# T-110.1100

# Mobile Multimedia

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# Mobile networks

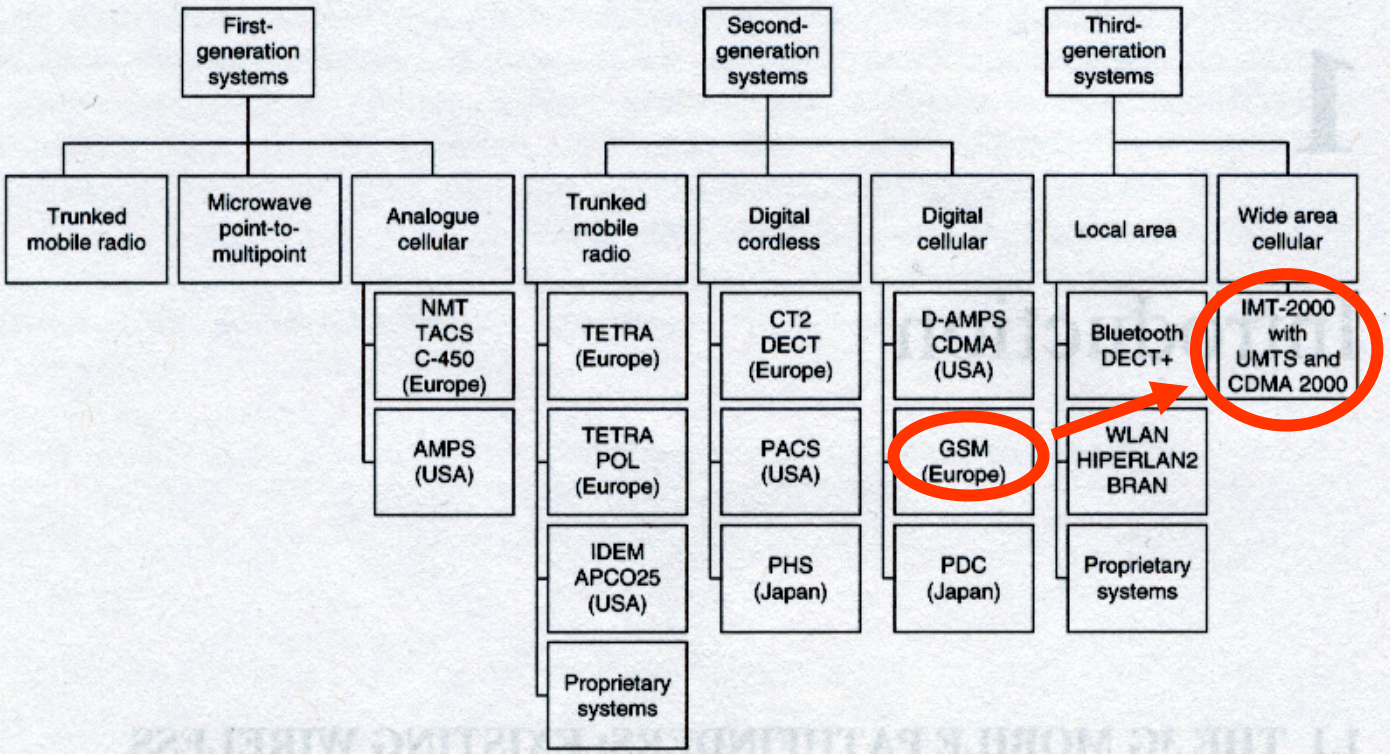



**Figure 1.1** Wireless technologies. *Source*: Huber and Huber (2002).

Source: Eylert 2005

# UMTS evolution

• the original success of GSM created excessive expectations of the market demand for the third generation mobile technologies

• originally 3G was planned to be a revolutionary concept especially in the research domain, which would renew the whole 2G network infrastructure

• the original target of UMTS was not only to increase the capacity of basic voice services like in the GSM case, but rather to enable the convergence of Internet and mobile networks

• 3G was then seen as a platform of fully integrated voice and data as well as fixed and mobile communications

# UMTS evolution

- USA has own CDMA2000 system, which is an evolution from 2G CDMA, while Japan operator NTT DoCoMo decided to join the European effort, China also introduced its own 3G radio interface called TD SCDMA
- ETSI delegated the UMTS specification work to a co-operative organization called 3GPP, while the 3GPP2 project was established to develop the rival CDMA2000 standard
- 3GPP started to produce specifications for UMTS efficiently and the first 3GPP R99 specification was ready in 2000
- it was also decided that UMTS would use the existing core network of GSM with GPRS, practically this meant that it is very difficult to operate UMTS without legacy GSM network
- the main new aspect was the radio network UTRAN, which contained a new controller called RNC and base stations that increased transmission speeds up to 2 Mbit/s per mobile user and even more by the incremental development of modulations like HSDPA

# UMTS evolution

• NTT DoCoMo was also the first operator who offered commercial 3G services, which began in Japan in 2001 by the name FOMA (Freedom of Mobile Multimedia Access)

