

TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) *TSGR2#6(99)823*
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Agenda Item:

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Title: Real-time Support for Acknowledged Mode in RLC

Document for: Discussion and Decision/Information

Abstract: This contribution proposed a retransmission mode for supporting real-time data in the acknowledged data transfer mode in RLC.

1. Real-time acknowledge mode in RLC

A real-time option is necessary in the acknowledged data transfer mode for RLC. The proposed rules are as follows. Each UE can serve as a sending station or a receiving station. A pre-defined period W_o is given by the UTRAN for the purpose of this mechanism.

Rules for real-time ARQ:

Rule 1:

The receiving station should check the receiving status at every W_o and an ACK packet should be sent back to the sending station. Each ACK packet will indicate the error status reflecting the new packets received within the recent said pre-defined period W_o .

Rule 2:

If an ACK packet is lost, the sending station will skip the error and go on to send the next group of packets (GOPs).

Rule 3:

The transmitter, upon receiving the ACK packet, will retransmit only the error packet(s) before going on sending the next data packets.

Rule 4:

The ACK packet will be sent only once in every said pre-defined period W_o .

Rule 5:

For each packet, there is only one chance to notify its error status back to the sending station during the data transmission session.

An example showing the data transmission using real-time ARQ is given in Figure 1. There are multiple time periods W_o for error status observation at the receiving station during this example. Let all packets have the same packet length. Assuming that ptt represents the time unit of transmitting one packet. In this example, the control window W_o is 8 ptt . The sequence of packet is organized into group of packets (GOP) for the simplicity of explanation. The first three GOPs are: GOP1 with packets 1, 2, 3, ..., GOP2 with packets a, b, c, d, ..., and GOP3 with packets i, ii, iii, We assume that both stations have the same sending/receiving speed and also assume that the signal propagation delay equals to 3 ptt . Thus, the receiving station will send an ACK feedback after the arrival of the 2nd packet in each GOP such that the ACK feedback will be received right before the transmitter starting to send the next GOP.

In the first control period of W_o , packet 2 is found to have an error and thus they are retransmitted before its sending the next GOP. In the second control window, packets 4 of GOP1 and b of GOP2 should be retransmitted. However, the only one ACK packet is having an error and therefore packets 4 and b are considered as lost packets. In the third control window, the retransmitted packet g occurred an error again and thus it is also lost in this burst.

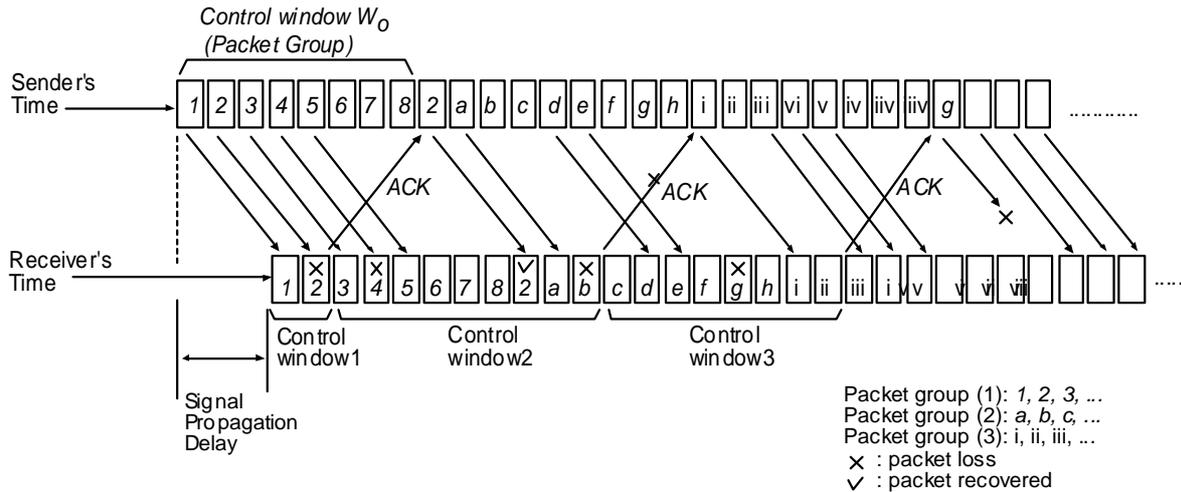


Figure 1. An example of real-time ARQ mode in RLC.

Summaries of the real-time ARQ mode:

1. There is only once chance of error recovery for each ACK feedback.
2. Reliability of the data transmission is better than the unacknowledged or the transparent mode, but is worse than the no-real-time acknowledged mode (under the same FEC scheme).
3. There is no need to use the retransmission timer.