

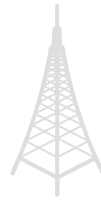
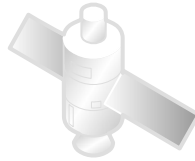


# Enabling Multicast QoS in a B3G Environment

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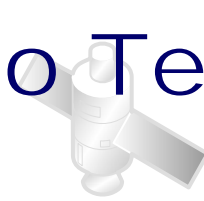
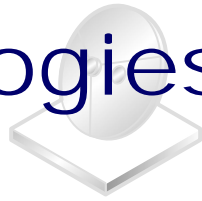


# Summary



- ▶ The importance of Broadcast technologies to Telecom Operators
- ▶ Multicast Services over Heterogeneous Networks vision
- ▶ IST-Daidalos general Architecture for unicast/broadcast services
- ▶ QoS enabled Multicast services
- ▶ Developments ongoing in IST-Daidalos

# The importance of Broadcast technologies to Telecom Operators

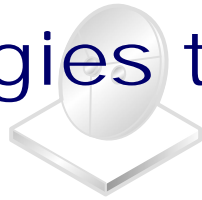


► Broadcast technologies provide B3G networks with great enhancements:

- Broadband
- Coverage
- Mass Market



# The importance of Broadcast technologies to Telecom Operators



▶ But with some drawbacks...

▶ Unidirectional technology

▶ Group based communication

(hard to handle QoS, security, A4C, personalization)



# The importance of Broadcast technologies to Telecom Operators



- ▶ How to make the best use of Broadcast technologies ?
  - ▶ Bringing information to a broader audience (**Federation Mechanisms**)
  - ▶ Unification under single Service Provisioning Platform (with simplified support by using **IPv6** at the network layer)
  - ▶ Use the best transport mechanisms for the Broadcast media (**Multicast**)



# Multicast Services over Heterogeneous Networks



- ▶ Reaching large sets of users who share information requires efficient mechanisms
- ▶ IP networks provide a common platform over heterogeneous networks
- ▶ Multicast enables efficient service to large audiences over IP networks
- ▶ **Federated Provisioning Platforms for inter-domain/inter-technology provisioning of Broadcast Services**

# IST-Daidalos general Architecture for unicast services



- ▶ Multicast Services are fully supported by
- ▶ IST-Daidalos Service Provisioning Platform
  - ▶ QoS
  - ▶ Security
  - ▶ A4C
  - ▶ Multimedia
- ▶ With Broadcast technologies supported by WP2 as yet another interface.

# IST-Daidalos general Architecture for unicast services



- ▶ IST-Daidalos Unicast Architecture
  - ▶ Service Provisioning Platform composed of key servers: MMSP, QoS Broker, CMS, A4C, PBNMS
  - ▶ QoS- enhanced Fast Mobile IPv6
- ▶ Most important QoS aspects
  - ▶ DiffServ Based Network
    - ▶ Per flow access control
    - ▶ Per aggregate QoS
  - ▶ Distributed network of QoS Brokers
  - ▶ Policy Based Network Management



# IST-Daidalos general Architecture for unicast/broadcast services



- ▶ Broadcast technologies are supported using WP2 bidirectional virtual interfaces
- ▶ Nonetheless efficiency requires the use of best technologies for such asymmetric interface.
- ▶ Source Specific Multicast
  - ▶ Best way to deploy multicast services over unidirectional links
  - ▶ Sources lie on the network operator “application garden”
  - ▶ Group management is handled by bidirectional links provided by mobile operators over narrowband links solely used for signalling

