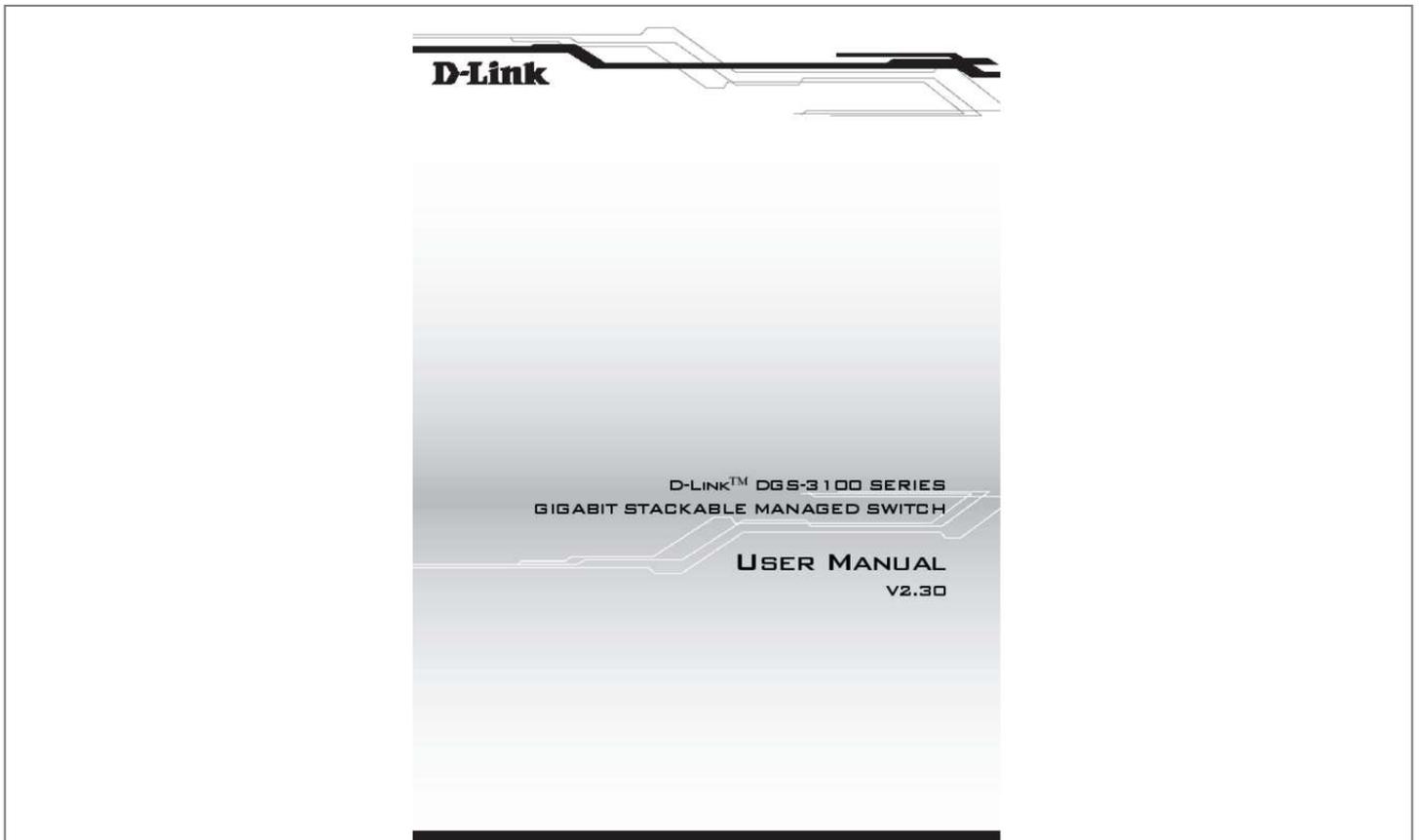




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**Manual abstract:**

**FCC Warning** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. **eMark Warning** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures. **62 Notes about VLANs on the DGS-3100 Series . 204 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Preface** This preface provides an overview to the guide, and includes the following sections: i System Overview Viewing the Device Device Management Methods User Guide Overview Intended Audience Notes, Notices, and Cautions Safety Cautions General Precautions for Rack-Mountable Products i DGS-3100 Series Gigabit Stackable Managed Switch User Manual System Overview The DGS-3100 series and the DGS-3100-24TG Gigabit Ethernet Switches enhance networks by providing a powerful switch that eliminates network bottlenecks, enabling network administrators to fine tune network configurations. The DGS-3100 series and the DGS-3100-24TG are perfect for departmental and enterprise connections, and are ideal for backbone and server connections. Viewing the Device The devices described in this section are stackable Gigabit Ethernet Managed Switches.

Device management is performed using an Embedded Web Server (EWS) or through a Command Line Interface (CLI). the device configuration is performed via an RS-232 interface. This section contains descriptions for the following: i The DGS-3100 series also provides 4 Mini-GBIC (SFP) combo ports which connect fiber optic media to switches, servers, or network backbone. The DGS-3100 series provides an additional RS-232 port (console port) for managing the switch via a console terminal or PC with a Terminal Emulation Program. Figure 1 DGS-3100 Series 48 Port Front Panel DGS-3100-24TG Front Panel The DGS-3100-24TG provides eight high performance 1000BASE-TX ports.

the ports operate at 10/100/1000 , and connect to backbones , end-stations , and servers. The DGS-3100-24TG also provides 16 Mini-GBIC (SFP) ports which connect fiber optic media to switches, servers, or network backbone. The DGS-3100-24TG provides an additional RS-232 port (console port) for managing the switch via a console terminal or PC with a Terminal Emulation Program. Figure 2 DGS-3100-24TG Front Panel ii DGS-3100 Series Gigabit Stackable Managed Switch User Manual Device Management Methods The DGS-3100 series and DGS-3100-24TG provide different methods for managing the device including: i Web Based Management Interface SNMP-Based Management Command Line Console Web Based Management Interface Once the device is installed, network managers can configure the switch, monitor the LED panel, and display statistics graphically via a web browser, including: i SNMP agent decodes the incoming SNMP messages, and replies to requests with MIB objects stored in the database. The SNMP agent updates the MIB objects to generate statistics and counters.

