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AX3800S/AX3650S Series

Stack Installation Guide

Edition 2

Document No. NTS-12-R-009

ALAXALA Networks Corporation

Preface

This document provides an overview of stacks and a system setup example to help to install the ALAXALA stack functionality in a system.

Related documents

- AX3800S/AX3650S Series product manuals
  (http://www.alaxala.com/en/techinfo/manual/index.html)
  Software manuals
  - Configuration Guide Vol.1
  - Configuration Command Reference Vol.1
  - Operation Command Reference Vol.1

- AX3800S/AX3650S Series Stack Operation Guide (Operation and Maintenance)
  (http://www.alaxala.com/en/techinfo/guide/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 operation of functionality, performance, or reliability under all environment requirements. Please use this document as a supplement to product manuals.
Unless otherwise stated, the OS software version as of the creation of this document is as follows:

AX3650S	Ver. 11.10
AX3830S	Ver. 11.10
AX2530S	Ver. 3.5
AX1240S	Ver. 2.4.A

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Contents

Update history

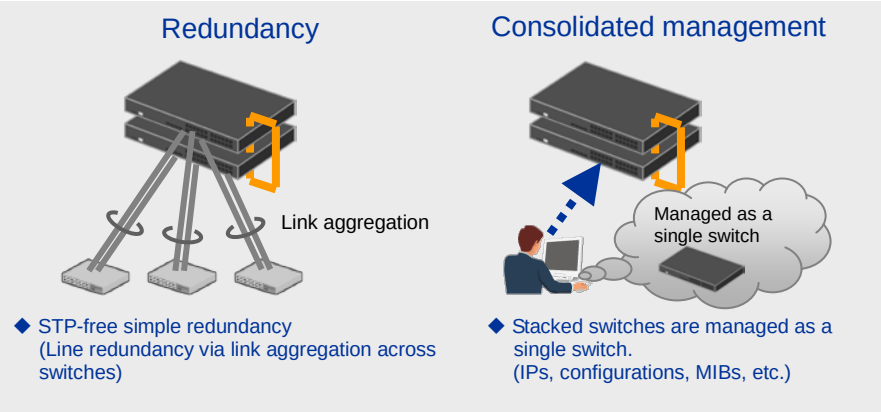
Edition.	Rev.	Date	Changes	Location
1	-	May 2012	First edition was issued.	-
2	-	Feb. 2013	The title of this document was partially changed (*AX Series => AX3800S/AX3650S Series*).	Front cover
			Description of the OS versions was updated.	Preface
			The AX3800S series was added to the product lineup.	1.3
			An example of stack configuration using the AX3800S series was added.	3.6
			Description on checking stack status (master/backup) by LEDs or SOP was added.	4.1
			Description on sample configuration files for AX3800S was added.	Appendix

1. What Is Stack?

1.1 Overview of Stackable Switches

A typical technique for layer 2 redundancy is to use a "protocol" such as STP. However, the mechanism of STP is complex and unstable as well as prone to loop faults and other problems.
Therefore, a new mainstream technique has come out to provide "stack functionality"-based redundancy, which does not depend on any protocols. This technique provides simple and reliable redundancy, as it allows multiple switches to be managed as a single switch, causing no loop fault. A switch that supports stack functionality is called a "stackable switch".

Switch stackability allows the consolidated management of switches by virtually managing multiple switches as a single switch. This allows the management of information including IPs, configurations, and MIBs (management information bases) to be consolidated, making it easier to detect connection status and problems and reducing the burden on the operator.

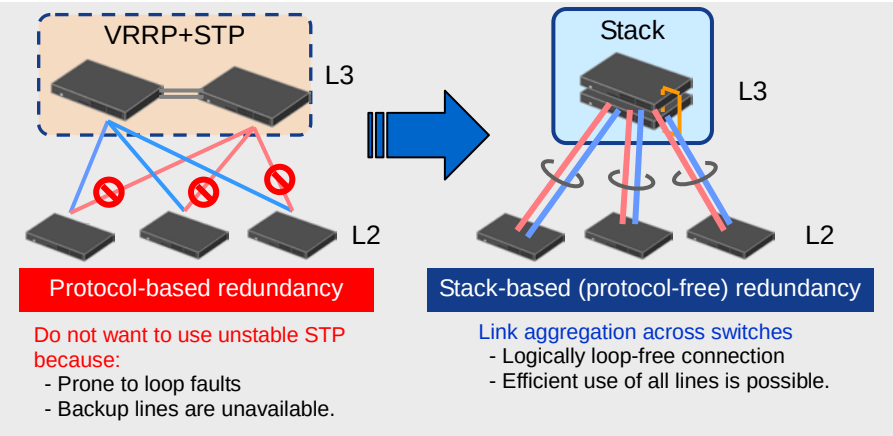


1.2 Highlights of the ALAXALA Stack Functionality

(1) Simple redundancy <Simple and high-qualiy management across two switches>

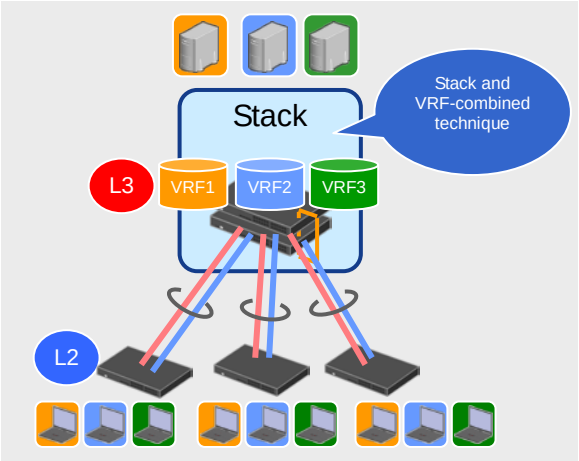
- **Link aggregation-based simple redundancy**
  The AX3830S/AX3650S switches use "link aggregation"-based redundancy instead of conventional unstable STP-based redundancy. Link aggregation provides a logically loop-free network configuration and uses all lines efficiently, making cost-saving, high-quality redundancy possible.

- **Fast switchover and business continuity in case of trouble**
  The redundancy supported by the AX3830S/AX3650S switches prevent network interruption and minimizes possible impacts on business. For example, in case of a master failure, it is possible to minimize impact on business activities, as the network can be recovered immediately in just a few seconds.
  Also, it is possible to perform software updates without stopping the network, eliminating the necessity of planned stops for maintenance.



(2) Combined use of VRF & Stack
<Implementation of a highly relilable virtual network by the combined use of VRF and Stack>

- **Implementation of simplicity and high relilability by the combined use of network partitioning (VRF) and stacks**
  The AX3830S/AX3650S switches implement a simple configuration that allows multiple switches to be handled as a single switch, while providing more efficient management and improved security for each connection by combining VRF and stack functionality.



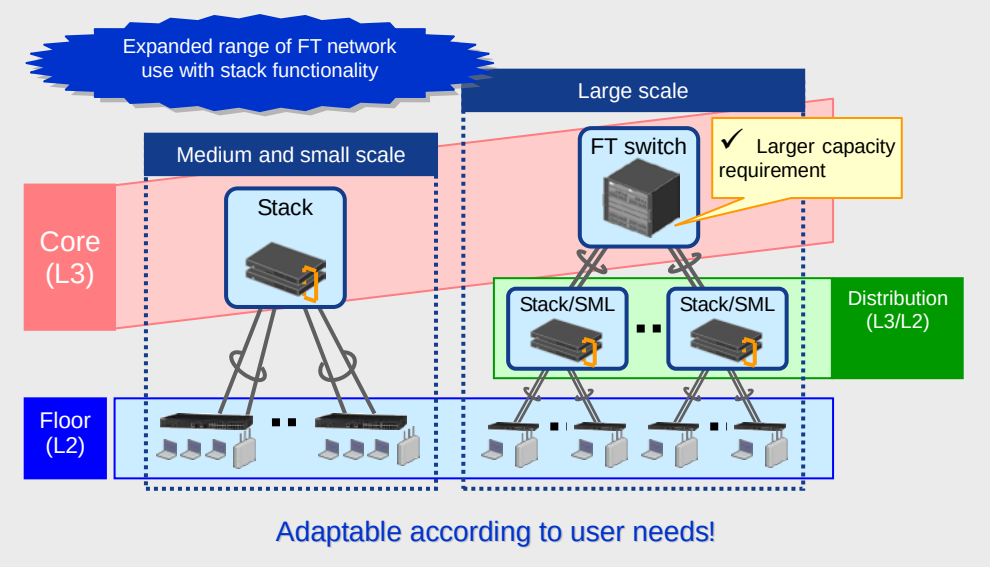
- **Significantly increased number of termminals that can be handled and the most advanced specfications now and in the future**
  It is possible to implement an easy-to-use, simple configuration while increasing the number of terminals that can be handled in the network, reducing the burden on the operator and management cost. The AX3830S/AX3650S switches also support IPv6 even while using VRF.

Note: VRF is a technology that virtualizes multiple networks on a single switch.

(3) Stack functionality-based fault-tolerant network evolution
<Simple FT network available for wider use>

- **Flexibly selectable switches according to user needs**
  Stack functionality, which ALAXALA proposes in addition to a "fault-tolerant switch (FT switch)"-based redundant network, now allows the customer to select box-type switches, as well as large chassis-type switches, according to user needs. The customer can now build an FT configuration by combining these types of switches.

