Multicast in the Mobile Environment and 3G

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Agenda

- Introduction
- MBMS - Multimedia Broadcast Multicast Service
  - Background
  - Architecture
  - Provisioning
- Comparison of Techniques
- Charging
- Projects
- Summary and Conclusion
Introduction

Market introduction of attractive services will lead to increased revenue and customer satisfaction.

Declining voice revenues

Time

Push and Talk, IM and Chat
Converged Centrex Services
Voice over IP
Video Telephony and Entertainment
Converged Address Book
Introduction

- According the studies demand for Mobile broadcasting services is increasing rapidly.

- In world media markets TV is by far the most popular.

- Having said that, there is a huge potentials for mobile broadcasting.

- For example Mobile TV for filling “the gaps” during the day:
  - While commuting
  - Watching mobile TV while waiting or queuing for something
  - At work during breaks – meetings?
  - Around 2-3 minutes per session

- Because of the costs effects, Mobile services have to be designed more interactive than TV.

- For above reasons, the 3GPP group developed the MBMS idea for providing solutions and architectures for broadcast and multicast services.
From Unicast to Broadcast/Multicast

- Unicast (2G/3G)
  - Individual services
  - One connection to each user
  - Expensive (bandwidth demanding) way to reach many users with same content

- Broadcast/Multicast
  - One service to many users
  - Independent of number of users
  - Cost-effective way to reach many users with same content
MBMS

- **Multimedia Broadcast Multicast Service**
  - Point-to-Multipoint Downlink bearer service for IP data
- Developed by 3GPP
- Deployment in 2006/2007(?)

MBMS (Multimedia Broadcast Multicast Service) is a point-to-multipoint downlink bearer service for IP data developed by 3GPP. It was deployed in 2006/2007.
The Problem: Unicast Tunneling
The Solution: MBMS
MBMS

- Preceding technologies
  - Point-to-Point tunneling in UMTS
  - SMS Cell-Broadcast

- Design principles and goals
  - Interoperability with IETF IP Multicast
  - Reuse existing network components
  - Efficient usage of resources:
    - multiple receivers should share common bearer resources

- Modes of operation
  - Multicast
    - Received by users subscribed to the service
  - Broadcast
    - Received by all in a certain area
MBMS - Architecture (1/2)
MBMS - Architecture (2/2)

- **New components**
  - BM-SC (Broadcast/Multicast Service Center)
    - Initiates and terminates MBMS transmissions
    - Interface for internal and external content providers
    - Maintains information on service subscriptions and charging

- **Modified old components**
  - GGSN (Gateway GPRS Support Node)
    - QoS negotiation
    - Resource allocation
  - SGSN (Serving GPRS Support Node)
    - User authentication & authorization
    - Generates charging data
  - RAN (Radio Access Network) GERAN or UTRAN
    - Makes decision whether to transfer using P-T-P or P-T-M
    - Delivery of MBMS data
  - UE (User Equipment)
    - Support for MBMS reception
MBMS - Broadcast Mode provisioning

- **Service Announcement**: Inform users of available services
- **Session Start**: Trigger to establish MBMS bearer for data transfer
- **MBMS Notification**: Inform UEs about forthcoming/ongoing MBMS data transfer
- **Data Transfer**: MBMS data transfer to UEs
- **Session Stop**: Stop data delivery and release MBMS bearer resources

*Broadcast Mode*
MBMS - Multicast Mode provisioning

Phases to enable charging

- **Subscription**
  Establish relationship between user and service provider

- **Service Announcement**
  Inform users of available services

- **Joining**
  User indicates his/her interest to receive a service

- **Session Start**
  Trigger to establish MBMS bearer for data transfer

- **MBMS Notification**
  Inform UEs about forthcoming/ongoing MBMS data transfer

- **Data Transfer**
  MBMS data transfer to UEs

- **Session Stop**
  Stop data delivery and release MBMS bearer resources

- **Leaving**
  User indicates his/her interest to stop service data reception

Multicast Mode
**Broadcasting schematics**

Schematic diagram

- **DVB-H**: ~330 kbps (13.3 Mbps / 40 channels)

Criteria's for mobile broadcast services:
- Available bandwidth
- Level of service customisation

- **MBMS/UMTS**: 64-256+ kbps
- **MBMS/GSM**: 32-128 kbps

- **Unicast UMTS & GSM/GPRS**:
  - **UMTS**: 64 kb/s (CS), 128 kb/s (PS)
  - **GPRS**: 30-40 kbps (PS)
  - **EDGE**: ~100 kbps (PS)

Service customization (service differentiation, personalization, etc)
Services for MBMS

MBMS services

- Improvement to 2G/3G
  - QoS
  - Availability

- Realtime:
  - News, weather, finance, traffic

- Location-based:
  - Broadcast to citizens
  - Local multicast in sport arena
  - Broadcast over a campus or corporate premises
  - Multimedia tourist Info

