



Application Guide

Stacking

XGS3700-24 / XGS3700-24HP / XGS3700-48 / XGS3700-48HP

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1. Purpose of this Document.

The main purpose of this document is to understand how ZyXEL XGS3700 switch performs the stacking function. It will allow up to 8 of ZyXEL XGS3700 switches to function as one logical switch.

The testing on this document will base on two switches and eight switches with the following functions:

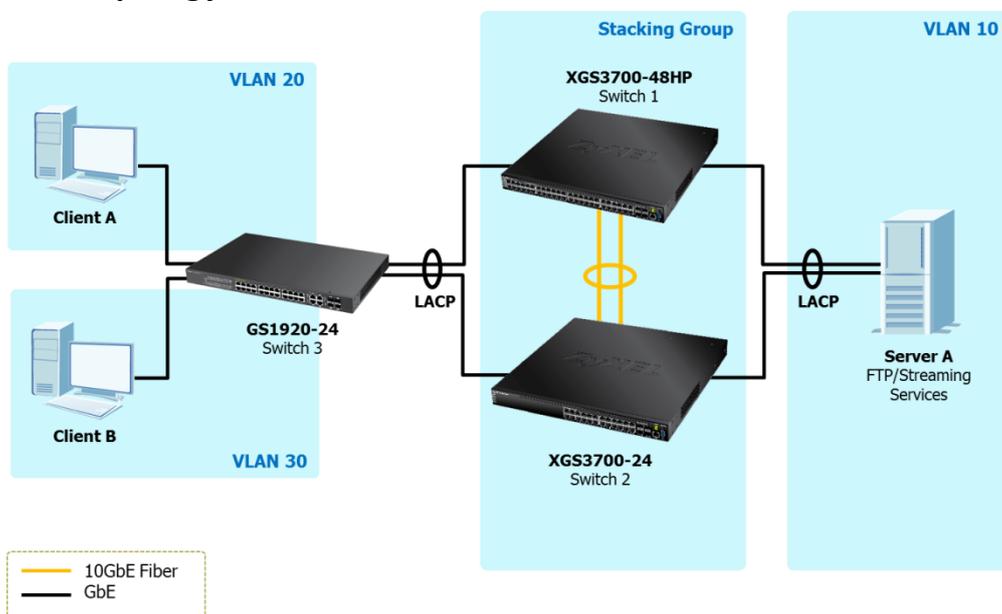
- LACP
- VLAN
- Firmware upgrade
- DHCP Snooping / ARP inspection
- Broadcast Storm Control
- Mirror
- QoS
- Loop Guard
- SNMP
- LLDP

The test is performed with XGS3700-48HP and XGS-3700-24. XGS3700 are interconnected on port 27/28 on XGS3700-24 and port 51/52 on XGS3700-48HP in a ring as the stacking function needs to run on these specific 2 ports. GS1910 performs as an access switch.

“Force master” option is strongly recommended to be enabled on the intended stacking master switch before building a stacking environment.

2. Scenario One: Stack two Switches

2.1 Topology



2.2 Application Scenario

In configuration illustrated above, the 2 clients are performing FTP & video streaming from the server. To go through this scenario, you will be able to understand how stacking to achieve cross-stack LACP for better resiliency. Also to understand how the advanced fail-over design of stacking master & stacking links work.

2.2.1 Cross-Stack LACP

With stacking enabled, access switch can have multiple links to different units in a stack and perform link aggregation. In the scenario, you'll be able to see 2Gbps FTP aggregated throughput on the Server, and any LACP link drops (one at a time), you can still see 1Gbps on the Server. It will recover to 2Gbps when the link is recovered.

For the video streaming in this scenario, only less than one second of screen frozen when any of the LACP link drops.

Note:

When the client keeps doing ping to server with ICMP during the testing. 0 to 1 ping lost are expected during link drop and recover. It is because LACP will need time to converge.

2.2.2 Stacking Link Redundancy

Any one of the stacking link fails, the FTP throughput on Server will keep on 2Gbps. There can be one ping lost during the stacking topology change caused by the stacking link removed.

For video streaming, the stacking topology change needs more time to clear and learn multicast table again. In this scenario, the video streaming will show up to 5 seconds of screen frozen when one of stacking link is down and recover.

2.2.3 Stacking Device Redundancy

If we turn off the Switch 1(Master switch) to simulate the case if somehow stacking master is down.

The FTP throughput on Server will be down to 1Gbps. And it will show 3 to 5 ping lost (around 10 seconds) while backup switch is taking over the operation.