• when the mobile hype was in the hottest phase, several European countries decided to award UMTS licences for the operators on the basis of an auction procedure

• the fear of getting out of the market raised the price of the licences to incredibly high levels especially in Germany and England

• this got the operators into financial trouble and the whole industry stagnated

# UMTS evolution

• the subscribers of the FOMA services did not grow on a level as it had been expected, and it was recognized that all the services that consumers were interested in were already available in their 2G network I-mode concept

• the introduction of video into the mobile environment did not create enough value added to end users compared to costs

• because of these experiences many operators in Europe delayed their commercial UMTS launches until 2004

• thus the original timetables set by the European Union could not be reached

• the operators that made an earlier start suffered from a shortage of UMTS terminals and decreasing prices and increasing competitiveness of GSM services and terminals

# Global mobile market

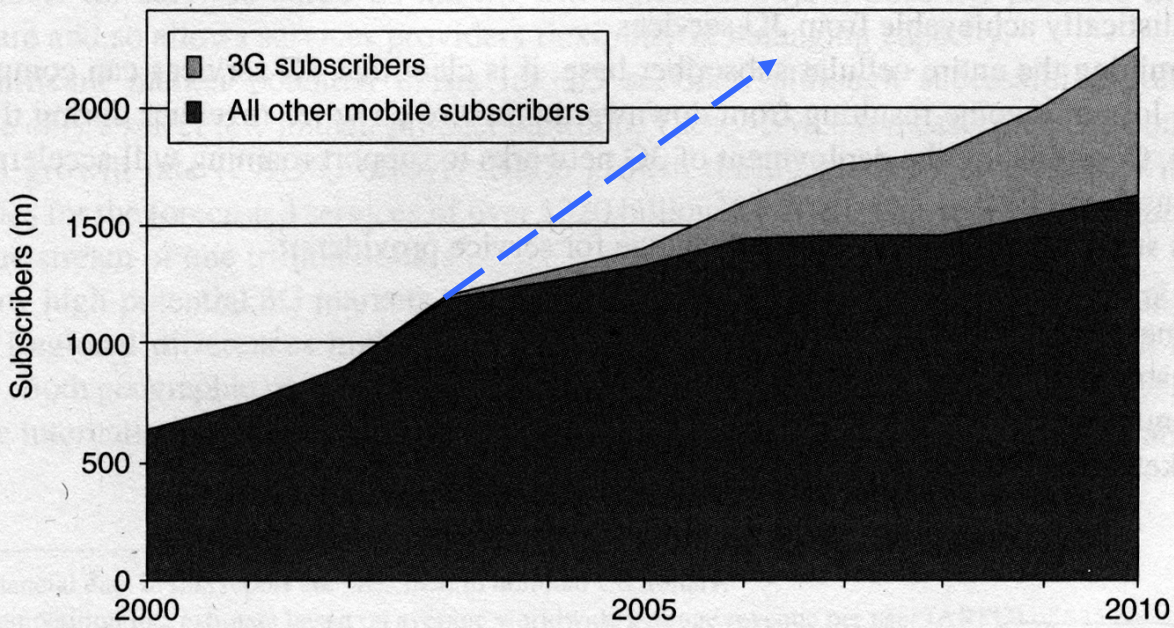
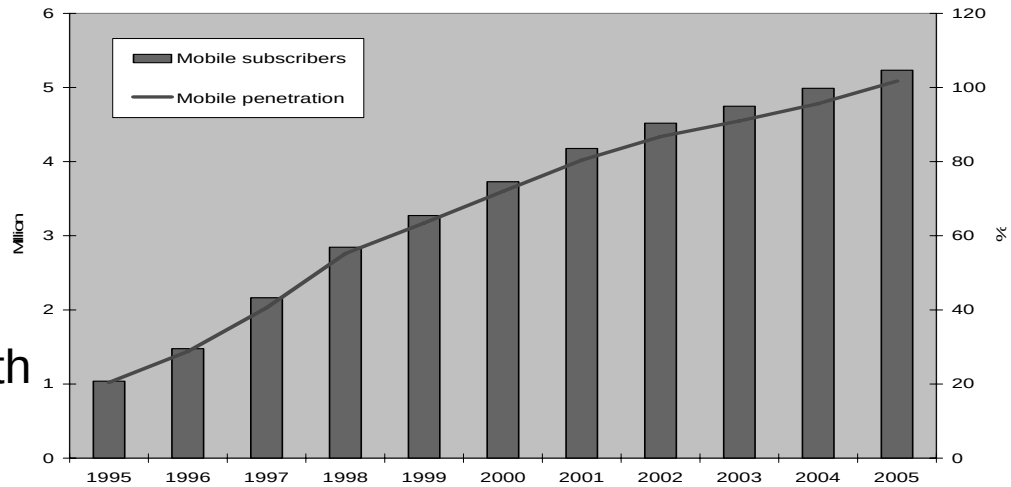



