

Panasonic R&D Center Germany GmbH (PRDCG)

Panasonic Frankfurt Laboratory (PFL)



MBMS and its Evolution in 3GPP

VDE/ITG-FG 5.2.4

Workshop – Mobile TV

20. September 2007

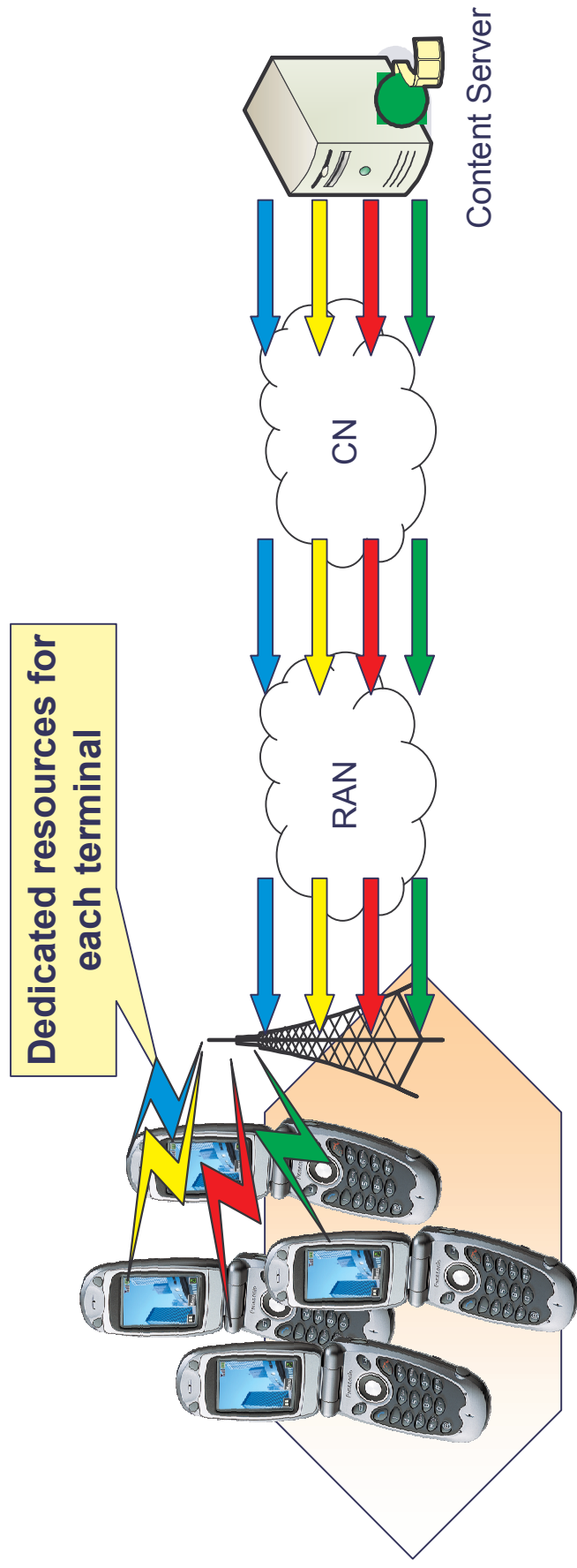
Outline

- Background and Motivation
- MBMS in UMTS (3G)
 - Functional Layers
 - Architecture
 - Shortcomings
- MBMS in SAE/LTE (3.9G, Super 3G)
 - Enhancements
 - Architecture
 - Functional Layers
- Trends
 - MBMS – Quo Vadis?

Traditional delivery of multimedia content

3GPP Packet Switched Streaming (PSS)

- IP-based streaming service using point-to-point delivery scheme
- Started in Rel-4, Standard available since Rel-5 (2002)



