



L2 / L3 Switches

VLAN

Configuration Guide

Revision 1.0

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1 VLAN Configuration Guide

This document describes the Virtual Local Area Network (VLAN) feature supported in Supermicro Layer 2 / Layer 3 switch products.

This document covers the VLAN configurations for the below listed Supermicro switch products.

Top of Rack Switches

- SSE-G24-TG4
- SSE-G48-TG4
- SSE-X24S
- SSE-X3348S
- SSE-X3348T

Blade Switches

- SBM-GEM-X2C
- SBM-GEM-X2C+
- SBM-GEM-X3S+
- SBM-XEM-X10SM

The majority of this document applies to all the above listed Supermicro switch products. In any particular sub section however, the contents might vary across these switch product models. In those sections the differences are clearly identified with reference to particular switch product models. If any particular switch product model is not referenced, the reader can safely assume that the content is applicable to all the above listed models.



Throughout this document, the common term “switch” refers to any of the above listed Supermicro switch product models unless a particular switch product model is noted.



This document covers only Layer 2 Static VLANs. Dynamic VLAN features are explained in the Dynamic VLAN Configuration Guide.

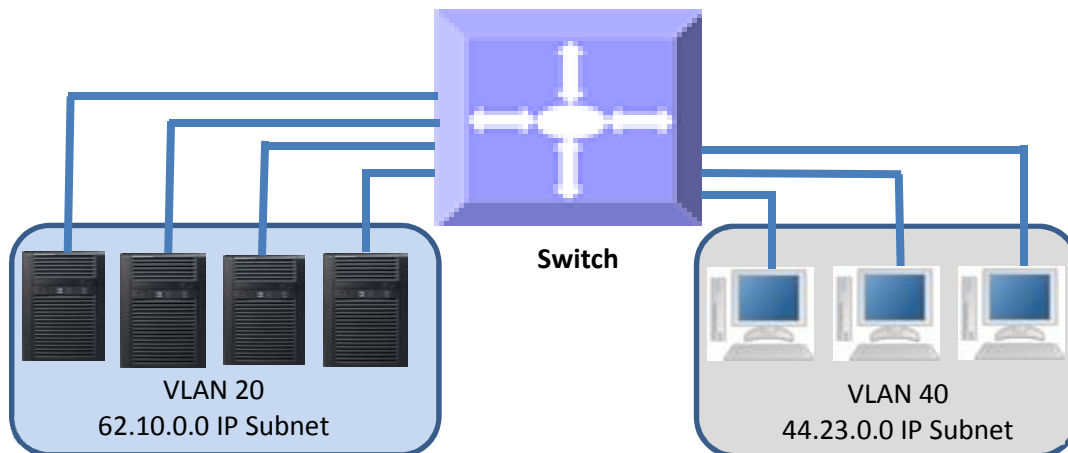
1.1 VLAN Basics

A Virtual LAN (VLAN) is a logical switched LAN formed by segmenting physical Local Area Networks (LANs).

Segmenting a switched LAN as one or more VLANs provides the following advantages:

- ⇒ Limits multicast and broadcast flood only to the required segments of the LAN to save LAN bandwidth
- ⇒ Provides secured LAN access by limiting traffic to specific LAN segments
- ⇒ Eases management by logically grouping ports across multiple switches

Figure VLAN-1: VLANs on a Switched LAN



VLANs work in same way as physical LANs. The packets from the end stations of a VLAN are switched only to other end stations or network devices inside that VLAN. To reach devices in another VLAN, the packets have to be routed from one VLAN to another. Supermicro L2/L3 switches support such InterVLAN Routing to route packets across different VLANs. InterVLAN Routing is done by creating “Layer 3 Interface VLANs”.

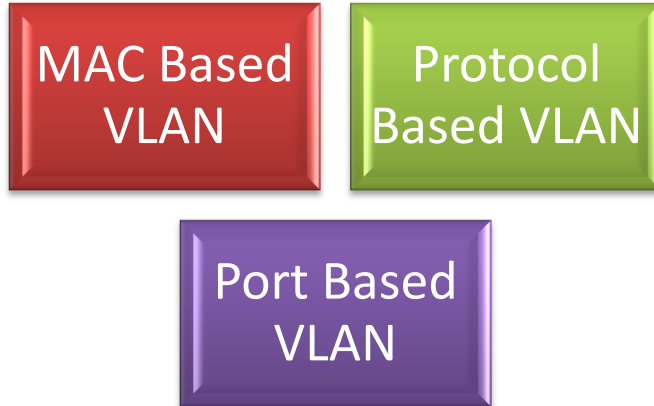


This document covers only Layer 2 VLANs. The Layer 3 Interface VLAN feature is explained in the IP Configuration Guide.

1.2 VLAN Support

Supermicro switches support the three types of VLANs – MAC Based VLANs, Protocol Based VLANs and Port Based VLANs.

Figure VLAN-2: Types of VLANs Supported



Once a packet is received, a switch tries to identify the VLAN for the received packet. This VLAN identification is done according to the procedure below.

If the incoming packet has a VLAN tag and the VLAN ID in the tag is not equal to zero, then this VLAN ID is used as the VLAN for this packet.

If the incoming packet does not have a VLAN tag (untagged packet) or if the VLAN ID in the VALN tag is equal to zero (priority tagged packet), the packet is considered as untagged/priority tagged and the below steps are used to identify the VLAN for this untagged/priority tagged packet.

Step 1: Use the source MAC of the incoming packet and check the MAC VLAN mapping. If the VLAN is found for this source MAC, that VLAN ID is used as the VLAN for this packet. If the MAC VLAN is not found, proceed to the next step.

