Telnet

```
RouterA# telnet 172.16.20.2
RouterA# 172.16.20.2
```

host configuration

manual host configuration

```
A(config)# ip host B 172.16.20.2
A(config)# ip host C 172.16.40.2
```

syntex of above command is A(config)# ip host C (C ip address)

```
A# telnet B
A# ping B
A# B (telneting to Router B)
```

Configuring DNS Server on a Router

```
A# config  t
A(config)# ip domain-lookup
A(config)# ip name-server 172.16.10.20
A(config)# ip domain-name sunbeam.com
```

```
A# b.sunbeam.com
A# b
```

If we stop the DNS service simply put command

```
A(config)# no ip domain-lookup
```

If by mistekenly put

```
    255 255 255 255 255 255....
```

this is because router takes a 1 and more than 1 min to reply because he find the ip and domain name 'cdefg' it considerd as router.

Configuring DNS Server on a Router

Configuring a Domain Name System (DNS) server on a router allows the router to perform DNS resolution for devices connected to the network. DNS is crucial for translating domain names (like www.example.com) into IP addresses, facilitating communication between devices on the network and the internet. Here's how you can configure a DNS server on a router:

1. Accessing Global Configuration Mode:

- Start by accessing the router's Command-Line Interface (CLI) and entering Global Configuration Mode ('Router(config)#' prompt).

  ```
  Router>
  Router> enable
  Router# configure terminal
  Router(config)#
  ```

2. Configuring the DNS Server:

- Use the 'ip name-server' command followed by the IP address of the DNS server you want to use.

  ```
  Router(config)# ip name-server <dns_server_ip>
  ```

  Replace '<dns_server_ip>' with the IP address of the DNS server you want to configure.

  Example:

  ```
  Router(config)# ip name-server 8.8.8.8
  ```

- You can configure multiple DNS servers by repeating the 'ip name-server' command with additional IP addresses.

  ```
  Router(config)# ip name-server <dns_server_ip2>
  Router(config)# ip name-server <dns_server_ip3>
  ```

  Example:

  ```
  Router(config)# ip name-server 8.8.4.4
  Router(config)# ip name-server 1.1.1.1
  ```

3. Verifying the Configuration:

- After configuring the DNS servers, exit Global Configuration Mode to apply the changes.

```
Router(config)# exit
Router#
```

4. Optional: Setting Domain Lookup:

- You can also set a default domain name for the router to append to unqualified hostnames.

```
Router(config)# ip domain-lookup
Router(config)# ip domain-name <domain_name>
```

Replace '<domain_name>' with your preferred domain name.

Example:

```
Router(config)# ip domain-lookup
Router(config)# ip domain-name example.com
```

5. Verifying DNS Configuration:

- You can verify the configured DNS servers using the 'show ip name-server' command.

```
Router# show ip name-server
```

- To test DNS resolution, use the 'ping' command with a domain name.

```
Router# ping www.example.com
```

Example Configuration Steps:

Here's an example of configuring DNS servers '8.8.8.8' and '8.8.4.4' on a router:

```
Router> enable
Router# configure terminal
Router(config)# ip name-server 8.8.8.8
Router(config)# ip name-server 8.8.4.4
Router(config)# ip domain-lookup
Router(config)# ip domain-name example.com
```

```
Router(config)# exit
Router#
```

Now, the router is configured to use DNS servers '8.8.8.8' and '8.8.4.4' for DNS resolution, with the domain name 'example.com' set as the default domain.

Routing:

1. Static Routing:

- **Definition:** Static routing involves manually configuring routes on routers.
- **Characteristics:** Routes do not change unless manually modified. Simple and predictable but not scalable for large networks.
- **Use Cases:** Suitable for small networks with stable topologies or for configuring default routes.

2. Dynamic Routing:

- **Definition:** Dynamic routing protocols allow routers to automatically exchange routing information and update their routing tables.
- **Characteristics:** Routes are dynamically learned and updated based on network changes. More scalable and adaptable than static routing.
- **Examples:** OSPF, RIP, EIGRP, BGP.

