



Configuration Guide

ActivChassis In AOS

This configuration guide describes the ActivChassis feature and its use in Adtran Operating System (AOS) products. This guide includes an overview of the feature, specific requirements used for the configuration and operation of ActivChassis, the configuration necessary to use ActivChassis, and ActivChassis troubleshooting information.

This guide contains the following sections:

- *ActivChassis Overview on page 2*
- *Hardware and Software Requirements and Limitations on page 10*
- *ActivChassis Configuration Overview on page 12*
- *ActivChassis Configuration Tasks on page 17*
- *Configuring the ActivChassis Master Device CLI on page 21*
- *Interface Configuration from the Master Device CLI on page 25*
- *ActivChassis Utility Commands from the Master CLI on page 26*
- *Linecard Device Configuration on page 28*
- *ActivChassis Configuration Scenarios on page 29*
- *Configuring ActivChassis from the Master Device's GUI on page 31*
- *ActivChassis Operational Scenarios on page 36*

ActivChassis Overview

ActivChassis is a feature in which multiple devices, such as Layer 2 or Layer 3 switches, are connected to create a virtual chassis that can be managed as a single virtual switch. In essence, multiple devices are stacked using ActivChassis ports to create a larger logical device comprised of the individual devices. This feature allows multiple devices to share resources and operate as though they are part of a larger chassis-based system, while allowing configuration and control of the logical device from a single member. In ActivChassis, each device adds its set of ports and hardware tables to form a logical device.

How ActivChassis Functions

ActivChassis functions as a virtual chassis, in which several devices are logically connected to form a larger device. The larger device is a logical construct, a virtual chassis, and is managed by one specific device (the master), which controls and coordinates the operation of the virtual chassis. The many devices connected to create the ActivChassis form a larger routing engine that is composed of the resources of the connected devices. The routing engine begins to operate over ActivChassis once the component devices are connected. ActivChassis component devices include a master device, a backup device, and a linecard device. The master device performs all control functions for the ActivChassis, including coordination of chassis functions, calculation and dissemination of shortest path topology within the chassis backplane, coordination with the backup device, and configuration of the ActivChassis itself. It also provides the management interface for the ActivChassis and the routing engine functions. In the event the master is lost, the backup device takes over as the master device, and shares its configuration and coordination of ActivChassis features with the master device. Linecard devices are neither the master nor the backup devices of the chassis, and supply their physical resources (switchports, Layer 2 and Layer 3 hardware-based forwarding tables, etc.) to the ActivChassis. Linecard devices receive their individual functions from the ActivChassis and are directly controlled by the ActivChassis master device.

Once the master and linecard devices are connected to create the ActivChassis, the routing engine begins to function over the ActivChassis. The routing engine is the network function provided by the ActivChassis (as viewed by the network to which it connects). In other words, the ActivChassis is viewed as the platform, and the routing engine uses the platform to perform certain network function, such as Layer 2 and Layer 3 switching. Once the ActivChassis is formed, it is logically identical to a standalone platform except that it has many more switchports provided by ActivChassis linecard and backup devices. All AOS functions operate over the ActivChassis platform.

ActivChassis in the Network

The following figures illustrate how ActivChassis looks internally (as a connected group of devices sharing resources) and how it looks externally to the rest of the network (as a singular device). *Figure 1* displays an ActivChassis built from four Layer 2/3 switches whose ActivChassis ports are interconnected to form a ring. *Figure 2* displays the external view of the ActivChassis as a single device.

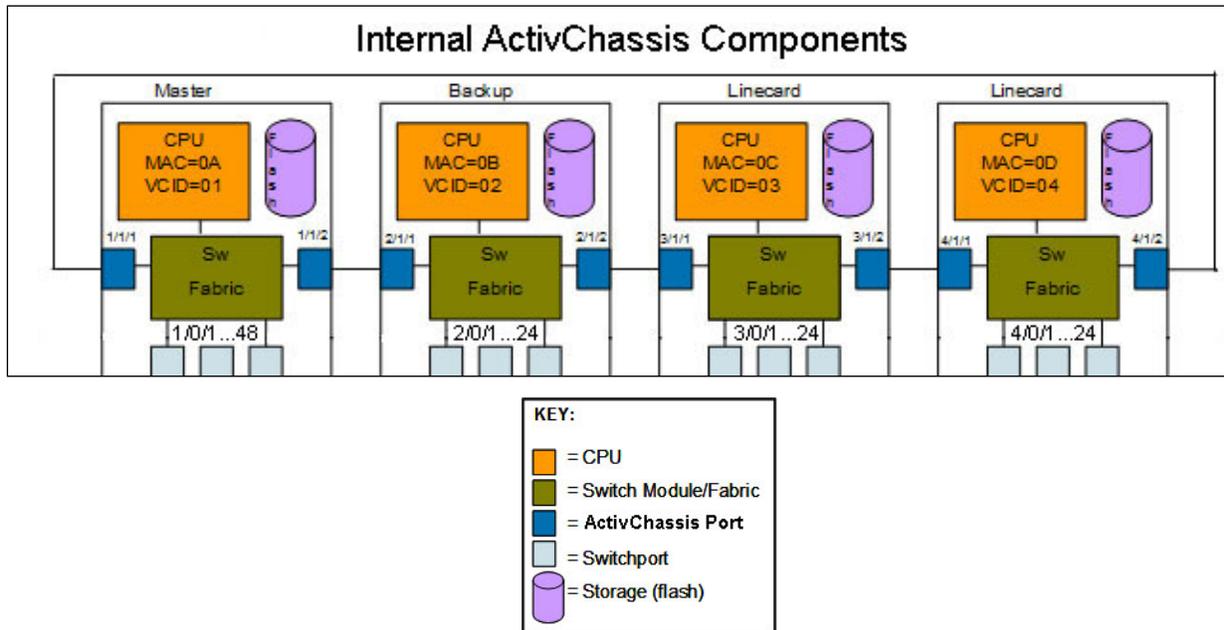


Figure 1. Internal View of ActivChassis

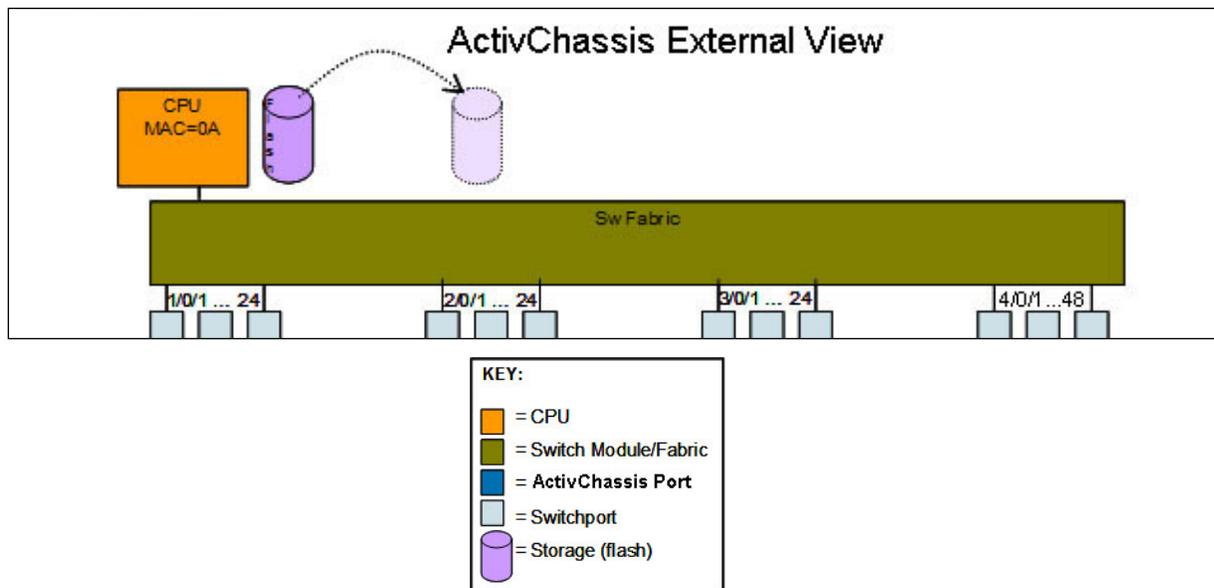


Figure 2. External Network View of ActivChassis

ActivChassis Network Topologies

ActivChassis should be configured so that a complete single or double daisy-chain ring is formed. The ring is formed when the cabling is configured so that the last device in the chain is connected to the first device in the chain. Ring topologies ensure that all devices are always connected in the event of a single device failure. In addition, for ActivChassis, the master and backup devices should be evenly spaced by linecard devices. ADTRAN recommends ring ActivChassis topologies due to the inherent redundancy they provide. *Figure 3* illustrates the single and double daisy-chain ring configurations. You can see that in a single ring (using one XIM module), the ports are connected from one device to another and a ring is formed when the last device is connected to the first device. In the double ring (using two XIM modules), two ports on each device are connected, with two rings formed when the last device is connected to the first device.

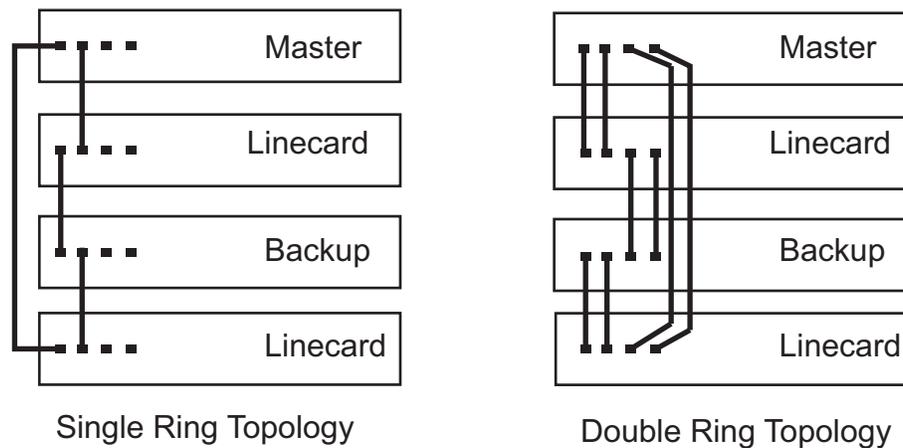


Figure 3. ActivChassis Network Topologies

ActivChassis Components

In addition to the master, backup, and linecard devices, ActivChassis includes various other components.

- It uses its own protocol that runs over ActivChassis ports to create the ActivChassis.
- It uses a new identification scheme for members of the chassis and their ports.
- It maintains a new hidden file called a manifest for configuration purposes.
- It requires that each device be assigned an ActivChassis role.

Each of these components are discussed in the following sections.

ActivChassis Protocol

ADTRAN ActivChassis Protocol (AVCP) is a lower-layer protocol that runs over ports used to create the ActivChassis. These ports are ActivChassis enabled, and use AVCP to communicate between ActivChassis ports on different devices within the ActivChassis. The protocol connects devices together to form an ActivChassis using a control plane, and uses a data plane to forward network control and data packets.

ActivChassis Identifier

ActivChassis is constructed from the shared resources of multiple ActivChassis members. Members must have similar resources, and each member must use the same local numbering scheme, so it is necessary to create a new number to identify which ActivChassis member owns a particular resource so that the resource can be identified at the ActivChassis level. This is accomplished using an ActivChassis identifier (VCID). Each device joined to the ActivChassis must have a unique VCID value. These values are configured locally on each device. Master and backup devices have a VCID of **1** or **2**. Linecard devices can be manually assigned a VCID or they are dynamically assigned a VCID by the ActivChassis master device when they join the chassis. The VCID is never assumed. Once a device has joined the chassis and received a VCID, it is critical that the VCID of a device remain the same. Only with careful planning and coordination should a device's VCID ever be changed.