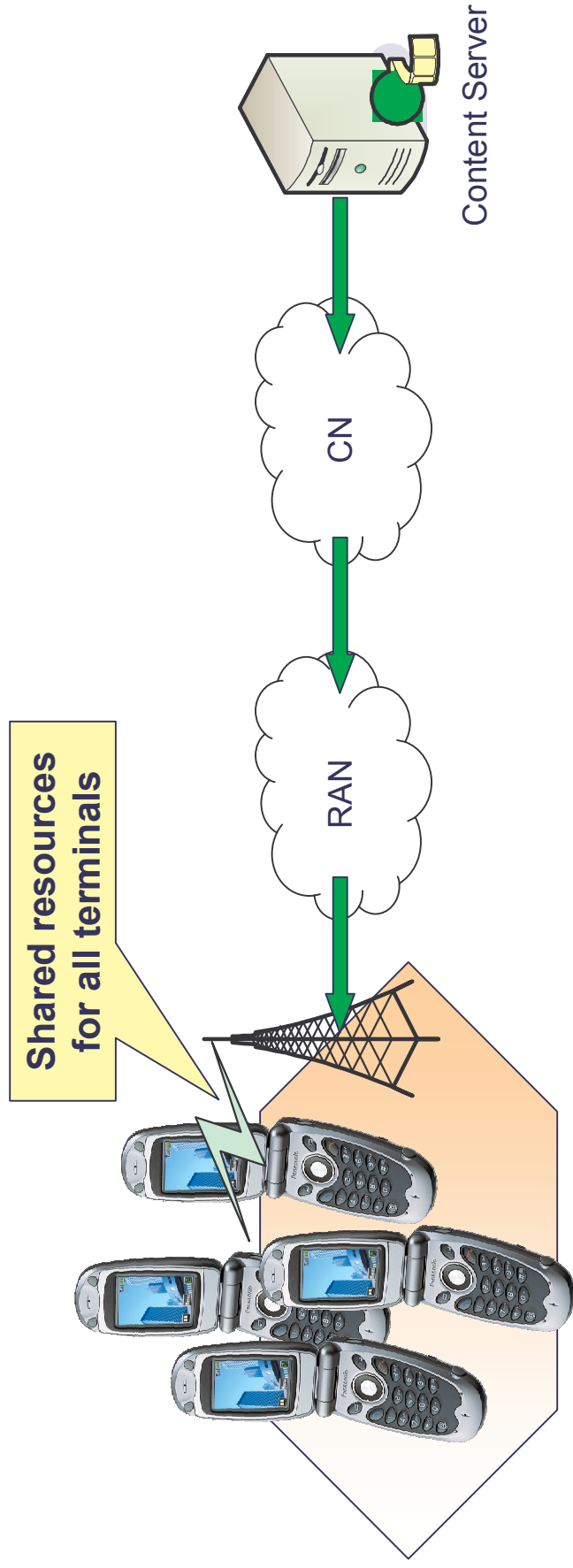
Required resources depend on number of mobile terminals

Does not scale for large number of users consuming same content

Delivery of multimedia content using MBMS

