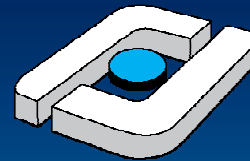


# Is 3G MBMS suitable for Video?

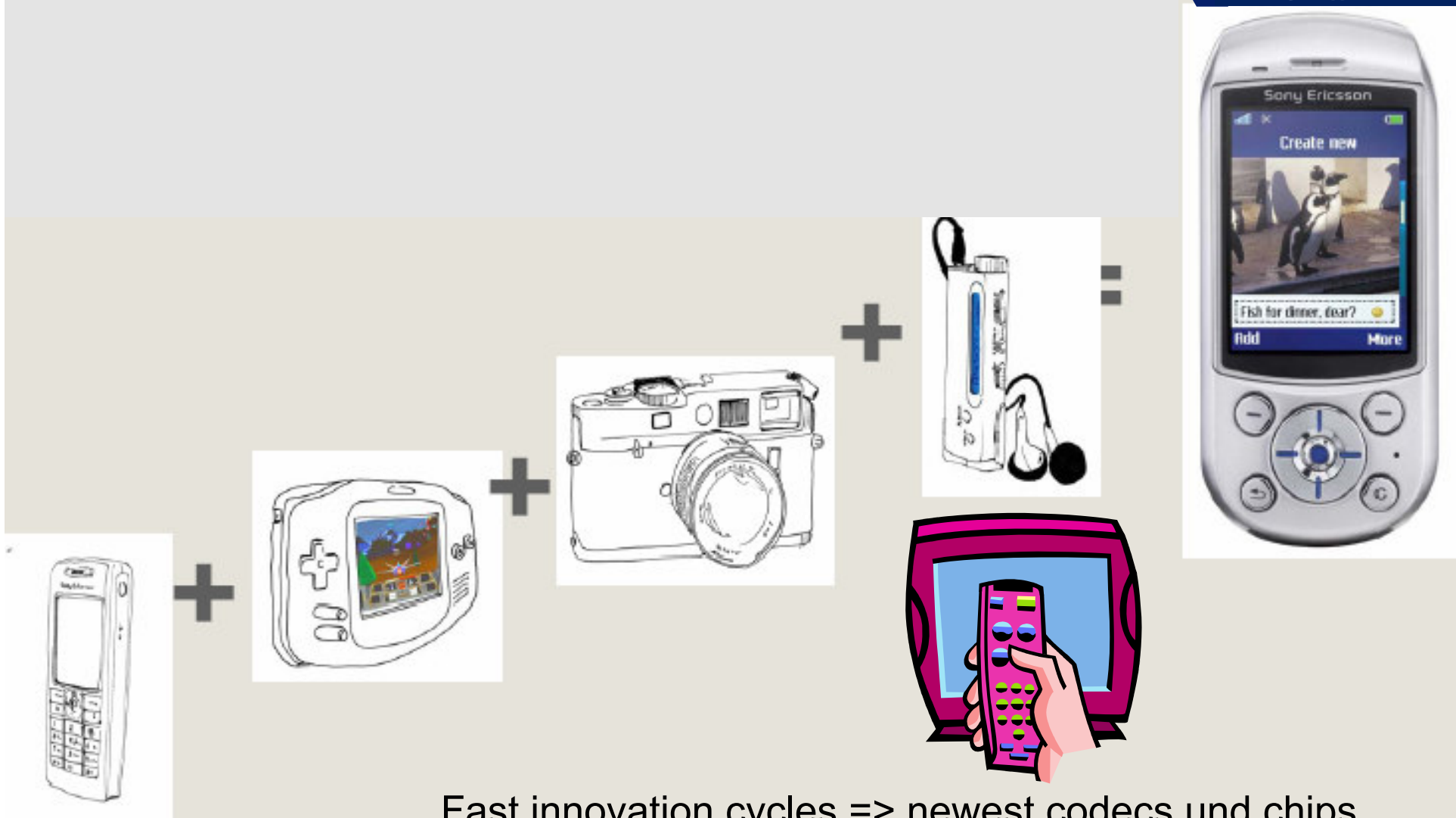
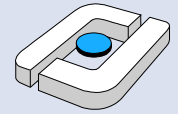


**Prof. Ralf Tönjes**

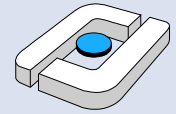
**University of Applied Sciences  
Osnabrück, Germany**



