

Approaches in Economic Traffic Management

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CSG Research Overview
Motivation and Detailed Project Goals
Research Issues



Communication Systems Group CSG@IFI

- ❑ Internet-based Communications and Network Management (FCAPS, SLAs, Services, ...)
- ❑ Charging and Accounting in Distributed and Fully Decentralized Systems
- ❑ NG Pricing Models (Post-paid and Pre-paid)
- ❑ Wireless Mobile Grids: Technologies and Regulation
- ❑ Peer-to-peer Networks with Incentive Mechanisms and TV Streaming
- ❑ Quality-of-Service (QoS) and Security Mechanisms
- ❑ Mobility Support in the Internet
- ❑ Biometric Security and its Management

People and Projects

People

Head of Group:	Prof. Dr. Burkhard Stiller
Secretary:	Evelyne Berger Julia Breddermann
Post-docs:	Dr. David Hausheer Dr. Hasan
Ph.D Students:	Fabio Hecht Gragor Schaffrath Thomas Bocek Martin Waldburger Peter Racz Cristian Morariu Thierry Kramis
Researcher:	Peter Ming

Projects

- **BioLANCC**
- **Daidalos II**
- **COST 290 (Management in Wireless Multimedia Networks)**
- **EMANICS**
- **EC-GIN**
- **COST 605 (A Telecommunications Economics COST Network)**
- **SmoothIT**
- **DaSAHIT**
- **SCRIPT**
- **Akogrimo (just finished)**

Motivation

- To develop solutions for technology and people/organizations on ***Economic Traffic Management*** by
 - Networking architecture aspects
 - Economic, business, and risk aspects
 - Partially regulatory and legal aspects
- To **provide enhanced network management** tasks for integrated Internet & telecommunication networks
- To **enhance solutions' efficiency** in the field of telecommunication economics and respective
- To **combine technology with real-life requirements**

Economic Traffic Management (SmoothIT)

- Requirements
 - To **classify** key application areas and applications in overlay networks
 - To specify overlay application **requirements** on packet-based networks
- Engineering and Test-bed Integration
 - To determine key engineering requirements for measurements, **accounting, and charging of overlay applications**
 - To **develop** a flexible networking protocol and systems architecture in support of overlay ETM mechanisms
 - To evaluate and select existing software components and protocol modules for their application in overlay management; to develop missing components
 - To make the ETM approach, transparently usable for multiple competing and cooperating ISPs and telcos, **secure and scalable**
- Trial Integration and Assessment
 - To determine **detailed parameterizations**, applications, and configurations for the internal trial

Service Level Agreement Management

- Communications services are purchased for several years based on traditional competitive bidding
 - Multi-party Service Level Agreements (SLA)
 - Automatic determination of legal domains
 - Authentication, signaling, and privacy
 - Role of telecommunication providers (telco) in inter-networking scenarios via SLAs
 - A bit is a bit is a bit – content is content is content
 - Integral focus on related legal aspects/liabilities

Nature of a Mobile Grid: Tech. Comparison

Category		CPU (1)	Decentralization as Design Goal (2)	End-to-end Connectivity (3)	Interoperability (4)	Location Transparency (5)	Robustness (6)	Standards (7)	Storage (8)
Grid Systems	Grid Computing	Green	Grey	Grey	Green	Green	Grey	Green	Green
	Service Grid	Green	Grey	Grey	Green	Green	Grey	Green	Green
	Mobile Grid	Grey	Grey	Grey	Green	Grey	Orange	Green	Green
SOA		Grey	Grey	Green	Green	Green	Grey	Green	Grey
P2P Systems		Green	Green	Green	Orange	Orange	Green	Orange	Green

Metric	Explanation
1	Computational power exploitable by offered services
2	Fully decentralized system architecture envisaged
3	Direct peer communicate, irrespective of nodes in between
4	Nodes of heterogeneous nature
5	Location information not bound to services
6	Prone to failure and system attacks
7	Rely on open or widely accepted standards and protocols
8	Storage capacity exploitable by offered services

Legend:

- Green: relevant and existent
- Grey: not relevant
- Orange: relevant, however, not existent in current designs or implementations

Scalable, Decentralized, and Real-time IP Traffic Analysis (SCRIPT)

- Goal is to develop a scalable and decentralized architecture for collecting/analyzing IP flow records with the necessary level of accuracy in real-time.
 - Utilize resources of many nodes: collaboratively store/process IP flow records (distributed, flexible, robust).
 - Develop mechanisms that will provide a high level of automation, self-configuration, and self-healing
 - Advantages
 - Possibility to gradually increase the flow collection and analysis capacities compared to a complete replacement of devices
 - Offering fast access to multiple-resolution aggregation of flow data
 - Applicable to real-time IP traffic analysis scenarios: flow accounting, flow path monitoring, and distributed intrusion detection systems

Key Observations – Research Directions

- No need for far too complex technologies, but need for **mechanisms to manage the Internet** in efficient manner
 - Pricing is the key bottleneck in driving new services
 - Service and SLA management key for operations
 - Internet tests boundaries of today's laws in countries and communities
- The **definition of a Telco** and its “core” necessities as well as its “add-ons” by new IP services?
- **Content provider's side**: bigger players will come up, all of this will be followed by governments and governed by regulators to avoid monopolies