ELEN 602 Lecture 15

- More on IP
- TCP

TCP Streams

TCP end-to-end Flow control

TCP Segment

- Source Port
- Destination Port
- Sequence Number
- Acknowledgement Number
- Header Length
- Reserved
- Urgent Pointer
- Options
- Padding
- Data
TCP Pseudoheader

<table>
<thead>
<tr>
<th>Source IP Address</th>
<th>Destination IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 0 0 0 0 0</td>
<td>Protocol = 6</td>
</tr>
<tr>
<td></td>
<td>TCP Segment Length</td>
</tr>
</tbody>
</table>

3-way Handshake for connection establishment

Host A

SYN, Seq_no = x
SYN, Seq_no = y, ACK, Ack_no = x+1
Seq_no = x+1, ACK, Ack_no = y+1

Host B

Sequence numbers

Host A

SYN, Seq_no = n
SYN, Seq_no = n, ACK, Ack_no = n+1
Seq_no = n+1, ACK, Ack_no = n+1

Host B

Delayed segment with Seq_no = n+2 will be accepted

TCP application example

Host A (Client)

socket
bind
connect (blocks)
connect returns
write (blocks)
read (blocks)
read returns

Host B (Server)

socket
bind
listen
accept (blocks)
accept returns
read (blocks)
request message
reply message
write read (blocks)
read returns
write read (blocks)
TCP Window control

TCP Header overhead

Connection Termination

TCP State diagram
Routing for mobile hosts

IP to IP Encapsulation