

Beyond 2G

what comes after GSM?

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- Beyond simple voice telephony and texting
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Generations

1. Analogue technology
 - TACS, AMPS, etc
2. Digital technology
 - PHS, GSM, CDMA
3. IP technology
 - IMT-2000: cdma2000, UMTS and TD-SCDMA
4. ?????
 - Faster data
 - Non-line of sight

2.5 G

- Adding data to voice and SMS
- IP interface
- Requires upgrading of:
 - network infrastructure
 - handsets
- Requires development of new business models:
 - raw IP access
 - value-added services
- Extending the value chain to include:
 - service providers
 - content aggregators
 - Mobile (MVNOs)

2.5 G

GPRS

- Data packages in very small quantities
- International roaming punitively expensive
- Unsuccessful efforts at "walled gardens" for value-added services
- Death from hype of WAP
- Vast majority of GPRS-enabled handsets are never used for that
- Some success with Blackberry over GPRS

cdma2000

- Offers of flat-rate data access:
 - Japan
 - USA
- Development of value-added services in some markets
- Content-based MVNOs in some markets

Recent handset features

- Camera
- Stored music and video
- Receiver for digital mobile radio and television
 - satellite and terrestrial
- RFID for identification:
 - access controls
 - payments

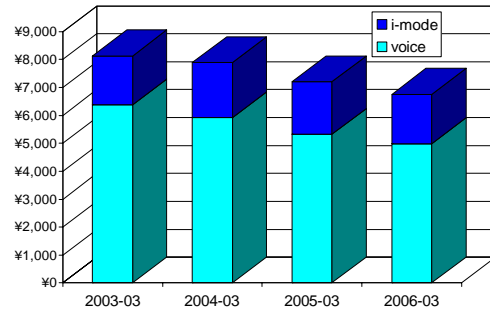
These can, but often do not, generate network traffic.

Mobile content

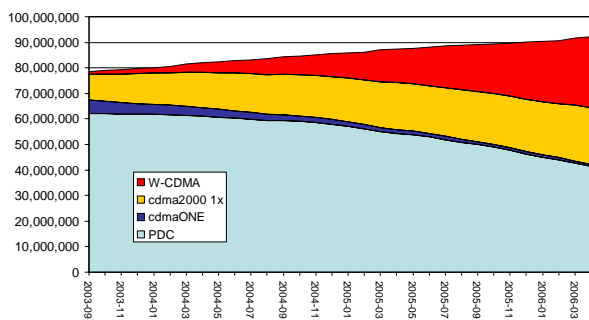
- Sport
- Games
- Betting
- News
- Music (downloads and streaming)
- Television (broadcasts and “mobisodes”)
- The content that nobody talks about

Is it one device or many?
iPod or cellphone?

Japan - DoCoMo ARPU



Japan switches to 3G



<http://www.tca.or.jp/>

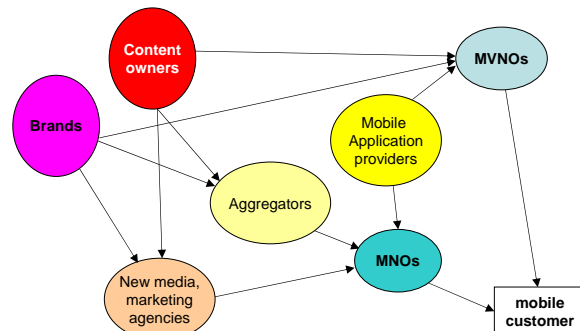
China

- Beijing Olympics opening on 08/08/08 will be a showcase for 3G
- Everyone is waiting for the licences
- Ministry of Information Industries (MII) seems undecided between:
 - technology neutrality
 - support for TD-SCDMA
- A lot of foreign and domestic lobbying
- Forecasts of 50 to 100 million customers by 2010
- Will drive the export market
- Many emerging and developing markets will copy

3G

- Games, Gambling and Girls
- Greed, Gullibility and Grief
- Location Based Services (LBS)
- Entertainment:
 - streamed audio
 - streamed video

Mobile value chain



What is the value of mobility?

- People expect “mobility” for text and voice
- Mobility for data and value-added services:
 - need?
 - want?
 - value?
 - is nomadicity enough?
 - will people pay more for ubiquity?
- What are the operators selling?