- **Cost reduction by using box-type switches even where Layer 3 is required**
  Stacking now allows links to be aggregated anywhere by the use of two box-type switches. Box-type switches can now be used even where Layer 3 is required.
  This provides Layer 3 fault-tolerance by the use of low-cost box-type switches, helping to significantly reduce cost.



1.3 Product Lineup

Among the various AX series, the AX3650S series and the AX3800S series support stack functionality. It provides two software models, the L3S light and L3S advanced, both of which support stack functionality.

◆ AX3650S series

UTP24port + 10G Uplink
AX3650S-24T6XW

10GBASE-R SFP+/SFP 6 ports
10/100/1000BASE-T 24 ports
Switching capacity (half-duplex) 168 Gbps
Redundant power supply (hot-swappable)
Supported power: AC/DC

UTP48port + 10G Uplink
AX3650S-48T4XW

10GBASE-R SFP+/SFP 4 ports
10/100/1000BASE-T 48 ports
Switching capacity (half-duplex) 176 Gbps
Redundant power supply (hot-swappable)
Supported power: AC/DC

SFP20port + 10G Uplink
AX3650S-20S6XW

10GBASE-R SFP+/SFP 6 ports
1000BASE-X SFP 20 ports
10/100/1000BASE-T 4 ports
Switching capacity (half-duplex) 168 Gbps
Redundant power supply (hot-swappable)
Supported power: AC/DC

Note: The stack functionality of AX3650S is supported by Ver.11.8 or later.

◆ AX3800S series

10G×44port
AX3830S-44XW

10G multi-port switch

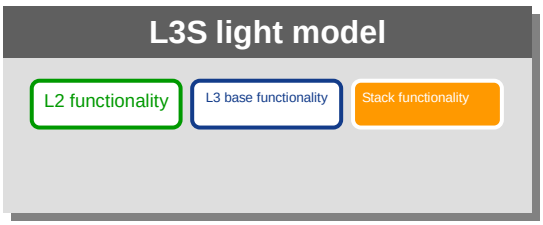
10GBASE-R SFP/SFP+ 44 ports
10/100/1000BASE-T 4 ports
Switching capacity (half-duplex) 888 Gbps
Redundant power supply (hot-swappable)
Supported power: AC/DC

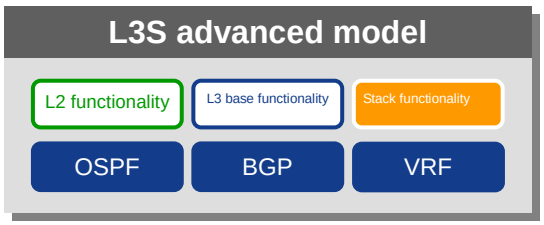
10G×44port + 40G×4port
AX3830S-44XW4QW

40G uplink model

40GBASE-R QSFP+ 4 ports
10GBASE-R SFP/SFP+ 44 ports
10/100/1000BASE-T 4 ports
Switching capacity (half-duplex)1208 Gbps
Redundant power supply (hot-swappable)
Supported power: AC/DC

Note: The stack functionality of AX3830S is supported by Ver.11.10 or later.



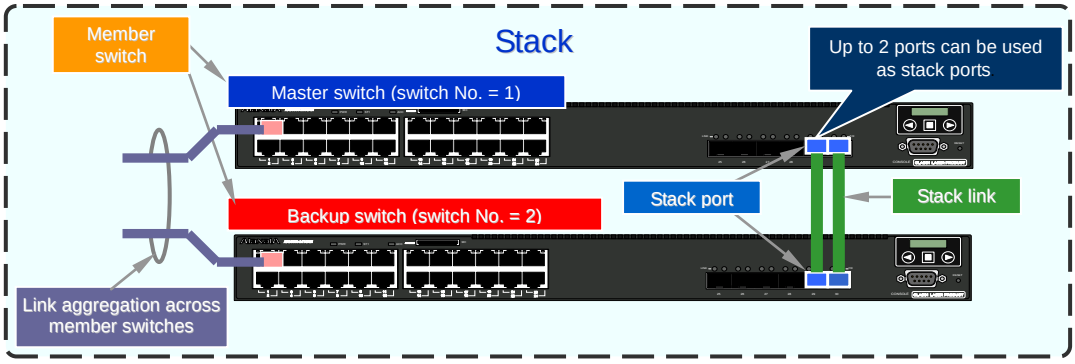


2. Stack Overview

2.1 Stack Components

This section explains the stack components and the stack terminology used in this document.
A stack consists of two member switches—one master switch and one backup switch. The master switch controls the other member switch, and they run virtually as a single switch.

In the AX3800S/AX3650S series stack, ports for connecting the member switches, which are a master switch and a backup switch, are called "stack ports", and the lines connected to the ports are called "stack links."
A switch number is a number for indentifying a member switch composing the stack and is unique to each member switch. In a stack configuration, to secure line redundancy, link aggregation is established between the upper-level and lower-level switches across the member switches.



No.	Term	Description
1	Stack	A collection of multiple switches running virtually as a single switch
2	Stackable (switch)	A switch supporting stack functionality
3	Member switch	A switch that makes up a stack
4	Master (switch)	A stackable member switch playing a role to control all the other member switches in the stack
5	Backup (switch)	A member switch that becomes the master if the original master relinquishes its role or is deemed not to be able to continue to operate
6	Standalone	A switch where stack functionality is not running or such a state
7	Switch number	A number used to identify a member switch composing the stack
8	Stack port	A port used to connect member switches to configure a stack
9	Stack link	A line (or link) connecting two member switches via stack ports It is recommended that two stack links be used for redundancy.
10	Master selection priority	Priority (numerical value) compared when selecting the master switch

2.2 Introduction to Stack

● Stack specifications

ALAXALA's AX3800S/AX3650S series stack is configured by connecting member switches via a general-purpose Ethernet line or a direct attach cable. No special cable is necessary for stacking. A stack can consist of up to two switches.

● Stack ports

Stack ports are ports connecting member switches that make up a stack, and up to two ports can be used per member switch.

For AX3830S switches, SFP/SFP+ shared ports (No.37-.44) and QSFP+ ports can be used as stack ports. These stack ports can be activated only with 10G transceivers (SFP+/QSFP+).

For AX3650S switches, only SFP/SFP+ shared ports can be used as stack ports, and you can select 1G or 10G according to the type of a transceiver to be used.

● Stack links

Stack links are lines connecting the stack ports of the two member switches. Up to two stack links can be used. Directly connect the stack links via an Ethernet line. Do not connect any other network device between the two stack ports connecting the two member switches.

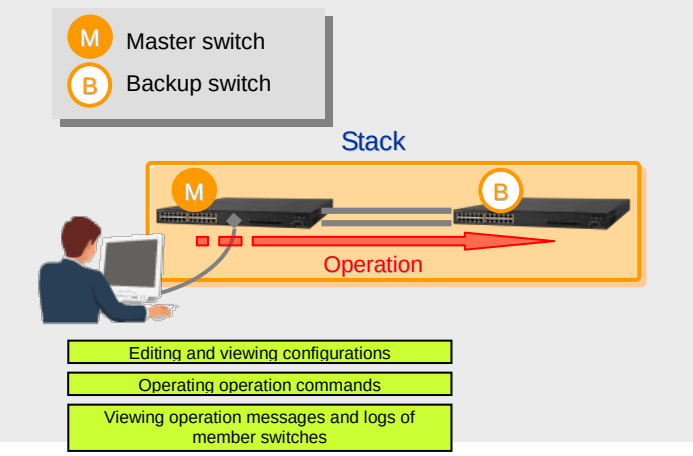
No.	Item	Specification
1	Stack cable	Use either of the following cables. - 1G or 10G Ethernet - direct attach cable
2	Number of switches in a stack	Up to two
3	Number of stack ports/stack links	Up to two ports
4	Models available for stacking	Different switch models of the same series can be used together. Coexistance of AX3830S switches and AX3650S switches is not possible.