Command Line Console The device also supports device configuration using the Command Line Interface. a terminal is connected to device via the serial console port. User Guide Overview This section provides an overview to the DGS-3100 series and the DGS-3100-24TG Switch Manual, including the guide structure and a chapter overview: i Section 1, Getting Started Provides general background for understanding and using the Boot/Startup Menu and the Embedded Web System, including an explanation of the interface buttons and general system functions. Section 2, Defining the Basic Device Configuration Provides information for viewing system information, defining IP addresses, managing stacking, defining ports, configuring SNMP management, and defining the system time settings. section 3 , Configuring L2 Features Provides information for enabling and configuring Jumbo frames , VLANs , Trunks (LAGs) , Traffic Segmentation , Multicast forwarding , Spanning Tree and LLDP. Section 4, Configuring Quality of Service Provides information for ability to implement QoS and priority queuing within a network. section 5 , Security Features Provides information for enabling and configuring device security. Section 6, Monitoring the Device Provides information for monitoring the device. section 7 , Managing Power over Ethernet Devices Provides information configuring the PoE function. Section 8, Defining Access Profile Lists Provides information for configuring the ACL.

Intended Audience The DGS-3100 series/DGS-3100-24TG User Guide contains information for configuring and managing the DGS-3100 series/DGS-3100-24TG Switches. This guide is intended for network managers familiar with network management concepts and terminology. Iii DGS-3100 Series Gigabit Stackable Managed Switch User Manual Notes, Notices, and Cautions NOTE: A NOTE indicates important information that helps you make better use of your device. NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem. CAUTION: A CAUTION indicates a potential for property damage , personal injury , or death. Iv DGS-3100 Series Gigabit Stackable Managed Switch User Manual Safety Cautions Use the following safety guidelines to ensure your own personal safety and to help protect your system from potential damage. Throughout this safety section, the caution icon ( ) is used to indicate cautions and precautions that you need to review and follow. To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions. i Do not service any product except as explained in your system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose you to electrical shock. Only a trained service technician should service components inside these compartments. If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider: a The power cable, extension cable, or plug is damaged. The product has been dropped or damaged. The product does not operate correctly when you follow the operating instructions. i Keep your system away from radiators and heat sources.



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Also, do not block the cooling vents. Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the system gets wet, see the appropriate section in your troubleshooting guide or contact your trained service provider. Do not push any objects into the openings of your system. Doing so can cause a fire or an electric shock by shorting out interior components.

Use the product only with approved equipment. Allow the product to cool before removing covers or touching internal components. Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company. To help avoid damaging your system, be sure the voltage selection Switch (if provided) on the power supply is set to match the power available at your location: 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan 230 V/50 Hz in most of Europe, the Middle East, and the Far East. Also be sure that attached devices are electrically rated to operate with the power available in your location. Use only approved power cable(s).

If you have not been provided with a power cable for your system or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product. To help prevent an electric shock, plug the system and peripheral power cables into properly grounded electrical outlets.

These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs. Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip. To help protect your system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS). Position system cables and power cables carefully; route cables so that they cannot be stepped on or tripped over. Be sure that nothing rests on any cables. Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications.

Always follow your local/national wiring rules. When connecting or disconnecting power to hot-pluggable power supplies, if offered with your system, observe the following guidelines: Install the power supply before connecting the power cable to the power supply. Unplug the power cable before removing the power supply. If the system has multiple sources of power, disconnect power from the system by unplugging all power cables from the power supplies. Move products with care; ensure that all casters and/or stabilizers are firmly connected to the system.

avoid sudden stops and uneven surfaces. General Precautions for Rack-Mountable Products Observe the following precautions for rack stability and safety.

Also refer to the rack installation documentation accompanying the system and the rack for specific caution statements and procedures. Systems are considered to be components in a rack. Thus, "component" refers to any system as well as to various peripherals or supporting hardware.

**CAUTION:** Installing systems in a rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack. After installing system/components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and may result in serious injury. Before working on the rack, make sure that the stabilizers are secured to the rack, extended to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack. Always load the rack from the bottom up, and load the heaviest item in the rack first. Make sure that the rack is level and stable before extending a component from the rack. Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers. After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.

Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed the terminal emulation application, such as HyperTerminal, may display the progress of the loading process. After software downloads, the device reboots automatically. Refer to the Set Terminal Baud-Rate section to define the Terminal Baud-Rate. Set Terminal Baud-Rate Use the Set Terminal Baud-Rate option to define the Baud-Rate. The Baud-Rate is the serial bit rate used to communicate with the management host. 2 DGS-3100 Series Gigabit Stackable Managed Switch User Manual The following prompt is displayed: Set new device Baud rate: \_ 2. press Enter to apply changes. Defining Stacking Units Use the Stack menu option to display the current stack unit ID list and define an alternative unit ID (stack membership number). Unit ID 0 is allocated for auto-numbering, which is the factory default.

The following prompt is displayed: Stack menu [1] Show unit stack id [2] Set unit stack id [3] Back Enter your choice or press ESC to exit: 2. To display the current unit stack ID list, press ESC. The following prompt is displayed: Stack menu [1] Show unit stack id [2] Set unit stack id [3] Back Enter your choice or press ESC to exit: Current working mode is stacking. The following prompt is displayed: Stack menu [1] Show unit stack id [2] Set unit stack id [3] Back Enter your choice or press ESC to exit: Enter unit stack id [0-6]: 3 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Using the Web-Based User Interface This section contains information on starting the D-Link Embedded Web Interface. Ensure that pop-up blockers are disabled.

If pop-up blockers are enabled, edit, add, and device information messages may not open. 2. Enter the device IP address in the address bar and press Enter.



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The user interface provides access to various switch configuration and management windows, allows you to view performance statistics, and permits you to graphically monitor the system status. The screen captures in this Guide represent the DGS-3100-48 48 port device.

The Web pages in the 24 port and the DGS-3100-24TG devices may vary slightly. 4 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Understanding the D-Link Embedded Web Interface The D-Link Embedded Web Interface Device Information Page contains the following information: View

Tree View Zoom View Menu Information View Device Information View Stacking Status View Description Displays the different system features, and configuration options. Located at the top of the home page, the port LED indicators provide a visual representation of the ports on the D-Link front panel.

