

1) Explain Snooping TCP? What are its advantages and disadvantages?

Snooping TCP

Data Transfer with destination as mobile host:

- In this approach the Foreign agent buffers all packets with destination mobile host and additionally 'snoops' the packet flow in both direction to recognize acknowledgements.
- The reason for buffering packets towards the mobile node is to enable the Foreign agent to perform a local retransmission in case of packet loss on the wireless link.
- The Foreign agent buffers the packet until it receives an acknowledgement.
- It can also be able to identify and filter the duplicate acknowledgements to avoid unnecessary retransmission of data.

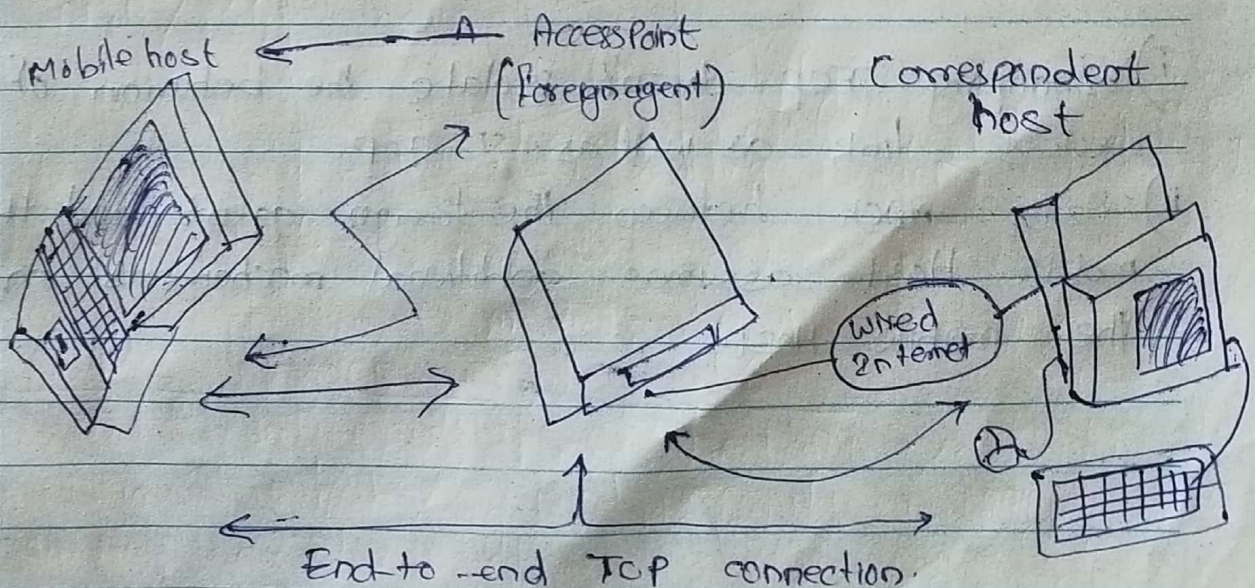


Fig: Indirect TCP segments a TCP connection into two parts.

- From the figure the standard TCP is used between fixed computer and the access point (APs).
- Instead of mobile host, now AP terminates the connection which acts as a proxy.

Data transfer with destination as correspondent Host:

The data transfer from mobile Host works as follows

- The foreign agent snoops into the packet stream to detect gaps in the sequence numbers of TCP.
- As soon as the foreign agent detects a missing packet, it returns NACK (Negative Ack) to mobile host.
- Thereby, the mobile host can now retransmit the missing packet immediately, and reordering packets.

Advantages of snooping TCP:-

- i) The end-to-end TCP semantic is preserved.
- ii) The correspondent host doesn't need to be changed i.e., most of the enhancements are in the foreign agent.

Disadvantages of snooping TCP:-

- i) Snooping TCP doesn't isolate the behaviour of the wireless link as well as T-TCP.
- ii) Using NACK between the foreign agent and the mobile Host assumes additional mechanisms on the mobile Host.

→ Compare several enhancements to TCP for mobility?

