Connections
Switching
Routing
ITS 214
Connection

- **Connection-oriented Networking**
  - Requires up-front signaling
  - Very little signaling during the connection, possibly none
  - Connection is usually torn down after the “call” is done
  - Good for time-critical applications

- **Connectionless Networking**
  - Requires packets
  - Every packet moves through the network independent of the other ones
  - Very efficient
Switching

• Circuit switching
  • Sets up a fixed, exclusive path through the network
  • Can be switched (per call) or permanent
  • Fixed timing (delay), no jitter

• Packet Switching
  • Circuits are always shared
  • Performance is variable
    • Variable delay=jitter
  • Note: Delay = Latency = time for a bit to transition the network
<table>
<thead>
<tr>
<th>Connection-oriented</th>
<th>Connectionless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Cell Phone (1G, 2G)</td>
<td>Not Possible!</td>
</tr>
<tr>
<td>ATM Frame Relay SS7 MPLS</td>
<td>The Internet</td>
</tr>
</tbody>
</table>

Circuit Switching

Packet Switching
Switching

- Usually refers to a process inside a network node
- Many circuits come in, many go out
- The switch creates (on demand) a connection between one input and one output
- Used in circuit switching in each node that is on the (pre-determined) path of the data
Routing

• Used in packet switching - superficially similar to switching, but:

• Imagine a computer with at least three network cards (to be interesting)
  • A packet is received on one interface
  • Router stores the packet in its entirety
  • Router consults a local table to decide where the packet needs to go
  • Router now sends the packet out on the selected port
More Routing

• Connectionless
  • Routing decisions are made based on an address contained in the packet itself

• Connection Oriented
  • During connection setup, a routing decision is associated with a short label
  • Packets carry this label
  • Forwarding is done based on the label
Broader Definition

- Routing
  - Often refers to the overall process by which all the routers in a network do their job
  - Static routing
    - Forwarding decisions are built into the router by hand and changed by hand
  - Dynamic routing
    - Routers communicate with each other and build decision (routing) tables based on what they learn from the other routers