Because ActivChassis devices have many of the same port types, the VCID also becomes part of the physical port ID in ActivChassis devices (logical interfaces, such as virtual local area network (VLAN) or loopback interfaces, do not include the VCID). Traditionally, ports in AOS devices have been identified by a slot/port identifier. In ActivChassis, the port ID is expanded to include the VCID, using the form `vcid/slot/port`. This expansion allows the port to be identified as unique in the ActivChassis configuration. When ActivChassis is not enabled on the device, the port continues to use the traditional slot/port identification format. When ActivChassis is enabled on the device, the current VCID of the device is combined with the slot/port identifier. The three-part identification is required when configuring an ActivChassis-enabled device. Each device that joins the ActivChassis requires a VCID which identifies the position of that device in the ActivChassis.

Only one device with a given VCID is allowed in the same ActivChassis. The VCID is stored locally on each device. Possible VCID values are **master-assigned** and **1** through **8**. The value of the VCID defines a device's configured ActivChassis role.

ActivChassis Manifest

In ActivChassis, the master device maintains a hidden file called the manifest. This file contains information about each device admitted to the ActivChassis. The file is synchronized to the file system of each ActivChassis member once the device joins the ActivChassis or a change is made to the manifest. Certain settings in the manifest are required by individual devices in order to know how to operate during bootup, before the startup configuration is loaded. Most settings are maintained by the ActivChassis master, but some settings can be stored locally (such as a VCID). The manifest contains information such as VCID, type of device (PoE or non-PoE switch), number and media type of ports, and ports with ActivChassis enabled.

ActivChassis Roles

Each device that is added to the ActivChassis is assigned a role: master, backup, or linecard. Device roles are determined by the value of the device VCID. The devices configured with VCID **1** or **2** are candidate masters. One device is elected master based on election criteria (detailed in [ActivChassis Master Election Rules on page 12](#)), and the other becomes the backup device. All other VCID values (**3** through **8**) are for linecard roles, and these devices cannot become master or backup.

Master: In this role, the device is responsible for performing ActivChassis supervision tasks to coordinate and control the logical interconnection and admission of ActivChassis members, configure the backplane forming the ActivChassis, and provide utilities necessary for chassis maintenance. The master device hosts the ActivChassis routing engine, including all data and control plane functions of the Layer 2 Ethernet

switch, and all routing functions of the Layer 3 switch. The master serves as the CPU of the routing engine that supervises the chassis, and provides the ActivChassis management interface. The master has shared resources, and therefore also contributes functionality similar to that of a linecard, by providing those resources to the ActivChassis. When a device is elected master, it restores from the local startup configuration file which represents that of the ActivChassis.

Backup: In this role, the device performs as a backup to the master device. When the master device is operational, the backup device performs as a linecard device, except that its files are fully synchronized with that of the master device. The backup device becomes the master if the master device fails or is removed from the ActivChassis. In the event a master device fails, the backup device replaces the master device and assumes ActivChassis and routing engine control.



If the original master device rejoins ActivChassis, it will be a backup device. The original master will not preempt the current master device.

When a device is admitted to the ActivChassis by the master and elected backup, it does not restore from its local startup configuration. Instead, like a linecard device, it is configured by the master (per the ActivChassis configuration). The backup also contains a saved copy of the full ActivChassis startup configuration in its local filesystem. The backup only boots from the startup configuration if it becomes the master device.

Linecard: All devices that are part of the ActivChassis, but not a master or backup device, perform as linecards. Linecard devices provide their shared resources to the ActivChassis, including switchports and local Layer 2 and Layer 3 switching tables. Linecard CPUs assist as required with operation of the chassis in such functionality as communication with the master device, local maintenance as directed by the master, and updates to the master when changes to local resources occur. This type of device is fully capable of performing as a master device and hosting the routing engine, but while it is in the linecard role it can only perform as a linecard. When a device is admitted to the ActivChassis as a linecard, it does not restore from its local startup configuration. Instead, it is configured by the master.

ActivChassis Management Views

Management of ActivChassis is analogous to the management of a single AOS device, except that resources (such as interfaces and forwarding tables) are distributed across all the devices in the ActivChassis and combined into one logical device. The main difference is that the ActivChassis appears as a Layer 2 or Layer 3 switch with many more switchports than a single AOS device. Depending on the configuration of the ActivChassis device (as standalone (non-ActivChassis), linecard, or master), the command mode and user interface views for the device differ. The following sections describe the three available management views for ActivChassis devices.

Standalone View

When a device has ActivChassis disabled, the management view is that of a standalone device with full access to all resources of the single device. No ActivChassis settings are included, except the ability to enable ActivChassis mode. This is the traditional view of any AOS product without ActivChassis. Access to the command line interface (CLI) or web-based graphical user interface (GUI) provides configuration access to the single device.

Linecard View

When a device is ActivChassis-enabled, and its VCID is not 1 or 2, the device must be admitted to an ActivChassis to complete the boot cycle and begin forwarding traffic. While attempting to detect an ActivChassis, if **Escape** is entered on the local console, the device halts booting and its management view provides the view of an ActivChassis linecard. Also, the linecard view is available after the linecard has joined the ActivChassis. The linecard view is only available from the console port of the linecard device. Linecard view can be accessed whether or not the device is a current member in the ActivChassis.

The linecard management view is a small subset of ActivChassis commands that include basic ActivChassis troubleshooting, the ability to manually change the device's VCID, and the ability to disable ActivChassis functionality and return the device to standalone mode. The running and startup configuration of the linecard device cannot be accessed, and once the linecard is a member of ActivChassis, the switchports can only be configured by the master device.

ActivChassis Master View

When a device is ActivChassis enabled, and its VCID is 1 or 2, and it is elected master, the management view of the entire ActivChassis is available from the device. This includes full access to all resources of the master device and the shared resources of all other ActivChassis members, as well as all functions of the routing engine (which runs on the ActivChassis master's CPU). This management view, whether GUI or CLI, is used to configure and manage ActivChassis.



If the device is ActivChassis enabled, and the VCID is 1 or 2 but the device is booted as the only device in the ActivChassis, it becomes master of its own ActivChassis (i.e. an unelected master) and provides the same management view as an ActivChassis master. In addition, when a device is ActivChassis enabled and admitted to ActivChassis, but is not elected master, it provides no GUI or CLI management. These devices, including an ActivChassis backup, can only be configured or managed from the current ActivChassis master device.

The routing engine, or network function provided by ActivChassis when it is viewed externally by the attached network, can be configured from the ActivChassis management interface. The ActivChassis management interface is accessed from the master device, and controls routing engine and ActivChassis configuration. ActivChassis uses the same configuration storage model as a standalone AOS device. The running configuration holds the currently active configuration, which can be written to a file (startup configuration) that is used when the device boots, and it is stored on the file system of the master and backup devices for use if the backup device becomes the master.

Console access to the ActivChassis management interface is provided when a terminal is connected to the physical console port of the current master device. Refer to the applicable quick start guide for the master device for CLI access instructions. Quick start guides are also available online at <https://supportforums.adtran.com>.



Console access to the ActivChassis is only provided on the master device. Console access on non-master devices provides access to the limited linecard view described previously.

IP management, including Telnet, SecureShell (SSH), Hypertext Markup Language (HTML), Secure Sockets Layer (SSL), or Simple Network Management Protocol (SNMP), can be accessed using any allowable IP address. IP addresses are typically assigned to logical interfaces (VLAN, loopback, etc.) and since the master device's CPU hosts the ActivChassis routing engine, IP addresses are always owned by the current master device. IP management is the recommended management method for ActivChassis.



*If devices with a VCID of 1 or 2 are both present in the ActivChassis, either device can be master at any given time. Those devices can be physically separated, making it difficult to manage or change console port access to the ActivChassis. Therefore, it is highly recommended that IP management be used for configuration since the current master device always owns the IP addresses of the ActivChassis. In the linecard management view, you can identify the master device using the **show activchassis** command (refer to [Linecard Device Configuration on page 28](#)).*

Activating or Deactivating ActivChassis

AOS products that support ActivChassis configuration are shipped with ActivChassis disabled by default. In addition, AOS products that are upgraded to firmware that supports ActivChassis have the feature disabled by default. In both cases, the AOS product will operate in standalone mode until a console or front panel command is issued to enable ActivChassis on the product, and then ActivChassis configuration can begin. The **activchassis vcid** command specifies a VCID, creates a manifest, and defaults ports capable of supporting ActivChassis to ActivChassis mode (however, the final mode of the port will be what is configured in the startup configuration, if any). If the VCID is set to 1 or 2 (master candidate), the startup configuration is preserved, so it is available as a basis for ActivChassis configuration. If the VCID is any other value, the startup configuration is erased since the device will be a linecard in the ActivChassis configuration, and the device will be configured by the ActivChassis master.

In addition, a device with ActivChassis enabled can be converted to a state in which ActivChassis is disabled. When ActivChassis is disabled, the default mode for ActivChassis ports becomes **access**. The device no longer exercises its ActivChassis capabilities, and it operates strictly as a standalone device. The ports no longer rely on the three-part identifier, but return to the two-part slot/port identifier.

ActivChassis Operating Modes

When ActivChassis is enabled on AOS devices, and the master or backup device (VCID 1 or 2) is booted, ActivChassis configuration can begin. The ActivChassis configuration moves through different operating modes, beginning with open mode, then device admission, connectivity, and management interface access. The following sections discuss these operating modes.

Open Mode

Open mode allows a master and backup device to become part of an ActivChassis with minimal configuration. Once the master and backup devices are configured, linecard devices can be added to the ActivChassis system. In open configuration mode, any device can join the ActivChassis as long as the device limit is not exceeded and the device meets admission requirements. In this mode, the master and backup VCIDs must be manually assigned. Linecard VCIDs can be set manually, or they can be dynamically assigned by the master when they are added to the ActivChassis.

Linecard Device Admission

Once the master and backup devices are configured, linecard devices can be added to the ActivChassis system. When a device attempts to connect to the ActivChassis, it must pass the admission policy set forth by the active master device. All devices must be of the same model as the master device. If a device has previously been admitted to the ActivChassis, its hardware modules must be exactly as they were when previously admitted. For example, if a previously admitted device had a stacking card in slot 1, and an SFP+ card in slot 2, then when that device is readmitted to the chassis it must have a stacking card in slot 1 and an SFP+ card in slot 2.



Although all devices in ActivChassis must be of the same model as the master device, Power over Ethernet (PoE) and non-PoE switches of the same model can be used.

If ActivChassis communication is successful, but device admission is rejected, an event is generated on the ActivChassis master console. The event provides an explanation of the admission failure. The failure information is available from the **show ActivChassis detail** command on the ActivChassis master.

Linecard Connectivity States

When a linecard device is connecting or connected to ActivChassis, there are three states in which the device can be: not admitted, connected, or lost master.

The **not admitted** state indicates the linecard device did not detect an ActivChassis, or that the linecard was denied admission to the ActivChassis. If the device has a VCID other than 1 or 2, it will continue to attempt to connect to the ActivChassis. Troubleshooting can be accomplished from the linecard management view. If the device has a VCID of 1 or 2, it restores from its local startup configuration. If the device was previously an ActivChassis master or backup device, it will have the ActivChassis' startup configuration file and can appear with settings that are a duplicate of the current ActivChassis master.

The **connected** state indicates that the device is admitted and fully functioning as a member of the ActivChassis as instructed by the master device.

The **lost master** state indicates the device was in the connected state, but then lost contact with the ActivChassis master. The spanning tree states of the device's switchports are locked in their current states, non-unicast traffic is dropped (to prevent broadcast storms), and media access control (MAC) address learning is disabled. When the master device returns, the switchports on the device in the lost master state transition to a spanning tree blocking state while the ActivChassis configuration is pushed from the master device to the linecard device.

