Lecture 3

Switches

Objectives

Switches

Switches

The various types of switches contained in a network are:

- **Unmanaged switch**
- **Smart managed switch**
- **Managed switch**

Unmanaged Switch

low end **unmanaged switches**

HP 1405-5G Unmanaged desktop Switch

such as buffering traffic to avoid collisions

Unmanaged Switch

Smart Managed Switch

also known as a web managed switch

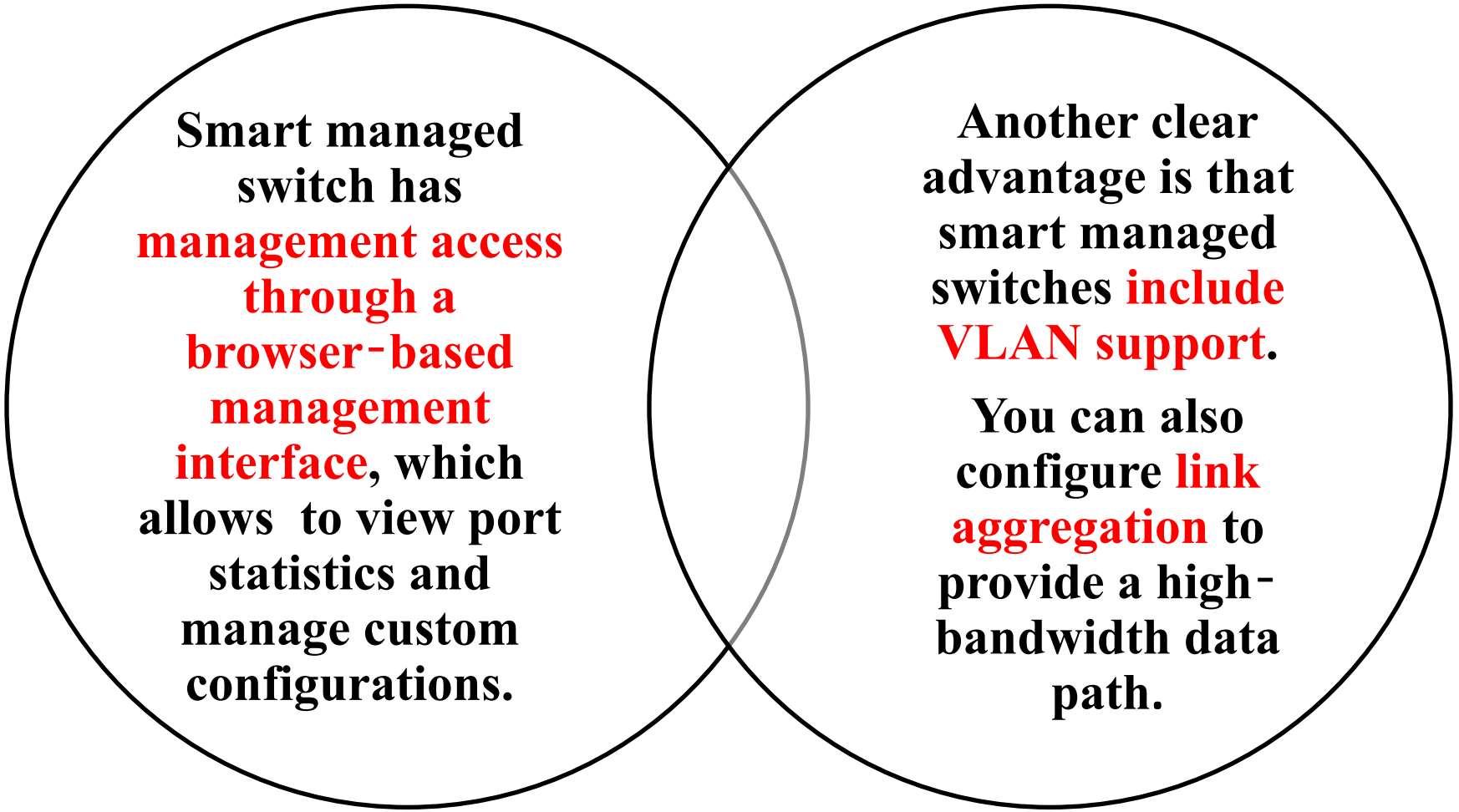
HP 1620-24G 24-PORT 10/100/1000 Gigabit Smart Managed Switch

functionality at OSI Layer 2, but a small number include some Layer 3 functionality

static routes only

can typically be deployed as plug-and-play devices

Smart Managed Switch Advantages



Smart Managed Switch Limited

- Most switches of this type also have an RJ-45 console port. Some also have a USB connection that can be used to connect directly to the switch. This is similar to the console connection on managed switches, but it can typically be used to perform the same procedures as the web interface.
- Smart managed switches also include limited SNMP support. SNMP management devices can automatically discover and remotely monitor smart managed switches. However, smart managed switches do not support remote management from an SNMP management device.

Managed Switch

that connects devices together

to the device for which the message was intended.

using a MAC address

HP 7510 Switch with 2 48-port Gig-T PoE+ Modules and 768Gbps MPU

Managed Switch functionality

Layer 3 functionality
dynamic routing

- **Support for dynamic updates to network destinations and routes to allow for changes in available routes and network conditions.**

Managed Switch interfaces

- **CLI (console port or over the network);**
- **Menu interface (console port or over the network);**
- **Web interface (over the network only).**

Managed Switch and SNMP

monitored and configured through SNMP

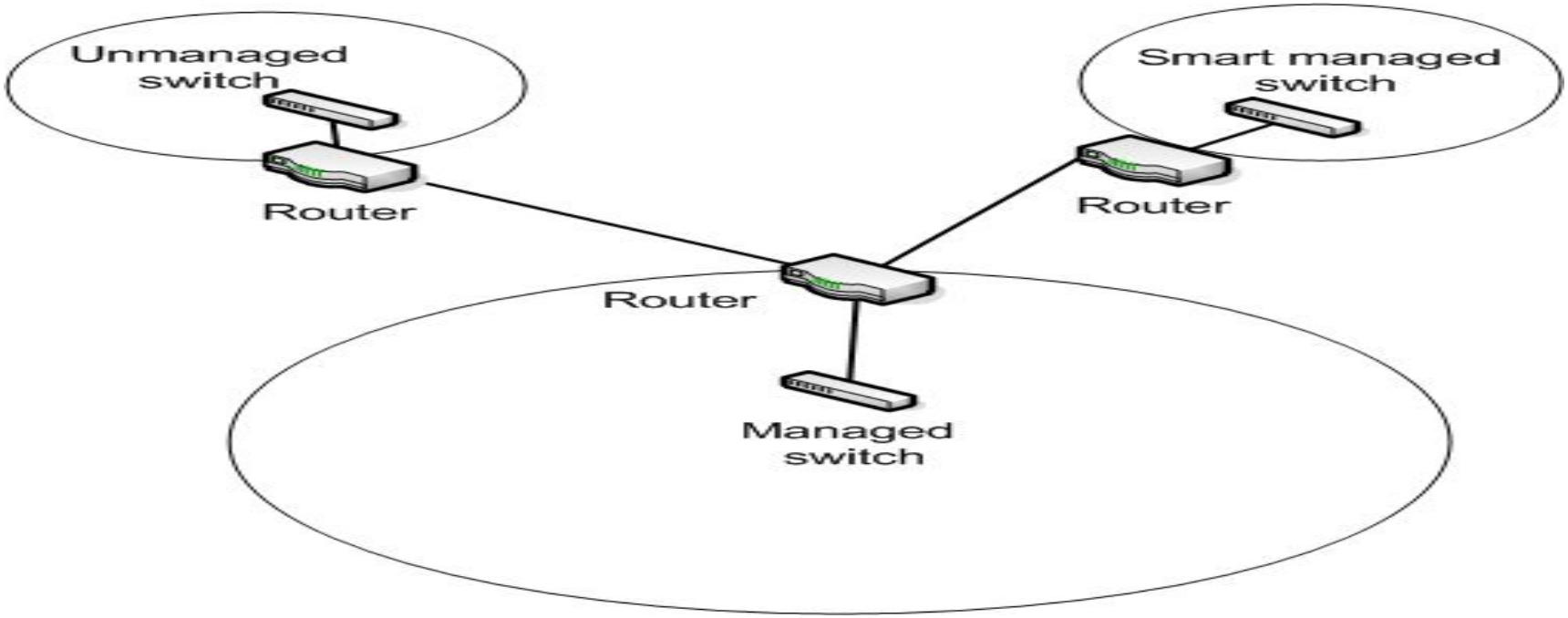
the switch's MIB

available

- A collection of management information about a device for use with SNMP management

Deployment Sample

different types of switches in different physical locations



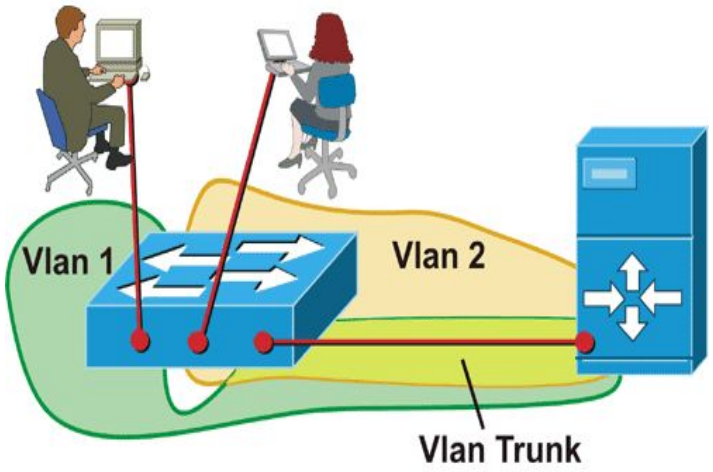
Summary

- **Unmanaged switch**
- **Smart managed switch**
- **Managed switch**

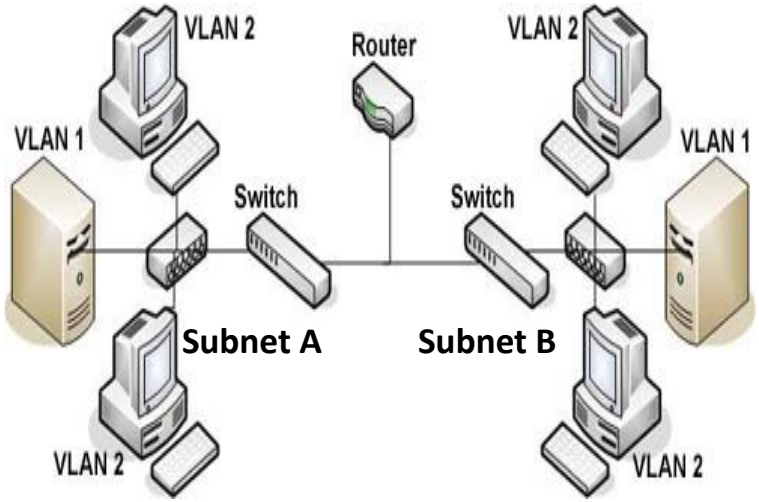
Switches

Virtual LANs

partitioned
|pɑːˈtɪʃənd| and isolated

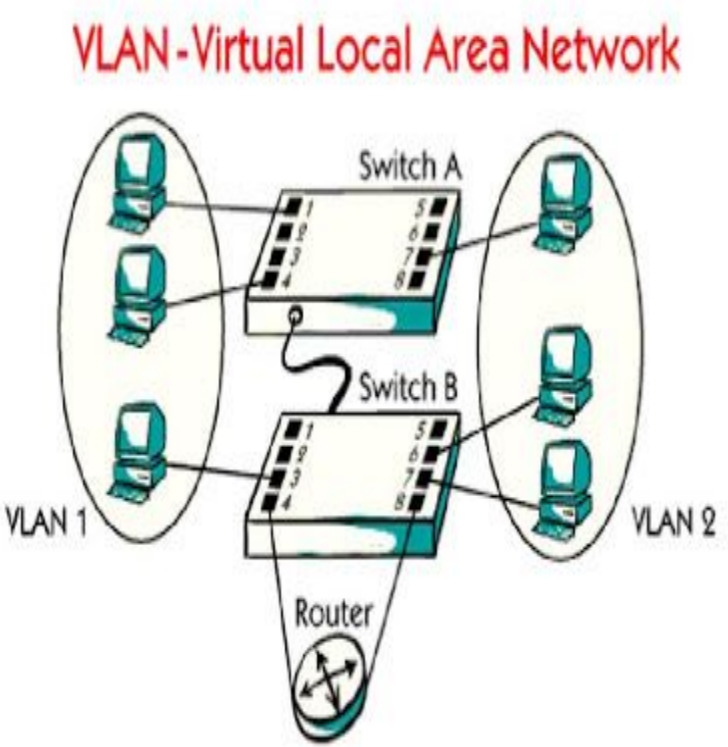


a subnet is based on location (physical connection)
is based on port configuration (logical connection)



Membership in Virtual LANs

on the port to which a device is attached



ports located on different physical switches

Traffic between ports in the same VLAN

are propagated through the VLAN

Traffic between VLANs

does not cross VLANs

Virtual LANs (VLANs) Types

Default VLAN

- Includes all switch ports when a switch is in its default configuration. In the default configuration, the default VLAN carries both management traffic and standard network traffic.

