

Alternating Bit Protocol (ABP) Simulator

ABP (Alternating Bit Protocol) is a communication protocol to ensure reliable transmission through unreliable network. The sender sends a packet and waits for an acknowledgement. If the acknowledgement doesn't arrive within a predefined time, the sender re-sends this packet until it receives an expected acknowledgement and then sends the next packet. In order to distinguish two consecutive packets, the sender adds an additional bit on each packet (called *alternating bit* because the sender uses 0 and 1 alternatively). This software is a simulator to replicate the behavior of the Alternating Bit Protocol.

The ABP Simulator consists of 3 components: sender, network and receiver. The network is decomposed further to two subnets corresponding to the sending and receiving channel respectively. (Figure 1)

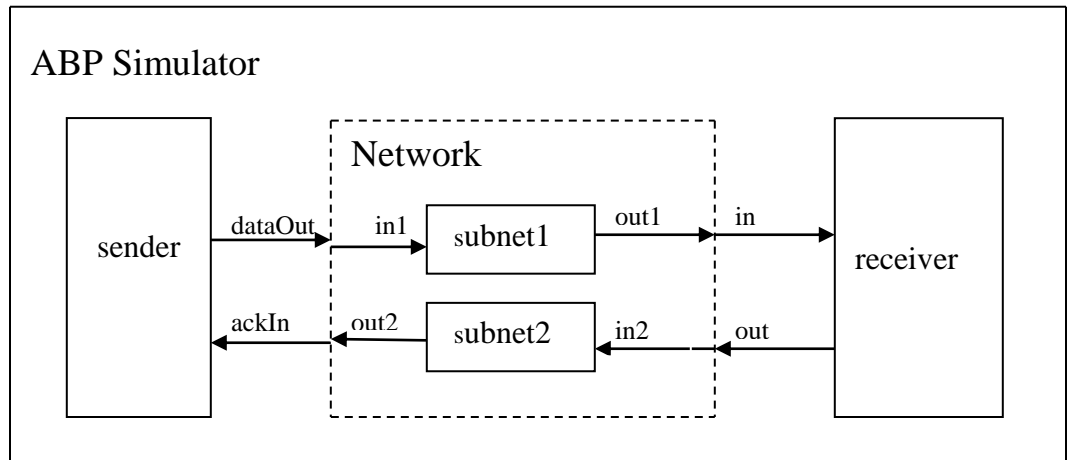


Figure 1 Structure of ABP Simulator

Simulator specifications:

The behavior of **receiver** is to receive the data and send back an acknowledgement extracted from the received data after a time period.

The **subnets** just pass the packets after a time delay. However, in order to simulate the unreliability of the network, only 95% of the packets will be passed in each of the subnet, i.e. 5% of the data will be lost through the subnet.

The **receiver** and **subnets** have two phases: *passive* and *active*. They are in *passive* phase initially. Whenever they receive a packet, they will be in *active* phase, and send out the

acknowledgment (receiver) or the packet with a probability of 95% (subnet) after a time duration. Once the acknowledgement or packet are sent, they go back to the *passive* phase.

The delay of the receiver is a constant while the delay in subnets is non-deterministic value expressed by a normal distribution with a mean and deviation.

The **sender** behavior is pretty complex. The sender changes from initial phase *passive* to *active* when an external signal is received. Once activated it start sending the packet with the alternating bit. Every time a packet is sent, it waits for an acknowledgement during an specific waiting time. If the acknowledgment does not arrive within the time window, the sender will re-send the previous packet with the alternating bit. If the expected acknowledgement is received within the time window, the sender will send the next packet. When there are no more packets to send, the sender will go again to the *passive* phase.

In the current simulator implementation, for simplicity, the packet sent out by the sender is just the packet sequence number plus an alternating bit, (e.g. 11 for the first packet, 100 for the 10th packet etc).

Test Strategies

Each component using the “black box” testing method. Test cases are created by adding different combinations of inputs, run the simulator and check whether the outputs are what we expected.