# The Mobile Phone Today



# The Mobile Worlds View



## Today:

Service differentiation to attract new customers

- Highly personalized person-to-person or on-demand services

## For Tomorrow:



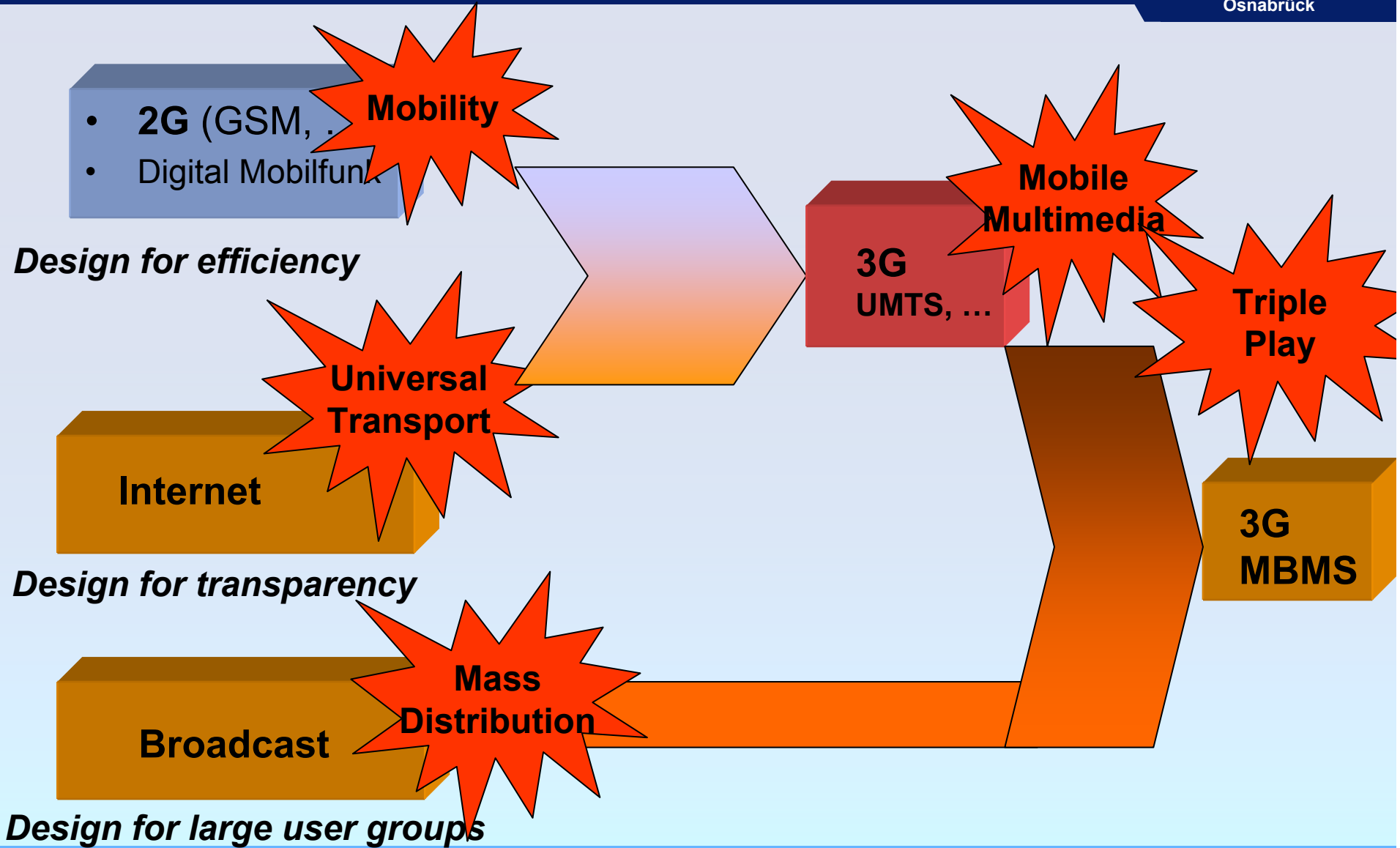
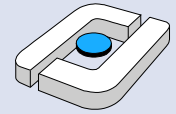
### ”Multimedia Channels”

- Channel concept: Content is aggregated into few channels and pushed to many users (e.g. TV)
- Successfully employed today by mobile operators: content-to-person MMS goal notification (one club = one channel), TV “re-broadcast”

