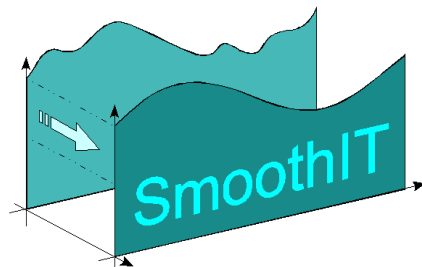




*Future Internet
Architecture Group*



Socio-Economic Services for
European Research Projects



Simple Economic Management Approaches of
Overlay Traffic in Heterogeneous Internet Topologies

Design Principles for Future Internet

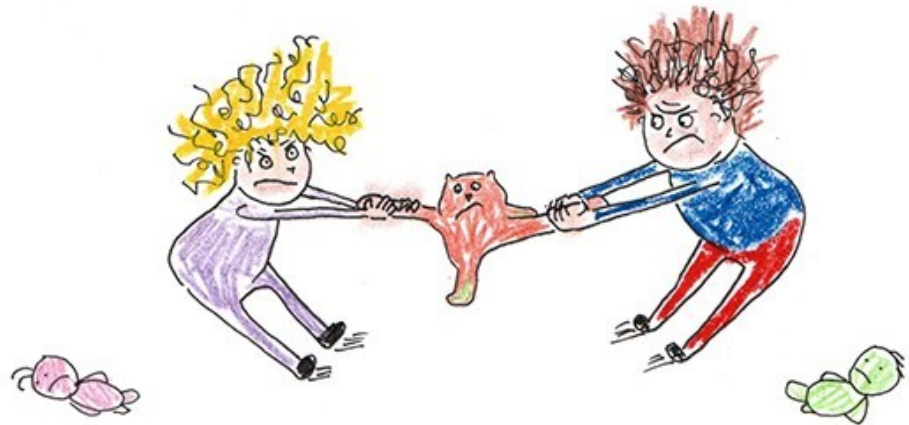
Ioanna Papafili, AUEB
George D. Stamoulis, AUEB
Costas Kalogiros, AUEB
Sergios Soursos, ICOM
Krzysztof Wajda, AGH
Burkhard Stiller, UZH

