Computer Communication & Networks

Lecture 12

Network Layer

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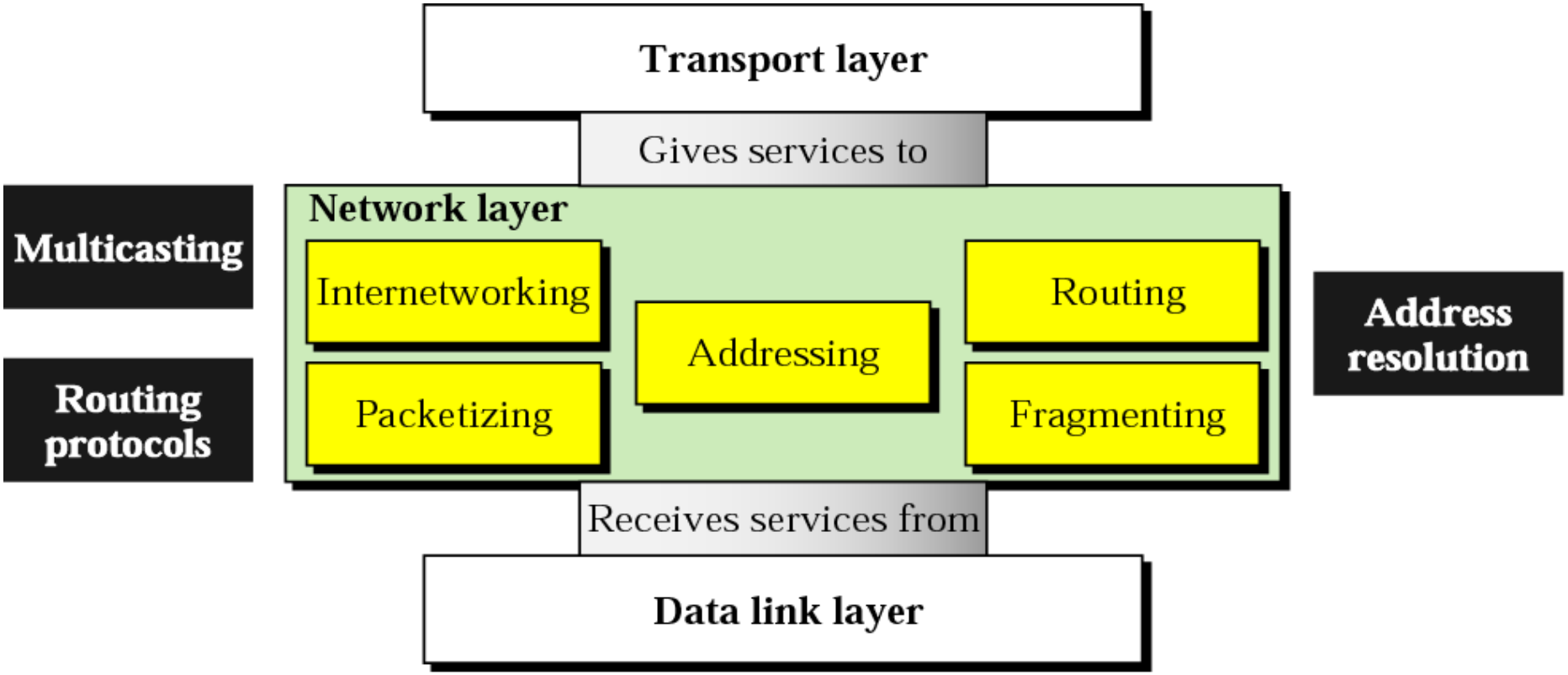


Layer 3: Network Layer

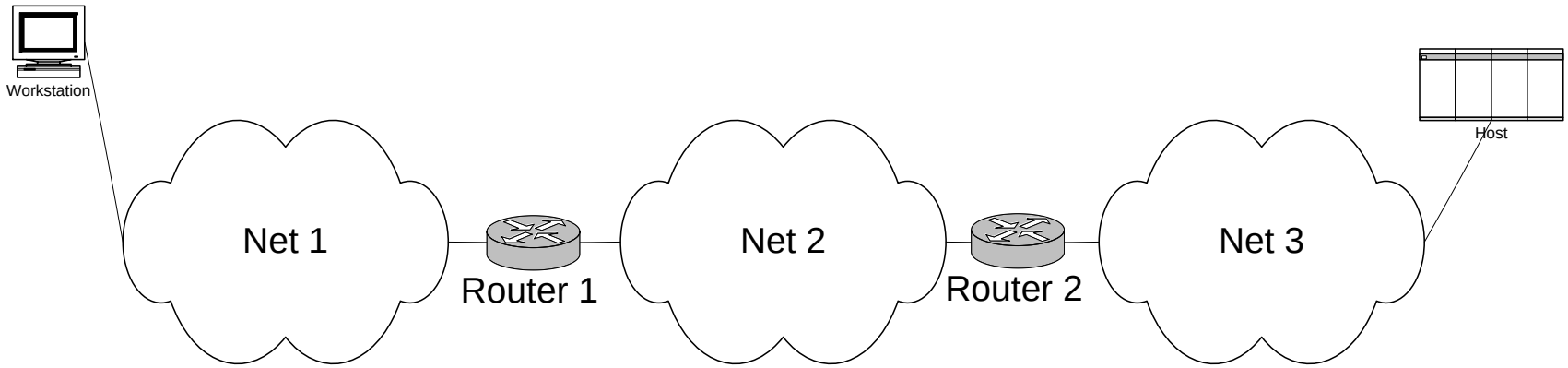
- Network layer is responsible for the delivery of user data from the source host to the destination host
  - PDU: Packet
- **Services/Functions**
  - End to end delivery of individual packets (Routing/Addressing)
    - Creates logical paths
    - Path determination (routing)
    - Uses logical hierarchical addresses (Network address), it changes when a node is moved to a new subnet
      - The network layer defines the network address, which differs from the MAC address.
  - Message forwarding
  - Error handling
  - Hides the lower layers, making things hardware independent