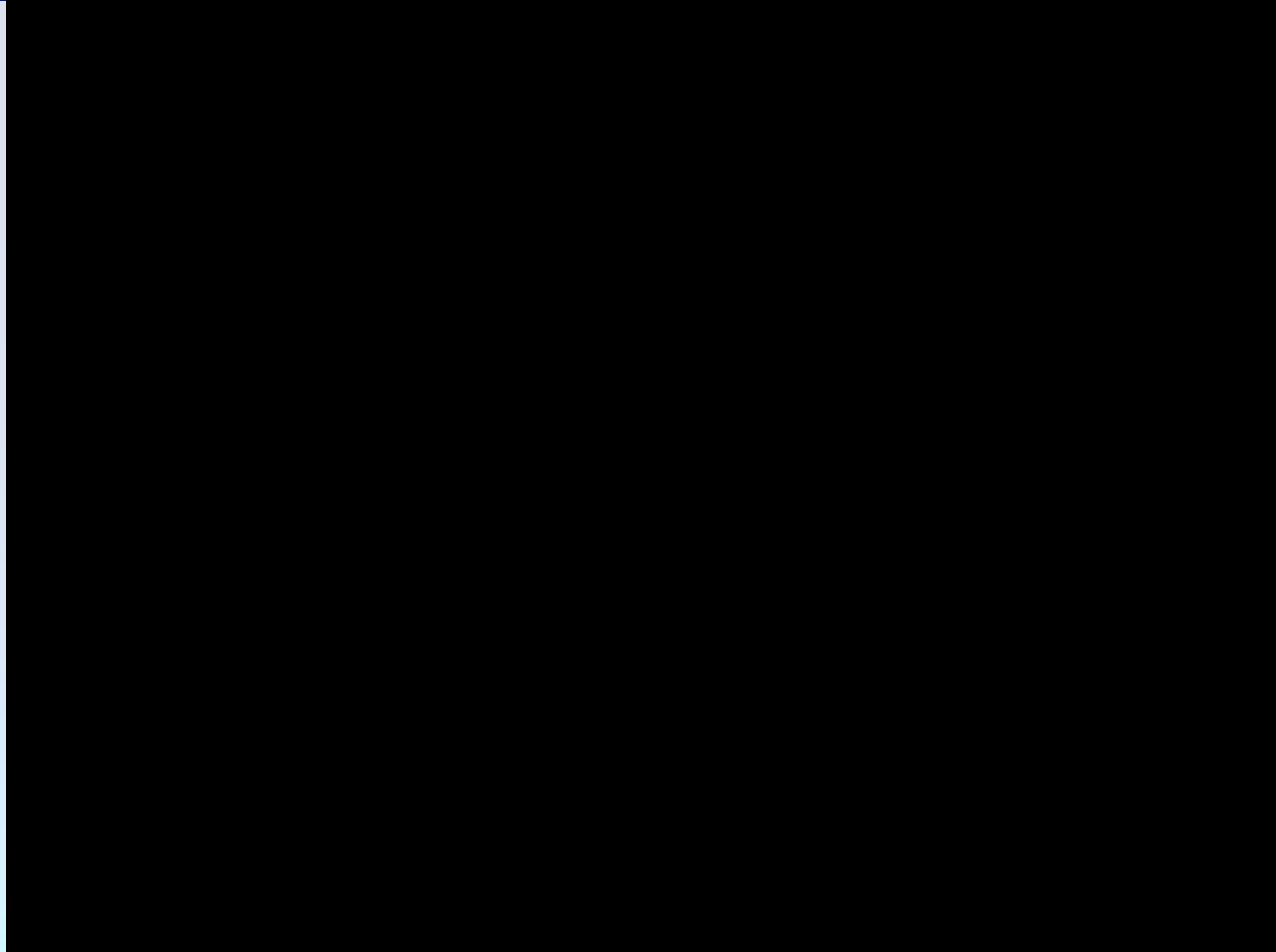
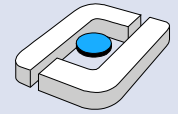
**Channel delivery requires broadcast!**