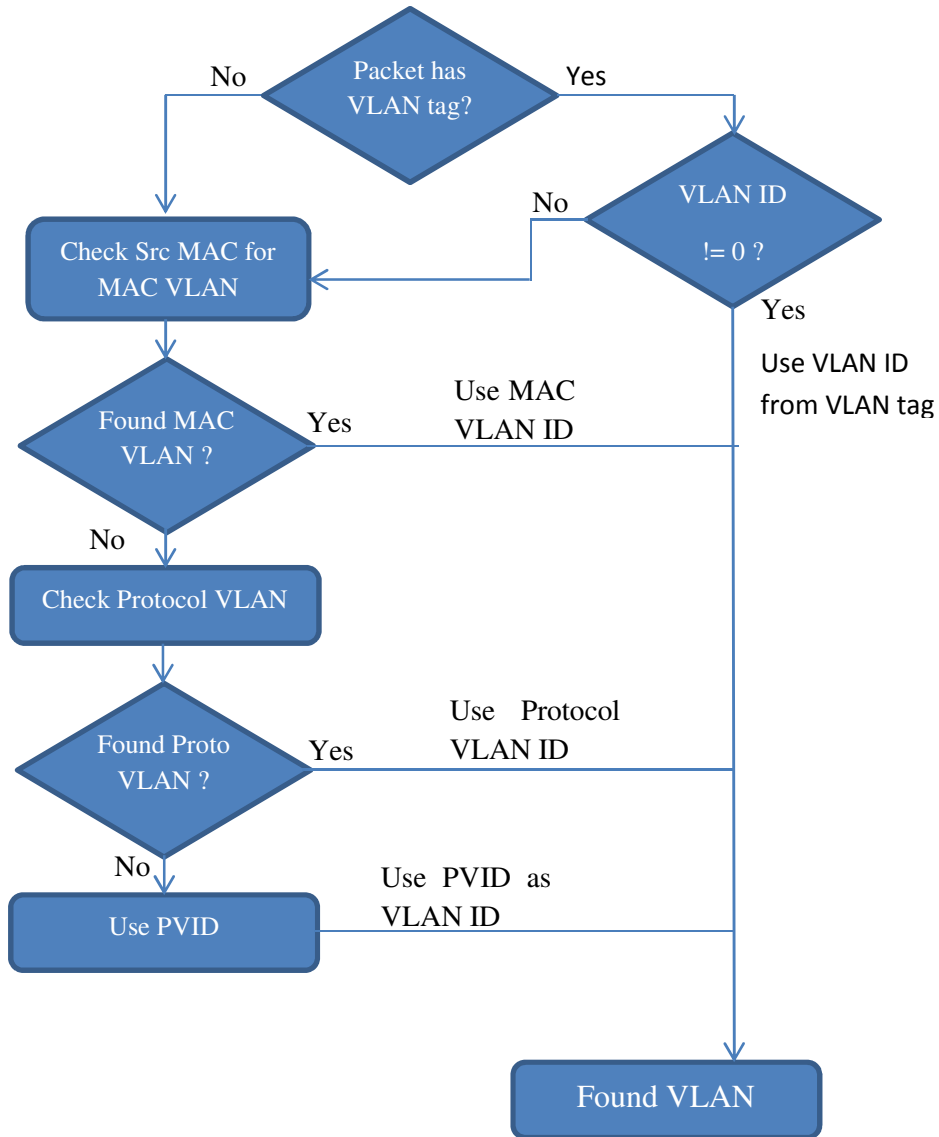
Step 2: Use the protocol field from the incoming packet layer 2 header and check the protocol VLAN table. If a protocol VLAN is found, that VLAN ID is used as the VLAN for this packet. If a protocol VLAN is not found, proceed to the next step.

Step 3: Use the PVID from the port on which the packet is received as the VLAN ID for this packet.

This VLAN identification procedure is shown in Figure VLAN-3: VLAN Identification Procedure.

Once the VLAN is identified for the received packet, it will be forwarded to any other member port of this VLAN based on the forwarding logic. If there are no other member ports for this VLAN, the packet will most likely be dropped unless it was routed or sent to the CPU or redirected by an ACL rule.

Figure VLAN-3: VLAN Identification Procedure



1.3 VLAN Numbers

Supermicro switches support VLAN identifiers from 1 to 4069 for user created VLANs. VLAN identifiers 4070 to 4094 are reserved for internal use.

The number of supported VLANs differs among different models of Supermicro switch products as shown in the table below.

Switch Product	Number of VLANS Supported
SSE-G24-TG4	1024

SSE-G48-TG4 SBM-GEM-X2C SBM-GEM-X2C+ SBM-GEM-X3S+	
SSE-X24S SBM-XEM-X10SM SSE-X3348S SSE-X3348T	4094



The command “**show vlan device info**” displays the maximum VLAN identifiers and total number of VLANs supported by the switch.

All the above switch models support 1024 MAC based VLANs.

Supermicro switches support 16 protocol groups for protocol based VLANs. These 16 protocol groups can be mapped to different VLANs in every port. Same protocol group can be associated with different VLAN in different port.

1.4 VLAN Defaults

Supermicro switches boot up with VLAN 1, which is a default Layer 2 VLAN. The switchable ports of all switches are added to this default VLAN 1 as access ports. This default setup helps switch forwarding traffic across all the ports without the need of any user configuration.

Users can modify the port members of this VLAN 1 by adding or removing any ports to this VLAN 1 as either tagged or untagged ports.



VLAN 1 cannot be deleted by the user. Instead, a user can remove all the ports from VLAN 1 to make it nonfunctional. This can be done by using the “**no ports**” command in VLAN the configuration mode in CLI.

The port based VLAN identifier (PVID) for all the switch ports is set to 1 by default. The PVID is used to associate incoming untagged packets to port based VLANs. Users can modify the PVID for switch ports to any VLAN identifier.

The switch port mode is set to “hybrid” for all switch ports by default. Users can change the port mode as explained in the [Port Based VLAN Section](#).

VLAN 1 is configured as the default native VLAN for all trunk interfaces. Users can change the native VLANs for trunk interfaces as explained in section [Native VLAN on Trunk](#).

Protocol based VLAN is enabled by default.



Supermicro switches do not create VLANs by default except for VLAN 1. Users need to create all the VLANs used on their network in Supermicro switches. Trunk ports will be able to carry only VLANs created in Supermicro switches.

1.5 Creating VLANs

Follow the steps below to create VLANs in Supermicro switches.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	vlan <vlan-list>	Creates a VLAN using vlan command. <i>vlan-list</i> – may be any vlan number or list of vlan numbers. Multiple vlan numbers can be provided as comma-separated values. Consecutive vlan numbers can be provided as a range, such as 5-10. User can configure VLANs with identifiers 1 to 4069.
Step 3	show vlan	Displays the configured VLANs
Step 4	write startup-config	Optional step – Save these VLAN configuration to be part of startup configuration.

The examples below show various ways of creating VLANs.

Create a VLAN with identifier 10

```
SMIS# configure terminal
SMIS(config)# vlan 10
SMIS(config-vlan)# exit
```

Create VLANs with identifiers 20 to 30, 50 and 100

```
SMIS# configure terminal
SMIS(config)# vlan 20-30,50,100
SMIS(config-vlan)# exit
```

1.6 Modifying VLANs

To modify a configured VLAN, follow the same steps used to create a VLAN as explained in the [Creating VLANs](#) section.

1.7 Removing VLANs

Follow the steps below to remove VLANs from Supermicro switches.

Step	Command	Description
Step 1	configure terminal	Enter the configuration mode
Step 2	no vlan <vlan-list>	Remove VLANs using the no vlan command. <i>vlan-list</i> – may be any vlan number or list of vlan numbers. Multiple vlan numbers can be provided as comma separated list. Consecutive vlan numbers can be provided as ranges like 5-10.
Step 3	show vlan	To display the configured VLANs
Step 4	write startup-config	Optional step – Save these VLAN configuration to be part of startup configuration.

The below examples show sample ways to remove VLANs.

