RELIABLE COMMUNICATION OVER WIRELESS LINK

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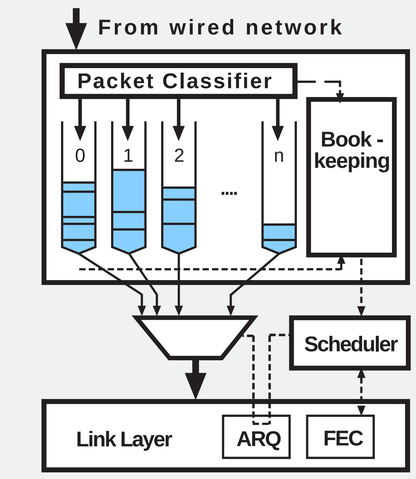
TCP/IP

TCP is a connection oriented transport layer protocol that provides:

- Reliable byte stream transport;
- In-sequence delivery of data;
- End to end flow control;
- Calculates and verifies a mandatory checksum;
- Interface to the applications (e.g. HTTP, FTP etc.);

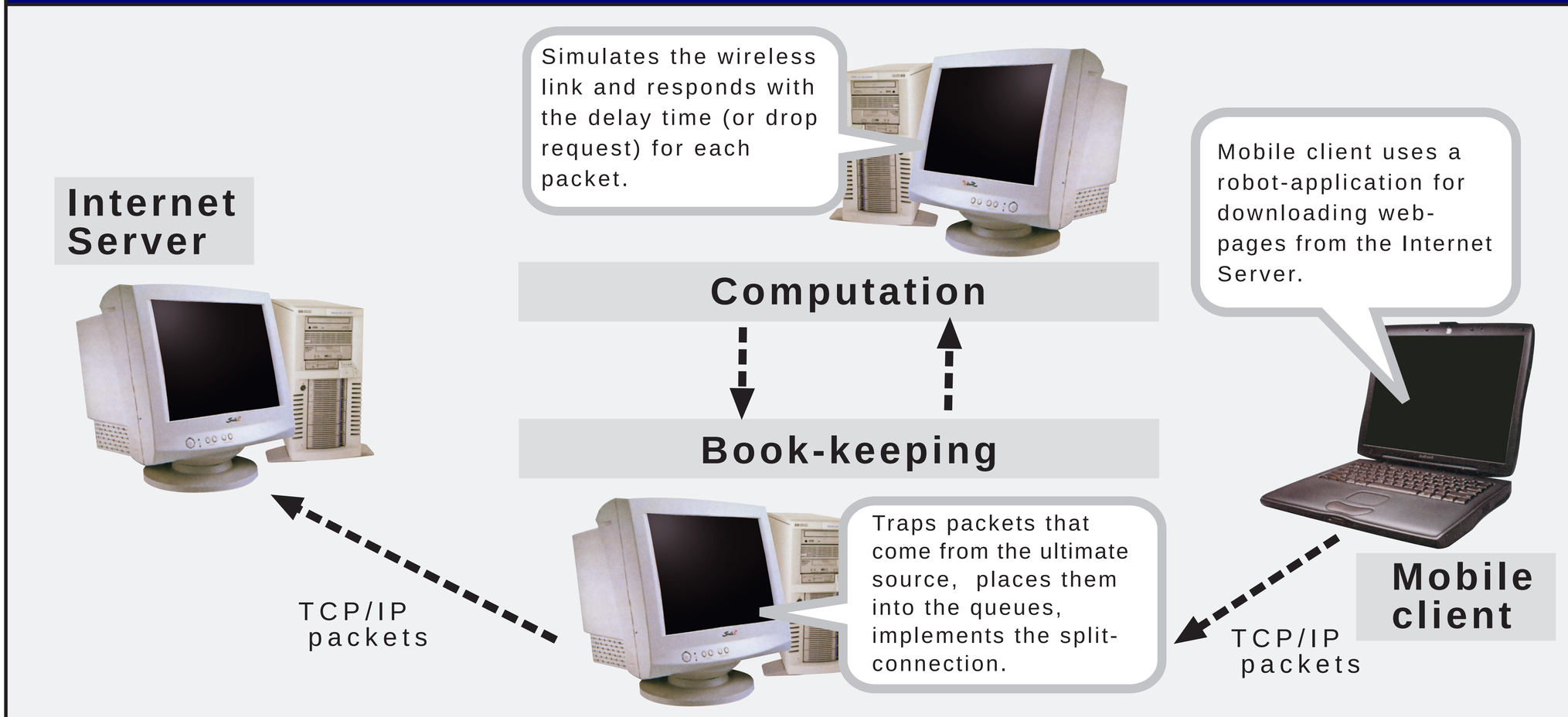
Communication over wireless link is characterized by varying high bit error rates and intermittent connectivity due to fading. Standard TCP performance in such networks suffers from significant throughput degradation and very high interactive delays.

The assumed MAC and Link Layers



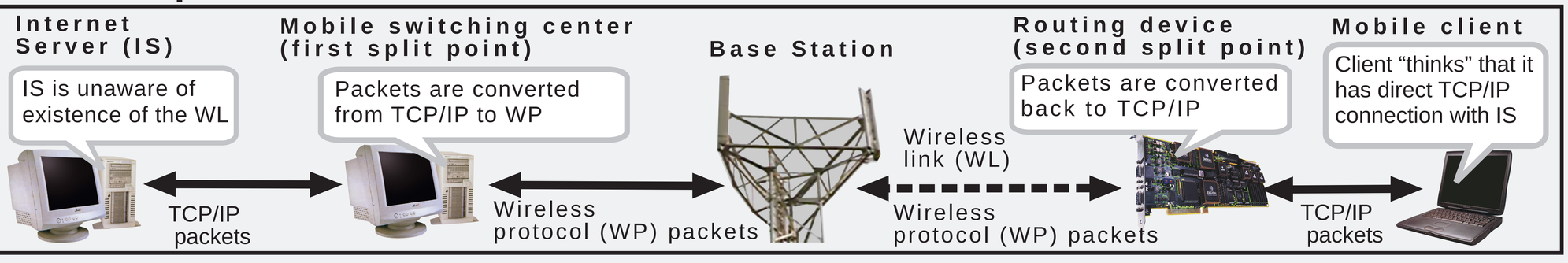
Packets go into queues (one for each connection). They are scheduled for transmission over one common link for multiple users, based on predictions of the channel quality. Fast link adaptation and Hybrid type-II ARQ are used (see nearby poster). The time-scale for scheduling is much faster than the flow control bandwidth of TCP.

Simulation Environment



Solutions to Investigate:

Double-split connections



TCP-Westwood

TCP Westwood enhances the performance of the TCP window congestion control by using an end-to-end measurements of the available bandwidth as feedback. The available bandwidth is estimated at the TCP source by measuring and low-pass filtering the returning rate of acknowledgments. The estimated bandwidth is then used to properly set the congestion window and the slow start threshold after a congestion episode. The advantage of this approach is that the TCP sender recovers faster after losses, especially over connections with large round trip times. It also improves the performance over wireless links where sporadic losses are due to unreliable links rather than congestion.

Other solutions

- Explicit congestions notifications
- Selective acknowledgment
- Snoop protocol