Mobile Transport Layer

Lesson 04

Mobile TCP

Mobile TCP (M-TCP)

- A split TCP protocol
- Splitting of the TCP layer into two TCP sub-layers
- A mechanism to reduce the window size to zero

Mobile TCP (M-TCP)

- TCP split– asymmetric
- M-TCP supervisory host (SH*M*) agent sub-layer between BTS and the fixed node
- Conventional TCP between the fixed nodes

Mobile TCP (M-TCP)

- Windowsize field used for congestion control during transport
- When disconnection noticed– The window set to 0
- Prevent the transmission from the TCP transport layer at the mobile node (MN) or the fixed node Disconnection

Mobile TCP (M-TCP)

- Disconnection detected when the split connection does not get packets within a timeout interval
- The window opens again on getting the packet

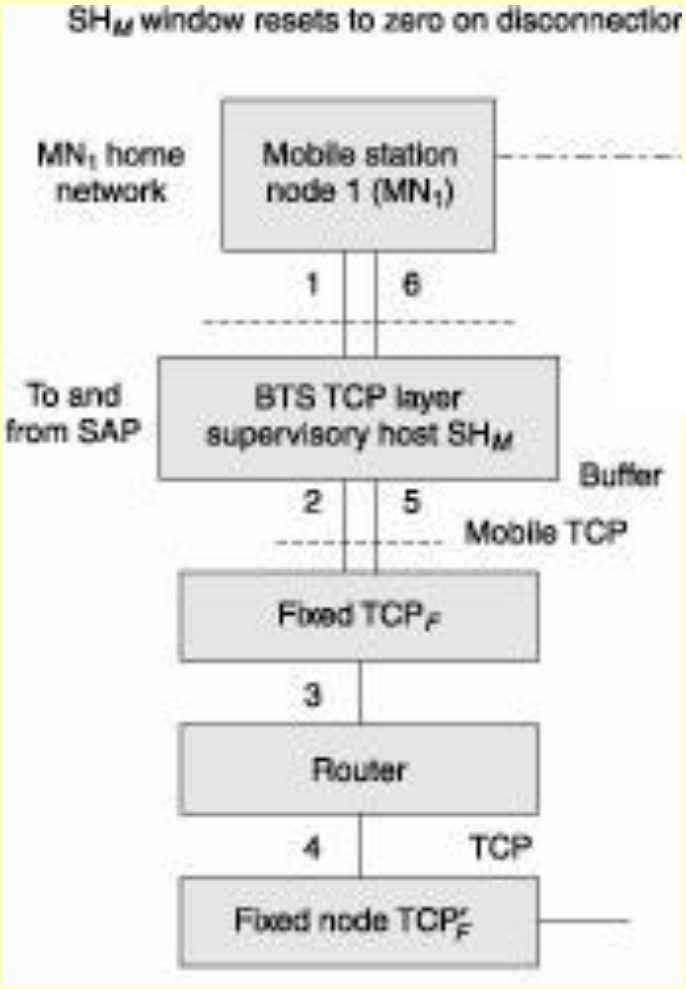
Mobile TCP (M-TCP)

- M-TCP host at the base does not use slow start
- Presumes that the packet loss is due to disconnection and not due to congestion or interference
- Data flow control on the wireless part of the network— like an on–off control

Mobile TCP (M-TCP)

- The windowsize field specifies the number of bytes the sender is willing to receive starting from the acknowledgement field value
- Slow start window size: set to 1 on congestion detection
- In M-TCP: set to 0 on detection of packet loss or out of reach from the timeout or DACK from the other end

M-TCP supervisory host (SH*M*) agent sub-layer between BTS and the fixed node



Connections

- One between the mobile node (MN) and the BTS (base transceiver)
- Other between the BTS and the fixed node (FN)
- The BTS has an access point at an agent, SH_M for the TCP connection
- SH_M sends and receives the packets to and from the MN through the BTS

M-TCP functioning

1. SH_M sends and receives the packets to and from TCP_F layer at the fixed node
- only one hop
- SH_M sets the windowsize to 0 in case of timeout, as it presumes disconnection of the MN

M-TCP functioning

- The MN or TCP_F will also not retransmit as each of them finds that SH_M not receiving packets within the timeout and has set the window to 0

M-TCP functioning

- When SH_M finds that the MN has sent the packet, it presumes that the connectivity is alive again and sets the window to its old value, i.e., the value when it last received the packets

M-TCP FUNCTIONING

2. TCP_F layer at a fixed node sends and receives the packets to and from another fixed node TCP'_F
- The transfer mechanism multiple hops through the routers

