CS3200: Computer Networks

Lecture 20

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22 Sep, 2019

Anycast Routing

- In anycast, a packet is delivered to the nearest member of a group. Schemes that find these paths are called **anycast routing**.

- Sometimes nodes provide a service, such as time of day or content distribution for which it is getting the right information all that matters, not the node that is contacted; any node will do. For example, anycast is used in the Internet as part of DNS.

- Suppose we want to anycast to the members of group 1. They will all be given the address "1," instead of different addresses. Distance vector routing will distribute vectors as usual, and nodes will choose the shortest path to destination 1. This will result in nodes sending to the nearest instance of destination 1.

Routing for Mobile Hosts

- Mobile hosts introduce a new complication: to route a packet to a mobile host, the network first has to find it.
- We will assume that all hosts are assumed to have a permanent **home location** that never changes. Each hosts also has a permanent home address that can be used to determine its home location.

home address = mobile no.

- The routing goal is to make it possible to send packets to mobile hosts using their fixed home addresses and have the packets efficiently reach them wherever they may be.

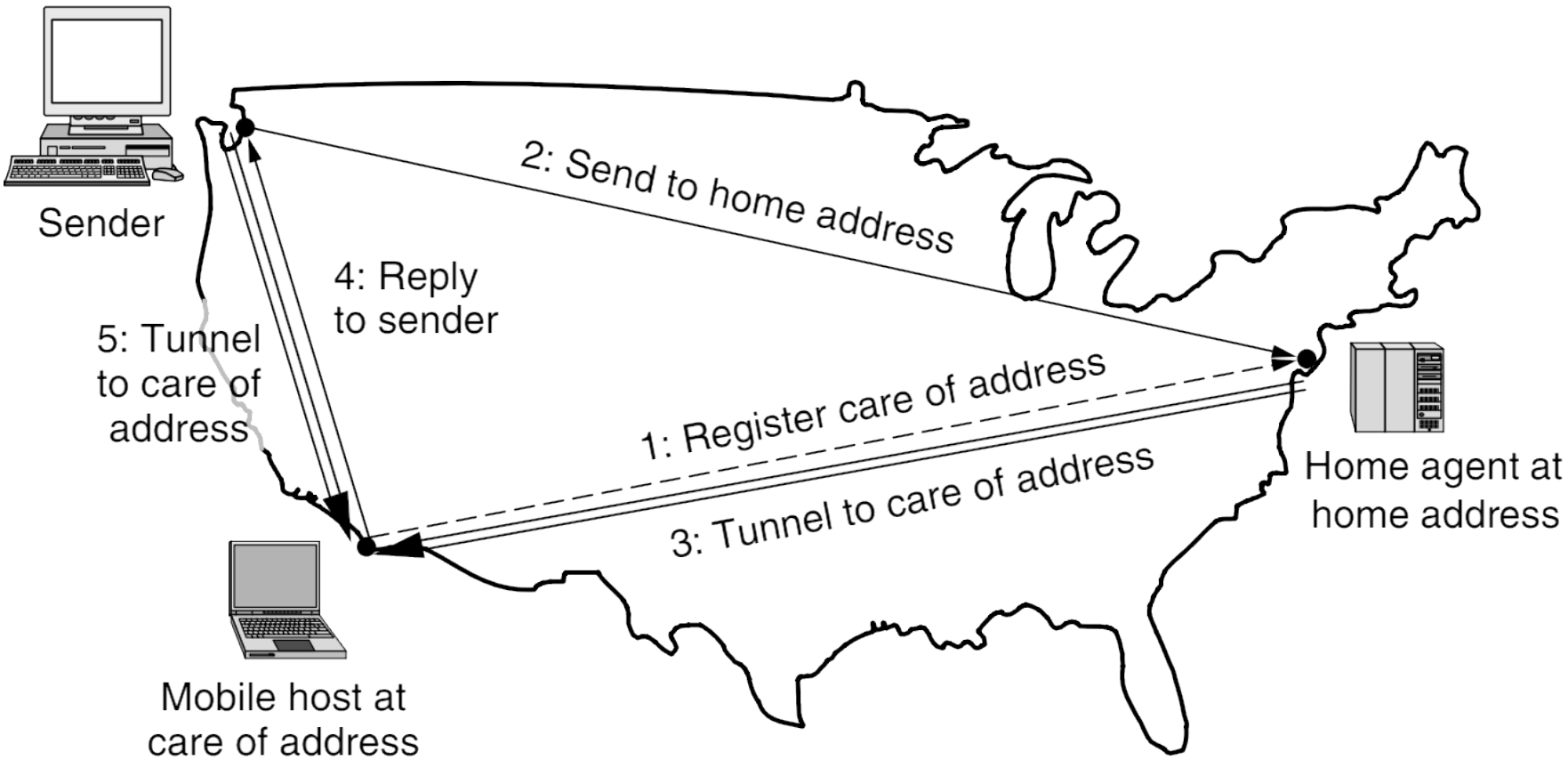
Routing for Mobile Hosts

- A different model would be to recompute routes as the mobile host moves and the topology changes. We could then simply use the routing schemes described earlier in this section. **Any issues?**

  Issues -> most of the time we would be just doing this recomputation.