Located in the main part of the home page, the device view provides a view of the device, an information or table area, and configuration instructions. Located at the bottom left corner of the home page, the stacking status view provides a graphic representation of the stacking links and ports status. Device Information Page The following table describes the main 6 areas on the Device Information Page: View 1. Zoom View 5 Description Select the folder or window to be displayed. The folder icons can be opened to display the hyperlinked menu buttons and subfolders contained within them. Presents Switch information based on the selection and the entry of configuration data Presents the Save button, a menu for accessing device tools, and a menu for Stack ID selection. Presents a graphical near real-time image of the front panel of the Switch.

This area displays DGS-3100 Series Gigabit Stackable Managed Switch User Manual View Description the Switch's ports and expansion modules, showing port activity, duplex mode, or flow control, depending on the specified mode. Various areas of the graphic can be selected for performing management functions, including port configuration Provides access to the device logout, and provides information about the Safe Guard mode currently enabled on the device. Displaying the Stack Status Locating Devices Backing up and Restoring Configuration Files Resetting the Device Downloading the Firmware

Rebooting the System Displaying the Stack Status The Stacking Information Page provides specific information for stacked devices. For more information regarding the stacking setup, see Managing Stacking section. The LED locator is activated for 20 seconds On which the letter "L" will flash on the 7 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Backing up and Restoring Configuration Files The Config Backup and Restore Page contains fields for downloading and uploading the configuration file from the device through HTTP or TFTP server. Figure 1-3 Config Backup and Restore Page The Config Backup and Restore Page contains the following fields: Field Htp Description Indicates that the system files are backed up or restored via an HTTP server. The possible field values are: Backup current setting to file "L" Backs up the current configuration files via the HTTP server. Restore saved setting from file "L" Restores the current configuration files via the HTTP server. file Type "L" Specifies the current configuration file type. The possible field values are Startup Config and Running Config.

Indicates that the system files are backed up or restored via an TFTP server. The possible field values are: Server IP "L" Specifies the TFTP Server IP Address to which files are backed up or from which they are restored. File "L" Indicates the file that is backed up or restored. file Type "L" Specifies the current configuration file type. The possible field values are Startup Config and Running Config.

Backup current setting to server "L" Backs up the current configuration files via the TFTP server. Restore saved setting from server "L" Restores the current configuration files via the TFTP server. To backup files, click To restore files, click Resetting the Device The Factory Reset Page restores the factory defaults. To restore the device to the factory default settings: 1. The factory default settings are restored once it completely reloaded, and the device 9 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Downloading the Firmware The "L" Firmware Download "L" web page is used to download the firmware files that will be used to manage the device.

X, for more details, please refer to the Release Notes. When upgrading firmware from version 1. X on the switch, the user should upgrade the boot software as well from version 1. X, TCP/UDP ports of access profile are in hexadecimal instead of decimal values. However - if the user upgrades the switch firmware from version 1. X, ACLs access rules priority did not work in firmware version 1. X, the priority is supported and it is not allowed two identical access rules priority from different access profiles. If the user download configuration file from version 1. x. X which including ACLs which has more than one rule, it might not work and there will be an error message.

The user can delete and create the ACLs again if he encountered a problem. In addition to that it was not required to configure priority to Tacacs servers in 1. X and try to download the configuration to firmware 2. x. X, he will get an error message, the same event will happened because of the Tacacs priority. The Firmware Download Page enables downloading files either via an HTTP or a TFTP server. The Firmware Download Page opens: Figure 1-5 Firmware Download Page 10 DGS-3100 Series Gigabit Stackable Managed Switch User Manual The Firmware Download Page contains the following fields: Field HTTP Download Description Indicates that the Firmware file is downloaded via an HTTP server. Unit "L" Indicates if the Firmware file is downloaded to a specific stacking member or to All stacking members. File "L" Indicates the Firmware file that is downloaded to the stack or specific device. indicates that the Firmware file is downloaded via a TFTP server.

Unit "L" Indicates if the Firmware file is downloaded to a specific stacking member or to All stacking members. Server IP Address "L" Specifies the TFTP Server IP Address from which files are downloaded. File "L" Indicates the Firmware file that is downloaded to the stack or specific device. For Http download, define the File field, or alternatively, browse to select the file. click .

The Firmware is downloaded, and the device is updated. 11 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Rebooting the System The System Reboot Page provides a method for selecting one, or all of the units to be rebooted. The System Reboot Page opens: Figure 1-6 System Reboot Page

The System Reboot Page contains the Select Unit to Reboot field. 12 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Using the Web System Components The following table contains information regarding the list of buttons: Component Name Activate Add ALL Apply Backup Cancel Clear Clear All Delete Delete VID Download Edit Factory Reset Find System Reboot Refresh Restore View All Entry Description Activates field commands Adds selected items Selects all Applies field settings Evokes backup Cancels settings Clears selected settings and fields Clears all settings and fields Deletes selected fields Deletes VLAN Identification Starts downloading system files.



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User Interface Buttons 13 DGS-3100 Series Gigabit Stackable Managed Switch User Manual 2 CONFIGURING BASIC CONFIGURATION This section contains information for viewing device information, defining IP addresses, managing stacking, defining port parameters, configuring system user accounts, configuring and managing system logs, defining the system time, and configuring SNMP system management.

This section contains the following topics: Viewing Device Information Defining System Information Defining IP Addresses Managing Stacking Defining Ports ARP Settings Configuring User Accounts Managing System Logs Configuring SNMP Configuring DHCP Auto Configuration Dual Image Services Telnet Setting 14 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Viewing Device Information The Device Information Page contains parameters for configuring general device information, including the system name, location, and contact, the system MAC Address, System Up Time, and MAC addresses, and both software, boot, and hardware versions. The Device Information Page opens: Figure 2-1 Device Information Page The Device Information Page contains the following fields: Field Device Type System Contact System Name System Location Firmware Version Hardware Version Serial Number System Time System Up Time Description Displays the factory defined device name and type. Displays the name of the contact person. Displays the location where the system is currently running. Displays the amount of time since the most recent device reboot. The system time is displayed in the following format: Days, Hours, Minutes, and Seconds. For example, 41 days, 2 hours, 22 minutes and 15 seconds. IX Status SSH Port Mirroring Description Displays the MAC address assigned to the device. Displays the IP address assigned to the device. Displays the subnet mask assigned to the device.