3GPP Multimedia Broadcast/Multicast Service (MBMS)

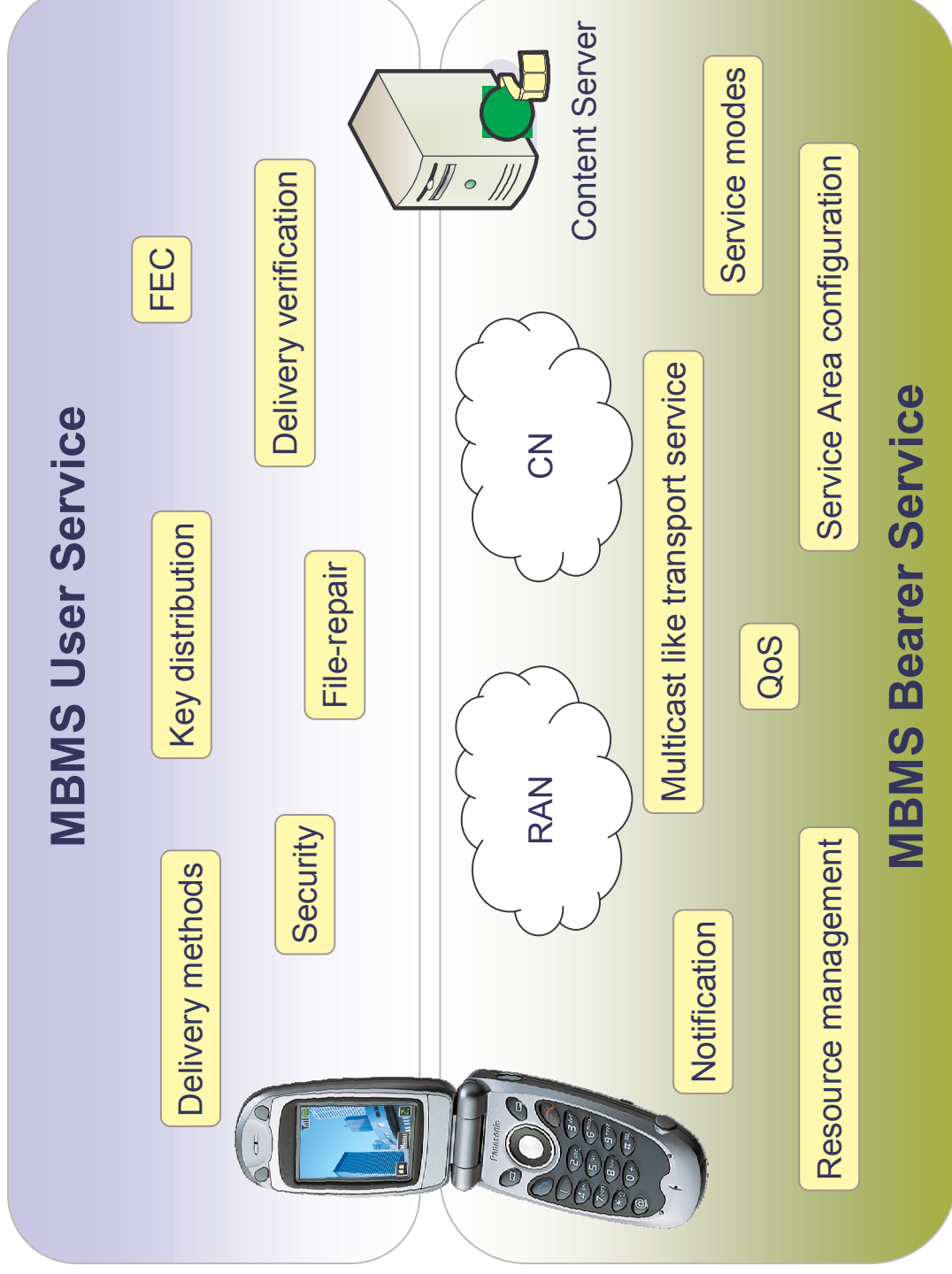
- Offering point-to-multipoint delivery scheme
- Started in Rel-5, Standard available since Rel-6 (2005)



