AX Series
SML Configuration Guide

Application of Large-Scale Fault-Tolerant Network

for the Guaranteed Network

Edition 2

Preface

This document describes how to establish and operate a three-layered, large, fault-tolerant network (FT network) composed of fault-tolerant switches (FT switches) and SMLs (Split Multi Links) with AX2530S series products to achieve an ALAXALA *network that does not stop*.

This document offers guidelines for establishing a large-scale system that utilizes the SML functionality of AX2530S series switches. For details about the basic information and settings for FT switches, see the *AX Series Fault-Tolerant Network Introduction Guide*.

Related documents

- AX Series Fault-Tolerant Network Introduction Guide
- AX series product manuals (http://www.alaxala.com/en/techinfo/manual/index.html)

Notes on using this document

The information in this document is based on the basic operations verified under the environment specified by ALAXALA Networks Corporation, and does not guarantee the operations in functionality, performance, and reliability under all environment requirements. Please understand that this document is intended to help with system configuration for our products.

Unless otherwise stated, the OS software version as of the creation of this document is as shown below.

AX6700S: Ver. 11.5
AX2530S: Ver. 3.2.B
AX1240S: Ver. 2.3.A

Information in this document is subject to change without notice.

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Conventions: The terms "Switch" and "switch"

The term Switch (upper-case "S") is an abbreviation for any or all of the following models:

- AX6700S series switch
- AX2530S series switch
- AX1240S series switch

The term switch (lower-case "s") might refer to a Switch, another type of switch from the current vendor, or a switch from another vendor. The context decides the meaning.

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Revision history

Edition	Rev.	Date	Description	Applicable sections
Edition 1	-	February 11, 2011	First edition	-
Edition 2	-	December 1, 2011	Operating systems were updated to the current versions..	Preface
			10G uplink models (AX2530S-24S4X, AX2530S-24T4X, AX2530S-48T2X) were added to the product lineup.	1.4
			Along with the addition of the 10G uplink models, description on peer links/peer link ports in Table 2.1-1was changed.	2.1
			Along with the addition of the 10G uplink models, configuration examples for the 10G uplink models were also added.	3.2 (8)
			Along with the addition of the 10G uplink models, description on peer links and tips on configuration setting were added.	3.3 (2)

Contents

1. What Is SML (Split Multi Link)?

1.1 SML overview

Usually, link aggregation cannot provide line redundancy across two devices. However, pairing two switches offering the SML functionality by ALAXALA Networks Corporation makes redundancy over multiple devices possible.

As shown in Figure 1.1-1, each of the two switches with the SML functionality offers separate but interlinked link aggregation between the upstream and downstream switches, which implements line redundancy across two devices.

This configuration provides fast switching and maintains stable communications in case of a failure.

This guide describes the details of the SML functionality.

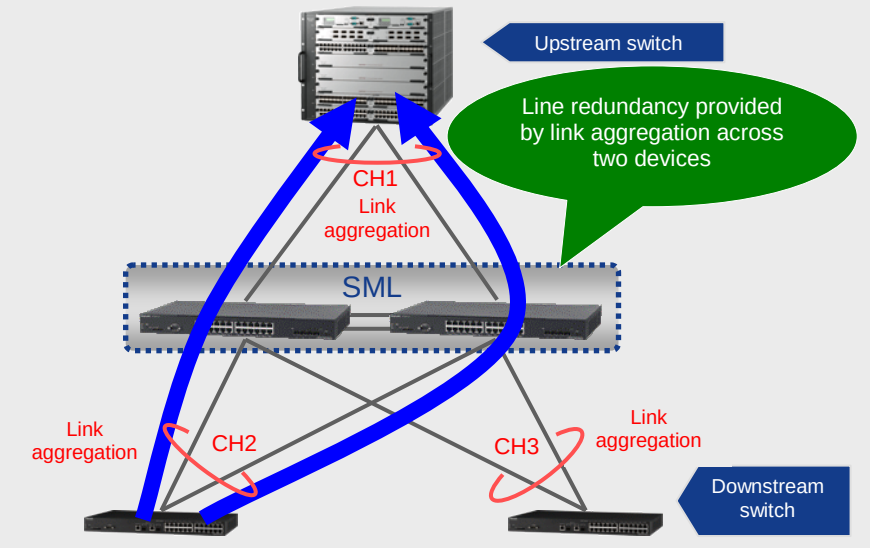


Figure 1.1−1 SML overview

1.2 Background of SML development

An FT network is a simple redundant network containing FT switches (AX6700S, AX6600S, AX6300S) at its core, which provides link aggregation of communication lines. FT switches combine the functions of two switches into a single device to achieve high fault tolerance.

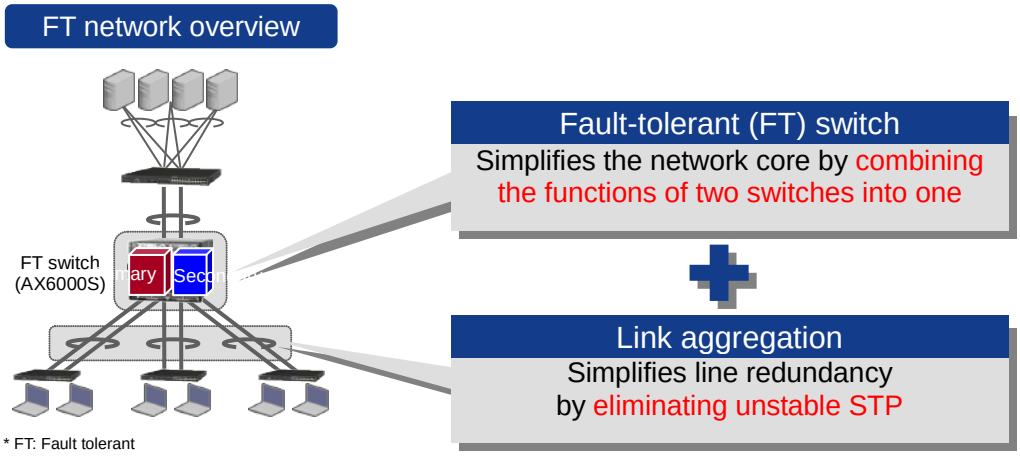


Figure 1.2−1 FT network overview

In an FT network, it is assumed that a two-layered configuration is set up because FT networks offer line redundancy through link aggregation. This makes it difficult to implement FT networks into large-scale systems with a lot of terminals.

To deal with this issue, a new technology called the SML functionality was developed so that larger systems can implement FT networks by using link aggregation, as well as allow for distribution switches to be added while maintaining redundancy.

With SML-enabled AX2530S series switches used as distribution switches, large-sized systems can implement a *simple network that does not stop*, which embraces the concept of link aggregation networking.

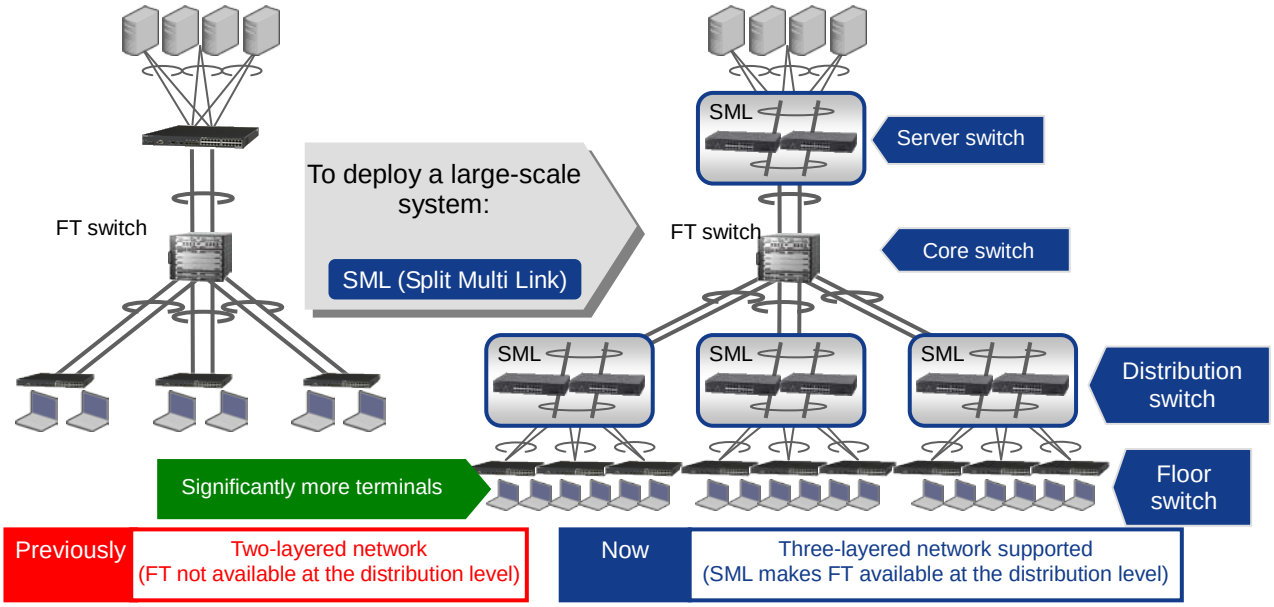


Figure 1.2−2 Three-layered FT network

1.3 Features of SML

An SML-enabled FT network provides the following features, which makes the network suitable for a large-scale redundant system offering high reliability and availability:

(1) Providing line redundancy through link aggregation across two devices

Even if a failure occurs on the line connected to either of the switches, data is routed to the path through the other switch to continue communication. In addition, providing line redundancy by link aggregation eliminates the risk of loop failures.

(2) Effective use of the bandwidth by eliminating the need for the backup line

SML does not have the concept of master and backup lines. This allows for effective use of the link aggregation bandwidth.

(3) Version updating with communication being maintained

While the software is being updated, degenerate operation of link aggregation allows communication to continue without stopping services.

(4) Making significantly more terminals available

With SML-enabled AX2530S series switches as distribution switches, a redundant FT network that uses link aggregation allows many more terminals to be available.

1.4 Product lineup

The AX2530S series, supporting SML, has lineups of 1G uplink and 10G uplink models, form which you can select your switch according to the bandwidth you use.

The uplink ports of the 10G uplink models, supporting the optic module SFP+, can be used as SFP/SFP+ shared ports, allowing for smooth transition from 1G Ethernet to high-performance 10G Ethernet. Further, you can use direct attach cables (SFP+).