ActivChassis Detection

When an ActivChassis-enabled device boots, it consults its manifest to determine which ports are in ActivChassis mode, then enters a detection phase where it attempts to detect the ActivChassis. If the device's VCID is 1 or 2, it seeks the device with the other number (1 or 2) and holds an election to determine which device is master, and which is backup. Once determined (or timed out), the master device restores from its local startup, and all other devices come under the control of the master device and are configured per the ActivChassis configuration. If the booting device's VCID is anything other than 1 or 2, it searches for an ActivChassis master until one is found.

During the detection phase, non-master devices periodically display (at their console port) a brief status indicating that detection is in progress, as well as key information about the device's ActivChassis settings and information to use in troubleshooting detection problems. The information is periodically repeated so that it is available even when connecting to a device after the detection phase first begins. Once a non-master device is admitted to the ActivChassis, the periodic messages cease, but the linecard interface is still available through the local console.

Hardware and Software Requirements and Limitations

The ActivChassis feature is only available on NetVanta 1638 and 1638P products running AOS firmware AC1.0 or later, as outlined in the *AOS Feature Matrix*, available online at <https://supportforums.adtran.com>.

ActivChassis supports up to eight connected devices.

ActivChassis capability is provided by the ports in the module slots on the AOS device. In a stacking XIM module, dual mode ports can be individually set as 16Gbyte ActivChassis ports or standard 10 G Ethernet mode switchports. In a NetVanta Dual SFP+ XIM module, dual mode ports can be individually set as 10 G ActivChassis ports or as standard 10 G Ethernet mode switchports. Front panel ports are not ActivChassis compatible.



ActivChassis is supported on SFP+ XIM modules, but not SFP XIM modules.

All devices in the ActivChassis have at least one CPU. The scope of responsibility of a device's CPU depends on its role in the chassis (master, linecard). If the device is not a master, its CPU is limited to maintenance of its local device resources, as directed by the ActivChassis master. The master device's CPU coordinates all devices in the ActivChassis as well as performs the CPU functions of the routing engine.

General ActivChassis Information

There are no special MIBs for Simple Network Management Protocol (SNMP) in ActivChassis. All relevant MIBs supported on NetVanta switches are supported on switches in ActivChassis mode.

When an ActivChassis command is issued, and an internal condition causes an error when applying the command to an ActivChassis member, an error is returned. If the command is issued while that device is not present, the command is accepted and becomes inactive. When the device returns, if an error occurs when activating and applying the command, an event is generated. Commands that apply only to switchports (such as **monitor-session**, **channel-group**, etc.) return an error if they are applied to an ActivChassis port.

ActivChassis runs a single instance of spanning tree. Therefore, from a network perspective, an ActivChassis that has 8 member units looks like a single spanning tree node (as opposed to 8 individual nodes). The spanning tree state machine is controlled by the ActivChassis master device. ActivChassis supports up to 32 directly connected spanning tree neighbors. Performance of the ActivChassis is likely to decrease if pushed beyond this limit.

The ActivChassis can be configured with the normal AOS methods of securing the management interface (passwords, Authentication, Authorization, and Accounting (AAA), etc.). Non-master devices that are active ActivChassis members provide no user interface, and can disclose no ActivChassis configuration information. If a linecard device is disconnected and booted as a standalone device, it provides the linecard command mode (which does not disclose any significant configuration information). Only VCID and manifest settings can be viewed from the linecard mode. The startup configuration for the ActivChassis is not stored on these devices. If the active backup device is disconnected and booted as a standalone device, it contains the ActivChassis configuration and invokes the security settings that were in place on the ActivChassis master.

ActivChassis Port Functionality

The ports of devices in the ActivChassis are split into two general categories: switchports and ActivChassis ports. Switchports are used to connect the ActivChassis to devices outside the virtual chassis. The switchports provide traditional Layer 2 and Layer 3 switch functionality, are cabled to end devices or other switches in the network, use standards-based IEEE 802.3 encapsulation, and are used by devices as shared resources in ActivChassis. ActivChassis ports are used to interconnect devices within the ActivChassis. Ports use proprietary ActivChassis encapsulation, appear in the ActivChassis configuration, and can operate in dual mode (ActivChassis or switchport modes).

The port mirroring functionality is enhanced in ActivChassis to allow monitor source and destination ports to be any switchport in the ActivChassis (excluding ports functioning as ActivChassis ports). Configuration of port mirroring on an ActivChassis member is almost identical to that of a standalone device, except that **monitor session** commands are issued from the ActivChassis master view, the interfaces are specified with the three-part vcid/slot/port identifier, and the source and destination ports can be on different ActivChassis members.

The link aggregation functionality using port channels is enhanced in ActivChassis to allow ports on different devices in the ActivChassis to be a member of the same channel group. Links on different devices can be aggregated to increase bandwidth and add resiliency so that a single device failure does not take down an entire port channel. Any combination of switchports in the ActivChassis (excluding ActivChassis ports) can be combined into a channel group up to ActivChassis imposed limits. The only differences between configuring link aggregation on a standalone device and on ActivChassis are that the link aggregation commands are executed from the routing engine on the master device, the channel group assignments occur on switchports whose interface is specified in the vcid/slot/port format, and the port-channel interface is on the master device's routing engine.

If multiple ActivChassis mode ports are connected in parallel between two devices, those ports will automatically form an aggregate link, similar to a port channel but requiring no configuration. Up to four ActivChassis ports can be connected in parallel to form an aggregate link.

ActivChassis and Hardware Tables

ActivChassis devices have local hardware-based forwarding tables for Layer 2 and Layer 3 switching. These resources are shared resources by ActivChassis. In most applications, the hardware tables of the device owning the switchport on which a packet is received (ingress port) determine where the packet is delivered within the ActivChassis (egress port, CPU, etc.). The hardware tables of each device are transparent to external operation. Hardware tables are used during packet inspection at ingress to the ActivChassis and switch the packet as quickly as possible towards its final destination within the chassis. If the destination port is on another member device in the chassis, an ActivChassis header is applied to the

packet and it is switched across the ActivChassis backplane to the destination port, often without further inspection for basic Layer 2 and Layer 3 switching. In addition to the typical information contained in Layer 2 and Layer 3 hardware tables, the destination port of each table entry (MAC address of IP network) is also mapped to its ActivChassis address. When an ActivChassis header is applied to the packet at ingress, the ActivChassis addresses of the source (ingress) and destination (egress) ports are mapped into the ActivChassis header.

ActivChassis Configuration Overview

ActivChassis configuration requires an understanding of how ActivChassis devices operate together, as well as careful planning in the assignment of ActivChassis roles per device. The following sections outline general information necessary for the correct configuration of ActivChassis.

Preparing a Device for Operation in ActivChassis

A standard ADTRAN switch is shipped with ActivChassis mode disabled. If the device is to operate as a master or backup, the VCID must be manually set to 1 or 2 using the local console or front panel. If a device is being added to an existing ActivChassis as a linecard, but currently has a VCID of 3 to 8, the VCID should be manually set to the **master-assigned** value. If the device is replacing a linecard that was already a part of the ActivChassis, but had to be removed, the VCID should be manually set to the value of the device being replaced. Refer to *Enabling ActivChassis and Specifying the VCID on page 22* for instructions to assign the VCID.

Devices with pre-ActivChassis software must be upgraded and prepared for ActivChassis operation.

ActivChassis Master Election Rules

Elections are held to determine which master candidate (devices with VCID 1 or 2) will be the active master and which will be the backup. Election takes place early in the boot process, before the startup configuration is restored. The election rules are as follows:

1. If both VCID 1 and 2 participate in the election, and neither has been previously elected master, VCID 1 is selected. If VCID 1 is not present, a device with VCID 2 becomes the master.
2. Once a master is elected, it will not relinquish its role voluntarily except in the event of an ActivChassis merge. In this case, VCID 1 becomes the active master device and VCID 2 becomes the active backup device.
3. If the active backup device can no longer detect an active master, a new election is held and the backup begins the process of taking over as master of the chassis.
4. If a master candidate has already joined an ActivChassis, duplicate master candidates are ignored. If a master candidate has not already joined an ActivChassis, and it detects the presence of a duplicate master candidate, the device enters master mode, elects no one master, and does not attach any linecards. Once the duplicate candidates are removed, normal election rules apply and a master and backup device are then elected. For example, if two devices are configured with a VCID of 1, ActivChassis waits until one of the master candidates is removed before applying normal election rules.

Bootup and ActivChassis Detection

During the bootup of an ActivChassis-enabled device, there is a period before the configuration is restored where the device attempts to detect ActivChassis connectivity, other ActivChassis devices, and to find its place within the ActivChassis. As an ActivChassis device boots, its local console displays a series of messages indicating the boot progress. Messages are included to indicate the content of the manifest, to notify the user when the detection phase is entered, and the progress of the detection phase.

After initial bootup, the device reads its hardware manifest and determines its VCID, as well as which ActivChassis capable ports are set in ActivChassis mode. The ActivChassis mode ports then attempt to establish ActivChassis communication with the port and device to which they are connected. Elections are then held to determine if device with VCID 1 or 2 becomes the ActivChassis master. If devices with the VCID 1 or 2 are present and communicating, the election period ends. The master will wait up to 60 seconds for all known linecards to be detected. When the 60 seconds are up, or when all linecards are detected, the master applies its local startup configuration file.

If a device with VCID 1 is not present, a device with VCID 2 remains in the election period until it times out or detects that all previously detected linecard devices are present. In that case, it becomes the master device and applies configuration from the local startup configuration file. Because the startup configuration files are synchronized between the master and backup devices, the configuration is the same whether VCID is 1 or 2 is the active master. If a device with VCID 1 is then added to the ActivChassis, it is configured by the master and becomes the active backup. In this case, VCID1 does not preempt VCID 2.

If a device with VCID 2 is not present, a device with VCID 1 remains in the election period until it times out or detects that all previously detected linecard devices are present. It then becomes the master device and applies configuration from the local startup configuration file.

If a device has a VCID of 1 or 2, and **Escape** is selected during the election period, the device elects a master and backup from whatever devices are present at that moment. If it is elected master, it will then apply the configuration from the local startup configuration file.

Devices with a VCID of any value other than 1 or 2 search for an active master device. If the master is found, and it is admitted to the ActivChassis by the master, the device is configured by the master and becomes an active linecard. If no master is detected, the linecard device will continue to search for a master until one is found.

Admission to ActivChassis

The ActivChassis master gives admission to each device that attempts to join the ActivChassis. Admission control allows new devices to be added to the ActivChassis without prior knowledge of that device. By default, as many devices as are supported by the ActivChassis system (eight) can be added.

For the following reasons certain devices may not be granted admission to the ActivChassis by the master device:

- The hardware type is not allowed (it does not match the master).



Device hardware must match the master. However, PoE and non-PoE devices can be intermingled in an ActivChassis.

- The device has a VCID that is already present.
- The provided VCID does not match the details of the manifest entry for that VCID.
- The device's VCID cannot be set.
- All VCIDs have been allocated.

If a device is denied admission to the ActivChassis by the master, an alert is generated. This alert contains the reason for denial, and the device attempting admission must be reconfigured to correct the problem.

ActivChassis File System Synchronization

Initially, the ActivChassis master device takes control of every ActivChassis member's file system when the member is admitted to the ActivChassis. When this occurs, all files on the member's file system are deleted.



*If you are upgrading an existing device installation to ActivChassis, you **MUST** save elsewhere the configuration files of the switches that will become linecard or backup devices because they will be deleted. You must re-add specific configuration parameters for switchports of the linecard or backup devices.*

The master device then synchronizes certain content of its file system to each ActivChassis member's file system. Information that is synchronized includes the hardware manifest and the primary and backup software image. Additionally, the master device's startup configuration is synchronized to the active backup device. Not included in the synchronization are the VCID setting of the local device.