**FIArch workshop,
Brussels, Belgium
May 23, 2011**



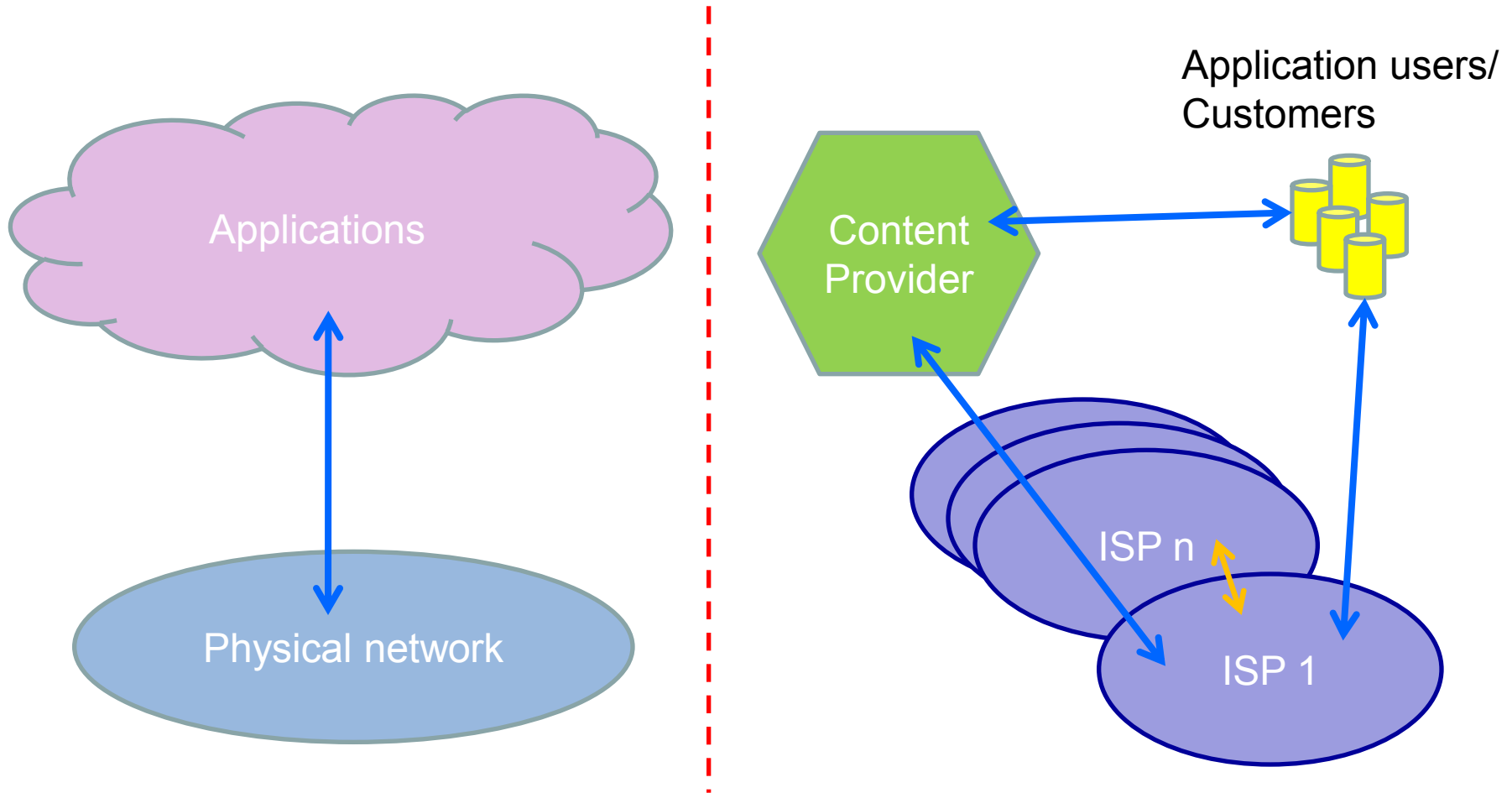
The Internet Ecosystem: Current and Future

- Many players acting simultaneously ...
 - Customers/Users
 - Providers
 - ISPs
 - Application providers
 - Over-the-top providers
 - Content providers
 - ...



- ... with conflicting interests → leading to **tussles**

Cross-layer & Cross-player



Information Asymmetry

- ❑ ISPs make routing decisions ignoring application requirements
- ❑ Applications (e.g. overlays) manage traffic do not take into account underlay characteristics
- ❑ What is needed?

FI Design Objectives

- ❑ **Cross-layer optimization**
 - Underlay-overlay

- ❑ **Cross-player optimization**
 - ISPs, Content Providers, End-Users

- ❑ **Promotion of mutually beneficial cooperation**
 - Among layers
 - Among players

FI Design Principles

- ❑ Allow the exchange of information among different players and layers
- ❑ Reveal only **sufficient** information, no critical details
- ❑ If feasible, enable “All-Win”
 - Provide incentives to affect stakeholders’ behavior
- ❑ *Clark et al.*: **Do not dictate** the outcome, ...
permit players to express their preferences

Economic Traffic Management

developed by SmoothIT project (www.smoothit.org)

- Employs **economic concepts** and **incentive-based mechanisms** to promote collaboration across layers and between players
- Target: “All (stakeholders)-Win” situation
- ETM Focused on P2P traffic, but...
applies also to CDN traffic, cloud etc.

Conclusion

- SmoothIT ETM mechanisms implemented as **complements** to current Internet architecture

- New design principles would allow:
 - Broader applicability
 - Richer intelligence
 - Higher efficiency in
 - performance
 - implementation
 - scalability
 - Lower costs

Thank you for your attention!

Back-up

Generic Design Objectives

- ❑ Genericity
- ❑ Scalability
- ❑ Robustness/Stability
- ❑ Security
- ❑ Simplicity and Cost-Effectiveness

Challenges of Current Design Principles

- ❑ Address inter-connection aspects inherently in the design
 - Inter-connection principle

- ❑ Allow for more flexible modularization
 - Modularization principle

- ❑ Employ locality/proximity information besides pure routing information
 - Connectionless packet forwarding principle