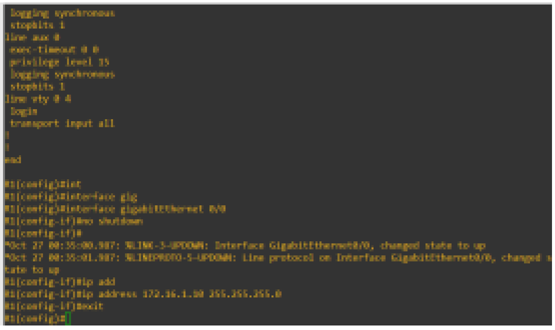
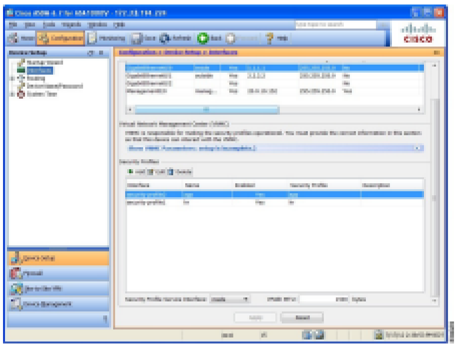
The Cisco CLI

The Cisco IOS CLI

We will go over the **Cisco Command Line** and how it is used.

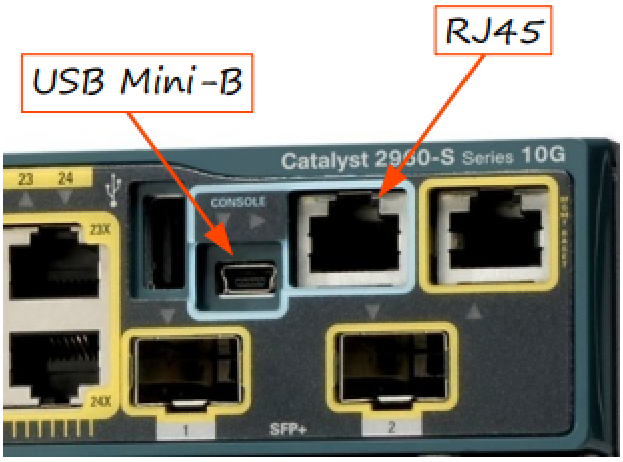
The **Cisco IOS CLI** is the operating system for Cisco devices - **routers, switches & firewalls**.

It comes in 2 forms: command-line & GUI.

> - *Command-line interface*
> - *The interface you use to configure Cisco devices*
>
> 
>
> ```
>  logging synchronous
>  stopbits 1
> line aux 0
>  exec-timeout 0 0
>  privilege level 15
>  logging synchronous
>  stopbits 1
> line vty 0 4
>  login
>  transport input all
> !
> !
> end
>
> R1(config)#int
> R1(config)#interface gig
> R1(config)#interface gigabitEthernet 0/0
> R1(config-if)#no shutdown
> R1(config-if)#
> *Oct 27 00:35:00.987: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
> *Oct 27 00:35:01.987: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed s
> tate to up
> R1(config-if)#ip add
> R1(config-if)#ip address 172.16.1.10 255.255.255.0
> R1(config-if)#exit
> R1(config)#
> ```
>
> - *GUI (Graphical User Interface)*
>
> 

Connecting To The Console

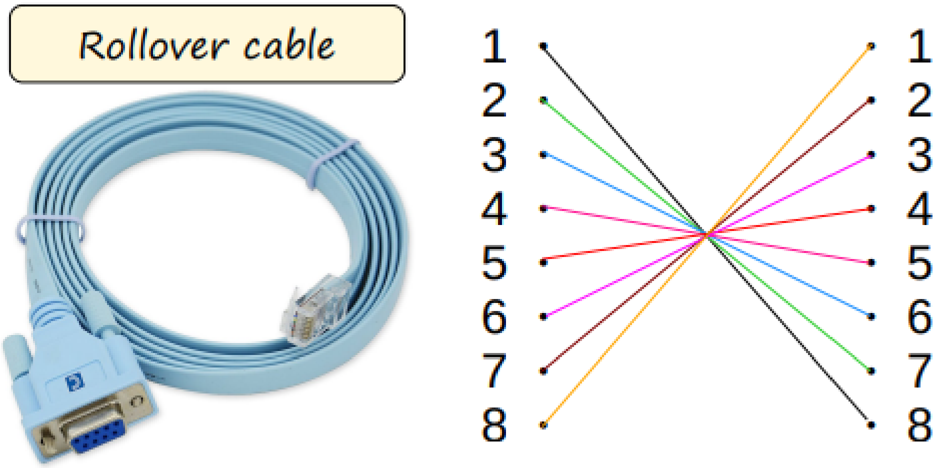
To to able to use the CLI we need to connect to the Cisco device through the **console port**. The port has 2 connections - one with a `RJ45` connector and the other with a **USB Mini-B** connector.



