ICT40120

CERTIFICATE IV IN INFORMATION
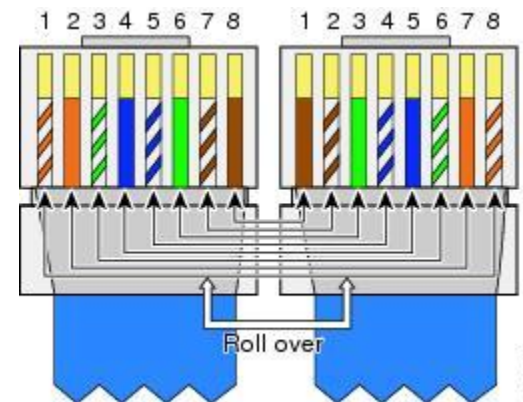TECHNOLOGY

Configuring Switches

TasTAFE

Console Connection

Initial configuration of a Cisco switch (or router) is done using a console connection; a 'roll-over' cable is connected to the serial (or USB) port on a computer and a terminal session opened with something like Putty or Tera Term.

Serial console cable
with 8P8C connector

8P8C pin-out for a
roll-over cable

User Exec Mode

Initial configuration of a Cisco switch is done using a console connection; a 'roll-over' cable is connected to the serial (or USB) port on a computer and a terminal session opened with something like Putty or Tera Term.

When a switch is first powered on you enter what is known as **User Exec** mode.

There is not much you can do in this mode; ping, tracert and a few others – but no configuration.

```
Switch>
```

The prompt in User Exec mode is a **>** and is preceded by the hostname of the device.

Help

At any time, you can type a ? to get a list of all the available commands:

```
Switch>?
Exec commands:
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  ping        Send echo messages
  resume      Resume an active network connection
  show        Show running system information
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
Switch>
```

Privileged Exec Mode

To change to Privileged mode from User mode type **en** (enable) and enter.

To return to User mode type **dis** (disable) and enter:

```
Switch>en
Switch>enable
Switch#disa
Switch#disable
Switch>
```

Note the change in prompt from **>** to **#**.

Also notice that I have partially typed a command then hit the **Tab** key – this completes the command.

Privileged Exec Mode

Once you are in Privileged mode there is a heap more stuff that you can do:

```
Switch>en
Switch#?
Exec commands:
  <1-99>      Session number to resume
  clear       Reset functions
  clock       Manage the system clock
  configure   Enter configuration mode
  connect     Open a terminal connection
  copy        Copy from one file to another
  debug       Debugging functions (see also 'undebug')
  delete      Delete a file
  dir         List files on a filesystem
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection

  ... [output cut]
```

Global Config Mode

To really start doing some configuration you need to enter Global Config mode.

You do this from Privileged mode by typing **`config t`** (configure terminal), note the change in prompt to **`(config)#`**:

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

To exit from Config mode type **`exit`** or use **`CNTL / Z`**

Specific Config Mode

From within Global Config mode, you can enter a whole bunch of other modes depending on what you specifically want to configure.

For example, to configure an interface type `int fx/x` (interface); note that the prompt changes to `(config-if)#`:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

Switch(config)#int f0/1
Switch(config-if)#
```

Hostname

One of the very first configuration tasks for any switch or router should be to set the hostname of the device.

The default names are **Switch** and **Router** – trouble is if we have a lot of devices, they will all be called **Switch** or **Router** – very confusing:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

Switch(config)#hostname Steve
Steve(config)#
```

Negating Commands

Worth mentioning at this point that in the Cisco world if you want to undo a command or reverse it just type the command again with a **no** in front:

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

Switch(config)#hostname Steve

Steve(config)#no hostname
Switch(config)#
```

Also, worth mentioning that in the Cisco IOS when you type a command and hit the **enter** key, that configuration is now active; this is in contrast to some other vendors where you have to **commit** for that command to become active.

Banners

Banners are just messages that appear when logging in (for example).

It may seem silly, but they are somewhat of a legal requirement – not unlike a "No Entry" sign to a property.

The **+** sign I used is a delimiting character; it denotes the start and finish of the message.

```
Switch(config)#banner motd +
Enter TEXT message.  End with the character '+'.
No unauthorised access!!!
+

Switch(config)#
```

When I log in, I get the banner message:

```
Press RETURN to get started.

No unauthorised access!!!
```

Enable Password

The enable password is a global password; it protects the privileged mode – regardless of how you connect.

To set; just type **enable password** followed by your password:

```
Switch(config)#enable password cisco
```

Configuring Console Line

Ideally switches and routers should be either in a server room or a comms cabinet; if there is no physical security then it is imperative that the console line is secured.

```
Switch(config)#line console 0
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#exit
Switch(config)#
```

In this example the password is `cisco` and the `login` command enables authentication on the console line.

Shutdown

By default, all switchports in a Cisco switch are 'on'.

Cisco recommend that any unused switchports are switched off – this is purely for security.

The reasoning is that if all ports are on and patched to wall outlets somewhere then there is a chance some evil person (or just some idiot) will plug something in they shouldn't.

Once a switch has been configured all the unused switchports should be issued with the shutdown command.

Shutdown

If I use the `show ip interface brief` command, I can see what ports are being used:

```
Switch#show ip interface brief
Interface                 IP-Address      OK? Method Status
Protocol

FastEthernet0/1           unassigned      YES manual up                          up

FastEthernet0/2           unassigned      YES manual down                        down

...
```

In my example I have ports `fa0/1`, `fa0/10` and `fa0/11` being used; the rest are empty – so I'll switch them all off.

Shutdown

Since I'll be switching quite a few off I'll use the `range` command; this allows me to configure multiple ports in one hit:

```
Switch(config)#int range fa0/2 - 9
Switch(config-if-range)#shutdown

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to administratively down

...
```

Shutdown

Note the change when I do another **show ip interface brief**:

```
Switch#show ip interface brief
Interface              IP-Address      OK? Method Status
Protocol

FastEthernet0/1        unassigned      YES manual up                        up

FastEthernet0/2        unassigned      YES manual administratively down down

FastEthernet0/3        unassigned      YES manual administratively down down

...
```

do

Some commands we tend to issue all the time; but many of them can only be issued from privileged mode - this means we are constantly exiting back just to issue a **show** command.

Cisco have come to the rescue with the **do** command; this precedes any other command and means that command can be run from anywhere.