Delete a VLAN with identifier 10

```
SMIS# configure terminal
SMIS(config)# no vlan 10
```

Delete VLANs with identifier 20 to 30, 50 and 100

```
SMIS# configure terminal
SMIS(config)# no vlan 20-30,50,100
SMIS(config-vlan)# exit
```

1.8 VLAN Name

VLANs can be associated with a label name string for easier configuration and identification.

Follow the steps below to add or modify a name string to any VLAN in Supermicro switches.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode.
Step 2	vlan <vlan-list>	Enters the VLAN configuration mode. <i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma-separated values. Consecutive VLAN numbers can be provided as a range, such as 5-10. If multiple VLANs are provided, the same name string provided in next step will be associated with all these VLANs.
Step 3	name <vlan-name-string>	Associates a name string to this VLAN using the name command. <i>vlan-name-string</i> is any alphanumeric string up to 32 characters.
Step 4	show vlan	Displays the configured VLANs
Step 5	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.

The example below shows the necessary steps to associate a name string to a VLAN.

Associate name main_user_vlan to VLAN 50.

```
SMIS# configure terminal
SMIS(config)# vlan 50
SMIS(config-vlan)# name main_user_vlan
SMIS(config-vlan)# exit
```

Follow the steps below to remove a name string from any VLAN in Supermicro switches.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode.
Step 2	vlan <vlan-list>	Enters the VLAN configuration mode. <i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma-separated values. Consecutive VLAN numbers can be provided as a range, such as 5-10.

		If multiple VLANs are provided, the name string of all these VLANs will be removed by the next step.
Step 3	no name	Removes associated name string from this VLAN.
Step 4	show vlan	Displays the configured VLANs
Step 5	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.

The example below shows steps to remove name string from a VLAN.

Remove name from VLAN 50.

```
SMIS# configure terminal
SMIS(config)# vlan 50
SMIS(config-vlan)# no name
SMIS(config-vlan)# exit
```

1.9 Port Based VLANs

Port based VLANs are the simplest and most useful type of VLAN.

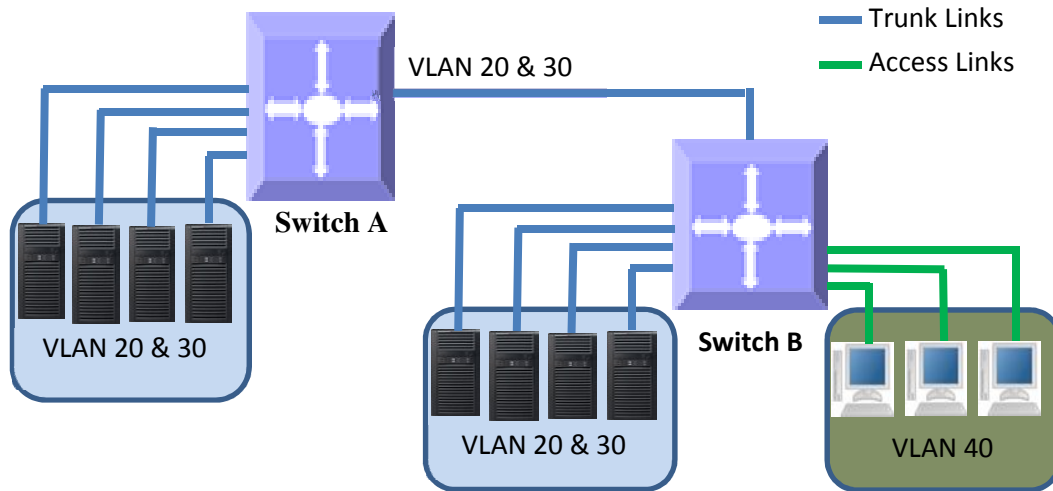
In port based VLAN deployment, switch ports are associated with one or more VLANs as member ports.

The VLAN traffic sent on the ports is decided by the VLAN membership modes of the ports. Mostly ports are associated with VLANs as either “access” port members or “trunk” port members. Supermicro switches support an additional port mode called “hybrid”.



Port Channel interfaces also can be configured as VLAN member ports.

Figure VLAN-4: Port Based VLANs



1.9.1 Access Ports

Access ports carry traffic of only one VLAN. Any switch ports can be configured as access ports. Mostly switch ports connected to end stations (computers / servers) that have only one type of traffic are configured as access ports.



Access ports cannot be configured to be part of more than one VLAN.

When a switch port is configured as an access port to any VLAN, that port is added as an untagged member port of the given VLAN. Also, the Port based VLAN identifier (PVID) of that port is configured as the given VLAN.

Switch strips the VLAN tag header from all packets sent out on an access port. Hence, access ports are also called untagged ports.

When a packet is received on an access port, the switch identifies the VLAN for the received packet from the packet's VLAN tag header. If the received packet did not have a VLAN identifier and the packet did not match any MAC or protocol VLAN, the port PVID is used as VLAN for all the received untagged and priority tagged packets.

Follow the below steps to configure any port as the access port of any VLAN.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the

	<p>following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po</p> <p><i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be the port channel identifier for port channel interfaces.</p> <p>To configure multiple interfaces, use the “interface range ...” command. To provide a range use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10</p> <p>To provide multiple interfaces or ranges, use separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20</p>
Step 3	switchport mode access	Sets the port mode as the access port.
Step 4	switchport access vlan <vlan-id>	<p>Configures the access VLAN for this interface. The VLANs identifiers may be any VLAN number from 1 to 4069.</p> <p>The VLAN provided in this command must exist in the switch. If the VLAN does not exist, create it first.</p>
Step 5	show vlan port config port <iftype> <ifnum>	Displays the configured mode and accesses the VLAN for this interface.
Step 6	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



“no switchport mode” command will change the port mode to the default hybrid mode. For more details about hybrid mode, refer to section [Hybrid Ports](#).

“no switchport access vlan” command will set the access VLAN as default VLAN 1. The port will continue to be the access port of VLAN 1.

The examples below show various ways to create VLANs with access ports.

Create a VLAN with identifier 50 and configure ports gi 0/2 to gi 0/10 as access ports to this VLAN.

SMIS# configure terminal

```
SMIS(config)# vlan 50
SMIS(config-vlan)# exit
SMIS(config)# interface range gi 0/2-10
SMIS(config-if)# switchport mode access
SMIS(config-if)# switchport access vlan 50
SMIS(config-if)# exit
```

Create a VLAN with identifier 10 and configure port channel 1 as access port to this VLAN.

```
SMIS# configure terminal
SMIS(config)# vlan 10
SMIS(config-vlan)# exit
SMIS(config)# interface po 1
SMIS(config-if)# switchport mode access
SMIS(config-if)# switchport access vlan 10
SMIS(config-if)# exit
```

1.9.2 Trunk Ports

Trunk ports carry the traffic of one or more VLANs. Any switch ports can be configured as trunk ports. Mostly switch ports connected between switches are configured as trunk ports to carry multiple VLAN traffic across switches. Switch ports connected to end stations (computers / servers) that have multiple VLANs are also configured as trunk ports.