Primary VLAN

- Initially the default VLAN. For HP switches, the primary VLAN is the only VLAN on the switch that can receive a switch-generated address via DHCP.
- You can designate a custom VLAN as the primary VLAN and make it responsible for some management functions.

Virtual LANs (VLANs) Types

Mana-ge ment VLAN

- **Management VLAN is used for managing the switch from a remote location by using protocols such as telnet, SSH, SNMP, syslog etc.**
- **Normally the Management VLAN is VLAN 1, but you can use any VLAN as a management VLAN.**
- **To identify a specific VLAN as the only VLAN from which users can connect to the switch management interface.**

Virtual LANs (VLANs) Types

Secure Mana-ge ment VLAN

- **When created as a custom VLAN, the secure management VLAN is an isolated network specifically used for switch management. Access to management functions is then limited to only those ports configured as secure management VLAN members. Traffic cannot be routed to or from this VLAN.**

Voice VLAN

- **Custom VLAN that can be created to isolate VoIP traffic from other network traffic.**

Creating a VLAN

- **Define the VLAN name and ID;**
- **Transfer ports from the default VLAN to the new VLAN;**
- **Assign an IP address to the VLAN (optional).**

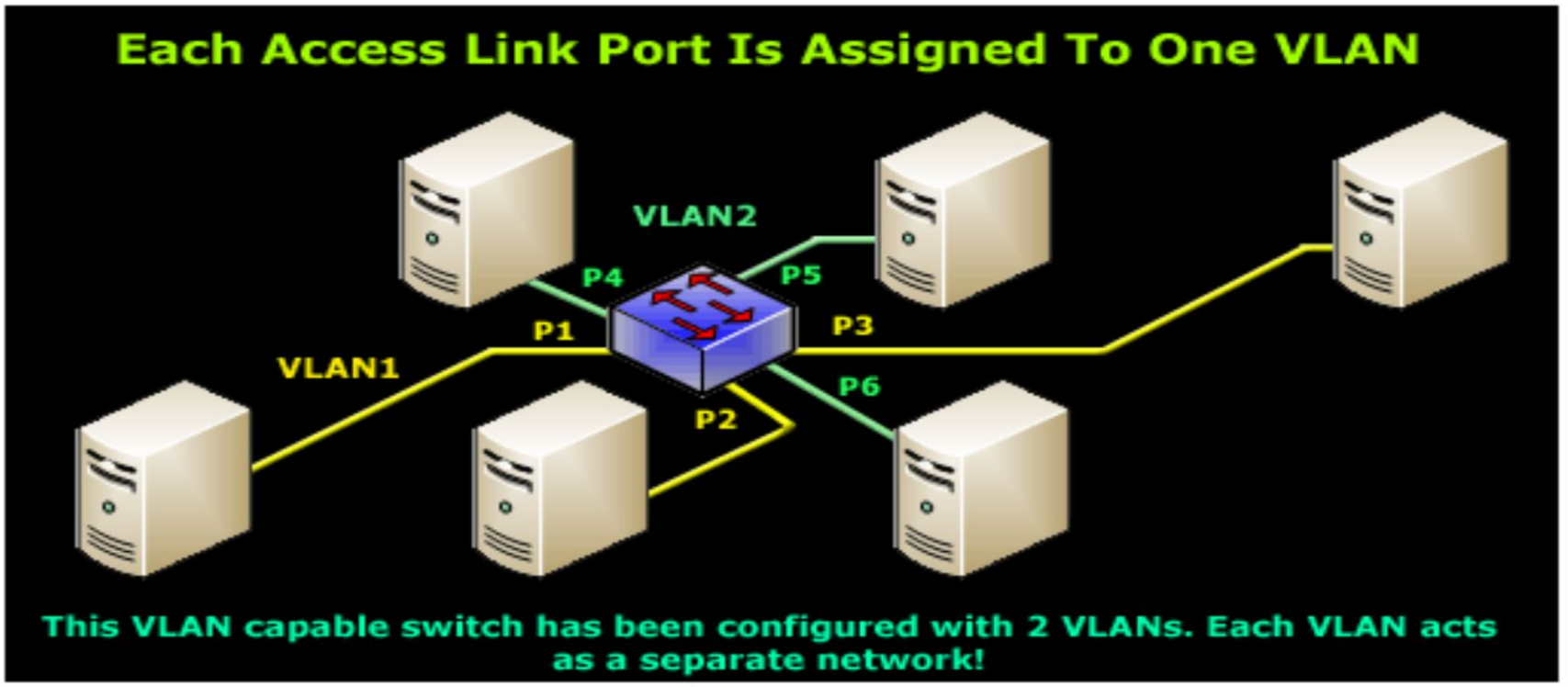
VLAN links

Untagged/Access link; Tagged/ Trunk link

Untagged/Access link	• **Port linked to a network device other than another switch.**
Tagged/Trunk link	• **Port linked to another switch.**

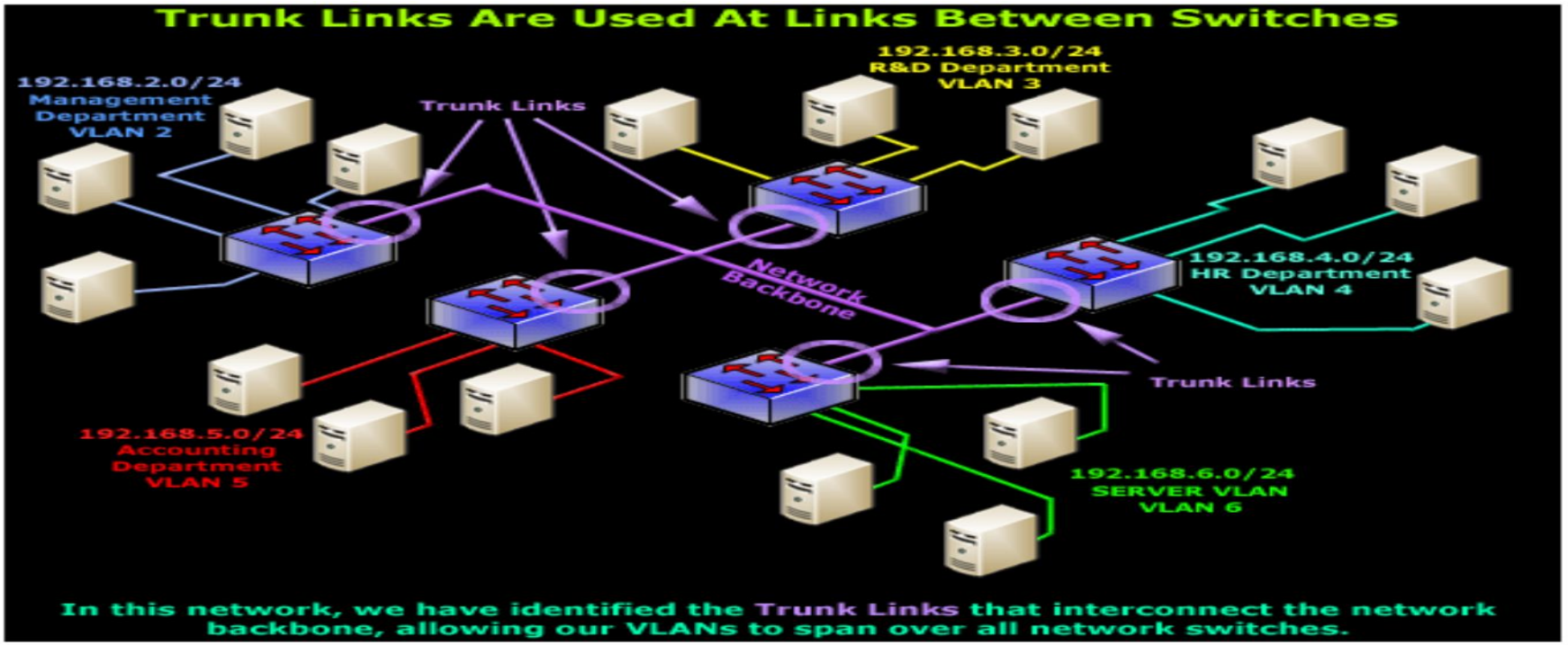
Tagging is based on the 802.1Q standard.

Access link


Each Access Link Port Is Assigned To One VLAN
VLAN2
P4
P5
P1
P3
VLAN1
P6
P2
This VLAN capable switch has been configured with 2 VLANs. Each VLAN acts as a separate network!

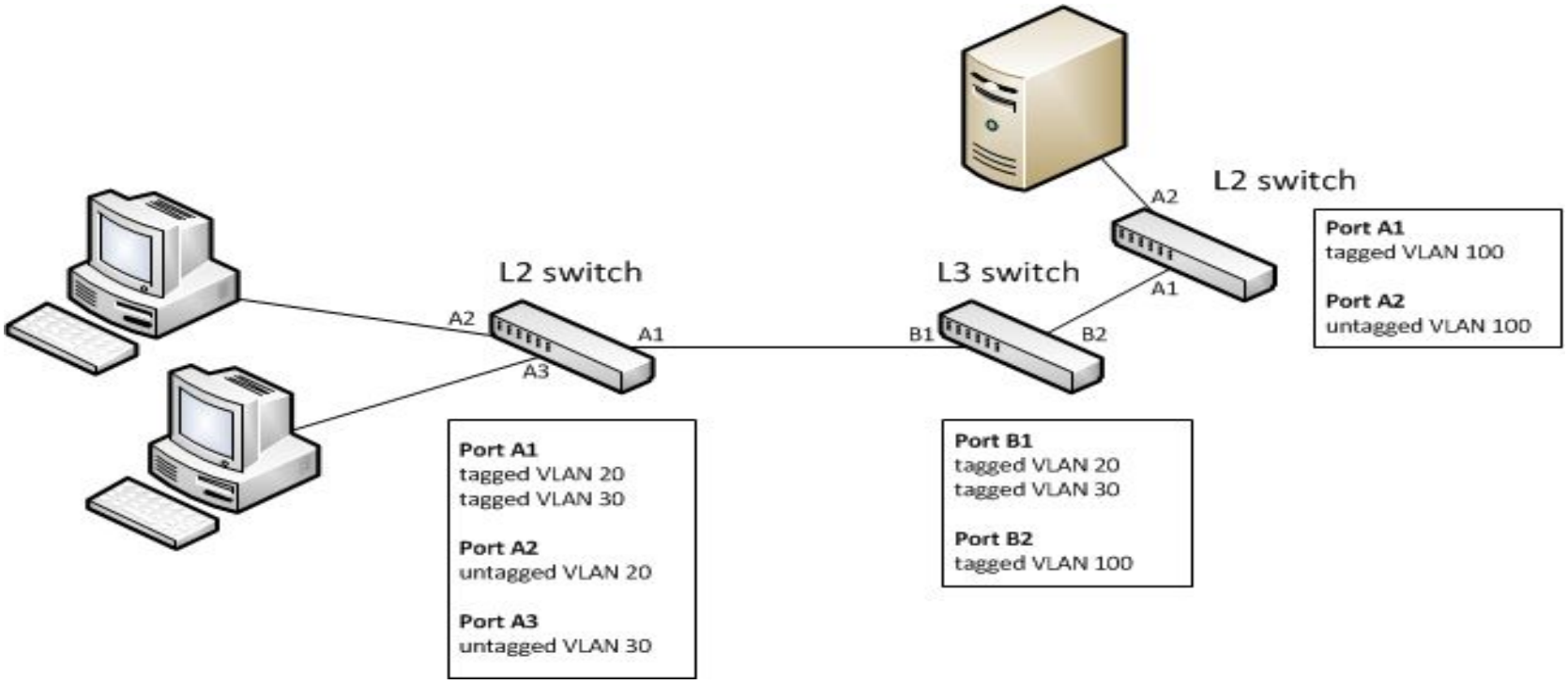
Trunk link

These type of ports are usually found in connections between switches.