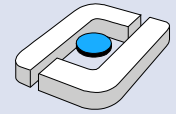
# Triple Play



# MobiTV commercial

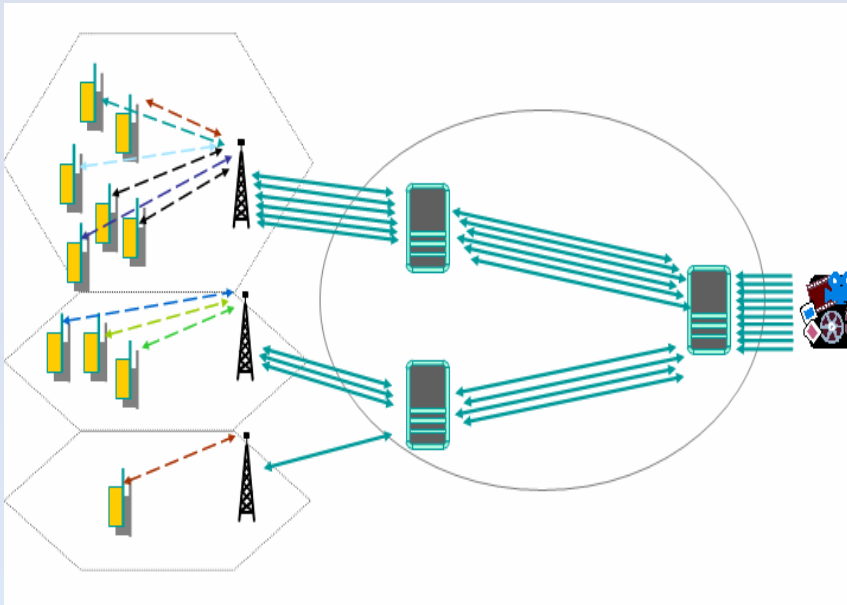


# Multicast: Efficient Usage of Common Resources



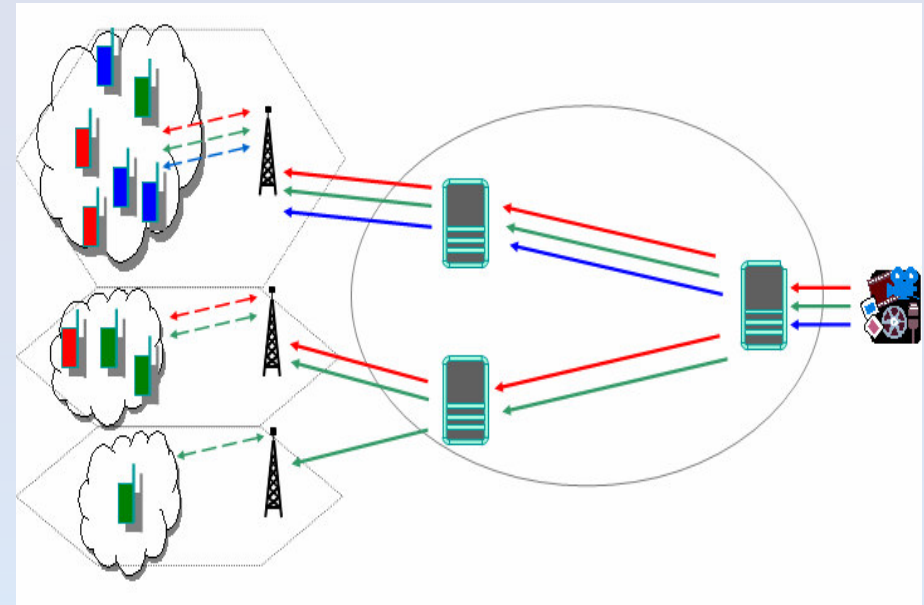
University of Applied Sciences  
Osnabrück

## Unicast



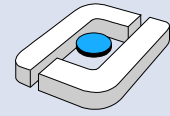
One bearer for each user  
**inefficient, does NOT scale**

## Multicast



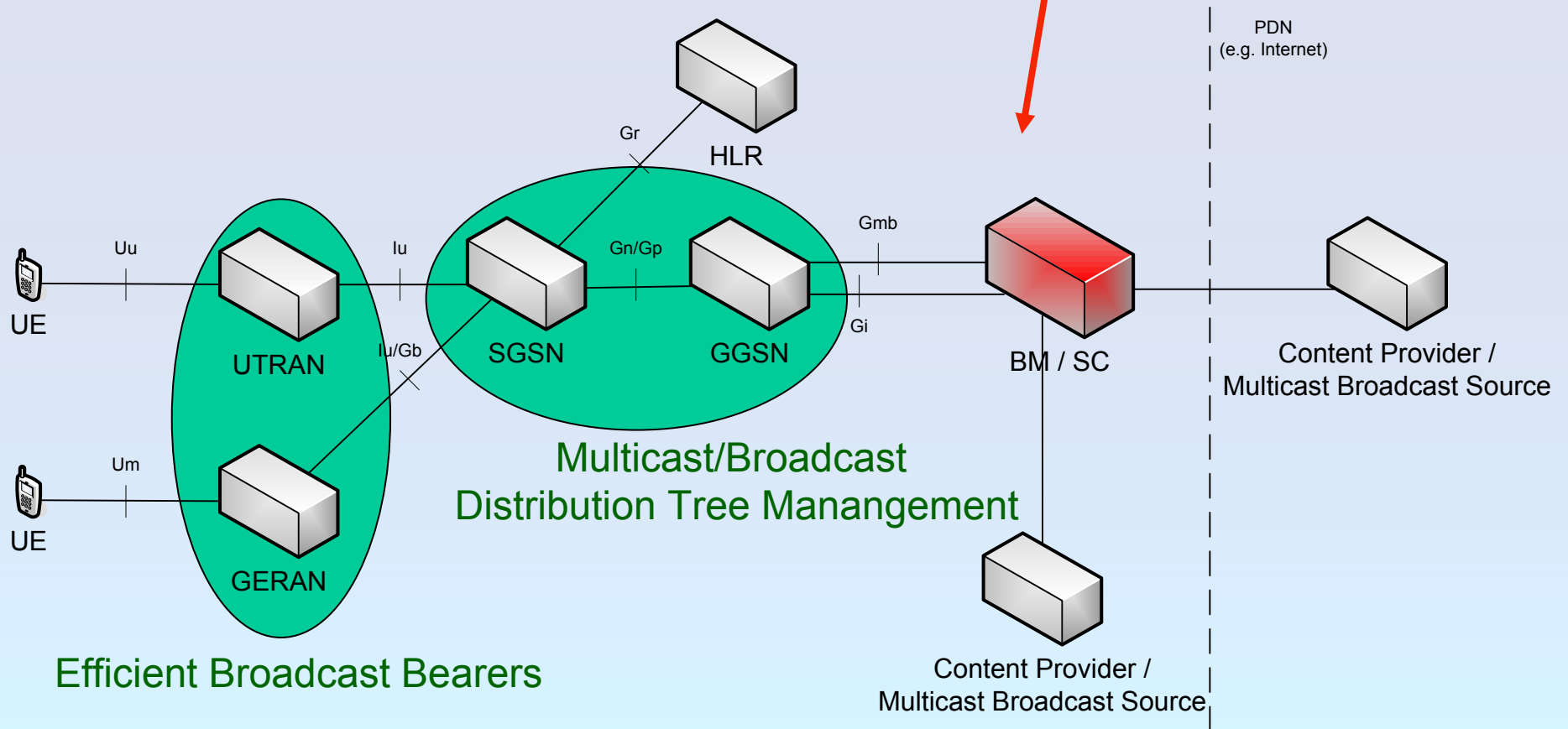
One bearer for each content  
**More efficient, does scale**