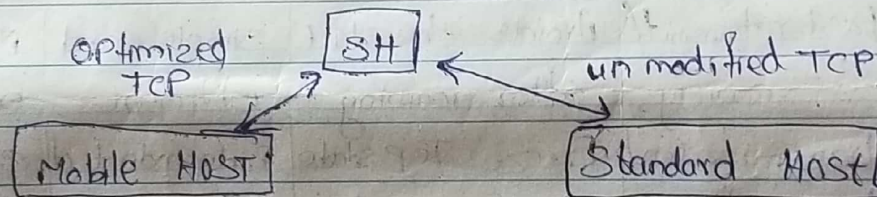
Overview of classical enhancement to TCP for mobility:

Approach	Mechanism	Advantages	Disadvantages
Indirect TCP	Splits a TCP connection into two connections.	Isolation of wireless link, Simple	Loss of TCP semantics, higher latency, at handover, less security.
Snooping TCP	Snoops data and acknowledgements; local retransmission	Transparent for end-to-end; can MAC integrate	Insufficient isolation, security problems.
M-TCP	Splits TCP connection; chooses sender end via window size	Maintains end-to-end semantics; handles long term	Bad isolation, processing overhead due to bandwidth
Fast retransmit/ Fast recovery	Avoids slow-start after retransmission	Simple and efficient	Mixed layers, not transparent
Transmission/ time-out freezing	Freezes TCP state at disconnection; resumes after reconnection	Independent of content, works for longer interruptions.	Changes in TCP required, MAC dependent.
Selective retransmission	Retransmits only lost data	Very efficient	Slightly more complex s/w, more buffers space needed.
Transaction oriented TCP	Combines connection setup release and data transmission	Efficient for certain applications	Changes in TCP required, not transparent security problems.

③ Explain mobile TCP? How a Supervisory host sends TCP packet to mobile node and to Fixed TCP connection?

Mobile TCP:

- M-TCP splits the TCP connection into parts as I-TCP does.
- An unmodified TCP is used between the standard host and supervisory host (SH) connection, while an optimized TCP is used on the supervisory host (SH) and mobile host (MH).
- The SH is responsible for exchanging data between both parts similar to the proxy in I-TCP.



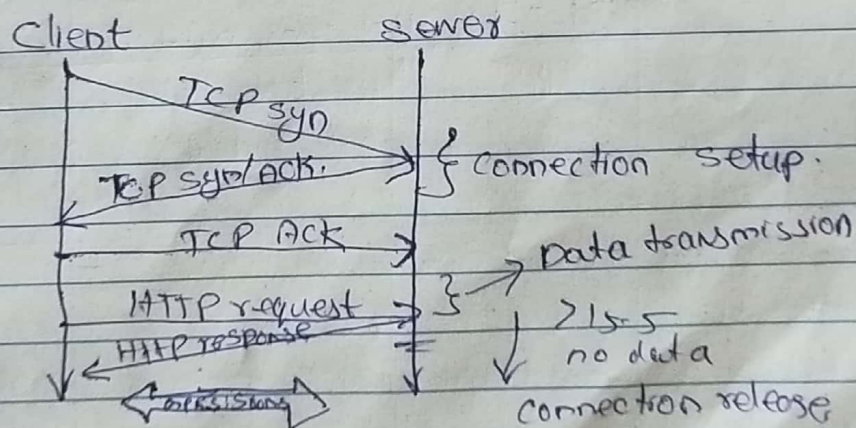
- * The SH monitors all packets sent to the MH and acks returned from the MH. If a packet is lost, it has to be retransmitted by the original sender; hence, no buffering by SH is needed.
- * If the SH doesn't receive an ACK for some time, it assumes the MH is disconnected, and forces the sender to go into persistent mode by making the window size to 0.
- * This state of the sender will avoid the continuous retransmission of data and it will continue till the SH detects the connectivity again.
- * After the connection is found, the sender can continue sending at full speed. This mechanism doesn't require changes to the sender's TCP.
- * The wireless side uses an adapted TCP that can recover from packet loss much faster.

This modified TCP does not use slow start; thus M-TCP needs a bandwidth manager to implement fair sharing over the wireless link.

4) Describe Transaction oriented protocol [TCP]?

Transaction oriented protocol TCP:-

- * For example if assume an application running on the mobile host that sends a short request a server from time-to-time, which responds with a short message.
- * If the application needs a reliable communication it may use TCP.
- * Using TCP may now require several packets over the wireless links.



- * TCP uses a three way hand shake to establish the connection.
- * Atleast one additional packet is usually needed for transmission of the request and requires three more packets to close the connection via a three-way handshake.

* The IF the communication is for long duration this overhead is minimal.

* If it is for sending one data packet it seems to be hard, requires several packets

* Thus it reduces the number of packets down to two instead of seven.