Figure 1.4-1 AX2530S series product lineup

Table 1.4-1 Number of ports available in each model

Model	Uplink	Downlink	Remarks
AX2530S-24T	SFP (4 ports)	UTP (24 ports)	
AX2530S-48T	SFP (4 ports)	UTP (48 ports)	
AX2530S-24S4X	SFP/SFP+ shared (4 ports)	SFP (24 ports)	•10G uplink model •Supported from Ver.3.1
AX2530S-24T4X	SFP/SFP+ shared (4 ports)	UTP (24 ports)	•10G uplink model •Supported from Ver.3.2
AX2530S-48T2X	SFP (2 ports) SFP/SFP+ shared (2 ports)	UTP (48 ports)	•10G uplink model •Supported from Ver.3.2

2. SML Operations and Supported Functions

2.1 SML components

This section explains the SML components and the SML terminology used in this document. SML is composed of two switches. The two SML switches are connected by peer links, and the uplink and downlink ports of the switches are grouped to form link aggregation called *SML channel groups*.

Each SML group is identified with an SML domain, and the SML switches within an SML domain are managed by their SML IDs.

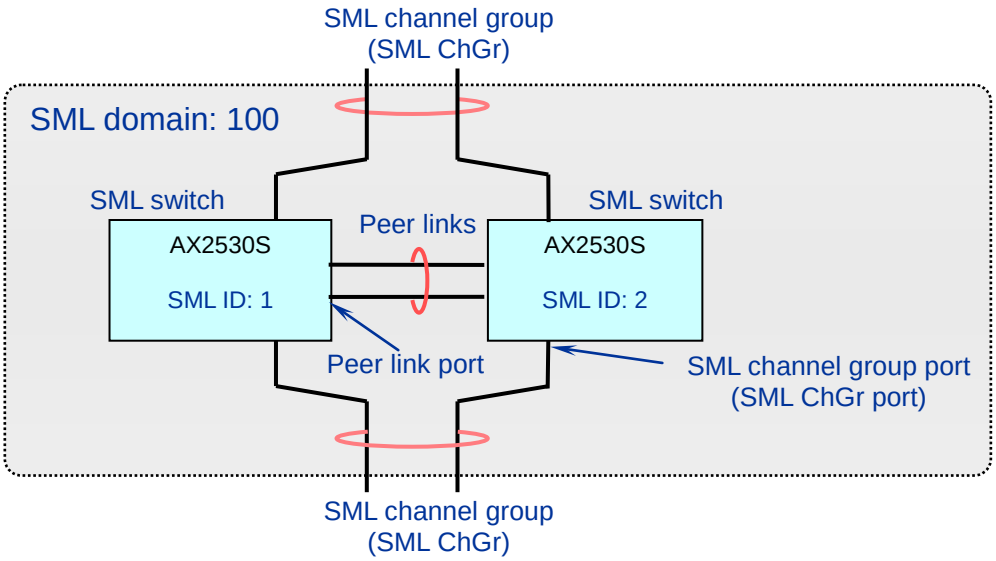


Figure 2.1−1 SML components

Table 2.1−1 SML terminology

No.	Term	Description
1	SML (Split Multi Link)	Functionality for configuring link aggregation across two devices
2	SML switch	Switch that makes up an SML configuration (AX2530S)
3	SML ID	SML switch ID that identifies an individual SML switch
4	SML domain	SML configuration ID specified for each SML configuration
5	Peer link, peer link port	A peer link is a connection that associates two switches to form an SML configuration. A peer link port is used to establish a peer link. The following ports can be used as peer link ports. - SFP ports (24T, 48T, 48T2X) -SFP/SFP+ shared ports (24S4X, 24T4X, 48T2X)
6	SML channel group (SML ChGr)	Port channel interface shared by both SML switches
7	SML channel group port (SML ChGr port)	Physical port that contains a port channel interface shared by both SML switches

2.2 Overview of normal operation

SML synchronizes the *MAC address table information* and the *link aggregation information* through peer links.

Synchronization of the MAC address table information reduces unknown addresses and thus suppresses flooding, which results in prevention of unnecessary packet sending.

Synchronization of the link aggregation information allows communication to continue via a peer link when a failure occurs on all the SML channel group lines of one of the devices.

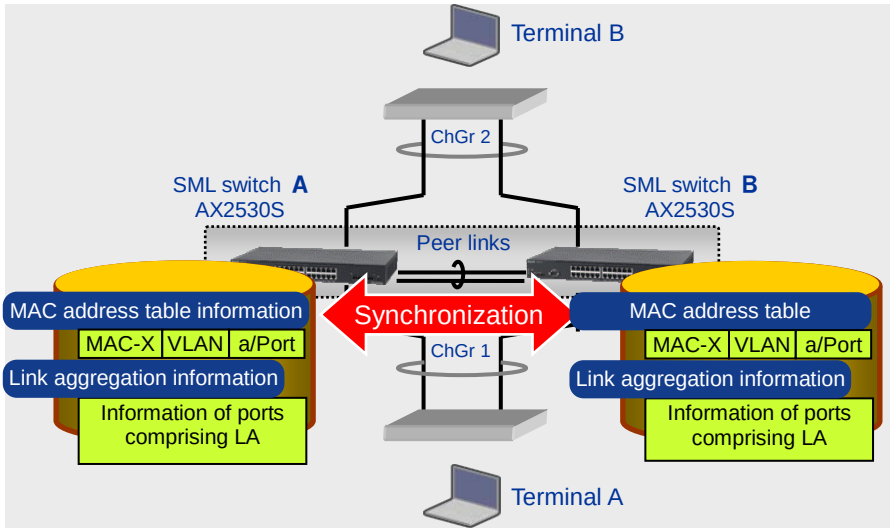


Figure 2.2−1 Synchronized information in SML

When SML is working properly, operating SML switches relay packets via the shortest forwarding path. Communication across SML channel groups does not use the peer links during normal operation.

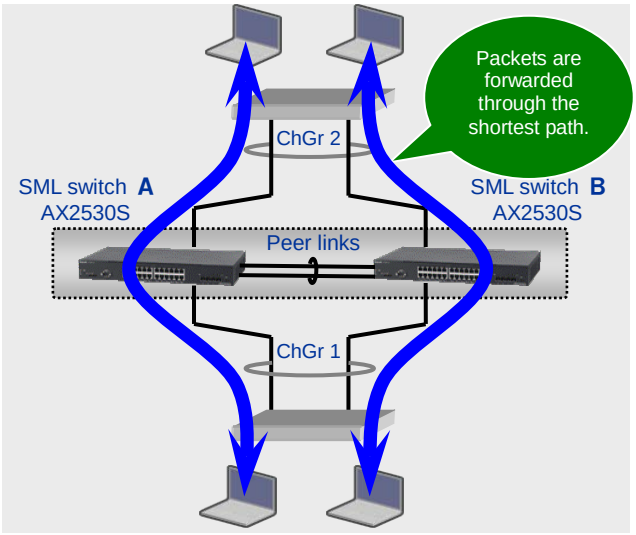


Figure 2.2−2 Basic relay in SML

The following sections explain packet relay operation for unicast packets with learned MAC addresses and for unicast, multicast, and broadcast packets with unlearned MAC addresses.

(1) Unicast packets with learned MAC addresses

For unicast packets with learned MAC addresses, frames are forwarded according to the routing information.

(1) SML Switch A receives a packet from Terminal A.
(2) The switch looks up the MAC address table and finds the information for routing the packet to Terminal B.
(3) The packet is forwarded to Terminal B.

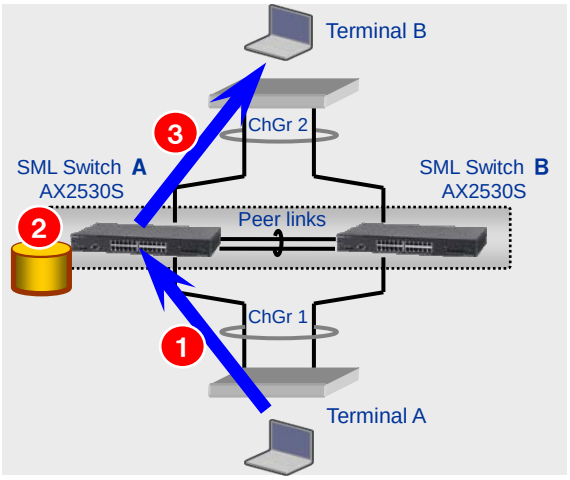


Figure 2.2−3 Unicast packet with a learned MAC address

(2) Unicast, multicast, and broadcast packets with unlearned MAC addresses

Unicast, multicast, and broadcast packets with unlearned MAC addresses are forwarded to all the ports.

(1) SML Switch A receives a packet from Terminal A.
(2) The switch floods the packet to all the ports, including the peer links. Terminal B and SML Switch B receive the packet.
(3) To prevent duplicate packet relay to SML channel groups, SML Switch B does not forward the received packet to SML channel groups.

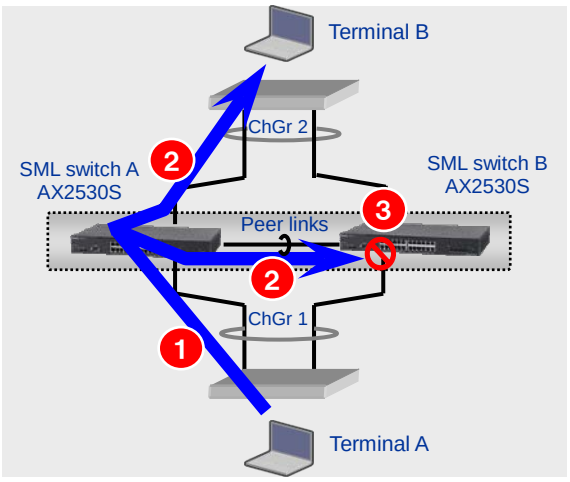


Figure 2.2−4 Unicast, multicast, and broadcast packets with an unlearned MAC address

2.3 Overview of operation during failures

This section explains operation when problems occur in various parts of the communication path from Terminal A through SML Switch A to Terminal B.

(1) Operation during an SML channel group failure

If failures occur in all the links of an SML channel group, the following switchover operation takes place:

(1) Failures occur in all the links from SML Switch A to the SML channel group.
(2) SML Switch A detects a link failure.
(3) The link aggregation information of SML Switch A is looked up, and the route is switched to the one via the peer link to continue communication.

Later when the SML channel group link recovers from the failure, further communication switches back to the original route.

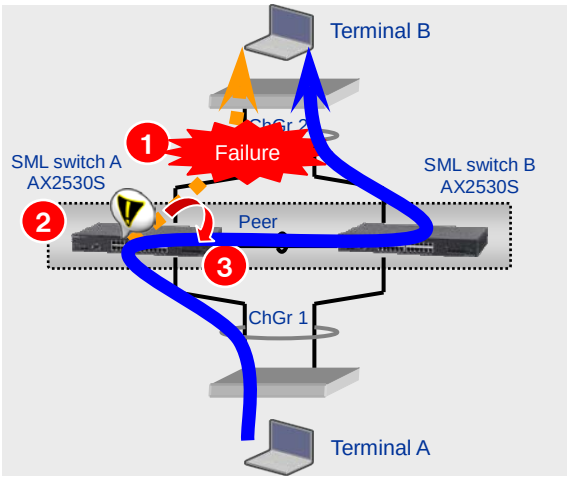


Figure 2.3−1 SML channel group failure

(2) Operation during an SML switch fault

If a fault occurs in an SML switch, the following switchover operation takes place:

(1) A fault occurs in SML Switch A.
(2) The partner switch detects the link failure.
(3) Degenerate operation of link aggregation switches the route and allows communication to continue.