2.3 Overview of Stack Behavior

(1) Master switch role

The master switch controls all member switches of the stack and their functionality. Each member switch behaves according to the configuration in and control from the master switch.
The master switch represents the member switches. If the user logs in from a remote terminal, the user is always logged into the master switch. The user can perform the following operations from the master switch in which the user is logged:

- Editing and viewing configurations
- Operating all member switches
- Viewing operation messages and logs from all member switches



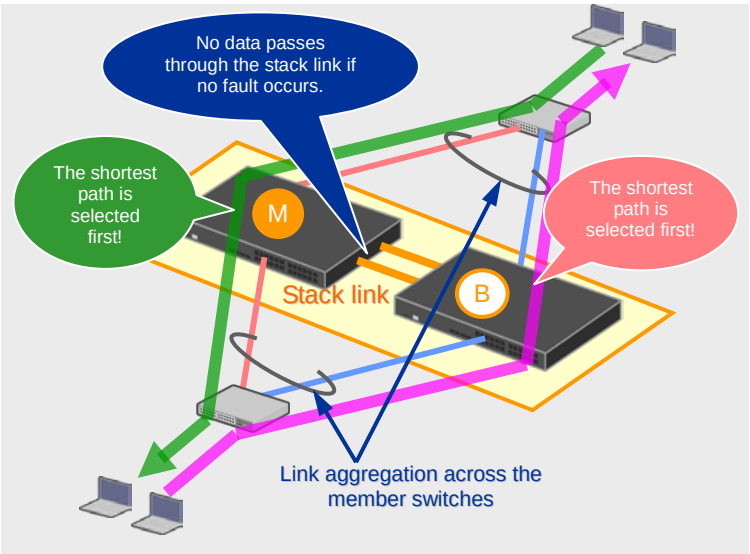
(2) Master switch selection

The master switch is selected according to three elements: switch status, master selection priority, and chassis MAC address of each member switch. The master switch is selected by the following standards:

No.	Switch status	Master selection result
1	If the master switch already exists	The existing master switch is selected. However, if its master selection priority is set to 1 and a different member switch has a master selection priority of 2 or higher, the member switch with that priority is selected as the master.
2	If there is no master switch	The backup switch is selected as the master. This case occurs if the master switch goes down due to a fault or other problem.
3	If there is no master or backup switch	A member switch with the highest master selection priority is selected as the master. If they are set to the same master selection priority, a member switch with the lowest chassis MAC address is selected as the master. This case occurs if two member switches are started at the same time.
4	If there is two master switches	A member switch with the highest master selection priority is selected as the master. If they are set to the same master selection priority, a member switch with the lowest chassis MAC address is selected as the master. This case occurs if two stacks that are both a one-member switch stack are connected.

(3) Packet forwarding in a stack configuration

Considering line redundancy in a stack, we recommend using link aggregation across the member switches so that forwarding can be continued even if a fault occurs.
In an ALAXALA stack, if the destination is a link aggregation across the two member switches as shown in the figure below, the forwarding is directed to the port of the receiving member switch first. If no fault occurs, the shortest path without going through the stack links is selected in forwarding.

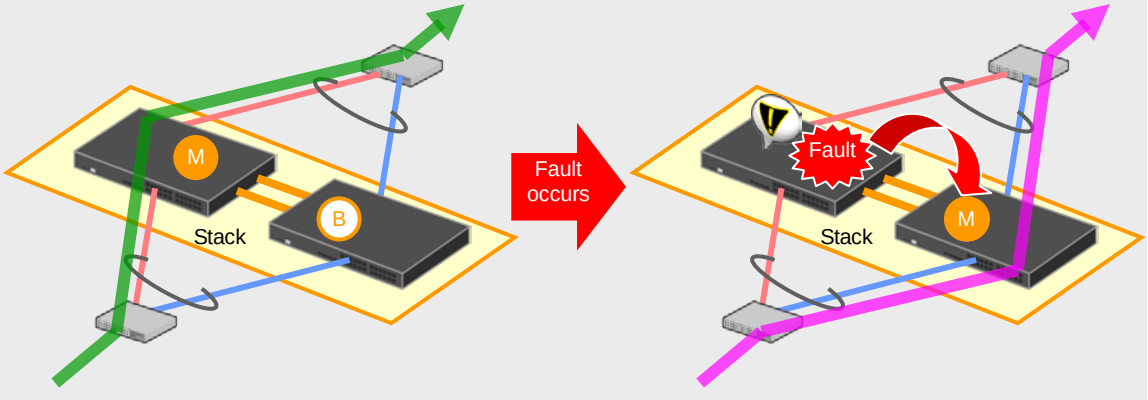


2.4 Overview of Stack Behavior During Fault

This section describes how a stack behaves if a fault occurs in (1) the master switch, (2) a line, and (3) a stack link, in this order.

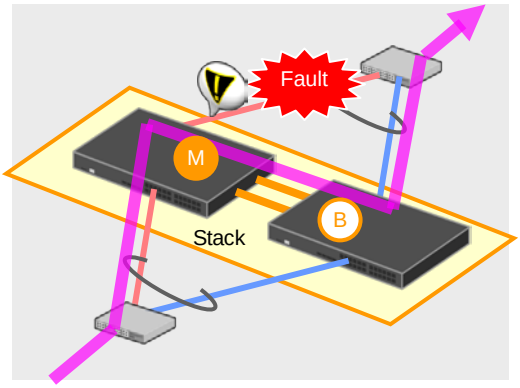
(1) Behavior if a fault occurs in the master switch

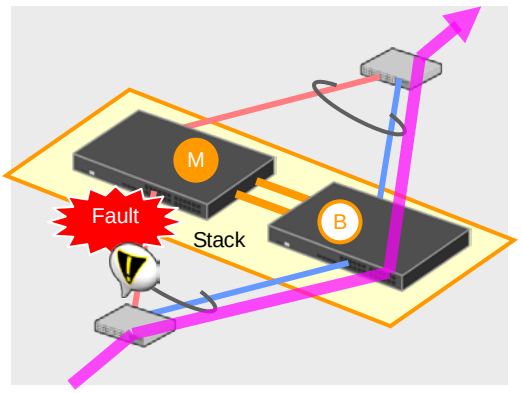
If the master switch stops due to a fault in it, the backup switch becomes the master and the stack continues to run. At the same time, communications going through the old master switch are now redirected to go through the new master switch. If the backup switch stops due to a fault in it, the stack status does not change and only communications going through the backup switch are now redirected to go through the master switch.



(2) Behavior if a line fault occurs

If a fault occurs in a line of link aggregation across the member switches, either one of the two behaviors shown below occurs. In either case, the faulty line is bypassed and the link aggregation continues to operate in degraded mode.
If a line fault occurs, the stack status does not change and only the communication path changes.



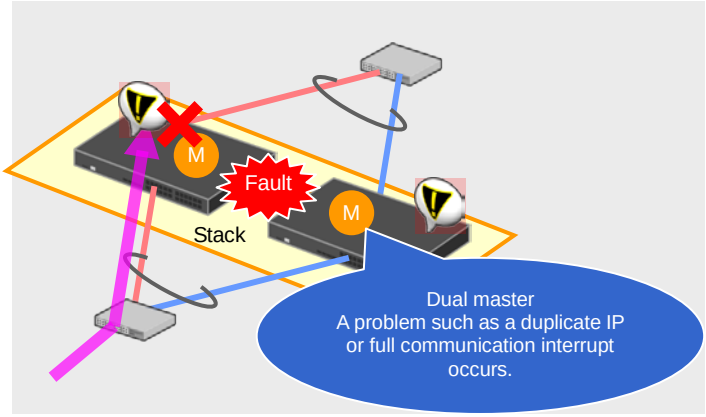


(3) Behavior if a stack link fault occurs

If all stack links fail, it becomes impossible for the master switch and backup switch to recognize their neighboring member switch. As a result, one stack is divided into two stacks, where the master switch remains the master and the backup switch becomes a new master. The system enters a dual master state.

In this state, since the two stacks use the same IP address and the same device MAC address, it becomes impossible to communicate normally due to a duplicate address. If such a dual master state occurs, stop either one of the member switches.

If a stack is configured with two stack links and either one of the two links fails, the stack can continue to run with the remaining one link. In this case, the stack status or communication path does not change, and the stack can continue to run.
Therefore, we recommend a stack configuration with two stack links for redundancy, wherever possible.



2.5 Supported Functionality

This section shows the support status for typical functionality in a stack. For details, see ***Chapter 7*** in the ***Configuration Guide Vol. 1***.

Item				Support status	Remarks
Operation management	Login from console			○	
	Login from remote terminal			○	
	Operating and editing configurations			○	
Layer 2 functionality	VLAN			△	MAC VLAN is not supported. VLAN ID 4094 is unavailable.
	Link aggregation		Static	○	Max. number of channel groups: 52 Max. number of ports per group: 8
			LACP	--	
	Spanning Tree Protocol			--	
	Ring Protocol			--	
	IGMP snooping			--	
	MLD snooping			--	
Layer 3 functionality	IPv4	IPv4, ARP, ICMP		○	
		Policy-based routing		--	
		Static routing		○	
		RIP		○	
		OSPF		○	
		BGP4		○	
		Graceful restart		--	OSPF: Operable as a helper router BGP4: Operable as a receive router
		IPv4 multicast		○	
	IPv6	IPv6, NDP, ICMPv6		○	
		RA		○	
		Static routing		○	
		RIPng		○	
		OSPFv3		○	
		BGP4+		○	
		Graceful restart		--	OSPFv3: Operable as a helper router BGP4+: Operable as a receive router
		IPv6 multicast		--	
Filtering	Access list			○	
	QoS			○	
Security	Network authentication		IEEE 802.1X	--	
			Web authentication	--	
			MAC authentication	--	
	DHCP Snooping			--	
Redundancy-based high reliability	GSRP			--	Operable as GSRP aware
	VRRP			--	
	Uplink redudandancy			--	
Fault detection-based high reliability	IEEE 802.3ah/UDLD			○	
	Storm contol			--	
	L2 loop detection			○	
	CFM			--	
Remote network management	SNMP			△	RMON is not supported.
	Log output			○	
	sFlow statistics			--	
Network partitioning	VRF			○	

