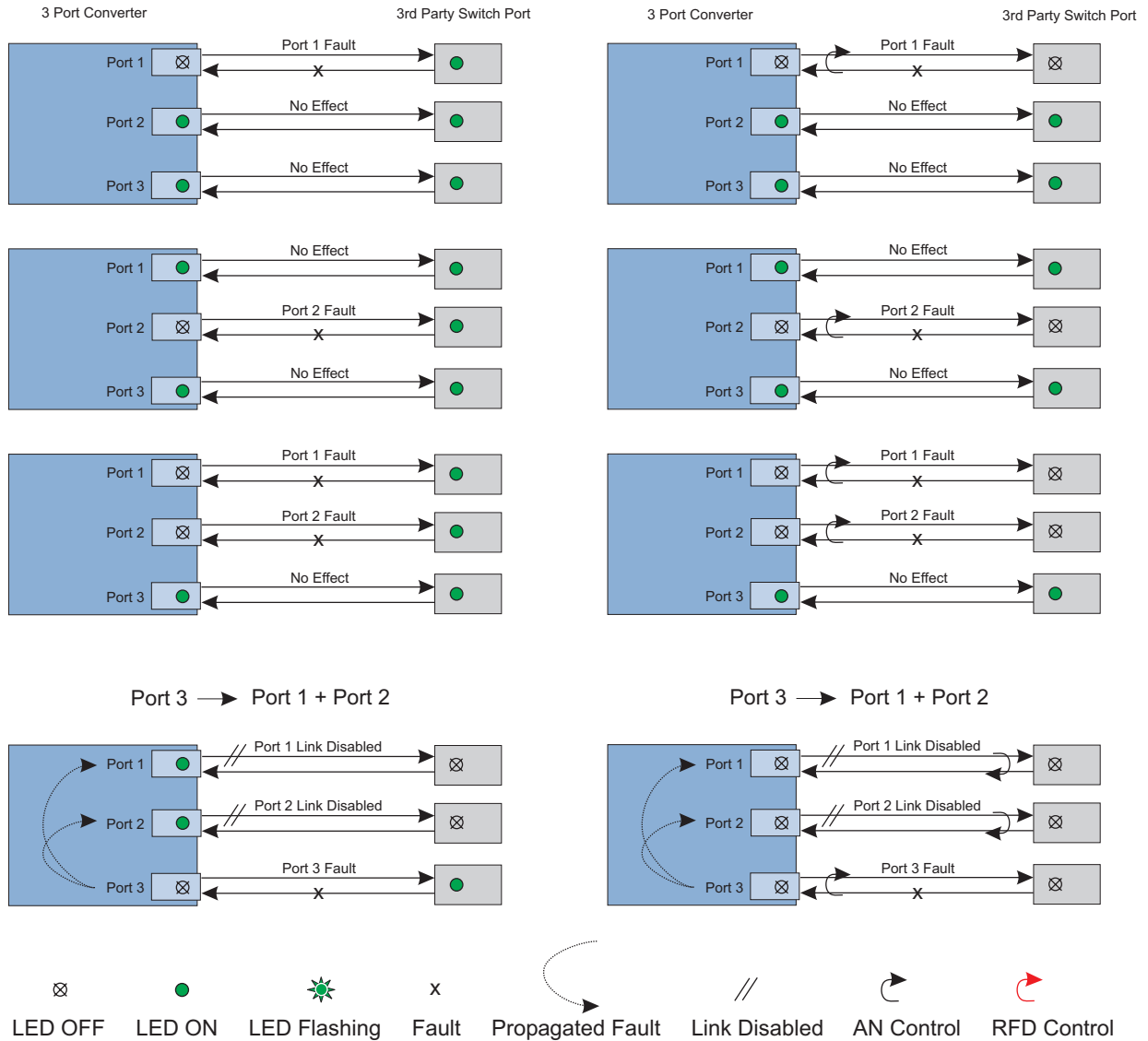
Asymmetrical Link Propagate Redundant Uplink (ALP + RU)
Ports configured for Auto



7.2.3 Asymmetrical Link Propagate Multi-Tenant 1 (ALP MT1)

Asymmetrical Link Propagate
Multi-Tenant 1 (ALP + MT1)
Ports configured for Manual