**Figure 2.5** Worldwide mobile market – all subscribers. *Source*: UMTS Forum (2000a).

Source: Eylert 2005

# Mobile market in Finland

- GSM was launched in 1991
- During the 1990s Finland was the forerunner in mobile voice and SMS
- Saturation of mobile subscriptions was reached quite early on in Finland
- Currently only slow growth
- Mobile voice and SMS dominant design, in new mobile multimedia services **no forerunner position** any more

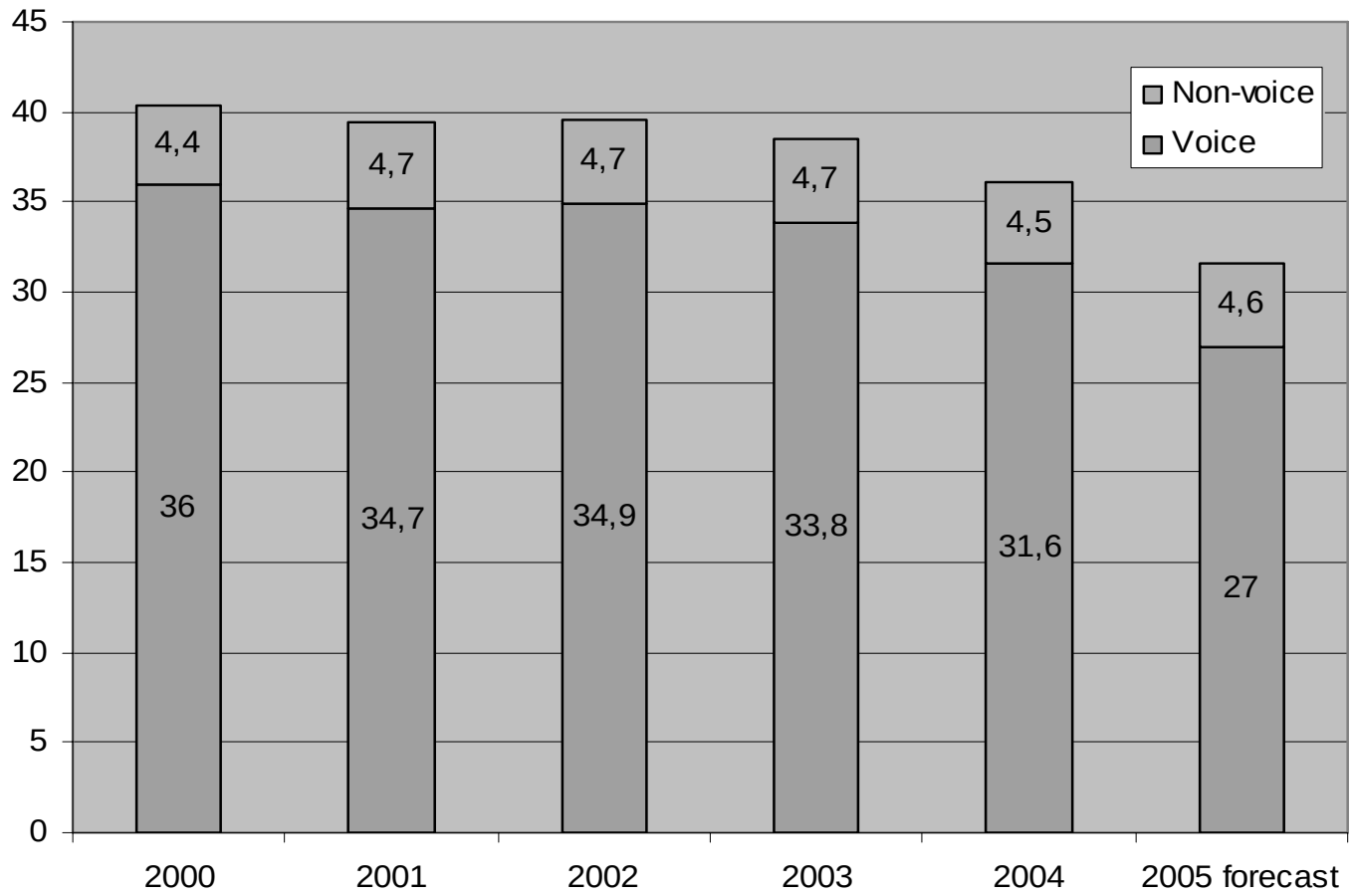



Source: ITU, Haantie 2006

# Recent developments

- The most significant development (25.7.2003): the introduction of the number portability arrangement by regulator in order to reduce **switching cost**
  - *Makes number portability easy for subscribers*
  - *Increased competition resulted in declining user loyalty and increased customer churn*
- Diverse new entrants (MVNO) emerged in the market (full control over SIM cards, branding, marketing, billing and customer care, might have own CC, MSC, HLR, IN)
- Finnish authorities have intervened to guarantee equal network usage fees to all competitors
- At the beginning of March 2004 network operators cut their fees by approximately 30%