Later when the SML switch recovers from the fault, further communication is forwarded according to the link aggregation port allocation of the partner device.

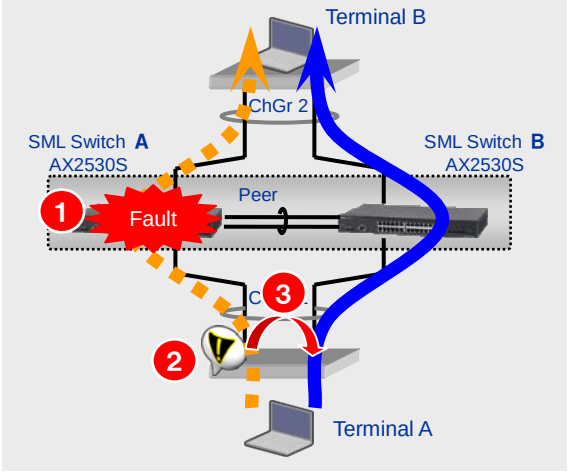


Figure 2.3−2 SML switch fault

(3) Operation during a peer link failure

When two ports are used to provide redundancy to the peer link, a failure might occur in one of the ports or in both peer links. This section explains these two cases.

(a) Peer link failure of one port

If a failure occurs in the peer link connected to one of the two ports, all the communication through SML channel groups or the peer link continues to function.

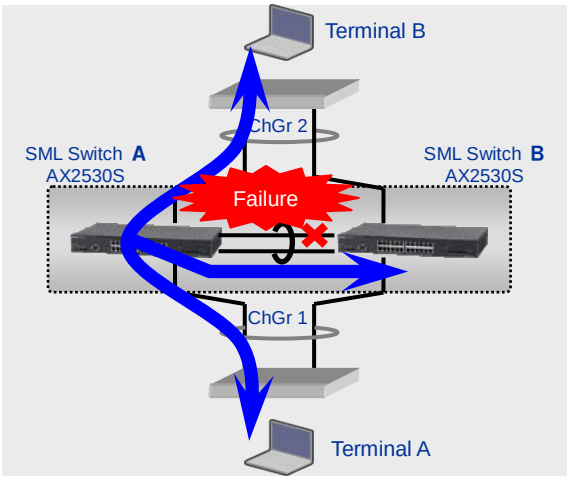


Figure 2.3−3 Peer link failure of one port

(b) Multiple failures on the peer link

If both peer links stop working due to multiple failures, communication through the peer link might not work any longer. The operation in this case is shown below.

(1) Failures occur in both peer links.
(2) SML Switches A and B detect the peer link failure.
(3) Communication through the peer link stops.
Communication through SML channel groups continues to function.

Later when the peer link ports recover from the failures, communication through the peer link resumes.

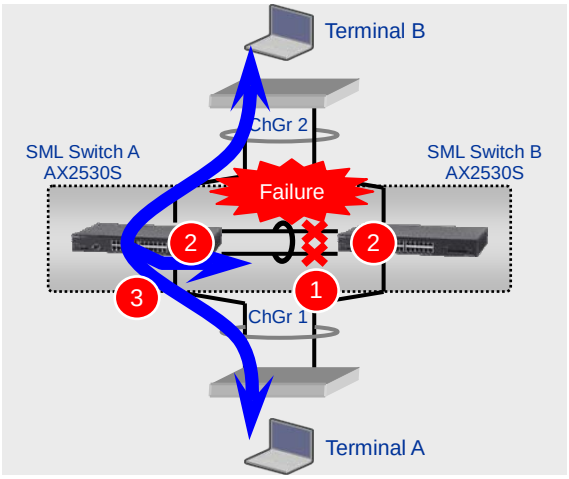


Figure 2.3−4 Failure in all the peer links

2.4 Supported functions

Though SML can establish link aggregation by combining two SML switches, the operation, configuration, and logging of messages are separate for each switch. For details, see *4.1 Operation of SML*.

The tables below describe the availability of other functions and the capacity limit during SML operation. Basically, the capacity of each device, not the combined capacity of the devices, determines the capacity limits of functions during SML operation. Exceptions are the capacity limits of link aggregation and the MAC address table, which are determined on a per-SML domain basis.

Table 2.4−1 Functions supported by SML

Category	Function		Availability during SML operation	Remarks
Layer 2	Link aggregation	Static	Y	
		LACP	Y	
		Standby link	Y	
	Spanning Tree		N	
	Ring Protocol		N	
	Uplink redundancy		N	
	DHCP snooping		N	
	Storm control		Y	Works separately on individual devices.
	UDLD		Y	Works separately on individual devices.
	L2 loop detection functionality		Y	Works separately on individual devices.
	Filtering, QoS		Y	Works separately on individual devices.
Layer 3 (IP communication)	Remote terminal	Telnet	Y	Works separately on individual devices.
		FTP	Y	Works separately on individual devices.
	Utilities	ping	Y	Works separately on individual devices.
		tracert	Y	Works separately on individual devices.
		ARP	Y	Works separately on individual devices.
		NTP	Y	Works separately on individual devices.
Operation management	SNMP (MIB/Trap)		Y	Works separately on individual devices.
	Operation message log		Y	Works separately on individual devices.
	CFM		Y	Works separately on individual devices.
	LLDP		Y	Works separately on individual devices.
Additional functions	Network authentication functionality		N	
	Port mirroring		Y	Works separately on individual devices.
	Dynamic power saving functionality		Y	Works separately on individual devices.
	IGMP/MLD snooping		N	
	DHCP server		N	

Y: Supported; N: Not supported

Table 2.4−2 Capacity limit per SML domain

Function	Capacity limit	
Link aggregation	Maximum number of channel groups	64
	Maximum number of ports (per SML channel group)	8
MAC address table	Maximum number of entries	32,768
	Number of static entries	256

3. Example of an SML-Enabled FT Network

This chapter shows an example FT network that utilizes SML and provides important points for constructing and setting up the network, as well as how to specify the configuration.

3.1 Example of an SML-enabled FT network

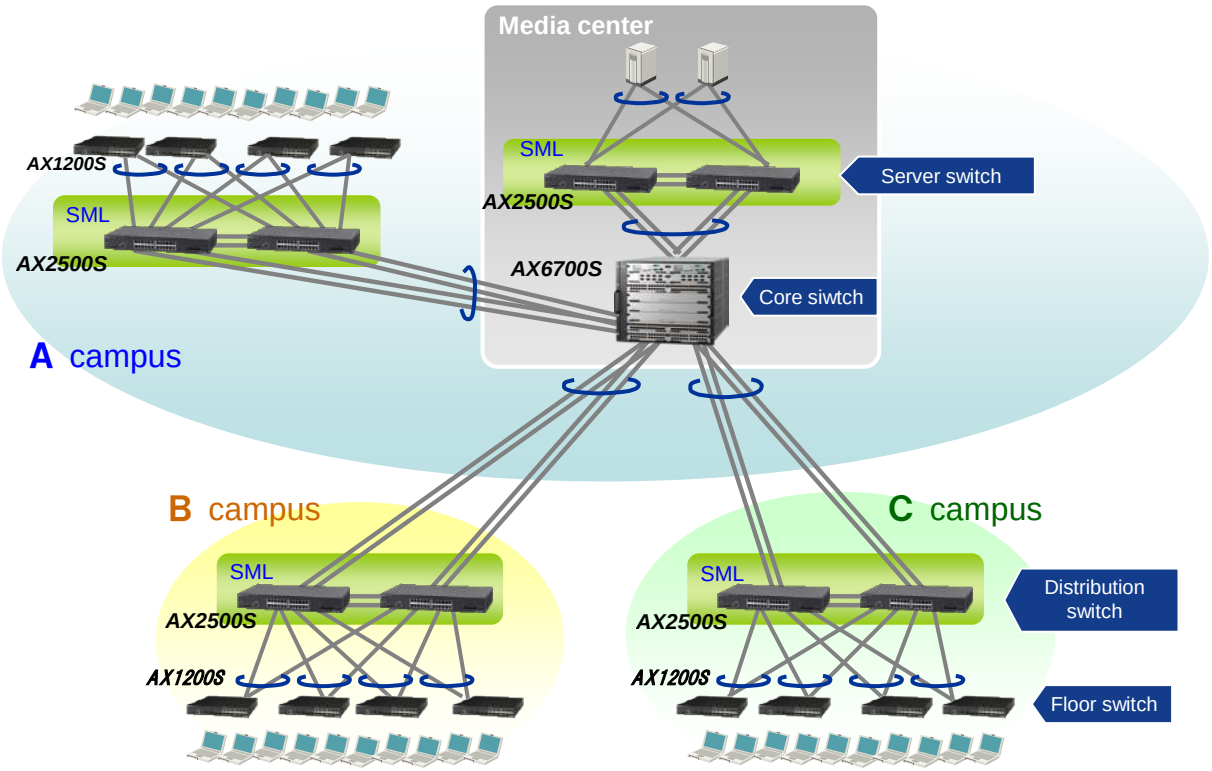


Figure 3.1−1 Example of an SML-enabled FT network

Figure 3.1-1 shows an example of an SML-enabled FT network.

This example considers a redundant campus network composed of three campuses and a media center. The media center contains core and server switches. The core switch is connected to distribution switches in each campus.

An FT switch with supreme fault tolerance, an AX6700S series switch, is used as the core switch. For the distribution switches and for the server switches of the servers, AX2500S series switches that implement SML are used. An FT network, including servers, that uses link aggregation is set up by using SML.

Figure 3.1-2 shows the logical configuration of the entire system. An AX6708S switch, which is used as the core switch, is made redundant by installing two control section (BCU) modules and two forwarding section (BSU) modules. One forwarding section module is for active operation, and the other module is for standby operation. Redundancy is provided to the lines through link aggregation of the network interface section (NIF).

The SML functionality of an AX2530S series switch is enabled for both distribution and server switches connected to the core switch, and link aggregation is set up for each SML switch pair. The links between the server switches and the servers are made redundant with the SML functionality and the server NIC teaming functionality.