- Announcement:
  - Emergences
  - Marketing tools/Commercial offers

- Multipoint to Multipoint:
  - New Community Based services

- Broadcast:
  - New business with broadcasting

- Peer groups:
  - Multiparty video conferencing
  - Multiplayer games
  - Multiparty messaging

- Mobile TV

- Visual radio:
  - FM with other multimedia services

- Cross Referencing services:
  - Between Mobile TV, Visual Radio

- Interactive TV/Radio:
  - Voting what to see/listen next
  - Pay per View
Business Models

- How do to business with broadcasting?
  - Operator, Content provider, Content owner and Subscriber

- Free to air Broadcast
  - Advertisements (paid by content providers)
  - TV-like services (stimulate subscription to charged services)

- Subscription Based services
  - Shared revenue between operator and content provider based on end user charges

- Lower cost for potential multicast services
  - Lower charging due to low traffic and cost
Charging

Different payment schemes, such as a monthly subscription model and pay-per-view are required to satisfy consumers' demand.

Possible charging Models:

- Monthly fixed fee for using a broadcasting services.
- Pay-per-view.
- Pay-per-period.
- Pay-per-volume.
- Pay-per-channel
- ...


3GPP, 3rd Generation Partnership Project

- MBMS included in release 6, released in 2005
- The 3GPP specification of MBMS involves two distinct aspects:
  - Specification of enhancements to the GPRS network to provide for multicast and broadcast data distribution as a bearer capability
  - The specification of MBMS applications which will use the MBMS bearer capabilities to meet the service requirements as identified by each such MBMS application.
Projects, C-Mobile

- GOALS(2006-2008):
  - Develop new high capacity MBMS radio interface technologies, radio resource management and new topological approaches in the architecture for beyond 3G systems.
  - Provide a concept for integration of a more flexible MBMS architecture into IMS (IP Multimedia Sub-System) including group management, session management, scheduling, media delivery and transcoding.
  - Evolve MBMS, in order to exploit alternative broadcast bearers (e.g. DVB-H), when available, in a heterogeneous mobile networks environment, with multi-interface terminals.
  - Specify and implement interactive content formats for MBMS and a secure content management architecture within and in-between content provider and mobile operator domain.
  - Validate various innovative technical solutions experimentally or via system level simulations.
  - Ensure the commercial viability of mobile broadcast services by identifying the needs of multicast-broadcast users, network operators and content providers and to derive new business models for the emerging market of mobile broadcast.
  - C-Mobile investigates MBMS enhancements to both the Radio Access Network and Core Network.
  - Partner from universities, telecom- and broadcasting industries
Other Mobile broadcast technologies (1/2)

- **BCMCS (BroadCast MultiCast Services)** -- a service comparable to MBMS that is currently being standardized by 3GPP2, the 3rd Generation Partnership Project 2, as part of its ongoing specifications for the evolution of worldwide cdma2000-based 3G networks.

- **DVB-H (Digital Video Broadcasting - Handheld)** - an ETSI standard adapted from the DVB-T (Digital Video Broadcasting - Terrestrial) standard to support IP datacasting to mobile devices.

- **ISDB-T (Integrated Service Digital Broadcasting - Terrestrial)** - a standard developed by the Japanese Association of Radio Industries and Business (ARIB) that encompasses digital TV and digital audio broadcasting as well as mobile IP datacasting.

- **T-DMB (Terrestrial Digital Multimedia Broadcasting)** - a Korean standard adapted from the Eureka 147 DAB (Digital Audio Broadcasting) standard to deliver video, audio, and data services via MPEG-2 Transport Streams to mobile devices.

- **MediaFLO (Media Forward Link Only)** - a proprietary Qualcomm multimedia broadcast system targeted for deployment in the US.
### Other Mobile Broadcast Technologies (2/2)

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<th>DVB-H</th>
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<td>OFDM (DQPSK, QPSK, 16-QAM, 64-QAM)</td>
<td>OFDM (QPSK, 16-QAM, &quot;layered modulation&quot;)</td>
<td>OFDM (QPSK)</td>
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*MBMS is one of a number of current and future mobile multimedia broadcast technologies*
Summary & Conclusion

- Operators desperately seeking for revenues, broadcasting looks promising
- New project to improve the Broadcasting concept (3GPP rel 7, C-mobile...)
- MBMS is a bearer service that provides an efficient way of transmitting multimedia information to several users simultaneously
- MBMS is most efficient when several users are receiving the same service at the same time in a localized area
- MBMS will be competing with 3G P-t-P and DVB-H connections
References

- The course book

- *Multimedia Broadcast Multicast Service - Technology Overview and Service Aspects*, A. Bone, E. Launay, T. Mienville, P. Stuckmann


- Mobile Broadcast/ Multicast Service Whitepaper, MediaLab TeliaSonera
The End

Thank You