# MBMS Architecture

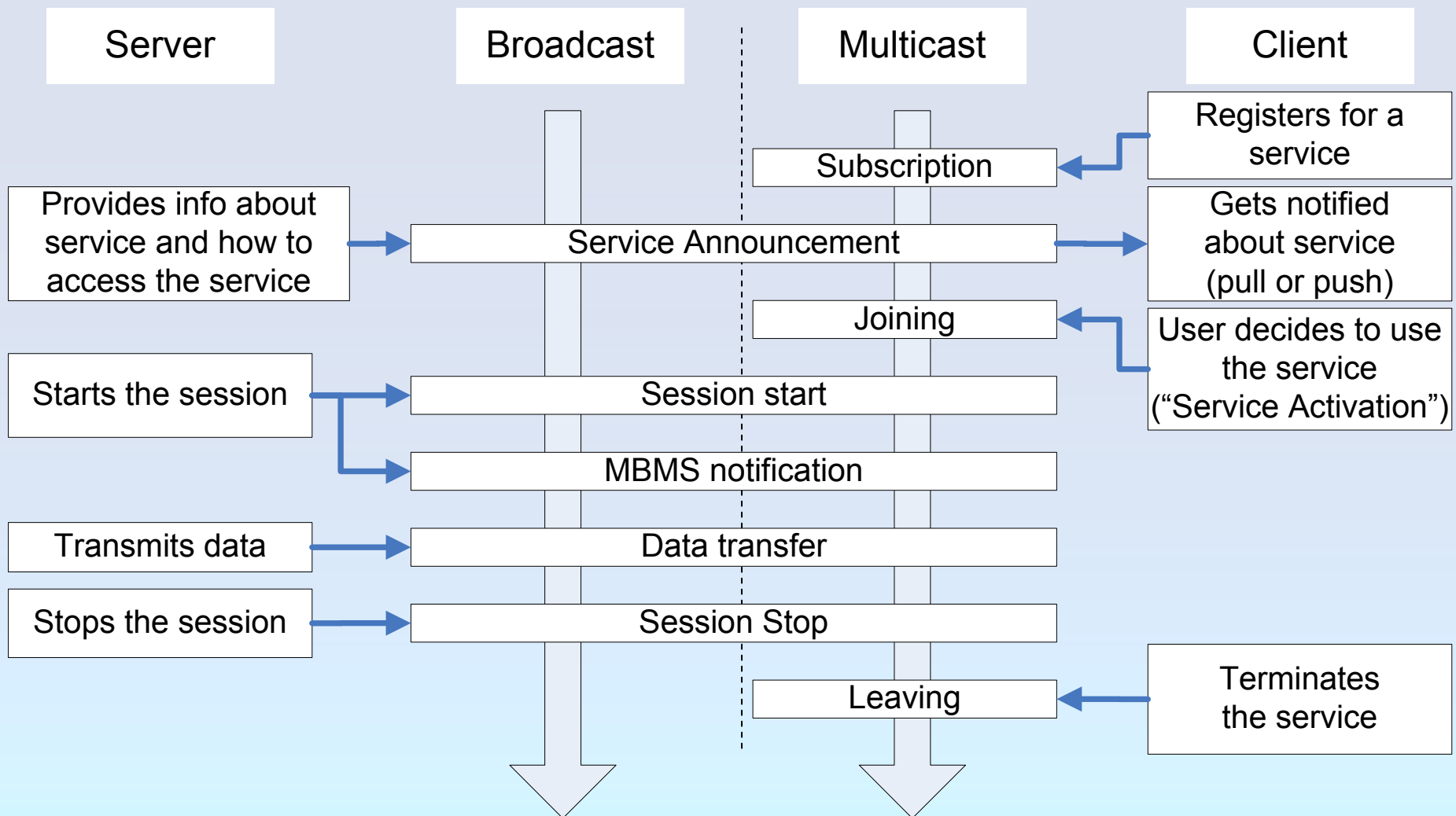
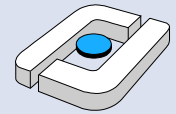


(UMTS Release 6, 2005)

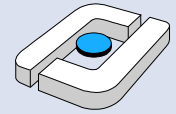
New:  
Broadcast/Multicast  
Service Center