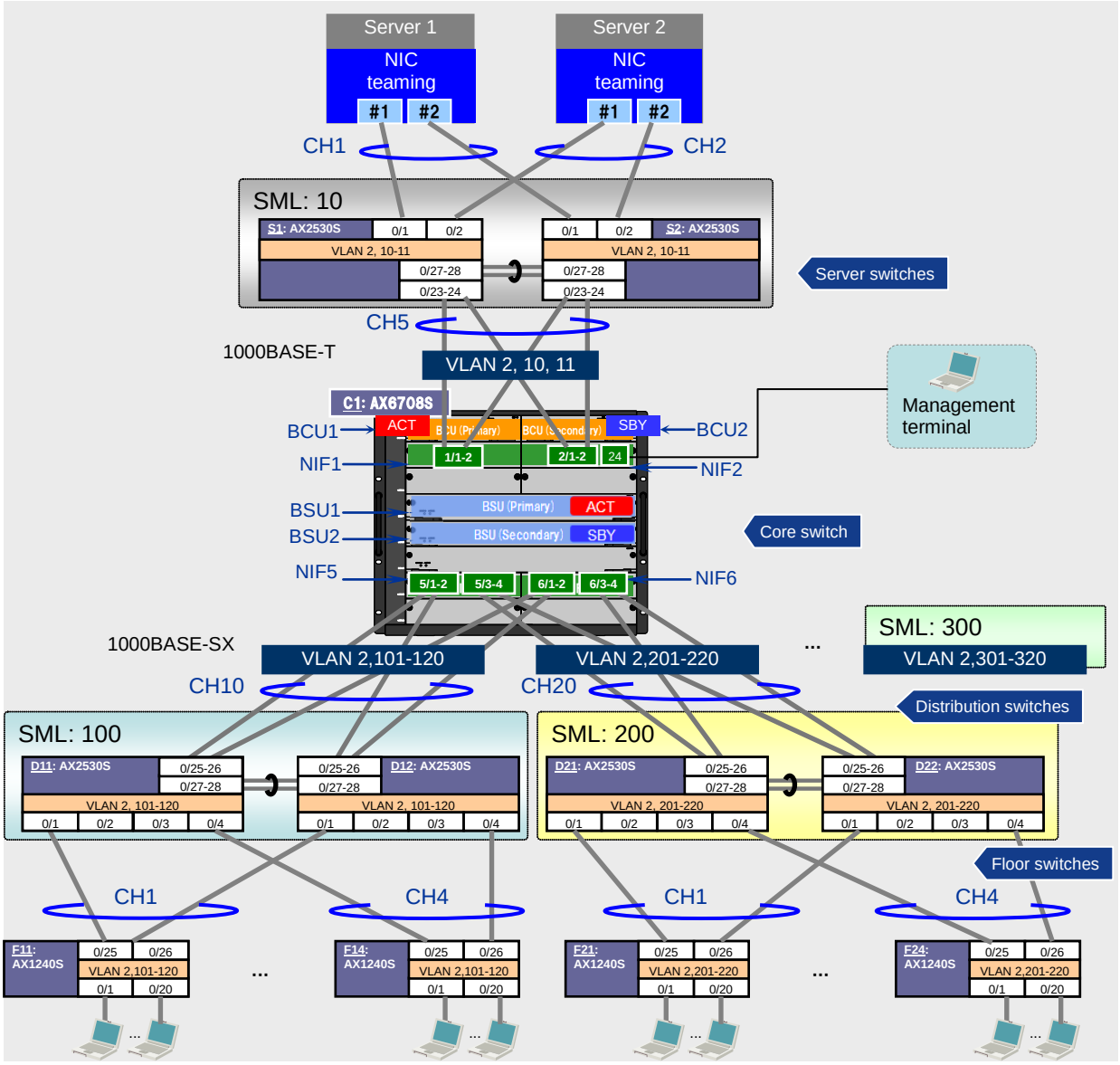


Figure 3.1−2 Logical configuration of an SML-enabled FT network

Table 3.1−1 List of used devices

	Device name	Module	Device abbr. name/model	Quantity	Remarks
Core switch	AX6708S	BCU (Control section)	BCU-S1	2	Redundant configuration
		BSU (Forwarding section)	BSU-LA	2	Redundant configuration
		NIF (Network interface section)	NK1G-24T	2	Redundant configuration
			NK1G-24S	2	Redundant configuration
Distribution switch	AX2530S	--	AX2530S-24T	6	SML configuration
Server switch	AX2530S	--	AX2530S-24T	2	SML configuration
Floor switch	AX1240S	--	AX1240S-24T	12	

3.2 Important points for constructing a system

Important points for constructing a system in this example can be summarized as follows:

(1) Not using Spanning Tree in SML and an FT network
(2) Using link aggregation in static mode
(3) Cross-connecting multiple uplinks across NIF modules
(4) Providing redundancy to the peer link between SML switches
(5) Specifying different SML domains for SML configurations
(6) Providing high availability through a combination of SML and the server teaming functionality
(7) Deployment to the system after SML settings are completed
(8) Uplink for 10G uplink models

Details are given below.

(1) Not using Spanning Tree in SML and an FT network

In an FT network system with SML functionality support, link aggregation is used to provide redundancy to the lines. Thus, Spanning Tree is not used.

(2) Using link aggregation in static mode

When an active-standby switchover occurs in the control section (BSU, CSU, or MSU) of the FT switch, communication will sometimes be interrupted for a prolonged period of time because LACP does not support active-standby switchovers without communication interruptions.

However, in static mode, active-standby switchovers can be performed without interrupting communication. For this reason, use static mode for link aggregation.

(3) Cross-connecting multiple uplinks across NIF modules

When multiple uplinks of a single SML switch are used in the configuration, connect each uplink port to a different NIF module, as shown in the figure below. This way, even if a fault occurs with an NIF in an upstream FT switch, communication is not directed to a route that bypasses the peer link, and the SML switch status is preserved.

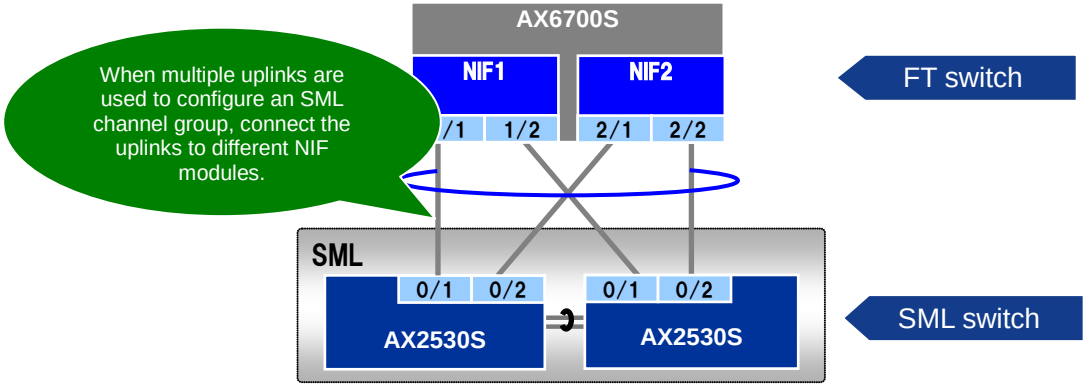


Figure 3.2−1 Uplink-NIF connection in SML

(4) Providing redundancy to the peer link between SML switches

When you use two ports to configure redundant peer links, all communications can continue to work unless both of the peer links fail due to multiple failures.

On the other hand, if a non-redundant peer link fails, problems might occur with the types of communication shown below. To avoid such problems, make sure that you use two ports to configure redundant peer links.

- Communication going through the peer link
- Functions such as Telnet, FTP, and SNMP that establish IP communication with the SML switch itself

(5) Specifying different SML domains for SML configurations

In SML, two switches share a single SML domain. To configure multiple SML configurations, specify a different SML domain for each SML configuration.

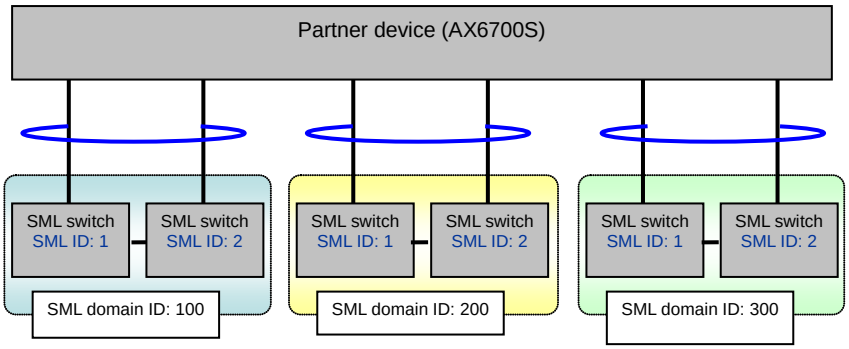


Figure 3.2−2 Specifying SML domains

(6) Providing high availability through a combination of SML and the server teaming functionality

Combine the link aggregation functionality provided by SML in the AX2530S server switch and by the server teaming functionality. Using multiple server NICs increases the total bandwidth and provides line redundancy to the server connections. As a result, simple link aggregation provides redundancy to the entire network, from clients to servers.

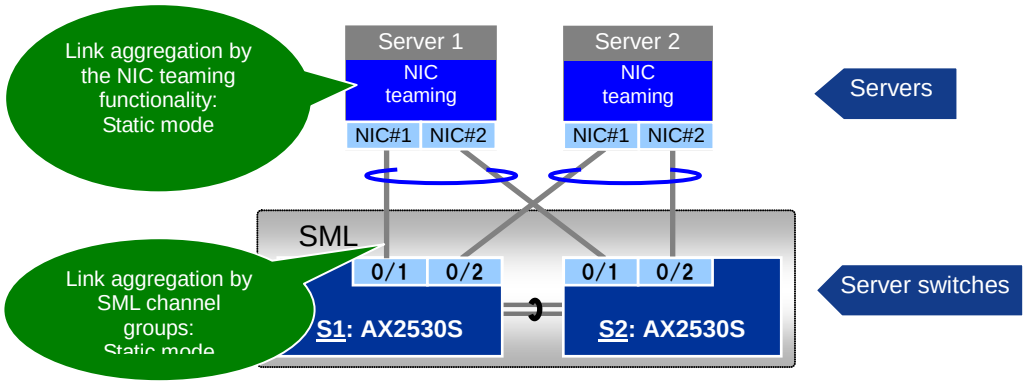


Figure 3.2−3 Combination of the SML and server teaming functionality

Configure the teaming functionality of the server NIC for link aggregation in static mode. Then connect the servers and server switches, as shown in the figure above. Link the SML link aggregation by setting it to static mode.

(7) Deployment to the system after SML settings are completed

To avoid looping, connect the SML switches to the system after setting up the SML functionality of the switches. As explained in the next section, *Important points for setting up a system*, the procedure of setting up SML is as follows:

Step (1) Enabling SML

Enable the SML functionality of the two SML switches that make up an SML configuration.

Step (2) Enabling the SML channel group

Configure and enable the SML channel group for the two switches that make up an SML configuration.