Sample Network

A port in a VLAN can be either tagged or untagged

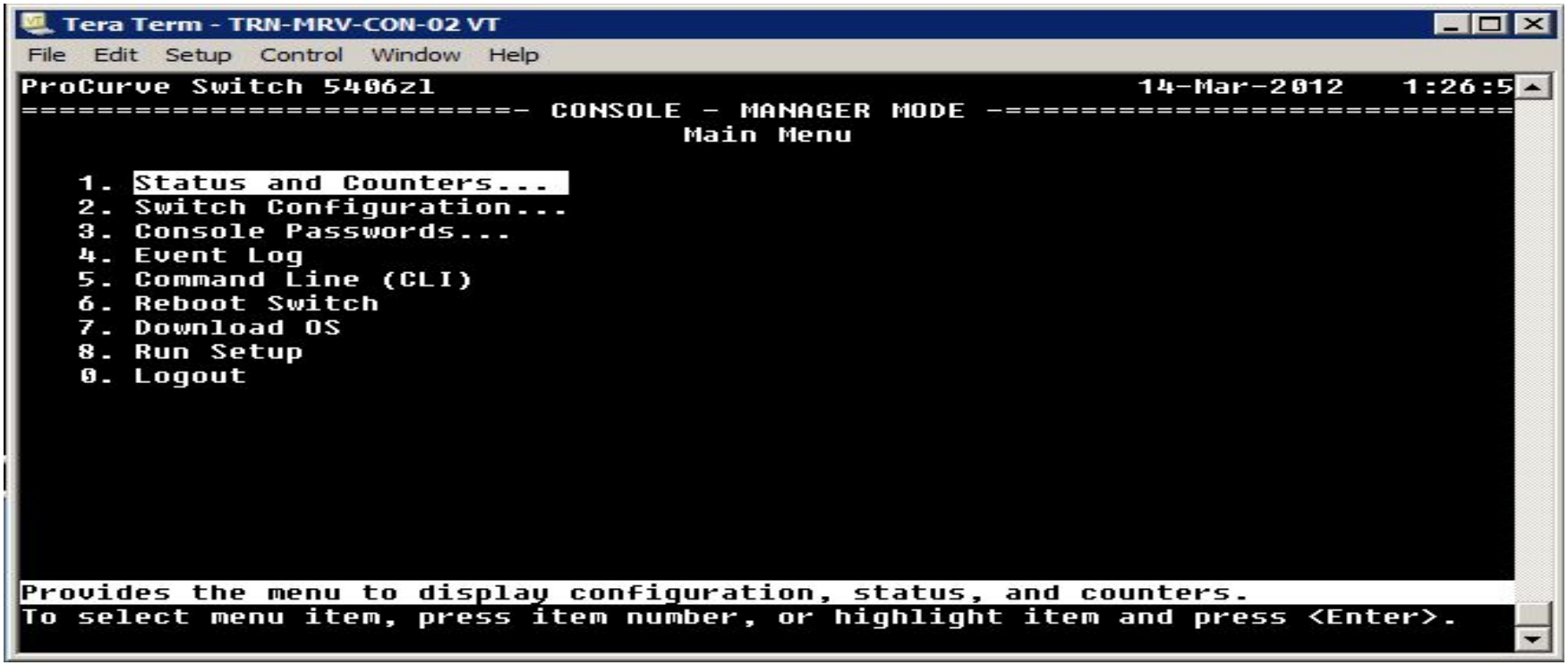


Summary

Switches

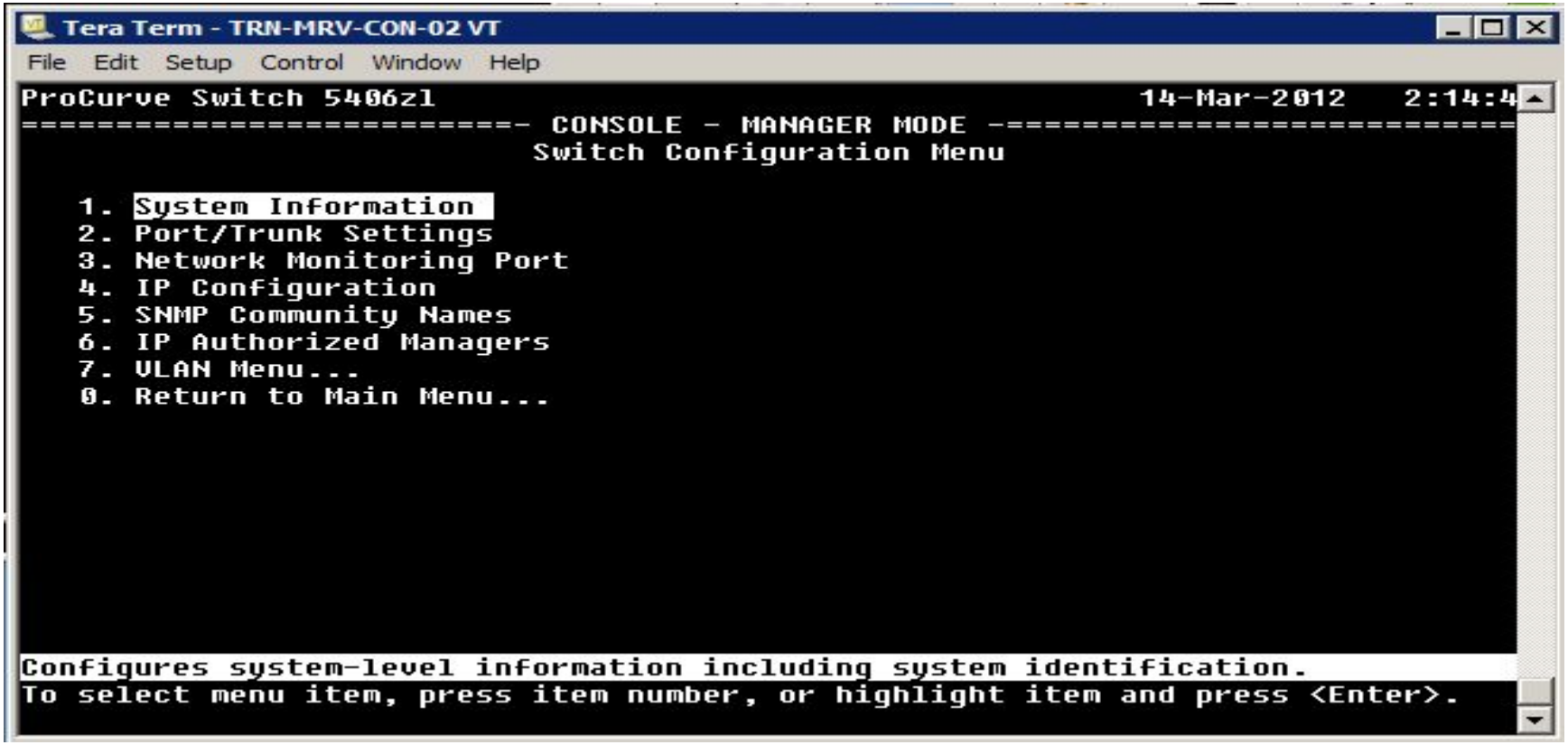
Main Menu

2. Switch Configuration



Switch Configuration Menu

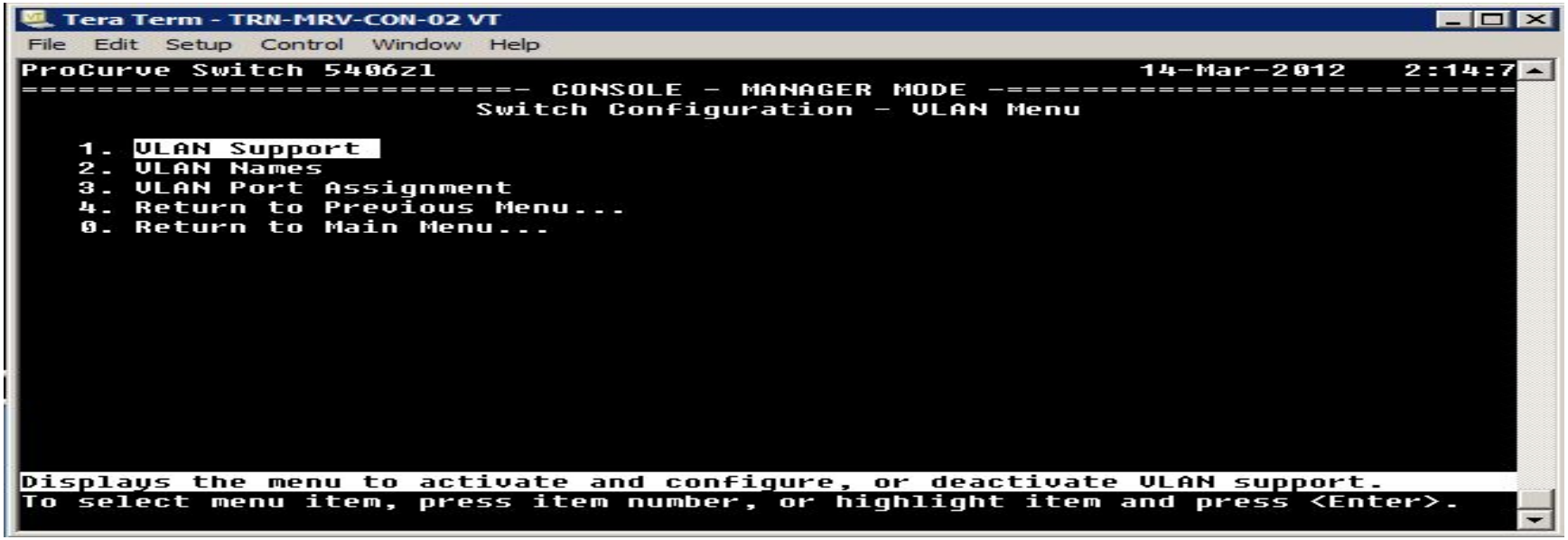
7. VLAN Menu



VLAN Menu

VLAN Menu

- **Configure VLAN support parameters.**
- **Create and manage VLAN names and IDs.**
- **Assign ports to or remove ports from VLANs.**



