



Motivation and Target

Traffic explosion:

Growth in traffic is not matched by a corresponding growth in ARPU (increasing traffic, declining costs per delivered bits)

Cost-efficiency:

Cost-efficient operation (CAPEX & OPEX) while maintaining QoS/CoE even under high-load situations

New mobile Internet applications:

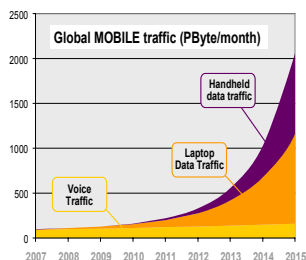
These applications are expected to have highly variable and unpredictable traffic characteristics and very different QoS requirements

Reliable infrastructure:

Fail-safe mobile broadband communication infrastructure (for urban & rural areas) is critical for modern information society

User / Application Differentiation:

Consider user needs / behavior for relevant applications and associated traffic patterns. Increase user satisfaction and bind the user to the operator - individual user experience (QoE) as differentiator for service providers



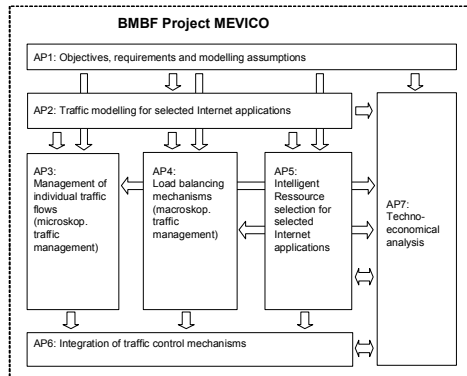
Approach and Work Structure

Interfaces to EU
Celtic Project
MEVICO

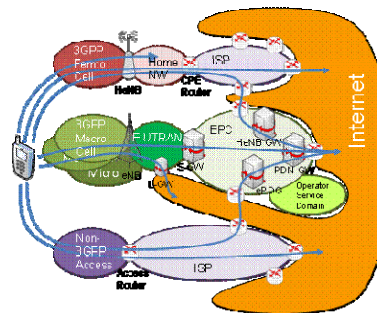
Objectives & Requirements

Traffic Control Mechanisms

Results of techno-
economical analysis



Traffic Management Diversity



Managing traffic via multiple path options between user device and Internet

Challenges and Solutions

What is needed?

- Mechanisms that allow a highly efficient usage of (expensive) network resources while satisfying the user's QoE expectations (also for "over-the-top" i.e. Internet services)
- **Mechanisms for smart traffic management (TM) considered in MEVICO:**
 - Microscopic TM: rate adaptation of individual traffic streams
 - Macroscopic TM: control of traffic flow paths
 - Access network selection (heterogeneous access)
 - Gateway selection, Traffic engineering in EPC
 - Optimized content delivery (content caching, resource selection)
- **Technical challenges for smart traffic management:**
 - Network-wide traffic measurement and bottleneck identification as well as QoE estimation - bottlenecks can be anywhere along the e2e path (radio IF, radio access network, core, and transport)
 - Efficient realization of individual TM mechanisms (i.e. low signalling overhead, low computational effort for online optimization)
 - Coordination of the different TM mechanisms to avoid inconsistent TM actions
 - Coordination with other mechanisms, e.g. mobility management, policy control and charging (PCC)

First Results

- Development, implementation and performance investigation of a transparent proxy based Multipath TCP architecture that aims to completely avoid end-system modifications
- QoS support for live TV streaming originating outside the MNO domain by exchange of control information on application layer and introduction of QoS proxy
- QoE behaviour analysis of Skype and Youtube traffic, development of QoE models and a measurement framework
- Development of a CAPEX calculation model for ATCA based LTE network platform
- Development of a software platform for CAPEX modelling parameter exchange

German Project Partners