(Legend) ○: Supported △: Partly supported --: Not supported

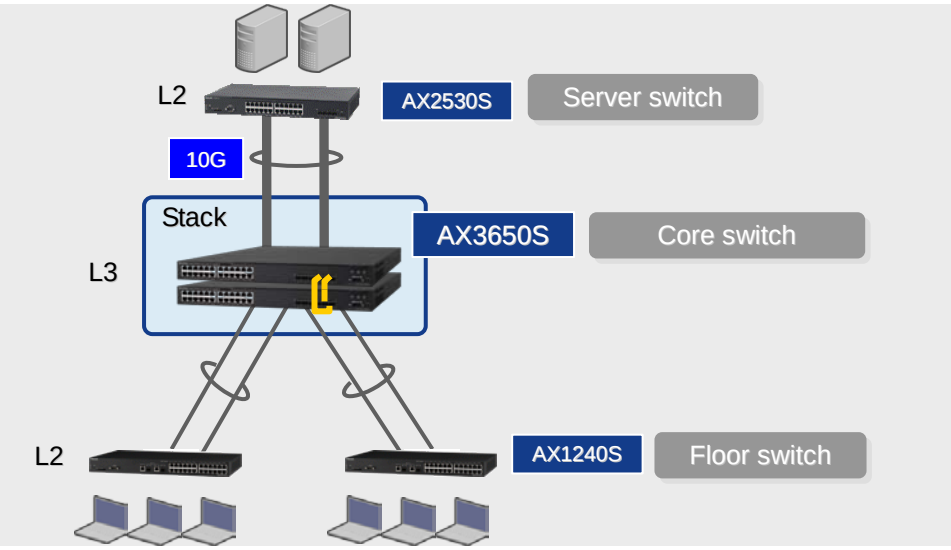
3. Stack Setup

This chapter provides some tips to be noted when setting up a system with a stack and how to set up such a system.

3.1 Example of System Setup with a Stack

The figure below shows an example of a basic stack setup. This setup example shows an ALAXALA-recommended fault-tolerant network, assuming a network system for a medium and small-scale company.

The core switch consists of a stack with AX3650S-series switches that runs as an L3 switch. The core switch is connected with the server switch via a 10G interface and with the floor switch via a 1G interface, and line redundancy is secured by use of link aggregation across the member switches.



The following table shows the switch models and modules used in this setup example with required quantities. No optical or UTP cable is included.

- **Core switch (stack)**

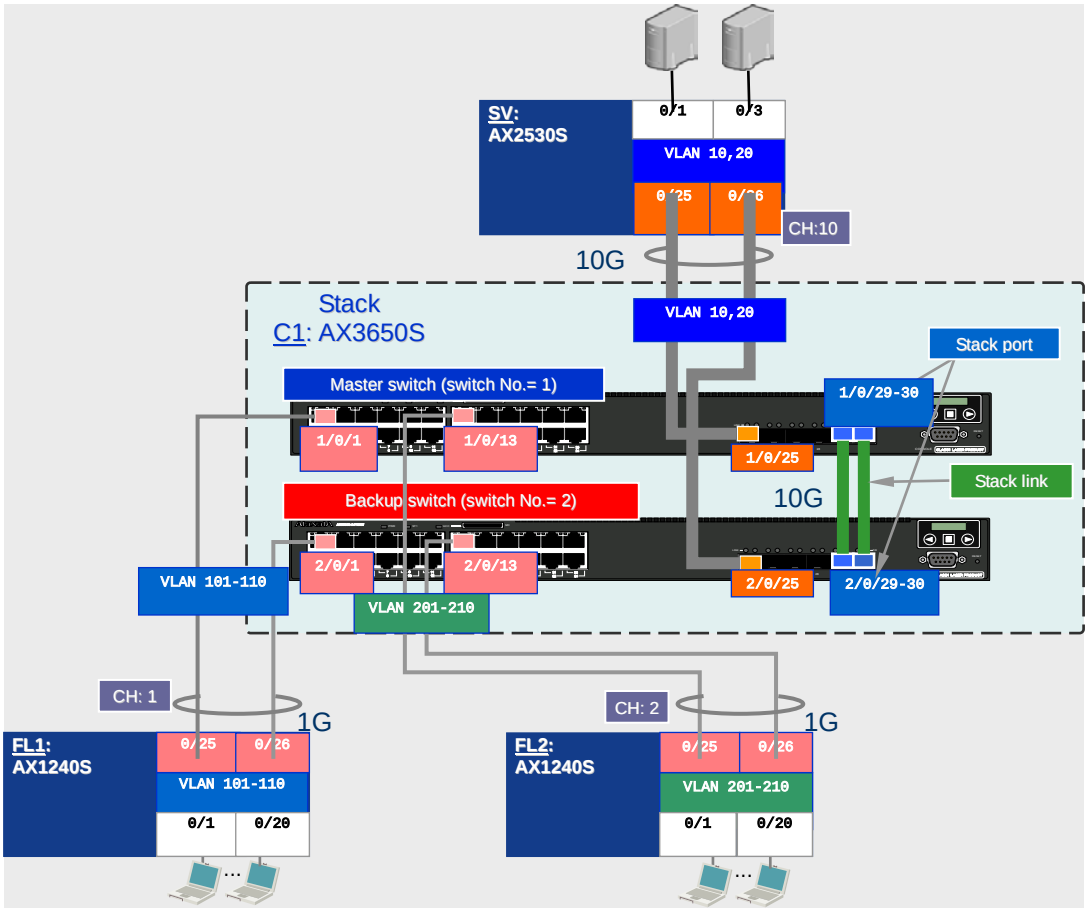
Product	Name	Description	Quantity
AX3650S-24T6XW	Core switch	Stack member switches (Ver.11.10)	2
SFPP-CU30C	30 m-long direct-attach cable	For stack link	2
SFPP-SR	SFP + optical transceiver	For 10G uplink	2

- **Server switch/floor switch**

Product	Name	Description	Quantity
AX2530S-24T4X	Server switch	Switch supporting 10G (Ver.3.5)	1
AX1240S-24T	Floor switch	Switch supporting 1G (Ver.2.4.A)	2
SFPP-SR	SFP + optical transceiver	For core switch connection	2

3.2 System Configuration Diagram

The following figure shows the physical connections used in this setup example and its logical configuration. Settings are configured according to this figure.



3.3 Setup Tips

The setup tips for this application example are as follows:

(1) Do not use a Spanning Tree Protocol in a stack.
(2) Achieve line redundancy by use of link aggregation across the member switches.
(3) Use two ports for stack link redundancy.
(4) To install a stack in a remote place, use a long-distance transceiver.
(5) Directly connect the member switches to each other as a stack link.
(6) Deploy a stack to the system after completing the stack settings.
(7) It is recommended that device information for a stack be backed up.

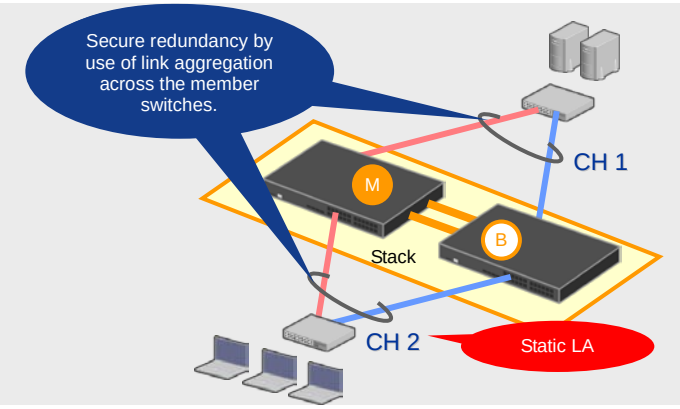
Details are as follows:

(1) Do not use a Spanning Tree Protocol in a stack.

A network system with a stack uses link aggregation for line redundancy, thus it does not use a Spanning Tree Protocol.
If stack functionality is enabled in the AX3650S series, it is not necessary to set Spanning Tree Protocols because they are automatically disabled. For the upper-level switch (server switch) and the lower-level switch (floor switch), it is necessary to disable Spanning Tree Protocols.

(2) Achieve line redundancy by use of link aggregation across the member switches.

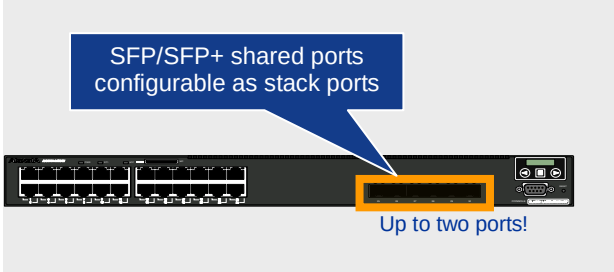
To secure line redundancy, configure link aggregation across the member switches. A stack configuration only supports static mode.



(3) Use two ports for stack link redundancy.