Required resources are independent of number of mobile terminals
Resource savings in the network and in the cells

MBMS functional layers

MBMS architecture is separated in two functional layers



MBMS Bearer Service in UMTS

- Multicast service mode
 - Requires (authorised) service activation by the UEs
 - MBMS service is **distributed to interested users** located in the MBMS Service Area (e.g. switching between P-t-P and P-t-M based counting procedure)
- Broadcast service mode
 - No Service Activation, **service can be received by any UE**
 - Service is distributed to entire MBMS Service Area independent of presence of interested UEs
- QoS
 - **Background traffic class:** no guaranteed resources, higher SDU error ratio (packet loss)
 - **Streaming traffic class:** guaranteed bit rate, lower SDU error ratio

MBMS User Service in UMTS

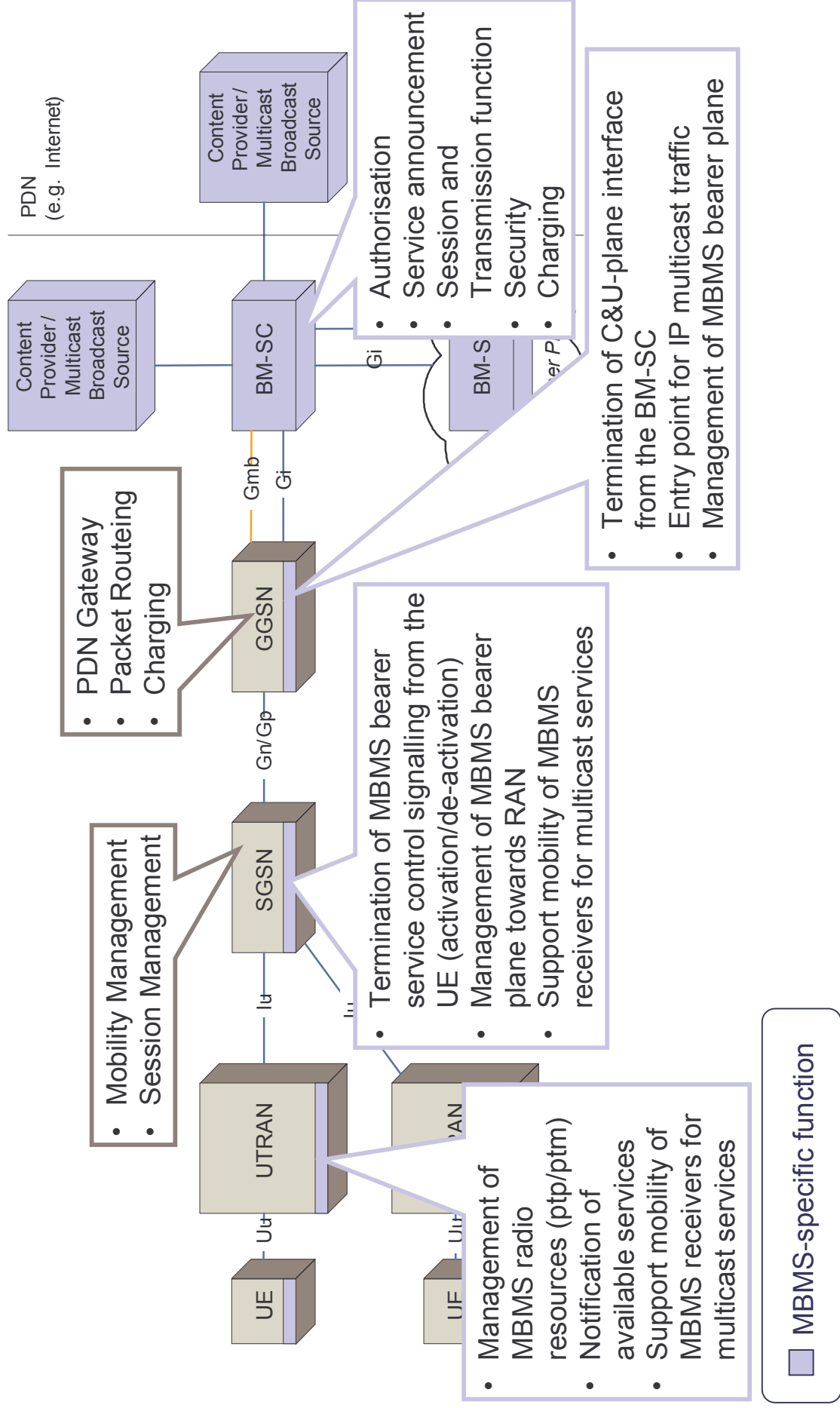
- Download delivery method
 - Delivery of discrete objects using FLUTE protocol
 - **Push-type services**, e.g. distribution of audio/video files during night time
- Streaming delivery method
 - Delivery of continuous media using RTP/RTCP protocol
 - **Streaming-type services**, e.g. live content or news clips
- Supported media codecs
 - **H.264**, H.263 for video
 - **Enhanced aacPlus**, Extended AMR-WB for audio
 - Variety of other codecs for
 - Speech, Synthetic audio, Still images, Vector graphics, Timed text, 3GPP file format, Scene Description

MBMS User Service in UMTS

- File Repair Procedure
 - **Lossless reception** for download delivery method
 - Point-to-point or point-to-multipoint repair
- Reception Reporting Procedure
 - **Acknowledgements** for download delivery method (e.g. charging purposes)
 - **Statistical reporting** for streaming delivery method (e.g. QoE for streaming services)
- Application level Forward Error Correction (FEC)
 - Can be used with download and streaming delivery methods to improve reception at the UEs
- MBMS Security
 - Provides authentication, key distribution and data protection for a MBMS User Service

