

Computer Network Protocols

Network Layer (Part 1)

Lesson 1



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المرحلة الرابعة

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Introduction

Network layer it's the third layer of OSI reference model which is responsible about routing of data from **one network to another network** choosing the **best path** from the routing table.

- **Routing table** consist of **only the best routes** for every destinations.

The main functions of network layer

- **Routing:** determine route taken by packets from source to destination.
- **Forwarding:** move a packet from router's input to appropriate router output.

Types of Routing

Static	<ul style="list-style-type: none">• It is configure by Administrator manually• Need for destination network ID• It is secure and fast• Used for small organization which have network of 10-15 routers
Dynamic	<ul style="list-style-type: none">• Means automatically routing• Dynamic routes means that the router <u>learns</u> of paths of destinations by receiving periodic updates from other routers• Is automatically choose the best shortest path• Can be done by using routing protocol
Default	<ul style="list-style-type: none">• Is configured for unknown destination• When there is no entry for the destination network in a routing table, the router will forward the packet to its default router.• It is last preferred routing

Routing Algorithm

The **routing algorithm** is that part of the network layer software **responsible for deciding which output line an incoming packet should be transmitted on**. Routing algorithms can be grouped into two major classes: **Static (non-adaptive)** and **dynamic (adaptive)**.

Non adaptive algorithms (static routing)	Adaptive algorithms (dynamic routing)
<ul style="list-style-type: none">• Do not base their routing decisions on measurements or estimates of the current traffic and topology.• It is called static algorithm.	<ul style="list-style-type: none">• Change their routing decisions to reflect changes in the topology, and usually the traffic as well.• It is called dynamic.

Static Algorithm

Flooding	<ul style="list-style-type: none">• A simple local technique, where each router must make decisions based on local knowledge, <u>not the complete picture of the network</u>.• Is a simple algorithm to send a packet along all paths (Every incoming packet is sent out on every outgoing line <u>except</u> the one it arrived on).• Generates infinite number of duplicate packets unless some measures are taken to damp the process.• One such measure is to have a hop counter in the header of each packet, which is decremented at each hop, with the packet being discarded when the counter reaches zero
Shortest Path Routing	<ul style="list-style-type: none">• Shortest path routing first developed by Dijkstra algorithm.• Find the shortest path from a specified source to all other destinations in the network.• In the general case, the labels on the lines could be computed as a function of the distance, bandwidth, average traffic, communication cost, measured delay, and other factors.

Static Algorithm

Example 1: Find the shortest path from router A to router H?

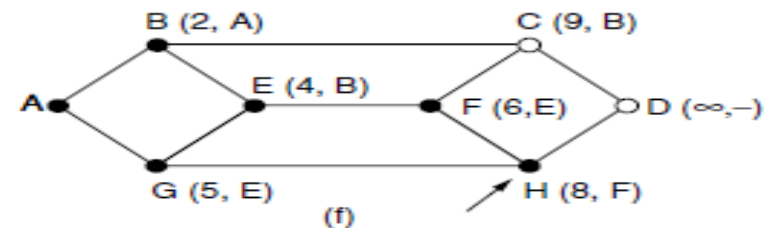
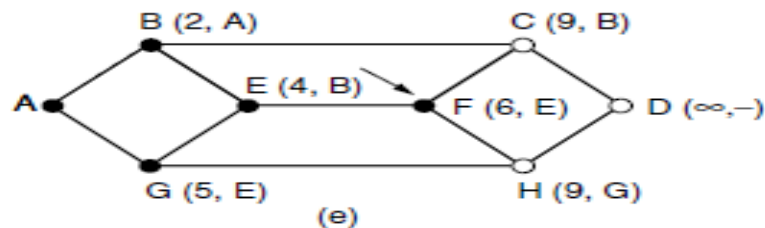
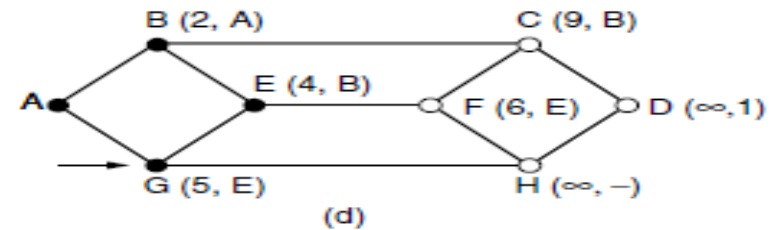
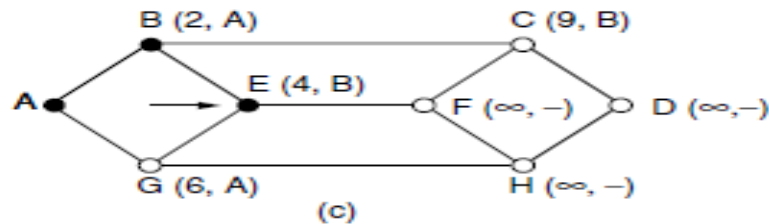
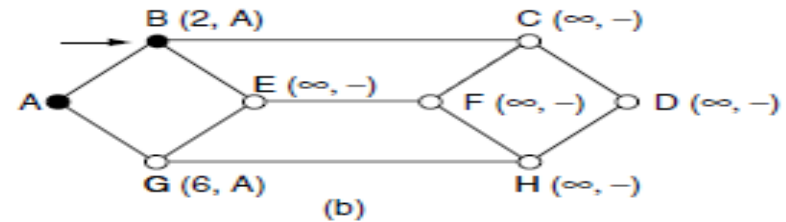
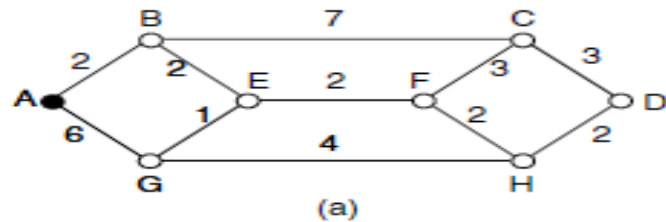


Figure The first six steps used in computing the shortest path from A to D. The arrows indicate the working node.

End Of Lesson 1

Thanks For Listening