Step (3) Connecting peer link ports

Connect the peer link ports of the two SML switches by optical cables. This establishes the SML configuration.

(8) Uplink for 10G uplink models

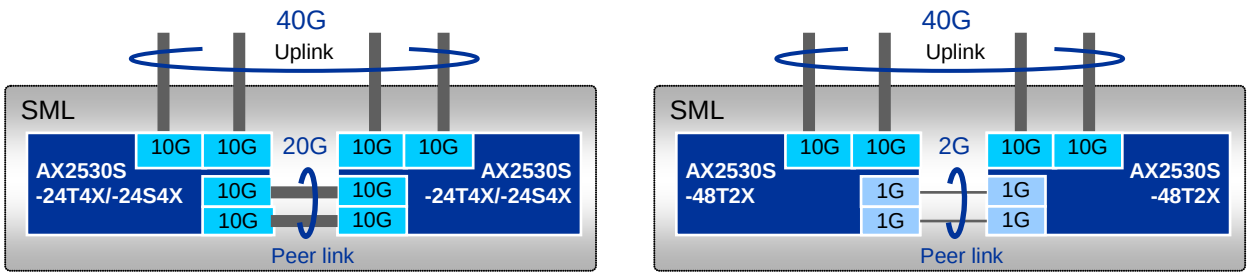
In uplinking with 10G uplink models, the number of 10G interface ports available is decided by model type. In AX2530S-24T4X and AX2530S-24S4X, all of the four uplink ports, which are SFP/SFP+ shared ports, can be used as 10G ports.

In AX2530S-48T2X, two of the four uplink ports (0/49-0/50) are SFP exclusive ports (used as 1G ports only), while the other two (0/51-0/52) are SFP/SFP＋shared ports (used as 1G or 10G ports).

The setting examples of uplinking and peer linking for SML using each 10G uplink model are shown in Table 3.2-1 and Fig. 3.2-4. For example, when using the uplink ports of AX2530S-48T2X in the normal condition, if SML is enabled, the bandwidth for peer links, though narrow, can be used for 40G uplink while securing redundancy.

Table 3.2-1 Uplink ports of 10G uplink models

Model name	Uplink port	Number of ports	SML configuration example	
			Uplink	Peer link
AX2530S-24S4X	SFP/SFP+ shared < 0/25 to 0/28 >	4	10G port x 2 Bandwidth: 20G x 2 = 40G	10G port x 2 Bandwidth: 20G
AX2530S-24T4X	SFP/SFP+ shared < 0/25 to 0/28 >	4	110G port x 2 Bandwidth: 20G x 2 = 40G	10G port x 2 Bandwidth: 20G
AX2530S-48T2X	SFP exclusive < 0/49 to 0/50 >	2	-	10G port x 2 Bandwidth: 20G
	SFP/SFP+ shared < 0/51 to 0/52 >	2	10G port x 2 Bandwidth: 20G x 2 = 40G	-



Example of SML configuration with AX2530S-24T4X/-24S4X

Example of SML configuration with SAX2530S-48T2X

Figure 3.2-4 Examples of using the uplink ports of 10G uplink models

3.3 Important points for setting up a system

Important points for setting up a system in these examples can be summarized as follows:

(1) Configuring FT switch redundancy
(2) Enabling SML
(3) Setting up SML channel groups
(4) No special action required for peer link redundancy
(5) Disabling Spanning Tree
(6) Optimizing the link-down detection time

Details are given below.

(1) Configuring FT switch redundancy

(a) Configuring BCU/BSU redundancy

You can provide redundancy for a BCU by installing two BCU modules. To configure BSU redundancy, specify the number of BSU modules used for active operation. In this example, one unit is for active operation, and the other unit is for standby operation. Therefore, specify as follows:

```
(config)# redundancy max-bsu 1
```

(b) Configuring NIF redundancy

Set up NIF redundancy by building link aggregation between different NIF modules. To add redundancy in the case of NIF faults, install multiple NIF modules and set up link aggregation between ports of different NIF modules.

(2) Enabling SML

To enable the SML functionality, you need to specify the three settings shown below. After configuring and saving these three settings, make sure that you restart the device. SML is enabled after the restart.

- **SML domain ID: Specify the same SML domain ID for each SML configuration unit.**
  `(config)# system sml domain` *<domain-no.>*
- **SML ID: Specify the device ID 1 or 2 for devices that make up an SML configuration.**
  `(config)# system sml id` *<id-no.>*
- **Peer link: Specify the peer link ports connecting SML switches.**
  (a) For SFP ports
  `(config)# system sml peer-link interface gigabitethernet` *<port-no.>*
  (b) For SFP/SFP+ shared ports
  `(config)# system sml peer-link interface tengigabitethernet` *<port-no.>*

Table 3.3−1 Peer link port specification

Model type	Configurable peer link ports	Available port combinations
AX2530S-24T AX2530S-24T4X AX2530S-24S4X	0/25-0/28 [24T4X][24S4X]: SFP/SFP+ shared ports	0/25-26 or 0/27-28
AX2530S-48T AX2530S-48T2X	0/49-0/52 0/51-52 of [48T2X]: SFP/SFP+ shared ports	0/49-50 or 0/51-52

The ports that can be used as peer link ports are shown in Table 3.3-1. Only uplink ports (SFP ports, SFP+ ports) can be specified as peer link ports. You can select a maximum of two ports as peer link ports. Ports not specified as peer link ports can work as normal ports.

Regarding the 10G uplink models, in AX2530S-24T4X and AX2530S-24S4X, all four uplink ports (0/25-0/28) are available as SFP/SFP+ shared ports; in AX2530S-48T2X, two uplink ports (0/49-0/50) are available as SFP ports, while the other two (0/15-0/52) as SFP/SFP+ shared ports.

(3) Setting up SML channel groups

Set up an SML channel group for each of the two SML switches. You must specify the same settings for both SML switches. If the SML channel group settings, such as the group number, the setting mode, and the VLAN the group belongs to, do not match, the group might not work properly.

(4) No special action required for peer link redundancy

To make the peer link redundant, you simply specify two peer link ports when enabling SML and connect the ports with two optical cables. Other settings, including link aggregation and interface settings, are not required.

(5) Disabling Spanning Tree

Disable Spanning Tree in all devices. Spanning Tree is not used in SML and FT networks. You can forcibly disable Spanning Tree configuration by enabling SML for the SML switch and restarting the switch.

(6) Optimizing the link-down detection time

Make sure that you set as small a link-down detection time (link debounce time) value as possible without risking the link becoming unstable. This shortens the time of degenerate operation of link aggregation in case of a failure.

3.4 Configuration example

This section shows example settings of the configuration shown in Figure 3.1-2.

(1) Configuration example of the core switch (device C1: AX6700S)

Setting the core switch C1	
Configuring BSU redundancy	
`(config)# redundancy max-bsu 1`	Configure redundancy of BSU. BSU1 acts as an active unit, and BSU2 as a standby one. In this case, the standby BSU would be in a hot standby state. Important points for setting up a system (1)
Configuring VLANs	
`(config)# vlan 2,5,10-11,101-120,201-220,301-320`	Specify the VLANs to be used. Data transfer VLANs: 10-11, 101-120, 201-220, 301-320 Management VLANs: 2, 5
Disabling Spanning Tree	
`(config)# spanning-tree disable`	Disable Spanning Tree. Important points for setting up a system (5)
Configuring the ports and channel groups	

`(config)# interface range gigabitethernet 1/1-2, gigabitethernet 2/1-2`
`(config-if-range)# link debounce time 0`
`(config-if-range)# channel-group 5 mode on`
 	
`(config)# interface range gigabitethernet 5/1-2, gigabitethernet 6/1-2`
`(config-if-range)# link debounce time 0`
`(config-if-range)# channel-group 10 mode on`
 	
`(config)# interface range gigabitethernet 5/3-4, gigabitethernet 6/3-4`
`(config-if-range)# link debounce time 0`
`(config-if-range)# channel-group 20 mode on`
 	
`(config)# interface range gigabitethernet 5/5-6, gigabitethernet 6/5-6`
`(config-if-range)# link debounce time 0`
`(config-if-range)# channel-group 30 mode on`
	Configure ports.
	Configure the channel group 5 to ports 1/1-2 and 2/1-2 for server switch connections.
	
	Configure the channel group 10 to ports 5/1-2 and 6/1-2 for distribution connections (SML: 100).
	
	Configure the channel group 20 to ports 5/3-4 and 6/3-4 for distribution connections (SML: 200).
	
	Configure the channel group 30 to ports 5/5-6 and 6/5-6 for distribution connections (SML: 300).
	
	Set the link-down detection time to 0 milliseconds on all ports.
	Important points for setting up a system (6)
	Set link aggregation to static mode.

Configuring port channels	

`(config)# interface port-channel 5`
`(config-if)# switchport mode trunk`
`(config-if)# switchport trunk allowed vlan 10-11`
 	
`(config)# interface port-channel 10`
`(config-if)# switchport mode trunk`
`(config-if)# switchport trunk allowed vlan 101-120`
 	
`(config)# interface port-channel 20`
`(config-if)# switchport mode trunk`
`(config-if)# switchport trunk allowed vlan 201-220`
 	
`(config)# interface port-channel 30`
`(config-if)# switchport mode trunk`
`(config-if)# switchport trunk allowed vlan 301-320`
	Configure port channels.
	Set port channels to trunk mode and specify the VLANs to which each port channel belongs.
	
	Specify as follows:
	Port channel 5: VLANs 10-11
	Port channel 10: VLANs 101-120
	Port channel 20: VLANs 201-220
	Port channel 30: VLANs 301-320

Setting the core switch C1	
Setting IP addresses	
(config)# interface vlan 10 (config-if)# ip address 172.16.10.1 255.255.255.0 (config)# interface vlan 11 (config-if)# ip address 172.16.11.1 255.255.255.0 (config)# interface vlan 101 (config-if)# ip address 192.168.1.254 255.255.255.0 ... (config)# interface vlan 120 (config-if)# ip address 192.168.20.254 255.255.255.0 (config)# interface vlan 201 (config-if)# ip address 192.169.1.254 255.255.255.0 ... (config)# interface vlan 220 (config-if)# ip address 192.169.20.254 255.255.255.0 (config)# interface vlan 301 (config-if)# ip address 192.170.1.254 255.255.255.0 ... (config)# interface vlan 320 (config-if)# ip address 192.170.20.254 255.255.255.0	Set IP addresses to data transfer VLANs. VLAN 10: IP address: 172.16.10.254/24 VLAN 11: IP address: 172.16.11.254/24 VLAN 101: IP address: 192.168.1.254/24 ... VLAN 120: IP address: 192.168.20.254/24 VLAN 201: IP address: 192.169.1.254/24 ... VLAN 220: IP address: 192.169.20.254/24 VLAN 301: IP address: 192.170.1.254/24 ... VLAN 320: IP address: 192.170.20.254/24
Configuring remote management of devices	
(config)# interface vlan 2 (config-if)# ip address 10.1.1.1 255.255.255.0 (config)# interface vlan 5 (config-if)# ip address 10.50.0.254 255.255.255.0 (config)# line vty 0 1	Set IP addresses to the devices. Set IP addresses to remote management VLAN 5. Allow login via Telnet (by a maximum of two concurrent users).

