Unit 6

Mobile Transport Layer

Traditional TCP

- Congestion Control
- Slow Start
- Fast Retransmit / Fast Recovery
- Implications on Mobility

Congestion Control

- If there is packet loss due to asymmetric link between sender and receiver then

  receiver will not send the acknowledgement for lost packet.
- So sender determines that packet is lost due to congestion at receiver.
- To minimize the congestion at receiver, sender will use slow start mechanism as action

Slow Start

- When sender detects congestion then, slow start is immediate next action by sender.
  - sender calculates a congestion window for a receiver
  - start with a congestion window size equal to one segment
  - exponential increase of the congestion window up to the congestion threshold, then linear increase
  - missing acknowledgement causes the reduction of the congestion threshold to one half of the current congestion window
  - congestion window starts again with one segment

Fast Retransmit / Fast recovery

- TCP sends an acknowledgement only after receiving the packets.
- If a sender receives several acknowledgements for the same packet, this is due to a gap in received packets at the receiver
- Gap in packet stream is due to transmission error not due to congestion problem.
- Sender now retransmits the missing packet before timer expires. This is called fast retransmit.

Implications on Mobility

- Mobility can cause packet loss.
- Soft handover from one AP to another, is not possible for mobile end systems.
- Error rates on wireless links are of higher magnitude.

e.g. Old FA may not able to forward packets to new FA.

Classical TCP improvements

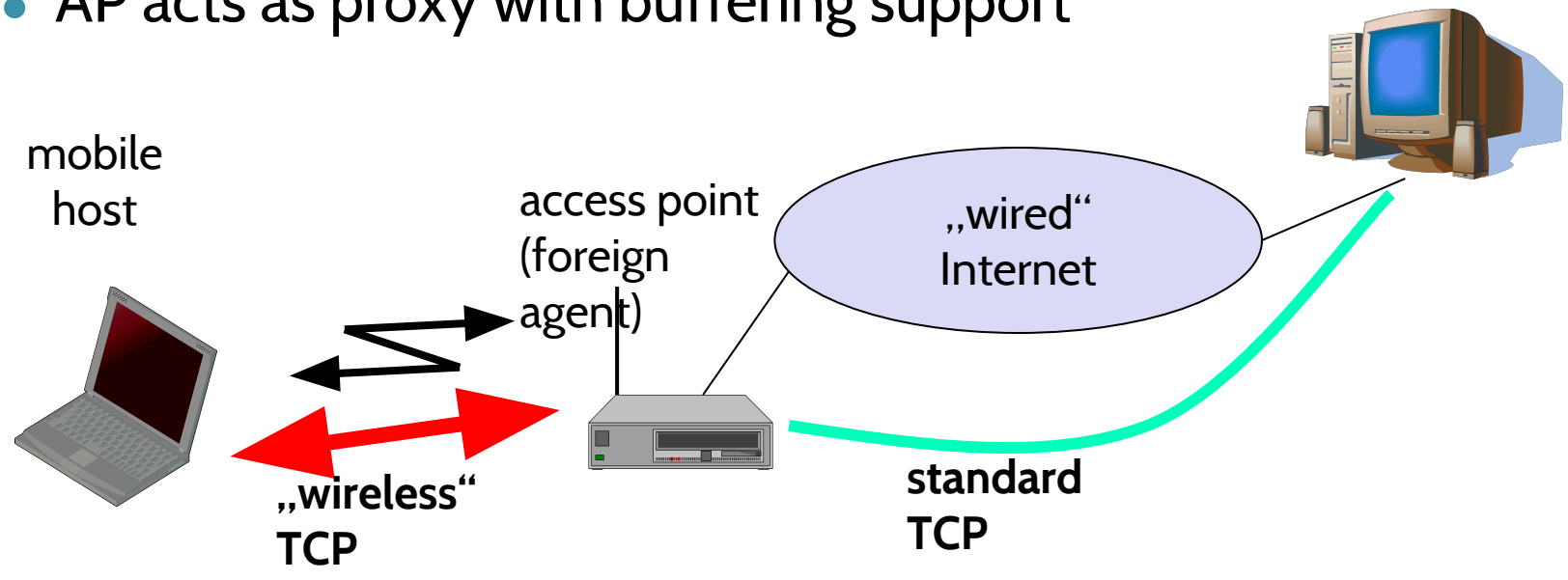
- Indirect TCP (I-TCP)
- Snooping TCP
- Mobile TCP
- Transmission / Timeout Freezing
- Selective Retransmission
- Transaction Oriented TCP