When a switch port is configured as trunk port, by default it will be added to all the VLANs in the switch as a tagged port. To restrict the VLANs carried in trunk ports, refer section [Allowed VLANs on a Trunk](#).



Trunk ports will not carry traffic for VLANs that are not configured in a switch. For example, if the user wants to carry traffic for all the VLANs from 1 to 1024 in a trunk port, VLANs 1 to 1024 need to be created in the switch using the “**vlan**” command.

A switch adds the VLAN tag header to all packets sent out on the trunk port except for native VLAN traffic. Supermicro switches support only IEEE 802.1Q encapsulation for VLAN tag headers.

When a packet is received on a trunk port, the switch identifies the VLAN for the received packet from the packet’s VLAN tag header. If the received packet did not have a VLAN identifier and the packet did not match any MAC or protocol VLAN, the port PVID is used to determine the VLAN for all untagged and priority tagged packets that are received.

A native VLAN identifier is configured as a PVID for the trunk ports. If the user has not configured a native VLAN, the default VLAN 1 will be used as PVID for the trunk ports.

Follow the steps below to configure any port as a trunk port.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode

Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po <i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be a port channel identifier for port channel interfaces. To configure multiple interfaces, use the “ interface range ... ” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20
Step 3	switchport mode trunk	Sets the port mode as a trunk port.
Step 4	show vlan port config port <iftype> <ifnum> and show running-config	Displays the configured mode for this interface.
Step 5	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



“no switchport mode” command will change the port mode to the default hybrid mode. For more details about hybrid mode, refer to the [Hybrid Ports](#) section.

The examples below show various ways to configure trunk ports.

Configure port ex 0/1 and ex 0/2 as trunk ports.

```
SMIS# configure terminal
SMIS(config)# interface range ex 0/1-2
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# exit
```

Configure port channel 1 as a trunk port.


```
SMIS# configure terminal
SMIS(config)# interface po 1
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# exit
```

1.9.2.1 Allowed VLANs on a Trunk

By default, all the VLANs configured on a switch are allowed on the trunk interfaces. However, there may be some cases where users would like to limit the number of VLANs carried on the trunk ports. This can be configured by following the steps below.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po <i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be a port channel identifier for port channel interfaces. To configure multiple interfaces, use the “ interface range ... ” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20
Step 3	switchport mode trunk	Sets the port mode as trunk port.
Step 4	Use any one of the below steps 4a to 4f based on the need.	The <i>vlan-list</i> parameter used in the below commands could be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma-separated values. Consecutive VLAN numbers can be provided as a range, such as 5-10.
Step 4a	switchport trunk allowed vlan <vlan-list>	This command configures the list of allowed VLANs on this trunk. Only the VLANs provided on the <i>vlan-list</i> will be

		carried over the trunk.
Step 4b	switchport trunk allowed vlan add <vlan-list>	This command adds the given list of VLANs to the existing set of allowed VLANs on this trunk.
Step 4c	switchport trunk allowed vlan remove <vlan-list>	This command removes the given list of VLANs from the existing set of allowed VLANs on this trunk.
Step 4d	switchport trunk allowed vlan except <vlan-list>	This command makes all the configured VLANs allowed on this trunk except for the given list of VLANs.
Step 4e	switchport trunk allowed vlan all	This command sets the default behavior of allowing all VLANs configured in the switch as allowed VLANs on this trunk.
Step 4f	switchport trunk allowed vlan none	This command removes all the allowed VLANs from this trunk.
Step 5	show vlan port config port <iftype> <ifnum> and show running-config	Displays the configured, allowed VLANs for this trunk interface.
Step 6	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



A trunk port will not carry traffic for any VLANs that are not configured in the switch. For example, if a user wants to allow traffic for VLANs 1 to 100, VLANs 1 to 100 need to be created in the switch using the “**vlan**” command.

The examples below show examples of configurations to allow VLANs on trunk ports.

Configure to allow only VLANs 2 to 20 on trunk interface ex 0/1.

```
SMIS# configure terminal
SMIS(config)# vlan 2-20
SMIS(config-vlan)# exit
SMIS(config)# interface ex 0/1
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# switchport trunk allowed vlan 2-20
SMIS(config-if)# exit
```

Configure to not to allow VLANs 30 to 50 on trunk interface ex 0/1.

```
SMIS# configure terminal
SMIS(config)# interface ex 0/1
SMIS(config-if)# switchport mode trunk
```

```
SMIS(config-if)# switchport trunk allowed vlan except 30-50
SMIS(config-if)# exit
```

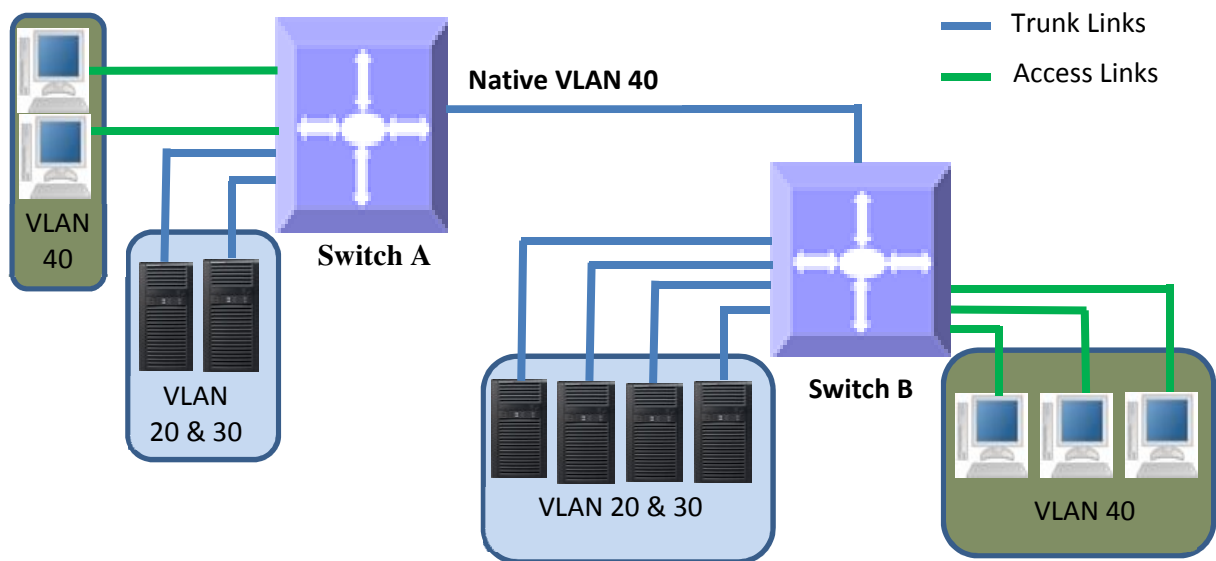
1.9.2.2 Native VLAN on Trunk

All packets sent out on a trunk interface carry the 802.1Q VLAN tag header. There may be cases in which untagged packets need to be carried over a trunk interface. This is achieved by using the native VLAN feature of the trunk interface.