*If the software image is changed during synchronization, the flash drive is updated with the new image. This information can be viewed from the **boot system flash** command on the master device.*

After the initial synchronization, additional synchronization only takes place when the information on the master device's file system changes, for example, when the running configuration is written to the startup configuration file, or when a new device is admitted to ActivChassis and the manifest is updated. There may be a slight delay before a change in the master device's file system is fully synchronized with the other members.

Synchronization can be tracked through generated event messages. These messages indicate a problem has been detected with the synchronization, and include the identity of the target device (by VCID) as well as a warning that the device is out of sync. When this occurs, the master device continues to attempt to re-establish communication with the problem device. If communication is re-established, another event is generated that identifies the device and informs that the device is again synchronized. You can additionally view synchronization status using the **show activchassis** command (described on page [Viewing ActivChassis on page 27](#)).

ActivChassis Configuration Considerations

The ActivChassis configuration, as viewed from the active master device, has the following characteristics:

1. The configuration for ActivChassis resides on the master device. When the master device boots, it restores the ActivChassis configuration from its startup configuration file. It is possible that some ActivChassis members for which configuration exists are not present or not yet booted into the virtual chassis. In this case, the configuration for these devices is restored on the master device, but held in an inactive state in the ActivChassis running configuration until the additional ActivChassis member is admitted, at which time the configuration is applied to the device and made active. Inactive configurations are viewable from the ActivChassis's running configuration.
2. Configuration edits can take place on resources that have been admitted to ActivChassis, and for which a manifest entry exists for those resources, whether the resources are currently present in the ActivChassis or not. This includes creating new or changing the existing configuration. If the resource device is present, configuration changes are immediately applied. If the resource device is not present, configuration changes are held inactive and applied once the device is re-admitted into ActivChassis. Logical interfaces (such as VLAN interfaces) are immediately applied since they are logical constructs that exist on the ActivChassis routing engine and are always present in the current master device.



For changes to be applied to a resource device that is not present in ActivChassis, the device must have been previously admitted and recorded in the manifest in order for ActivChassis to know what resources can be configured.

3. If a member other than the master is admitted to ActivChassis and is configured, running, and then removed from the ActivChassis configuration, the device's VCID and running configuration is preserved and remains in the ActivChassis running configuration in an inactive state. If the device, or another device with the identical resources and VCID, are returned to ActivChassis, the configuration is reapplied and made active.
4. In all cases, when ActivChassis commands in the running configuration are inactive, comments are added to the configuration indicating that part of the configuration is inactive. These comments are removed when the configuration becomes active again.
5. Unlike switchports and hardware forwarding tables, a device's file system is not a shared resource in ActivChassis. However, the file system is managed by the ActivChassis master in order to keep certain files up-to-date and to synchronize certain information. It is critical that the master maintain authoritative control of file system content on each ActivChassis member. The master device runs a background process that performs these tasks.

6. When a device first joins ActivChassis, the master takes control of the device's file system. In doing so, it is possible that some files on non-master devices can be deleted. In addition, maintenance is performed to confirm that devices are ready to be added to ActivChassis. This maintenance includes verifying the firmware image on the device, synchronizing a copy of the hardware manifest on every ActivChassis member, storing the ActivChassis startup configuration on the backup device, and optionally updating the ActivChassis firmware image on every device in the ActivChassis when needed.
7. All physical ports capable of operating as ActivChassis ports are dual mode, meaning they can be used as an ActivChassis port or a standard IEEE Ethernet switchport. When an ActivChassis-enabled device has ActivChassis disabled, the default mode for these ports is switchport. When the device has ActivChassis enabled, the default port mode is ActivChassis mode. The port mode can be configured in ActivChassis configuration and is recorded in the manifest. Since the mode of ActivChassis ports is recorded in the manifest, and the manifest is synchronized on the file system of all devices in ActivChassis, each device can reference its local copy while booting to know which of its ports are in ActivChassis mode.
8. When an ActivChassis port is operating in ActivChassis mode, it is part of the internal backplane and is not a resource to the routing engine and does not appear as an interface in routing engine tables. When an ActivChassis port operates as a switchport, it can appear as a resource to the routing engine. In addition, the extended headers used on ActivChassis port frames do not limit their dataplane or management functionality. Statistics and status are maintained for ActivChassis ports similarly to switchports, including typical counts and error conditions. These ports also support extended functionality found on switchports (such as jumbo frames).
9. All devices in ActivChassis monitor for changes or failures in the ActivChassis. Certain changes can be detected by events, such as an ActivChassis port changing status. Other changes require the expiration of other mechanisms that indicate a device is no longer present or functional, even though the ActivChassis links remain active. Detection of such changes results in a restart of the underlying mechanism, which is then analyzed to determine if there is a need for additional actions, such as transferring of mastership to a backup device and notifying the routing engine that resources have been added or removed.
10. Commands are available to renumber or delete a member from an ActivChassis. Renumbering a device changes the VCID of that device, and upon reboot, the device operates using the new VCID. Renumbering a device does not change any ActivChassis configuration. When deleting an ActivChassis member, the device cannot be physically present in the ActivChassis when the command is issued. The deletion command removes all information about the device from the manifest and the ActivChassis configuration on the master and the VCID becomes unallocated. Once a device is deleted from ActivChassis, it should be linecard defaulted and have its manifest cleared (refer to [Clearing or Defaulting an ActivChassis Device on page 20](#) for specific instructions). If the device is later reconnected, it is treated as a new device being added to the ActivChassis.



If a device is assigned a VCID that already exists in the ActivChassis configuration, the device taking that value must have the identical hardware configuration as the original device, including the content of the module slots.

11. ActivChassis can detect changes in connectivity between members, and it can automatically resolve its own topology should any connectivity changes occur. These changes include a transition from an up to a down state for physical ActivChassis port connections, any ActivChassis link line protocol transitions, or an ActivChassis link that is added or removed. In addition, any devices that fail to return a keepalive message (or other communication) causes ActivChassis to resolve its topology.

12. Transition of ActivChassis mastership occurs when the active master becomes unresponsive or disconnected from the ActivChassis. The active backup device is elected master of the ActivChassis, and requires a reboot for this mode change to take effect. Only the new master device reboots in this case. The ActivChassis backup device receives a copy of the ActivChassis startup configuration file from the master device. If the backup detects that it needs to become master, it reboots and loads the startup configuration file.



The master-to-backup failover process can take minutes for the entire ActivChassis to reboot.

13. If an active ActivChassis linecard device loses both the master and backup device, the spanning tree state of the switchports on the linecard device is locked. In addition, to prevent broadcast storms, non-unicast traffic is dropped and MAC learning is disabled. When the master device returns, the linecard device's switchports transition to a spanning tree blocking state while new ActivChassis configuration is pushed from the master to the linecard device.

ActivChassis Configuration Tasks

ActivChassis configuration relies on configuring the virtual chassis, not the individual devices which make up the virtual chassis. Therefore, all configuration tasks center around the virtual chassis. Specific device configuration is not covered in this document. Configuration of ActivChassis can be completed from the CLI of the master device (as well as the GUI, as described in *Configuring ActivChassis from the Master Device's GUI on page 31*), and includes the following tasks:

- *Restoring, Editing, and Maintaining ActivChassis Configuration on page 17*
- *Local Management of the VCID on page 18*
- *Deleting an Allocated VCID on page 20*
- *Transitioning from an ActivChassis Device to a Standalone Device on page 20*
- *Clearing or Defaulting an ActivChassis Device on page 20*
- *Adding or Updating ActivChassis Device Firmware on page 21*

To complete these configuration tasks, connect to the CLI of the master device following the instructions included in the device's quick start guide (available online at <https://supportforums.adtran.com>). Once you have connected to the device's CLI, complete the tasks outlined in the following sections.

Restoring, Editing, and Maintaining ActivChassis Configuration

The running and startup configuration for ActivChassis is completed using the ActivChassis master device. The ActivChassis master restores the configuration for the entire ActivChassis from its startup configuration. All non-master devices are configured by the master, according to the ActivChassis configuration on the master device, upon booting and being admitted to the ActivChassis. Non-master devices do not store ActivChassis configuration locally.

Restoring the Routing Engine Configuration

When the elected master device boots, it restores the startup configuration to the ActivChassis. It is possible during this time that the configuration settings for resources located on another ActivChassis member are encountered, even if that member is not currently present in the ActivChassis. Configuration for absent members is restored and held inactive in the ActivChassis running configuration until the member is again admitted into the ActivChassis. Comments are added to the running configuration to indicate sections that are currently inactive. Therefore, restoring the routing engine configuration relies solely upon rebooting the master device.

Editing the Routing Engine Configuration

Configuration edits of the routing engine or ActivChassis configuration can take place on resources that have been admitted to the ActivChassis, and for which a manifest entry exists, whether the device that owns those resources is currently present in the ActivChassis or not. This includes creating new configurations or changing existing ones. Changes are applied to the master device.



Although logical interfaces (such as VLAN interfaces) can be configured at any time on the master device, physical interfaces (such as a switchport) that reside on non-master devices can only be configured if the device has been admitted to the ActivChassis and an entry exists in the manifest.

Interactive changes made on the routing engine for resources that are present in the virtual chassis are applied immediately to the affected resources. Changes are stored in the running configuration, and only written to startup when commanded, just as with standalone AOS devices. You can configure resources for a linecard device that is no longer present in the chassis as long as it is still in the manifest. When the linecard rejoins the ActivChassis, the changes are applied.

ActivChassis Member Removal or Replacement

If a non-master device in the ActivChassis that has the routing engine configuration applied to its resources is removed, whether from being powered down, disconnected, failed, etc., the ActivChassis topology automatically resolves itself as much as possible. In addition, the removed device's configuration and VCID are placed in an inactive state, but remain stored in the running configuration, and the configuration is preserved so that it is available should the device return to the ActivChassis. The inactive configuration is removed from the ActivChassis's runtime operation, but if the same device (or an equivalent) is restored to ActivChassis, the configuration is reapplied and made active.

Local Management of the VCID

VCIDs can be specified manually on all ActivChassis devices. By default, a device's VCID can be set through its front panel when that device is in standalone mode (whether ActivChassis is enabled or disabled). There are two methods for managing the VCID of a local device: using the device's front panel, or using the **activchassis vcid** command from the local console.



You can also specify a VCID using the GUI. Refer to [Renumbering ActivChassis Member VCID on page 33](#).

To configure the VCID from the front panel of the device, follow these steps:

1. Press the LED mode switch on the front panel of the local device to scroll through the front panel modes: VCID, link activity, or PoE. Select the **VCID** option. The current VCID value is displayed on the front panel LEDs. If the value is displayed in red, the device is not currently admitted to ActivChassis. If the value is displayed in green, the device is currently admitted to an ActivChassis, and has a VCID value other than a master-assigned value.
2. To change the VCID value, and enable ActivChassis mode on the device, hold the LED mode switch button on the front panel for 2 seconds until the VCID LED flashes green. This signifies that the VCID is ready to configure.
3. Press and release the LED mode switch button on the front panel to cycle through the VCID values. At each press and release of the button, the port LEDs will cycle through VCID values: ActivChassis is disabled, VCID is 1, 2, 3, 4, 5, 6, 7, 8, or the VCID is master assigned. When all LEDs are off, it indicates that ActivChassis is disabled. When all LEDs are lit, it indicates the VCID is master assigned. Each value (1 through 8) has an associated port LED. When scrolling through the VCID values, the port LED for the corresponding value is lit.
4. Once you have selected the proper VCID value for the device, press and hold the LED mode switch button on the front panel for 2 seconds, until the VCID mode light stops flashing.
5. At this point, ActivChassis is enabled on the device, the file system is updated with the new VCID, and if the VCID is not , the original startup configuration is deleted. If the VCID setting is a new setting, the unit reboots.



If the VCID is 2 (backup device) the startup configuration will be deleted. You must backup the startup configuraiton for VCID 2 manually, as you must for any linecard devices.