# ARPU development






Source: Prisma Research, Haantie 2006

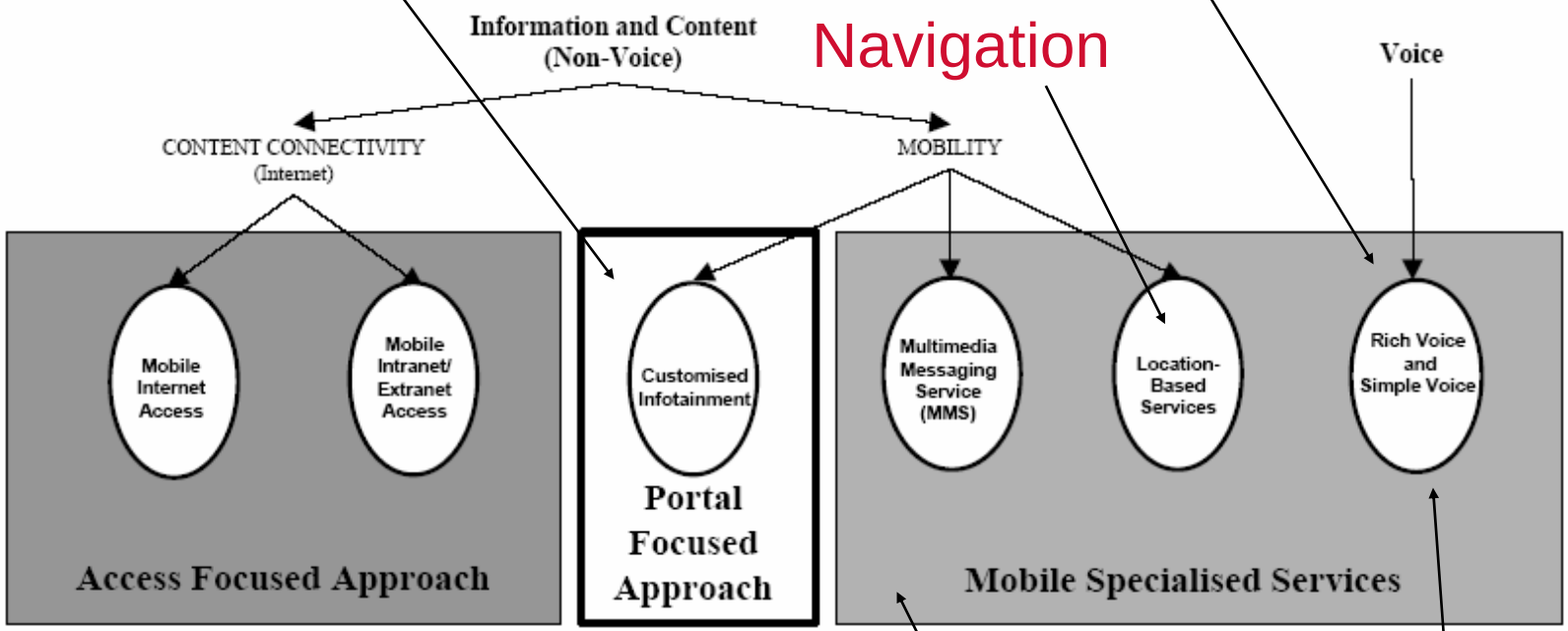
# Mobile market in Finland

- Competition was **price-based**, revenue per subscriber (ARPU) decreased significantly to about 30 e / month, roaming still significant revenue source because of scarce competition
- Scarce competition through **differentiation**
- Mobile data services (excluding SMS) create still only few procents of operators revenues (disappointment in WAP, MMS, low GPRS usage etc.)
- MVNO´s have disappeared - price competition has now settled down, incumbent operators have started to increase their prices
- Increasing importance of **multimedia services** as a new growth source

Mobile search engines

Videophone

Navigation




Music / gaming

TV

VoIP/PoC



Source: UMTS Forum, 2001

# Search engines

• development of mobile browsers is starting to enable true mobile Internet access after the failure of WAP technologies and also puts pressures to walled garden business model

• major search engines have introduced search pages specifically designed for small mobile screens and practically any phone with an Internet HTML or XHTML browser can access the search engines


• search engines companies are in the advertisement business - mobile environment is ultimate advertising platform - personal, always on, always with user and billing and payment options available

• mobile search has a number of barriers compared to PC world, usability has to develop

• still limited screen size does not encourage long query strings, in 84 % of mobile searches is used 1-2 words, however over 60 % of mobile data traffic is currently browsing (Feller 2005)

# Search engines

• decreasing call and SMS revenues are forcing mobile operators to compete with Google and Yahoo! mobile search engines and some operator groups are currently developing own engines

• the goal is to introduce own branded mobile search portal and to have a share of the search advertising market in order to avoid fragmentation of the value chain

• some operators have already decided to co-operate with an existing search engines, e.g. Google service comes pre-installed on some mobile terminals