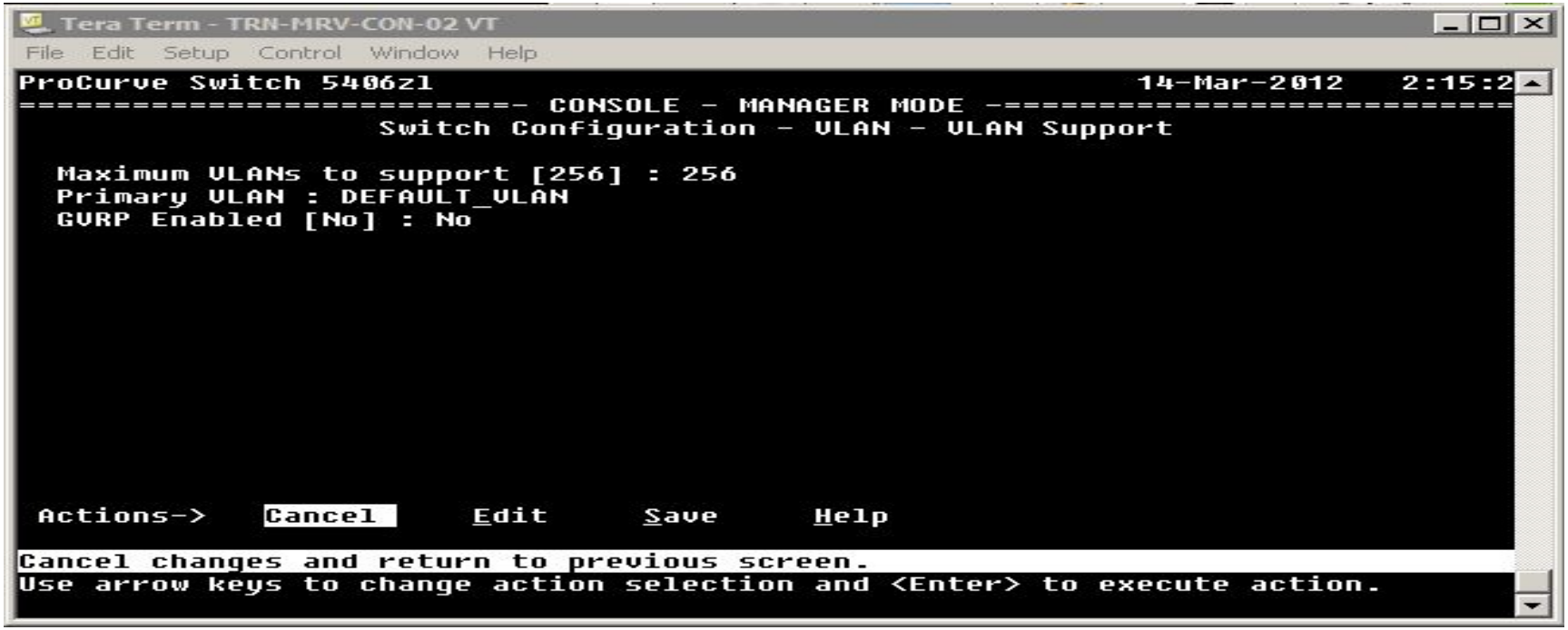
VLAN Support

256 VLANs

primary VLAN is also the default VLAN

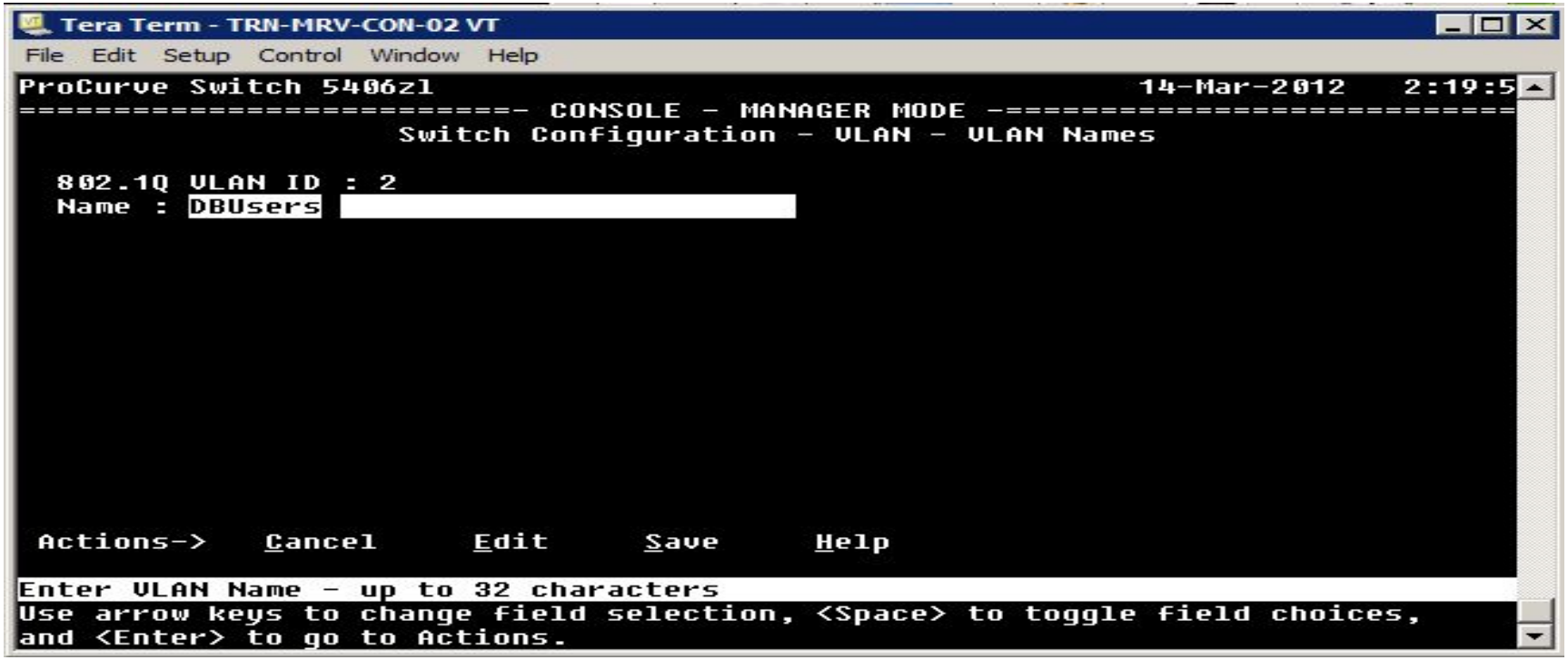
GVRP

is disabled

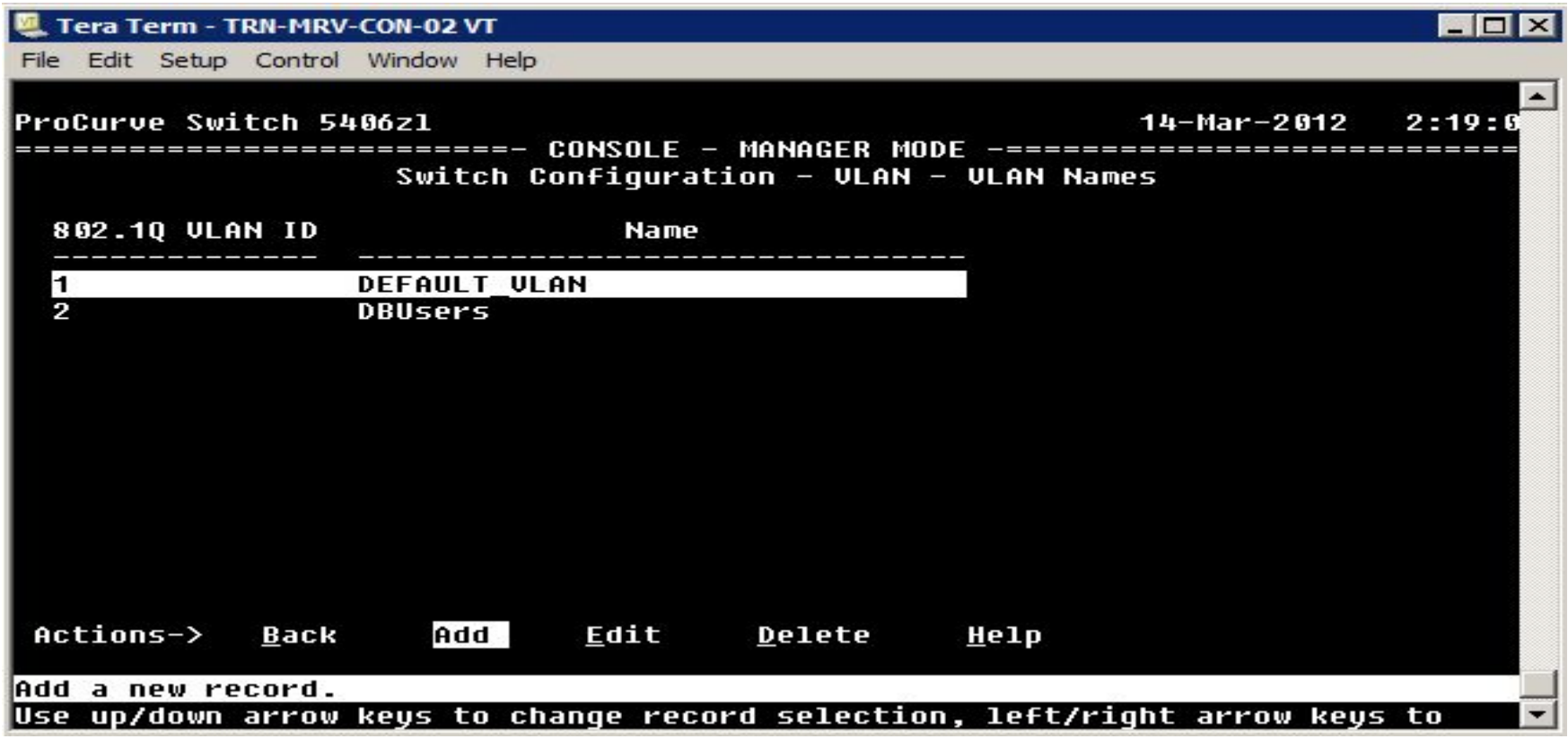


VLAN Names

2. VLAN Names

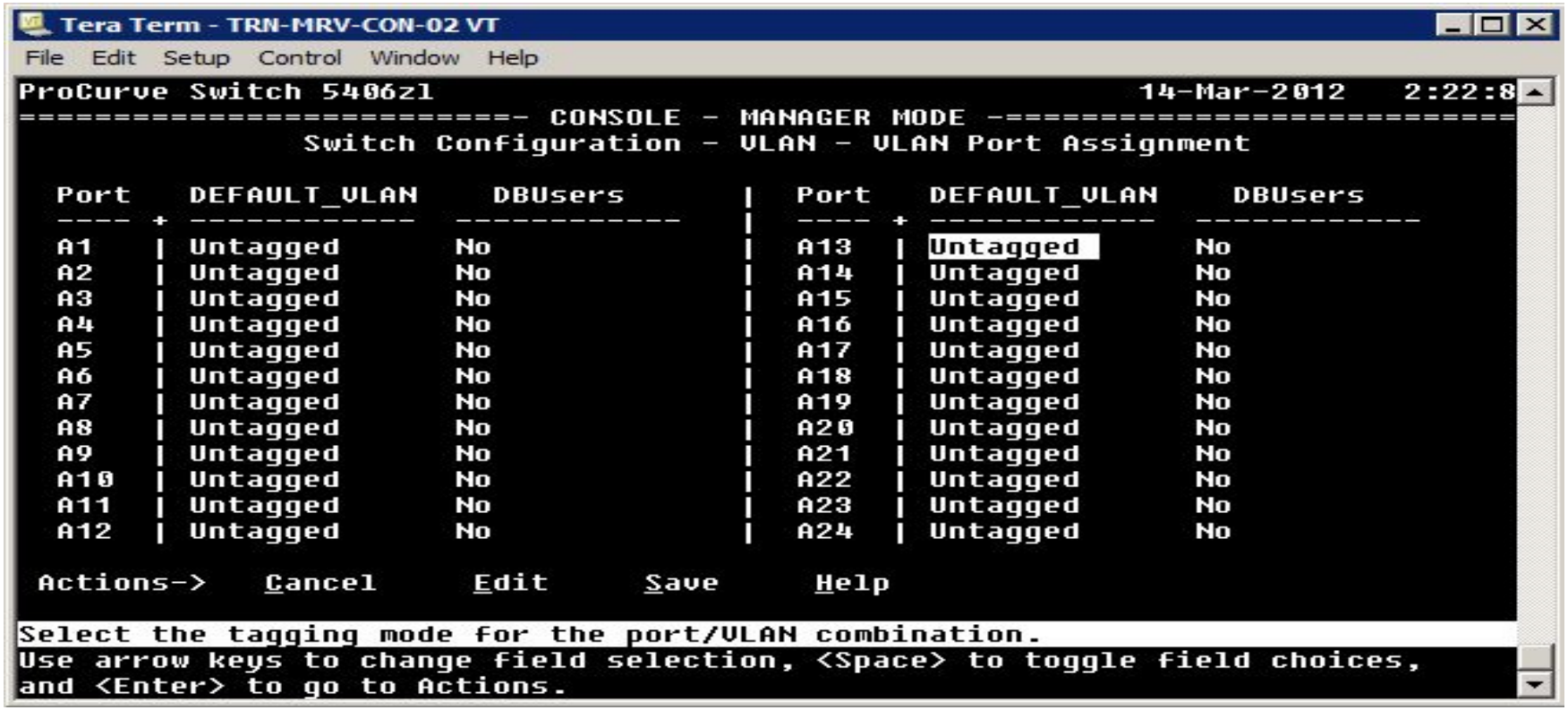


New VLAN


Tera Term - TRN-MRV-CON-02 VT
File Edit Setup Control Window Help
ProCurve Switch 5406zl 14-Mar-2012 2:19:0
CONSOLE - MANAGER MODE
Switch Configuration - VLAN - VLAN Names
802.1Q VLAN ID Name
1 DEFAULT_VLAN
2 DBUsers
Actions-> Back Add Edit Delete Help
Add a new record.
Use up/down arrow keys to change record selection, left/right arrow keys to

