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An Impairment Sensitive and Reliable SR-ARQ (RSR-ARQ) Mechanism for Unreliable Feedback in GPRS

Abstract

The advances in wireless communication have opened unlimited horizons but there are some challenges as well. The Nature derived air medium between MS (Mobile Station) and BS (Base Station) is beyond human control and produces channel impairment. The impact of the natural conditions at the air medium is the biggest issue in wireless communication. Natural conditions make reliability more cumbersome; here reliability refers to the efficient recovery of the lost or erroneous data. The SR-ARQ (Selective Repeat-Automatic Repeat Request) protocol is a de facto standard for any wireless technology at the air interface with its standard reliability features. Feedback (Negative Acknowledgement-NACK) signal carries the message for destination to recover the erroneous or lost data. Reliability of the system depends on the secure communication of NACK to either terminal (MS and BS). The natural conditions for data and NACK are similar. Therefore, the probability of getting erroneous or lost data as well as NACK is similar. If the only source of communication (NACK) between the two terminals gets erroneous or lost, system will face a greater jeopardy. This will compromise the reliability of the system. Reliability of the SR-ARQ protocol cannot be improved without minimizing the impact of channel impairment conditions. Our focus in this research is on the reliability of the feedback signal of the SR-ARQ protocol. Efforts to achieve the reliability of the NACK communication has already been made but without considering the channel impairment. The proposed mechanism, RSR-ARQ (Reliable SR-ARQ) is an enhancement of the SR-ARQ protocol that has ensured the reliability of the control signals through channel impairment sensitive mechanism. RSR-ARQ absorbs the channel impairment with increasing probability of reaching NACK to the destination by associating it with probability of channel impairment. We have modeled the system under two-state discrete time Markov Channel. The simulation results demonstrate the better recovery of the lost or erroneous data that will increase the overall system performance and reliability.