MultimEDia transport for mobIlE Video AppLications

**COMET-ENVISION workshop
on Future Media Distribution Networks
10-11 November 2011, Slough, UK**
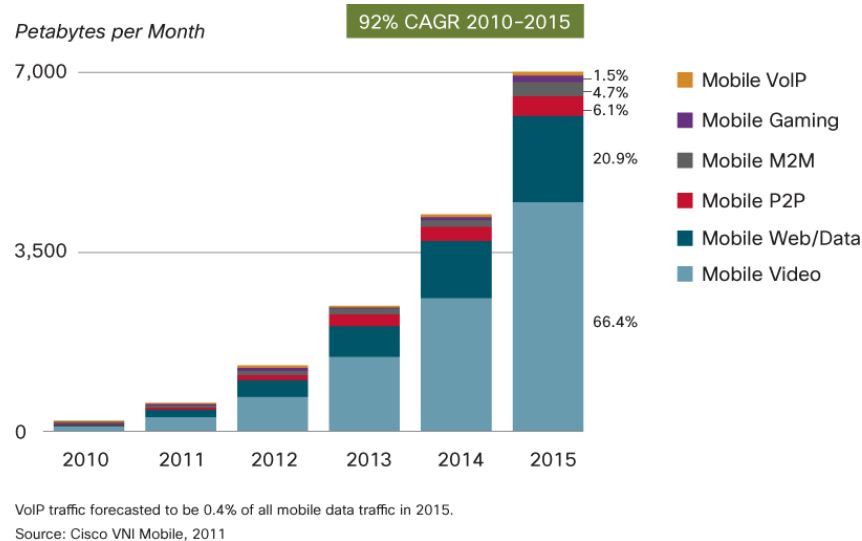Bo Fu[1], Noam Amram[2]
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Outline

- Motivation
- The MEDIEVAL project
- QoE-based cross-layer design
- The MEDIEVAL architecture

Background – Video Rule

- **Video** is a major **challenge** for the future mobile networks

Petabytes per Month — 92% CAGR 2010–2015

Category	2015 share
Mobile VoIP	1.5%
Mobile Gaming	4.7%
Mobile M2M	6.1%
Mobile P2P	20.9%
Mobile Web/Data	66.4%
Mobile Video	

7,000 — 3,500 — 0

2010 2011 2012 2013 2014 2015

VoIP traffic forecasted to be 0.4% of all mobile data traffic in 2015.
Source: Cisco VNI Mobile, 2011

- Current mobile network **IS NOT** designed for **video**
  - Today's architectures are very inefficient when handling video
  - Future network architecture should be tailored to efficiently support the requirements of this type of traffic
  - Specific **enhancements for video** should be introduced **at all layers** of the protocol stack where needed

The MEDIEVAL project

- MEDIEVAL is an **operator-driven** project specifying and demonstrating a **mobile video** architecture with **cross-layer** mechanisms to provide high quality of experience to users