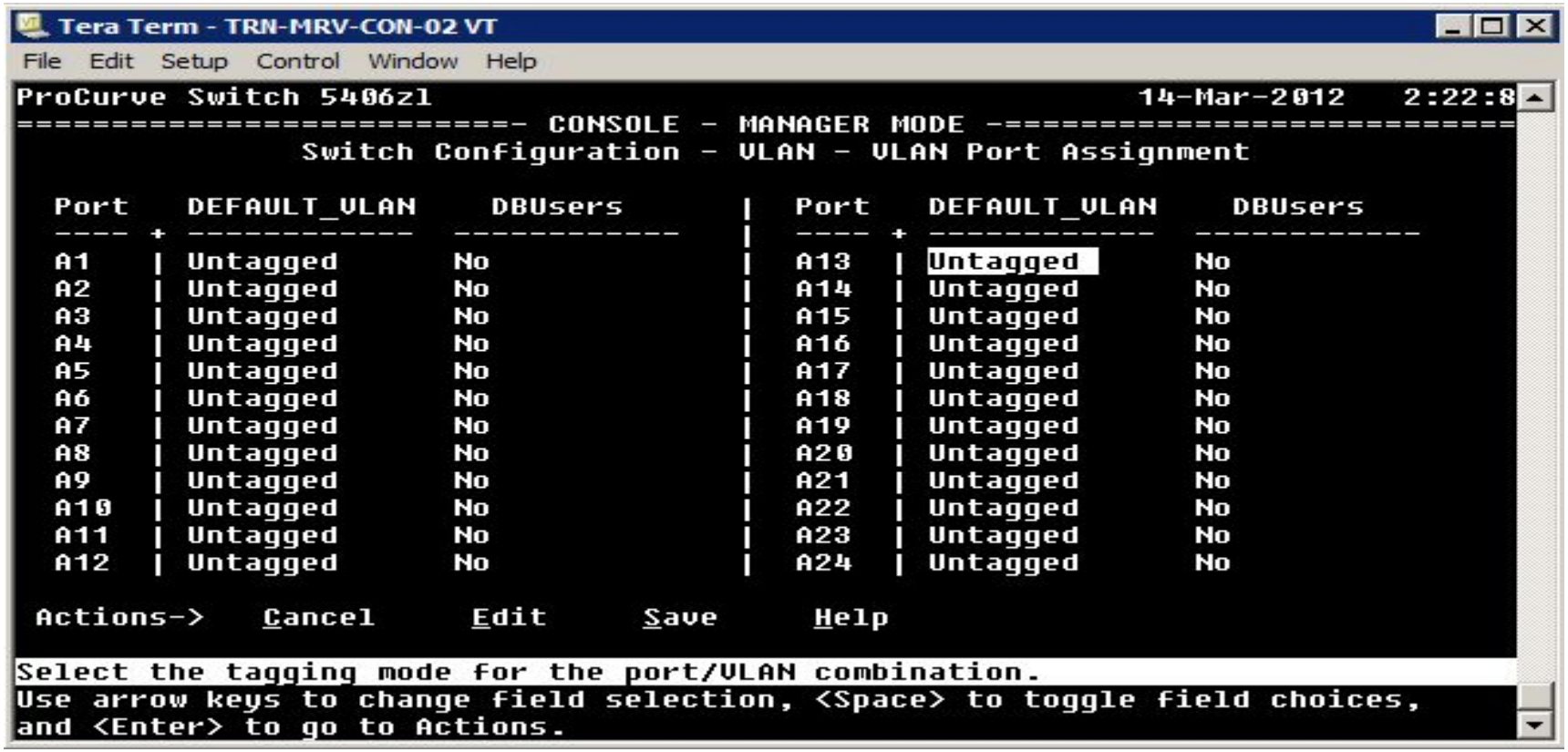
Default Port Assignments

3. VLAN Port Assignment



Selected Port

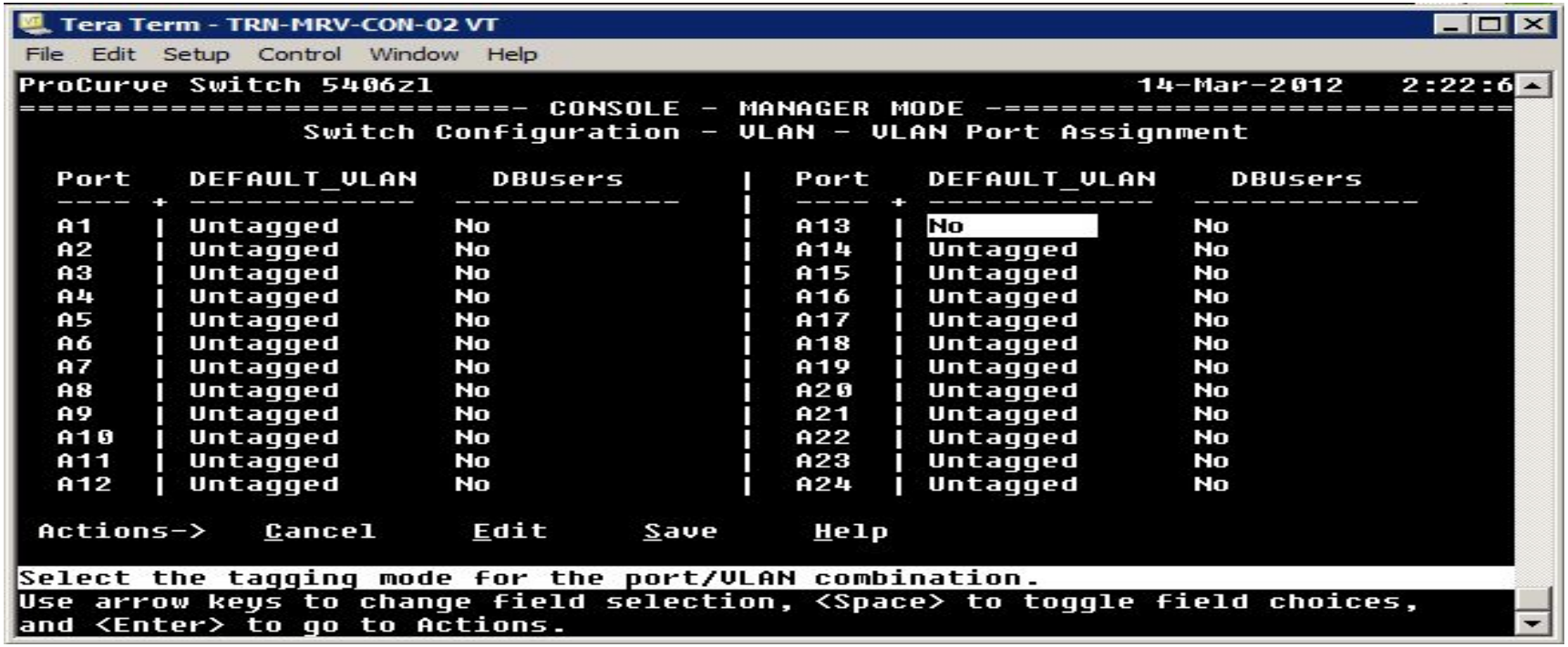
Edit
select the port



Configured Port

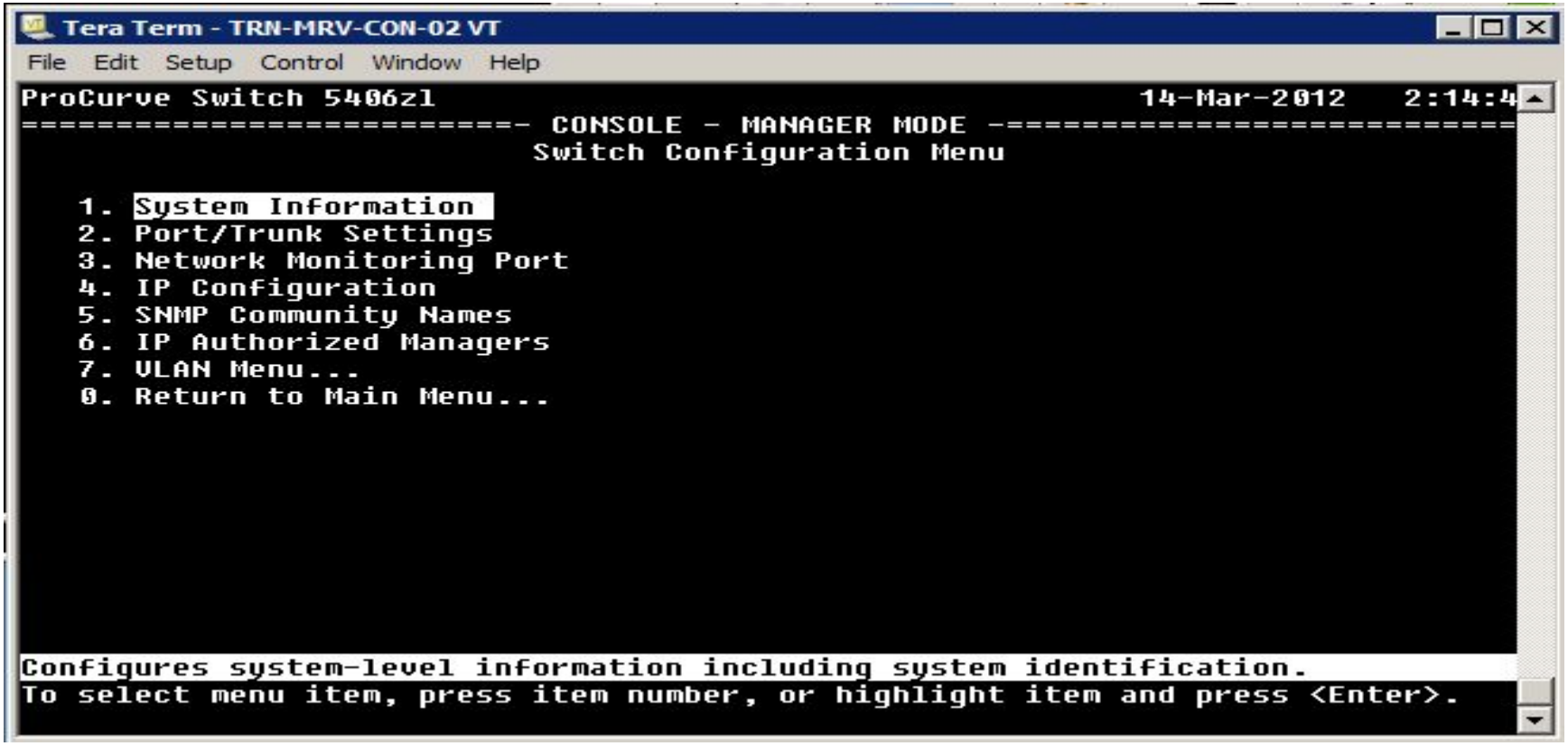
No

Untagged



Switch Configuration Menu

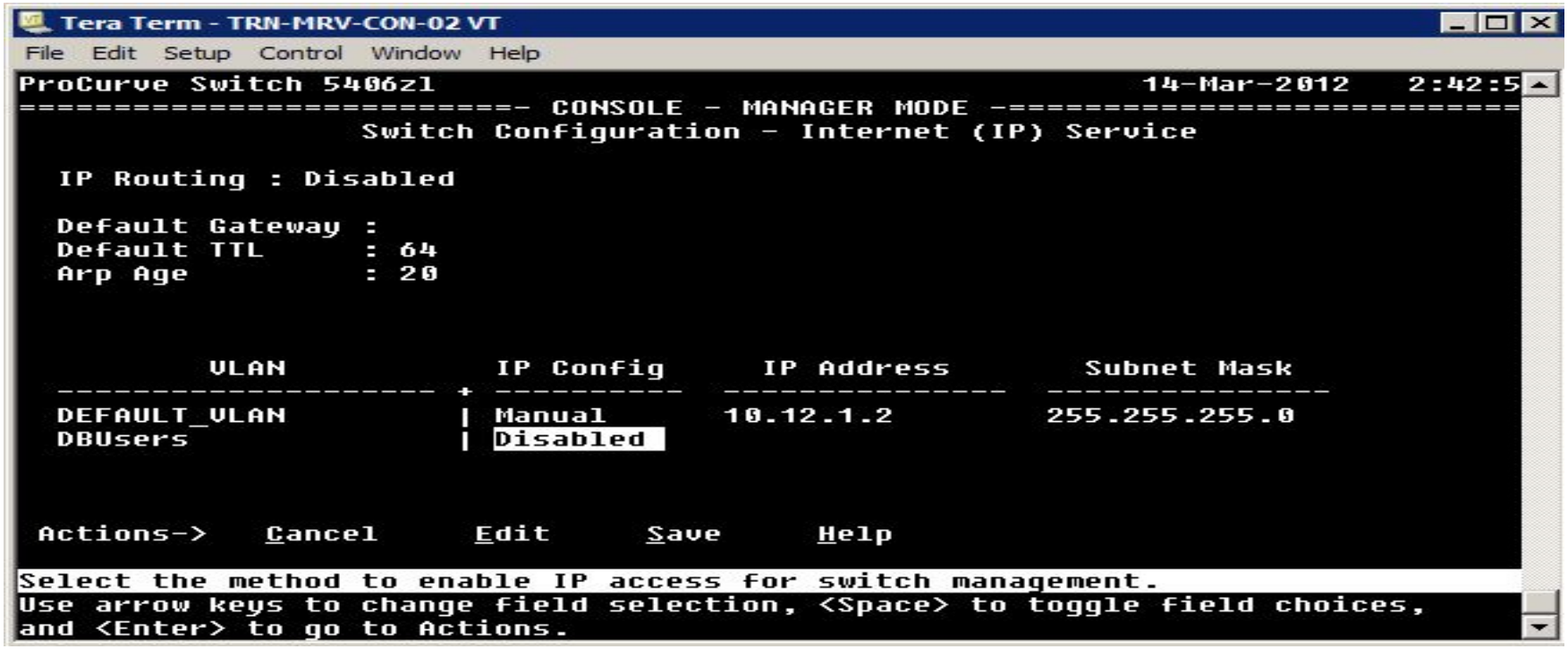
4. IP Configuration



IP Configuration

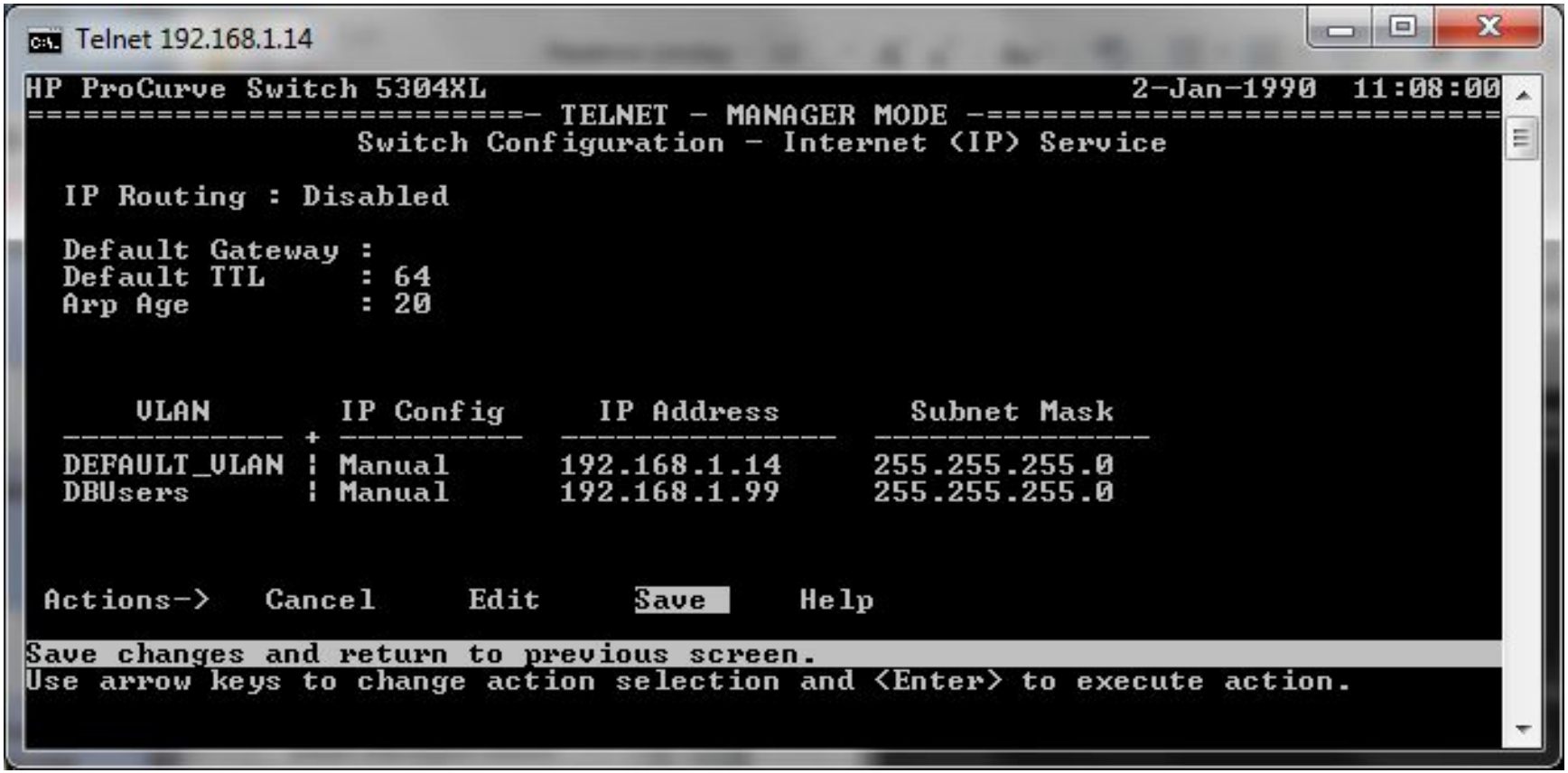
DHCP/Bootp

Manual



Assigned IP Address

static IP address



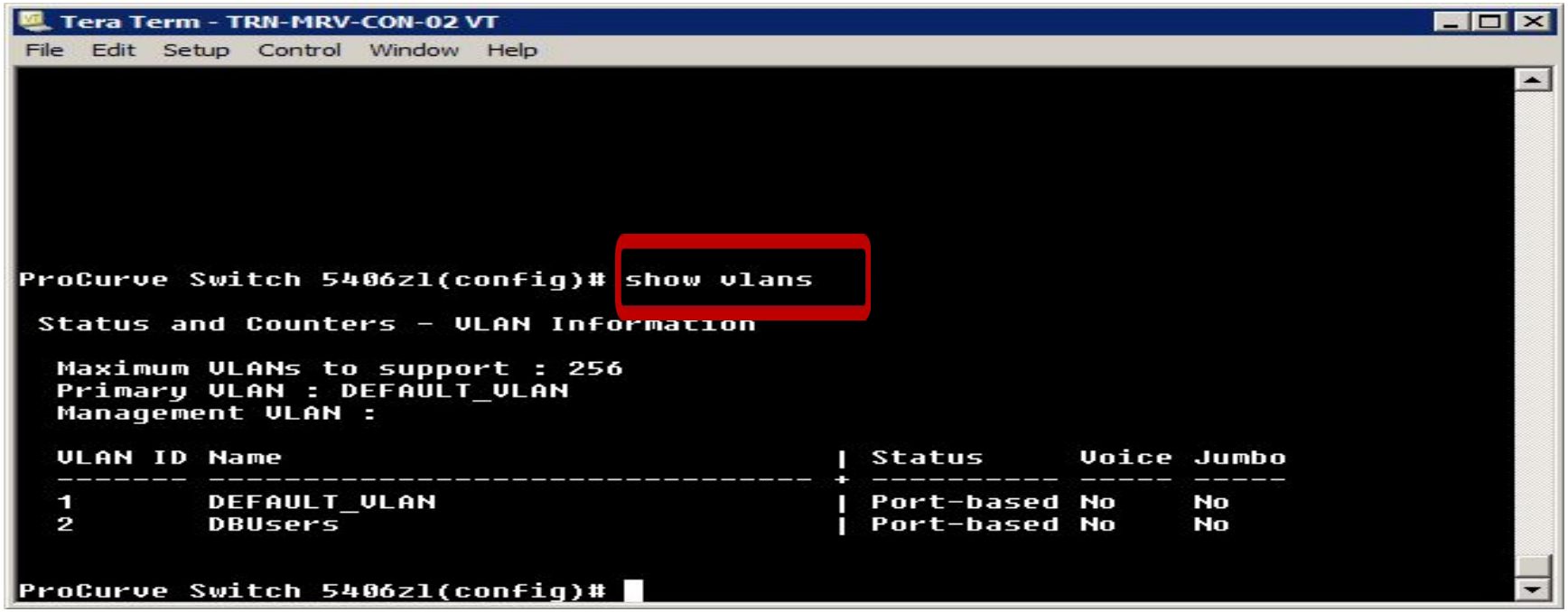
Summary

- **Define the VLAN name and ID;**
- **Transfer ports from the default VLAN to the new VLAN;**
- **Assign an IP address to the VLAN (optional).**

Switches

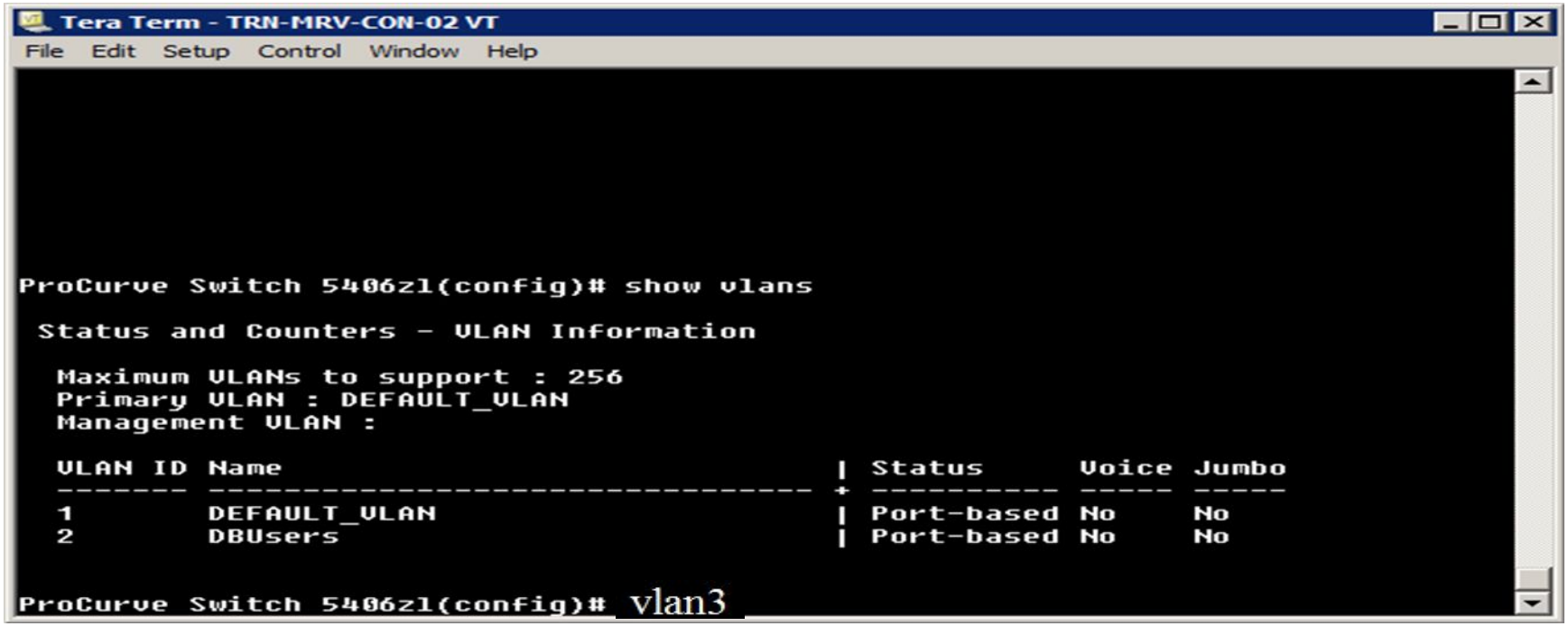