# Session Set-up



# Protocols and Codecs



## Voice:

- AMR narrow-band speech codec
- AMR wideband speech codec

## Music:

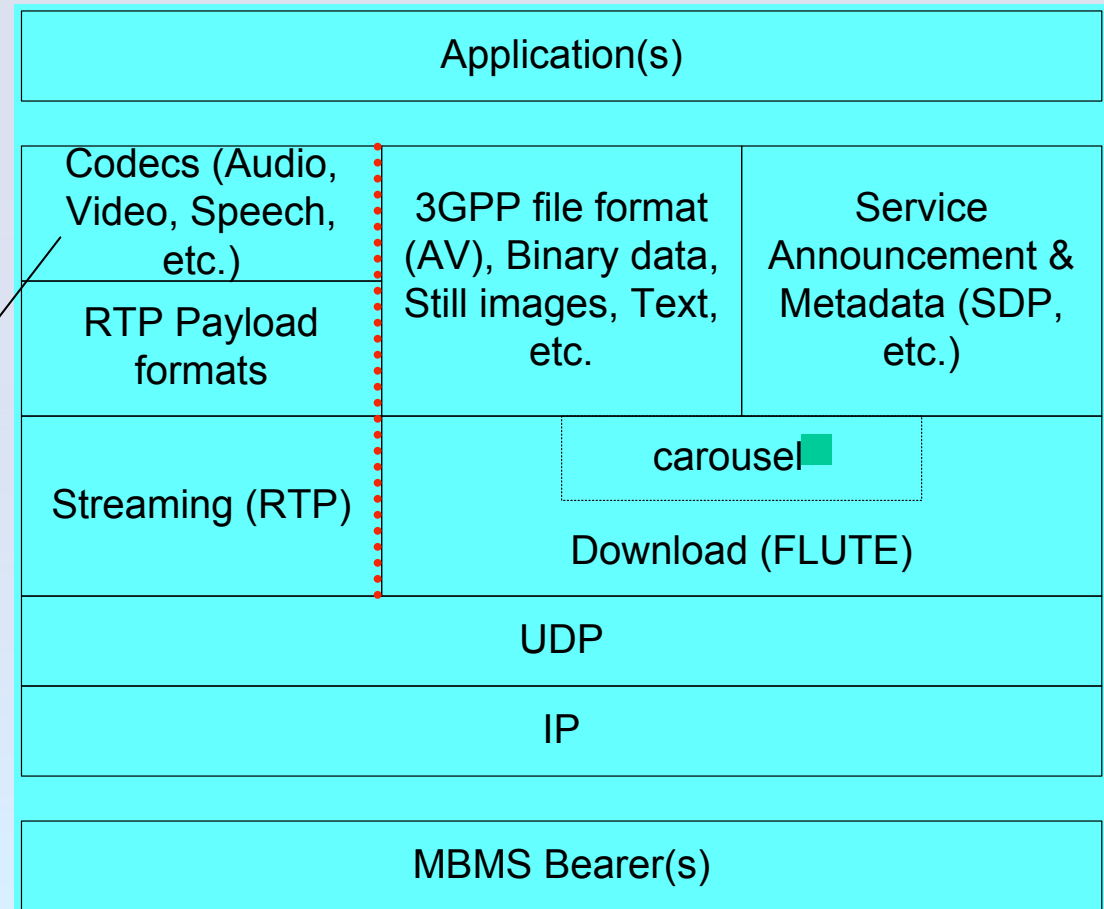
- Extended AMR-WB codec
- Enhanced aacPlus codec

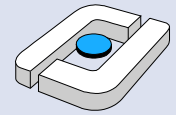
## Video:

