




# 250 CT PORTFOLIO – INDIVIDUAL ACTIVITIES



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## 250 CT Portfolio – Individual Activities

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### Individual Activities

The following activities are to be carried out **individually** by the students **outside lab hours** (though asking for help during labs is possible). **Submit this piece of work separately from the rest of the portfolio.** Notice that since this is not group work submitting the same piece of work as the rest of your group members will be considered plagiarism.

### 1. Router Operation Diagram

Construct a diagram showing the relationship between the different modes of operation/prompts that you used in the course of the labs and the commands that can be used to change between them.

#### Router Modes

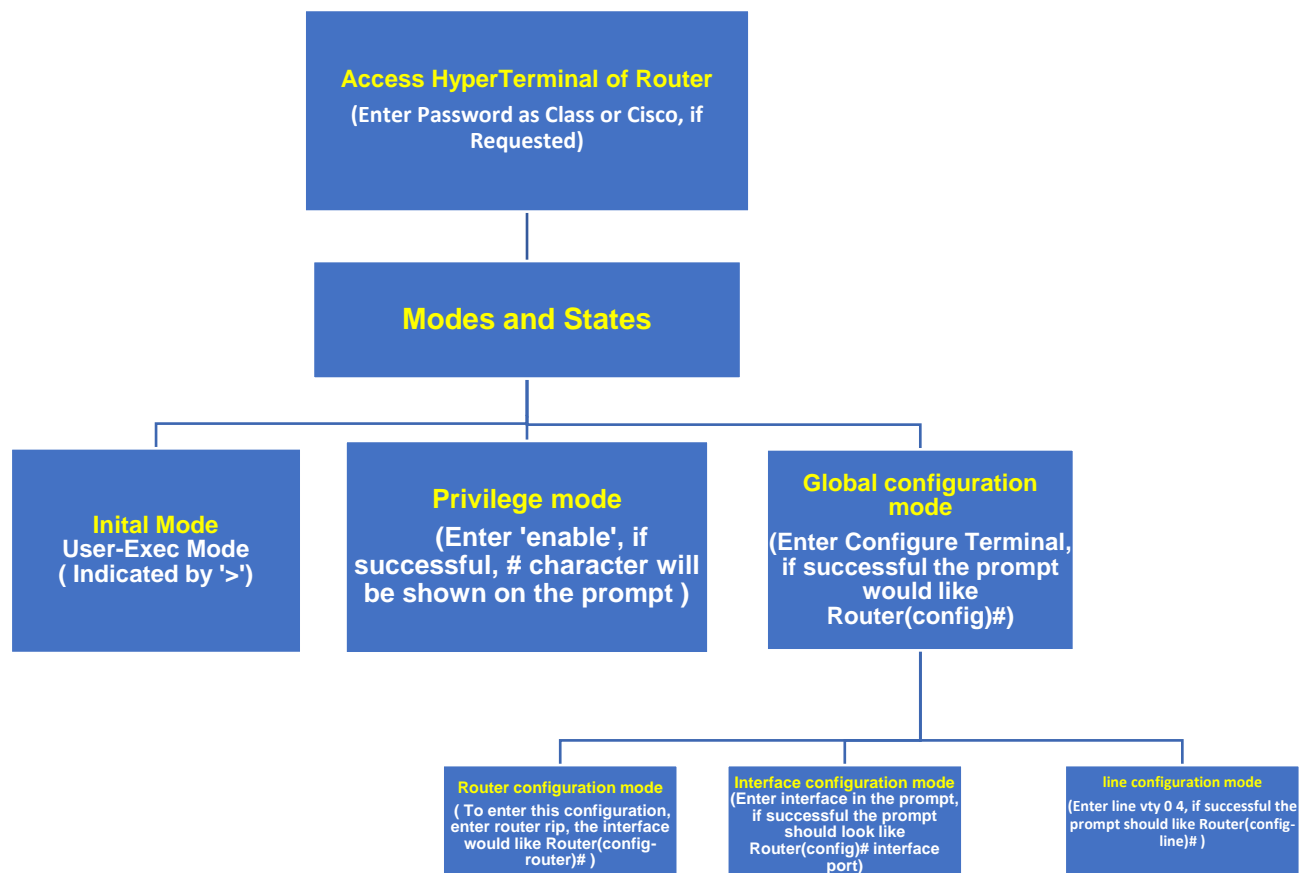


Fig 1.0 Router Modes

### Router Mode Relationship

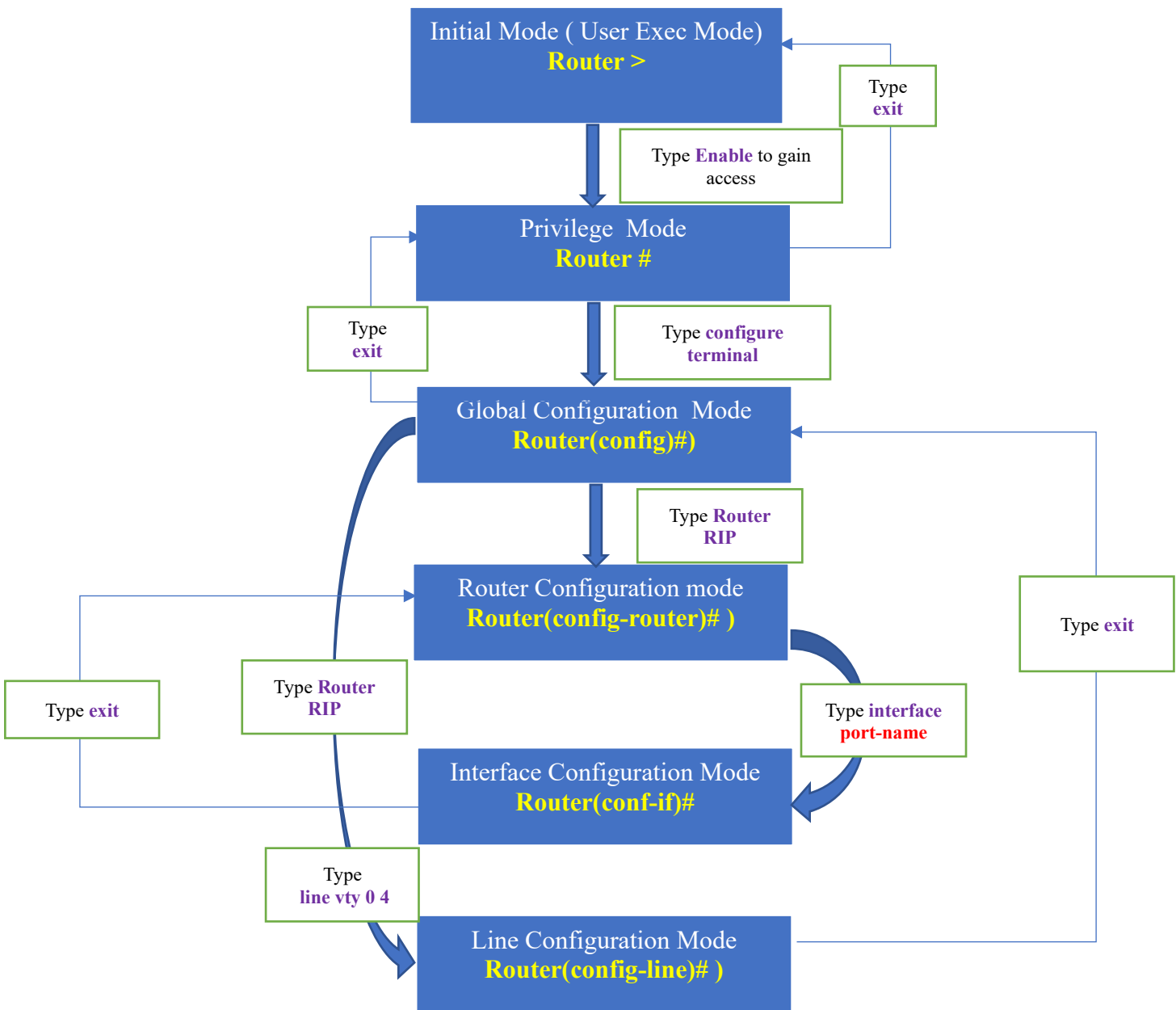


Fig 2.0 Router Modes and Commands

### Initial Mode Commands

Commands	Description
1. Enable	Enter privileged mode
2. Disable	Return to user mode from privileged mode
3. Disconnect	Disconnect a current network connection
4. Logout	Exit from the Exec Mode
5. Ping	Transmit echo message

### Privilege Mode Commands

Commands	Description
1. Lock	Lock the terminal
2. Exit	Exit from privilege mode
3. Clock	Manage the system clock
4. Debug	Debug menu and functions
5. Delete	Delete a File

### Global Configuration Mode Commands

Commands	Description
1. hostname name	Configure Router Names
2. Router(config)# interface	Enter the interface configuration mode
3. Router(config-if)# ip address	Configure the IP address and subnet mask
4. Router(config)# line	Enter the line configuration mode
5. Router(config-line)# password	Enables the user to set a password

## 2. Research Question

In regards to the portfolio 3 exercise: Access to the outside world for the scavengers' group is critical for the operation of the company. You have been asked by management to provide some advice on how the network's fault tolerance can be improved in that regard. Write a short proposal (200-500 words) about the steps that could be taken in order to maximise the chances of that particular group still having access to the internet in the event of equipment failure or other unforeseen problems. State any assumptions you made and what extra equipment and resources could be needed to achieve such a task. Explain the cons and pros of your suggestions and if necessary illustrate the new layout by means of a diagram. References to online material or printed sources (if you use any) do not count towards the word count.