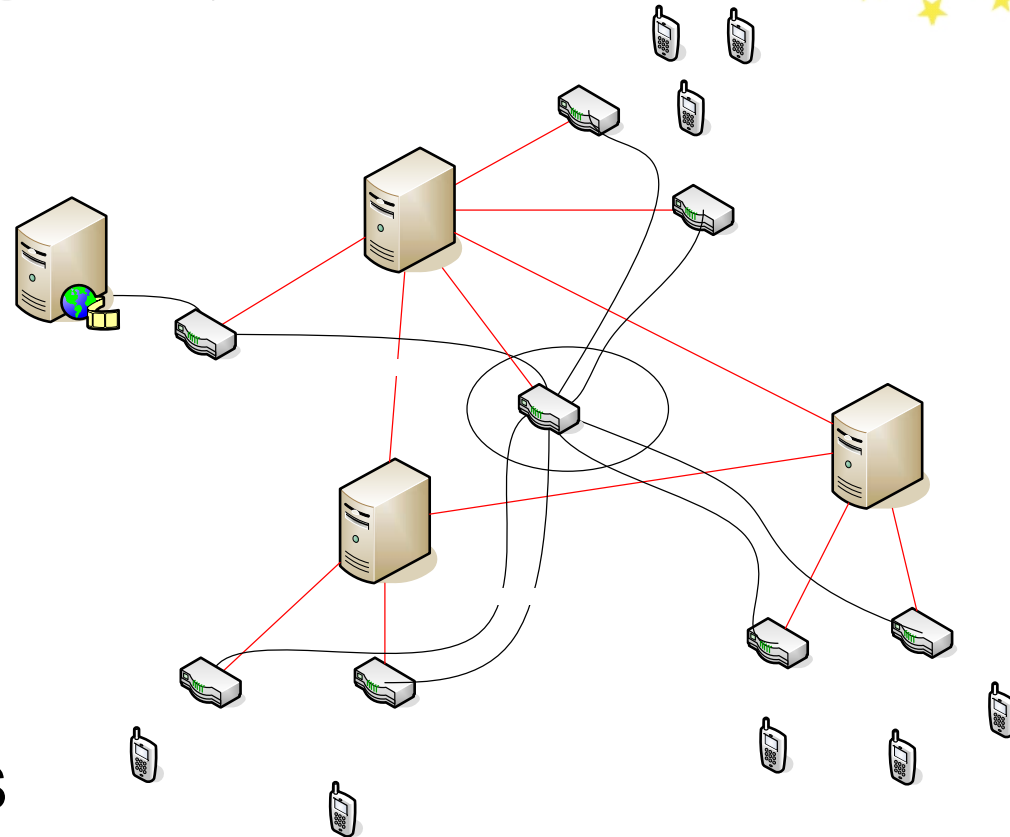
# QoS enabled Multicast services



- ▶ Key concepts for QoS enabled services

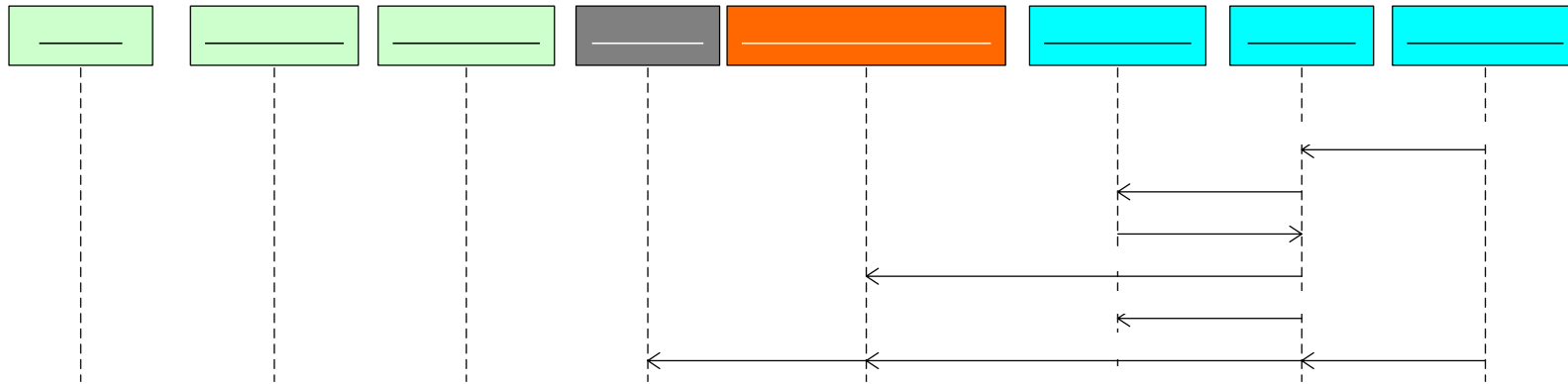
- ▶ Multicast Subscriptions are outsourced to a distributed network of QoS Brokers

- ▶ Source Discovery can efficiently be handled by the QoS Brokers

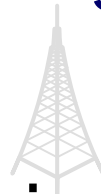


# QoS enabled Multicast services

## ► Multicast Service Request



# Developments ongoing in IST-Daidalos



## ▶ Developments done in Daidalos WP3

### ▶ QoS Broker architecture supports several enhancements to Multicast Architecture

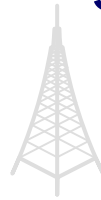
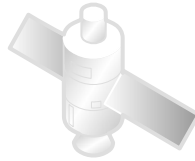
- ▶ Session Based Interface optimization

- ▶ Group based QoS

### ▶ FLUTE Server/Client

### ▶ Multicast Streaming Server

# Developments ongoing in IST-Daidalos



## ▶ Development of an IPv6 Multicast Router for Linux

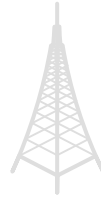
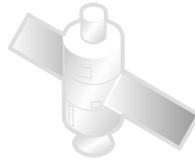
### ▶ Technical Features

- ▶ MLDv1 and MLDv2 support
- ▶ PIM-SM support (ASM and SSM)
- ▶ Partial MBGP support
- ▶ Abstract Multicast Forwarding Interface (MFA) with user-space forwarding
- ▶ CLI support (remote configuration and management) via telnet or local access

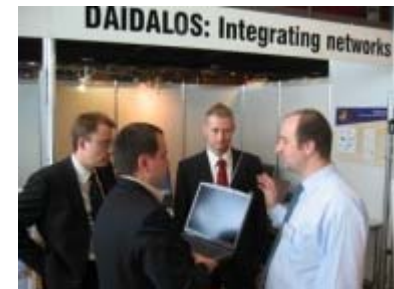
### ▶ Already used over the M6BONE

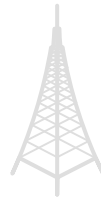
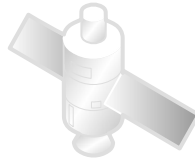
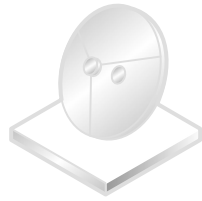


# Conclusions



- ▶ Broadcast will become yet another technology to network operators
  - ▶ Information to broad audiences (e.g. News, Software Updates)
  - ▶ Capability to combine with technologies less efficient such as GPRS
- ▶ **IP Multicast:** key to fully exploit Broadcast Services
- ▶ IST-Daidalos results in terms of research and open source contributions (IST-Mobile Summit's, MRD6)





Questions ?