(2) Configuration example of the distribution switches (devices D11, D12: AX2530S)

Devices D11 and D12 require the setting that enables the SML functionality. Also, you must restart the devices after you complete the setting. Configuration of the devices D11 and D12 are almost the same. Thus, for settings of D12, this section only shows the settings specific to the device D12.

Setting the distribution switch D11	
Enabling SML	Important points for setting up a system (2)
(config)# system sml domain 100 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Set the SML domain ID to 100. A message appears that asks you to save the settings and restart the device.
(config)# system sml id 1 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Set the SML ID of the device D11 to 1. Set the SML ID of the device D12 to 2. <<Setting different between the devices D11 and D12>> A message appears that asks you to save the settings and restart the device.

Setting the distribution switch D11	
(config)# system sml peer-link interface gigagitethernet 0/27-28 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Configure the two ports 0/27 and 0/28 as peer link ports. Important points for setting up a system (4) A message appears that asks you to save the settings and restart the device.
(config)# save @(config)# exit @# reload Restart OK? (y / n) : y Please wait a few minutes. The reload command is executing.	Save the settings. When the settings are saved, @ appears at the prompt. With @ at the prompt, restart the device.
Configuring VLANs	
(config)# vlan 2,101-120	Specify the VLANs to be used. Data transfer VLANs: 101-120 Management VLAN: 2
Disabling Spanning Tree	
(config)# spanning-tree disable	Disable Spanning Tree. You can forcibly disable Spanning Tree by enabling SML for the Switch and restarting the Switch. No specific actions are required. Important points for setting up a system (5)
Setting up SML channel groups	Important points for setting up a system (3)
(config)# interface range gigabitethernet 0/25-26 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 10 mode on (config)# interface gigabitethernet 0/1 (config-if)# link debounce time 0 (config-if)# channel-group 1 mode on (config)# interface gigabitethernet 0/2 (config-if)# link debounce time 0 (config-if)# channel-group 2 mode on (config)# interface gigabitethernet 0/3 (config-if)# link debounce time 0 (config-if)# channel-group 3 mode on (config)# interface gigabitethernet 0/4 (config-if)# link debounce time 0 (config-if)# channel-group 4 mode on	Specify the SML channel group settings. Configure the SML channel group 10 to the uplink ports 0/25-26 for connection with the core switch C1. Configure the SML channel group 1 to the downlink port 0/1 for connections with the floor switch F11. Configure the SML channel group 2 to the downlink port 0/2 for connections with the floor switch F12. Configure the SML channel group 3 to the downlink port 0/3 for connections with the floor switch F13. Configure the SML channel group 4 to the downlink port 0/4 for connections with the floor switch F14. Set the link-down detection time to 0 milliseconds on all ports. Important points for setting up a system (6) Set link aggregation to static mode.
Configuring port channels	
(config)# interface port-channel 10 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-120 (config)# interface port-channel 1 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-120 (config)# interface port-channel 2 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-120 (config)# interface port-channel 3 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-120	Configure port channels. Set port channels to trunk mode and specify the VLANs to which each port channel belongs. Specify as follows: Port channel 10: VLANs 101-120 Port channel 1: VLANs 101-120 Port channel 2: VLANs 101-120 Port channel 3: VLANs 101-120 Port channel 4: VLANs 101-120

Setting the distribution switch D11	
(config)# interface port-channel 4 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-120	
Configuring remote management of devices	
(config)# interface vlan 2 (config-if)# ip address 10.1.1.10 255.255.255.0 (config)# line vty 0 1 (config)# ip route 10.50.0.0 255.255.255.0 10.1.1.1	Set IP addresses to the devices. Set a different IP address to the device D12. <<Setting different between the devices D11 and D12>> Allow login via Telnet (by a maximum of two concurrent users). Set a static route for remote management.

The uplink is established with two ports. Connect each uplink port to different NIF modules, as shown below.
Important points for constructing a system (3)
Uplink port 0/25 - NIF5/Port1 Uplink port 0/26 - NIF6/Port1

When multiple SML groups are configured like *SML: 200, 300*, specify different SML domains.
Important points for constructing a system (5)

This document does not explain settings for *SML: 200, 300*. These settings are the same as those for *SML: 100* (devices D11, D12), except for the SML domain, SML channel group number, VLAN to which the SMLs belong, and device IP addresses. See the configuration example of *SML: 100*.

(3) Configuration example of the floor switch (device F11: AX1240S)

Setting the floor switch F11	
Configuring VLANs	
(config)# vlan 2,101-120	Specify the VLANs to be used. Data transfer VLANs: 101-120 Management VLAN: 2
Disabling Spanning Tree	
(config)# spanning-tree disable	Disable Spanning Tree. Important points for setting up a system (5)
Setting up SML channel groups	
(config)# interface range gigabitethernet 0/25-26 (config-if-range)# media-type rj45 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 1 mode on	Specify the SML channel group settings. Configure the SML channel group 1 to the uplink ports 0/25-26 for connection with the distribution switches D1 and D2. Set the link-down detection time to 0 milliseconds. Important points for setting up a system (6) Set link aggregation to static mode.
Configuring ports	
(config)# interface port-channel 1 (config-if-range)# switchport mode trunk (config-if-range)# switchport trunk allowed vlan 2,101-120 (config)# interface fastethernet 0/1 (config-if)# switchport mode access (config-if)# switchport access vlan 101 ... ... (config)# interface fastethernet 0/20 (config-if)# switchport mode access (config-if)# switchport access vlan 120	Configure ports. Specify uplink ports 0/25-26 as trunk ports. Configure VLANs 101-120 for data transfer and VLAN 2 for management. Specify ports to be connected to the terminals. Configure the VLANs assigned to each port as an access port.

Setting the floor switch F11	
Configuring remote management of devices	
(config)# interface vlan 2 (config-if)# ip address 10.1.1.101 255.255.255.0	Set IP addresses to the devices.
(config)# line vty 0 1	Allow login via Telnet (by a maximum of two concurrent users).
(config)# ip route 10.50.0.0 255.255.255.0 10.1.1.1	Set a static route for remote management.

This document does not explain settings for other floor switches. These settings are the same as those for the device F11, except for the SML channel group number, VLAN to which the SML belongs, and device IP addresses. See the configuration example of the device F11.

(4) Configuration example of the server switches (devices S1, S2: AX2530S)

Devices S1 and S2 require the setting that enables the SML functionality. Also, you must restart the devices after you complete the setting. Configurations of the devices S1 and S2 are almost the same. Thus, for settings of S2, this section only shows the settings specific to the device S2.

Setting the server switch S1	
Enabling SML	Important points for setting up a system (2)
(config)# system sml domain 10 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Set the SML domain ID to 10. A message appears that asks you to save the settings and restart the device.
(config)# system sml id 1 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Set the SML ID of the device S1 to 1. Set the SML ID of the device S2 to 2. <<Setting different between the devices S1 and S2>> A message appears that asks you to save the settings and restart the device.
(config)# system sml peer-link interface gigagitethernet 0/27-28 Please execute the reload after saving all the following commands, because these command become effective after reboot. - system sml id - system sml peer-link - system sml domain	Configure the two ports 0/27 and 0/28 as peer link ports. Important points for setting up a system (4) A message appears that asks you to save the settings and restart the device.
(config)# save @(config)# exit @# reload Restart OK? (y / n) : y Please wait a few minutes. The reload command is executing.	Save the settings. When the settings are saved, @ appears at the prompt. With @ at the prompt, restart the device.
Configuring VLANs	
Disabling Spanning Tree	

Setting the server switch S1	
(config)# spanning-tree disable	Disable Spanning Tree. You can forcibly disable Spanning Tree by enabling SML for the Switch and restarting the Switch. No specific actions are required. Important points for setting up a system (5)
Setting up SML channel groups	Important points for setting up a system (3)
(config)# interface range gigabitethernet 0/23-24 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 5 mode on (config)# interface gigabitethernet 0/1 (config-if)# link debounce time 0 (config-if)# channel-group 1 mode on (config)# interface gigabitethernet 0/2 (config-if)# link debounce time 0 (config-if)# channel-group 2 mode on	Specify the SML channel group settings. Configure the SML channel group 5 to the uplink ports 0/23-24 for connections with the core switch C1. Configure the SML channel group 1 to the downlink port 0/1 for connections with the server 1. Configure the SML channel group 2 to the downlink port 0/2 for connections with the server 2. Set the link-down detection time to 0 milliseconds on all ports. Important points for setting up a system (6) Set link aggregation to static mode.
Configuring port channels	
(config)# interface port-channel 5 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 10-11 (config)# interface port-channel 1 (config-if)# switchport mode access (config-if)# switchport access vlan 10 (config)# interface port-channel 2 (config-if)# switchport mode access (config-if)# switchport access vlan 11	Configure port channels. Set port channels to trunk mode and specify the VLANs to which each port channel belongs. Specify as follows: Port channel 5: VLANs 10-11 Port channel 1: VLAN 10 (for the server 1) Port channel 2: VLAN 11 (for the server 2)
Configuring remote management of devices	
(config)# interface vlan 2 (config-if)# ip address 10.1.1.2 255.255.255.0 (config)# line vty 0 1 (config)# ip route 10.50.0.0 255.255.255.0 10.1.1.1	Set IP addresses to the devices. Set a different IP address to the device S2. <<Setting different between the devices S1 and S2>> Allow login via Telnet (by a maximum of two concurrent users). Set a static route for remote management.

The uplink is established with two ports. Connect each uplink port to different NIF modules, as shown below.

Important points for constructing a system (3)

Uplink port 0/23 - NIF1/Port1 Uplink port 0/24 - NIF2/Port1

A combination of the SML functionality and the server teaming functionality provides high availability to the connections between the server switches and the servers.

Important points for constructing a system (3)

Configuration files for the devices explained above are provided with this document.
For details, see *Appendix. Configuration Files*.

4. Operation Management

This chapter explains the management of basic SML operation.

4.1 Operation of SML

Though SML can establish link aggregation combining two SML switches, the functions shown below, including the operation, configuration, and logging of messages, are separate for each switch.

(1) Device operation

You must operate each of the two SML switches, one at a time.

Also, you must separately set up and edit configuration of each of the switches, and the specified configurations work independently from each other.

(2) IP communication and logging

Establish IP communications for SML switches on a per-switch basis. Also, you must set different IP addresses for each VLAN interface.