Indirect TCP (I-TCP)

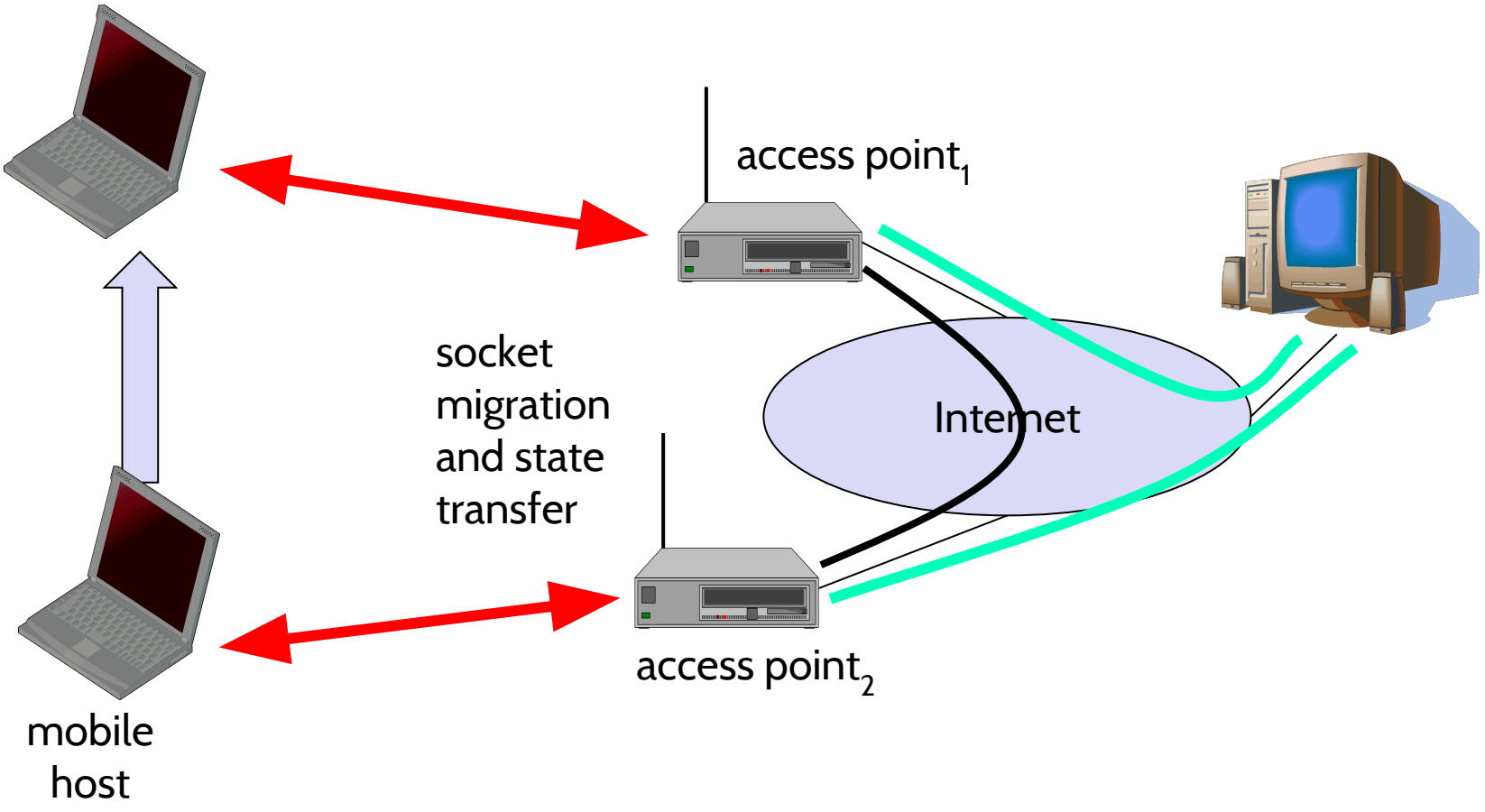
- Two segments 1. Fixed part 2. Wireless part
- Two main reasons for development of I-TCP