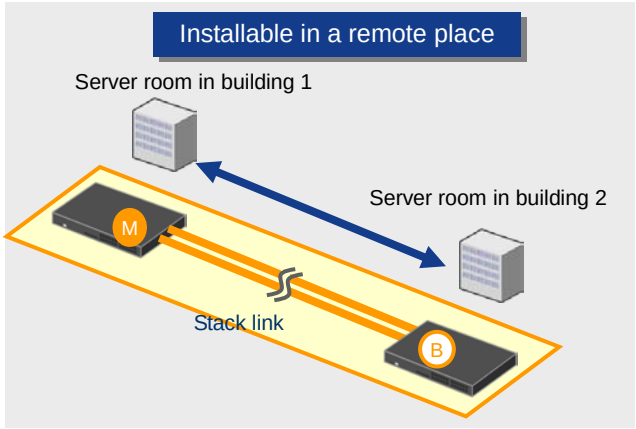
If there is only one stack link and it fails, it becomes impossible for the master switch and backup switch to recognize their neighboring member switch.
If this occurs, it might become impossible to communicate normally due to a duplicate IP or MAC address or an incorrect routing table.

To avoid this, we recommend configuring two ports as stack ports for stack link redundancy. Up to two ports can be configured as stack ports.



(4) To install a stack in a remote place, use a long-distance transceiver.

If the distance between the member switches is short, for example, because they are installed in the same rack, we recommend using a low-cost direct-attach cable for a stack link.
On the other hand, for example, if it is necessary to install the member switches in different buildings, use a long distance optical transceiver so that the stack can be installed in a remote place.
Select the appropriate type of cables according to the actual installation and purpose.



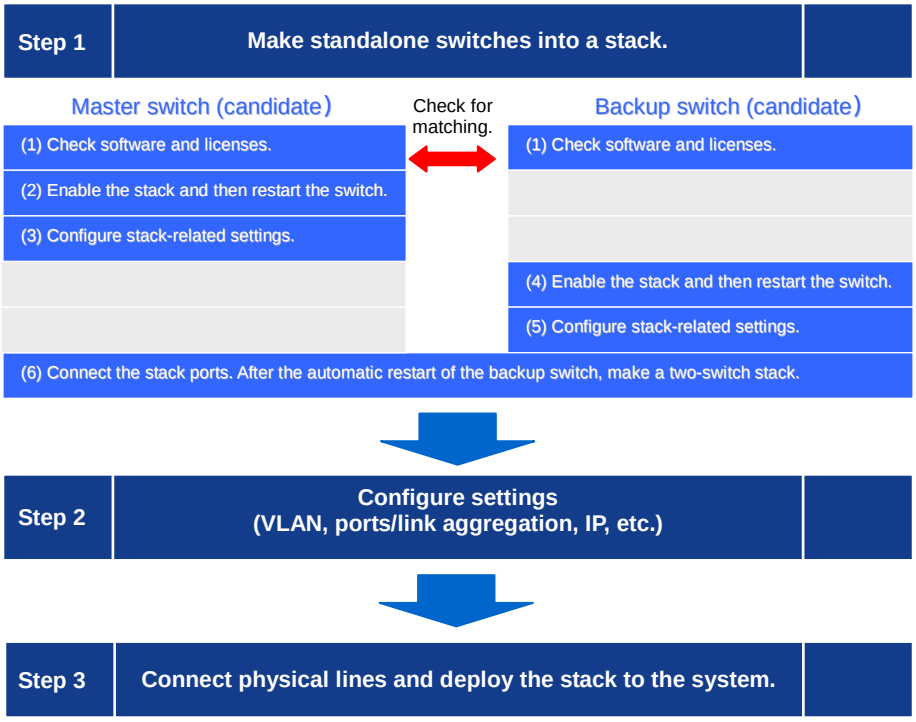
Transceiver type		Line speed	Selection tip
Direct-attach cable 	SFPP-CU	10 Gbps	Usually use a low-cost direct-attach cable.
Optical transceiver (SFP+) 	SFPP-SR	10 Gbps	For a long-distance connection, use an optical transceiver.
	SFPP-LR		
	SFPP-ER		

(5) Directly connect the member switches to each other as a stack link.

Directly connect a line as a stack link. Do not connect any other network device between the two stack ports connecting the two member switches. If a network device such as a Layer 2 switch, hub, or media converter is connected to a stack port, the operation of the stack is not guaranteed.

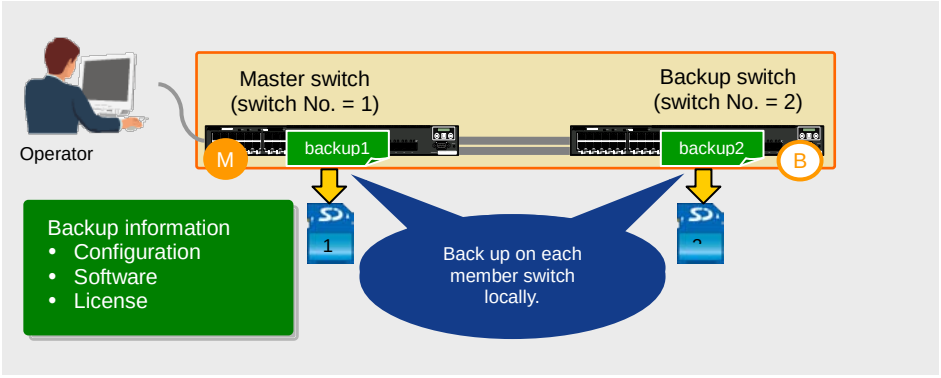
(6) Deploy a stack to the system after completing the stack settings.

To set up a system with a stack, make two standalone switches into a two-switch stack, configure the necessary settings, and then connect the member switches via physical line cables.
An overview of the procedure is given below. The "step 1" for conversion to a stack is detailed in *3.4 Configuration Tips (1)*.



(7) It is recommended that device information for a stack be backed up.

The AX series has backup-and-restore functionality. In a stack configuration, the backup and restore functionality makes it easier to replace a switch in the event of hardware failure or the like by eliminating the necessity of software version matching and configuration settings.
Therefore, when using a stack, it is recommended that backup functionality be used to save a device information backup file to each member switch before operating it.
For details about how to use the backup and restore functionality, see the separate ***AX3800S/AX3650S Series Stack Operation Guide (Operation and Maintenance)***.



3.4 Configuration Tips

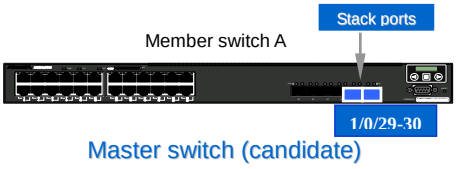
The configuration tips for this application example are as follows:

(1) Make standalone switches into a stack.
(2) It is not necessary to configure any link aggregation settings for stack link redundancy.
(3) To achieve line redundancy, configure link aggregation between ports across the member switches
(4) Disable Spanning Tree Protocols.
(5) Optimize the link-down detection time.

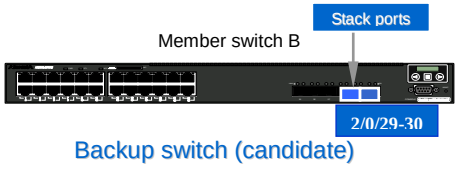
Details are as follows:

(1) Make standalone switches into a stack.

The configuration tips for making a stack from the standalone switches are as follows.



Switch No.	1
Switch model	AX3650S-24T6XW
Stack port	1/0/29, 1/0/30
Master selection priority	20



Switch No.	2
Switch model	AX3650S-24T6XW
Stack port	2/0/29, 2/0/30
Master selection priority	10

Step 1): Match the software and licenses between them.

Match the optional licenses, software model (light or advanced), and software version between the two switches making up the stack. Use version 11.8.A or later of the software.

Step 2): Check to see what functionality is not compatible with the stack functionality.

When the stack functionality is enabled, some functionality# becomes unavailable. Make sure that any functionality that is not supported by the stack is not used.

#: See *2.5 Supported Functionality.*

Step 3): Enable the stack functionality.

The stack functionality becomes available by setting the config setting (`stack enable`) to enable the stack functionality and then restarting the switch. When `stack enable` is set, it becomes impossible to change any configuration until the switch restarts. When the switch restarts, the Spanning Tree Protocols and IPv6 DHCP functionality are automatically disabled.

Step 4): Set config for all member switches in the master switch.

The configuration of the backup switch is synchronized with that of the master switch. Therefore, configure all settings (stack ports, switch model, and master selection priority for all member switches) necessary to make up a stack in the master switch. To make member switch A the master switch, set the master selection priority of the member switch A to a value greater than that of member switch B.

Step 5): Set the switch number, stack ports, and priority of the backup switch locally.

Use the operation command (`set switch`) to set a switch number in the backup switch, and use the config setting (`stack enable`) to enable the stack and restart the switch. After the member switch B restarts, set the stack ports and set the master selection priority to `1` so that the member switch B does not become the master.

A member switch with the master selection priority set to 1 is selected as the master only when "the stack consists of only one member switch" or when "the master selection priority is set to 1 for all member switches".
The configuration of the master switch is replaced with the configuration set in this step when the stack ports are connected.

Step 6): Connect the stack ports of the switches to make them into a two-switch stack.

As the last step after completing the settings, connect the stack links between the member switches A and B . The member switch B restarts automatically.
After the restart, the backup switch (member switch B) automatically restarts again to synchronize its configuration with that of the master switch. The two switches are now made into a two-switch stack configuration.

(2) It is not necessary to configure any link aggregation settings for stack link redundancy.