Displays the device default gateway assigned to the device. Indicates the amount of time after which if no user activity occurs, the device times out. Indicates if STP is enabled on the device, and provides a shortcut to viewing the STP settings. Indicates if DHCP Client is enabled on the device, and provides a shortcut to viewing the DHCP Client settings. Indicates if the Safeguard Engine is enabled on the device, and provides a shortcut to viewing the Safeguard Engine settings. Indicates if SNMP Traps are enabled on the device, and provides a shortcut to viewing the SNMP Traps settings. Indicates if Secure Socket Layer (SSL) is enabled on the device, and provides a shortcut to viewing the SSL settings. Indicates if Jumbo Frames are enabled on the device, and provides a shortcut to viewing the Jumbo Frames settings. Indicates if BPDU Forwarding is enabled on the device, and provides a shortcut to viewing the BPDU Forwarding settings. Indicates if IGMP Snooping is enabled on the device, and provides a shortcut to viewing the IGMP Snooping settings. Indicates if MLD Snooping is enabled on the device, and provides a shortcut to viewing the MLD Snooping settings. Indicates if Broadcast Storm Control is enabled on the device, and provides a shortcut to viewing the Broadcast Storm Control settings. indicates if 802.1X is enabled on the device, and provides a shortcut to viewing the 802.1X settings.

Indicates if Secure Shell Protocol (SSH) is enabled on the device, and provides a shortcut to viewing the SSH settings. indicates if Port Mirroring is enabled. To view settings for a device feature: 1. Click setting next to the feature name. The configuration page for the selected device feature opens.

The System Information Page opens: Figure 2-2 System Information Page The System Information Page contains the following fields: Field Unit ID MAC Address Firmware Version Hardware Version System Contact System Name System Location Login Timeout (minutes) 2. 17 Description Displays the stack unit ID. Displays the MAC address assigned to the device Displays the stacking memberâ€™s software version number. displays the stacking memberâ€™s hardware version number. Defines the name of the contact person. Defines the location where the system is currently running. the field range is 0-160 characters. Defines the amount of time the device times out when no user activity occurs. The system information is defined, and the device is updated. dGS-3100 Series Gigabit Stackable Managed Switch User Manual Defining IP Addresses The IP Address Page contains fields for assigning IP addresses.

Packets are forwarded to the default IP when frames are sent to a remote network via the Default Gateway. The configured IP address must belong to the same IP address subnet of one of the IP interfaces. the Dynamic Host Configuration Protocol (DHCP) assigns dynamic IP addresses to devices on a network. DHCP ensures that network devices can have a different IP address every time the device connects to the network. The IP Address Page opens: Figure 2-3 IP

Address Page The IP Address Page contains the following fields: Field Static DHCP IP Address Subnet Mask Gateway Management VLAN VID 2. Description When selected, the IP address is static and user-defined in the IP Address field. This is the default value. When selected, the IP address is retrieved from a DHCP server. defines the IP address. This field is active if the IP address is static.

Defines the address mask that manages sub-netting on the network. The default gateway manages connections to other subnets and other networks. defines the management VLANâ€™s VID. Select the IP address type in either the Static or DHCP fields. If Static is the defined IP address type, define the IP Address field.

The IP address information is defined, and the device is updated. 18 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Managing Stacking Stacking enhances network flexibility by building virtual switches with more ports than are available in a single device. Stacks are managed by stacking member which called Stack Master. , All other stacking members serve as ports only. The following paragraphs provide a stacking explanation for DGS-3100 series and include the following topics: Managing Stacking Modes Advanced Stacking Building Stacks â€” Quick Start Stack Management Examples Configuring Stacking Managing Stacking Modes A switch operates in the following modes: NOTE: The DGS-3100 series family stacking connections have two HX ports.

Stacking - Switches operating in Stack mode run as organized group of switches known as a Stack. a stack consists of one Stack Master , a Backup Master , and up to four Stack Member Switches. However, in specific scenarios, a single unit can be considered a Stack of One. A Stack of One is a single unit which is not connected to any other stacking members. If the unit is reset to the factory defaults, the unit is reloaded in stacking Auto-Numbering mode. Unit ID and how they are allocated â€” stacking member start up process. This section contains the following topics: Allocating Unit IDs Assigning Unit IDs Allocating Unit IDs Switches are shipped from the factory without a Unit ID and in Auto Assign mode.



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All switches must be assigned a Unit ID before switches can operate as stacking members. More than one stacking member cannot receive the same Unit ID. Unit IDs are assigned by:

- Unit IDs that are assigned by the system administrator and can only be changed manually by the system administrator.

If the system administrator does not set the Unit IDs manually, the Auto Assign initializes the switches when they are powered up. From the switches who are automatically assigned a Unit ID, one of the stacking members is assigned the Unit ID 1. That stacking member is the Stack Master. If there were more than one switch in the stack, there is a Master Election and Backup Master Election process. Following the Master Election process, the other stacking members are assigned a Unit ID by the stack Master. For more information on the Master Election process, please see Electing a Stacking Master. Stacking members maintain the assigned Unit ID even after the stacking member is rebooted. The Stack Master may reallocate IDs during system initialization to resolve duplicate ID conflicts. Manually assigned IDs cannot be changed by the Stack Master, even if there is a conflict. 19 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Unit ID assignments or modifications are effective only during system initialization, and do not occur during the system uptime.

Stacking members do not have to be numbered in sequence, and can be interconnected, as long as each stacking has a unique ID, and at least, one stacking member serves as the Stack Master. assigning Unit IDs Each stacking member has an assigned unique Unit ID. Unit ID numbers are assigned as follows:

- Unit ID 1 - Assigned to the Stack Master. The Stack Master is indicated by the Master LED on front which is lit solid green.
- Unit ID 2 - Assigned to the Backup Master
- Unit ID 3, 4, 5, and 6 - Assigned to Stacking members.

NOTE: There are cases in which a unit to which Unit ID 1 is assigned is not the stack Master but a Backup Master. This section contains the following topics:

- Defining a Stacking Master
- Defining a Stacking Backup Master
- Defining Stacking Members
- Master Enabled Stacking Members
- Electing a Stacking Master
- Defining a Stacking Master

The stacking member assigned the Unit ID 1 operates as the Stack Master. The Stack Master provides a single point of control, configuration, and management for the entire stack. In addition, the Stack Master stores all stack member configuration. The individual stacking members do not store any configuration information.