Any VLAN can be configured on any trunk interface as a native VLAN. Trunk interfaces will send native VLAN packets as untagged packets without adding the 802.1Q VLAN tag header. Similarly, any untagged packets received on a trunk interface will be considered to be native VLAN packets.

The native VLAN identifier will be configured as a PVID on trunk interfaces. VLAN 1 is the default native VLAN for all trunk interfaces.

Figure VLAN-5: Native VLANs



Users can configure a native VLAN for trunk interfaces by following the steps below.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx

		<p>port-channel – po</p> <p><i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be a port channel identifier for port channel interfaces.</p> <p>To configure multiple interfaces, use the “interface range ...” command. To provide a range, use a hyphen (-) between the start and end interface numbers.</p> <p>E.g.: int range gi 0/1-10</p> <p>To provide multiple interfaces or ranges, separate with a comma (,).</p> <p>E.g.: int range gi 0/1-10, gi 0/20</p>
Step 3	switchport mode trunk	Sets the port mode as a trunk port.
Step 4	switchport trunk native vlan <vlan-id >	<p><i>vlan-id</i> - The VLAN identifiers may be from 1 to 4069.</p> <p>The VLAN provided in this command must exist in the switch. If the VLAN does not exist, create it first.</p>
Step 5	show vlan port config port <iftyp> <ifnum> and show running-config	Displays the configured native VLAN for this trunk interface.
Step 6	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



“no switchport trunk native vlan” command will reset the native VLAN as VLAN 1 for trunk interfaces.

The examples below show examples of configuring native VLANs for trunk ports.

Configure VLAN 20 as a native VLAN for trunk interface ex 0/1.

```
SMIS# configure terminal
SMIS(config)# vlan 20
SMIS(config-vlan)# exit
SMIS(config)# interface ex 0/1
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# switchport trunk native vlan 20
SMIS(config-if)# exit
```

Remove a native VLAN from trunk interface ex 0/1.

```
SMIS# configure terminal
SMIS(config)# interface ex 0/1
SMIS(config-if)# no switchport trunk native vlan
SMIS(config-if)# exit
```

1.9.3 Hybrid Ports

Hybrid ports carry both untagged and 802.1Q tagged packets. Hybrid ports are equivalent to trunk ports, with a limited amount of allowed VLANs and native VLANs.

Hybrid ports carry the traffic of one or more VLANs. Any switch port can be configured as a hybrid port. In Supermicro switches, all switch ports by default come up in hybrid mode.

Users need to explicitly add the hybrid ports to all the required VLANs as either tagged or untagged interfaces. A hybrid port could be configured simultaneously as a tagged port on one or more VLANs and as an untagged port on any one VLAN. Similar to access ports, hybrid ports may be an untagged port on only one VLAN, but may be a tagged port on many VLANs.

Users need to configure the PVID for hybrid ports to correctly handle the incoming untagged packets.



It is recommended for users to use hybrid ports only when they thoroughly understand the PVID, tagged and untagged interfaces of their network.

Hybrid ports might cause VLAN packet forwarding drops if the ports are not correctly added to the required VLANs as untagged or tagged interfaces as needed.

Hybrid ports can be configured through trunk ports with allowed VLANs and a native VLAN configuration.

A switch adds the 802.1Q VLAN tag header for VLAN traffic in which the hybrid port is configured as a tagged interface. The switch sends out packets without a VLAN tag header for the VLAN on which the hybrid port is configured as an untagged interface.

When a packet is received on a hybrid port, a switch identifies the VLAN for the received packet from the packet's VLAN tag header. If the received packet did not have a VLAN identifier and the packet did not match any MAC or protocol VLAN, the port PVID is used as the VLAN for all the received untagged and priority tagged packets. If the user has not configured the PVID, VLAN 1 will be used as the default PVID for hybrid ports.

Follow the steps below to configure any port as a hybrid port.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode

Step 2	vlan <vlan-list>	<p><i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma-separated values. Consecutive VLAN numbers can be provided as a range, such as 5-10.</p> <p>If multiple VLANs are provided, the ports configuration provided in the next steps will be applied to all these VLANs.</p>
Step 3	Use steps 3a to 3c below one or more times to configure the required port configurations for the VLANs provided in Step 2 above.	
Step 3a	ports <ports-list> tagged or no ports [<ports-list>] tagged	<p>Adds the tagged ports list to this VLAN.</p> <p><i>ports-list</i> – up to three ports or three ranges of ports separated by spaces. The range of ports is provided in the format gi 0/1-10, which specifies the ports from gi 0/1 to gi 0/10.</p> <p>Use the no form of this command to remove tagged ports from this VLAN. If <i>ports-list</i> is not provided to the no command, all the tagged ports are removed from this VLAN.</p>
Step 3b	ports <ports-list> untagged or no ports [<ports-list>] untagged	<p>Adds the untagged ports list to this VLAN.</p> <p><i>ports-list</i> – up to three ports or three ranges of ports separated by spaces. The range of ports is provided in the format gi 0/1-10, which specifies the ports from gi 0/1 to gi 0/10.</p> <p>Use the no form of this command to remove untagged ports from this VLAN. If <i>ports-list</i> is not provided to the no command, all the untagged ports are removed from this VLAN.</p>
Step 3c	ports <ports-list> forbidden or no ports [<ports-list>] forbidden	<p>Denies traffic from ports given by <i>ports-list</i> to this VLAN.</p> <p><i>ports-list</i> – up to three ports or ranges of ports separated by spaces. The range of ports is provided in the format gi 0/1-10, which specifies the ports from gi 0/1 to gi 0/10.</p>

		<p>Use the no form of this command to remove forbidden ports from this VLAN.</p> <p>If <i>ports-list</i> is not provided to the no command, all the forbidden ports are removed from this VLAN.</p>
Step 4	exit	Exits the VLAN configuration mode.
Step 5	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	<p>Enters the interface mode.</p> <p><i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po</p> <p><i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be a port channel identifier for port channel interfaces.</p> <p>To configure multiple interfaces, use the “interface range ...” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20</p>
Step 6	switchport mode hybrid	Sets the port mode as a hybrid port.
Step 7	switchport pvid <vlan-id>	<p>Configures the PVID for this interface. The VLANs identifiers could be any VLAN number from 1 to 4069.</p> <p>The VLAN provided in this command must exist in the switch. If the VLAN does not exist, create it first.</p>
Step 8	show vlan port config port <iftype> <ifnum> show running-config show vlan	Displays the configured VLAN and ports information.
Step 9	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



Any port may be configured as an untagged port into only one VLAN.