VLAN Summary

show vlans



Create a new VLAN

To create a new VLAN, run the *vlan command* followed by the VLAN ID.



Adding a Port

tagged <port>

untagged <port>

Default VLAN Name

Work1

- 5406zl (vlan-3)# name Work1
- 5406zl (config)# vlan VLAN3 name Work1

IP Configuration

5406zl (vlan-3)# ip address 192.168.1.14/24

The number after the “/” specifies the number of bits in the subnet mask

Port management

vlan

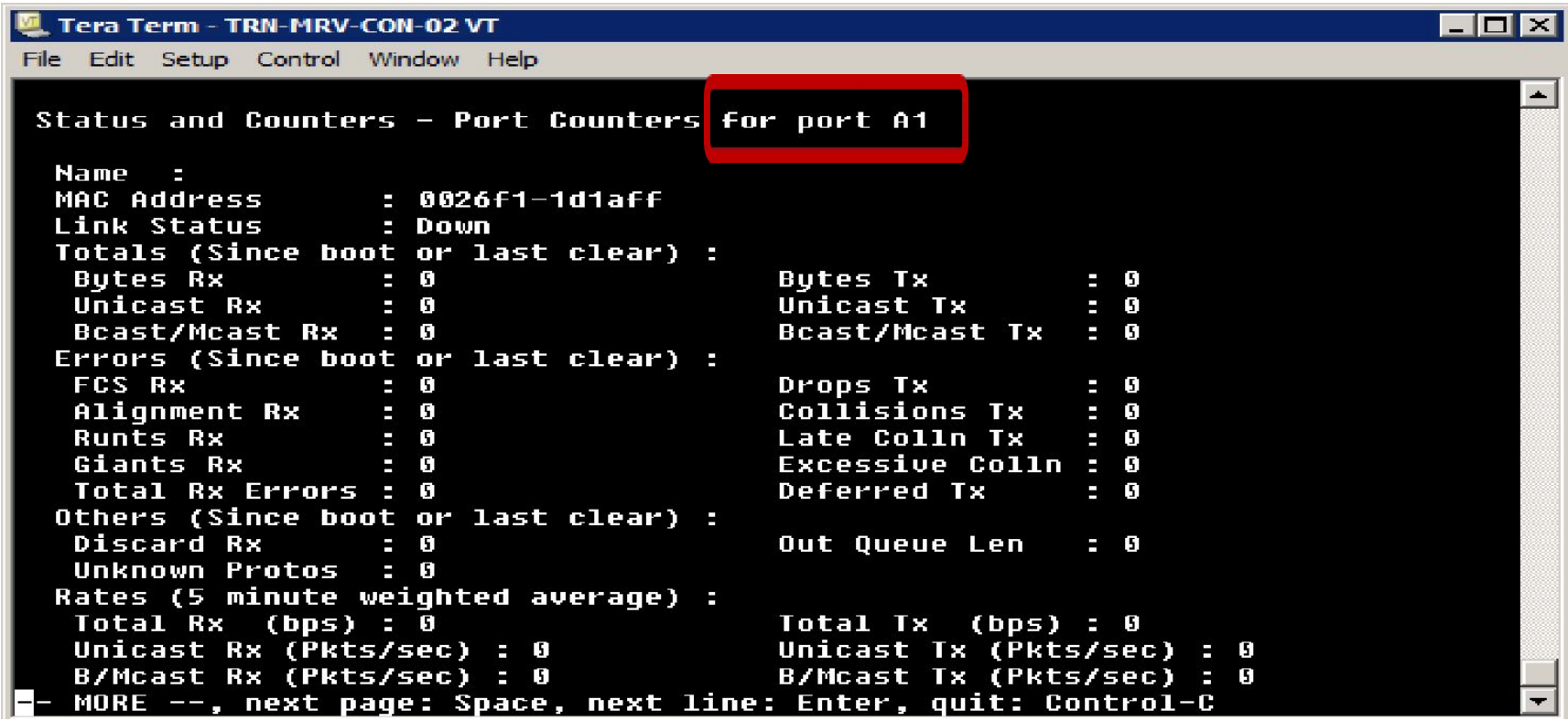
context

show interface

show interface 1

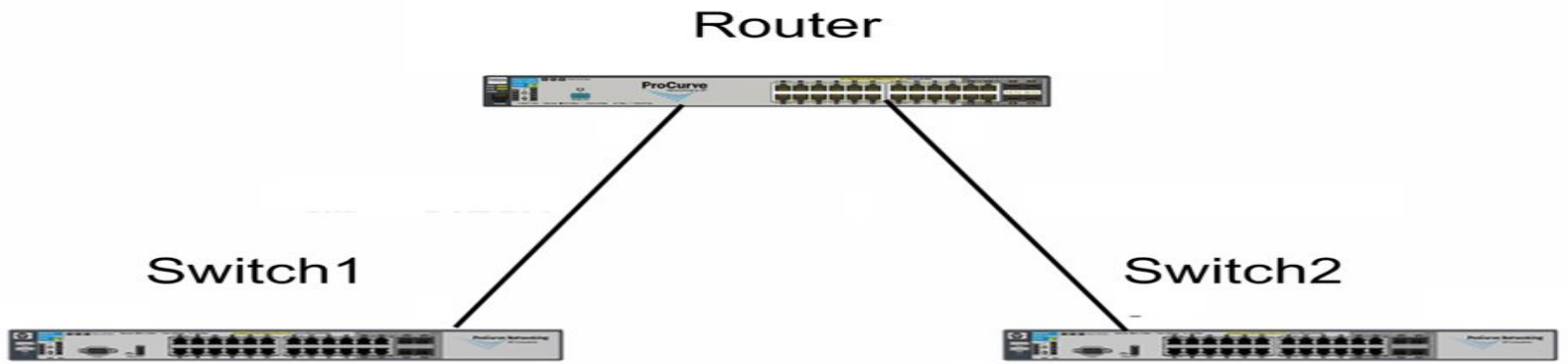
Show interface a1

- Link status.
- Total bytes, unicasts, and broadcasts received and transmitted.
- Transmit and receive rates.



