MOBILITY MANAGEMENT IN HIERARCHICAL ACCESS NETWORKS WITH THE USAGE OF OAM CHANNELS

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ABSTRACT

Increasing usage of packet-switching for different types of services (especially for broadband) instead of classic solutions based on links commutation has a significant impact on the development of telecommunication networks. Increasing customer demands of scope extension of services provided by operators stimulate the evolution of communication techniques for next-generation networks (NGN). It also causes the need of continuous development of mechanisms oriented on ensuring the quality of provided services and users mobility. Nowadays we observe the increasing popularity of IP/MPLS solution and MPLS-TP architecture in all segments of networks. They offer the functionalities characteristic for lower lower layers of OSI model (below network layer) as scalability, performance and fast-responsiveness for dynamic changes in networks. To meet these requirements, the doctoral research was devoted to the problem of end-user mobility management and increase of its efficiency by optimization of the handoff process responsible for keeping the data transmission in active state when moving mobile node is changing its supporting cell.

The main purpose of the thesis is preparation of new conception of mobility management implementation with the use of beneficial functionalities of MPLS-TP and verification of its effectiveness for selected scenarios considering different characteristics of end-user movement.

Thesis proves below assumptions:

1. Micro-mobility support with the usage of OAM channels in hierarchical MPLS-TP access networks allows for the reduction of handoff processing time.

2. Modification of handoff procedures may also reduce the signaling cost related to handoff process handling.

The basis of the thesis is literature overview related to topics as: evolution of MPLS technique, OAM mechanisms and end-user mobility and results of own researches on Mobile MPLS-TP concept. Verification of conceptual solution was done with the use of designed model allowing for analytical check of suggested solution efficiency for selected variants of end-user movement simulating real scenarios. Basing on the simulations results for these cases the efficiency assessment of conceptual solution was done. Mobile MPLS, which is already developed standard, was selected as reference for comparison. Research confirmed that the usage of Mobile MPLS-TP gives the benefits which correspond to networks size. Benefits are bigger in spread hierarchical access networks based on its application and may result in several times shortening of handoff processing time and reduction of signaling data, what confirms the assumptions of the thesis.