Untagged ports should be either in hybrid or access mode. Ports in trunk mode cannot be configured as untagged ports.

The examples below show various ways to configure hybrid ports.

Configure a VLAN 10 with ports gi 0/1 to gi 0/10 as untagged ports and add port ex 0/1 as a tagged port to this VLAN.

```
SMIS# configure terminal
SMIS(config)# vlan 10
SMIS(config-vlan)# ports gi 0/1-10 untagged
SMIS(config-vlan)# ports ex 0/1 tagged
SMIS(config-vlan)# exit
SMIS(config)# interface range gi 0/1-10
SMIS(config-if)# switchport mode hybrid
SMIS(config-if)# switchport pvid 10
SMIS(config-if)# exit
```

Configure a VLAN 100 with ports gi 0/1, gi 0/10, gi 0/20, gi 0/30, gi 0/40 and ex 0/1-2 as untagged ports and add port channel 1 as a tagged port to this VLAN.

```
SMIS# configure terminal
SMIS(config)# vlan 100
SMIS(config-vlan)# ports gi 0/1 gi 0/10 gi 0/20 untagged
SMIS(config-vlan)# ports gi 0/30 gi 0/40 ex 0/1-2 untagged
SMIS(config-vlan)# ports po 1 tagged
SMIS(config-vlan)# exit
SMIS(config)# interface range gi 0/1,gi 0/10, gi 0/20, gi 0/30, gi 0/40, ex 0/1-2
SMIS(config-if)# switchport mode hybrid
SMIS(config-if)# switchport pvid 100
SMIS(config-if)# exit
```

1.9.4 Acceptable Frame Types

By default, Supermicro switch ports accept all frames types – tagged, untagged and priority tagged.



Priority tagged packets have a VLAN tag header with a VLAN identifier of 0.

Users can control this behavior to make switch ports accept either only tagged or untagged and priority tagged packets.

Follow the steps below to configure acceptable frame types for any port or port channel.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po <i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It may be a port channel identifier for port channel interfaces. To configure multiple interfaces, use the “ interface range ... ” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g. : int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g. : int range gi 0/1-10, gi 0/20
Step 3	Use any of the below steps 3a to 3d to configure acceptable frame types for the ports provided in Step 2 above.	
Step 3a	switchport acceptable-frame-type tagged	This command makes only tagged frame types accepted on these ports. Any untagged or priority tagged packets received will be dropped.
Step 3b	switchport acceptable-frame-type untaggedAndPrioritytagged	This command makes only untagged and priority tagged frame types accepted on these ports. Any tagged packets received will be dropped.
Step 3c	switchport acceptable-frame-type all	This command makes accepting all frame types the default behavior.
Step 3d	no switchport acceptable-frame-type	This command makes accepting all frame types the default behavior.

Step 5	show vlan port config port <iftyp> <ifnum>	Displays the configured mode and access VLAN for this interface.
Step 6	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.

The examples below show various ways to configure acceptable frame types on switch ports.

Configure gi 0/1 to gi 0/10 to accept only untagged and priority tagged packets.

```
SMIS# configure terminal
SMIS(config)# interface range gi 0/1-10
SMIS(config-if)# switchport acceptable-frame-type untaggedAndPrioritytagged
SMIS(config-if)# exit
```

Configure port channel interface 1 to accept only tagged packets.

```
SMIS# configure terminal
SMIS(config)# interface po 1
SMIS(config-if)# switchport acceptable-frame-type tagged
SMIS(config-if)# exit
```

1.10 MAC Based VLANs

When end users move often from one place to another but remain inside the same LAN, it is difficult to maintain the same VLAN for an end user with port based VLAN configurations.

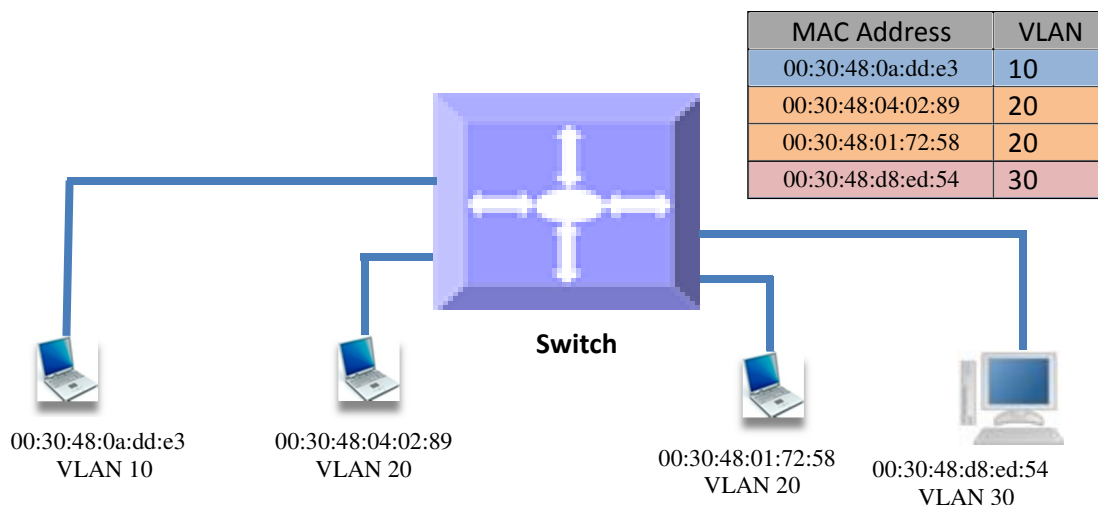
MAC based VLAN features are used to provide the same VLAN to any end user irrespective of the switch port the end user connecting to.

The switch administrator could configure MAC to VLAN mappings for unicast MAC addresses. When a switch receives any untagged packets, the source MAC address of the packet refers to this MAC VLAN mapping to identify the VLAN. If MAC VLAN mapping is not found for the received source MAC address, a protocol based VLAN or port based VLAN is used.



Supermicro switches support 1024 MAC based VLANs.

Figure VLAN-6: MAC Based VLANs



Follow the steps below to configure MAC based VLANs.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	vlan <vlan-list>	Creates the required VLANs. <i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma separated values. Consecutive VLAN numbers can be provided as ranges such as 5-10.
Step 3	exit	Exits the VLAN configuration mode.
Step 4	mac-vlan <ucast_mac> vlan <vlan-id>	Configures MAC VLAN mapping entry. <i>ucast_mac</i> – Unicast MAC address. This VLAN will be applied to all incoming untagged packets from this unicast MAC address. <i>vlan-id</i> - VLAN identifiers may be any VLAN number from 1 to 4069. The VLAN must have already been created in this switch.
Step 5	show mac-vlan	Displays the configured MAC based VLANs.
Step 5	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.