6. Repeat Step 1 to verify the VCID after the unit reboots.

To specify the VCID using the local console, follow these steps:

1. When the device is booted in standalone mode and it is not admitted to ActivChassis, enter the **activchassis vcid [master-assigned | <value>]** command from the local console. This command can create an ActivChassis master or specify a local standalone device as a member of the ActivChassis. The <value> parameter specifies the VCID as a value between **1** and **8** (1 and 2 are used for master and backup devices). The **master-assigned** parameter specifies that the VCID is assigned by the master device when the standalone device is admitted to the ActivChassis. Using the **no** version of this command disables the ability to configure the VCID on the local device. Enter the command from the device's Global Configuration mode as follows:

```
(config)#activchassis vcid 3
(config)#
```



If this command is entered on a device that is already ActivChassis enabled, and the VCID specified is the same as the VCID currently in use, it will have no effect and the command will not be performed.

2. Once the command is entered, you are asked to confirm that the device configuration and operating mode will be altered. After confirmation, if the device is currently ActivChassis disabled, it becomes ActivChassis enabled, and the file system is updated with the VCID. If the device has already been ActivChassis enabled, the VCID is changed to a specified value. In either case, the device reboots, and any unconfigured ActivChassis capable ports on the device default to ActivChassis mode.

Deleting an Allocated VCID

The entire configuration for a particular device can be deleted from the ActivChassis configuration by issuing the **activchassis deallocate** <vcid> command from the master device's Global Configuration mode. The <vcid> parameter specifies which VCID configuration is to be removed. Valid range is **1** to **8**. When this command is used, all configuration corresponding to the device with the specified VCID is deleted from the ActivChassis configuration and the master device's hardware manifest. If the device later reconnects to the ActivChassis with the same VCID value, it is treated as if it is a new device.



The device that has the VCID to be deleted cannot be connected to the ActivChassis when the command is issued. It must be disconnected from the chassis before issuing the command. In addition, deleting a VCID does not change the VCID on the device using that VCID value. You should linecard default the device to clear all ActivChassis information (refer to [Clearing or Defaulting an ActivChassis Device](#) on page 20).

To delete an allocated VCID on a non-master device, enter the command as follows from the master device's Global Configuration mode:

```
(config)#activchassis deallocate 6  
(config)#
```

Transitioning from an ActivChassis Device to a Standalone Device

Devices that are currently ActivChassis members can be restarted in standalone mode. To restart a device in standalone mode, you must first disconnect the device from all other ActivChassis-enabled devices and reboot the unit. The device attempts (and fails) to detect an ActivChassis, and successfully boots as a standalone device. Once the device is disconnected from ActivChassis, and has been rebooted as a standalone device, enter the **no activchassis** command from the device's local console. You must confirm that you want the device configuration and mode to be altered. By confirming the action, the local manifest is updated with indications that ActivChassis mode should be disabled at device boot. The startup configuration file is backed up and then deleted, causing the configuration to return to default at the next boot. The device is then rebooted and is in standalone mode.

To disable ActivChassis and return the device to standalone (after it has been disconnected from the ActivChassis), connect to the device's local console and enter the command from the Global Configuration mode as follows:

```
(config)#no activchassis
```

Clearing or Defaulting an ActivChassis Device

There are several methods for clearing ActivChassis configuration information from an ActivChassis device. First, you can enter the **write erase** command from the master device's Enable mode. This command clears the ActivChassis startup configuration, but does not affect the VCID or directly affect the ActivChassis manifest. This command is only used on the master device (since linecard devices do not use a startup configuration). ActivChassis ports on the device return to their default value when the configured values are cleared. To erase ActivChassis configuration, enter the command as follows:

```
>enable  
#write erase
```



If the **write erase** command is issued on the current ActivChassis master, it erases the startup configuration for the entire chassis.

The second method for defaulting or clearing an ActivChassis device is to default the device itself using the **activchassis restore-linecard-dflt** command. This command clears the local copy of the manifest, the VCID, and the startup configuration for the device. This command is most useful when a device that was connected to an ActivChassis needs to be factory restored or have all knowledge of its existence in the virtual chassis removed. To default an ActivChassis linecard, enter the command as follows from the linecard mode of the device:

```
linecard>activchassis restore-linecard-dflt
```

To default a non-linecard device (master or backup), enter the command from the device's Global Configuration mode as follows:

```
(config)#activchassis restore-linecard-dflt
```

Adding or Updating ActivChassis Device Firmware

ActivChassis will not function properly if any of the device do not have the same firmware as the master device in the ActivChassis. Therefore when adding a device to ActivChassis, or updating the firmware of a device that is already a member, it is possible a firmware mismatch can occur. There are two methods for rectifying this situation.

The first method is to manually update the device. This is accomplished by disabling ActivChassis on the device, performing a firmware upgrade, and then re-enabling ActivChassis on the device. When the device is reactivated, it searches for the ActivChassis master and is resynched.

The second method is to sync the linecard with the master device that has the correct firmware. When the linecard joins the ActivChassis, notifications will indicate that it is not running the correct firmware. In spite of that fact, the linecard will sync with the correct firmware. Once the linecard is in sync, it can be rebooted using the **reload vcid** *<value>* command, where the *<value>* is the linecard in question. Only after the linecard reloads will it be running the correct firmware.

Configuring the ActivChassis Master Device CLI

The master device in ActivChassis controls the configuration and operation of all other ActivChassis members. You can specify several options from the master device CLI. These configuration options are described in the following sections.

Tasks associated with configuring ActivChassis from master device's CLI include:

- [Front Panel Configuration on page 22](#)
- [Enabling ActivChassis and Specifying the VCID on page 22](#)
- [Changing an Allocated VCID on page 23](#)
- [Removing a VCID Configuration from the ActivChassis Manifest on page 23](#)
- [Removing a Master Device's Configuration from ActivChassis on page 24](#)
- [Specifying the Firmware Used in ActivChassis on page 24](#)
- [Using LEDs to Test Master and Linecard Connectivity on page 25](#)

Front Panel Configuration

Use the **activchassis front-panel-config** command from the master device's CLI to enable the ability to configure the VCID from a device's front panel. The VCID can always be monitored from the front panel. The **no** form of this command disables the ability to configure the VCID from the front panel. By default, this feature is enabled. You can access this command from the master device, and specify that the master VCID can or cannot be configured through the front panel, or you can specify that any device in the ActivChassis can or cannot have its VCID configured through the front panel of the particular device. To specify that front panel configuration of the VCID is disabled for all ActivChassis members, enter the command from the Global Configuration mode as follows:

```
(config)#no activchassis front-panel-config
```

Enabling ActivChassis and Specifying the VCID

Use the **activchassis vcid [master-assigned | <value>]** command to enable ActivChassis on the device and specify the device's VCID. The **master-assigned** parameter specifies that the master device assigns the VCID once the device upon which the configuration occurs is rebooted and admitted to the ActivChassis. The **<value>** parameter manually assigns a VCID to the device. Valid range is **1** to **8**, with **1** and **2** being master and backup device candidates. The **no** version of this command transitions the device to an ActivChassis disabled (standalone) device. This is a single action command, and it is not stored in the ActivChassis configuration. It does, however, make changes to the device structure and hardware manifest. It takes immediate action on the local device. If the device is already ActivChassis enabled, and the specified VCID matches the existing VCID, the command is not performed. If the device is already ActivChassis enabled, and the VCID specified is different than the existing VCID, the device's current VCID is modified after the action is confirmed. If the device is not ActivChassis enabled, the device is converted to ActivChassis with the new VCID. The device is rebooted for the changes to take effect.

This command is not executed in the following circumstances:



- the device is the current ActivChassis master*
- the device is not ActivChassis enabled and the device's primary or backup firmware images are set to boot from the USB drive*
- the device is not ActivChassis enabled and the device's startup configuration file does not exist on the device's internal flash drive*
- the device is not ActivChassis enabled and the device's backup startup configuration is in use*

Once the device is rebooted, you can be presented with the linecard console (if the device is in linecard mode), or the full ActivChassis console (if the device VCID is 1 or 2 and the device is a master).

To enable ActivChassis on a device, and specify the VCID, enter the command as follows from the device's Global Configuration mode (this example specifies an ActivChassis master):

```
(config)#activchassis vcid 1
```

Changing an Allocated VCID

A VCID that has been allocated by the master device can be modified from the CLI of the master device using the **activchassis renumber** *<from vcid>* *<to vcid>* in the Global Configuration mode. This command changes a device's VCID from its current value to a different value. The change is made on the device and in the ActivChassis hardware manifest, but not in the ActivChassis configuration. This is a single action command and it is not stored in the configuration. It does, however, take immediate action on the local device. Valid VCID ranges are **1** to **8**.

When using this command, remember that the device that currently has the *<from vcid>* value must be connected and actively communicating in the ActivChassis in order to be renumbered. Neither VCID value can be that of the current master. Master VCIDs must be reassigned by rebooting the device as a standalone unit and using the **activchassis vcid** command (as described in [Local Management of the VCID on page 18](#)). In addition, the *<to vcid>* value must be currently unallocated. If the value is allocated, you must first deallocate it with the **activchassis deallocate** command (as described in [Removing a VCID Configuration from the ActivChassis Manifest on page 23](#)).

If the device with the *<from vcid>* value is present in the ActivChassis, and the VCID values are valid, a warning is displayed that the current VCID and configuration will be changed. You must confirm the changes to be made. Once the changes are confirmed, the VCID of the device is updated to the *<to vcid>* value, the master device's manifest is updated with the change, and the targeted device is rebooted for the changes to take effect. The new role and configuration of the new VCID are applied to the device after reboot.

To change an allocated VCID on a non-master device in ActivChassis, for example, from **3** to **4**, connect to the master device's CLI, and enter the command from the Global Configuration mode as follows:

```
(config)#activchassis renumber 3 4
(config)#
```

Removing a VCID Configuration from the ActivChassis Manifest

Use the **activchassis deallocate** *<vcid>* command to remove all configuration for the specified VCID device from the ActivChassis configuration and manifest. The *<vcid>* parameter specifies the VCID to be removed. Valid VCID range is **1** to **8**. Issuing this command makes the change on the master device. The target device must already be disconnected from the ActivChassis. The following rules apply to this command:

- The device currently using the specified VCID value must be disconnected and not communicating with the ActivChassis. If the device is connected to ActivChassis, the command is not performed.
- If the device later reconnects to the ActivChassis with the same VCID value, it is treated as if it is a new device being added to ActivChassis.
- The VCID cannot be that of the current master. Refer to [Removing a Master Device's Configuration from ActivChassis on page 24](#) for instructions on removing the master device's configuration.

To remove a VCID of a device that is not currently connected to ActivChassis, enter the command as follows from the master device's Global Configuration mode:

```
(config)#activchassis deallocate 5
```



Once this command is issued, the device whose VCID has been removed is returned to the linecard default state. Refer to [Clearing or Defaulting an ActivChassis Device on page 20](#).

Removing a Master Device's Configuration from ActivChassis

To remove a master device from the ActivChassis configuration, follow these steps:

1. Backup the master device configuration.
2. Disable ActivChassis on the master device by entering the **no activchassis** command.
3. If there is a backup device, allow it to become the ActivChassis master.
4. Connect to the new master device and enter the **activchassis deallocate <vcid>** command from the Global Configuration mode, specifying the old master device's VCID.
5. Next, you can either linecard default the old master, or boot the old master device in standalone mode.