Stack link redundancy can be achieved simply by specifying two ports when setting stack ports and connecting two cables, without being aware of link aggregation settings.

(3) To achieve line redundancy, configure link aggregation between ports across the member switches.

To achieve line redundancy, configure link aggregation between the member switch ports of the master switch (switch No. 1) and the backup switch (switch No. 2).

(4) Disable Spanning Tree Protocolss.

Disable Spanning Tree Protocols for all switches. Spanning Tree Protocols are not used in the stack network system.
When the core switch is restated after enabling the stack functionality, the Spanning Tree configuration is forcibly disabled by overwriting it. Therefore, it is not necessary to manually disable Spanning Tree Protocols.

(5) Optimize the link-down detection time.

Set the link-down detection time (**link debounce time**) value as low as possible without risking the link becoming unstable. This shortens the time of the degraded operation of link aggregation in case of a failure.

3.5 Configuration Setting Example

This section shows a configuration setting example for the system setup example.

(1) Configuration setting example for the core switch (Device C1: Two-AX3650S switch stack)

◆ Configuration settings for making standalone switches into a stack

Configuration for member switch A: Master switch (candidate)	
Stack enable setting	Configuration tips (1) - 3)
(config)# stack enable After this command execute, please save configuration editing now in startup-config, and please reboot a device. Do you wish to continue ? (y/n): y	Enable the stack functionality. When a message that prompts for you to confirm the configuration changes and restart the switch appears, enter y.
(config)# save (config)# exit # reload	Save the configuration and return from configuration command mode to administrator mode. Restart the switch manually.
Stack settings	Configuration tips (1) - 4) (2)
(config)# interface range tengigabitethernet 1/0/29-30 (config-if-range)# switchport mode stack (config-if-range)# exit	Set the Ethernet interface of the local member switch A (switch No. 1) as the stack port.
(config)# switch 1 priority 20	Set the master selection priority of the local member switch A (switch No. 1) to 20.
(config)# switch 2 provision 3650-24t6xw	Set the device model of member switch B.
(config)# interface range tengigabitethernet 2/0/29-30 (config-if-range)# switchport mode stack (config-if-range)# exit	Set the Ethernet interface of the member switch B (switch No. 2) as the stack port.
(config)# switch 2 priority 10	Set the master selection priority of the member switch B (switch No. 2) to 10.
(config)# save (config)# exit	Save the configuration and return from configuration command mode to the administrator mode.

Configuration for member switch B: Backup switch (candidate)	
Switch No. setting	Configuration tips (1) - 5)
# set switch 2 The switch number was changed to 2. When device restart, the change in the switch number is reflected.	Set the switch number to 2. The switch number is incorporated when the switch is restarted. This is an operation command. Use this command in administrator mode.
Stack enable setting	Configuration tips (1) - 3), 5)
(config)# stack enable After this command execute, please save configuration editing now in startup-config, and please reboot a device. Do you wish to continue ? (y/n): y	Enable stack functionality. When a message that prompts for you to confirm the configuration changes and restart the switch appears, enter y.
(config)# save (config)# exit # reload	Save the configuration and return from configuration command mode to administrator mode. Restart the switch manually.
Stack settings	Configuration tips (1) - 5) (2)
(config)# interface range tengigabitethernet 2/0/29-30 (config-if-range)# switchport mode stack	Set the Ethernet interface of the local member switch B (switch No. 2) as the stack port.

Configuration for member switch B: Backup switch (candidate)	
(config-if-range)# exit	
Stack settings	
(config)# switch 2 priority 1	Set the master selection priority of the member switch B (switch No. 2) to 1.
(config)# save (config)# exit	Save the configuration and return from configuration command mode to administrator mode.

This completes the configuration settings for making the two switches into a stack.
Then, connect the stack ports of member switches A and B. The member switch B automatically restarts, building a two-switch stack configuration. <Configuration tips (1) - 6)>

◆ Configuration settings for the core switch

Core switch C1 settings	
VLAN settings	
(config)# vlan 10,20,101-110,201-210	Specify the VLANs to be used. Data trasnfer VLANs: 10, 20, 101-110, 201-210
Port/channel group settings	Configuration tips (3)
(config)# interface range tengigabitethernet 1/0/25, tengigabitethernet 2/0/25 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 10 mode on (config-if-range)# exit (config)# interface range gigabitethernet 1/0/1, gigabitethernet 2/0/1 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 1 mode on (config-if-range)# exit (config)# interface range gigabitethernet 1/0/13 gigabitethernet 2/0/13 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 2 mode on (config-if-range)# exit	Configure the uplink port of the 10G interface. Configure ports 1/0/25 and 2/0/25 as channel group 10 for server switch connections. Configure the downlink port. Configure ports 1/0/1 and 2/0/1 as channel group 1 for floor switch (FL1) connections. Configure ports 1/0/13 and 2/0/13 as channel group 2 for floor switch (FL2) connections. Set the link-down detection time to 0 milliseconds for each port. <Configuration tips (5)> Set link aggregation to static mode.
Port channel settings	
(config)# interface port-channel 10 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 10,20 (config-if)# exit (config)# interface port-channel 1 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 101-110 (config-if)# exit (config)# interface port-channel 2 (config-if)# switchport mode trunk (config-if)# switchport trunk allowed vlan 201-210 (config-if)# exit	Configure each port channel. Set each port channel to trunk mode and specify the VLANs to which the port channel belongs. Set the port channels as follows: Port channel 10: VLAN 10, 20 Port channel 1: VLAN 101-110 Port channel 2: VLAN 201-210

Core switch C1 settings	
IP address settings	
(config)# interface vlan 10 (config-if)# ip address 172.16.10.1 255.255.255.0 (config-if)# exit (config)# interface vlan 20 (config-if)# ip address 172.16.20.1 255.255.255.0 (config-if)# exit (config)# interface vlan 101 (config-if)# ip address 192.168.1.254 255.255.255.0 (config-if)# exit : (config)# interface vlan 110 (config-if)# ip address 192.168.10.254 255.255.255.0 (config-if)# exit (config)# interface vlan 201 (config-if)# ip address 192.169.1.254 255.255.255.0 (config-if)# exit : (config)# interface vlan 210 (config-if)# ip address 192.169.10.254 255.255.255.0 (config-if)# exit	Set the IP addresses for the data transfer VLANs. VLAN 10: IP address: 172.16.10.1/24 VLAN 11: IP address: 172.16.20.1/24 VLAN 101: IP address: 192.168.1.254/24 : VLAN 110: IP address: 192.168.10.254/24 VLAN 201: IP address: 192.169.1.254/24 : VLAN 210: IP address: 192.169.10.254/24

(2) Configuration setting example for the server switch (device S1: AX2530S)

Server switch S1 settings	
VLAN settings	
(config)# vlan 10,20	Specify the VLANs to be used. Data transfer VLANs: 10, 20
Spanning Tree setting (disable)	Configuration tips (4)
(config)# spanning-tree disable	Disable the Spanning Tree Protocols.
Channel group settings	
(config)# interface range tengigabitethernet 0/25-26 (config-if-range)# link debounce time 0 (config-if-range)# channel-group 10 mode on (config-if)# exit	Configure the channel groups. Configure 10G interface uplink ports 0/25-26 as channel group 10 for core switch C1 connections. Set the link-down detection time to 0 milliseconds. <Configuration tips (5)> Set link aggregation to static mode.
Port settings	
(config)# interface port-channel 10 (config-if-range)# switchport mode trunk (config-if-range)# switchport trunk allowed vlan 10,20 (config-if)# exit (config)# interface gigabitethernet 0/1 (config-if)# switchport mode access (config-if)# switchport access vlan 10 (config-if)# exit (config)# interface gigabitethernet 0/3 (config-if)# switchport mode access (config-if)# switchport access vlan 20 (config-if)# exit	Configure each port. Set 10G interface uplink ports 0/25-26 as trunk ports and configure VLANs 10 and 20 for data transfer. Specify the ports to be connected to the server. Configure the VLANs assigned to each port as an access port.

(3) Configurtion setting example for a floor switch (device FL1: AX1240S)

Floor switch FL1 settings	
VLAN setting	
`(config)# vlan 101-110`	Specify the VLANs to be used. Data transfer VLANs: 101-110
Spanning Tree setting (disable)	Configuration tips (4)
`(config)# spanning-tree disable`	Disable the Spanning Tree Protocols.
Channel group settings	

`(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`
	Configure the channel groups.
	Configure uplink ports 0/25-26 as channel group 1 for core switch C1 connections.
	Set the link-down detection time to 0 milliseconds.
	<Configuration tips (5)>
	
	Set link aggregation to static mode.

Port settings	

`(config)# interface port-channel 1`
`(config-if-range)# switchport mode trunk`
`(config-if-range)# switchport trunk allowed vlan 101-110`
 	
`(config)# interface fastethernet 0/1`
`(config-if)# switchport mode access`
`(config-if)# switchport access vlan 101`
`:`
`:`
`(config)# interface fastethernet 0/10`
`(config-if)# switchport mode access`
`(config-if)# switchport access vlan 110`
	Configure each port.
	Set uplink ports 0/25-26 as trunk ports and configure VLANs 101-110 for data transfer.
	