**Defining a Stacking Backup Master** The stacking member assigned the Unit ID 2 is defined as the Backup Master. In addition to being a stack member, Backup Master serves as a backup in case the Stack Master fails or disconnected. If the Stack Master fails or disconnected, the Backup Master takes over as the Stack Master. The Stack Master stores an active configuration which copied on the Backup Master. The active configuration copy is used if the Backup Master takes over for the Stack Master. only the configuration file is copied. Any dynamically filled tables, for example, learnt address, are not copied from the Stack Master to the Backup Master. If the Backup Master takes over the role of Stack Master, the Backup Master builds new dynamic tables.

**Defining Stacking Members** Switches assigned the Unit IDs 3,4,5,6 are called stacking members. The Stack Master (or Backup Master if the Stack Master fails) manages the stack members operation.

stacking members cannot be directly managed or configured. If neither the Stack Master nor the Backup Master were operating, the stacking members cannot function. Master Enabled Stacking Members Only Stacking members assigned to Unit ID 1 or 2 are called Master Enabled stacking members. Only the Master Enabled stacking members participate in the Master Election process, and therefore can become master or backup master (that means the s with assigned IDs of 3, 4, 5 and 6 can never become neither a master nor a backup master unless their ID is changed by the system administrator or reset to the factory default firstly). Electing a Stacking Master Whenever a stacking member (or more than one) comes up, one of the stacking members is elected to be the stack Master. the Stack Master is selected as follows: 20 DGS-3100 Series Gigabit Stackable Managed Switch User Manual

- If one of the master enabled stacking members in the stack was set to Force Master by the system administrator (through the GUI Stacking Master selector), that master enabled stacking member is the Stack Master. Stacking members which are defined as Force Master stacking members are manually selected as the Stack Master. Only a master enabled stacking member can be selected as the Force Master. If the stack contains more than one stacking member whose Unit ID is either 1 or 2, then one of the stacking members are elected the Stack Master. It does not matter if the Unit ID was originally automatically or manually assigned. These stacking members are called Master Enabled. If there is only one stacking member, that stacking member is selected as the Stack Master, even if the stacking member's Unit ID is 2. If there are more than one stacking members, the two stacking members decide which stacking member is elected Stack Master by checking: Which stacking member has been running for a longer time. the up-time is measured in increments of 10 minutes. The stacking member running the longest is elected the Stack Master.

- If they have been running for the same amount of time, the stacking member with the Unit ID 1 is the stack Master. If both stacking members have been running for the same amount of time, and both stacking membes have the same Unit ID, the stacking members with the lowest MAC address is selected as the Stack Master. The other unit is rebooted and is assigned the Unit ID 2. If the stack contains one or more stacking members set to the factory default states, and there is no Unit ID assigned to a stacking member, then the Stack Master is one of these stacking members. The stacking member selected to be the Master is the stacking member running for the longest time.

If all stacking members are running the same amount of time, the stacking member with the lowest MAC address is selected as the Stack Master. The Stack master has a Unit ID of 1 and the Backup Master has a Unit ID of 2 (if a Backup Master was included in the stack). If a Master Enabled stacking member, a Unit ID of 1 or 2, is added to a stack and powered on, the newly added switch invokes Master Election process. The Master Election process occurs even though the stack has an elected master. However, the newly added switch loses in the election process (lower up-time) and joins the stack as a stacking member or Backup Master. Stack Startup Process When a stacking member is initialized, either powered up or rebooted, the stacking member goes through the same exact process including:

- Allocating Unit IDs/Resolving Unit ID Conflicts
- Unit and Stacking Port Configuration
- Discovering the Stacking Master

When a stacking member is initialized in stack mode, the stacking member's behavior depends on its Unit ID.



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• If the stacking member does not have a current Unit ID the stacking member operates in Factory Default mode. If there is a Stacking Master, the stacking member is assigned a Unit ID through Unit ID Allocation. The stacking members receive a Unit ID from the Stacking Master. If the stack does not have a Stacking master then the switch participates in Master-Election, and may be elected either the new Stacking Master or Backup Master.

If the stacking member's current Unit ID is 1 or 2, the stacking member participates in the Master Election. For example, the Unit ID was previously allocated, or the stacking member was in a different stack. If the stacking member has a current Unit ID the stacking members attempts to use the Unit ID in the new stack. If the stacking member current ID is 3, 4, 5, or 6, then the stacking members attempts to connect to the running Stack Master. The new stacking member does not proceed to the next stage until there is contact with the Stack Master. These stacking members do not participate in the Master Election process, and if no Stack Master is present, the stacking members' network ports are shut down. Only the stacking ports are operational. Both the Stack Master and all other stacking members carry out a continuous process of Master Discovery by frequently exchanging stack control messages. This allows the stacking members to discover when a stacking member fails or is unreachable. 21 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Allocating Unit IDs/Resolving Unit ID Conflicts Once the Stack Master is elected, it allocates the Unit IDs to the stacking members that do not have a Unit ID.

Stacking members that do not have a Unit ID operate in the Factory Default mode. In addition, the stack Master attempts to resolve all duplicate Unit IDs occurrences among stacking members. The Stack Master reallocates the duplicate Unit ID if there are available Unit IDs. If two stacks are merged, stacking units that were initially in the Stack Master's sub-group retain their Unit ID. New stacking member are allocated new Unit IDs.

If a conflict occurs after the stacking members are rebooted, the following occurs: • If both duplicate stacking members are in Auto Assign mode, then the Unit ID is assigned by the MAC address. The stacking member with the lowest MAC address maintains its Unit ID. The other stacking member is assigned a new Unit ID. If one of the stacking members with duplicate Unit IDs is in Auto Assign mode and the other stacking member is in manual mode, the stacking member in Manual mode maintains its Unit ID. The other stacking member is assigned a new Unit ID. .