If you look closely you will see that the console ports are labelled

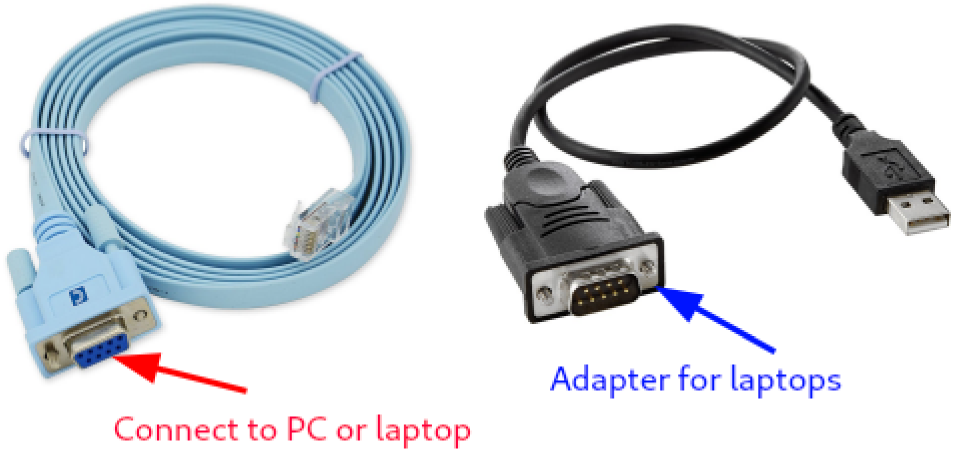
We can also connect to the device remotely but that will be covered later in the course.

The `RJ45` cable for the console is a little different; it has 8 pins attached at the opposite end of the `RJ45` connector. This is called a **Rollover cable**.



In a rollover cable pins connect 1 to 8, 2 to 7, 3 to 6, 4 to 5, 5 to 4, 6 to 3, 7 to 2, 8 to 1.

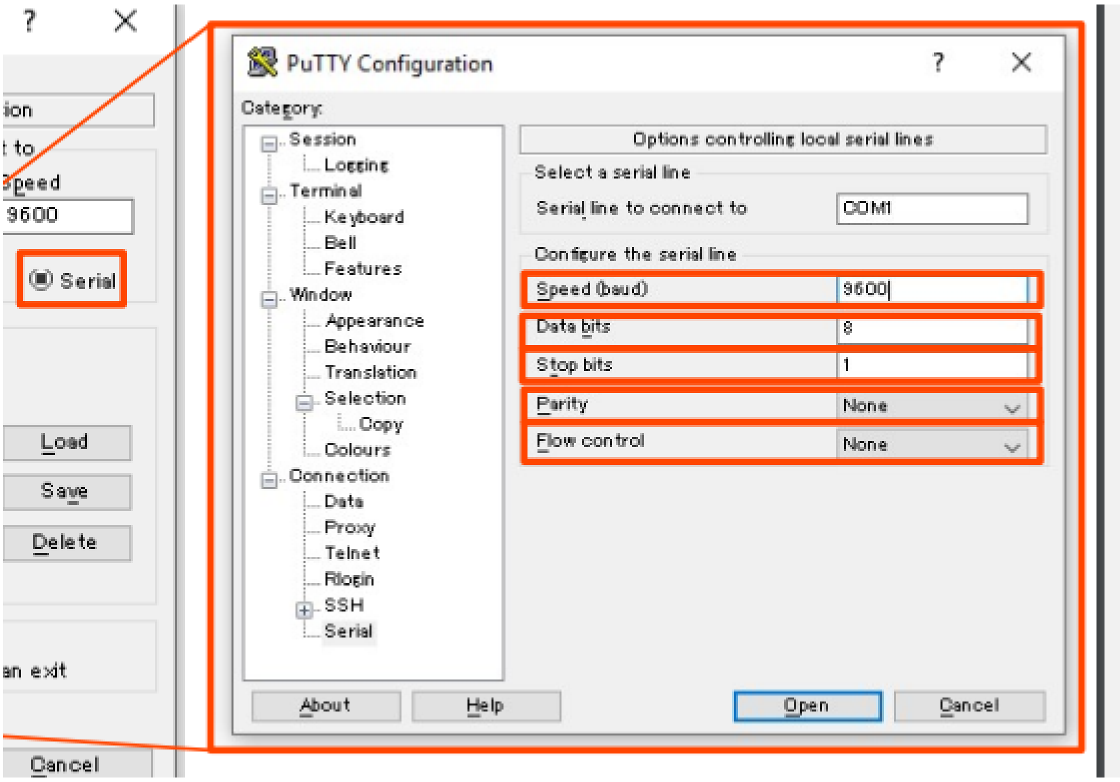
This part of the cable is what you connect to your laptop or computer.