Layer 3 Management

use a switch as a router



enable routing

Router(config)# ip routing

Configure default gateway

The default gateway must be in same subnet as the management IP address of the Router

Switch1(config)# ip default-gateway 192.168.10.1

Router# ping 192.168.1.108

Configure) ip helper-address

This command must be run separately for each VLAN

Router(vlan-1)# ip helper-address <ip_address>

Router(vlan2)# ip helper-address 10.10.5.2

Summary

Switches

Link Aggregation

multiple physical ports as a single logical communication channel

Port trunking	• **Also known as link aggregation. Combining physical ports to create a single communication channel to provide higher bandwidth communication.**
Link Aggregation Control Protocol (LACP)	• **Protocol used to control combining physical ports for use as a single communication channel. LACP is defined in RFC 802.3ad.**

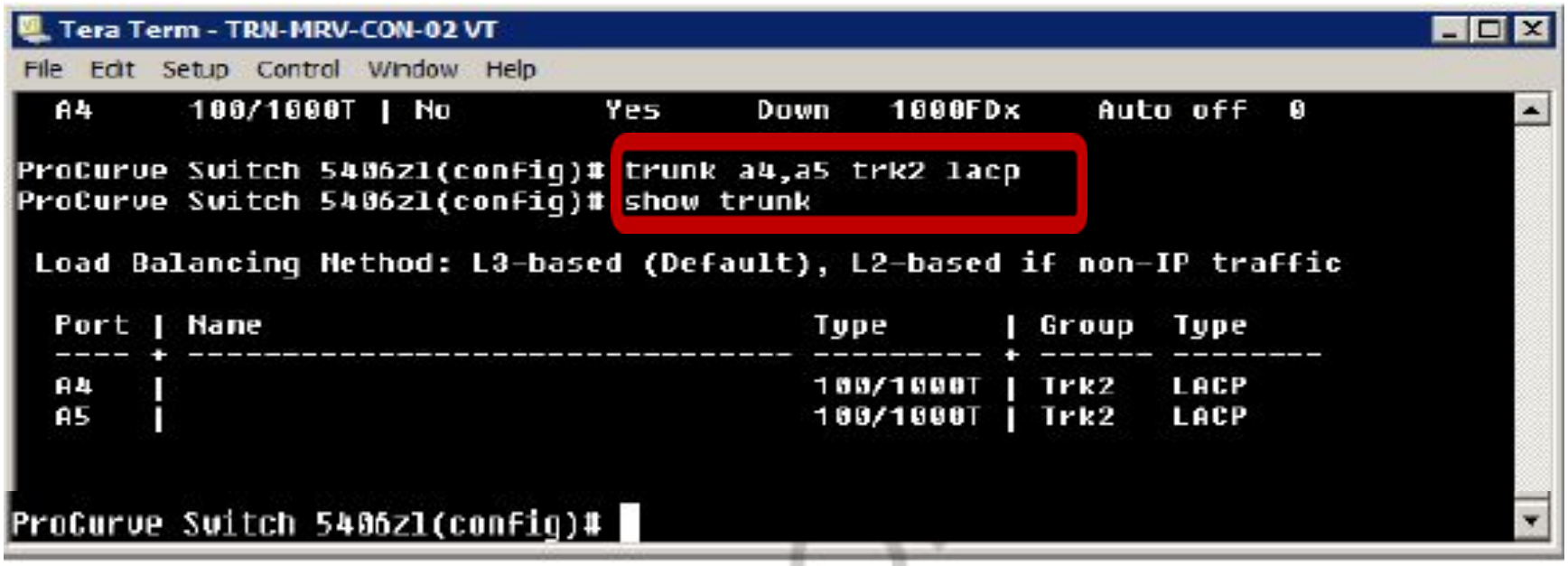
Configured Link Aggregation

trunk <port_id,port_id> trk<id> lacp

trunk 4,5 trk2 lacp

Show trunk

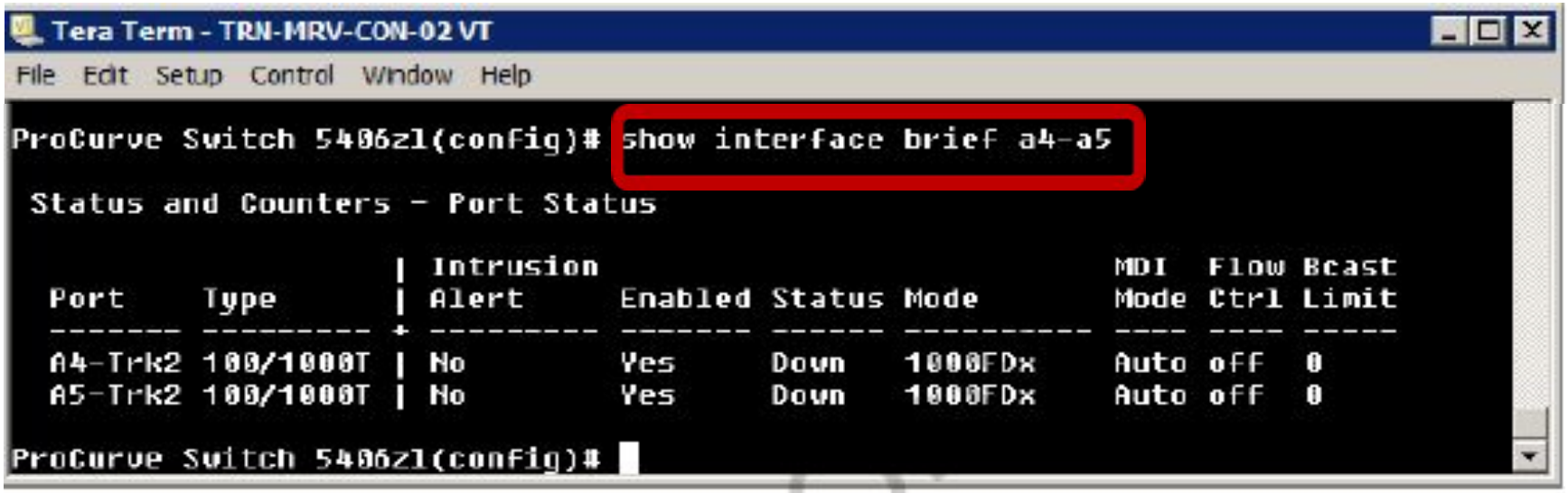
show trunk



Load Balancing

Port Status Summary

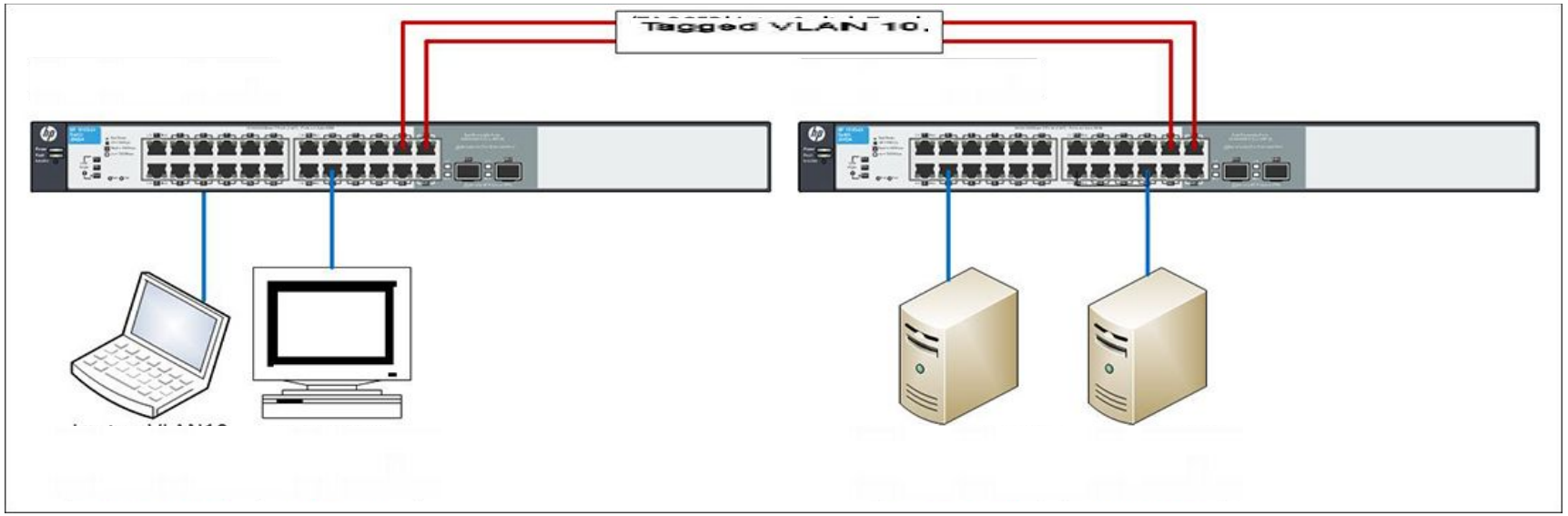
show interface brief 4-5



Associate a trunk

vlan <id> tagged trk<id>

vlan 10 tagged trk2



Summary

Switches

Configuration management

show running-config

show running-config status

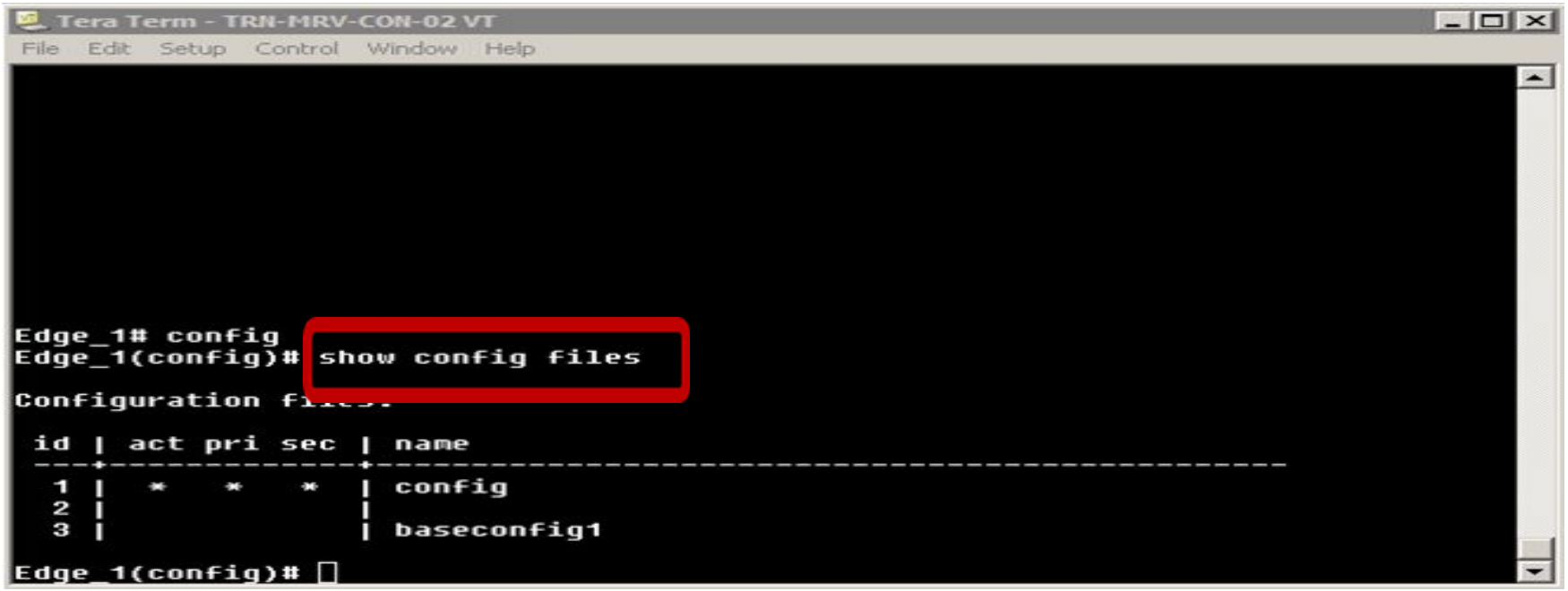
write memory

Configuration management

Actually, the switch has two software images: the primary and secondary.

