

# COMPARATIVE ANALYSIS OF AL-FEC RAPTOR AND RAPTORQ OVER 3GPP eMBMS NETWORK

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## ABSTRACT

Long Term Evolution (LTE) is the current standard for wireless mobile communication based on Third Generation Partnership Project (3GPP). LTE includes enhanced multimedia broadcast and multicast services (MBMS), also called as Evolved multimedia broadcast and multicast services (eMBMS) where the same content is transmitted to multiple users in one specific area. eMBMS is a new function defined in 3GPP Release 8 specification that supports content distribution and streaming to group users into LTE mobile networks. In LTE an important point of demanding multimedia services is to improve the robustness against packet losses. In this sense, in order to effectively support point-to-multipoint download and streaming delivery, 3GPP has included an Application Layer Forward Error Correction (AL-FEC) scheme in the standard eMBMS. The standard AL-FEC system is based on systematic, fountain Raptor codes. Raptor coding is very useful in case of packet loss during transmission as it recover all data back from insufficient data at receiver terminal. However, the 3GPP standardized systematic fountain Raptor code is nowadays considered obsolete, since a new variation of the Raptor codes has emerged. This enhanced AL-FEC scheme, named RaptorQ, promises higher protection efficiency and superior flexibility on the provision of demanding mobile multicast services. In this work, we provide an extensive performance evaluation presenting at first a theoretical performance comparison of the newly introduced RaptorQ FEC scheme with its predecessor Raptor code, examining the enhancements that RaptorQ introduces on the AL-FEC protection robustness. Thereafter, to verify the enhanced performance of RaptorQ, we present several simulation results considering the modeling of the AL-FEC protection over multicast services for next generation mobile networks.

**KEYWORDS:** Long Term Evolution, Multimedia Broadcast Multicast Services, Forward Error Correction, Raptor Codes, RaptorQ Codes