Common Dynamic Routing Protocols:

- *** 1. Link state** **Open Shortest Path First (OSPF):**
  - Link-state routing protocol designed for IP networks. It uses Dijkstra's algorithm to calculate shortest paths.
  - OSPF routers exchange link-state advertisements (LSAs) to build a topological map of the network.
- *** 2. Distance vector** **Routing Information Protocol (RIP):**
  - Distance-vector routing protocol widely used in small to medium-sized networks.
  - RIP routers exchange routing tables with their neighbors and use hop count as a metric.
- *** 3. Hybrid** **Enhanced Interior Gateway Routing Protocol (EIGRP):**
  - Cisco proprietary routing protocol that combines features of distance-vector and link-state protocols.
  - EIGRP routers exchange routing updates and maintain a topology table to calculate routes.

RIP Protocol (Routing Information Protocol)

The Routing Information Protocol (RIP) is one of the oldest distance-vector routing protocols used in computer networks. RIP is designed to exchange routing information between routers within a small to medium-sized network. Here's an overview of the RIP protocol:

1. Distance-Vector Algorithm:

- RIP uses the Bellman-Ford algorithm to determine the best path to a destination network. Each router maintains a routing table that lists known networks, their next-hop routers, and the distance (hop count) to reach each network.

2. Metric:

- RIP uses hop count as its metric to measure the distance to a network. A hop count represents the number of routers a packet must pass through to reach the destination network.
- By default, RIP considers any network reachable within 15 hops as unreachable (infinite metric), limiting its effective range.

configuration rip on router A

on RouterA global configuration mode

```
A(config)# router rip
A(config-router)# network 172.16.0.0
```

(after network you type classfull value of directly connected interfaces,here 172.16.0.0 is classful value)

significance -newly connected network was not detected unless untill you update in network commands.

Equal-Cost Load Balancing in RIP:

- It balances a traffic load across redundant links of equal cost.
- It takes 4 Default path and 6 maximun path.
- **Definition:**
  - Equal-Cost Load Balancing is a routing technique used when there are multiple equal-cost paths available to reach a destination network.
  - RIP supports this feature, allowing traffic to be distributed evenly across multiple paths to a destination.
- **Advantages:**
  - Efficiently utilizes available bandwidth across multiple paths.
  - Improves network performance by spreading traffic load.
- **Considerations:**
  - All paths to a destination must have the same metric (hop count) in RIP for equal-cost load balancing to occur.
  - Load balancing occurs automatically when multiple equal-cost paths exist.
- **Example:**
  - If two paths to the same destination network have the same hop count, RIP will distribute traffic evenly between them.

Pinhole congestion

"Pinhole congestion" refers to a scenario in a network where a single router interface receives a large amount of traffic destined for different networks, resulting in congestion on that interface. In the context of RIP (Routing Information Protocol) routers, this can occur if a router is used as a default gateway for multiple networks, causing all traffic to pass through a single interface. Here's how you can mitigate pinhole congestion in RIP routers:

Understanding Pinhole Congestion:

- Pinhole congestion occurs when a router interface becomes a bottleneck due to a large amount of traffic passing through it.
- In a RIP network, this often happens when the router serves as the default gateway for multiple networks, leading to all inter-network traffic passing through a single interface.
- let path 1 connection having less bandwidth eg. 1 Mbps and path 2 having more bandwidth eg. 10 Mbps
- Most of Packet travel through 10 Mbps and remaining from 1 Mbps.
- so 1 Mbps is choke up earlier due to less bandwidth.

Drawbacks of RIP:

Routing Loops:

- **Count-to-Infinity Problem:**
  - RIP is susceptible to the count-to-infinity problem, where routers incorrectly advertise routes in a loop.
  - When a network link goes down, routers may continue to advertise the unreachable network, causing routing loops.
  - This can lead to network instability.

Remeady

1. Hop count limit

- hop count limit set to 15, after 15 count packets get discarded.

2. Split horizon

- split horizon dont send back from which recieved
- split horizon work with hold on timer for RIP protocols hold downs timer is 180 sec.
- It dosn't recieve or process packets once router forward to another router for 180 sec.

3. Triggerd update

- Triggerd update once change in topology means network up or down then immediatly update the router within 180 sec.

4. Route poisioning

- when network down router keeps update uin his routing table and update also neighbouring router to hop count 16 i,e. not reachable or down so we have hop count limitation is 15.

Timers which help RIP

- 1. Update timer 30 sec
- 2. Hold down timer 180 sec
- 3. Invalid timer 180 sec
- 4. Flush timer 240 sec

monitoring command:

```
Show ip route
```

this command will help to display routing table.