Rollover cable and laptop adaptor

We also need to have the PuTTy terminal emulator installed - we can do this by going to the website.

Once installed we set up the configurations by clicking on `Serial`, then making sure the following are set up accordingly:



Speed 9600

Serial line to connect to: COM1

Speed (baud): 9600

Data bits: 8

Stop bits: 1

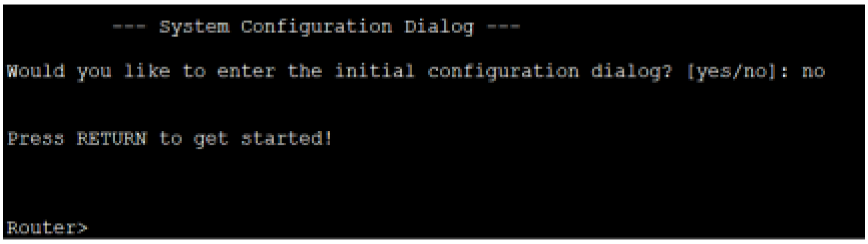
Parity: None

Flow control: None

- **Speed (baud rate)** is set to 9600
- **Data bits** set to 8
- **Stop bits** set to 1
- **Parity** set to None
- **Flow control** set to None

Navigating The Command Line

When we open the terminal for the first time we are brought to a screen where we are prompted for the initial configuration dialogue.

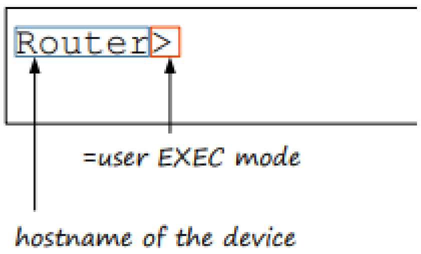


```
         --- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no


Press RETURN to get started!



Router>
```

We enter `no` and we are able to start.

User-Exec Mode

When we enter the CLI we are first brought to the user mode of the device. We signify the name we are in-exec **mode** with `>`.



```
Router>
```

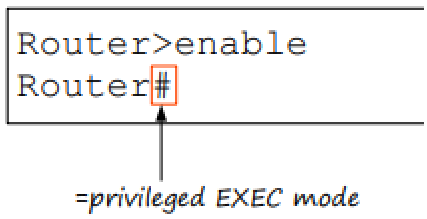
We are also given the name if the device

There are some **limitations** to the user-exec mode. User can look at files etc, but can't make any changes. This can also be called **user mode**.

Privileged-Exec Mode

If we want to be able to change files and gain root access, we need to activate the privileged-exec mode by entering enable in the terminal.

