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Final report on QoS management in the Core Network and QoS Mapping

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Abstract:

In continuation of deliverable D08, this document further analyses the topics introduced previously: the Everest end-to-end QoS architecture encompassing CRRM and the bandwidth broker, a centralized IP QoS entity; QoS class mapping between RANs and the DiffServ domain; and finally the cross-issues between the bandwidth broker, QoS routing and the micromobility overlay. As novel contributions, the signalling message chart between the introduced QoS entities is given. The performance evaluation of previously introduced concepts like QoS class mapping and hierarchical bandwidth brokers has been done.

Keyword list: end-to-end QoS architecture, policy-based networking, DiffServ core network, mapping between DiffServ classes and radio QoS classes, hierarchy of bandwidth brokers, Wireless QoS Broker.

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13-07-05	008	Int	Final version. To be approved by PCC
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Executive summary

This document addresses the end-to-end QoS framework envisaged in the EVEREST project, in the context of beyond 3G systems. The document completes the end-to-end QoS architecture introduced in deliverable D08 and presents performance evaluation results. The document is basically divided in two main sections.

The first main section is devoted to explain the rationality of the end–to-end QoS architecture considered in the EVEREST project. This section completes the end-to-end QoS architecture introduced in deliverable D08, where the basis of such architecture was presented as an extension of 3GPP QoS framework for heterogeneous radio access networks. As major contributions, the architecture presented encompasses CRRM functionality support in the radio part and proposes a QoS control plane to jointly manage IP resources in the core network and radio bearers in the RANs. In this sense, functional entities and their roles in the overall QoS management framework have been identified and addressed in D08. In this section, the proposed architecture is further developed in terms of procedures and signalling and QoS class mapping between UMTS and DiffServ classes.

The second main section looks at the implications of the use of a BB, introduced by the Everest end-to-end QoS architecture, in an IP mobile access network. It is shown that the use of BB in an IP mobile access network implies the analysis of the interactions between BB, QoS routing and IP micromobility overlay. Thus, the mechanism involved in the initial access router selection and IP handover are presented for the different cases of a host-based or tunnel-based micromobility protocol and a source or hop-by-hop QoS routing protocol. Furthermore through simulation and analytical evaluation, it is shown that there is trade-off between scalability and QoS performance of the different cases. It is concluded that a hierarchy of BBs with hierarchical QoS routing areas presents a lower signalling overhead compared to a single BB with a single QoS routing area. Nonetheless a higher network utilisation can be achieved for a single BB with a single QoS routing area. And finally It is shown that for different network topologies, a tunnel-based micromobility protocol presents a higher disruption time during IP handover compared to a host-based micromobility protocol.

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