	Specify the ports to be connected to terminals.
	Configure the VLANs assigned to each port as an access port.

For floor switch FL2, no configuration setting example is given here, as FL2 has almost the same configuration settings as FL1 except for the VLAN to which its ports belong and the channel group numbers. See the configuration setting example for device FL1.

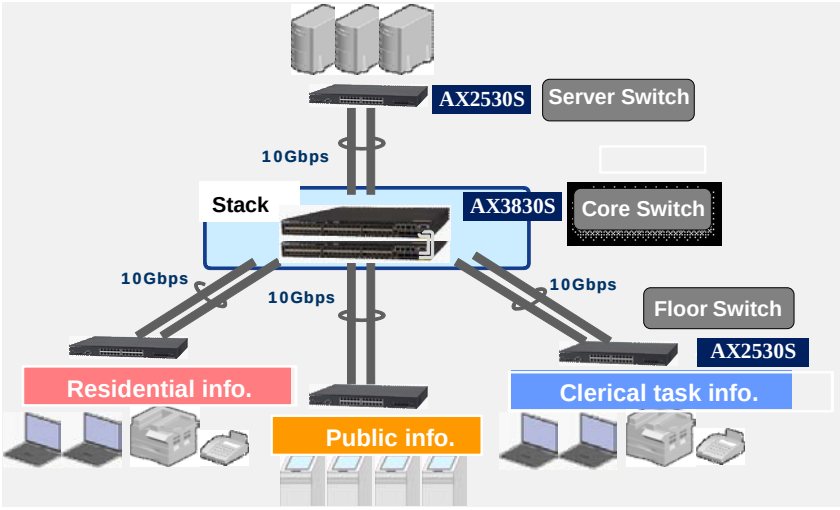
Configuration files for the devices explained above are provided with this document.
For details, see *Appendix (1) Sample configuration files for AX3650S stack .*

3.6 Example of AX3800S Series Stack Configuration

This section introduces an example of stack configuration using AX3800S series switches.

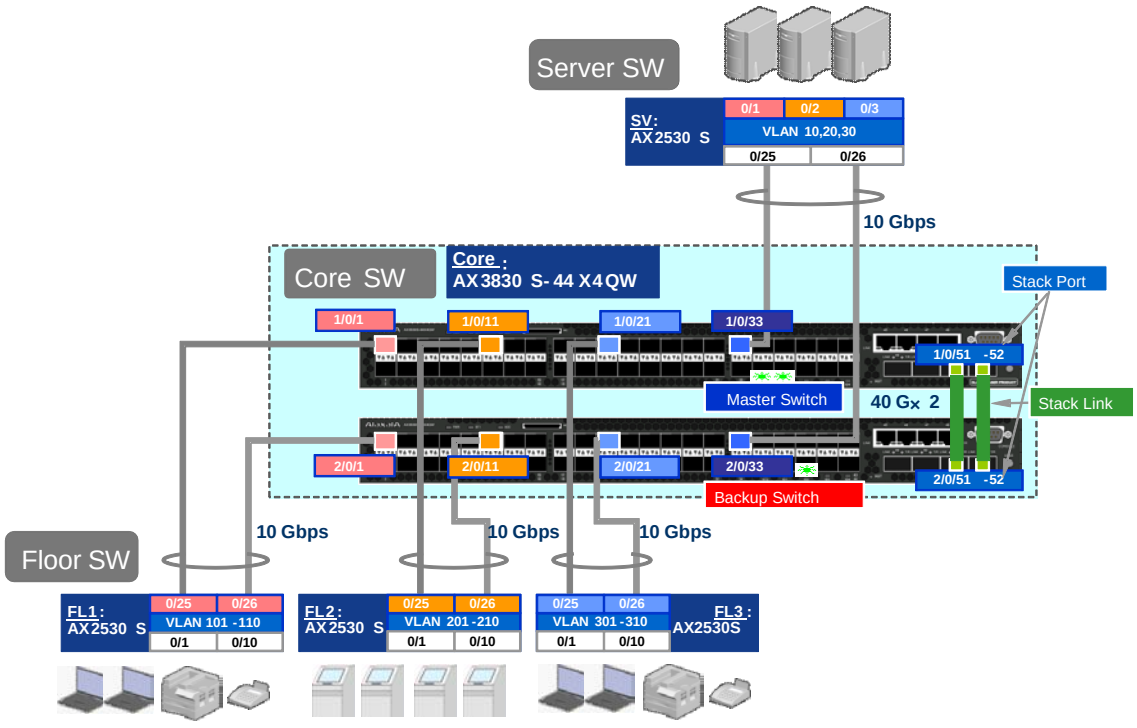
(1) Configuration example

The AX3830S, which supports multiple 10G interface connections, also supports 40G interface. The configuration example below shows a network using 10G interfaces, in which 40G interfaces are used only between the stack ports of the member switches.



(2) System configuration diagram

Given below is a detail system configuration diagram. For configuration setting examples, see *Appendix (2) Sample configuration files for AX3830S stack*.



The devices and accessories used in this configuration example are as follows (not including optical cables and UTP cables).

- **Core switch (stack configuration)**

Device number	Device category	Description	Quantity
AX3830S-44X4QW	Core switch	Switch for stack (Ver.11.10)	2
QSFP-CU35C	40G direct attach cable (35cm)	Used for 40G stack link.	2
SFPP-SR	SFP+ optical transceiver	Used for 10G interface.	8

- **Server switch/floor switch**

Device number	Device category	Description	Quantity
AX2530S-24T4X	Server switch	Supports 10G interface (Ver.3.5).	1
AX2530S-24T4X	Floor switch	Supports 10G interface (Ver.3.5).	3
SFPP-SR	SFP+ optical transceiver	Used for 10G interface.	8

Procedures and setting information used in this example of AX3800S stack are the same as those for AX3650S stack. The only differences between AX3800S stack and AX3650S stack here are the types of interface used for stack ports and the numbers of these ports. For details, see ***3.3 Setup Tips***, ***3.4 Configuration Tips***, and ***3.5 Configuration Setting Example***.

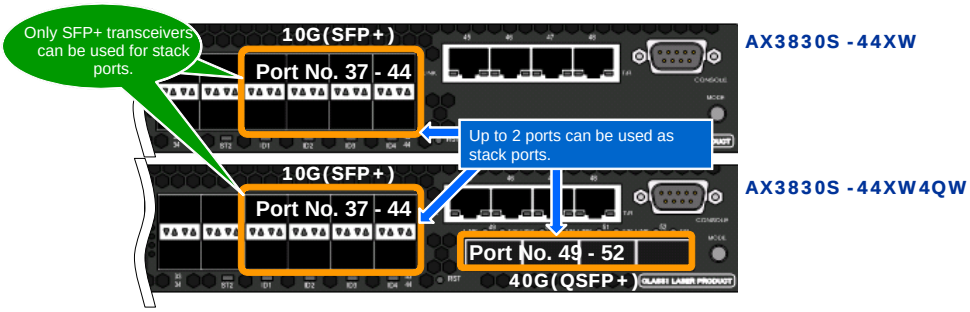
(3) Notes

The points to keep in mind regarding stack ports and stack link when configuring a stack with AX3800S series switches are as follows.

When using AX3830S-44XW, two ports can be used as stack ports among the 10G (SFP+) ports No.37 to No.44. When using AX3830S-44XW4QW, two ports can be used as stack ports among the 10G (SFP+) ports No.37 to No.44 and among the 40G (QSFP) ports No.49 to No.52, respectively.

In the AX3800S series, when using an SFP/SFP+ shared port as a stack port, use an SFP transceiver supporting 10G or more bandwidth (SFP+, direct attach cable). If an SFP transceiver is used, this port does not work as a stack port.

Further, when using two stack links, packets are highly likely to be dropped as a result of load balancing if these stack links have different line speeds. Therefore, when using two stack links, direct attach cables and transceivers (SFP+/QSFP) used for these links must be the same type so that line speeds for these links will be the same.



4. Operation Management

This chapter describes stack status checking. For other operation and maintenance-related information, see the separate ***AX3800S/AX3650S Series Stack Operation Guide (Operation and Maintenance)***, which describes the stack operation commands, software update procedures, member switch replacement, etc.

4.1 Status Checking

(1) Checking stack status

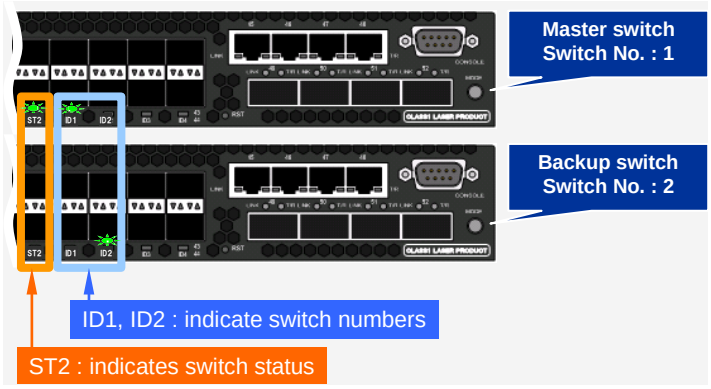
(a) Check by display panels

With Ver.11.10 or later, you can check stack statuses and switch numbers by LEDs for the AX3830S series switches, or by the system operation panels (SOPs) for the AX3650S series switches.
The brief description of the display panel of each device is given below.