`enable`

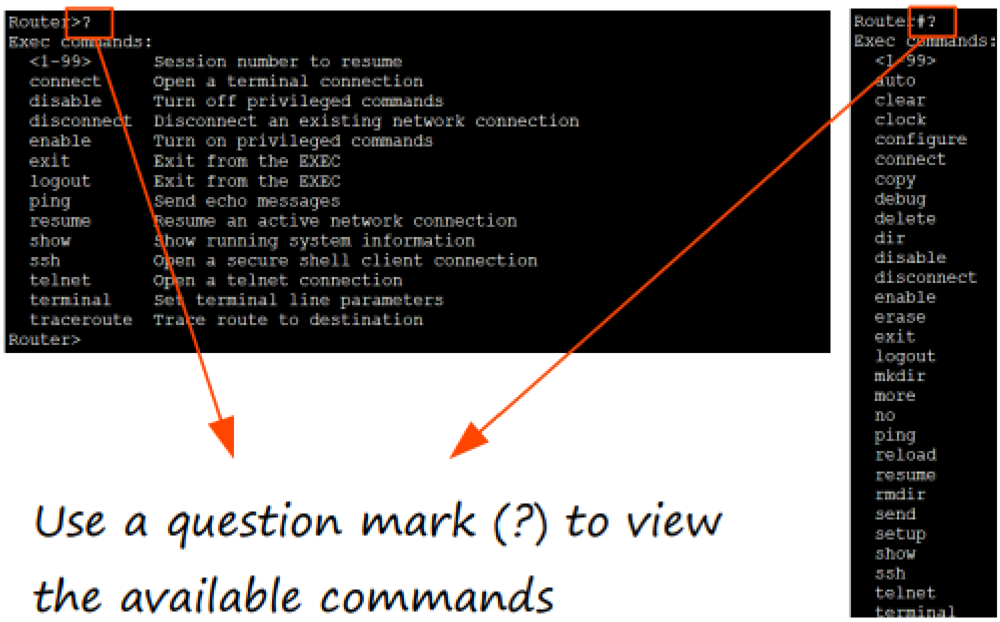


```
Router>enable
Router#
```

In privilege mode we can view the configuration settings but we cannot change them. We can do things like change the time on the device and save the configuration file, etc. To change the settings we would have to be **global configuration** file.

Commands and Shortcuts

There are a series of commands we can use in both user and privileged-exec mode. We can use `?` like the help command; this tells us what commands we have at our disposal.



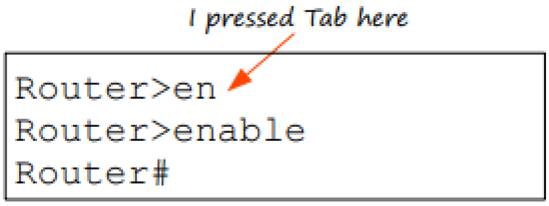
```
Router>?
Exec commands:
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit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

```
Router#?
Exec commands:
  <1-99>
  auto
  clear
  clock
  configure
  connect
  copy
  debug
  delete
  dir
  disable
  disconnect
  enable
  erase
  exit
  logout
  mkdir
  more
  no
  ping
  reload
  resume
  rmdir
  send
  setup
  show
  ssh
  telnet
  terminal
```

Using `?` in different modes give us different amount of commands available

We can also use the **Tab** button to auto-complete our commands. With the tab button it will only complete commands that do not have characters that match other commands.

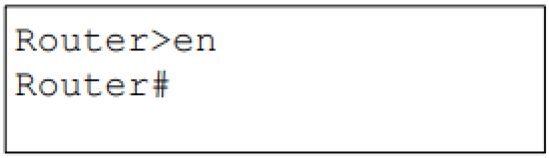
`en`



```
Router>en
Router>enable
Router#
```

So if the letter `e` has two commands - `enable` and `exit`, we would have to put `ex` to autocomplete to `exit` or `en` to `enable`.

`en`

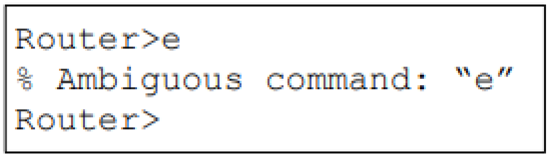


```
Router>en
Router#
```

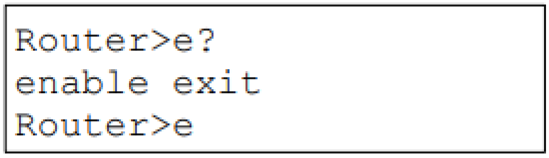
Notice we can just press enter without the tab button

If we try to enter `e`, we will get an `Ambiguous command` error because the com and line has **too many choices to pick from**.

`e?`