Vision
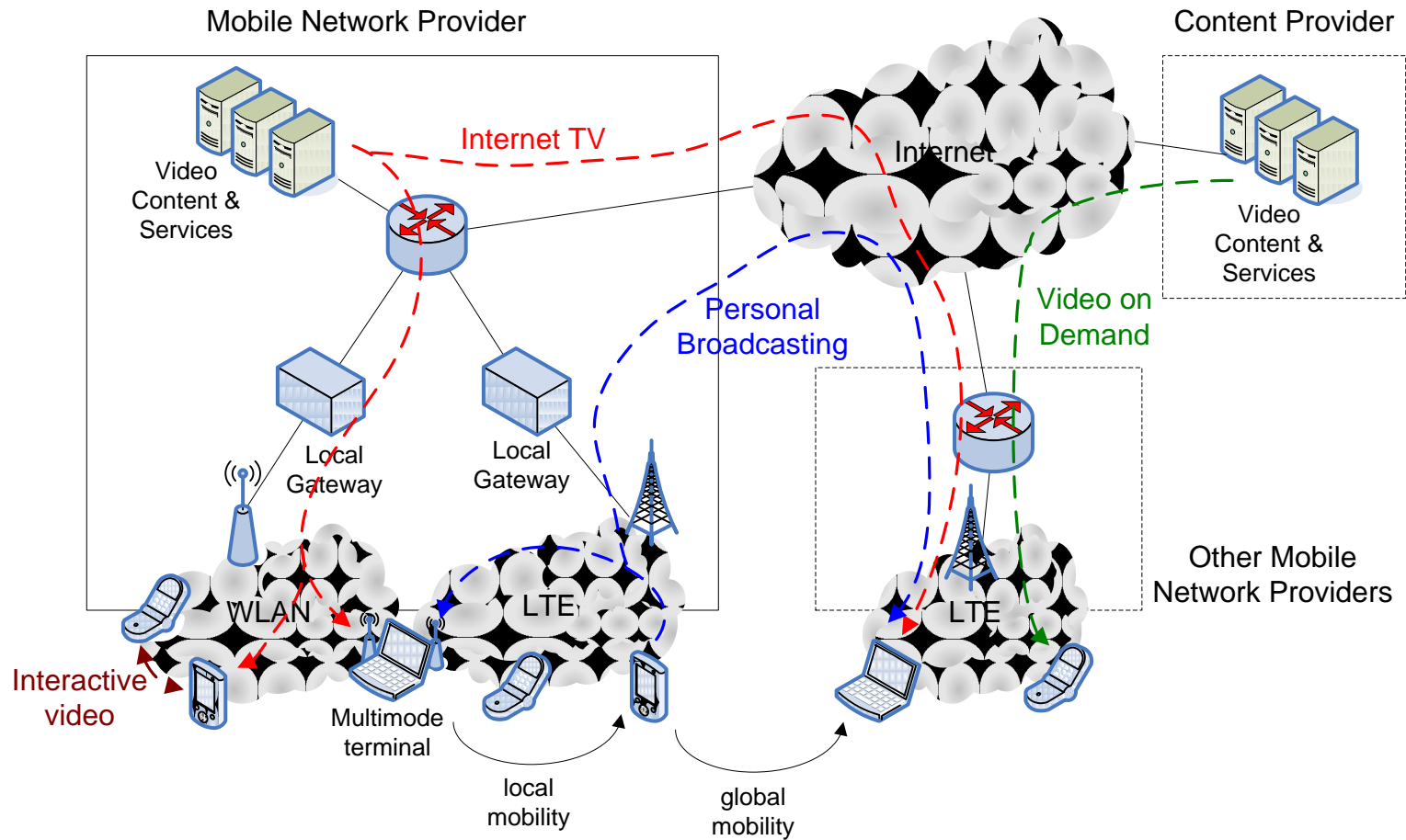
Innovations

- *evolved cross-layer algorithms and mechanisms between video services and network layer*

- *Quality of Experience based solutions for mobile video delivery*

- *a flat mobility architecture based on a distributed mobility management concept*

- *A mobile terminal is multi-homed* through an innovative *Logical Interface; novel mechanisms to optimise Video transmission over heterogeneous air interfaces*

- *a mobile CDN* (meaning the adding of new CDN entities in the mobile network) *concept for efficient media delivery*

➢ combine all these different mechanisms in a consistent way

Why QoE

- QoS is not enough for video delivery
  - Data rates vs. perceived quality is non-linear
  - I, P, B frames, SVC layers, have unequal importance
  - User satisfaction is key to operators

Video sensitivity (1)

- **Objective video quality assessment**
  - PSNR, SSIM
  - Mapped to Mean Opinion Score (MOS)