- Another alternative would be to provide mobility above the network layer. When they are moved to new Internet locations, laptops acquire new network addresses. In coming packets would need a higher layer location service. Moreover, connections cannot be maintained while the host is moving.

Routing for Mobile Hosts

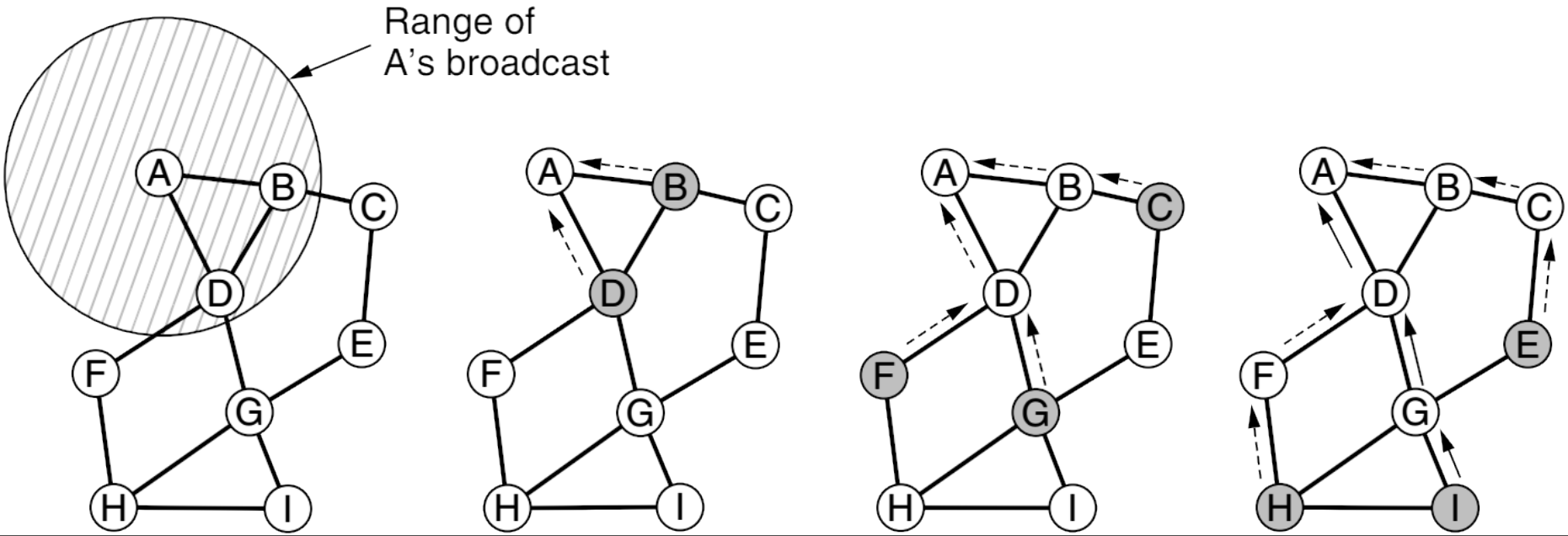


Routing for Adhoc Networks

- We have now seen how to do routing when the hosts are mobile but the routers are fixed.
- What to do when the routers themselves are mobile?
- Each node communicates wirelessly and acts as both a host and a router. Networks of nodes that just happen to be near each other are called ad hoc networks or MANETs (Mobile Ad hoc NETworks).
- We will look at **AODV (Ad hoc On-demand Distance Vector)** (Perkins and Royer, 1999). It is a relative of the distance vector algorithm that has been adapted to work in a mobile environment, in which nodes often have limited bandwidth and battery lifetimes

Routing for Ad Hoc Networks

Routes to a destination are discovered on demand, that is, only when a somebody wants to send a packet to that destination.