```
Router>e
% Ambiguous command: "e"
Router>
```



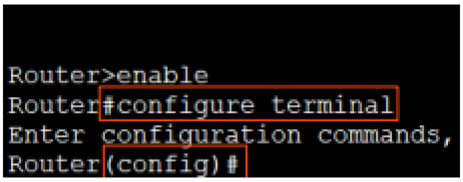
```
Router>e?
enable exit
Router>e
```

`e?` to find the different commands that begin with E

Global Configuration Mode

To enter the **global configuration** mode we have to be in the privilege-exec mode and enter `configure terminal` in the terminal.

`configure terminal`

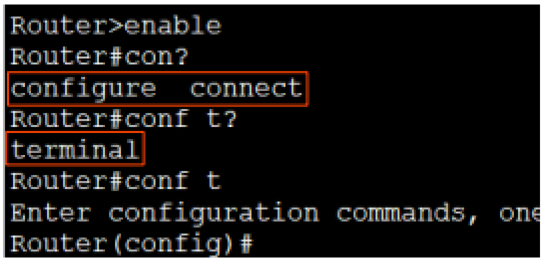


```
Router>enable
Router#configure terminal
Enter configuration commands,
Router(config)#
```

`config` will display in the terminal to indicate we are in the global configuration mode.

We can use the **shortcut method** to do the same.

`conf t`



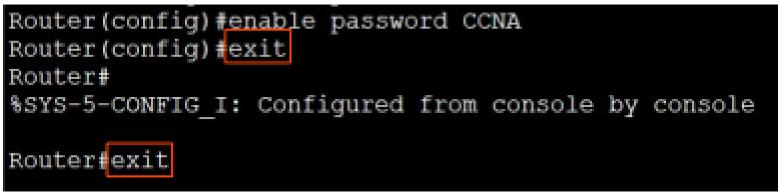
```
Router>enable
Router#con?
configure  connect
Router#conf t?
terminal
Router#conf t
Enter configuration commands, one
Router(config)#
```

Image displays the process of finding the `conf t` command

Enabling Passwords and Encryption

To prevent anyone from accessing devices within a network, we create a password in order to gain access to the privilege-exec mode. **This needs to be done in the global configuration mode**. To do this we use the `enable password` command followed by our password.

`enable password CCNA`

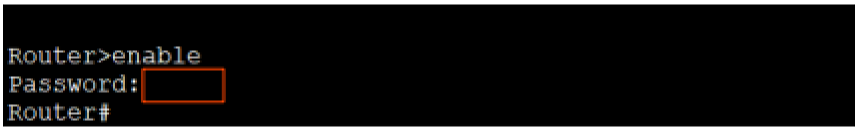


```
Router(config)#enable password CCNA
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#exit
```

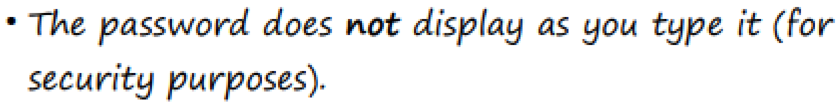
CCNA is now the password to enter privileged-exec mode

We exit the from the global configuration & privilege mode in order to re-enter the privilege mode with our password.

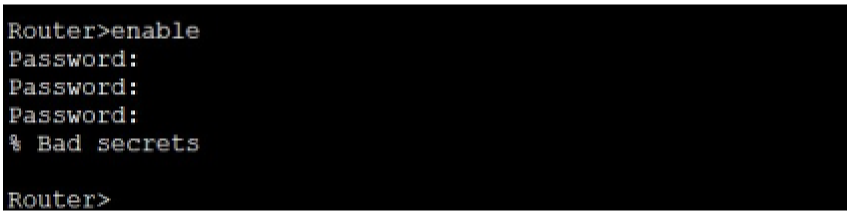
`enable` then enter password