Specifying the Firmware Used in ActivChassis

Use the **activchassis strict-firmware** command to prevent linecard devices from joining an ActivChassis when their firmware image differs from that of the master device. By default, linecard devices with different firmware images are allowed to join the ActivChassis. Using the **no** format of this command allows linecard devices with different firmware images to join the chassis (default value). When linecard devices have mismatched firmware, ActivChassis displays a warning message every 30 seconds that states which linecard has the improper firmware. To specify that all linecard devices must have the same firmware image as the master device before they can join an ActivChassis, enter the command as follows from the master device's Global Configuration mode:

```
(config)#activchassis strict-firmware
```

Updating the Firmware to All ActivChassis Members

Use the **boot system flash <primary filename> [flash <secondary filename>]** command to set the primary, and optionally the backup, firmware images of all the units in the ActivChassis to the specified files. This command also launches the file system synchronization process between the master device and all the connected linecard devices. To specify that all ActivChassis members synchronize with a new firmware image, connect to the master device and issue the command as follows from the Global Configuration mode:

```
(config)#boot system flash myimage.biz
```



*When in ActivChassis mode, the **boot system** command only allows the internal flash drive to be specified as the source of the firmware files. In addition, the **boot config flash** command cannot be used in ActivChassis mode.*

Using LEDs to Test Master and Linecard Connectivity

Use the **flashme [vcid <vcid>] [<value>]** command to allow the master device to flash the LED lights on its connected linecard devices. The optional **vcid <vcid>** parameter specifies that a specific device's LED lights are flashed. Valid VCID range is **1** to **8**. If no VCID is specified, all connected devices LED lights are flashed. The optional **<value>** parameter specifies how long (in seconds) the LED lights will flash. By default, LED lights flash for **3** seconds. To test master and linecard device connectivity using flashing LED lights, enter the command as follows from the master device's Enable Configuration mode:

```
>enable
#flashme
```

Interface Configuration from the Master Device CLI

The ActivChassis master device provides configuration for specific interfaces available on ActivChassis members. From the master console, you can configure switchport modes and interface shutdown states. The following sections describe the interface commands available from the master console. Tasks associated with interface configuration include the following:

- [Specifying the Switchport Mode on page 25](#)
- [Configuring the Interface's Shutdown State on page 26](#)

Specifying the Switchport Mode

Use the **switchport mode [access | trunk | activchassis]** command to change the mode of a dual-mode ActivChassis port. The **access** parameter specifies the port is a single port that transmits and receives no tagged packets. The **trunk** parameter specifies the port transmits and receives packets on all VLANs included within its allowed VLAN list. The **activchassis** parameter specifies that the port communicates with other ActivChassis devices. By default, if the device is not ActivChassis enabled, then ports are set to **access** mode (and the **activchassis** parameter is not available). If the device is ActivChassis enabled, then ports are set to **activchassis** mode. To change the port function on an interface of a device with ActivChassis, enter the command from the interface configuration mode as follows:

```
(config)#interface xgigabit-switchport 1/1
(config-xgiga-swx 1/1)#switchport mode activchassis
```

When the device for which this command is entered is ActivChassis enabled, the mode of the port can be changed from the master device. The port setting is stored in the ActivChassis configuration and the hardware manifest, allowing the local device to know its port's mode early in the boot cycle. In addition, when changing the port mode of a remote port, the linecard must be present. If no linecard is present, a warning message is displayed.



*In ActivChassis mode, the switchport becomes part of the ActivChassis backplane, and it is not available to connect to devices outside of the chassis. The port must be directly connected to other devices with the same capability and setting. In addition, if the port is part of the backplane, and it currently has an active link, the port mode cannot be changed from **activchassis** mode.*

Configuring the Interface's Shutdown State

Typically, interfaces in AOS can be administratively shut down using the **shutdown** command from the interface configuration mode. Alternatively, interfaces can be administratively activated using the **no shutdown** command. ActivChassis interfaces, however, are always administratively up and cannot be shut down.

ActivChassis Utility Commands from the Master CLI

In addition to configuring ActivChassis global and interface settings, the master device console can be used to execute ActivChassis utility commands. These commands include:

- *Reloading ActivChassis on page 26*
- *Clearing ActivChassis on page 27*
- *Viewing ActivChassis on page 27*
- *Enabling ActivChassis Debug Messaging on page 28*

Reloading ActivChassis

The ActivChassis is reloaded by issuing the **reload [in <delay> | cancel]** command from the master device's Enable mode. Issuing this command reloads the ActivChassis master and all linecard devices in the chassis. The optional **in** parameter specifies a delay period in minutes (mm) or hours and minutes (hh:mm) that ActivChassis will wait before reloading. The optional **cancel** parameter deactivates a pending **reload** command. To reload the entire ActivChassis (including the master device and all linecard devices), connect to the master device and enter the command as follows:

```
>enable  
#reload
```

In addition, you can enter the **reload vcid <vcid>** command to reload an individual ActivChassis member. The **<vcid>** parameter specifies an ActivChassis member to reload. Valid range is **1** to **8**, but the VCID of the active master is not accepted. To reload a specific ActivChassis member, connect to the master device and enter the command as follows:

```
>enable  
#reload vcid 3
```



Reloading an ActivChassis member can disrupt ActivChassis communication, potentially severing the ActivChassis backplane from other devices.

Clearing ActivChassis

Use the **clear activchassis** command to cause the master device to trigger a restart of the ActivChassis supervision protocols. This action causes the entire ActivChassis to restart discovery and to reresolve the current ActivChassis configuration. The current ActivChassis is re-evaluated to determine if any changes are needed for the topology, ActivChassis configuration, and the routing engine. To restart the ActivChassis supervision protocols, connect to the master device, and enter the command as follows:

```
>enable
#clear activchassis
```

Viewing ActivChassis

Use the **show activchassis [detail] [<vcid>]** command to display a summary or detailed information about ActivChassis members. The optional **detail** parameter specifies that details, rather than summaries, are displayed, and the optional **<vcid>** parameters specifies that only information pertaining to the specified VCID are displayed. Valid VCID range is **1** to **8**. Information included in detailed reports include the VCID of the member, the connection state of the member (not connected or connected), the role of the member, and additional information. To display the detailed information about ActivChassis members, enter the command from the master device's Enable mode as follows:

```
>enable
#show activchassis detail
VCID: 1 (NV1638)
ActivChassisVC Connection State: Connected
Role: Master
Connection Information: none
VC Ports:
  Xgiga-switchport 1/1/1
  Xgiga-switchport 1/1/2
```

```
VCID: 4 (NV1638)
ActivChassisVC Connection State: Not Connected
Role: Linecard
Connection Information: "This device has the wrong AOS version. The correct version is 10.5.1."
ActivChassisVC Ports:
  Xgiga-switchport 4/0/1
  Xgiga-switchport 4/0/2
```



*The **show activchassis** command can also be issued from a linecard device's CLI. In the linecard command mode, only the master and linecard ActivChassis members are displayed. If the linecard has not been admitted to the ActivChassis, the command only displays the linecard information.*

Enabling ActivChassis Debug Messaging

Use the **debug activchassis [election | fan | filesync | linecard | poe | rpc]** command to enable debug messaging for ActivChassis. The optional **election**, **fan**, **filesync**, **linecard**, **poe**, and **rpc** parameters specify that debug messaging for a specific part of ActivChassis (elections, fan, file synchronization, linecards, PoE, or remote procedure calls (RPCs)). If no additional parameters are used, debug messages for all of ActivChassis are enabled. To enable debug messaging for ActivChassis, enter the command from the master device's Enable mode as follows:

```
>enable
#debug activchassis
```



Turning on a large amount of debug information can adversely affect the performance of your unit.

Linecard Device Configuration

Devices that are ActivChassis enabled and are configured as a linecard device (the VCID is not 1 or 2), can be configured through the local console port. This linecard command mode provides a way to locally manage the device when the device is active in ActivChassis, or when the device is not yet active in ActivChassis, but it is actively detecting an ActivChassis (accessed by selecting **Escape** during the detection process). This command mode does not provide access to the local configuration of the device, but rather only linecard configuration for the ActivChassis member. Many of the commands available in the linecard command mode are the same as those available in the master command mode. Commands available in the linecard mode are outlined in *Table 1*.

Table 1. Linecard Device Configuration Commands

Prompt	Command	Description
linecard>	activchassis vcid [master-assigned <value>]	Specifies the VCID of the device, and enables ActivChassis on the device. Refer to <i>Enabling ActivChassis and Specifying the VCID on page 22</i> for more details.
linecard>	no activchassis	Disables ActivChassis on the device.
linecard>	activchassis restore-linecard-dflt	Restores an ActivChassis enabled device to linecard default settings. These settings are ActivChassis enabled, the VCID is a master assigned value, and the startup configuration is the default settings for the device.

Table 1. Linecard Device Configuration Commands (Continued)

Prompt	Command	Description
linecard>	flashme [<value>]	Specifies that the master device flash the LED lights for a specified amount of time. By default, the LED lights will flash amber for 3 seconds.
linecard>	reload	Reloads the linecard device.
linecard>	show activchassis	Displays the ActivChassis information for the linecard, as well as the master device if the linecard has been accepted into the ActivChassis.
linecard>	exit	Exits the linecard command mode.

ActivChassis Configuration Scenarios

There are two primary configuration scenarios for ActivChassis: configuring new equipment, and reconfiguring an existing, active set of switches as an ActivChassis. Configuring ActivChassis is similar to configuring a typical switch, except that there are many more ports and they are numbered differently. A three-part specifier is used instead of a two-part specifier. For instance, the Gigabit Ethernet interface on the first unit in the stack (**interface gig 0/1**) becomes **interface gig 1/0/1**, and the first port on the second unit in the stack becomes **interface gig 2/0/1**. The XIM modules in the back of the devices are similarly renamed. For example, the first port on the second module in the fifth unit in the stack becomes **interface xgig 5/2/1**. Both configuration scenarios are described in the following sections. These examples focus on CLI configuration.

Configuring New Equipment as an ActivChassis

1. Remove your new switches from the box and install them in the rack.
2. Insert the stacking modules or SFP+ modules into the desired option slots in the back of the units.
3. Connect all units together using stacking cables or fiber. The units should be cabled in a ring configuration. This means the top unit is connected to the unit just below it. Each unit is connected to the unit below it except the last unit, which is cabled back to the first unit in the stack (refer to [ActivChassis Network Topologies on page 4](#)).
4. Power the first unit and attach a serial cable to the console port for configuration.
5. At the configuration prompt, enter the **activchassis vcid 1** command. The unit will confirm that you want to proceed, and then it will reboot.
6. Verify that the ports used for stacking are in ActivChassis mode. If you have a stacking module in slot 1, for instance, enter the **show run interface xgig 1/1/1** to view the configuration for the first port in the first module. If the ports are not in ActivChassis mode, change the port mode by entering the **switchport mode activchassis** command.

7. Power up the second unit in the ActivChassis.



*If the second unit (and possibly units 2 through 8) are brand new units (out of the box), you must enable ActivChassis. The backup device (unit 2) should be configured with the **activchassis vcid 2** command. The rest of the units, as linecards, should be configured with the **activchassis vcid master-assigned** command. The units will confirm that you want to proceed after these commands are entered, and they will reboot.*

8. After the second unit has booted, verify that it joined the chassis by entering the **show activchassis** command.
9. Repeat Steps 7 and 8 for all switches in the ActivChassis (up to eight).
10. Configure the new ActivChassis switch as you would a standalone switch, remembering to use the three-part specifiers to specify ports.