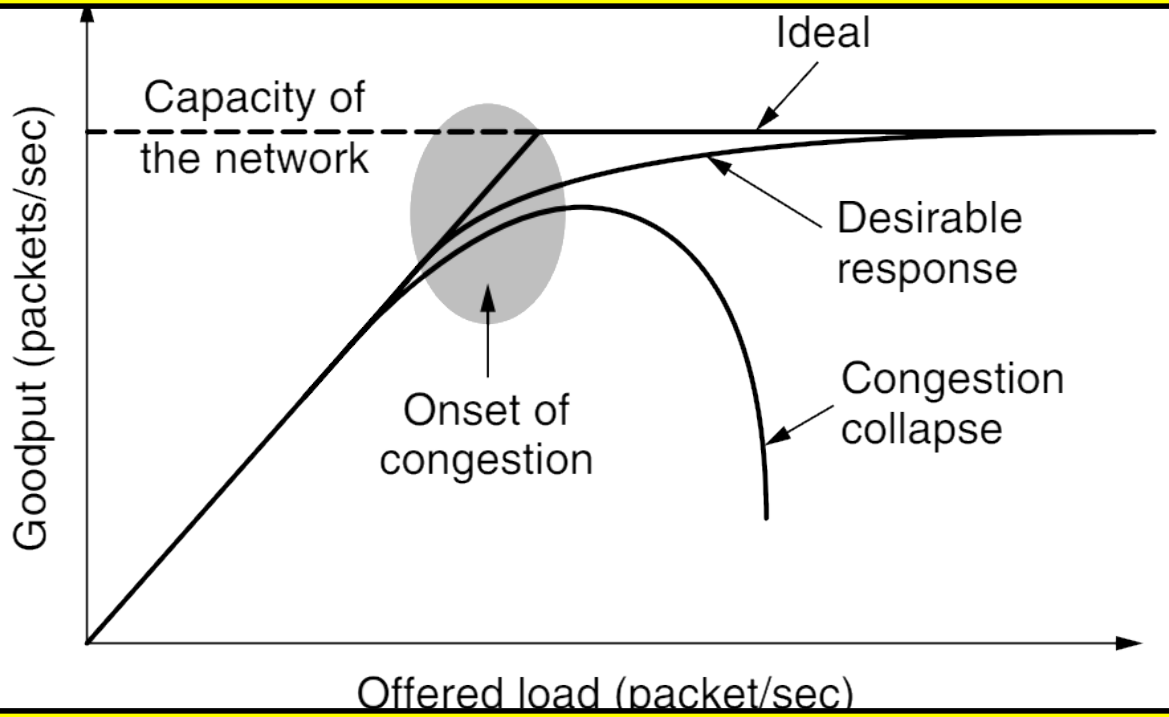


Each node maintains traditional "dv" table. First, A looks in its table and does not find an entry for I. It now has to discover a route to I. This property of discovering

Congestion Control

Too many packets present in (a part of) the network causes packet delay and loss that degrades performance. This situation is called **congestion**. The network and transport layers share the responsibility for handling congestion.

as the offered load approaches the carrying capacity, bursts of traffic occasionally fill up the buffers inside routers and some packets ar

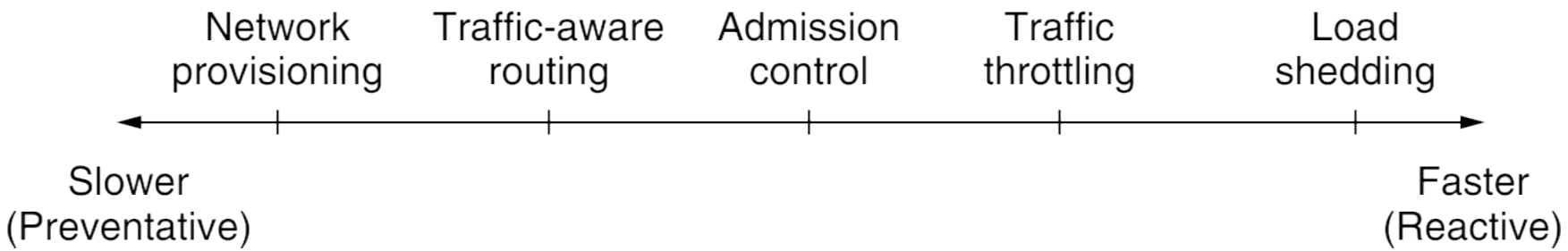


A different failuremode occurs when senders retransmit packets that are greatly delayed, thinkingthat they have been lost. In this case, copies of the same p

Approaches to Congestion Control

Congestion control has to do with making sure the network is able to carry the offered traffic. It is a global issue, involving the behavior of all the hosts and routers.

Flow control, in contrast, relates to the traffic between a particular sender and a particular receiver. Its job is to make sure that a fast sender cannot continually transmit data faster than the receiver is able to absorb it.



Approaches to Congestion Control: Provisioning

- The most basic way to avoid congestion is to build a network that is well matched to the traffic that it carries.
- If there is a low-bandwidth link on the path along which most traffic is directed, congestion is likely. Sometimes resources can be added dynamically when there is serious congestion, for example, turning on spare routers or enabling lines that are normally used only as backups (to make the system fault tolerant) or purchasing bandwidth on the open market.
- More often, links and routers that are regularly heavily utilized are upgraded at the earliest opportunity. This is called **provisioning** and happens on a time scale of months, driven by long-term traffic trends

Approaches to Congestion Control: Traffic-aware Routing

- To make the most of the existing network capacity, routes can be tailored to traffic patterns that change during the day as network users wake and sleep in different time zones.
- For example, routes may be changed to shift traffic away from heavily used paths by changing the shortest path weights. This is called **traffic-aware routing**.
- Splitting traffic across multiple paths is also helpful.