- H.264 (AVC) video codec

## Download:

- FEC with raptor codes
- File repair mechanisms

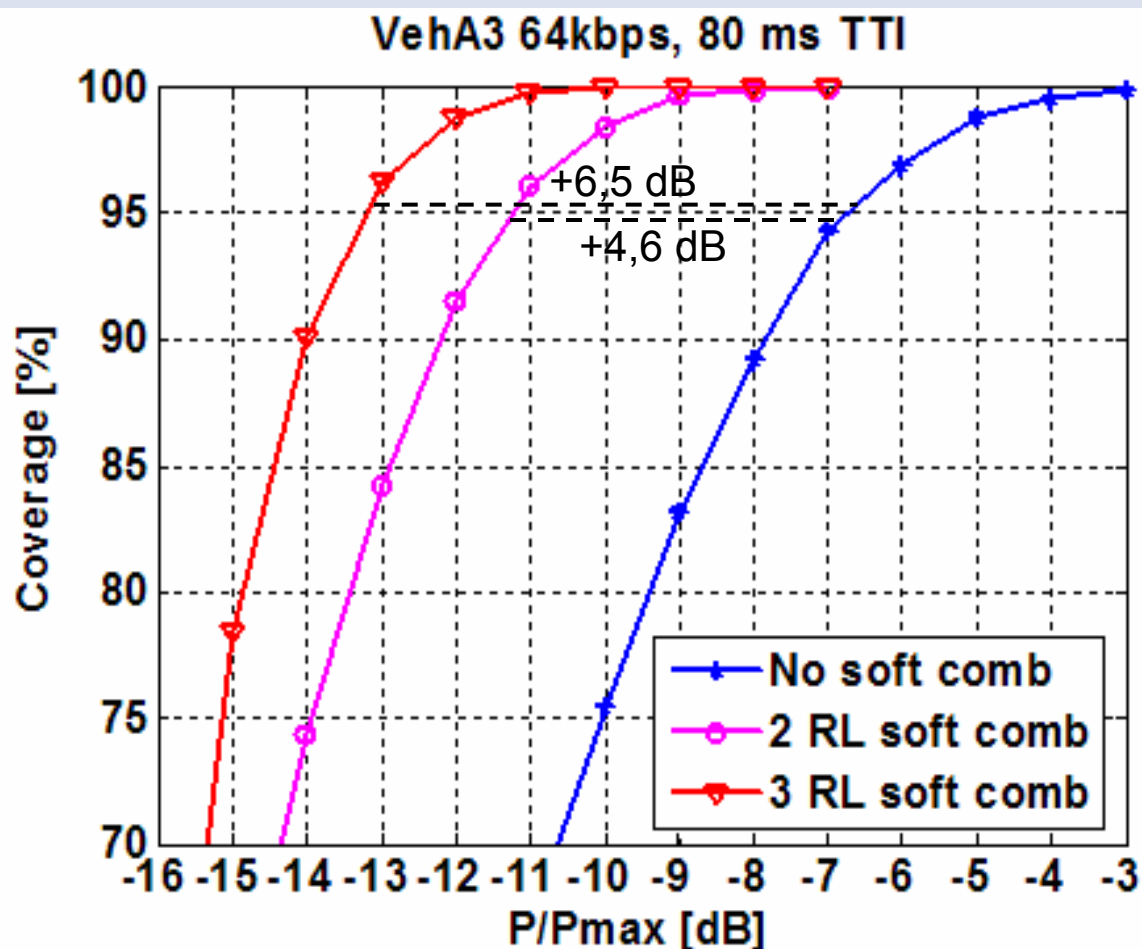




# Capacity of Radio Channel

- GERAN: 32-128 kbps per bearer
- UTRAN: 64-256+ kbps per bearer (16 p-t-m channels at 64 kbps = 1 Mbps)

(7-30 % cell power)

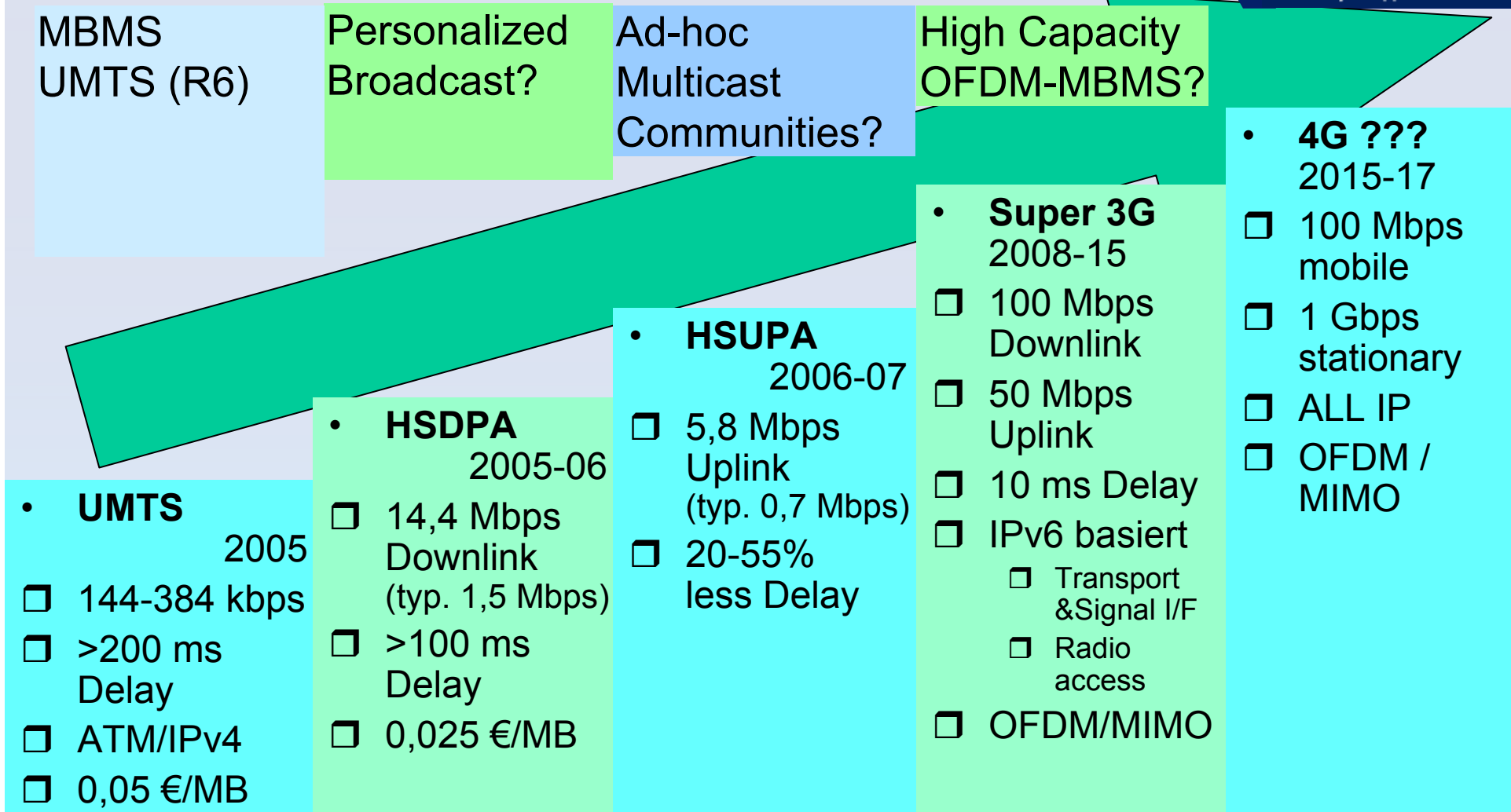
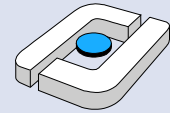