If we turn the switch 1 back on again, Switch 1 will join the stacking group again. Since Switch 1 with force master enable. It will take over the master role for stacking group and will trigger re-initialization process, whole of stacking units will not forwarding any data during this process. In this scenario, it will take around 30 seconds.

If we turn off the switch 2(Backup switch), there will be 2 to 3 ping lost due to the LACP convergence. And video streaming will be frozen around 1 to 3 seconds.

Powered on switch2 again, it will show 1 to 2 ping lost for LACP convergence then the FTP throughput back to 2 Gbps. And video streaming will be frozen around 1 to 3 seconds.

2.2.4 firmware Upgrade

There're 2 ways to upgrade the firmware of a XGS3700 stack:

Web GUI

FTP

The following figure shows how to do the firmware upgrade through the web GUI.

Note:

It will automatically copy to all other slots which are active on the stacking group after the firmware upload to “Switch 1”. In this scenario, it will take around 3 minutes to finish upload process to two of switches.

When the “firmware upload” page shown as “success”. It means the new firmware has been uploaded to all slots and ready to reboot.

The reboot button will become no function before firmware uploads to the entire stacking group. In this scenario, it will take around 5 minutes to finish upload process. If the stacked switches are up to 8. It will take more time to finish all the upgrade process for all switches. Please wait for 10 more minutes till upload process done.

All the slots need to running base on the same firmware. When process the firmware upgrade via web GUI. Please be sure the same firmware is applied to all slots as shown below.

The screenshot displays a web GUI for managing switch slots. At the top, a table shows two slots, 7 and 8. Slot 7 is currently 'inactive' and running 'Firmware 1'. Slot 8 is also 'inactive' and running 'Firmware 1'. Below the table, there are two sections for boot image configuration. The first section shows 'Current Boot Image' as 'Firmware 1' and 'Config Boot Image' as 'Firmware 1'. The second section is for upgrading the internal switch firmware, with a dropdown menu set to 'All' and an 'Upgrade' button highlighted. The 'File Path' field is empty, and the status is 'No file chosen'.

7	inactive	Running Firmware 1
8	inactive	Running Firmware 1

Current Boot Image: Firmware 1
Config Boot Image: Firmware 1

Apply Cancel

To upgrade the internal switch firmware, browse the location of the binary (.BIN) file and click Upgrade button.

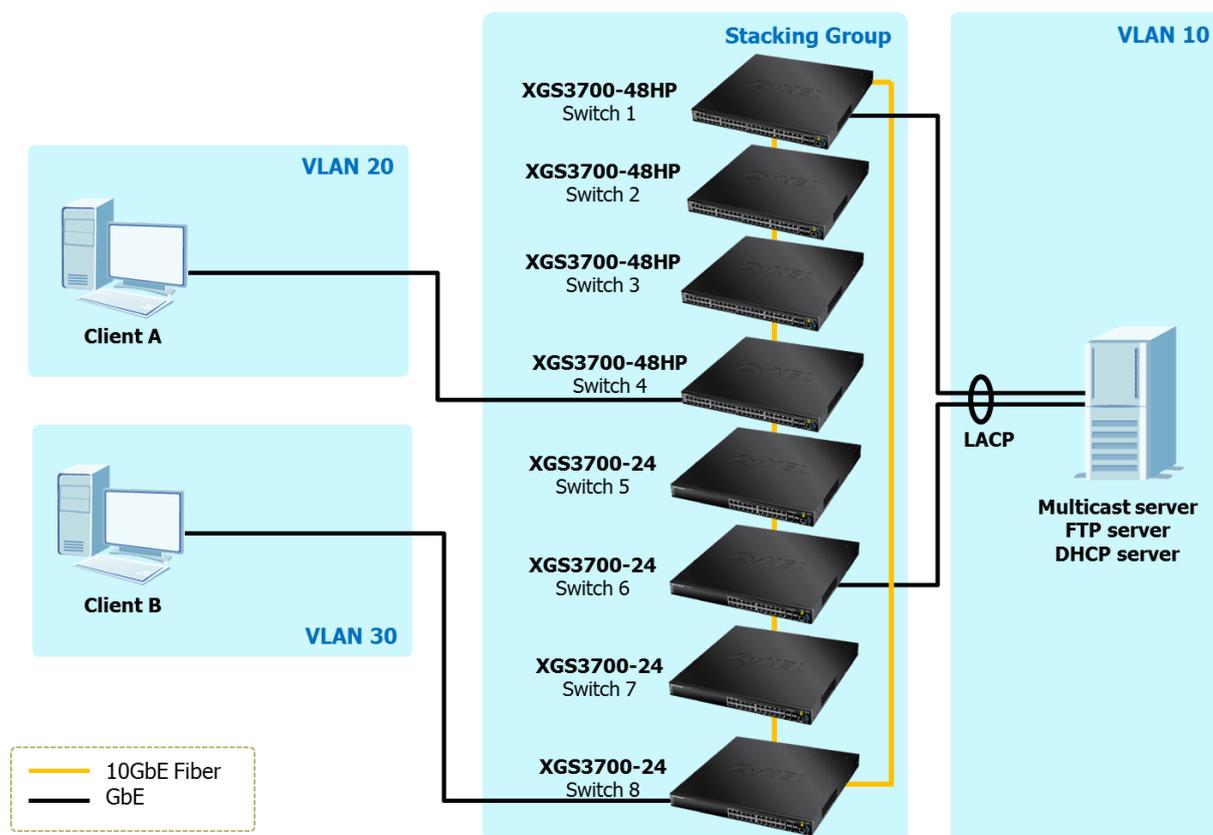
All Firmware 1 File Path Choose File No file chosen