```
Router>enable
Password:
Router#
```



- The password does **not** display as you type it (for security purposes).



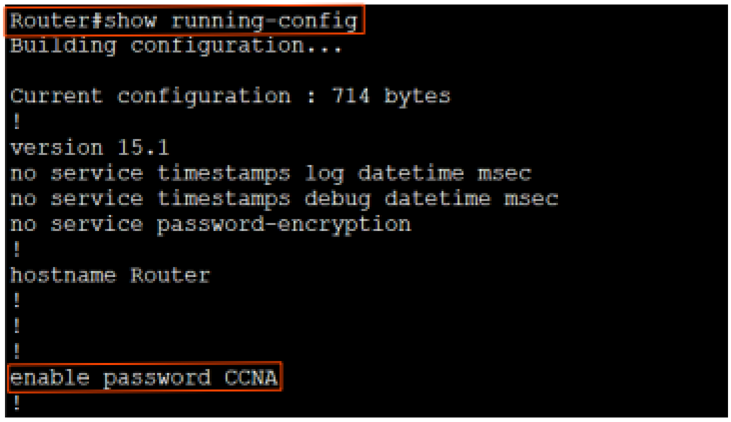
```
Router>enable
Password:
Password:
Password:
% Bad secrets

Router>
```

There are 2 configuration files that we focus on - **Running-config** & **Startup-config** file.

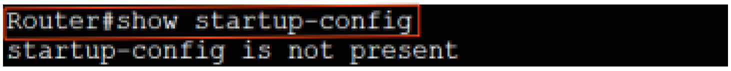
- `running-config` - the current active configuration on the device. As you enter commands in the CLI, you edit the active configuration.
- `startup-config` - the configuration file that will be loaded upon restart of the device.

To view the files we have to enter the `show` keyword followed by the file.

`show running-config`



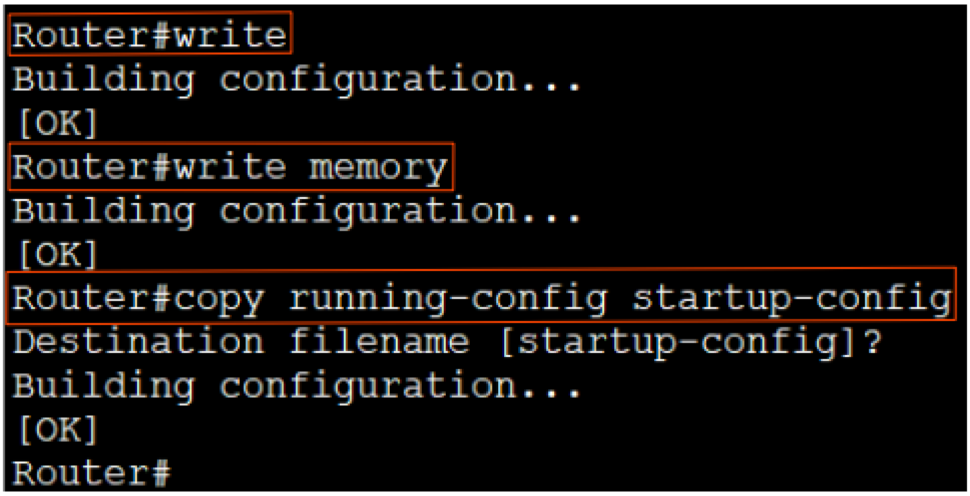
```
Router#show running-config
Building configuration...

Current configuration : 714 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable password CCNA
!
```