show config files

Show config files

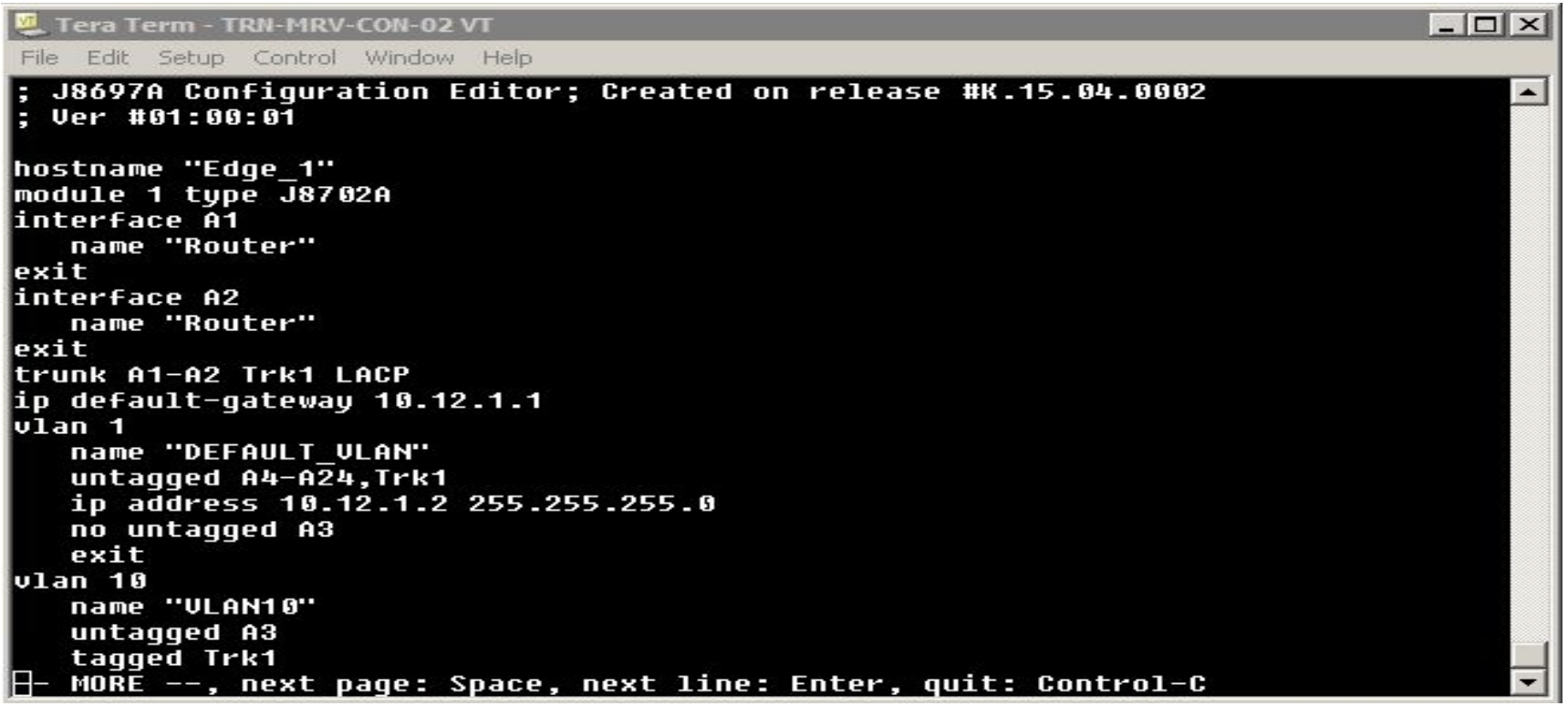


Configuration Files

act	• This is the active configuration, that is, the configuration used to boot the switch.
pri	• The configuration associated with the primary software image.
sec	• The configuration associated with the secondary software image.

Configuration File Content

show config config



Backing up configuration files

copy startup-config usb <filename>.<ext>

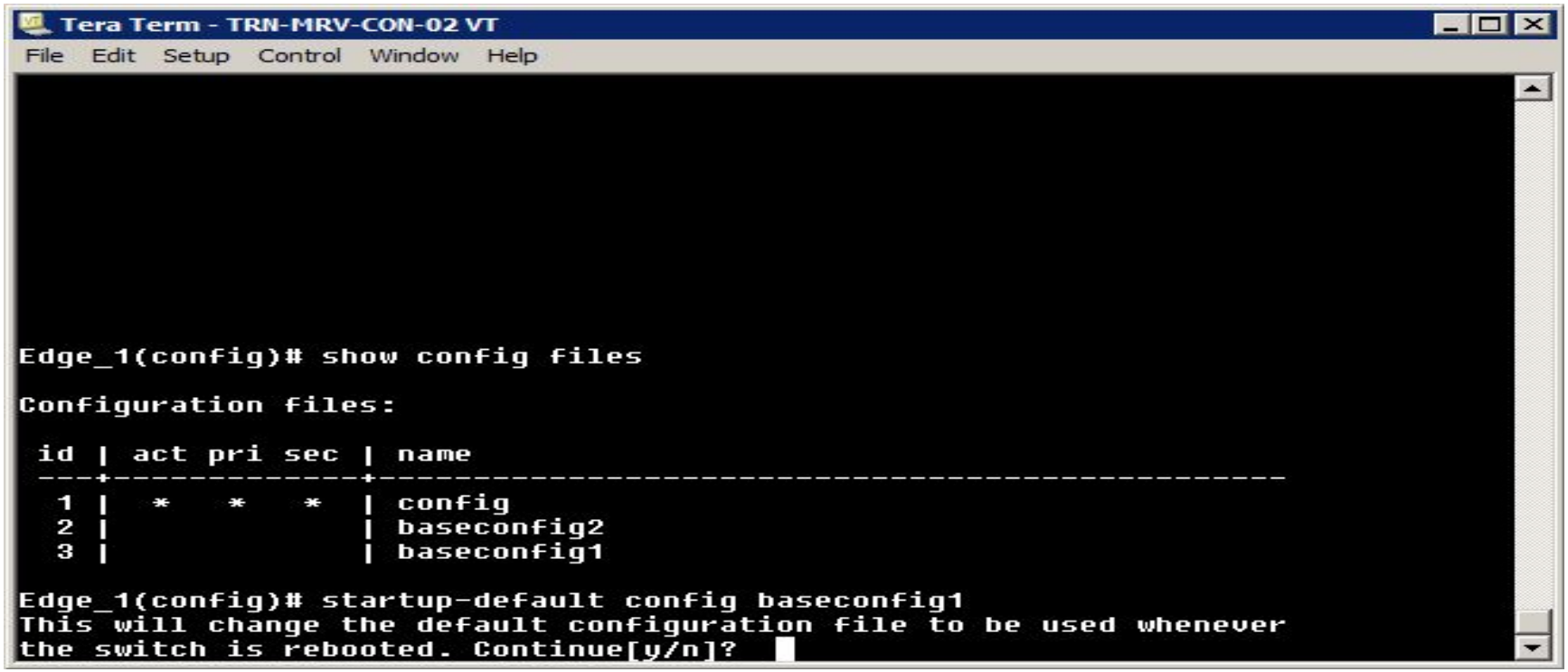
copy startup-config usb switch1.cfg

copy startup-config tftp <ip_address> <filename>.<ext>

Copy Configuration File

multiple configuration files

copy config baseconfig1 config baseconfig2



Associating Images with Configuration Files

startup-default config <configname>

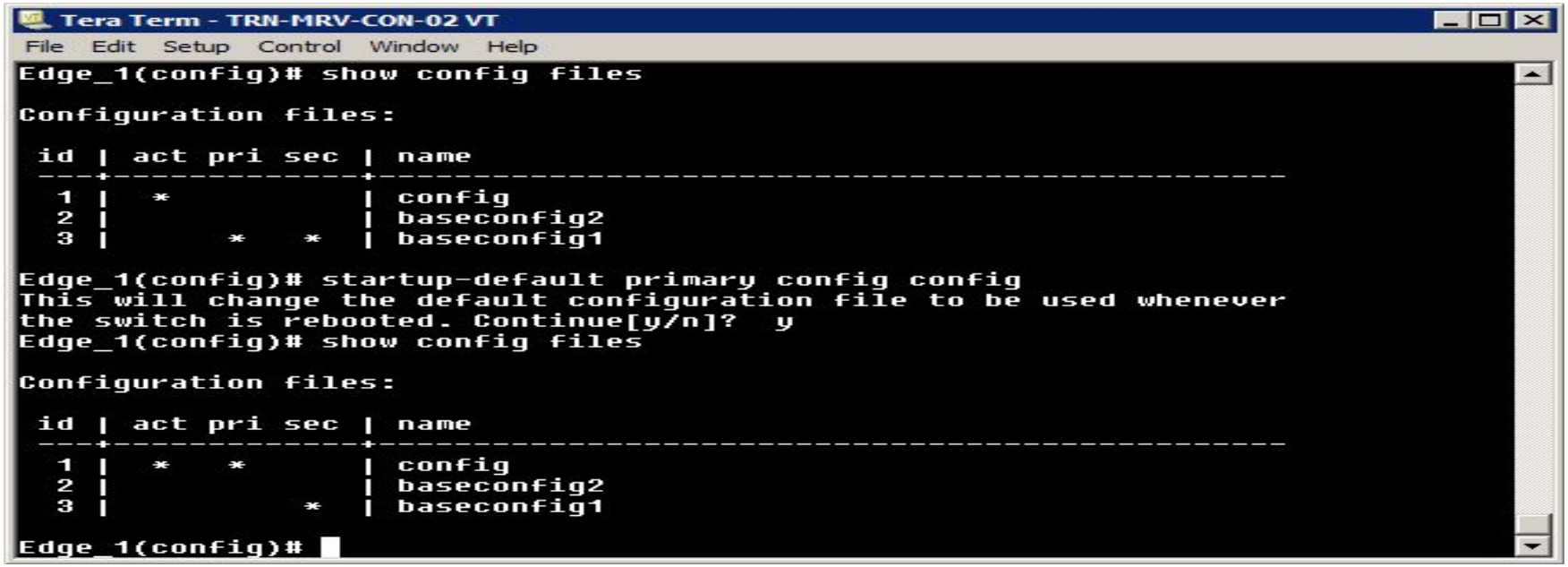
startup-default config baseconfig1

Separate Images – Separate Configurations

config with the primary

baseconfig1 with the secondary

startup-default primary config config



Erased Image

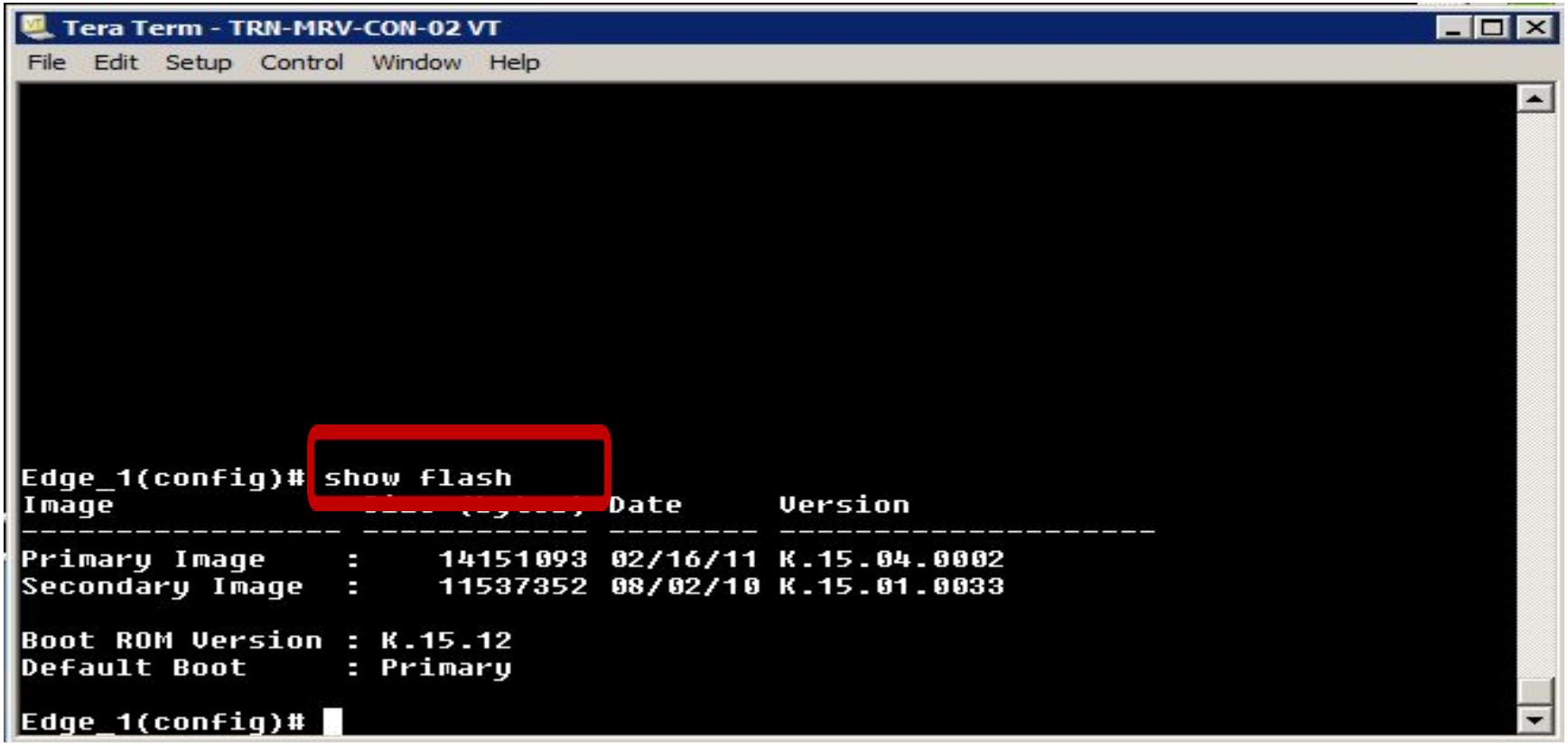
erase config baseconfig2

Erased Image

active configuration file

Show flash

to boot from the primary image



Using the secondary image

copy usb flash <filename> secondary

boot system flash secondary

Summary