Layer 3: Network Layer

- Some network layer implementations, such as the Internet Protocol (IP), define network addresses in a way that route selection can be determined systematically by comparing the source network address with the destination network address and applying the subnet mask.
- It defines the logical network layout, routers can use this layer to determine how to forward packets.
- Because of this, much of the design and configuration work for internetworks happens at Layer 3.
- Devices:
  - Routers, firewalls, L3 Switches

Routing

- Networks are connected by routers
  - Routers need to know about the topology of the internet beyond the networks to which they connect.
- Routers use the destination network, not the destination host, when routing a packet.



Routing

- *Routing* is the act of moving information across an internetwork from a source to a destination.
- It involves two basic activities:
  - determining optimal routing paths **can be very complex**
  - transporting information (i.e. packets) through an internetwork. **relatively straightforward**
- Routing Protocols
  - Static
  - Dynamic

Routing Algorithm classification - 2

Static:

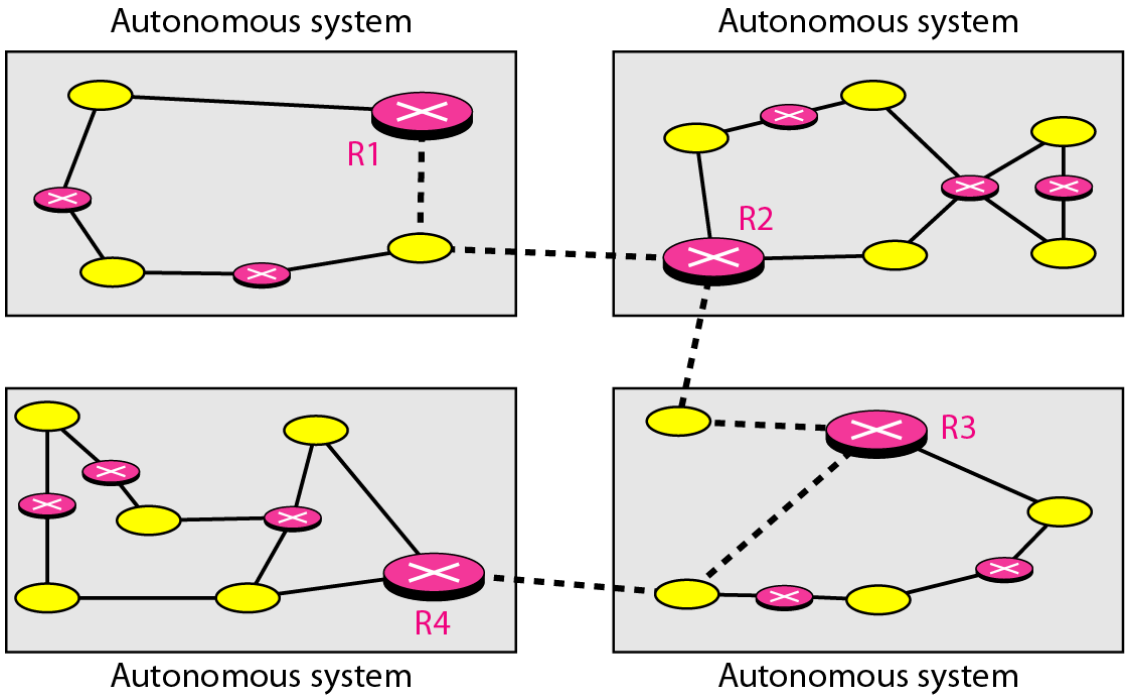
- routes change slowly over time

Dynamic:

- routes change more quickly
  - periodic update
  - in response to link cost changes

Autonomous systems

- Autonomous system (AS) or domain is a set of routers or networks administered by a single organisation.



Dynamic Routing