```
Switch(config)#int fa0/1
Switch(config-if)#do copy run start
Destination filename [startup-config]?
Building configuration...
[OK]

Switch(config-if)#do sh run
Building configuration...

Current configuration : 1548 bytes
!
version 12.2
```

VLAN Interfaces

The switchports on a layer 2 switch cannot be assigned IP addresses; not directly anyway.

We can, however, assign an IP address to the switch as a whole using a VLAN interface.

For now, consider a VLAN interface as **completely separate** from a VLAN.

Think of them as a 'virtual' interface – you can't plug anything into them, but you can assign an IP address to them; the same as you can assign an IP address to a router interface.

Although it is possible to create a number of VLAN interfaces for a variety of reasons, generally, we only need to create one – for `VLAN 1` (which is like an administrative VLAN – just for us).

VLAN 1

Notice below that I have given the VLAN 1 interface an IP address - with the subnet mask!

The `no shutdown` command just brings the interface up:

```
Switch(config)#interface vlan 1
Switch(config-if)#ip address 192.168.10.10 255.255.255.0
Switch(config-if)#no shutdown

%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch(config-if)#exit
Switch(config)#
```

Default Gateway

We could now connect to the switch – but only within the subnet.

If I want to connect from outside that network, I need a default gateway (the gateway router's interface address):

```
Switch(config)#ip default-gateway 192.168.10.200
```

This is entered from Global Config mode.

Note that you don't need a subnet mask for this – it's a unicast address.

Creating VLANs

Creating VLANs has to be one of the easiest things you can do in the world of Cisco:

```
Switch(config)#vlan 10
Switch(config-vlan)#name Sales
Switch(config-vlan)#exit
```

That's it; I have now created VLAN 10 – the name is optional, but it is a bit silly having a bunch of VLANs and having no idea what they are for.

VLANs can be renamed using the same method; convention is to use all caps for VLAN names – this is not a rule, just a suggested method of easily identifying created VLANs.

Checking VLANs

I'll do a check to make sure it has actually been created:

```
Switch(config)#do show vlan brief

VLAN Name                             Status     Ports
---- -------------------------------- ---------- -------------------------------
1    default                          active     Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig1/1, Gig1/2
10   Sales                            active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
Switch(config)#
```

Access Ports

An access port can have just the one VLAN assigned to it:

```
Switch(config)#int fa0/20
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
```

The first line is generally not needed; the second line will set it to access anyway.

Having said that, it's a good habit to get into.

Access Ports

To tidy up, I'll rename `Sales` to `SALES` and then assign a range of switchports to `VLAN10`:

```
Switch(config)#vlan 10
Switch(config-vlan)#name SALES
Switch(config-vlan)#exit
!
Switch(config)#int range f0/2 - 24
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#
```

Checking VLANs

Just do another check to ensure the VLAN has been assigned to all the correct ports:

```
Switch(config)#do show vlan brief

VLAN Name                             Status     Ports
---- -------------------------------- ---------- --------------------------------
1    default                          active     Fa0/1, Gig1/1, Gig1/2
10   SALES                            active     Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                 Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                                 Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                                 Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                 Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                 Fa0/22, Fa0/23, Fa0/24

1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
Switch(config)#
```

Trunk Ports

Setting a port to be a trunk is pretty easy – just got to remember to do it at both ends (both switches) if you want the trunk link to work:

```
Switch(config)#int range f0/10 - 11
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#switchport trunk allowed vlan all
Switch(config-if-range)#switchport nonegotiate
Switch(config-if-range)#description LINK TO ANOTHER SWITCH
Switch(config-if-range)#ex
Switch(config)#
```

The first line just tells the port it is a trunk; the second tells the port what VLANs are allowed to pass and the `nonegotiate` command just stops the port from automatically trying to figure out what it's supposed to be.

It's good practice to add a `description` to 'significant' ports and if all caps are used it makes the description stand out better when using `show` commands.

Portfast

One of the problems with Cisco switches is that they have a thing called the spanning tree protocol (STP) enabled – this is great for stopping switching loops but slows down new connections.

In the past this was not a big issue, but with the advent of VoIP phones it can be troublesome.

The **portfast** command, when issued to switchports, effectively disables STP on those ports.

Word of caution – if a network loop has been inadvertently created, setting portfast to the wrong switchports may cause the network to fail – it should only be applied to ports connected to hosts.

```
Access_A(config)#int range f0/2 - 24
Access_A(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single host.
Connecting hubs, concentrators, switches, bridges, etc... to this interface
when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast will be configured in 23 interfaces due to the range command but will
only have effect when the interfaces are in a non-trunking mode.
```

Saving Configuration

At the moment, all the configuration changes we have made are stored in RAM.

Once we know that the switch is working properly, we copy the active (running) configuration to the startup configuration – this is like saving data from RAM to a hard drive in a computer.

To save the changes to NVRAM we use the command copy running-config startup-config (or **copy run start** for short or **wr** for even shorter):

```
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
```

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1300 655 307 | www.tastafe.tas.edu.au

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