3G licensing in Africa

- South Africa:
 - MTN and Vodacom services operational
 - moving to HSDPA
- Tanzania:
 - Vodacom HSDPA in Dar es Salaam in 2006
- Nigeria:
 - discussion between NRA and operators
- Democratic Republic of Congo:
 - under evaluation by NRA

Location Based Services

- Originally the big hope for 3G revenues
- Adoption has been painfully slow
- Now there are many alternatives:
 - Global Positioning System (GPS)
 - Bluetooth
 - Ultra Wide Band (UWB)
 - Radio Frequency Identification (RFID) tags
 - Wi-Fi
 - identification of the mobile cell
 - embedded systems in cars

Audio and video streaming

- Some material is:
 - on-demand
 - interactive
- Broadcasting for news, sports and music:
 - satellite
 - terrestrial
- Wi-Fi and WiMAX where demand is not immediate:
 - residential
 - public hot-spot

Digital broadcasting

- Competing standards:
 - Digital Audio Broadcast (DAB)
 - Digital Multimedia Broadcast (DMB)
 - Digital Video Broadcast (DVB)
- Satellite and terrestrial
- Can carry vast amounts of entertainment and other services
- Very much cheaper than cellular for delivery to customers

Wireless VoIP

- Multiple possible devices:
 - lap-top computer
 - Personal Digital Assistant (PDA)
 - Skype phone
- Wi-Fi chips are cheap and easily added to consumer electronic devices (n.b., games consoles)
- New multimode handsets
- Dedicated Wi-Fi phones

Wireless VoIP

Nokia E-Series handsets

- Wi-Fi when in:
 - corporate offices worldwide
 - home
- SIP client
- Otherwise GSM
- Being combined with iPASS, a global Wi-Fi supplier

France Iliad "free.fr"

- Any Wi-Fi hotspot with "freebox":
 - your home
 - your neighbours
 - people in the next street, village or town
- Free calls to fixed networks in France and 14 countries

VoIP over 3G

- Theoretically possible, but questions of:
 - pricing
 - download limits
 - operators filtering out VoIP
- Some deals for Skype over 3G:
 - Hutchison Whampoa (a.k.a. Three)
 - E-Plus (KPN)
- Enormous reluctance of 3GSM operators:
 - but for how long?
- For the present, roaming charges make VoIP very expensive to use over 3G

Wi-Fi

- Slow adoption in Africa
- Few lap-top computers
- Lack of affordable ADSL as backhaul for residential hot spots
- Dominant operators overprice leased lines
- Lack of IXPs to ensure competition
- Absence of economies of scale
- Some countries have not yet opened both 2.4 and 5.8 GHz bands

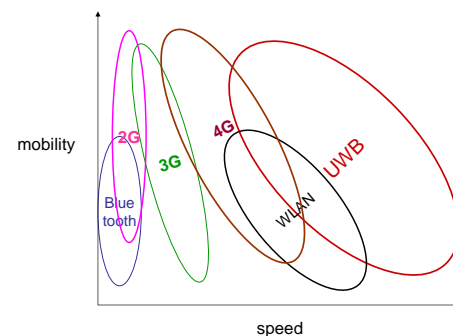
WiMAX

- Unlicensed bands:
 - often still not opened for use
 - 2.4 GHz and 5.8 GHz
- Licensed bands (e.g., 3.5 GHz):
 - very few issued so far
- Economies of scale not yet achieved
- A big push from Intel "World Ahead"

Not cellular mobile alone

- Fixed Network Operators told to:
 - spin-off MNOs
 - re-absorb MNOs
- Quadruple play (telephony, television, Internet, mobile)
- Comcast Cable (USA) now offers a bundle with cellular voice and data
- Vodafone is looking to add broadband, using unbundled local loops

Speed and mobility



Multiple networks

- Personal Area Networks (PANs)
- Car networks
- Residential networks
- Cellular
- Other wireless networks
- Fibre optic cables for high bandwidth

Ubiquitous Network Society

- The view from Japan and Korea
- Industry and government
- A focus on economic development
- A big push for manufacturing and services
- Multiple networks
- NGN plus RFID plus Ubiquitous Sensor Network (USN)

Conclusions

- Enormous uncertainty about demand for:
 - data services
 - value added services
- Enormous uncertainty about access to networks by value-added service providers
- There are non-cellular routes to markets
- The pre-paid business model worked well for voice, but does not look plausible for value-added services

Issues

- How might we regulate an integrated mobile operator and bank?
- Where are the market bottlenecks?
- How do we ensure competition?
- How do we ensure innovation?

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