All
SLOT 1
SLOT 2

Upgrade

3. Scenario Two: Stack eight Switches

3.1 Topology



3.2 Application Scenario

In this scenario, number of switches increase to the max support number of 8 of XGS3700 switches. In addition to the FTP, video streaming and LACP like in scenario 1, the following features will be enabled and tested:

- DHCP Snooping / ARP inspection
- Broadcast Storm Control
- Mirror
- QoS
- Loop Guard
- SNMP
- LLDP

The main propose is to understand how stacking role election works. Also to ensure 8 switches are able to function as one logical switch with selected features.

The “Switch 1” to “Switch 4” are using XGS3700-48HP. “Switch 5” to “Switch 8” are using XGS3700-24.

Force master enable on “Switch 1” to function as master role and “switch 2” function as backup role in this case.

8 switches are interconnected as a ring.

3.2.1 Stacking Role Election

Master role is acting as main stacking controller. The main function for stacking master is to process all the control packets, operation and also to maintain the configuration file.

There are two modes to elect master role, first is “force master mode” and the second is “auto mode”; with auto mode, master role will be elected automatically. The “auto mode” election priority will be “force master → priority number (0-63) → system uptime → MAC address” (from high to low)

“Force master mode” has highest priority; administrator can enable the master role on selected switches.

Priority number has default value of 32, and the highest number is 63, by manually assign the priority number on switches could also decide the master role.

If multiple switches have enabled “force master mode” with same priority. The switch will compare with system up time and MAC address. Keep in mind, the election priority is “force master → priority number (0-63) → system uptime → MAC address” (from high to low)

In this test scenario, “Switch 1” is configured as master with “force master enable”. When turn off “switch 1”, “Switch 2” will take over master role within 10 seconds. 3 to 5 ping lost are expected for LACP convergence.

When turn on “Switch 1” again, “Switch 1” will take over the master role due to its

“force master enable” setting. It will take 70 seconds for master change and 70 seconds of ping lost are expected.

If turn on/off any line card (SW3-SW8) or add/remove any line card (besides the master & backup master). 0 to 1 ping lost are expected for LACP convergence.

Caution:

When master switch is turned off then back online, as “Switch 1” has “force master enable” the entire stacking group will trigger the re-initialization process. It will take around 70 seconds to finish the re-initialization. During this process, the whole stacking units will not be forwarding any data.

To avoid the situation, enable force master on “Switch 2” before putting back the “Switch 1”. Master will still keep on “Switch 2” due to its longer system up time.

3.2.2 Configuration File Backup / Restore

The configuration file maintained by master switch on stacking mode. All others switches on stacking group will sync with master switch when:

- Click “Save” button on web GUI or type “write memory” on CLI.
- New master join stacking group. All configuration file will sync with new master.
- New line card install. Line card will sync configuration file with master.
- Configuration file restore.

Caution:

if in an event that master goes down and need to be replaced with a new switch, please ensure the new switch has ONLY default stacking configuration and the “force master mode” must be disabled. To avoid the trigger of master re-election process which can cause the whole stacking configuration loss.

In stacking mode, during the backup take over it will apply startup config again. ONLY save configuration will apply startup configuration to all the switches. Please ensure to save configuration after any configuration change. Or configuration will not sync to backup and the modified configuration will be lost after master power off.