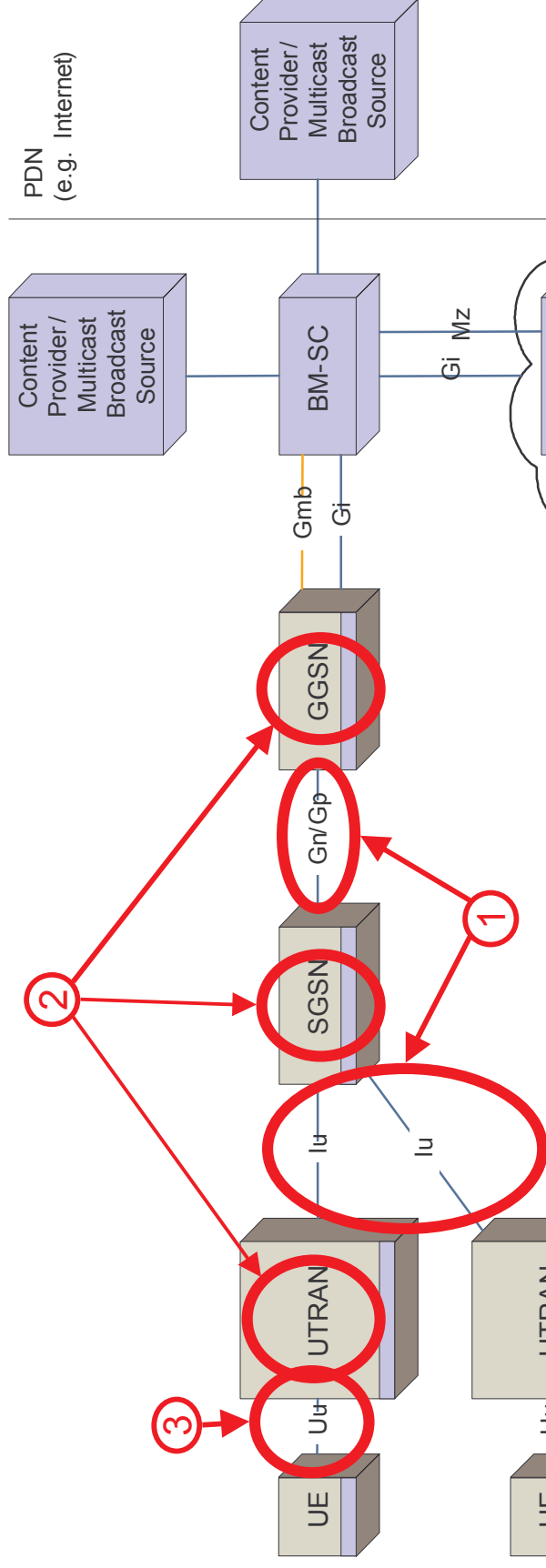
MBMS architecture in UMTS (3G)

Integrated into existing UMTS entities by addition of new functional entities



MBMS architecture in UMTS (3G)

Limitations of MBMS in UMTS



① MBMS bearer plane is based on shared (GTP) tunnels, which utilise unicast connections between peers (e.g. SGSN<->UTRAN)

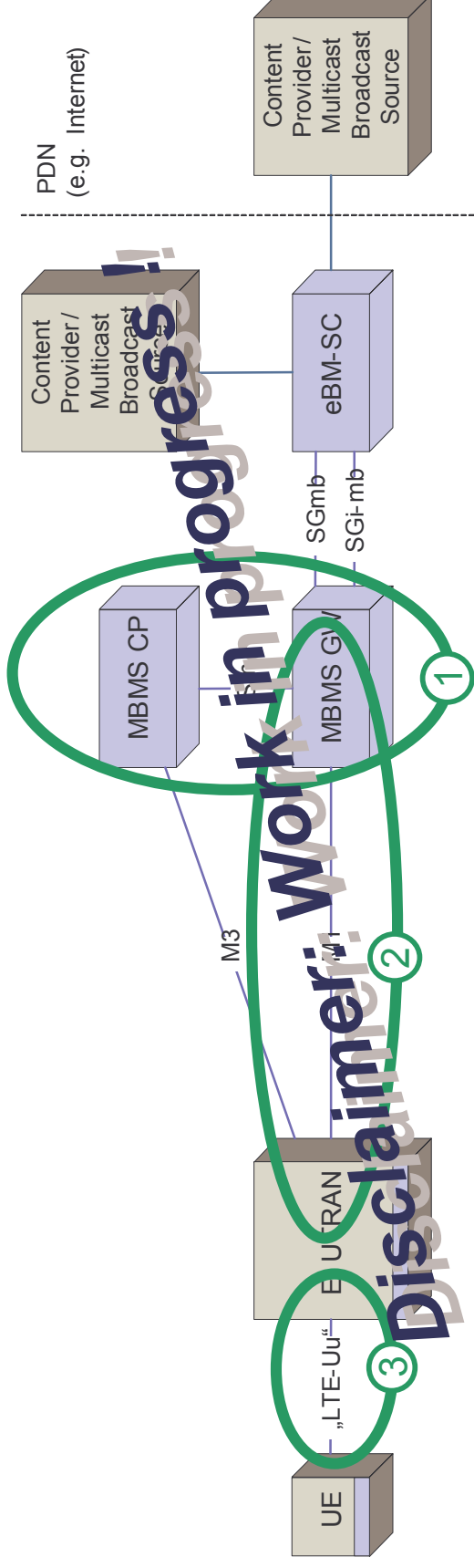
② Complex tunnel management and context establishment for MBMS

③ Inefficient point-to-multipoint radio (compared to P-t-P)

■ MBMS-specific function

MBMS architecture in SAE/LTE (3.9G)

Enhancements of MBMS in SAE/LTE



① Separation between MBMS control and user plane functions

Utilisation of native IP multicast for content distribution

② Simple MBMS bearer management (i.e. join/leave IP multicast group)
No MBMS context establishment by UE