Reconfiguring Existing Active Switches as an ActivChassis

1. It is recommended that you complete this procedure using a serial cable and a console port. It is possible to upgrade existing equipment using Telnet, but it requires careful planning and is not recommended.
2. If the units are not connected with stacking cables or 10 G fiber, you will need to have that equipment ready to install as you work your way through the procedure.
3. If the switches are not running ActivChassis-capable firmware, upgrade the switches to the firmware on which you intend to run ActivChassis. This step upgrades all the firmware on the switches without enabling ActivChassis. This is an important step especially if the current code is older than the first release of ActivChassis (AC1.0) because the order of certain commands have changed in the saved configuration.
4. Make a backup of the configuration of each switch that will be joining the ActivChassis. Save these on the computer you will be using to configure the new ActivChassis because you will need to edit these files to configure the new system.
5. If you plan to add modules to the master unit, do so now.
6. With the console cable attached to the unit that will be the master, enter the **activchassis vcid 1** command. The system will confirm your intent and then reboot.
7. Verify that the ports used for stacking are in ActivChassis mode. If you have a stacking module in slot 1, for example, enter the **show run interface xgig 1/1/1** command to view the configuration for the first port in the first module. If the ports are not in ActivChassis mode, change the port mode by entering the **switchport mode activchassis** command.
8. Move the serial cable to the next unit in the stack. For the purposes of this example, we will assume that the units are all stacked together in a rack, and that you want to number them from top to bottom beginning with the number 1. This will initially make the top unit the master device, and the next unit down the backup device.
9. If you plan to add modules to this unit, do so now.
10. At the configuration prompt, enter the **activchassis vcid 2** command to make this unit 2 in the chassis. The system will confirm your intent and then reboot. While it is rebooting, you can attach stacking cables between this unit and the one above (if necessary). When this unit boots, assuming it is cabled to the master and the master's stack ports are in ActivChassis mode, it should join unit 1. You will see a

Linecard> prompt on this unit if it is connected correctly. If it boots like a standalone unit, verify that the cabling is correct and that the port on the master device is in ActivChassis mode.

11. Move the cable back to the first unit and verify that it has accepted the second unit into the stack. Enter the **show activchassis** command to view the list of units in the chassis.
12. Move the cable to the next unit in the stack and cycle through Steps 7 through 10 until you have all units connected to the ActivChassis. Remember to increment the VCID for each unit.
13. Once all the units are stacked, configure them as they were before the upgrade. To complete this action, you will need the backup files that you saved in Step 4. For the purposes of this example, we will assume you have a text editor on the computer you are using for console access. The first unit's configuration was automatically converted, so no additional action is necessary for the ports on VCID 1.
14. Move the console cable back to the master device. You should see the familiar AOS prompt and prepare to configure ActivChassis.
15. In your text editor, open the configuration file for the second unit in the stack. Scroll to where the port configuration begins in the file. Search for **0/** and replace it with **2/0/**. Do this for all occurrences in the file.
16. Copy the Gigabit Ethernet interface configuration part of the script and paste it onto the console of the master device to configure all the ports on unit 2. Be careful with the XGigabit Ethernet ports because some of them are now used for stacking, and you do not want to change the configuration of those ports. Typically, the only time XGigabit Ethernet ports must be reconfigured is in fiber connections to remote network closets.
17. If there are any Global configuration settings on unit 2 that are not on unit 1, copy and paste these as well. Conflicts in Global settings or IP configurations are not covered in this procedure.
18. Repeat Steps 14 through 16 for all units in the chassis, until all the ports are configured.
19. Write the configuration to save it, using the **do write** command.
20. Verify that the network is functioning properly.

Configuring ActivChassis from the Master Device's GUI

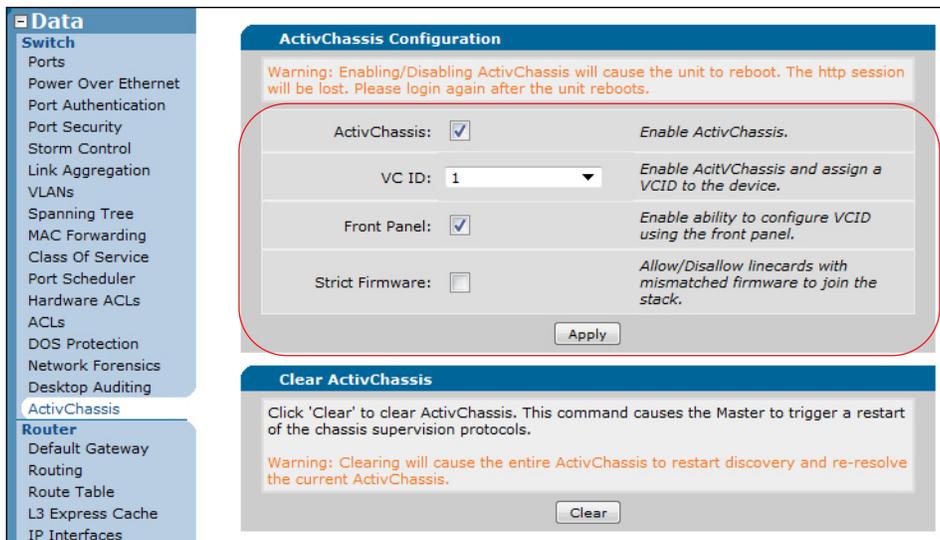
In addition to CLI configuration, the ActivChassis master device can be used to configure the ActivChassis functionality using the GUI. There are many configuration options available from the master device's GUI, but only the ones pertaining to ActivChassis are included in this document. In the master device's GUI there is an ActivChassis menu, which provides methods for enabling or disabling ActivChassis, configuring VCIDs, clearing ActivChassis, as well as viewing, renumbering, or removing members. To configure ActivChassis settings using the GUI, connect to the master device's GUI following the instructions in the product's quick start guide (shipped with the unit or available online at <https://supportforums.adtran.com>). Once you have connected to the GUI, access ActivChassis configurations using the instructions in the following sections.



ActivChassis GUI configuration is only available on the current ActivChassis master device.

Enabling ActivChassis

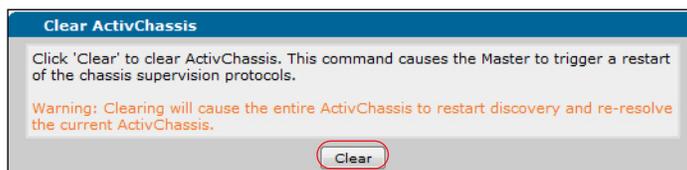
In the master device's GUI, navigate to **Data > Switch > ActivChassis**. In the **ActivChassis Configuration** menu you can enable or disable ActivChassis, specify the VCID for the device, and enable or disable front panel VCID configuration.



To enable ActivChassis on the device, select the **ActivChassis** checkbox. To assign a VCID to a device, select the appropriate VCID from the **VCID** drop-down menu. To enable front panel VCID configuration on the device, select the **Front Panel** check box. To enable the strict firmware option, select the **Strict Firmware** check box. Select **Apply** to apply the changes.

Clearing ActivChassis

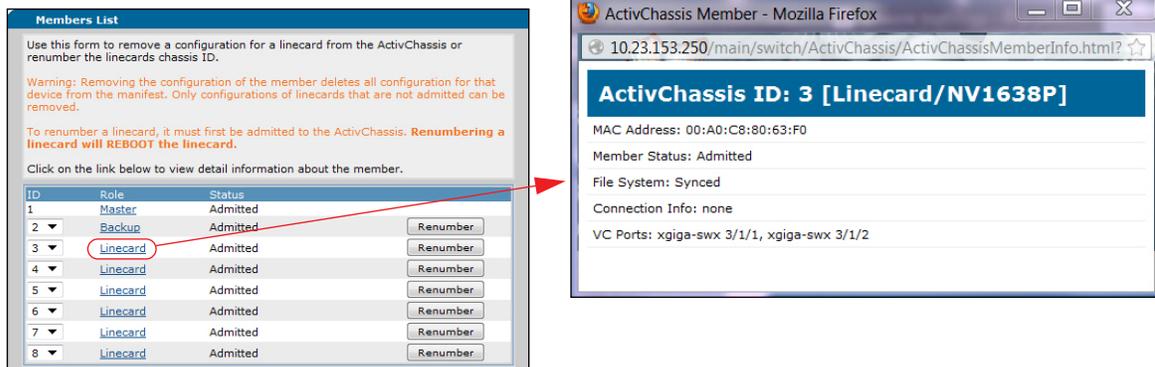
You can cause the ActivChassis master device to trigger a restart of the ActivChassis supervision protocols by clearing ActivChassis. To clear ActivChassis in the GUI, navigate to **Data > Switch > ActivChassis**. In the **Clear ActivChassis** menu, select **Clear**.



Clearing ActivChassis causes the entire ActivChassis to restart discovery and re-evaluate the current ActivChassis configuration. The current ActivChassis is re-evaluated to determine if any changes are needed for the topology, ActivChassis configuration, and the routing engine.

Viewing ActivChassis Members

To view detailed information about specific ActivChassis members, navigate to **Data > Switch > ActivChassis**. In the **Members List** menu, select the member from the **Role** list. A detailed menu is displayed with the VCID, MAC address, member status, file synchronization status, and ActivChassis ports of the member.



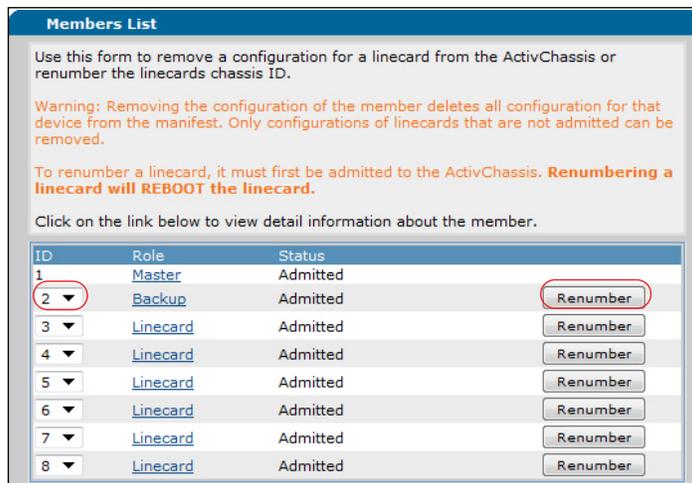
Removing ActivChassis Members

To remove a device from ActivChassis, navigate to **Data > Switch > ActivChassis**. In the **Members List** menu, find the member in the **Role** list. If the member has not been admitted to ActivChassis, select **Remove** to remove the device.

NOTE *Removing the configuration of the member deletes all configuration for that device from the manifest. Only configurations of linecards that are not admitted to ActivChassis can be removed.*

Renumbering ActivChassis Member VCID

To renumber an ActivChassis member VCID, navigate to **Data > Switch > ActivChassis**. In the **Members List** menu, find the member in the **Role** list. If the member has been admitted to the ActivChassis, select the appropriate VCID from the **ID** drop-down menu and select **Renumber** to change the member's VCID. Renumbering a linecard device reboots the device.



Viewing ActivChassis Ports

In the master device's GUI, you can view the configuration of ports associated with a specific VCID by navigating to **Data > Switch > Ports**, and selecting the **General** tab. This menu allows you to view ports on a particular ActivChassis, without displaying all the ports not associated with the chassis. To view the ports for a specific ActivChassis instance, select the appropriate VCID from the **VCID** drop-down menu. The drop-down menu only displays options for VCIDs that are admitted into the ActivChassis.

The screenshot shows the 'Switch Ports Configuration' page in the GUI. The left sidebar contains a navigation menu with 'Data' expanded and 'Switch' selected. Under 'Switch', 'Ports' is selected. The main content area has three tabs: 'General', 'Flow Control', and 'Bulk Config'. A note states: 'Note that applying changes only affect the selected VC ID ports. Use the 'Bulk Config' tab to configure all ActivChassis ports.' Below this, a 'VC ID' dropdown menu is set to '1'. A table lists the ports for this VCID:

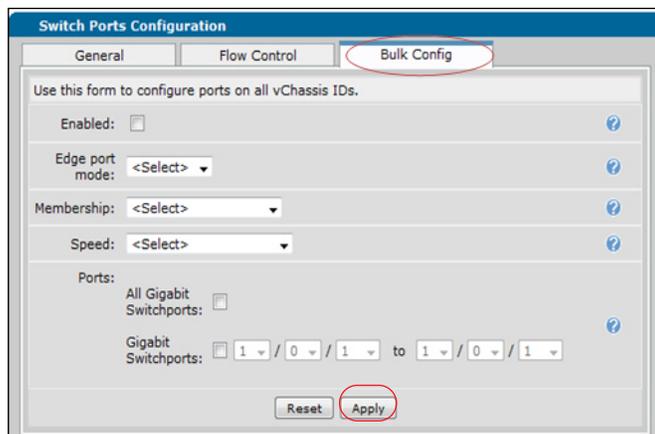
Port	Edge Port Mode	Membership	Speed/Duplex	Status	STP
qiga-swx 1/0/1	Disabled	vlan 100(VLAN0100)	Auto	Down	---
qiga-swx 1/0/2	Disabled	vlan 100(VLAN0100)	Auto	Down	---
qiga-swx 1/0/3	Disabled	vlan 100(VLAN0100)	Auto	Down	---
qiga-swx 1/0/4	Disabled	vlan 100(VLAN0100)	Auto	Down	---



Similar VCID drop-down menus are also available on the PoE, Port Authentication, Port Security, and Denial of Service (DoS) Protection GUI pages.