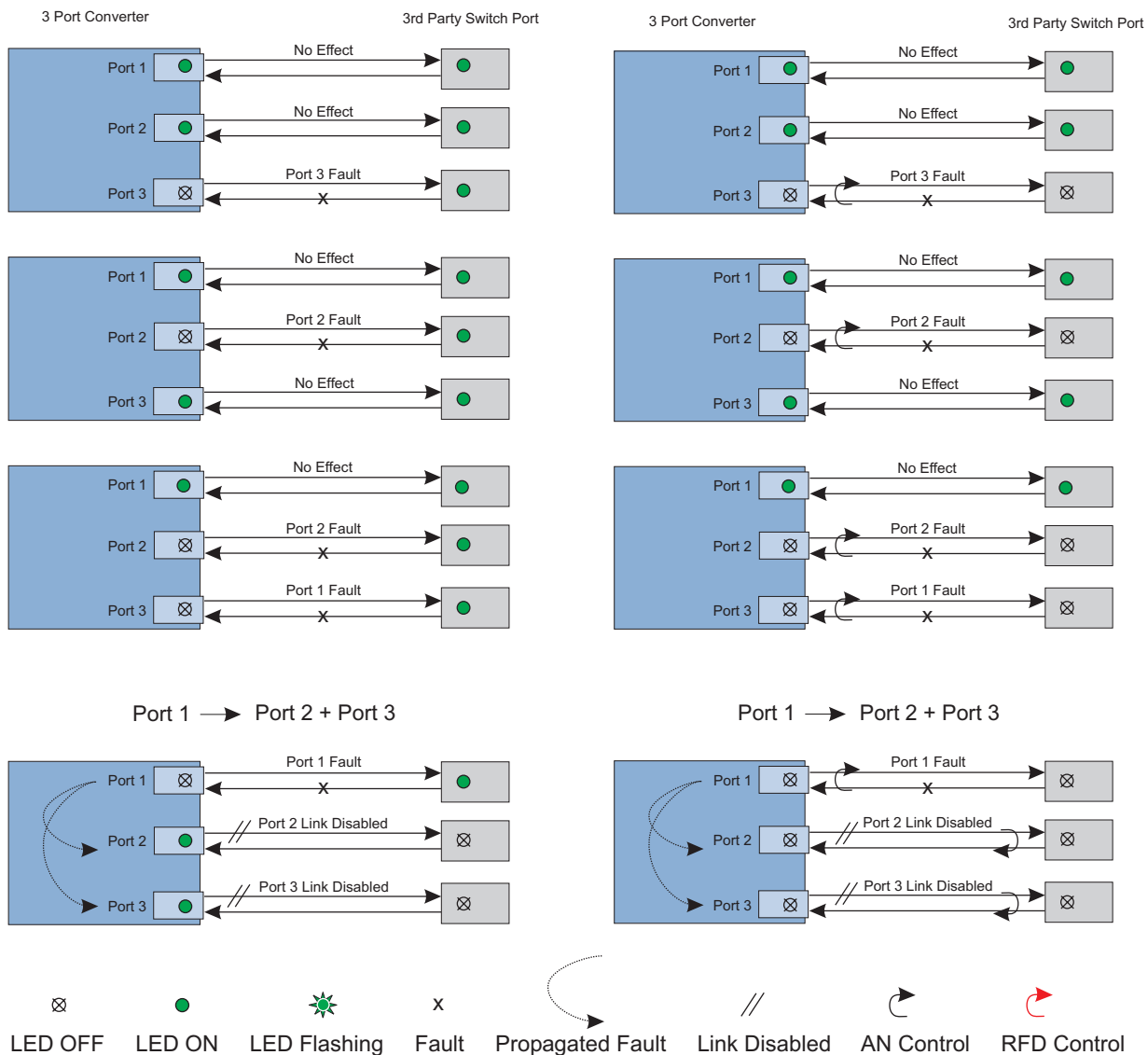
Asymmetrical Link Propagate
Multi-Tenant 1 (ALP + MT1)
Ports configured for Auto



7.2.4 Asymmetrical Link Propagate Multi-Tenant 2 (ALP MT2)

Asymmetrical Link Propagate
Multi-Tenant 2 (ALP + MT2)
Ports configured for Manual