• mobile search is even more valuable to users and advertisers than in the fixed Internet because serch results can be made geographically relevant while users can give their location and receive local information on weather, travel or entertainment

# Navigation

• Terminal vendors are starting to be active in the services in order to give comlementary value to their main products
• Nokia´s **smart2go** mapping and navigation platform
• maps of 150 countries, **GPS navigation** in over 30 countries, low cost of GPS technology, no need to use positioning info from mobile network
• views location of user on a map, search for points-of-interests: restaurants, accommodations etc., creates routes
• user can send their favorite locations to friends by multimedia message
• recognized brand names are placed as branded icons in maps
• free download of application and maps through mobile data connection, plan to pre-install the application on all future Nokia Nseries multimedia terminals
• in traditional navigation prepaid maps and specialized navigation terminal
• new business model: revenue collected only from navigation service, voice guided navigation feautures by a license from a one week to a three year term e.g. subscription to the service for the duration of the travel, payment directly from mobile terminal
• additional value for mobile multimedia terminals, supports fragmented business model

# Mobile videophone

- Videphone has been failure in the fixed network (H.261, 128 kbit/s-2 Mbit/s))
- New video comression methods (H.263, MPEG4, < 64 kbit/s) for low bandwidth applications which can be applied to mobile environment
- Parallel full-fuplex audio and video comression requires a lot of processing power
- Delays and syncronization of video and audio is also a big technical challenge
- First launched in NTT DoCoMo´s WCDMA networks FOMA service concept
- TeliaSonera piloted sign language applications in their 3G network
- Currently widely commercially available, lacks still critical mass of users
- Increased social interaction, remote supervision applications
- As technical problems has been solved commercially potential killer service when integrated to **videomailbox** service
- Could increase operators €/MB ratio, pricing currently 0,25 €/min