## Opportunity:

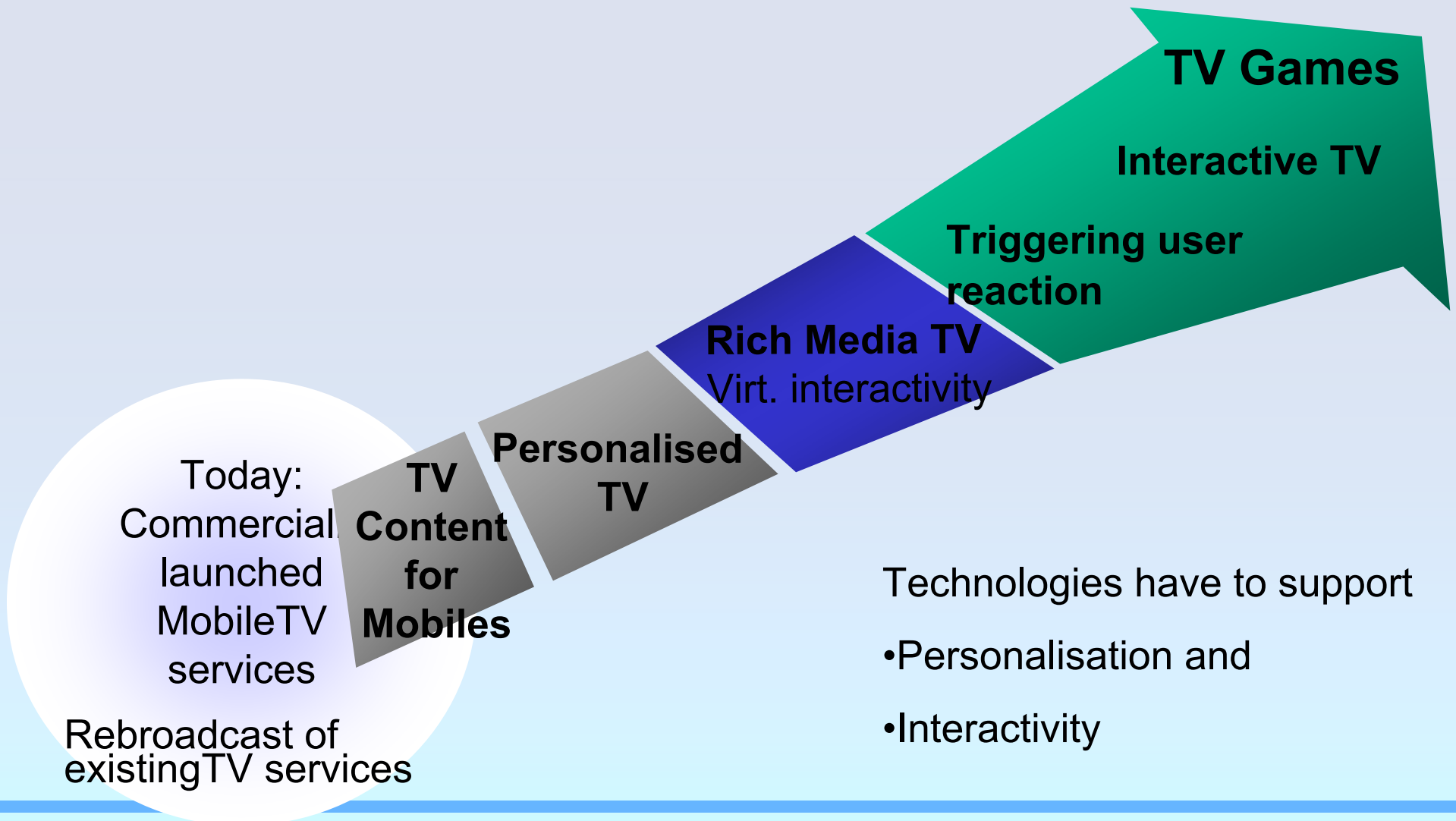
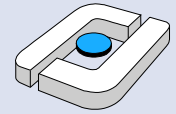
Increase MBMS capacity  
(using 80% cell power)

- soft combining  
> 1 Mbps with UE
- soft combining plus  
receiver diversity  
> 1.7 Mbps with UE

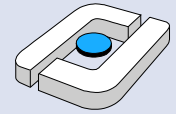
# Mobile Communication Roadmap



# Mobile Broadcast Service Evolution



# Conclusion



Seamless integration of broadcast/multicast into 2G/3G

- New function (“Broadcast/Multicast service center” BM-SC)
- Extensions in Core- and Radio Network for new MBMS context
- New multicast radio access bearers
  - GERAN: 32-128 kbps
  - UTRAN: 64-256 kbps
  - > 1 Mbps with UE soft combining



Users subscribe to channels:

- MBMS is a capacity booster
- Streaming + MBMS = Mobile TV
- Messaging + MBMS = Mass content push



Interactive Mobile Broadcast Services offer new service opportunities  
=> efficiently achieved by 3G + MBMS