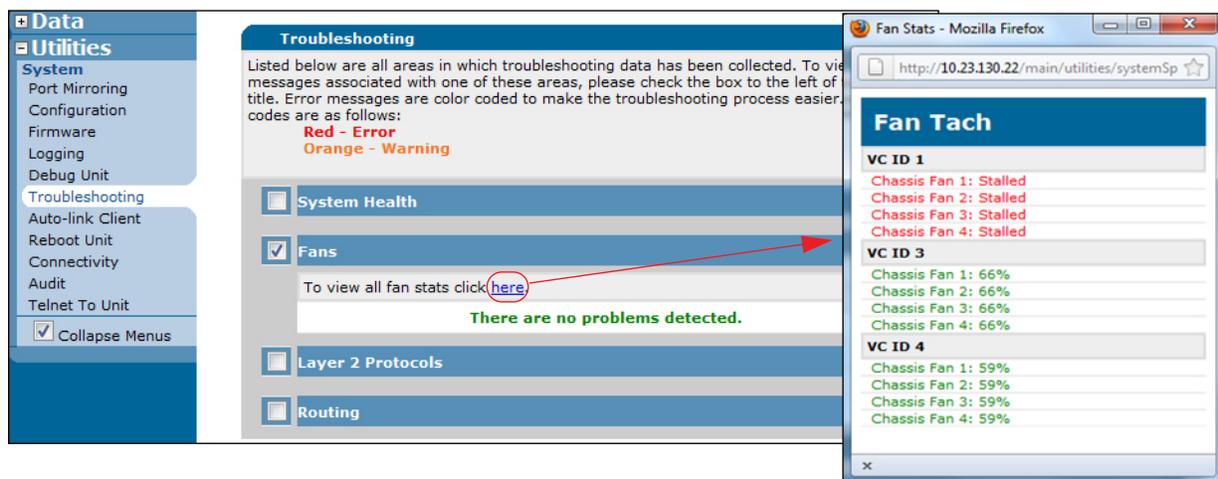
Bulk Configuration of ActivChassis Ports

In addition to viewing ActivChassis ports from the master device, you can also create a bulk configuration for all (or a selected few) Gigabit Ethernet switchports in the ActivChassis. Bulk configuration items include enabling the port, specifying the port mode, specifying the port membership, and specifying the port speed. To create a bulk configuration, navigate to **Data > Switch > Ports**, and select the **Bulk Config** tab. You can specify whether this is applied to all Gigabit Ethernet switchports by selecting the **All Gigabit Switchports** check box, or specify a range of ports in the **Gigabit Switchports** drop-down menu. Select **Apply** to apply the settings to the specified ports.



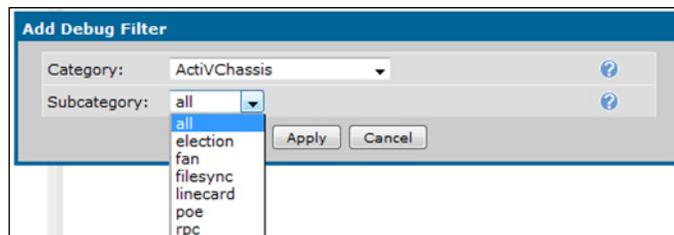
Troubleshooting Fan Status

You can troubleshoot the fans associated with ActivChassis through the troubleshooting menu in the master device's GUI. This troubleshooting feature allows you view the fan tach for a single ActivChassis VCID, or for all VCID fan statistics. To view the fan statistics, navigate to **Utilities > Troubleshooting** and select **Fans**. By default, only the fan statistics for the current VCID are shown. To view all VCID fan statistics, select the hyperlink.



Enabling ActivChassis Debug Messages

You can enable ActivChassis debug messages by connecting to the master device's GUI and navigating to **Utilities > Debug Unit**. Select **Add Debug Filter** to create an ActivChassis debug filter. In the **Add Debug Filter** menu, select **ActivChassis** from the **Category** drop-down menu. You can also optionally choose to limit the output of the debug messages to a specific parameter by selecting the appropriate item from the **Subcategory** drop-down menu. Select **Apply** to create the debug filter. Select **Start Debug** to begin capturing ActivChassis debug messages.



Turning on a large amount of debug information can adversely affect the performance of your unit.

ActivChassis Operational Scenarios

The following section contains ActivChassis operational scenarios to assist you in troubleshooting your ActivChassis configuration. These scenarios should help you to understand the overall function of ActivChassis, and how ActivChassis members behave when certain criteria are met.

A Device with VCID 1 Boots in ActivChassis Mode

If a device with a VCID of 1 boots in ActivChassis mode, the manifest is consulted and all ports configured for ActivChassis are enabled. An ActivChassis detection period is invoked to wait for all units in the manifest to be detected. During this process, if **Escape** is selected, the device stops detecting, and elects a master from the currently detected master candidates. If elected master, it then restores from its local startup configuration file. If **Escape** is not selected, the device continues detection and an election takes place to verify the device's role or determine the ActivChassis master. If another device with VCID 1 is detected, the unit will display an error stating that duplicate master candidates exist, and boot immediately with no linecard attached. the unit will stay in this state until the duplicate is removed and a valid election can take place.

If the device is elected master, it restores from its local startup configuration. As new devices request to join the ActivChassis, the master device updates its manifest with information about the new member, assigned VCID configuration is applied to the new device, and the file systems are updated and synchronized. As previously joined devices return, they are admitted to ActivChassis if they still meet admission requirements, and their hardware configuration matches what was previously recorded in the manifest.

If a device with VCID 2 is already the active master, the master candidate (VCID 1) is added as a non-master device to the working ActivChassis. If the device is elected as the backup device and is admitted to the ActivChassis, it is configured by the master device and becomes the backup. If this device was already fully booted and master of itself or some set of linecards, it becomes a case of ActivChassis merge (refer to *An ActivChassis Merge Occurs on page 38*).

A Device with VCID 2 Boots in ActivChassis Mode

If a device with the VCID of 2 boots in ActivChassis mode, it operates in the same manner as the previous scenario, except that if VCID 1 and 2 are detected at master election, the elected master will be whichever unit was the previous master of the ActivChassis. If both claim they were the previous master, then VCID 1 wins, and VCID 2 becomes the active backup.

A Device with VCID 3 through 8 Boots in ActivChassis Mode

If a device with a VCID of any value other than 1 or 2 boots in ActivChassis mode, the manifest is consulted and all ports configured for ActivChassis are enabled. An ActivChassis detection period is invoked to determine if other ActivChassis devices are in place, and to locate the elected master. If an active master is found, it queries the linecard for its VCID. If the linecard device's VCID is master assigned, the active master assigns the next available ID value, generates an event indicating a new VCID is allocated, and updates the manifest with new member information. If the linecard device's VCID is not master assigned, the master checks if there is another linecard currently active in the ActivChassis with the same VCID. If there is, the new device is not admitted. If the VCID is available, the master device then checks the hardware manifest to determine if the new device has the same hardware and module loading as the recorded values for the particular VCID. If the resources do not match, the new device is not admitted into the ActivChassis. If the new device meets the criteria, the device becomes an active linecard and is configured by the master device per the ActivChassis configuration, and ActivChassis configuration that aligns with the assigned VCID is applied to the linecard.

If an active master is not found during ActivChassis detection, or the device is not admitted to the ActivChassis, then the device does not boot and continues to search for a master device.

A Linecard Device Loses the Master Device

If a running linecard device loses contact with the ActivChassis master or backup device, the spanning tree state of the device's switchports is locked in the current state, non-unicast traffic is dropped (to prevent broadcast storms), and MAC address learning is disabled. If the master returns, the linecard clears its current configuration, places all ports in spanning tree blocking state, and notifies the master that it is ready to be reconfigured. The master then reconfigures the linecard with the appropriate configuration for that VCID.

An Active Master is Lost and the Backup Takes Over

If the active master device fails or is disconnected, the backup device detects the failure and assumes mastership over the ActivChassis. The backup device reboots in order to load the ActivChassis configuration from its startup configuration file. The ActivChassis configuration is reconstructed, the routing engine begins to run on the new master device, and packet forwarding resumes once the routing engine resolves the new network view.

To external devices communicating with the ActivChassis, the condition is viewed as a reboot of ActivChassis. The MAC addresses of all IP addresses change to those of the new master's hardware and sessions, and processes reinitialize to or from the routing engine.

An ActivChassis Split Occurs

If the ActivChassis master is one ActivChassis segment, and the ActivChassis backup is in another segment, an ActivChassis split occurs. In this case, the master segment continues as normal, and the routing engine resolves a new network view. The backup device reboots and becomes the active master in the new ActivChassis segment. The single ActivChassis effectively becomes two individual ActivChassis chassis, and the data path between the two is lost.

If there are two ActivChassis segments, and one segment has neither a master nor a backup, an ActivChassis split occurs. In this case, linecard devices detect a loss of the master, and wait until they are rejoined with a master. Any ports in ActivChassis mode continue to remain in ActivChassis mode and attempt to detect a master device.

An ActivChassis Merge Occurs

If two segments of ActivChassis exist, and both segments have an active master, then an ActivChassis merge occurs. In this case, both segments are joined together and two master devices are detected. A master election is held, and the device with VCID 1 is determined to be the master device. The device with VCID 2 becomes the backup device, and it reboots. After the VCID 2 reboot, the two segments become one, and the ActivChassis merge is complete.

A Linecard Device Must be Replaced

If a linecard device (including a backup device) needs replacement, the device is pulled from the ActivChassis, and the master device makes all parts of the ActivChassis configuration associated with that device inactive. When a new device is connected to the ActivChassis, its hardware must be the same (including the same modules in the same slots) as the original linecard.

If the original linecard is returned to the ActivChassis, it joins the chassis, is configured by the master per the ActivChassis configuration, and resumes operation as configured.

If the original linecard is to be replaced by different hardware of the same type, or the same hardware with a different VCID, and the device is to appear in the same location as the original device, you must set the device's VCID before attaching it to the ActivChassis. To do so, power the device in standalone mode, set the VCID to that of the device being replaced (from the front panel or local console, refer to [Front Panel Configuration on page 22](#)), power off the device, cable the device to the ActivChassis using the same ports as the original device, and power on the device. If the device meets admission requirements, it will join the ActivChassis and resume normal operation. If you do not want to set the device's VCID before attaching it to ActivChassis, you can opt to set the device's VCID after it is attached to the ActivChassis, but you must first return the device to factory defaults and specify the VCID is to be master assigned. The device will be admitted to ActivChassis after meeting the admission criteria, and will receive its configuration from the master device.

If a linecard device is to be replaced by different hardware, you must issue the command to delete the VCID of the device being replaced (refer to [Deleting an Allocated VCID on page 20](#)). This can only be accomplished while the device that has the VCID is not connected to the ActivChassis. Once the VCID has been removed, connect the new linecard device as you would a new device.