MEVICO - Mobile networks EVolution for Individual COmmunications experience

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A significant increase of mobile data traffic had been observed in the last years. This trend is expected to continue due to new bandwidth consuming Internet applications [1], [2]. The stepwise introduction of LTE will gradually offer more bandwidth to mobile users. However, such new deployments may not completely avoid temporary resource bottlenecks on the air interface and might temporarily cause congestion in the radio access network (mobile backhaul) as well as in the core network and the underlying transport network. This is due to the fact, that capacity extensions will be accomplished in a more restrictive way than in the past because of economical reasons. Moreover, the exact requirements for additional capacity will be harder to define due to unpredictable and dynamic traffic characteristics and user behaviour. Therefore, fast reaction to traffic fluctuations and avoidance or reduction of congestion is a key objective for economic traffic management in future mobile networks.

Focus of CELTIC project MEVICO is the investigation, development and evaluation of mechanisms and concepts especially for the core and transport network part of next generation mobile networks (LTE, LTE advanced) that will be deployed beyond the year 2014. The German part of the project concentrates primarily on scalable mechanisms for "Smart Traffic Management" to enable the optimum usage of network resources while providing a best possible quality of experience for end users especially for delay and loss sensitive Internet applications (e.g. multimedia applications).

From operator viewpoint the newly developed mechanisms offer the following advantages:

• cost reduction (CAPEX/OPEX): deployment of Smart Traffic Management enables capacity savings in network dimensioning and optimal resource usage (according to the operator policies)

• realization of an extended and differentiated user and service specific quality of service

From user viewpoint, the new mechanisms provide best possible quality of experience (with graceful degradation) in particular in high load and congestion situations.

The tasks carried out in the project can be categorized into the following three main categories:

1. Traffic modelling: The main objective is to get a „close-to-reality" model about the traffic characteristics and adaptive behaviour of selected Internet applications. Moreover the minimum requirements for sufficient QoE as well as the corresponding network QoS will be evaluated.

2. Development of new traffic management mechanisms: The emphasis of the project is on development and evaluation of innovative traffic management concepts for LTE. These concepts are considered both on microscopic and macroscopic level. While microscopic traffic management (MicTM) influences the rate of individual traffic streams only, macroscopic traffic management (MacTM) controls the traffic flow paths. For example, MacTM deals with mechanisms for selecting the access network, the gateways (towards external networks) and the paths in the EPC. Another level of investigation addresses mechanisms for caching and intelligent resource selection. These are fundamental components for efficient multimedia content delivery in mobile access networks. A big challenge arises in integrating the different traffic mechanisms in order to enable a well coordinated operation and avoid inconsistent actions.

3. Techno-economical analysis: This work is performed to verify the economical feasibility of the technical solutions developed by the project consortium. In this context models are developed for evaluating the overall network costs including both the cost of the network infrastructure (CAPEX)

as well as the operational cost (OPEX). Based on these cost models a study is carried out to evaluate selected network migration scenarios and a business case analysis is performed.

REFERENCES

[1] "MINTS: The Minnesota Internet traffic studies", http://www.dtc.umn.edu/mints/references.html

[2] "Cisco Visual Networking Index: Forecast and Methodology, 2008-2013", 2009http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360_ns827_Networking_Solutions_White_Paper.html