# Mobile videophone

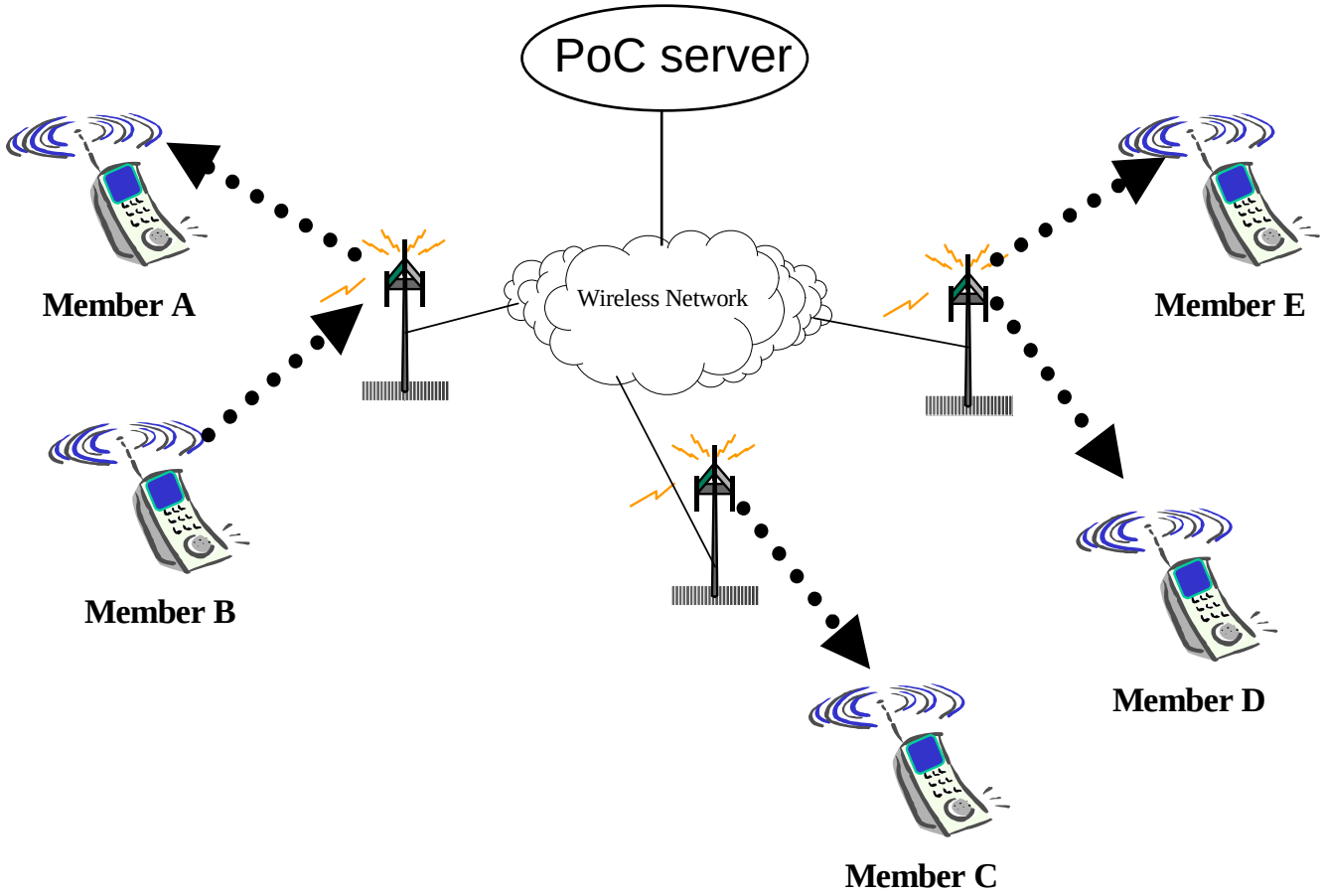
slashphone.com

# Push to talk over Cellular - PoC

- Push to talk over Cellular (PoC) introduces a new real-time direct one-to-one and **one-to-many half-duplex voice** communication service in the cellular network, the call connection is almost instantaneous and the receiver doesn't have to answer the call

- Push to talk service users are typically engaged in some other activity than a telephone call and they listen to the **group traffic** during their activity
- Part of the service offering in IP Multimedia Subsystem (IMS)
- Based on half-duplex VoIP technology over the GPRS network
- Uses mobile radio resources more efficiently than circuit-switched services thus reserving the resources only on the duration of talking
- Provision of better QoS classes for the transmission and enabling **full duplex mobile VoIP** conversation will require additional development throughout the mobile network
- Proprietary technology evolution: Mobile **Skype**