- **Data rates vs. perceived quality**
  - Different "sensitivities"
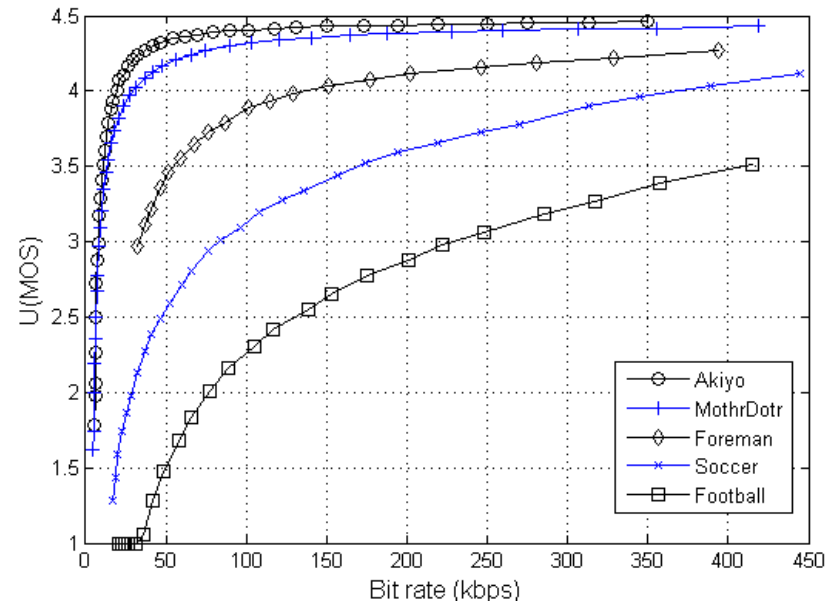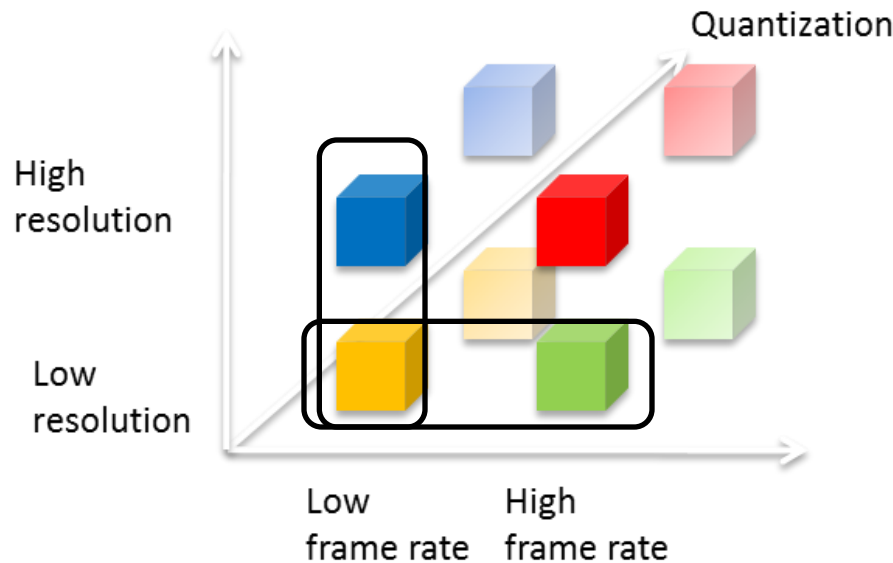 - Understanding the impact of resource allocation

Fig. source: Thakolsri. S, et al. QoE-based cross-layer optimization of wireless video with unperceivable temporal video quality fluctuation

- SVC layer dropping
  - Depending on different spatiotemporal characteristics

QoE-based traffic management

- Optimizer

  Given

  –Video sensitivity curves

  –Channel conditions

  –Overall available resources

  > -> To allocate resources for multiple users
  > while maximizing <u>overall QoE</u>

