Blind Hybrid ARQ Retransmissions with Different Multiplexing between Time and Frequency for Ultra-Reliable Low-Latency Communications in 5G

Authors : Mohammad Tawhid Kawser, Ishrak Kabir, Sadia Sultana, Tanjim Ahmad

Abstract : A promising service category of 5G, popularly known as Ultra-Reliable Low-Latency Communications (URLLC), is devoted to providing users with the staunchest fail-safe connections in the splits of a second. The reliability of data transfer, as offered by Hybrid ARQ (HARQ), should be employed as URLLC applications are highly error-sensitive. However, the delay added by HARQ ACK/NACK and retransmissions can degrade performance as URLLC applications are highly delay-sensitive too. To improve latency while maintaining reliability, this paper proposes the use of blind transmissions of redundancy versions exploiting the frequency diversity of wide bandwidth of 5G. The blind HARQ retransmissions proposed so far consider narrow bandwidth cases, for example, dedicated short range communication (DSRC), shared channels for device-to-device (D2D) communication, etc., and thus, do not gain much from the frequency diversity. The proposal also combines blind and ACK/NACK based retransmissions for different multiplexing options between time and frequency depending on the current radio channel quality and stringency of latency requirements. The wide bandwidth of 5G justifies that the proposed blind retransmission, without waiting for ACK/NACK, is not palpably extravagant. A simulation is performed to demonstrate the improvement in latency of the proposed scheme.

Keywords : 5G, URLLC, HARQ, latency, frequency diversity

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