Stacking members are shut down if: • If both duplicate stacking members are in Manual mode then both stacking members are shut down. If the Stack Master is able to allocate a Unit ID to each stacking member, then all stacking members operate as a stack. If the Stack Master is unable to allocate a Unit ID to any stacking member, that stacking member is effectively shut down and does not participate in the stack. Stacking members with a conflicting manually set ID are shut down as the Stack Master cannot override the system administrator's Unit ID assignment to resolve the conflict. If there are more stacking members than the maximum number allowed in a stack, and the incoming stacking members are already in Factory Default mode, the Stack Master is elected following Master Discovery and Master Election processes. All other stacking members are shut down in some extreme cases, due to during the boot process, where some stacking members may be connected and join the stack. If the new stacking members are already assigned a Unit, then the new stacking members cannot join the stack. The switches are remains shut down. If a stacking member is shut down, the stacking members stacking links are inactive. Moreover, if the stacking members are connected in a chain topology, the shut down of one stacking member breaks the chain.

This may cause other stacking members to be disconnected and shut down if the stacking members have no active link to the Stack Master. Unit and Stacking Port Configuration Each stacking member has a Unit ID; one of the stacking members is the stack Master, and, possibly, one of the stacking members serves as Backup Master. The Stack Master now configures each stacking member according to the Configuration file stored on the Stack Master. If the stack has a Backup Master the Configuration file are also be copied to the Backup Master. Once all the stacking members are configured, the stack proceeds to a normal operational mode. If any change is made to the system configuration, the change is stored by the stack Master and is copied to the Backup Master. 22

DGS-3100 Series Gigabit Stackable Managed Switch User Manual Building Stacks Quick Start The DGS-3100 series supports the following stacking scenarios: • Building a new stack from scratch • Increasing the stack by adding units to an existing stack This section contains the following topics: • Stack Resiliency Managing a Self-Ordered Stack Managing a New Manually Ordered Stack Stack Resiliency Topologies of stack can be either Ring or Chain.

Best practice is to configure the stack in Ring topology, due to the high resiliency in case of unit failure or stacking link failure. Additionally, in case of redundant power supply usage it is recommended to make sure that Master and Backup Master s are connected to a redundant power supply. managing a Self-Ordered Stack This section describes managing a self-ordered stack.

Self-Ordered stacks are automatically assigned Unit IDs by the system through the Master Election process. This section contains the following topics: • Building a New Self-Ordered Stack Adding Members to a Self Ordered Running Stack Building a New Self-Ordered Stack To build a self ordered stack: 1. Connect the units physically through the stacking ports. 2. Turn on the units.

After a short interval the stack will become operational with one of the units selected as the Master of the stack. The Master and Backup selection is known as Master Election. Master Election takes place if there are one or more eligible candidates contending to be the Master unit. The Master Unit is indicated by the green Master LED on the front panel. The Master LED is located near the Unit ID LEDs.

If a serial console is connected, the serial cable must be connected to the Stack Master console port since the only operational console port in the stack is the one of the Master unit. NOTE: To reset the stacking members to the factory defaults, press the Reset button for at least 5 seconds. adding Members to a Self Ordered Running Stack 1. Reset the new stacking units to the factory defaults by pressing the Reset button (optional). 2. Connect the stacking members physically to the stack.



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3. Turn on the switches, the new units will become stacking members. managing a New Manually Ordered Stack System administrator can also manually assign Unit IDs to stacking members. System administrator has to assign a unique Unit ID from 1 to 6 to each stack member.

A Unit ID that is manually assigned is not subject to automatic numbering. The Unit IDs are assigned as follows:   
• The Stack Master is indicated by the Master LED on front which is lit solid green. Unit ID 2 - Assigned to the Backup Master Unit ID 3 4, 5, 6   
• Assigned to the Stacking member. Building New Manually Ordered Stacks Adding Stacking Members to an Existing Manually Ordered Stack Building New Manually Ordered Stacks To build new a self ordered stack: 1. Connect the units physically through the stacking ports. 2. Turn on the units, one at a time. 3. Assign the Stack Master the Unit ID of 1 using a Stack Management Interfaces either the console port, Telnet, or Embedded Web Interface. 4.

Assign the Backup Master the Unit ID of 2 using a Stack Management Interfaces either the console port, Telnet, or Embedded Web Interface. 5. Assign the remaining stacking members using a Stack Management Interfaces either the console port, Telnet, or Embedded Web Interface. 6. Ensure that none of the stacking members have the same Unit ID.

Reset the new stacking units to the factory defaults by pressing the Reset button. 2. Connect the stacking members physically to the stack. 3. Turn on the switches, the new units become stacking members, but with automatically assigned Unit IDs.

4. Reassign the Unit ID manually to each of the newly added stacking members using a Stack Management Interfaces either the console port, Telnet, or Embedded Web Interface. This step is optional, and the stack is operational even if some unit IDs were manually configured while others are self-assigned. 5.

Reboot the stacking members to ensure the Unit ID is permanent. Stack Management Examples This section contains information for troubleshooting stacking, and includes the following topics:   
• Replacing Failed Stacking-Members in a Running Stack Replacing a Failed Stack Master Dividing Stacks Merging Stacks Stacking Cable Failure Inserting Excess Stacking Members Replacing Failed Stacking-Members in a Running Stack This example assumes that a stacking member, other than master, has failed in a running stack, when the system administrator is notified of the system failure the stacking member is removed and replaced with a new switch. When the stacking member fails, the Stack Master identifies the failed stacking member using the Master Discovery process. The Stack Master recognizes that the stacking member no longer responds. If the stack topology was ring topology, the Stack Master directs all other stack members to route traffic around the failed stacking member. At the same time the Stack Master notifies the system administrator of the failure using SYSLOG messages and SNMP traps.

When the failed stacking member is disconnected from the stack, all traffic is routed around the failed stacking member as stated above. As long as all other stacking connections are intact, the stack continues to run. When a new stacking member is inserted and the stack is powered up, the following occurs:   
•

The new stacking member which is in stacking mode, performs the Master Discovery process, and perhaps participates in a Master Election . For more information on the Master Election process, see Electing a Stacking Master. 24 DGS-3100 Series Gigabit Stackable Managed Switch User Manual   
• If the new stacking member has a Unit ID of 1 or 2, i. e. The stacking member is a master enabled unit, the new stacking member initiates the Master Election process. However, since the running Stack Master has a longer up-time, it remains the Stack Master and the new stacking member does not become a new Stack Master. If the new stacking member has a Unit ID of 3 to 6, the new unit attempts to become a stacking member, and is subject to the already running Stack Master. The Master Election process does not occur.