- Total bandwidth is optimally utilized w.r.p. QoE

- Enforcement

  –Traffic engineering: transcoding, packet dropping, SVC layer dropping

  –Content adaptation
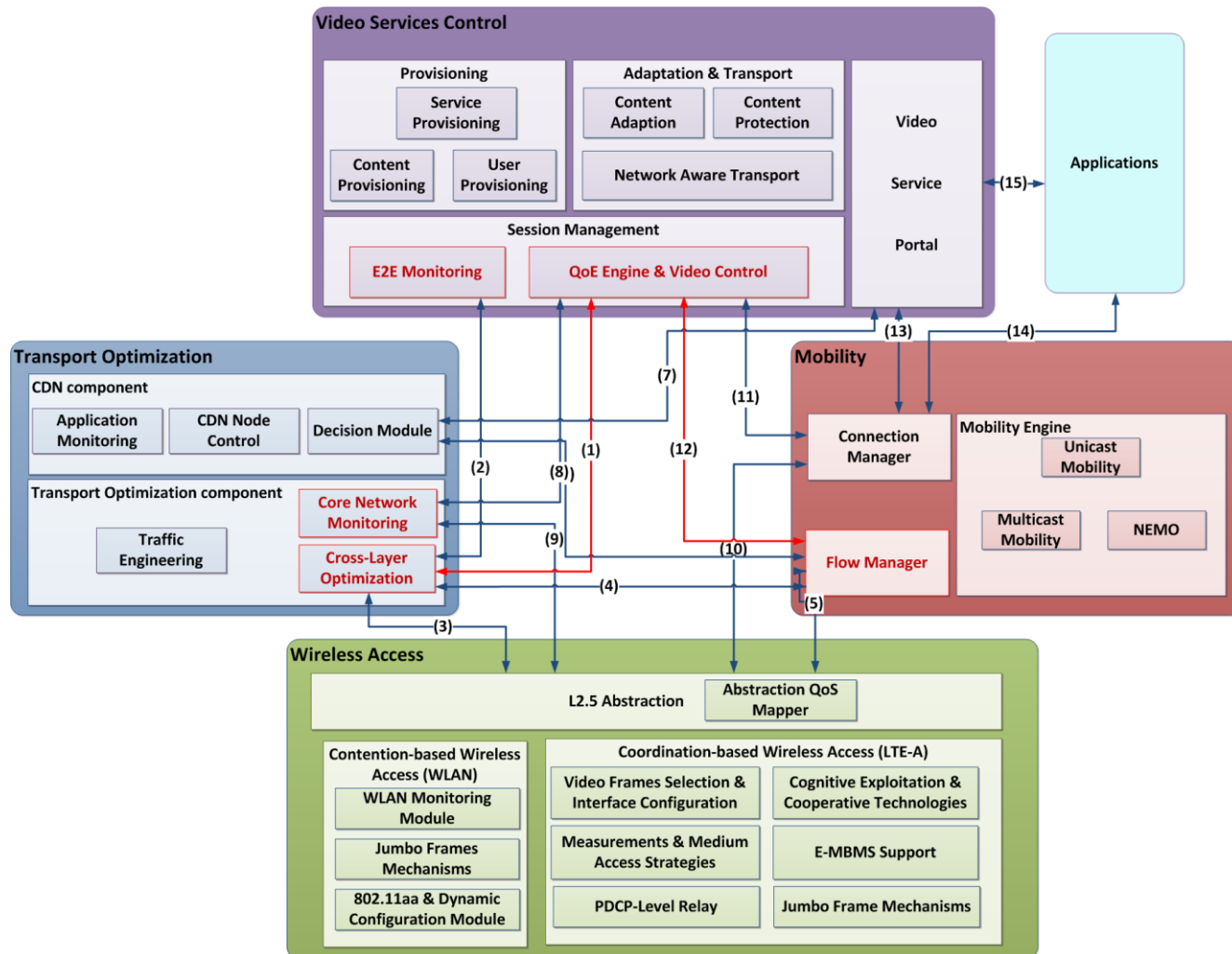
- Interactions between "applications" and the network
  - Application information
  - Network events
  - Monitoring
  - Adaptive control

- 3GPP standardization of the interfaces
  - ePCC (TR23813), UPCON(SA#85)
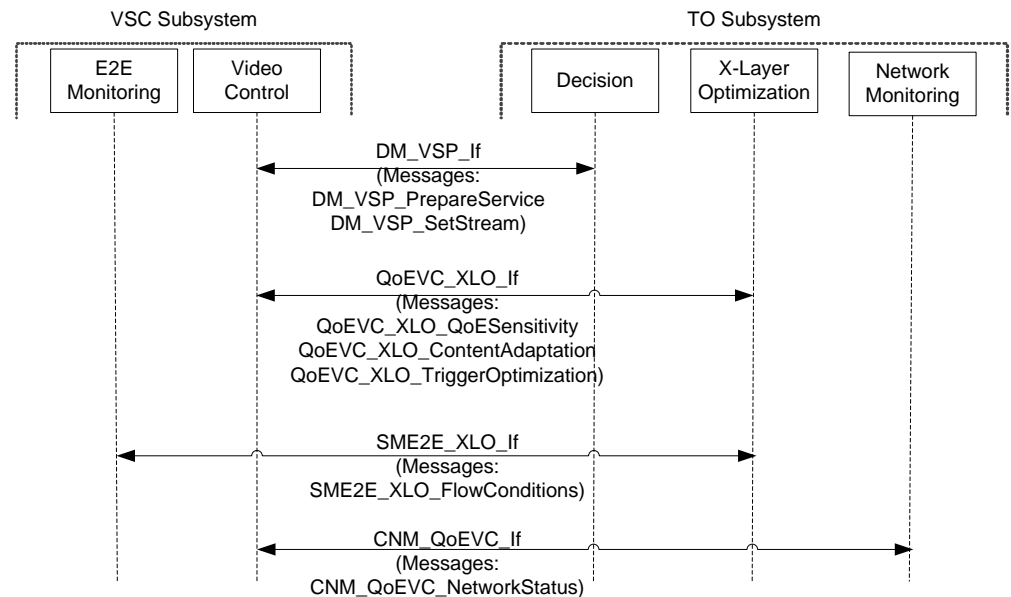
Summary

- MEDIEVAL targets to evolve the future mobile networks for video delivery

- A cross-layer mechanism is developed to improve overall QoE with limited network resources

- An architecture is proposed consisting of several innovations

Thank you for your attention

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