Asymmetrical Link Propagate
Multi-Tenant 2 (ALP + MT2)
Ports configured for Auto



7.2.5 Remote Fault Detect (RFD)

Remote Fault Detect (RFD)
Ports configured for Manual

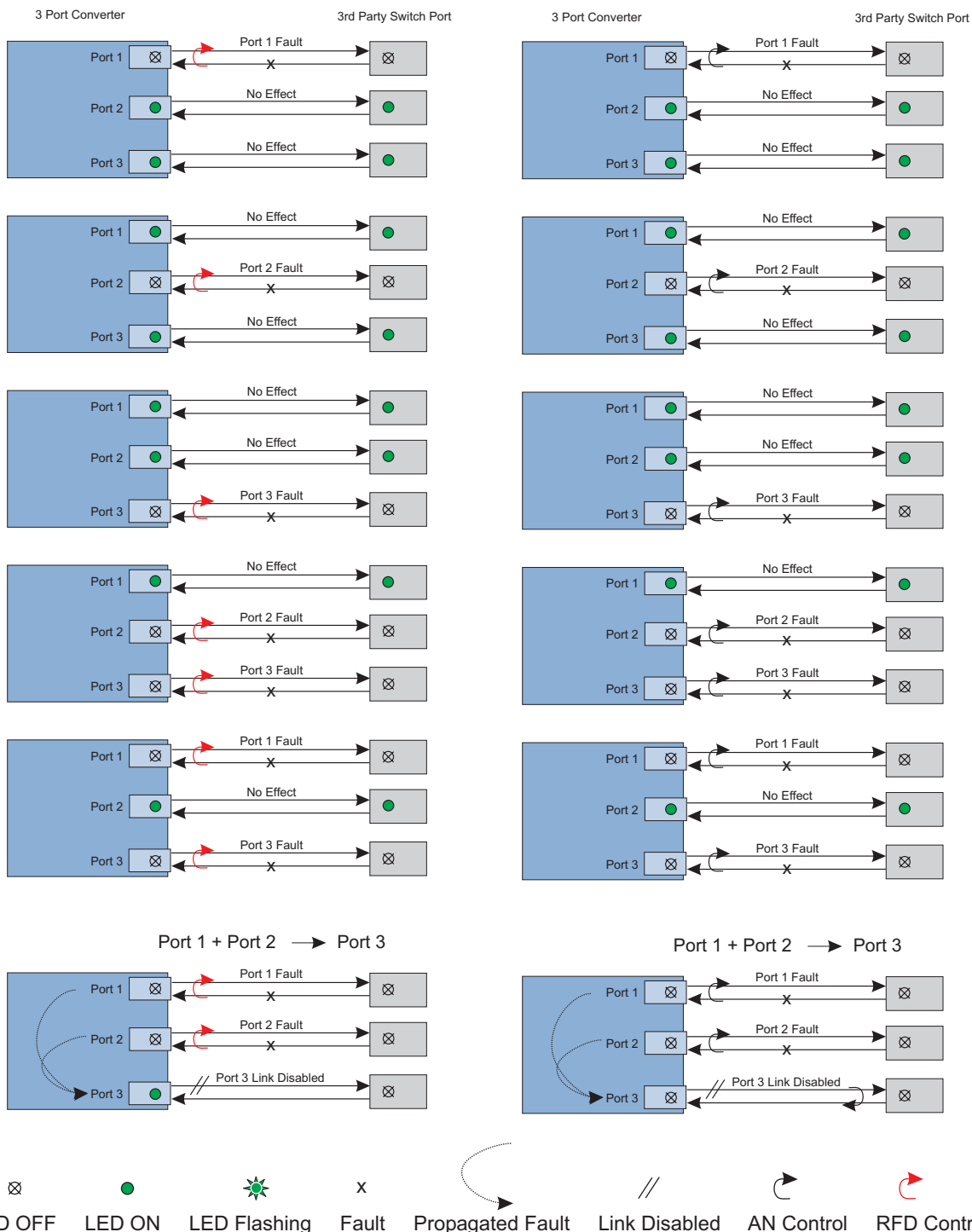
Remote Fault Detect (RFD)
Ports configured for Auto



7.2.6 Asymmetrical Link Propagate + Remote Fault Detect Redundant Uplink (ALP + RFD RU)

Asymmetrical Link Propagate +
Remote Fault Detect
Redundant Uplink (ALP + RFD + RU)
Ports configured for Manual