• If the new stacking member was in Factory Default mode (the unit does not have an assigned Unit ID). The new stacking member is assigned the lowest available Unit ID by the Stack Master. It is strongly recommended that automatic assigned Unit ID mode be used since it provides improved stack resiliency.

• If the new stacking member already has an assigned Unit ID, and that Unit ID is unused in the current stack, the new stacking member retains its assigned Unit ID. The Stack Master applies any configuration relevant to that Unit ID.

If the new stacking member already has an assigned Unit ID, and that Unit ID conflicts with an existing Unit ID the Stack Master reallocates a new Unit ID to the new stacking member. . The lowest available Unit ID is applied to the new stacking member. This occurs only if new stacking member does not have a manually assigned Unit ID, which the Stack Master cannot change. If the new stacking member cannot be assigned an available Unit ID, then the new stacking member is effectively shut down and cannot join the stack. For example, the stacking member replacement can only occur if the new stacking member has a manually assigned Unit ID.

The Stack Master now performs Unit and Stacking Port Configuration for the new stacking member. Any configuration information which the Stack Master stores that is relevant to the Unit ID is assigned to the new stacking member. If the new stacking member was assigned the same Unit ID of the replaced stacking member, then the new stacking member receives the same configuration as the failed stacking member. If the new stacking member is identical to the replaced stacking member, the entire configuration of the replaced stacking member is applied to the new stacking member. The stack reverts to the stacking state it was running in before stacking member failed. However, sometimes the new stacking member is not identical to the failed stacking member. The Stack Master applies the configuration as follows: If a 24-port switch replaces a failed 48-port switch, then the new stacking member's ports are configured according first 24 ports configuration of the failed stacking member. NOTE: The 48 port configuration of the failed stacking member is recorded, even though only the first 24 port configuration is currently applied. If a 48 port switch is inserted and assigned the same Unit ID, the switch is configured with the port configuration of the original 48 port stacking member. If a 48-port stacking member replaces a 24-port stacking member, then the first 24 ports of the new stacking member are configured according failed stacking member's ports configuration.

The remaining new stacking member ports are configured with the switch's default settings. Replacing a Failed Stack Master This example assumes that that a stacking member acting as the Stack Master has failed in a running stack.



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When the system administrator is notified of the Stack Master failure and replaces existing Stack Master with a new switch. When the Stack Master fails, the stack Backup Master recognizes the failure and that the Stack Master no longer responds and assumes the role of Stack Master. The Backup Master uses Master Discovery process to identify the failure. In case of Ring topology the Backup Master directs all other stack members to route traffic around the failed stacking member. At the same time the Backup Master notifies the system administrator of the failure using SYSLOG messages and SNMP traps. When the failed stacking member is disconnected from the stack, all traffic is already routed around the failed stacking member. If all other stacking connections are left intact, the stack keeps running. When a new stacking member is inserted and powered up, the following occurs: The new stacking member performs Master Discovery process, and participates in a Master Election process.

For more information on the Master Election, see Electing a Stacking Master. If the new stacking member has a Unit ID of 1 or 2, i. e. The stacking member is a master enabled; Master Election process is initiated. Since the running stack Backup Master has a longer run time and if the Backup Master has been running for more than 10 minutes, the Backup Master remains the elected Stack Master.

The new stacking member does not become the new Stack Master. This may result in new stacking member using 25 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Unit ID 1, and serving as the stack Backup master, while the already running stacking member with Unit ID 2 remains the active Stack Master. If the new stacking member is in the Factory Default mode, the new stacking member is assigned the lowest available Unit ID by the Stack Master. It is strongly recommended that Auto Assign mode is used to assign the Unit ID. The Auto Assign mode provides better stack resiliency. If the new stacking member already has an assigned Unit ID, and that Unit ID is unused in the current stack, the incoming stacking member is assigned Unit ID. The Stack Master applies any device configuration to the new stacking member. If the new stacking member already has an assigned Unit ID, and that Unit ID conflicts with an existing Unit ID the Stack Master reallocates a new Unit ID to the new stacking member. The lowest available Unit ID is applied to the new stacking member. This occurs only if new stacking member does not have a manually assigned Unit ID, which the Stack Master cannot change. If the new stacking member cannot be assigned an available Unit ID, then the new stacking member is effectively shut down and cannot join stack. For example, if stacking member replacement that can only occur if the new stacking member has a manually assigned Unit ID. The Stack Master performs Unit and Stacking Port Configuration for the new stacking member. Any configuration information the Stack Master retains that is relevant to the Unit ID of the new stacking member is applied. If the new stacking member was assigned the same Unit ID of the replaced stacking member, then the new stacking member receives the same switch configuration as the failed stacking member, described in Replacing Failed Stacking-Members in a Running Stack.

**Dividing Stacks** This example assumes that a working stack is divided into two groups. The stack is divided either by a failed stacking link connected to two stacking members in the stack or by a failed stacking members in a chain topology which causes disconnection between two units in the stack. In this case we should consider each sub-group as an independent running stack configuration. For each sub-group we should consider three sub options: Both the Stack Master and the Backup Master are part of the sub-group. Either the Stack Master or the Backup Master is part of the sub-group. Neither the Stack Master nor the Backup Master is part of the sub-group. When a stack is split into two parts, the following occurs in each partial stack according to the following scenario: Both the Stack Master and the Backup Master are part of the sub-group. Nothing changes, except the Stack Master recognizes the missing stacking members as removed stacking members and routes traffic around them. Since both the Stack Master and Backup Master are in this stacking section, this section is operating and the other section cannot operate. The following occurs when the stack is divided and both the Master and Backup master are in the sub-group: The Master Discovery, Master Election and Unit ID Allocation & Duplicate Unit ID Conflict Resolution processes are performed, resulting in the following: Any configuration information stored by Stack Master, which remained in the group, that is relevant to the stacking members remains unchanged.

Topology information, inter-stacking member forwarding information for transmitting traffic to any other stacking member, managed by the Stack Master includes only stacking members that remain connected after the stack is divided. The divided stack continues to operate normally, the only difference is there are less stacking members than prior to the stack division. No Unit ID changes are performed in each divided stack. The Stack Master notifies the system administrator using SYSLOG messages and SNMP traps of the removed stacking members. In addition the Stack Master also notifies the system administrator which ports belong to unreachable stacking members and are reported as Not Present.