1. TCP performs poorly with wireless networks.
2. TCP within fixed network remains unchanged.

- Wireless TCP – Mobile Host to AP
- Standard TCP – AP to Fixed Computer
- AP acts as proxy with buffering support

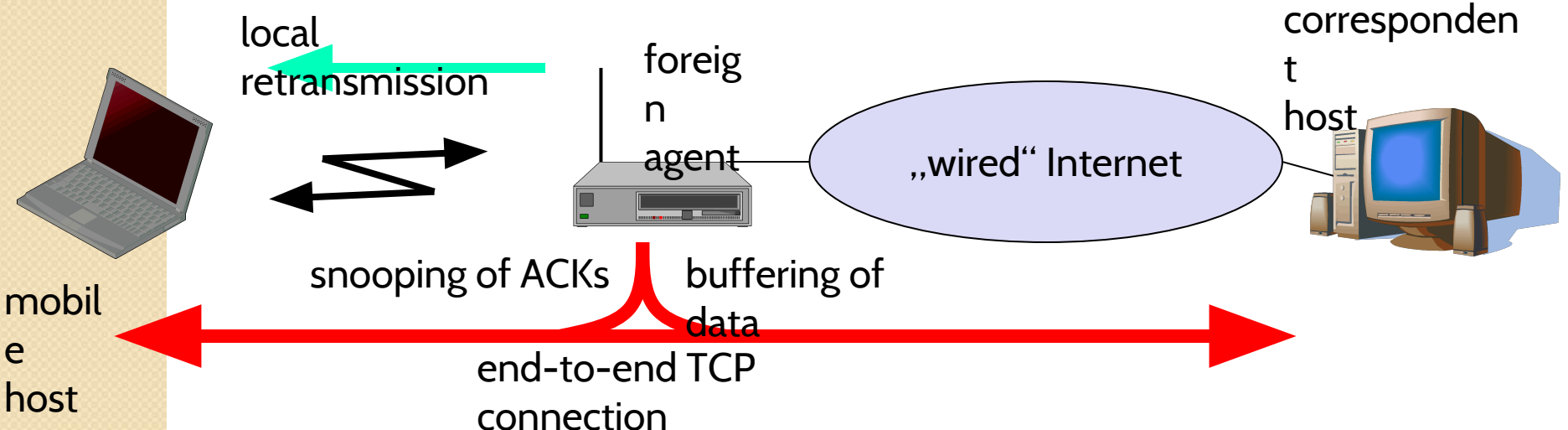


Indirect TCP (I-TCP)



Snooping TCP

- buffering of packets sent to the mobile host
- lost packets on the wireless link (both directions!) will be retransmitted immediately by the mobile host or foreign agent, respectively (“local” retransmission)
- the foreign agent therefore “snoops” the packet flow and recognizes acknowledgements in both directions, it also filters ACKs
- changes of TCP only within the foreign agent.



Mobile TCP (M-TCP)

- Special handling of lengthy and/or frequent disconnections
- M-TCP splits as I-TCP does
  - unmodified TCP fixed network to supervisory host (SH)
  - optimized TCP SH to MH
- Supervisory host
  - no caching, no retransmission
  - monitors all packets, if disconnection detected
    - set sender window size to 0
    - sender automatically goes into persistent mode
  - old or new SH reopen the window

Transmission / Time-out Freezing

- TCP freezing
  - MAC layer is often able to detect interruption in advance
  - MAC can inform TCP layer of upcoming loss of connection
  - TCP stops sending and freezes current state of it's congestion window and further timers/MAC layer signals again if reconnected

Selective Transmission

- This is extension of TCP which is useful.
- TCP acknowledgements are cumulative (in-sequence receipt of packets).
- TCP indirectly requests for retransmission of selected packets.
- Receiver retransmits the required packets.

Transaction Oriented TCP

- TCP phases
  - connection setup, data transmission, connection release
  - using 3-way-handshake needs 3 packets for setup and release, respectively
  - thus, even short messages need a minimum of 7 packets!