Perform IP communications required for device management, such as Telnet, FTP, SNMP, and traps, independently for each device. Also, collect operation logs and syslogs individually from each switch.

(3) Collecting operation logs

Different operation logs are created on each SML switch. Thus, collect the operation log individually from each device. Up and down operation logs of SML channel groups must also be collected from each device. To obtain logs of a single channel group, collect the logs from the two devices.

(4) MIB/Traps

IP communication (to and from the device) is also performed on a per-device basis. You must collect MIBs by specifying the IP address of individual devices.

Also, you must collect SML channel group statistics from each device, use the SNMP manager to make sure that the port channel is the same, and then add up the statistics counter values.

The interface number (`ifIndex`) of the SML channel group must be the same on both devices. Note that the SML channel group private MIB and traps are not supported.

4.2 Checking the SML status

(1) SML status

When the SML functionality is enabled on a device, you can check the SML status from the status LED (ST2) on the front of the device.

Table 4.2−1 LED indicators and SML status

ST2 LED indicator	SML status	Status details
Off	SML disabled	This is the normal status of the device when SML is disabled.
Blinking green	SML conflict (Conflict)	The error status occurs in the following cases: - A device with the same SML ID as this Switch is detected. - Three or more SML devices are detected for the configuration.
	SML standalone (Standalone)	The standalone status occurs in the following cases: - A device that has SML enabled is searching for the neighboring device during startup. - The device is in SML full status and has detected a fault of the neighboring SML device or a peer link failure.
Green	SML full (Full)	SML is enabled and properly configured.

* The SML statuses in parentheses are indications by the operation commands.

(2) SML operation commands

You can use operation commands to check SML status, SML configuration settings, and SML channel group status.

(a) Checking SML status information

Example result of the operation command `show sml`

```
D11# show sml

Date 2011/01/18 17:14:02 UTC
SML Status : Full                    ... [SML status]
  sml id       : 1                   ]
  sml domain   : 100                 ] ... SML settings of this Switch
  sml peer-link : 0/27-28            ]
Peer
  sml id       : 2                   ]
  sml domain   : 100                 ] ... SML settings of the neighboring device
```

(b) Checking SML channel group status information

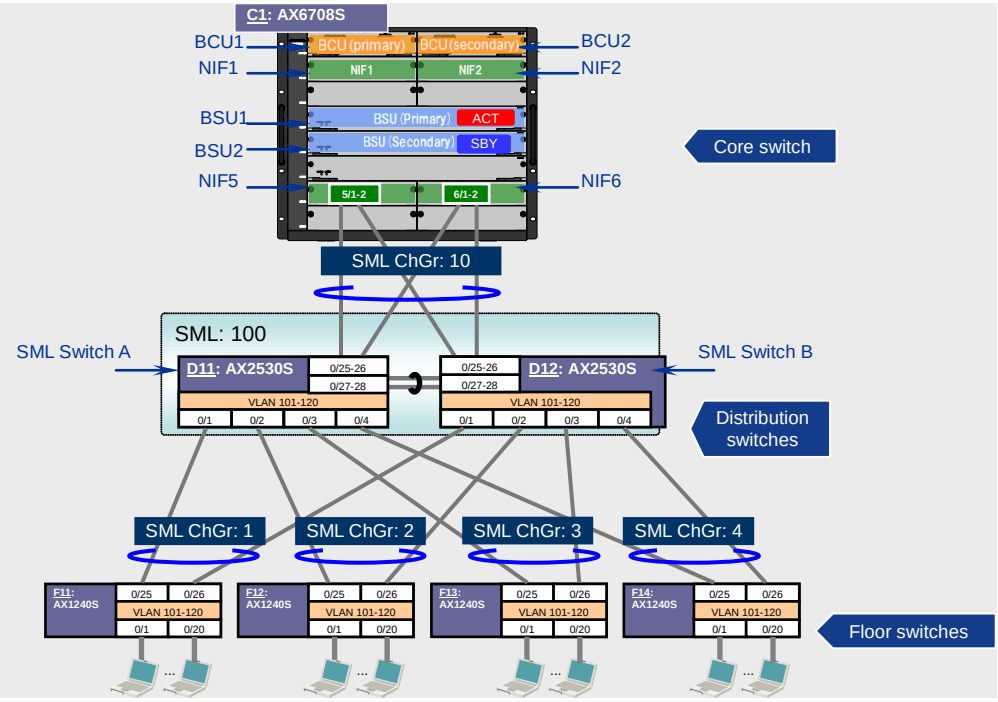
Example result of the operation command `show sml channel-group`

```
D11# show sml channel-group

Date 2011/01/18 17:14:08 UTC
<ChGr> <     channel-group status      >   ... [SML channel group status]
< No > <  SML ID:1   >   <  SML ID:2   >       Status of the SML channel
   1    Up              Up                    group composed of two SML
   2    Up              Up                    switches (this Switch and the
   3    Up              Up                    neighboring device)
   4    Up              Up
  10    Up              Up
```

(3) Example display of SML status

(a) Normal operation status

During normal operation, the SML status is shown as below. The two applicable SML switches are both in the `Full` status, and all the SML channel groups are in the `Up` status.



Status of SML Switch A

```
D11# show sml

Date 2011/01/20 11:05:58 UTC
SML Status : Full
  sml id       : 1
  sml domain   : 100
  sml peer-link : 0/27-28
Peer
  sml id       : 2
  sml domain   : 100
```

```
D11# show sml channel-group

Date 2011/01/20 11:06:05 UTC
<ChGr> <     channel-group status      >
< No > <   SML ID:1   >   <   SML ID:2   >
   1    Up                Up
   2    Up                Up
   3    Up                Up
   4    Up                Up
  10    Up                Up
```

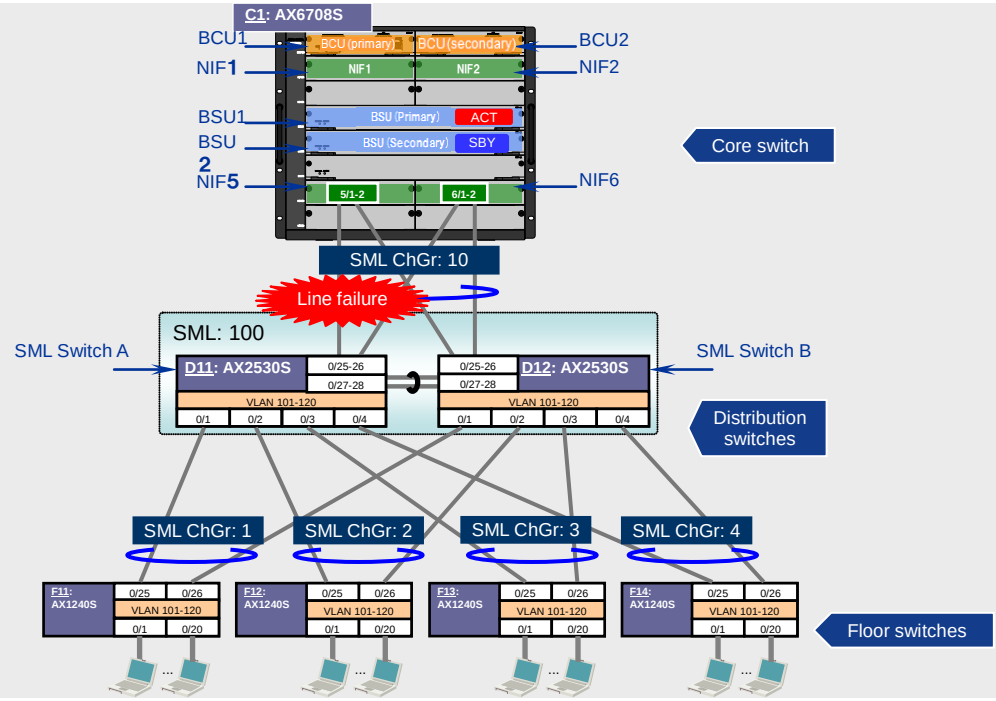
Status of SML Switch B

```
D12# show sml

Date 2011/01/20 11:06:11 UTC
SML Status : Full
  sml id       : 2
  sml domain   : 100
  sml peer-link : 0/27-28
Peer
  sml id       : 1
  sml domain   : 100
```

```
D12# show sml channel-group

Date 2011/01/20 11:06:18 UTC
<ChGr> <     channel-group status      >
< No > <   SML ID:2   >   <   SML ID:1   >
   1    Up                Up
   2    Up                Up
   3    Up                Up
   4    Up                Up
  10    Up                Up
```

(b) Line failure status

In the case of a line failure, the SML status is shown as below. If a line failure occurs in all the uplink ports of SML Switch A, SML switch A detects a downlink in uplink ports and redirects data to the peer link. In this case, the SML status remains `Full`, but SML ChGr: 10 of SML Switch A changes to the `Down` status.



Status of SML Switch A

```
D11# show sml

Date 2011/01/20 11:11:59 UTC
SML Status : Full
  sml id       : 1
  sml domain   : 100
  sml peer-link : 0/27-28
Peer
  sml id       : 2
  sml domain   : 100
```

```
D11# show sml channel-group

Date 2011/01/20 11:12:08 UTC
<ChGr> <     channel-group status      >
< No > <   SML ID:1   >   <   SML ID:2   >
   1    Up              Up
   2    Up              Up
   3    Up              Up
   4    Up              Up
  10    Down            Up
```

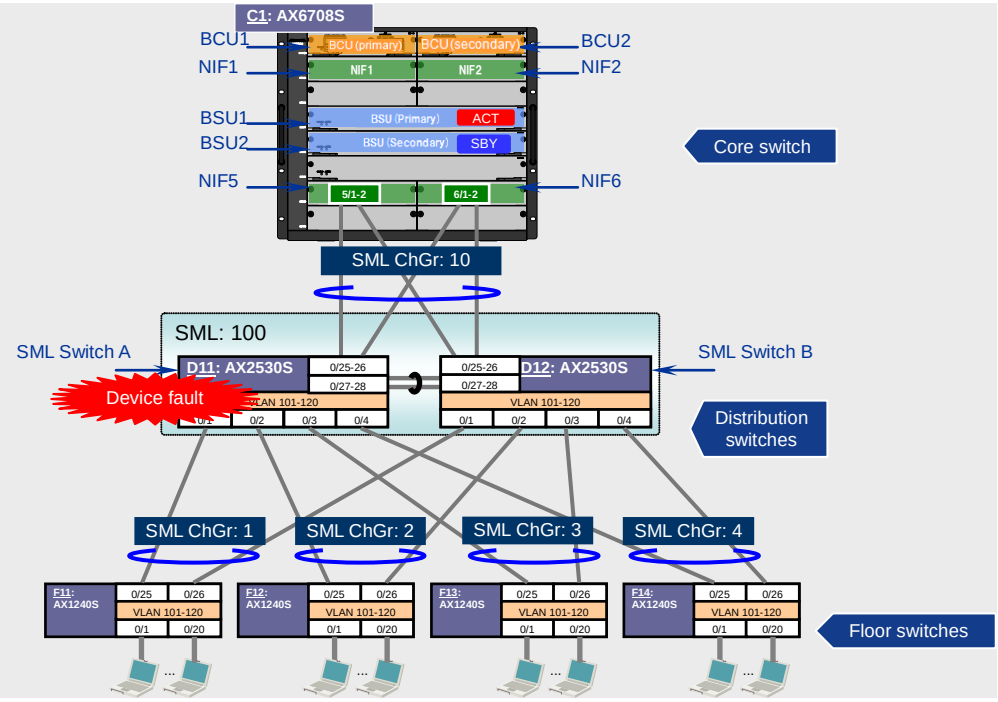
Status of SML Switch B

```
D12# show sml

Date 2011/01/20 11:12:20 UTC
SML Status : Full
  sml id       : 2
  sml domain   : 100
  sml peer-link : 0/27-28
Peer
  sml id       : 1
  sml domain   : 100
```

```
D12# show sml channel-group

Date 2011/01/20 11:12:27 UTC
<ChGr> <     channel-group status      >
< No > <   SML ID:2   >   <   SML ID:1   >
   1    Up              Up
   2    Up              Up
   3    Up              Up
   4    Up              Up
  10    Up              Down
```