- **AX3800S series**

  You can check the switch status/number by LEDs on the front panel of a switch. You can check the switch status by checking whether or not LED (ST2) is lit and the switch number by checking whether or not LED (ID1, ID2) corresponding to each switch number is lit For standalone switches, all these LEDs are in power-off state.

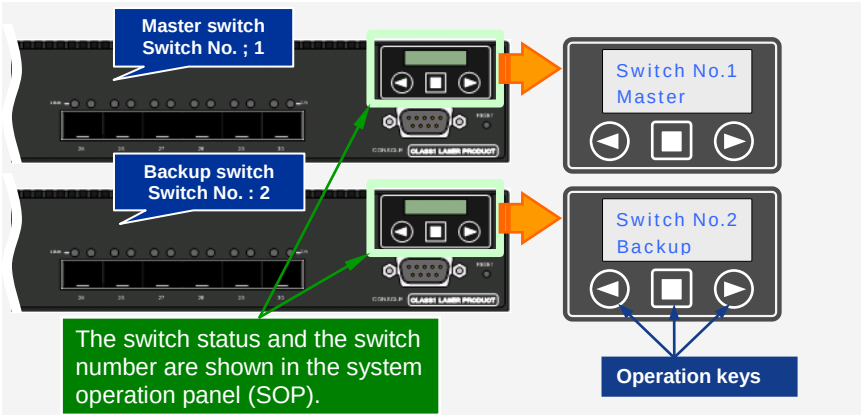
LED name	Switch status	LED status
ST2	Initial state	Power off
	Master	Power on
	Backup	Power off
ID1, ID2	Initial state	LED corresponding to each switch number is lit.
	Master	
	Backup	



- **AX3650S series**

  You can check the switch status/number of a switch by the system operation panel (hereinafter, referred to as SOP) mounted on the front surface of the switch. The switch status and the switch number are shown in the SOP when the switch status has changed or when one of the operation keys in the SOP has been pressed down. Such information, once displayed, disappears when 60 seconds have passed. For standalone switches, no information is shown on the SOP.

Status	Indication
Initial state	Init
Master	Master
Backup	Backup



(b) Check via a console

To check the status of a member switch, you must enter device administrator mode and input an operation command `show switch [ detail ]`. Below are the sample outputs of switch/stack status information..

Status	Displayed item	Displayed information	Meaning
Stack operating status	Stack status	Enable	Running as a stack
		Disable	Running as standalone
Member switch status	Switch status	Master	Master swtich
		Backup	Backup switch
		Init	Initializating

◆ Standalone state

```
# show switch
Date 2012/06/22 11:43:28 UTC
Stack status : Disable        Switch No : 1
                    … Standalone state (stack functionality disabled)
```

This is a sample output displayed when the stack functionality is disabled. In this case, the switch is running as a standalone switch.

◆ Stack enabled state

```
# show switch                    …… Stack enabled state
Date 2012/06/22 11:48:04 UTC
Stack status : Enable         Switch No : 1
System MAC Address : 0012.e292.d980
No  Switch status  Model        Machine ID     Priority  Ver
 1  Master        3650-24t6xw   0012.e292.d980  20       1
              … Single-switch stack state
```

This is a sample output displayed when the stack functionality is enabled and the switch is restarted. In this case, the switch is running as a single-switch stack.

◆ Two-switch stack state

```
# show switch                    …… Stack enabled state
Date 2012/06/22 12:05:31 UTC
Stack status : Enable         Switch No : 1 … Switch number
System MAC Address : 0012.e292.d980
No  Switch status  Model        Machine ID     Priority  Ver
 1  Master        3650-24t6xw   0012.e292.d980  20       1
 2  Backup        3650-24t6xw   0012.e242.b297  10       1
              … Two-switch stack state
```

This is a sample output displayed when the two switches are running as a two-switch stack. Switch No. 1 is running as the master switch, and switch No. 2 is running as the backup switch.

◆ Detailed member switch information

```
# show switch detail
Date 2012/06/22 12:05:48 UTC
Stack status : Enable        Switch No : 1
System MAC Address : 0012.e292.d980
No  Switch status  Model        Machine ID     Priority  Ver
 1  Master        3650-24t6xw   0012.e292.d980  20       1
 2  Backup        3650-24t6xw   0012.e242.b297  10       1
Port     Status          Neighbor(Port    Model        Machine ID)
1/0/29   Up(Forwarding)          2/0/29  3650-24t6xw   0012.e242.b297
1/0/30   Up(Forwarding)          2/0/30  3650-24t6xw   0012.e242.b297
2/0/29   Up(Forwarding)          1/0/29  3650-24t6xw   0012.e292.d980
2/0/30   Up(Forwarding)          1/0/30  3650-24t6xw   0012.e292.d980
```

... Stack port status

... Neighboring member switch information

If the [detail] option is specified, detailed information including stack port status and neighboring member switch information is displayed.

(2) Checking link aggregation status

To check link aggregation status, use the show channel-group operation command in administrator mode. This example shows that each link aggregation consists of ports across the member switches.

```
# show channel-group
Date 2012/06/26 16:42:14 UTC
channel-group Counts:3
ChGr:1    Mode:Static
  CH Status    :Up       Elapsed Time:05:49:24
  Multi Speed  :Off       Load Balance:src-dst-port
  Max Active Port:8
  Max Detach Port:7
  Description : FL1
  MAC address: 0012.e292.d981     VLAN ID:101-110
  Port(2)        :1/0/1
                  2/0/1
  Up Port(2)      :1/0/1,2/0/1
  Down Port(0)    :
ChGr:2    Mode:Static
  CH Status    :Up       Elapsed Time:05:49:24
  Multi Speed  :Off       Load Balance:src-dst-port
  Max Active Port:8
  Max Detach Port:7
  Description : FL2
  MAC address: 0012.e292.d98d     VLAN ID:201-210
  Port(2)        :1/0/13
                  2/0/13
  Up Port(2)      :1/0/13,2/0/13
  Down Port(0)    :
ChGr:10   Mode:Static
  CH Status    :Up       Elapsed Time:05:49:24
  Multi Speed  :Off       Load Balance:src-dst-port
  Max Active Port:8
  Max Detach Port:7
  Description : SV
  MAC address: 0012.e292.d999     VLAN ID:10,20
  Port(2)        :1/0/25
                  2/0/25
  Up Port(2)      :1/0/25,2/0/25
  Down Port(0)    :
```

... Link aggregation across the member switches

... Link aggregation across the member switches

... Link aggregation across the member switches

5. Important Notes

(1) Stack functionality support

Stack functionality is supported by the following software versions. Any earlier version does not support stack functionality.

Series	Software version
AX3650S series	Ver.11.8 or later
AX3830S series	Ver.11.10 or later

There are two different software models, L3S light and L3S advanced, both of which support stack functionality.

(2) Using different models together as stack member switches

In stack, you can use the different models of the same series together; that is, AX3650S-24T6XW, AX3650S-20S6XW and AX3650S-48T4XW of the AX3650S series, or AX3830S-44XW and AX3830S-44X4QW of the AX3800S series. It is not possible to use AX3650S series switches and AX3830S series switches together.

(3) Configuration editing

To edit a configuration, be sure to use the master switch. A configuration cannot be edited or displayed from the backup switch.

(4) Device login

If a remote connection is used, be sure to log into the master switch. If the console is used to log into the master or backup switch, the following command prompt is displayed respectively:

◆ Logging into the master switch

login: (login name)

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(host name) >

Same prompt as usual.

◆ Logging into the backup switch

login: (login name)

Copyright (c) 2005-2012 ALAXALA Networks Corporation. All rights reserved.

(host name -) 02B>

(host name -) is followed by "switch number + B". "B" means backup.

Appendix: Configuration Files

The table below shows a set of provided configuration examples for the system configuration described in this guide.
Text files containing configurations for the devices used in the stack system example 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 follows:

(1) Sample configuration files for AX3650S stack

Switch application	Device name/target device	Config host name	File name
Core switch	C1：AX3650S	Core-36STK	1_C1-STK_AX36S.txt
	Config file for stacking	Master switch	1_MST_AX36S.txt
		Backup switch	1_BAK_AX36S.txt
Server switch	S1： AX2530S	SV	1_S1-AX25S.txt
Floor switch	FL1：AX1240S	FL1	1_FL1-AX12S.txt
	FL2：AX1240S	FL2	1_FL2-AX12S.txt

(2) Sample configuration files for AX3830S stack

Switch application	Device name/target device	Config host name	File name
Core switch	C1：AX3830S	Core-38STK	2_C1-STK_AX38S.txt
	Config file for stacking	Master switch	2_MST_AX38S.txt
		Backup switch	2_BAK_AX38S.txt
Server switch	S1： AX2530S	SV	2_S1-AX25S.txt
Floor switch	FL1：AX2530S	FL1	2_FL1-AX25S.txt
	FL2：AX2530S	FL2	2_FL2-AX25S.txt
	FL3：AX2530S	FL3	2_FL3-AX25S.txt

For the core switch composing the stack, the pre-stack configuration files (for the master and backup switches) are also attached.

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