User has to create the VLANs using the “**vlan ..**” command prior to configuring MAC address VLAN mapping.

Follow the steps below to remove MAC based VLANs.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	no mac-vlan <ucast_mac>	Removes MAC VLAN mapping entry. <i>ucast_mac</i> – Unicast MAC address for which MAC VLAN mapping is to be removed.
Step 3	show mac-vlan	Displays the configured MAC based VLANs.
Step 4	write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.

The examples below show various ways to configure MAC based VLANs.

Create a VLAN 10 and configure MAC address 00:30:40:10:10:10 to VLAN 10.

```
SMIS# configure terminal
SMIS(config)# vlan 10
SMIS(config-vlan)# exit
SMIS(config)# mac-vlan 00:30:40:10:10:10 vlan 10
```

Remove MAC VLAN for MAC address 00:30:40:20:20:20.

```
SMIS# configure terminal
SMIS(config)# no mac-vlan 00:30:40:20:20:20
```

1.11 Protocol Based VLANs

Protocol Based VLAN features help to classify incoming traffic to different VLANs based on protocol. The protocol or ethertype field in the Layer 2 header is used to classify the packets to different VLANs.

Protocol VLAN features are enabled by default in Supermicro switches.

Protocol based VLAN features configuration is a three-step process, as shown in the diagram below.

Figure VLAN-7: Protocol Based VLAN Configuration Steps

1. Create VLANs and add ports

2. Create protocol groups

3. Associate groups to VLANs in ports

Follow the steps below to configure protocol based VLANs.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	vlan <vlan-list>	<i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma separated values. Consecutive VLAN numbers can be provided as a range, such as 5-10.
Step 3	ports <ports-list> untagged	Adds the required ports for this VLAN as untagged ports. <i>ports-list</i> – up to three ports or three ranges of ports separated by spaces. The range of ports is provided in a format like gi 0/1-10, which refers to ports from gi 0/1 to gi 0/10.
Step 4	exit	Exits the VLAN configuration mode.
Step 5	map protocol {arp ip rarp ipx novell netbios appletalk other <aa:aa or aa:aa:aa:aa>} {enet-v2 RFC1042 llcOther snap8021H snapOther} protocols-group <Group id integer(0-2147483647) >	Creates a protocol group. Protocol group creation takes three parameters. First: protocol field as arp, ip, rarp, ipx, novell, netbios or appletalk . Users can enter any other two-byte protocol fields in hex format as aa:aa. Second: frame type as enet-v2, llc or snap . Third: protocol group identifier number.
Step 6	interface <interface-type> <interface-id>	Enters the interface mode.

	<p>or interface range <interface-type> <interface-id> </p>	<p><i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po</p> <p><i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It could be the port channel identifier for port channel interfaces.</p> <p>To configure multiple interfaces, use the “interface range ...” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20</p>
Step 7	<p>switchport map protocols-group <Group id integer(0-2147483647) > vlan <vlan-id(1-4069) ></p>	<p>Associates the group to the VLAN on the above interface. <i>Group id</i> – Protocol Group Identifier <i>vlan-id</i> – VLAN identifier.</p>
Step 8	<p>switchport pvid <vlan-id></p>	<p>Configures the PVID for the default port based VLAN behavior. This will be used for packets that did not match any protocol VLAN map.</p> <p>The VLAN identifiers may be any VLAN number from 1 to 4069.</p> <p>The VLAN provided in this command must exist in the switch. If the VLAN does not exist, create it first.</p>
Step 9	<p>Exit</p>	<p>Exits the interface configuration mode.</p>
Step 10	<p>show vlan protocols-group</p> <p>show protocol-vlan</p>	<p>Displays the configured protocol based VLANs.</p>
Step 11	<p>write startup-config</p>	<p>Optional step – saves this VLAN configuration to be part of startup configuration.</p>

Follow the below steps to remove protocol based VLANs.

Step	Command	Description
Step 1	configure terminal	Enters the configuration mode
Step 2	interface <interface-type> <interface-id> or interface range <interface-type> <interface-id>	Enters the interface mode. <i>interface-type</i> – may be any of the following: gigabitethernet – gi extreme-ethernet – ex qx-ethernet – qx port-channel – po <i>interface-id</i> is in <i>slot/port</i> format for all physical interfaces. It could be a port channel identifier for port channel interfaces. To configure multiple interfaces, use the “ interface range ... ” command. To provide a range, use a hyphen (-) between the start and end interface numbers. E.g.: int range gi 0/1-10 To provide multiple interfaces or ranges, separate with a comma (,). E.g.: int range gi 0/1-10, gi 0/20
Step 3	no switchport map protocols-group <Group id integer(0-2147483647)>	Removes the protocol groups from interface mode. <i>Group id</i> – Protocol Group Identifier
Step 4	exit	Exits VLAN configuration mode.
Step 5	no map protocol {arp ip rarp ipx novell netbios appletalk other <aa:aa or aa:aa:aa:aa>} {enet-v2 RFC1042 llcOther snap8021H snapOther}	Removes the protocol group. Before removing any protocol group, it must have been removed from all interfaces.
Step 6	no vlan <vlan-list> or vlan <vlan-list> no ports <ports-list> untagged	Removes the VLANs created for protocol based VLANs. If the VLAN is shared with a MAC or port based VLAN, then remove only the ports added during the protocol based VLAN configuration. To remove the ports use the “no ports” command in the VLAN configuration mode.

		<i>vlan-list</i> – may be any VLAN number or list of VLAN numbers. Multiple VLAN numbers can be provided as comma separated values. Consecutive VLAN numbers may be provided as a range, such as 5-10.
Step 7	show vlan protocols-group	Displays the protocol based VLANs.
Step 8	show protocol-vlan write startup-config	Optional step – saves this VLAN configuration to be part of startup configuration.

The examples below show various ways to configure protocol based VLANs.

Assign all IP traffic to VLAN 20 and all other traffic to VLAN 30 on ports gi 0/1 to gi 0/10.

```
SMIS# configure terminal
SMIS(config)# vlan 20,30
SMIS(config-vlan)# po gi 0/1-10 untagged
SMIS(config-vlan)# exit
SMIS(config)# map protocol arp enet-v2 protocols-group 1
SMIS(config)# map protocol ip enet-v2 protocols-group 2
SMIS(config)# int range gi 0/1-10
SMIS(config-if)# switchport map protocols-group 1 vlan 20
SMIS(config-if)# switchport map protocols-group 2 vlan 20
SMIS(config-if)# switchport pvid 30
SMIS(config-if)# exit
```

Remove protocol VLAN 20.