In various work environments where many computers are used, malfunctions, equipment failures or unforeseen problems can be disastrous, these malfunctions can make a company lose a large amount of investment. Thus, the need for systems to be fault-tolerant, they should be able to have fail-safes that enable the computers and network at large to keep working despite the failure. Fault tolerance can be defined as the ability of nodes or computer systems to maintain its operation despite the failure if one or more of its components (What Is Fault Tolerance? n.d.). Murphy's first law states that "If anything can go wrong, it will", so if there is a system failure or power outage our network should be able to access the internet. Below are examples of steps that can be taken as well as some equipment that can be utilized to achieve fault tolerance.

Firstly, in the event of a power failure, the system can be powered using a UPS which stands for an uninterrupted power supply, so in the case that there is a loss of power the system engineer can safely save all the relevant data. Also if the access to the outside world is a high priority, inverters can be used to switch the main power supply to its back-up supply without the loss of data. Figure 1.0 below depicts the broad overview of how the UPS system would work, the secondary power supply would act as a backup in the event of a power outage. However, when it comes to the start-up cost of maintaining the battery of these power supplies should be taken into consideration as they usually last for 10 years depending on the manufacturer and for large scale industries, these batteries would have to be properly disposed of.

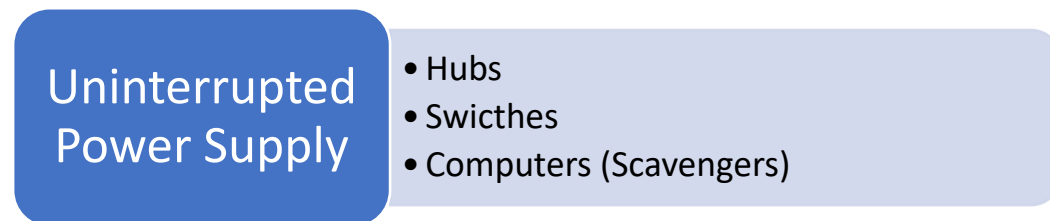
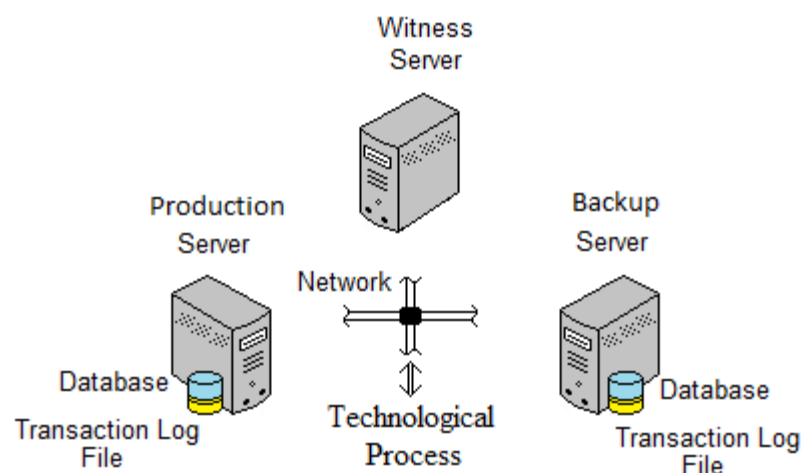


Fig 1.0 UPS Configuration

Moreover, to lessen data loss in the event of an unforeseen problem, data can be periodically backed up, this is particularly important for companies working with sensitive information, as a data loss can occur at any time. Also, a mirror of the data can be created on different devices at different locations. Mirrors refer to servers that provide the exact copies of data from another server. The main objective of these servers is to provide redundancy in case something happens to the primary server (Christensson, 2017). For this to work, a third server will be used, this server is responsible for monitoring and switching the server controls, this server is referred to as the witness-server as seen in Fig 2.0 below.

However, the main disadvantage of this system is that in the case of an unforeseen event like data loss, there will be a single point of failure (Witness Server), if that node fails, the entire system would fail as well.



Database Mirror with Witness server (L, 2014)

In conclusion, the various means of fault tolerance mentioned above are examples of preventative maintenance, for more complex systems like Data Centre's, careful consideration and planning should be made for all possible scenarios. This is vital as the system should continue working despite individual node failures.

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**List of References:**

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