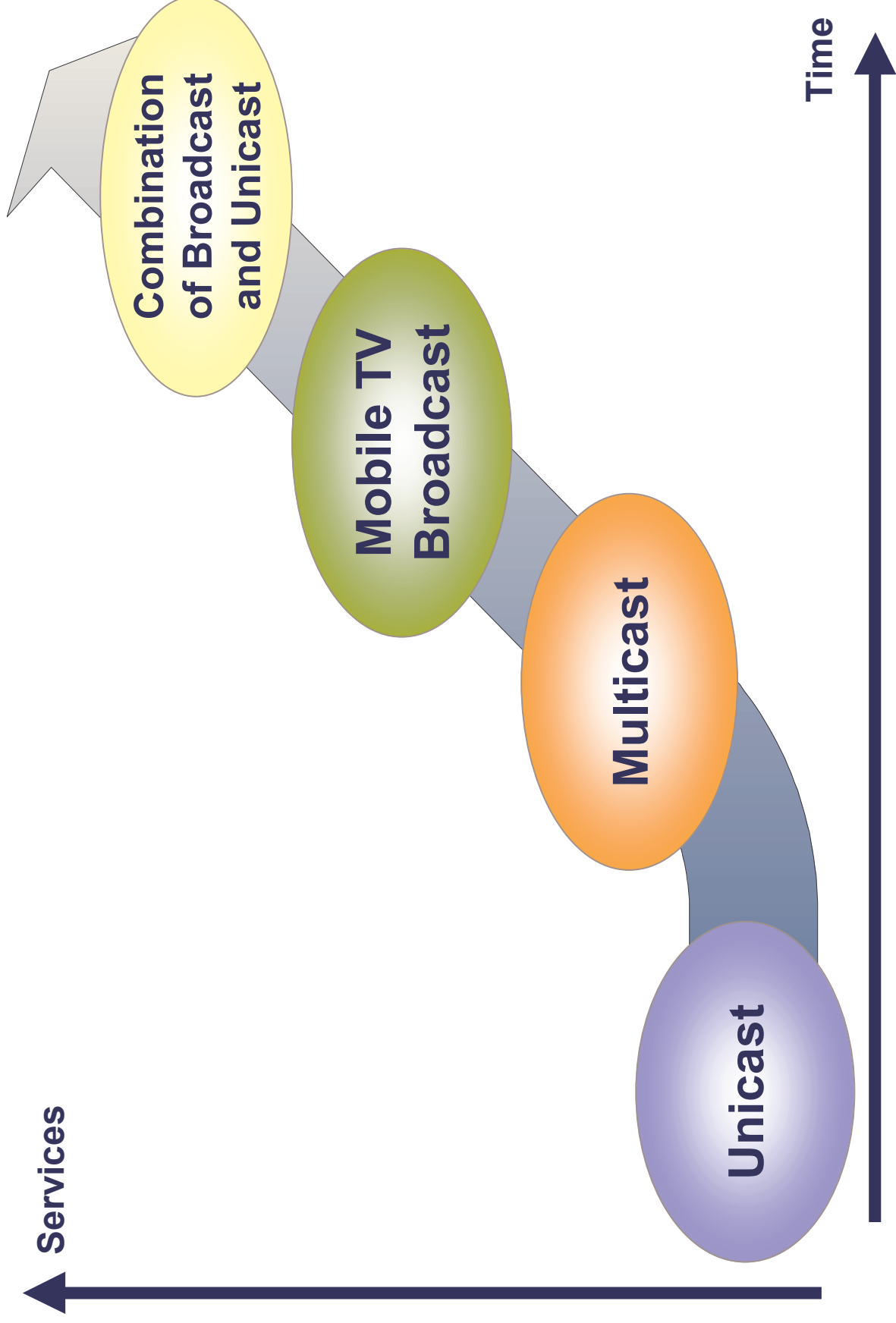
③ High gain from SFN transmission mode

■ MBMS-specific function

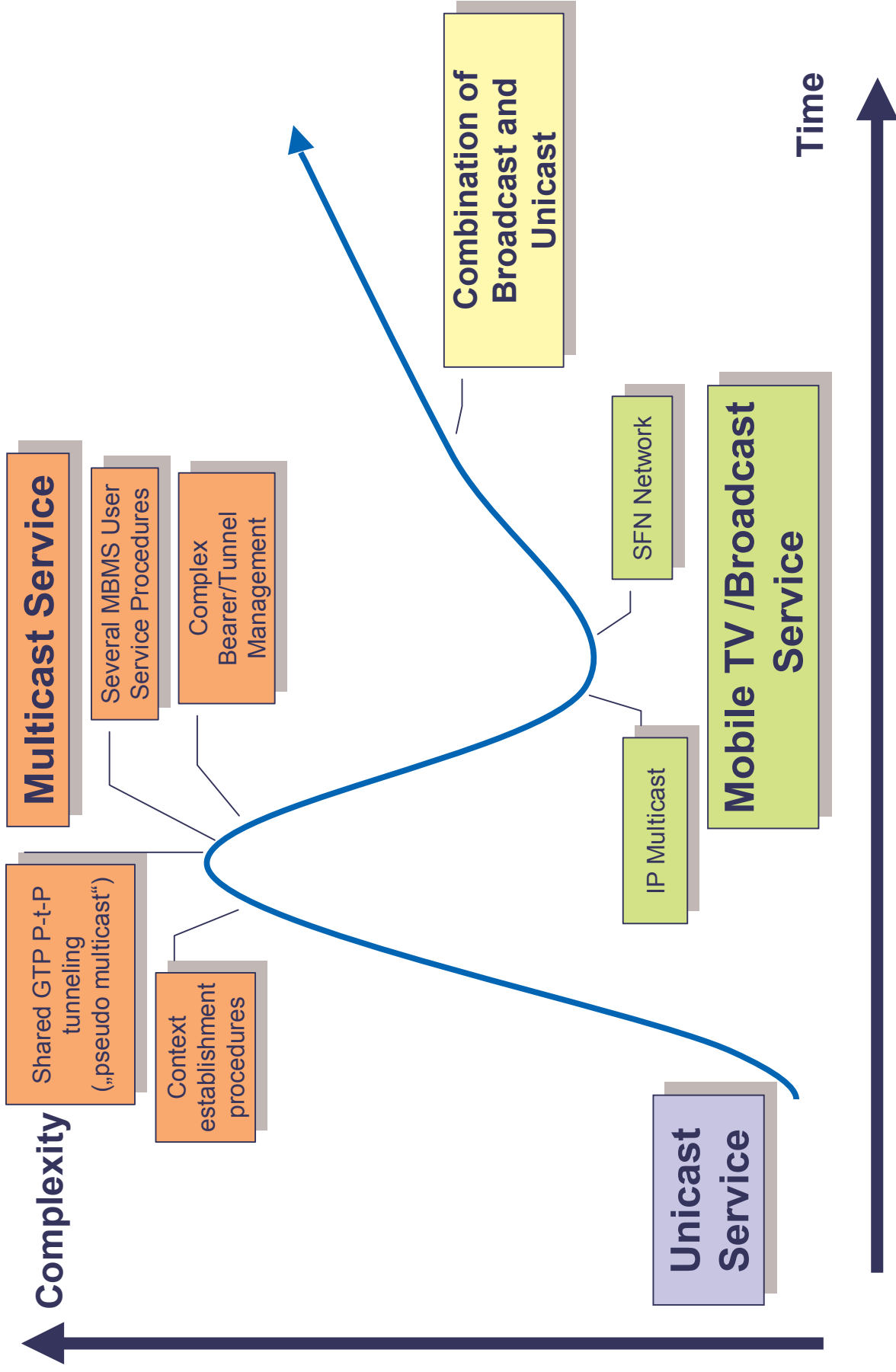
MBMS Bearer Service in SAE/LTE

- Broadcast service mode
 - Similar to Broadcast service mode in UMTS (but support for SFN)
 - For content that **needs to be available in the entire MBMS Service Area** at any time, e.g. 24/7 broadcasts or emergency services
- Enhanced Broadcast service mode
 - **Optimise radio resource utilisation** based on the number and location of UEs in the MBMS Service Area, e.g. using counting mechanism
 - For content for a particular/interested group of users, e.g. based on the topic or based on the time of day
- MBMS transmission in E-UTRAN
 - Multi-cell transmission, utilising **SFN transmission from several cells**
 - Combination of single-cell and multi-cell transmission in the MBMS Service Area
 - Dedicated uplink feedback for single-cell transmission allowing utilisation of adaptive modulation and coding (AMC)

