Assignment 1

Aim - Simulation of WAN using static routing (minimum 3 networks), using Cisco packet tracer tool.

Theory:

Routing is one of the most essential procedures in data communication. It ensures that data travels from one network to another with optimal speed and minimum delay and that its integrity is maintained in the process.

Broadly routing is performed in 2 ways

1. Dynamic Routing - continuously updates the routing table with paths and their cost/metric while making optimal routing decisions based on changing the network operating environments.

2. Static routing - performs routing decisions with preconfigured routes in the routing table, which can be changed manually only by administrators. Static routes are normally implemented in situations where the choices in the route selection are limited or there is a single default route available. Also static routing is used only if you have few devices for router configuration

Significance/Need of Routing –

Routing is the path process of selecting a path along which data can be transferred from source to destination. It is performed by a router. A router is a networking device that forwards the packets based on information available in the packet header and forwarding table. It helps to examine the destination IP address of a packet, determine the next hop address and forward it. Routers use the routing table to determine the next hop to which the packet should be delivered.

Optimality Principle – It states that if router J is on the optimal path from router I to router K, then the optimal path from J to K also falls along the same route. Call the route from I to J as r1 and the rest of the route as r2. r2 could be concatenated with r1 to improve the route from I to K contradicting the statement that r1,r2 is optimal only if a route better than r2 existed from J to K.

Difference between static and dynamic routing.

Static Routing	Dynamic Routing
In static routing, routes are user defined.	In dynamic routing, routes are updated according to topology.

Static Routing	Dynamic Routing
Static routing does not use complex routing algorithms.	Dynamic routing uses complex routing
Static routing provides high or more security.	Dynamic routing provides less security.
Static routing is manual.	Dynamic routing is automated.
In static routing, additional resources are not required.	In dynamic routing, additional resources are required.
In static routing, failure of link disrupts the rerouting.	In dynamic routing, failure of link does not interrupt the rerouting.
Static Routing may not follow any specific protocol.	Dynamic Routing follows protocols like BGP, RIP, etc.

Steps to configure static routing -

1. Connect end devices to switches, switches to routers & connect routers to each other using copper crossover cable.

2. Assign IP addresses to all the end devices and also to the 2 routers.
gigabit ethernet 0/0 → to connect to the switch
gigabit ethernet 0/1 → to connect with the other router.

3. Then add static routing.
Router 0 : Network → 172.16.0.0
Subnet mask → 255.255.0.0
Next Hop → 192.168.0.2

Router 1 : Network → 10.0.0.0
Subnet Mask → 255.0.0.0
Next Hop → 192.168.0.1

4. Assign default gateway of end devices with IP address of the nearest router and check for the connectivity.