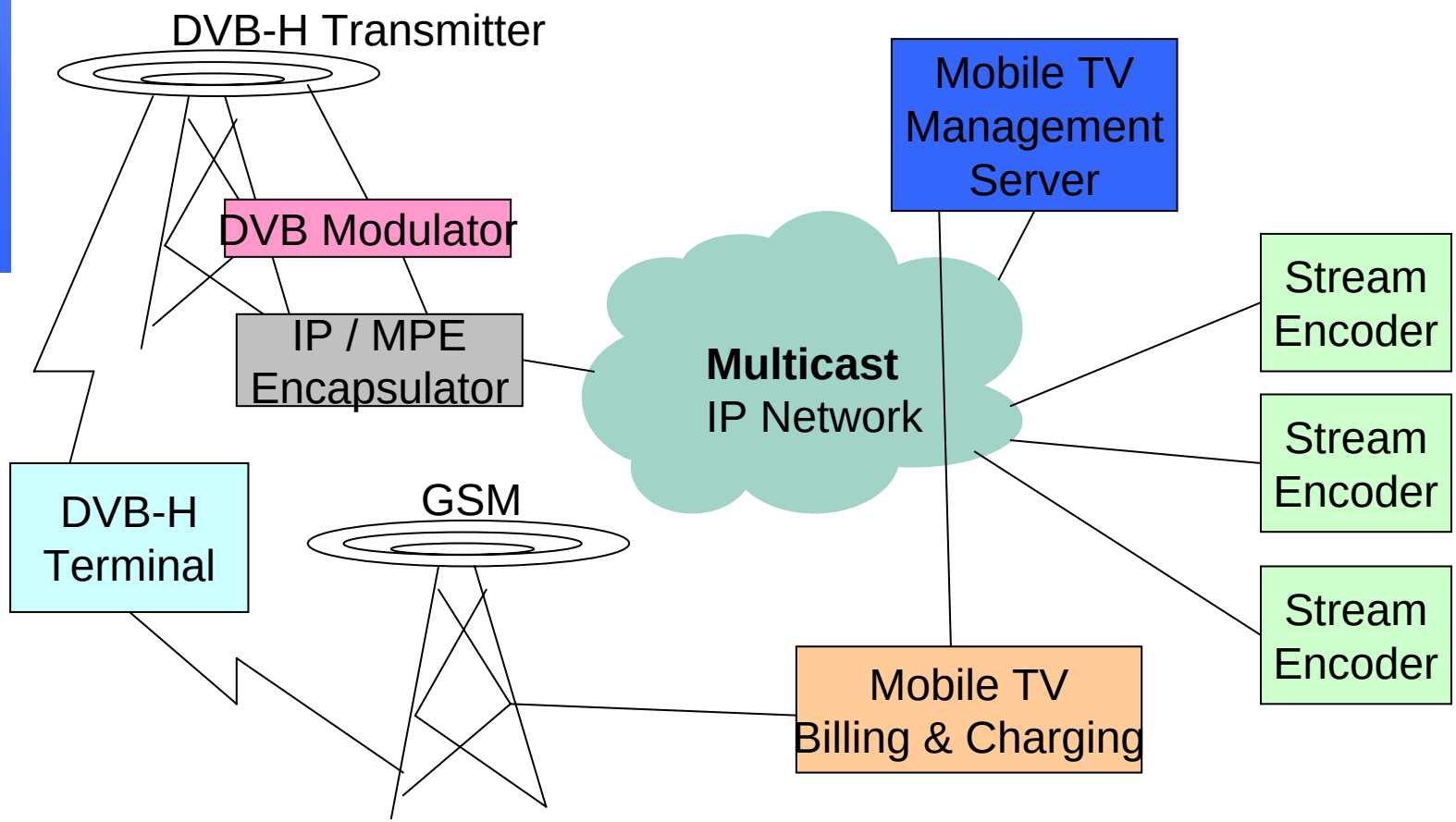
# Push to talk over Cellular - PoC



# Mobile TV

- **Terminal manufacturers** are looking for new, significant factors of differentiation
  - *Advanced (new) features with real benefits are a means **to avoid terminal price decline***
- **Mobile operators** are looking for new succesful applications as well
- Mobile TV is **a new channel for content providers** to re-sell their **existing content**
- DVB-H, MediaFLO and DMB competing, DVB-H having the broadest industry support
  - *DMB has head-start, but DVB-H and MediaFLO have 10 times more capacity (2 vs. 20 high-quality TV ch.)*