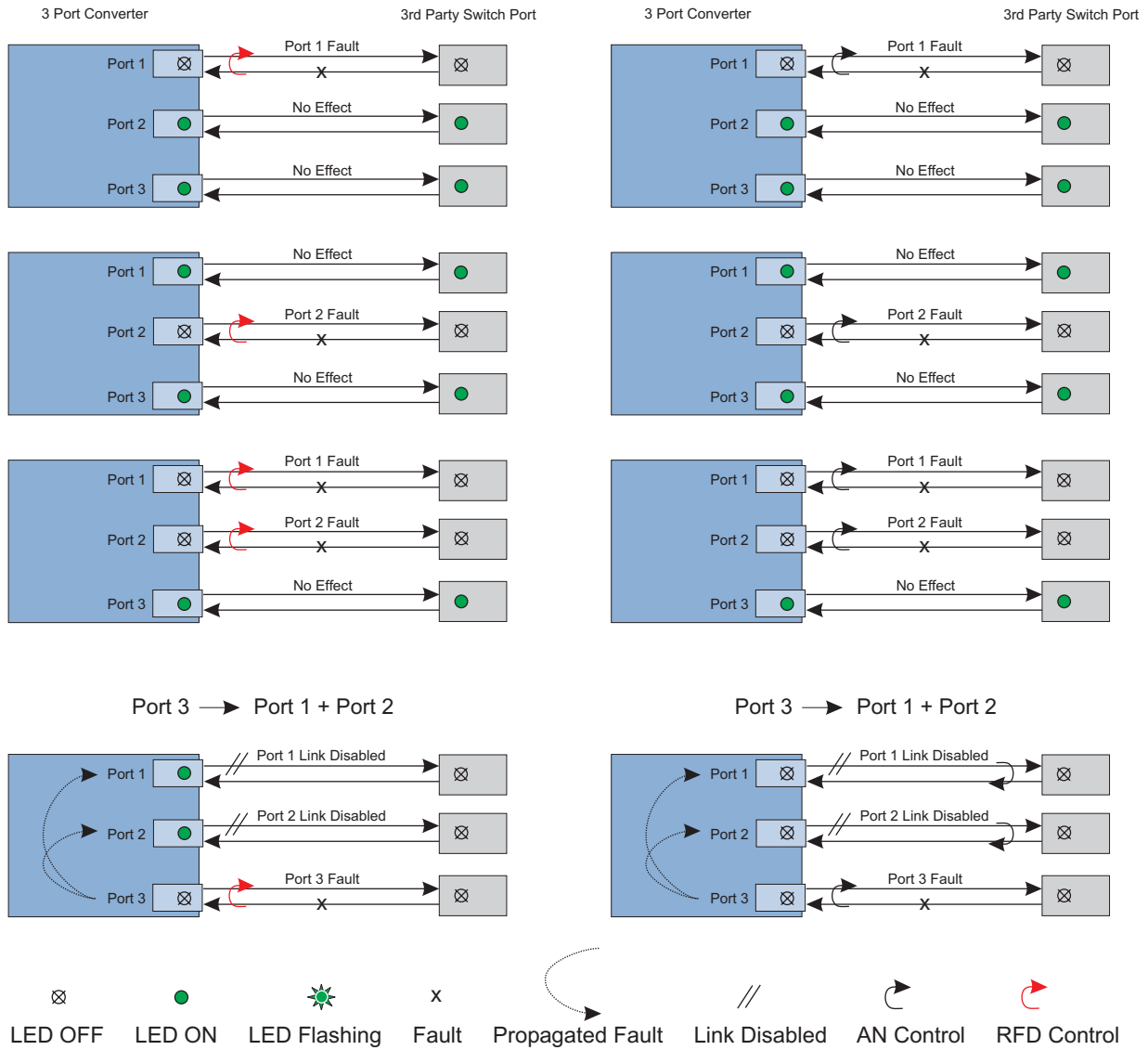
Asymmetrical Link Propagate +
Remote Fault Detect
Redundant Uplink (ALP + RFD + RU)
Ports configured for Auto



7.2.7 Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 1 (ALP + RFD MT1)

Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 1 (ALP + RFD + MT1)
Ports configured for Manual