M-TCP FUNCTIONING

3. Errors detection and correction at the data-link or physical layer at the BTS and MN, not at SH_M

M-TCP functioning

4. The TCP header can be compressed during transmission between SH_M and MN

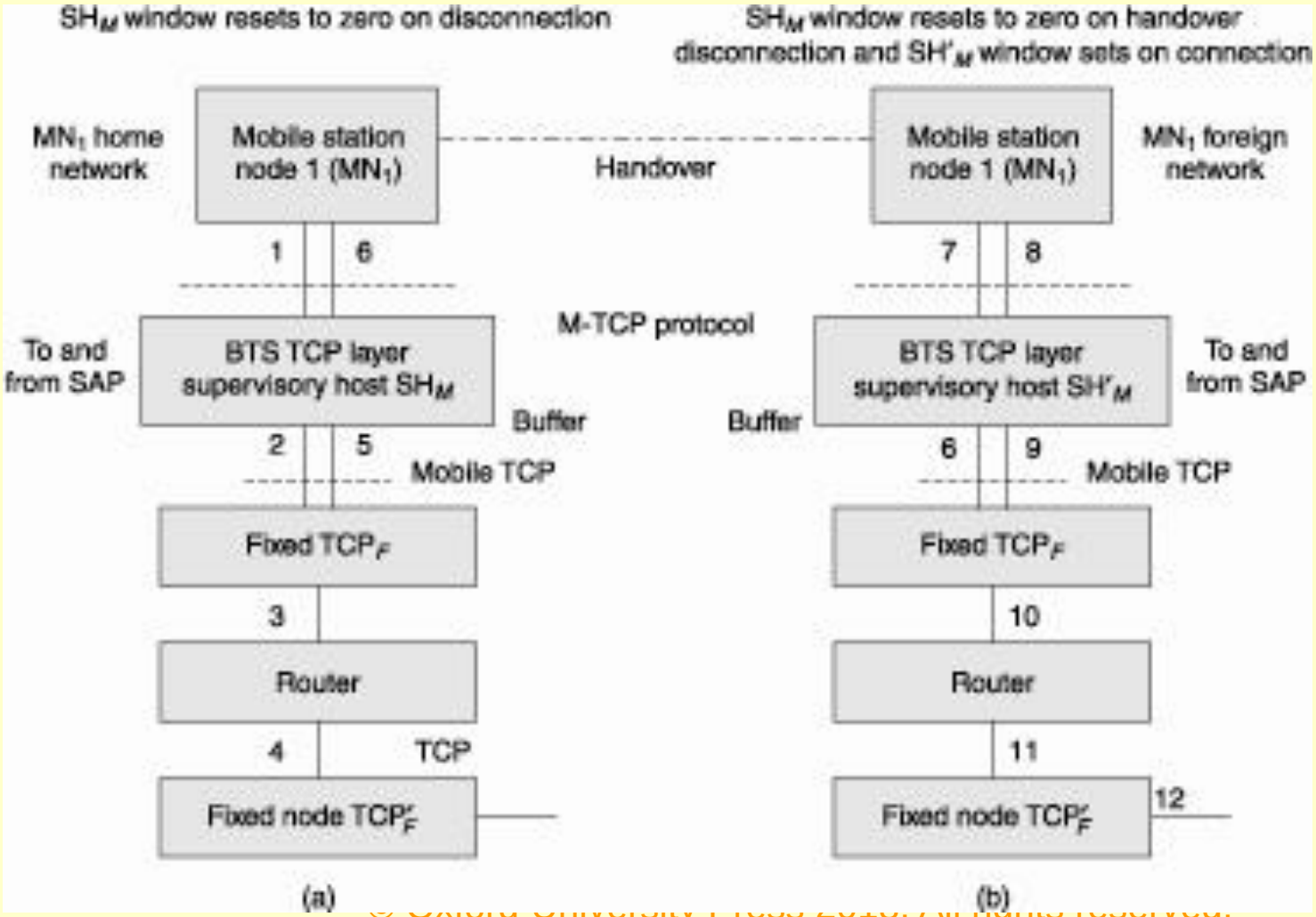
Handover mechanism

- The packets for transmission are not buffered at SH_M and no packet needs to be transferred to SH'_M
- On handover, the socket (port and IP address) and its present state do not migrate from SH_M to SH'_M

Handover mechanism

- SH_M to SH'_M transfer latency period = 0
- SH_M sets window size to 0 at the beginning of the handover
- SH'_M sets to a new windowsize at the new foreign network

Handover mechanism



Advantages of mobile TCP

(a) Maintains end-to-end connection between the base and TCP layer at the other end, which guarantees reliable packet delivery

(b) Takes into account frequent disconnections of the mobile node in a wireless network as the most important factor for data loss

Disadvantages of mobile TCP

1. Mobile part of the network not isolated from the conventional, because, though there is no change in the existing TCP network, the bandwidth changes are frequent due to frequent settings of window size to 0

Disadvantages of mobile TCP

2. Security risks from the added supervisory hosts
3. Presumption of low bit error rates in the wireless network

Summary

- M-TCP
- M-TCP supervisory host (SH*M*) agent sub-layer between BTS and the fixed node and Conventional TCP between the fixed nodes
- windowsize set to 0 on detection of packet loss or out of reach from the timeout or DACK from the other end
- Handover latency nil

End of Lesson 04
Mobile TCP– a split TCP protocol