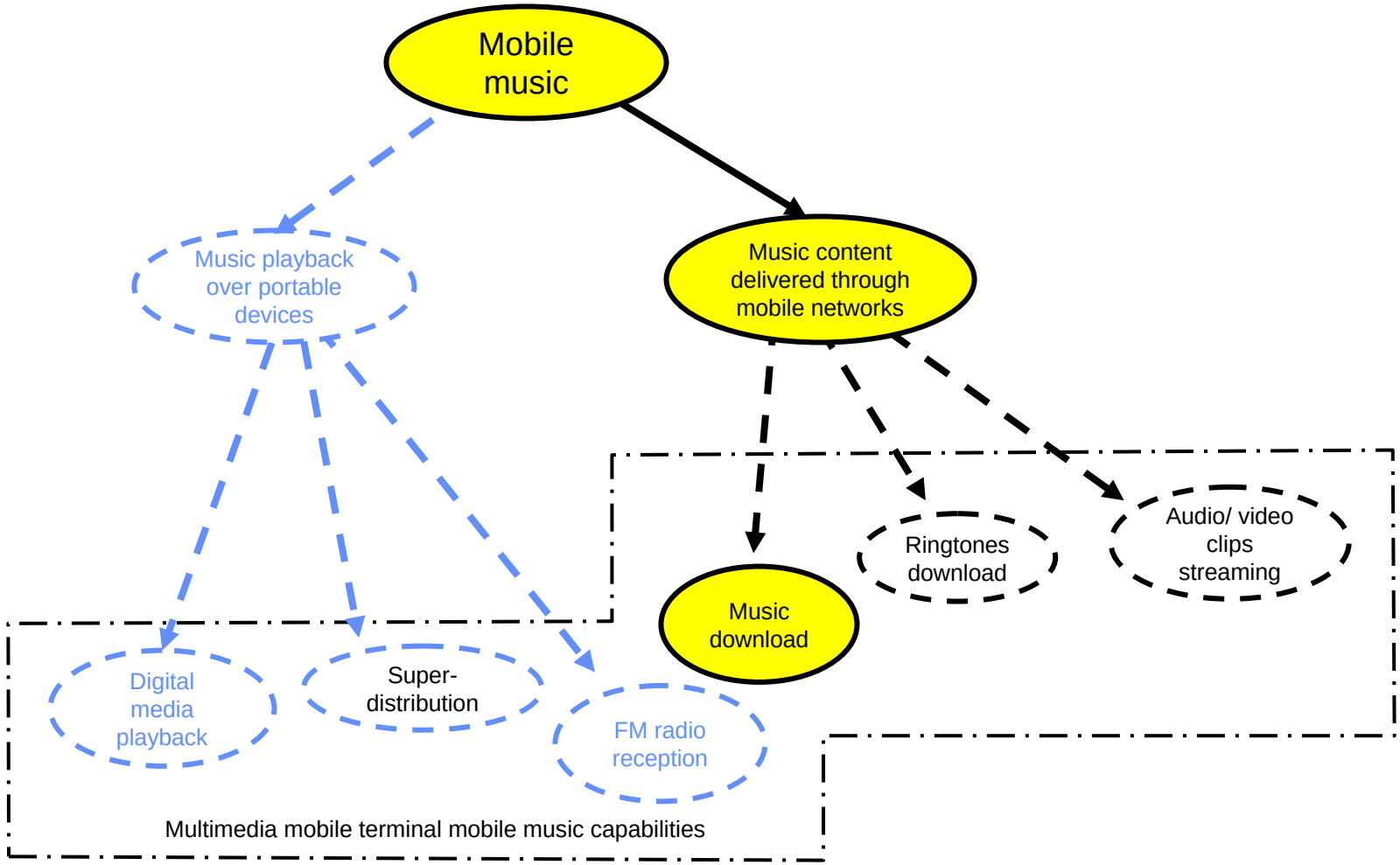
# Mobile TV Architecture



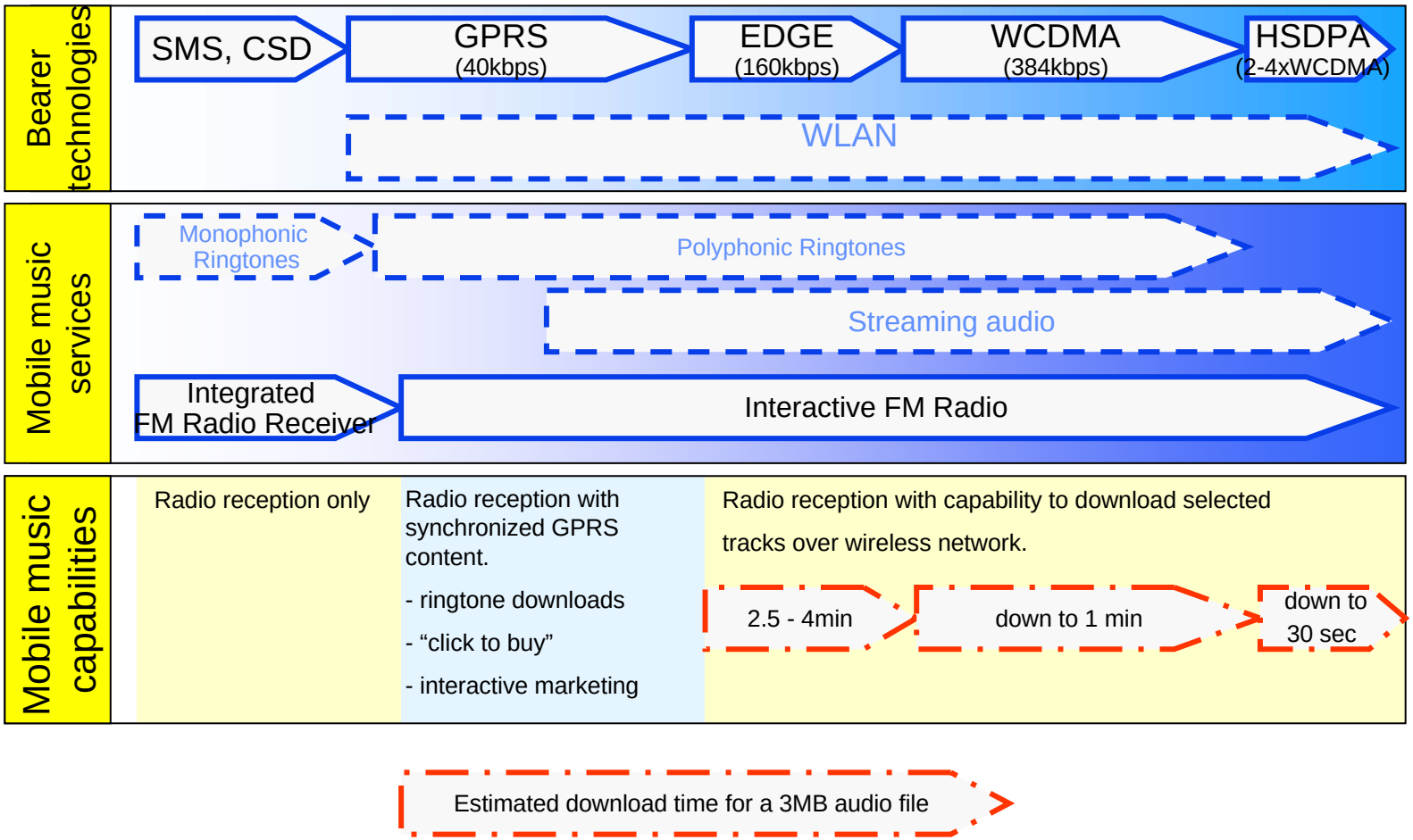
# Mobile Games

- The boom of the Internet based **multiplayer gaming** implies that the same phenomena could be applied also to the mobile environment
- Currently 80-90 percent of the mobile game market is in Japan and South Korea, similar same market penetration could be possible in both Europe and USA
- In late 2003 Nokia entered as a first mover into an entirely new market of cartridge based coverged mobile gaming devices by NGage platform without success
- Converged mobile phone vs. separate device (PSP) – **downloadable games and usage of network connection key issue in the future, provision of games in mobile portal, DRM**

# Mobile music



# Mobile music evolution



# Conclusion

- Convergence of telecommunications, computer and media industries provides possible but uncertain growth path for the mobile industry
- Price competition has settled down and  made possible for differentiation by mobile multimedia services
- Contradiction between high transmission cost and low enduser value
- Key question is what what are **mobile related enduser needs**, what are those services and what are their reasonable service pricing levels – **flat rate** tariffs
- **New mobile services** to increase market segmentation: e-mail, information, music, PoC, videophone, TV…
- Bundling of equipment, subscription and services could help 3G adoption rates, but it also promotes walled garden business model
- Key issue to promote service innovation by **low usage barriers** and **experimentation** with reasonable cost structure and openness