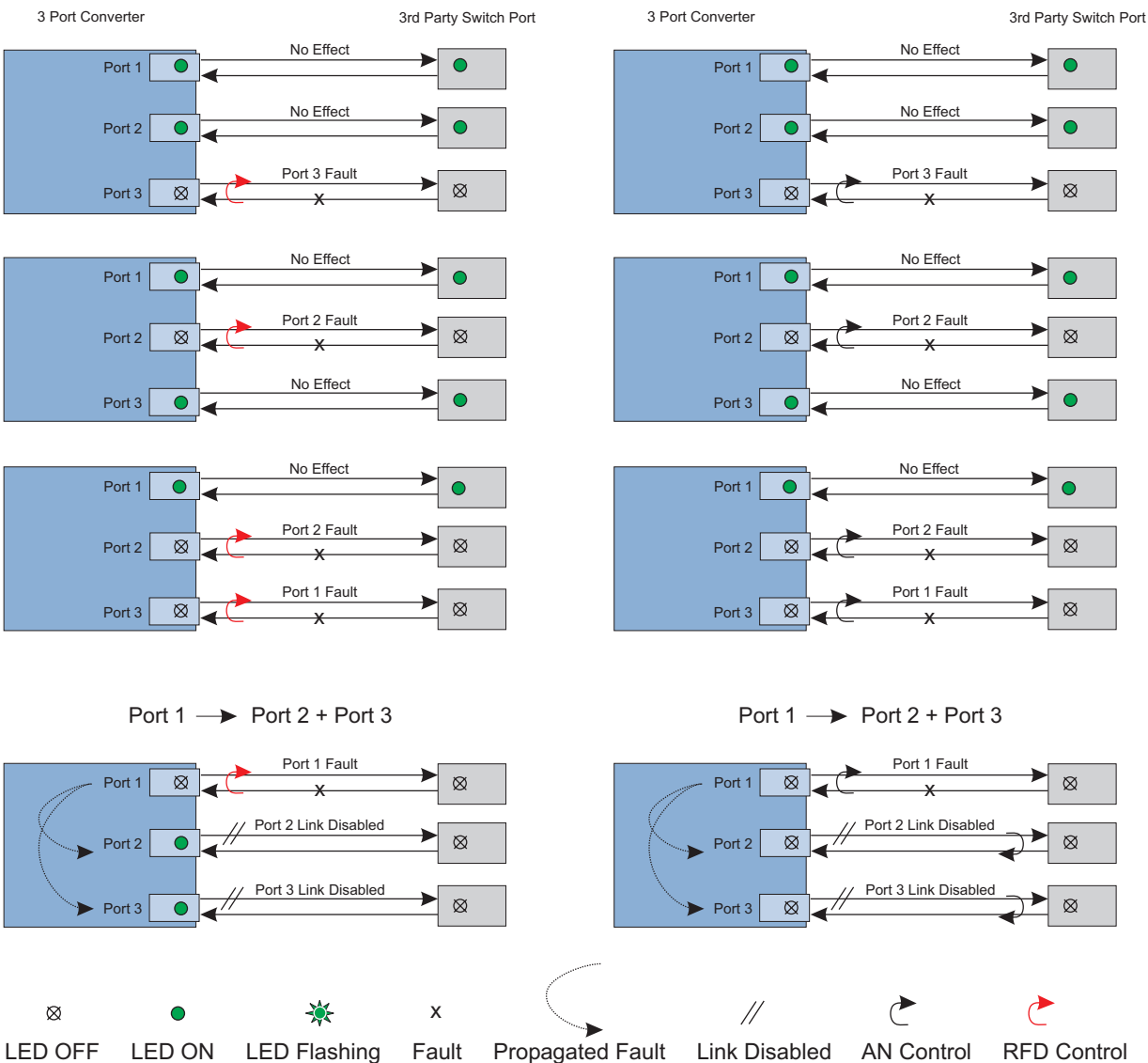
Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 1 (ALP + RFD + MT1)
Ports configured for Auto



7.2.8 Asymmetrical Link Propagate + Remote Fault Detect Multi-Tenant 2 (ALP + RFD MT2)

Asymmetrical Link Propagate +
Remote Fault Detect
Multi-Tenant 2 (ALP + RFD + MT2)
Ports configured for Manual

Asymmetrical Link Propagate +
Remote Fault Detect
Multi-Tenant 2 (ALP + RFD + MT2)
Ports configured for Auto



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