```
Router#show startup-config
startup-config is not present
```

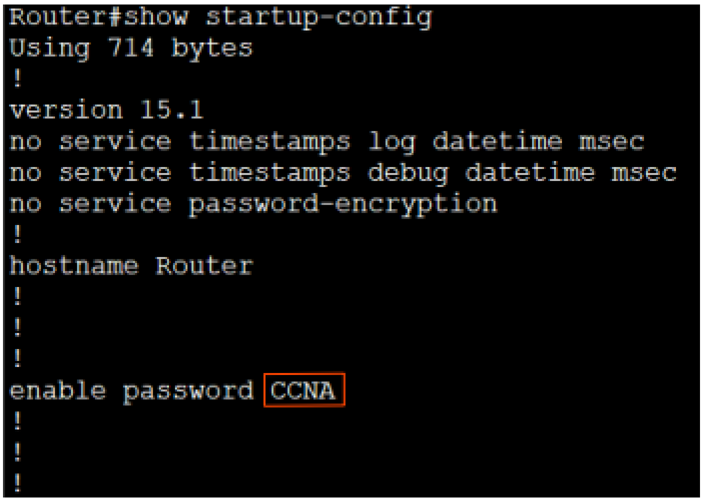
When we run this command we get to the see the device's information as well as the all the commands we have entered.

If we want to view the `startup-config` file we get an error message because we need to **save the running-configuration first**. We have 3 ways to save files:



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

When we now view the `startup-config` we can see the password we created is visible *(which isn't good for obvious security reasons)*.

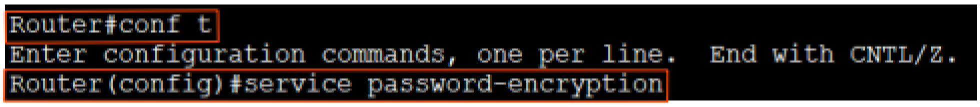


```
Router#show startup-config
Using 714 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
!
!
enable password CCNA
!
!
!
```

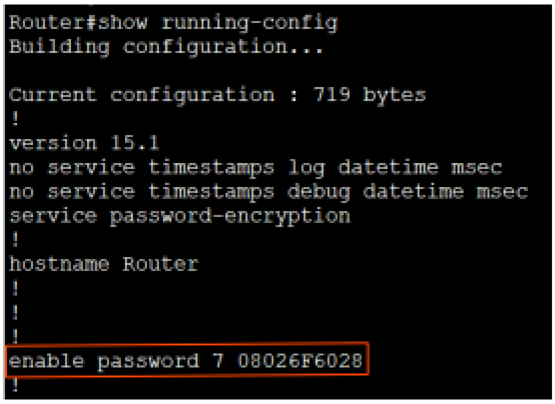
We have two options to get around this:

Option 1: `service password-encryption`

The first option is to enable the `service password-encryption` in the global `config` mode. What this does is encrypts all current passwords and also all future passwords. `service password-encryption`

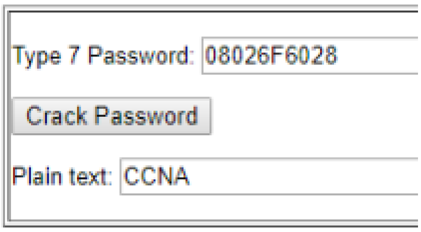


```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#service password-encryption
```



```
Router#show running-config
Building configuration...

Current configuration : 719 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router
!
!
!
enable password 7 08026F6028
!
```

This level of encryption is not secure, if we Google `Type 7 password` we will find sites to help us crack the password.



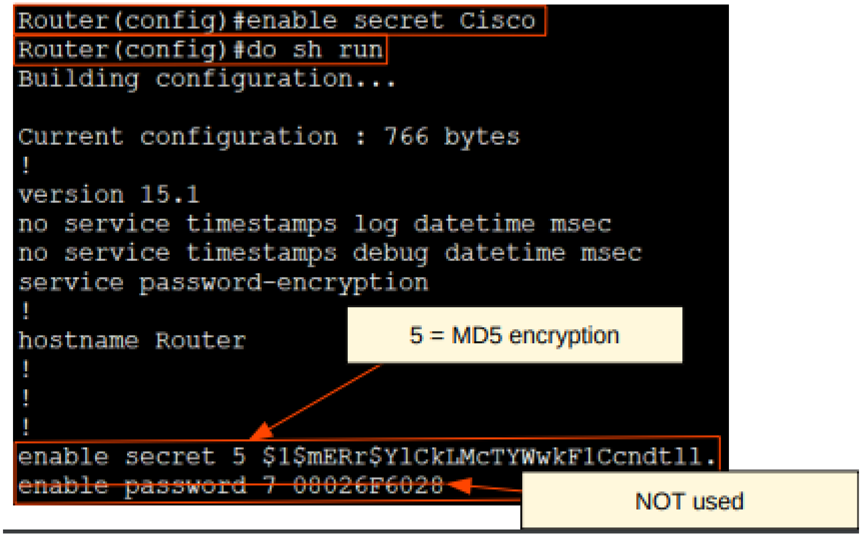
Type 7 Password: 08026F6028

Plain text: CCNA

Option 2: `enable secret`

In the global `config` mode we create our password using the enable secrete command. `enable secret` uses a **MD5 encryption** which is **stronger** than the **Cisco level 7 encrytion**.