(c) Device fault status

In the case of a device fault, the SML status is shown as below. If a fault occurs in SML Switch A, all the SML channel groups connected to SML Switch A are put into the `Down` status, and all communication is redirected to the path through SML Switch B. In this case, the SML status of SML Switch B becomes `Standalone`, and the SML channel groups of the neighboring device (SML Switch A) enter the `Isolated` status.



Status of SML Switch B

```
D12# show sml

Date 2011/01/20 11:15:39 UTC
SML Status : Standalone
  sml id       : 2
  sml domain   : 100
  sml peer-link : 0/27-28
Peer
  sml id       : -
  sml domain   : -
```

```
D12# show sml channel-group

Date 2011/01/20 11:15:44 UTC
<ChGr> <     channel-group status      >
< No > <   SML ID:2   >  <   SML ID:-   >
   1    Up              Isolated
   2    Up              Isolated
   3    Up              Isolated
   4    Up              Isolated
  10    Up              Isolated
```

4.3 Software update procedure

While the software is being updated, degenerate operation of link aggregation allows communication to continue. To update an SML switch:

(1) Update one of the SML switches (Switch A). When the update finishes, Switch A restarts automatically. During the update, degenerate operation of link aggregation allows communication to continue, redirecting data to the path through the other SML switch (Switch B).
(2) When the restarting of Switch A finishes, communication switches back to the original route. Make sure that the SML status is `Full`.
(3) Update Switch B. Do this in the same way as the update for Switch A. When the update finishes, Switch B restarts automatically. When the restart of the second switch finishes, the update of the two switches is completed.

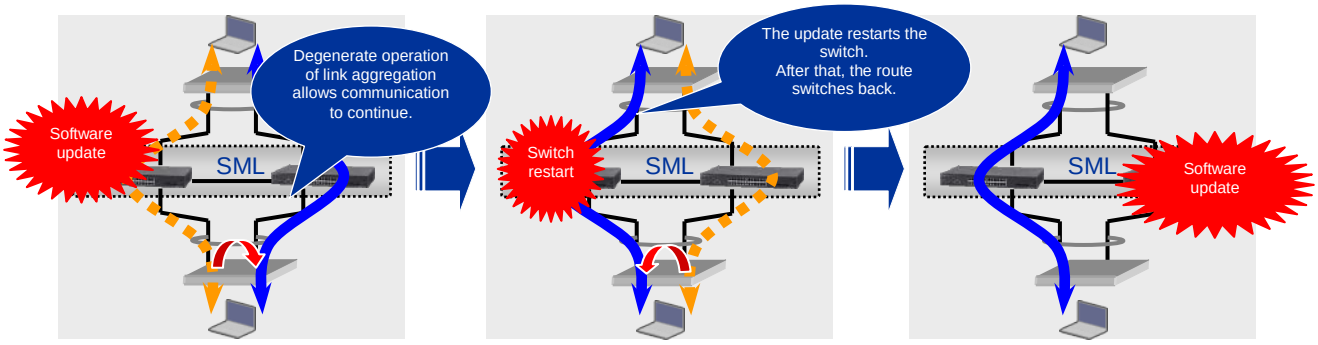


Figure 4.3-1 Software update procedure

4.4 SML switch replacement procedure

Replacing a device requires a similar procedure to software updating. To replace a device:

(1) Before replacing a device, create a backup file of the device, and then save the file via an MC, FTP, or other means.
(2) On the new device, restore the backup file created in step 1.
(3) Replace the device and connect the cables.
(4) Turn on the power of the device.

5. Important Notes

(1) Upgrade license requirement for SML

The SML functionality of AX2530S series products requires an optional upgrade license (OS-L2A-U).

(2) Peer link

Ports set for the peer link offer only the peer link functionality. Also, a port used for a peer link cannot be part of a set of ports used for other functions.

Ports specified for the peer link are always set as shown below, and you cannot enter the configuration interface mode (`config-if`) for such ports.

Table 5–1 Peer link port settings

Item	Setting	Remarks
Speed setting	auto	
MTU setting	Maximum value (9,216 bytes)	The command `system mtu` is ignored.
VLAN	All VLANs (1-4094)	The command `show vlan` does not show the value.

(3) Port allocation for sending frames

For link aggregation, port allocation for sending frames is performed by the partner device of an SML switch (that is, a switch connected to uplink and downlink ports).

The port allocation differs depending on the partner switch model. For AX series products, when a problem is resolved, the AX6000S family, the AX3600S series, the AX2400S series, and the AX2500S series switch communication back to the original route. On the other hand, unlike the other AX series, AX1200S series products allocate ports so that the current route is used as much as possible.

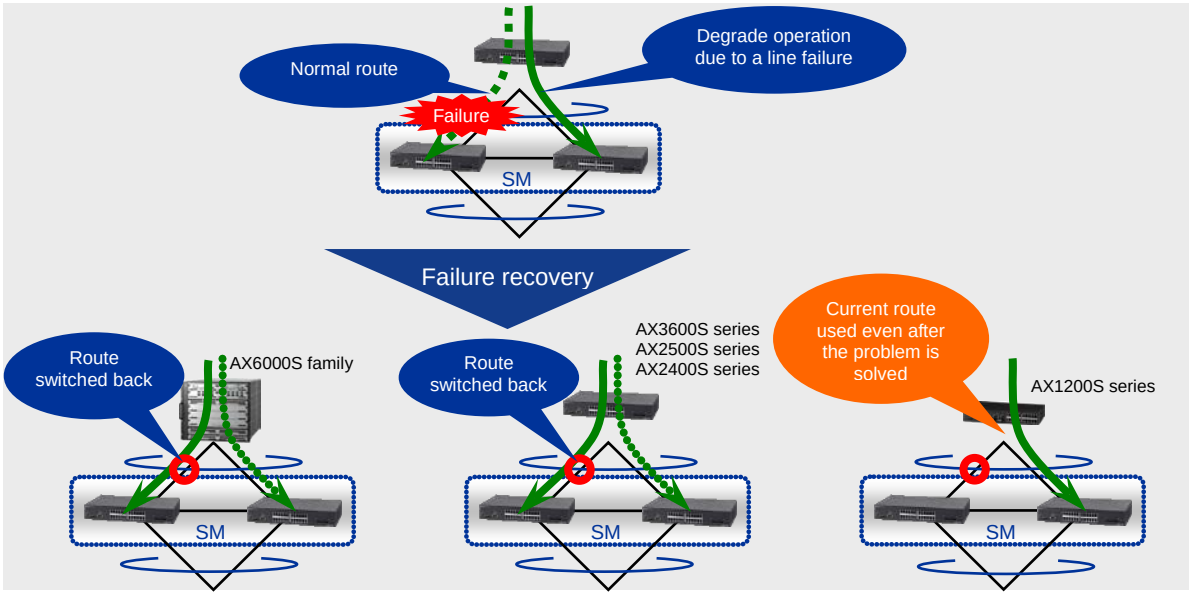


Figure 5–1 Port allocation for sending frames

(4) Prohibited configurations of SML

For SML, the following configurations are not allowed:

(a) Connection of devices with the same SML ID

[Prohibited configuration]

Devices with the same SML ID cannot form an SML configuration. Make sure that you connect SML switches with different SML IDs.

[Operation by prohibited configuration]

If devices with the same SML ID are connected together, both devices detect each other and forcibly inactivate the peer link port. Even in this state, the other functions work normally.

(b) Three or more devices connected for an SML configuration

[Prohibited configuration]

You cannot connect three or more devices with SML enabled. Make sure that you connect only two SML switches.

[Operation by prohibited configuration]

If three or more devices with SML enabled form an SML configuration, all the devices detect one another and forcibly inactivate the peer link port. Even in this state, the other functions work normally.

(5) Clearing the MAC address table

SML switches clear the MAC address table in synchronization.

(a) Clearing the MAC address table entry for a port

If a single port of the neighboring device is down, the MAC address of the port is cleared within the device. In addition, of the learned MAC address entries shown as `peer-link` in the interface of this device, the MAC address of the downed port of the neighboring device is cleared.

(b) Clearing the MAC address table of an entire device

When the configuration command `clear mac-address-table` is executed on one of the SML switches, the MAC address table of the other SML switch is also cleared. In such a case, the device on which the operation command is executed records the operation log entries of the KEY event and clearing of the MAC address table, and the other device only records the operation log entry of the clearing of the MAC address table.

Appendix. Configuration Files

The files below show examples of the system configuration described in this guide.

The text files containing configurations of devices used in the SML-enabled FT network example, explained in Chapter 3, are attached to this file. (Extracting the attachment files requires Adobe Reader 6.0 or later.)

For details about each configuration, see the attachment file with the same name as shown below.

Example of an SML-Enabled FT Network

Switch type	Device name/applicable switch	Configuration host name	File name
Core switch	C1: AX6708S	Core-SW	C1-AX67S.txt
Distribution switch	D11: AX2530S	DB1-SW1	D11-AX25S.txt
	D12: AX2530S	DB1-SW2	D12-AX25S.txt
Floor switch	F11: AX1240S	FL11-SW	FL11-AX12S.txt
	F12: AX1240S	FL12-SW	FL12-AX12S.txt
	F13: AX1240S	FL13-SW	FL13-AX12S.txt
	F14: AX1240S	FL14-SW	FL14-AX12S.txt
Server switch	S1: AX2530S	SV-SW1	S1-AX25S.txt
	S2: AX2530S	SV-SW2	S2-AX25S.txt

Edition 2 – December 8, 2011

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