Either the Stack Master or the Backup Master remain in the divided group 26 DGS-3100 Series Gigabit Stackable Managed Switch User Manual If the Stack Master remains in this sub-group, the behavior is the same as described above. If the Backup Master remains in this sub group the behavior is the same as described in 0 - Replacing a Failed Stack Master . NOTE: If a stack is divided into two parts with one section which containing the Stack Master, and the other section - Backup Master was operate. The following occurs if either the Stack Master or the Backup Master remains in the divided group: The Master Discovery, Master Election and Unit ID Allocation & Duplicate Unit ID Conflict Resolution processes are performed, resulting in the following: When the stack is divided and if the Stack Master remains in the split stack, the Stack Master recognizes that the stacking units were no longer responds. This occurs using the Master Detection Process.

The Stack Master notifies the system administrator using SYSLOG messages and SNMP traps of the removed stacking members. In addition the Stack Master also notifies the system administrator which ports belong to unreachable stacking members and are reported as Not Present.



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If the Backup Master remains in the split stack, when the stack is divided, the Backup Master identifies this as of the Stack Master failing. The Backup Master takes over and manages the remaining stacking members as a stack. The Backup Master retains the same Unit ID as before the stack was divided. Since the Backup Master was not acting as the Stack Master prior to the split, the Backup Master initiates a Topology Database and port learning process. Traffic can be halted for a short period until the stack is synchronized, i. New stacking members are learnt by the Backup Master and notified to the system administrator using SYSLOG messages and SNMP traps. The divided stack continues to operate normally, the only difference is there are less stacking members than prior to the stack division. No Unit ID changes are performed in each the divided stacks.

Even if each stacking section has a Stack Master, one section retains the Stack Master and the other section the Backup Master, both stacks have the same configuration and the same IP address. NOTE: If both stacks have the same IP Address, this can lead to network problem. There is no way for users to connect to any stacks through the stack IP address. If neither the Stack Master nor the Backup Master remain in the divided group. This is identical to a failed Stack Master, where no backup is available. Stacking members whose Unit IDs are 3, 4, 5 or 6 in original stack do not renumber themselves. The stacking members' network ports remain shut down until a Stack Master is enabled, is connected and is operating as the Stack Master. The Master-Discovery process recognizes that the Stack Master has been separated from the stack. The stacking members lose connection with the Stack Master. Since the stacking members started as a running stack, and the stacking members are not in the Factory Default Mode, the stacking members are not reassigned Unit IDs. resetting the stacking members will initiate Unit ID auto-assignment.

No Unit ID changes are performed in each one of the two stacking sections of the original stacks. NOTE: None of the stacking members in either stacking sections can remember themselves. 27 DGS-3100 Series Gigabit Stackable Managed Switch User Manual Merging Stacks This example assumes that the user would like to merge two working stacks. This creates one stack from two separate stacks. There are two scenarios: If new stacking members are powered down during insertion and then powered up This is identical to insert stacking members into a running stack, see Replacing Failed Stacking-Members in a Running Stack.

The only difference is that an additional stacking member is inserted into the stack. Therefore, for each stacking member inserted the same process occurs. If stacks being merged are connecting via stacking cables and, both stacks are running the following occurs: If each of the joined stacks has a Stack Master, both Stack Masters perform the Master Discovery process. Both Stack Masters participate in the Master Election process. one Stack Master is selected as the Stack Master.

The criteria for selecting a Stack Master in a merged stack as follows: Force Master If Force Master is enabled, then the Stack Master which was forced is selected. If Force Master is not enabled, the Stack Master with longest System Up Time is selected as Stack Master. If both Stack Masters have the same Up Time, the Stack Master with the lowest Unit ID is selected as Stack Master. If both Stack Master Unit IDs are equal the Stack Master with the lowest MAC address is selected. The Master Election process assigns a dynamically allocated Unit ID Reassignment of Unit ID to the other Stack Master and is performed by the new Stack Master. The switch is either allocated as a stack member or the Backup Master. There cannot be two stacking members with the same Unit ID at the process end. The Stacking Master that loses the Master election process is shut down if the Unit ID was manually allocated. It is recommended that the administrator configure the switch to Auto Assign mode before reconnecting the switch to the stack. When two stacks are combined, all of the configuration information for one of the stacks is lost.

After the discovery/election process is completed, only the new Stack Master maintains its configuration information, If one of the merged stacks had neither a Stack Master unit nor a Backup Master, then stacking members belonging to this group are inserted into the stack as in Replacing Failed Stacking-Members in a Running Stack. The Stack Master either connects stacking members to the stack using the current Unit IDs or reallocates the Unit IDs necessary. For more information see Replacing Failed Stacking-Members in a Running Stack. If two stacks are merged into one stack, both stack configuration cannot be maintained. All stacking member's dynamic information that belong to the portion of the stack that was not reelected is lost and the new Stack Master relearns the information. Stacking Cable Failure This example assumes that Stacking Connection Cables failed and caused the stack to split, as described in Dividing Stacks. When the stacking cable connection is fixed and stacking members are reconnected, it results in merging two stacks as described in Merging Stacks. This can be occurred only if the topology of the stack is Chain topology. Single stacking cable failure does not cause a stack split if a Ring topology is used.

Inserting Excess Stacking Members This example assumes that the user attempts to insert too many stacking members into a stack. All stacking members (existing and newly inserted) are powered on at the same time. A Stack Master is elected following Master Discovery and Master Election processes. A running stacking member group is added to an existing stack, assuming each one of the stack groups has an elected Stack Master. The total of existing stacking members and new stacking members exceeds the maximum allowed number of stacking members in a stack, which is 6 stacking members: Master Detection and Master Election processes determine the master out of one of two combined stacking groups. When switches are added to a running stack, the Unit ID Allocation and Duplicate ID Conflict Resolution process detects an error if too many switches are present in the stack, and no changes are to stacking members that originally belonged to the group managed by the newly elected master.

The original switches retain their ID assignments and configurations. The stacking members that originally belonged to the group managed by the Stack Master that lost the Master Election process are shut down.



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