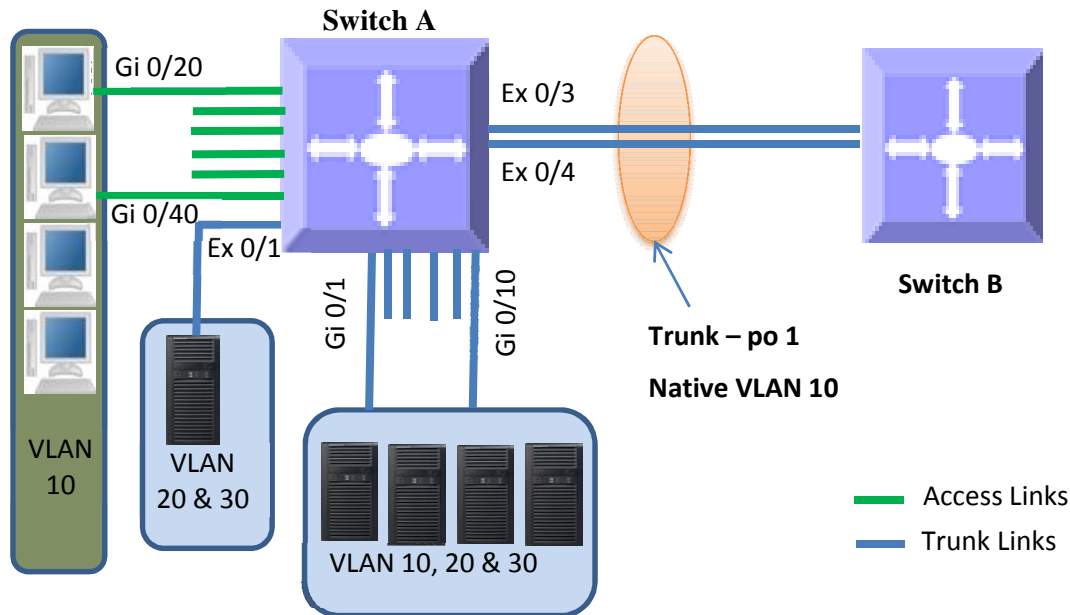
```
SMIS# configure terminal
SMIS(config)# int range gi 0/1-10
SMIS(config-if)# no switchport map protocols-group 1
SMIS(config-if)# no switchport map protocols-group 2
SMIS(config-if)# exit
SMIS(config)# no map protocol arp enet-v2
SMIS(config)#no map protocol ip enet-v2
SMIS(config)# no vlan 20
```

1.12 VLAN Configuration Example

Configure the following requirements on Switch A, as shown below in Figure VLAN-8.

1. Ports gi 0/1 to gi 0/10 are connected to servers that have VLANs 10, 20 and 30. Here, VLAN 10 is untagged.
2. Port ex 0/1 is connected to storage, which carries VLAN 20 and 30.
3. Ports gi 0/20 to gi 0/40 are access ports for VLAN 10.
4. Ports ex 0/3 and ex 0/4 are part of a trunk port channel that carries all the VLANs to other switches with native VLAN 10.

Figure VLAN-8: VLAN Configuration Example



SMIS# configure terminal

```
# Create all the VLANs first
SMIS(config)# vlan 10,20,30
SMIS(config-vlan)# exit
```

```
# Configure VLANs for ports gi 0/1-10
SMIS(config)# interface range gi 0/1-10
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# switchport trunk native vlan 10
SMIS(config-if)# exit
```

```
# Configure VLANs for port ex 0/1
SMIS(config)# int ex 0/1
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# exit
```

Configure the access VLAN for ports gi 0/20 to gi 0/40

```
SMIS(config)# interface range gi 0/20-40
SMIS(config-if)# switchport mode access
SMIS(config-if)# switchport access vlan 10
SMIS(config-if)# exit
```

Configure the port channel trunk interface on ex 0/3 and ex 0/4

```
SMIS(config)# interface port-channel 1
SMIS(config-if)# exit
SMIS(config)# interface range ex 0/3-4
SMIS(config-if)# channel-group 1 mode on
SMIS(config-if)# exit
SMIS(config)# interface port-channel 1
SMIS(config-if)# switchport mode trunk
SMIS(config-if)# switchport trunk native vlan 10
SMIS(config-if)# end
```

Check the running-configuration for accuracy

```
SMIS# show running-config
Building configuration...
Switch ID    Hardware Version    Firmware Version
0           SSE-G48-TG4 (P2-01)  1.0.13-7
```

```
ip address dhcp
interface port-channel 1
exit
```

```
vlan 1
 ports gi 0/11-19 untagged
 ports gi 0/41-48 untagged
 ports ex 0/2 untagged
exit
```

```
vlan 10
 ports gi 0/1-10 untagged
 ports gi 0/20-40 untagged
 ports po 1 untagged
exit
```

```
vlan 20,30
exit
```

```
interface Gi 0/1
 switchport trunk native vlan 10
 switchport mode trunk
```

```
interface Gi 0/2
 switchport trunk native vlan 10
 switchport mode trunk
```

```
interface Gi 0/3
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/4
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/5
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/6
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/7
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/8
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/9
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/10
switchport trunk native vlan 10
switchport mode trunk
```

```
interface Gi 0/20
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/21
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/22
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/23
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/24
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/25
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/26
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/27
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/28
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/29
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/30
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/31
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/32
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/33
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/34
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/35
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/36
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/37
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/38
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/39
switchport access vlan 10
switchport mode access
```

```
interface Gi 0/40
switchport access vlan 10
switchport mode access
```

```
interface Ex 0/1
switchport mode trunk
```

```
interface Ex 0/3
channel-group 1 mode on
```

```
interface Ex 0/4
channel-group 1 mode on
```

```
interface po 1
switchport trunk native vlan 10
switchport mode trunk
```

```
interface vlan 1
ip address dhcp
exit
```

Check the VLANs using the “**show vlan**” command

SMIS# **show vlan**

Vlan database

```
Vlan ID      : 1
Member Ports : gi 0/11-19 gi 0/41-48 ex 0/2
Tagged Ports  : None
Untagged Ports : gi 0/11-19 gi 0/41-48 ex 0/2
Forbidden Ports : None
Name         :
Status      : Permanent
```

```
-----  
Vlan ID      : 10  
Member Ports : gi 0/1-10 gi 0/20-40 po 1  
Tagged Ports : None  
Untagged Ports : gi 0/1-10 gi 0/20-40 po 1  
Forbidden Ports : None  
Name        :  
Status      : Permanent  
-----
```

```
-----  
Vlan ID      : 20  
Member Ports : None  
Tagged Ports : None  
Untagged Ports : None  
Forbidden Ports : None  
Name        :  
Status      : Permanent  
-----
```

```
-----  
Vlan ID      : 30  
Member Ports : None  
Tagged Ports : None  
Untagged Ports : None  
Forbidden Ports : None  
Name        :  
Status      : Permanent  
-----
```

```
# Save these VLAN configurations  
SMIS# write startup-config  
Building configuration, Please wait. May take a few minutes ...  
[OK]  
SMIS#
```