Service Trends



Complexity Trends



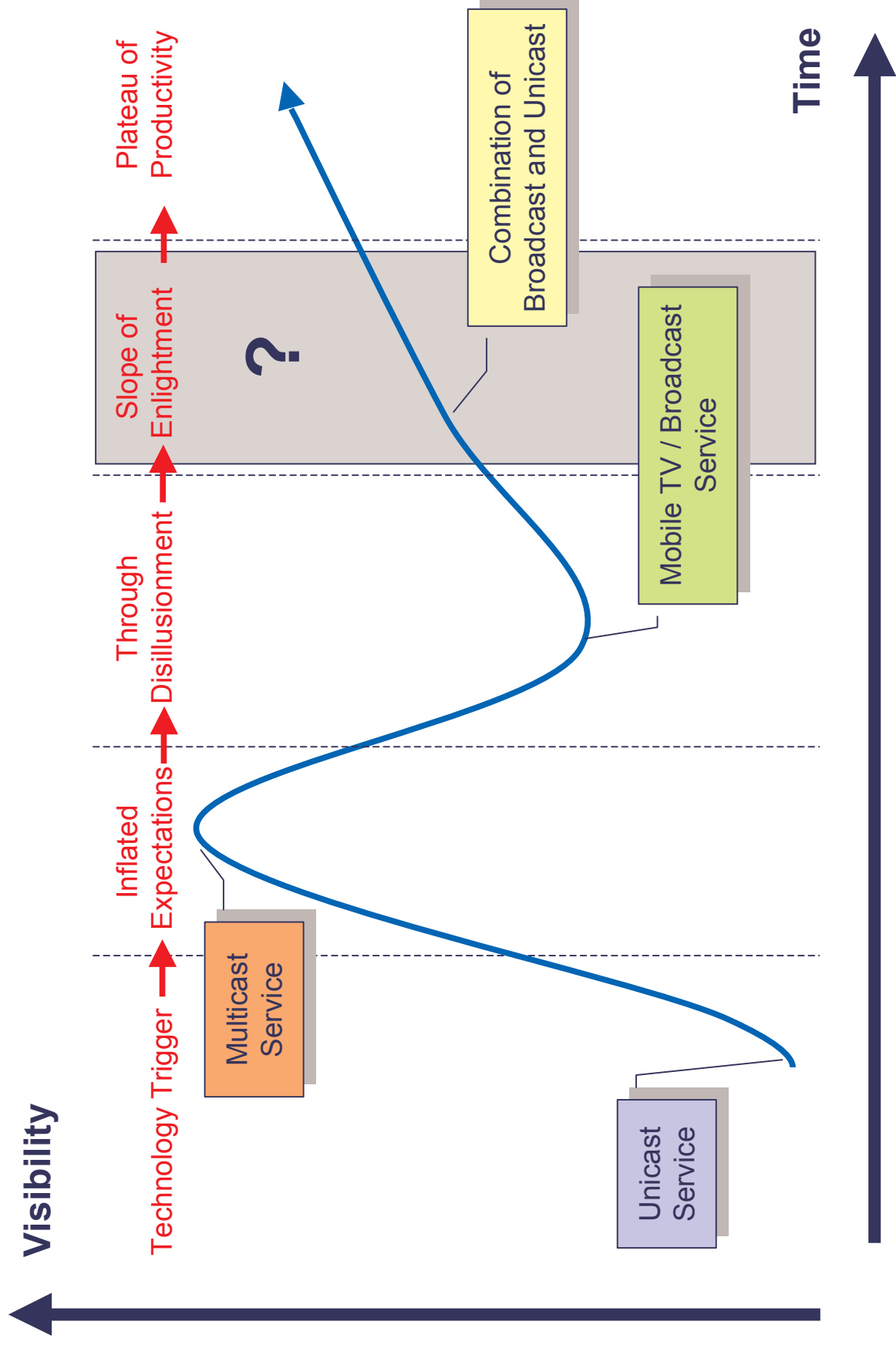
Conclusions

Mobile TV

or

MBMS – Quo vadis ?

The „MBMS Hype Cycle“



Thank You

Any Questions ?

ANNEX

MBMS Codes defined in 3GPP TS 26.346

- Video
 - H.264 (AVC) Baseline Profile Level 1.2
 - H.263 profile 0 level 45
- Audio
 - Enhanced aacPlus
 - Extended AMR-WB
- Speech: AMR, AMR wideband
- Synthetic audio: Scalable Polyphony MIDI (SP-MIDI)
- Still images: ISO/IEC JPEG, JFIF
- Bitmap graphics: GIF87a, GIF89a, PNG
- Vector graphics: SVG Tiny 1.2, ECMAScript
- Text, Timed text
- 3GPP file format
- Scene Description: 3GPP DIMS