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Enhancement in PPP-MP for Improving QoS in UMTS ALL IP Architecture

Abstract

In ALL IP network architecture of UMTS, ATM is replaced by IP. Unlike IP, ATM provides committed QoS. However, due to widespread IP adoption, networks are switching over to IP. There is, thus, a need to enhance the capabilities of IP for the better support of QoS in UMTS ALL IP Architecture.

In UMTS ALL IP architecture, a PPP session is established between RNC and SGSN routers for transmission. For supporting multiple services, multiple sessions have to be created. Creation of these multiple sessions influences on QoS negatively. PPP-MP is an extension of PPP [28] that manages multiple links in a single session. This thesis proposes modifications to PPP-MP that establish and manages multiple virtual links in a single session of UMTS ALL IP Architecture. The proposed modifications provide a better support of QoS in UMTS ALL IP Architecture.

In UMTS, the applications are QoS sensitive. If n services are being provided through PPP, then the connection establishment time becomes n -fold. Our proposed modification to PPP-MP resolves this problem by creating n -virtual links over one physical link. Creation of a virtual link takes only a fraction of physical connection establishment time. The connection establishment time of the PPP-MP is more than the PPP connection establishment time and PPP-MP header is larger than the PPP header, and so it puts extra load on network but the data analysis results of this research indicate that the proposed modified PPP-MP is a feasible solution for UMTS ALL IP Architecture. Because for multiple services PPP-MP, establishes and manages multiple virtual links in a single session.

Modified PPP-MP can also support more number of users. However, the increased number of users is at the expense of QoS because of the decrease in the bandwidth of physical connection. Even though there is decrease in bandwidth, which creates congestion in network, the modified protocol is still capable to manage the congestion.

My solution replaces PPP connection between RNC and SGSN with an enhanced PPP-MP. Our proposed enhancements meet the requirements of UMTS and provide better support of UMTS in ALL IP Architecture. For this enhancement, reserve bits of PPP MP are used. Two of the reserved bits are used for service class, three of the reserved bits are used for service type, and one reserved bit is used as priority bit for the congestion management. Enhanced PPP-MP enables multiple virtual links in a single session, as PPP-MP has the capability to provide multiple virtual links in a single physical link and provides additional capability to manage the congestion.

This proposed protocol is tested on five test cases and in each case different type of services are taken and observed the results of these cases. In the case where only one service type is using PPP is the better solution but where there is multiple services are using PPP-MP is the feasible solution because PPP-MP provides approximately same throughput but on remarkable difference in connection establishment time.