```
enable secret Cisco
```



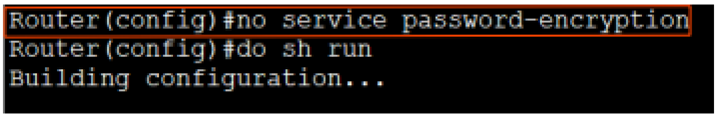
```
Router(config)#enable secret Cisco
Router(config)#do sh run
Building configuration...

Current configuration : 766 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Router
!
!
!
enable secret 5 $1$mERr$Y1CkLMcTYWwkF1Ccndtl1.
enable password 7 08026F6028
```

We have set the password to `Cisco`

This level of encryption is **more secure** than using the `service password-encryption`. If an `enable password` is set along with an `enable secret`, the `enable secret` will **override** the `enable password`.

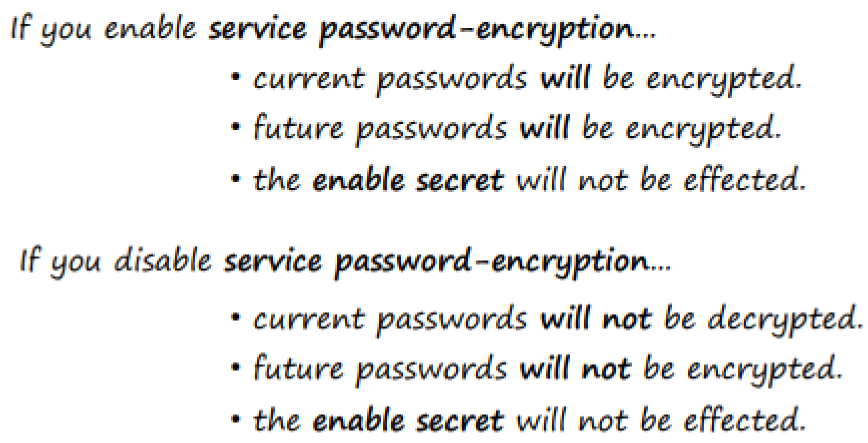
Notice when we ran the `running-config` file we used a shortcut. Instead of using the whole command we used `do sh run`. Shortcuts like these will be used often so it is recommended to get well acquainted with them! We used the `do` command to show the contents of the `running-config` file in the global `config` mode.

We can use the `no` command to **cancel or delete** a command.
`no service password-encryption`



```
Router(config)#no service password-encryption
Router(config)#do sh run
Building configuration...
```

This disables future passwords from being encrypted



If you enable **service password-encryption**...

- current passwords **will** be encrypted.
- future passwords **will** be encrypted.
- the **enable secret** will not be effected.

If you disable **service password-encryption**...

- current passwords **will not** be decrypted.
- future passwords **will not** be encrypted.
- the **enable secret** will not be effected.

Cisco Command Line Commands

- `>` : user-exec mode
- `#` : privileged-exec mode
- `(config) #` : global configuration mode
- `enable` : enter privileged-exec mode
- `configure terminal` : enter global configuration mode
- `enable password <password>` : sets a password for privileged-exec mode. After this you will need to use the password to sign into privileged-exec mode.
- `service password-encryption` : encrypts all passwords (*weak*)
- `enable secret <password>` : configures a more secure password which is always encrypted (*strong*).
- `do <privileged level command>`:-executes privileged-exec level commands in the global configuration
- `no` : removes a command
- `show running-config` : displays the current active configuration file on the device
- `show startup-config` : shows the saved configuration file. This will be file that will be loaded if the device is restarted.
- `write` : saves the configuration

- `write memory` : saves the configuration
- `copy running-config startup-config` : saves the configuration

REMEMBER !!

- A **roller-over cable** is used to connect to a **Cisco `RJ45` console port**
- When we first configure a device we have to connect to the console port
- All devices have a **default CLI name** (name of device)
- The `enable secret` will always **stay encrypted**
- Slides are available in a PDF format.