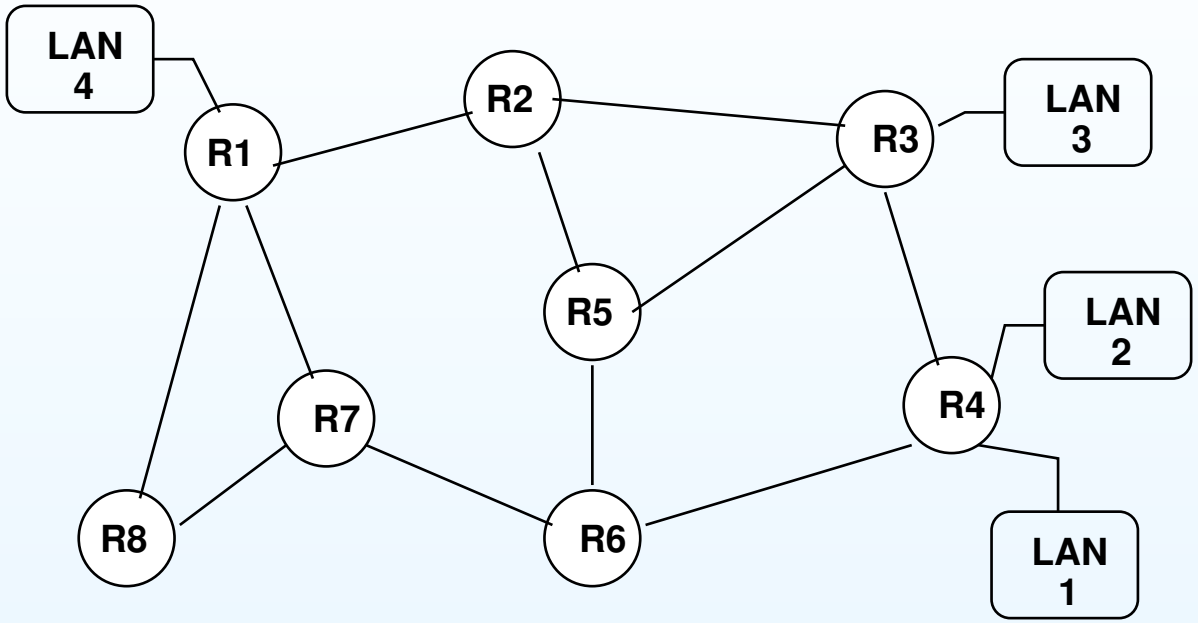
Routing

The process of determining the best route to follow for a connection or a packet.
Routing requires three things which are inter-related.

- An algorithm for selecting the best route.
- A means of acquiring and storing data about the network.
- A strategy for communicating with other routers.

Routing exists in the context of a switching network that can have a variety of forms, but we are primarily concerned with packet switching networks.

A Routing Network



Routing Table for R5

LAN 1	R6
LAN 2	R6
LAN 3	R3
LAN 4	R2

A Routing Network

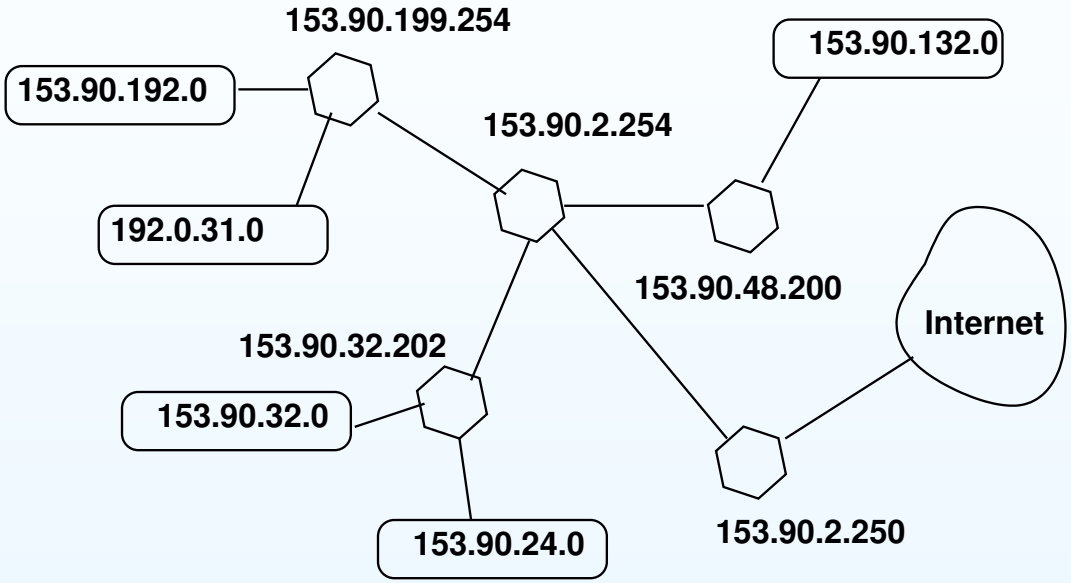
Routing Methods

- Static vs. dynamic routing
- Centralized vs. decentralized
- Decentralized, dynamic methods include
  - Source routing
  - Broadcast routing
  - Store and forward routing

Practicalities

- Routers and nodes don't have names like R1 or A.
- Routing is based on the network layer address scheme.
- Internet Protocol (IP) addressing
  - 32 bits, e.g. 153.90.199.47
  - Network part and host part
- Routers know the addresses of connected networks and other routers.

The Real Deal



Routing Table 153.90.2.254

153.90.192.0	153.90.199.254	2
192.0.31.0	153.90.199.254	2
153.90.32.0	153.90.32.202	2
153.90.24.0	153.90.32.202	2
153.90.132.0	153.90.48.200	2
Default	153.90.2.250	

Routing Table 153.90.199.254

153.90.192.0	Port2	1
192.0.31.0	Port 1	1
Default	153.90.2.254	

Source Routing

- Each packet contains the complete route.
- Routing can be strict or loose.
- Minimizes load on the routers.
- How do nodes get the route?
- Routers have little to do unless they supply the routes.

Broadcast Routing

- The packet is sent to all neighboring routers.
- Every packet has a unique ID that can prevent duplication.
- Gurantees faster delivery and maximum reliability.
- Only connected neighbor data is needed.
- No specific routing information needed.

Store and Forward Routing

- At each router, the routing decision is made.
- Gurantees faster delivery and maximum reliability.
- Routers must exchange information.
  - When a new router enters/leaves.
  - When a new network enters/leaves.
  - When a router fails.
  - To determine the best routes.
  - To handle errors.

Routing Methods

There are two general methods that are widely used for store and forward routing.

- Distance vector
- Link state