

# Beyond 2G

what comes after GSM?

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- Beyond simple voice telephony and texting
- Data services
- Value-added services
- Payment services
- Value chains in competitive markets
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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.**

# GSM Association

- m-commerce has particular benefits in emerging economies
- Capturing the unofficial cash float
- Eliminating the need to carry cash
- Reducing exposure to robbery
- Enabling the advancement of micro-loans
- Facilitating loan repayments
- Enabling the payment of utility bills
- Minimizing money-laundering opportunities

# Mobile payments

- Payment:
  - add to monthly bill
  - deduct from stored credit
  - link to a credit card
- By means of:
  - RFID tag
  - SMS
- The alternative is to use Internet payment systems
- India
  - Tata and ICICI
- Japan
  - DoCoMo and Sony
- Malaysia
  - Nokia and Visa
- USA and UK
  - PayPal

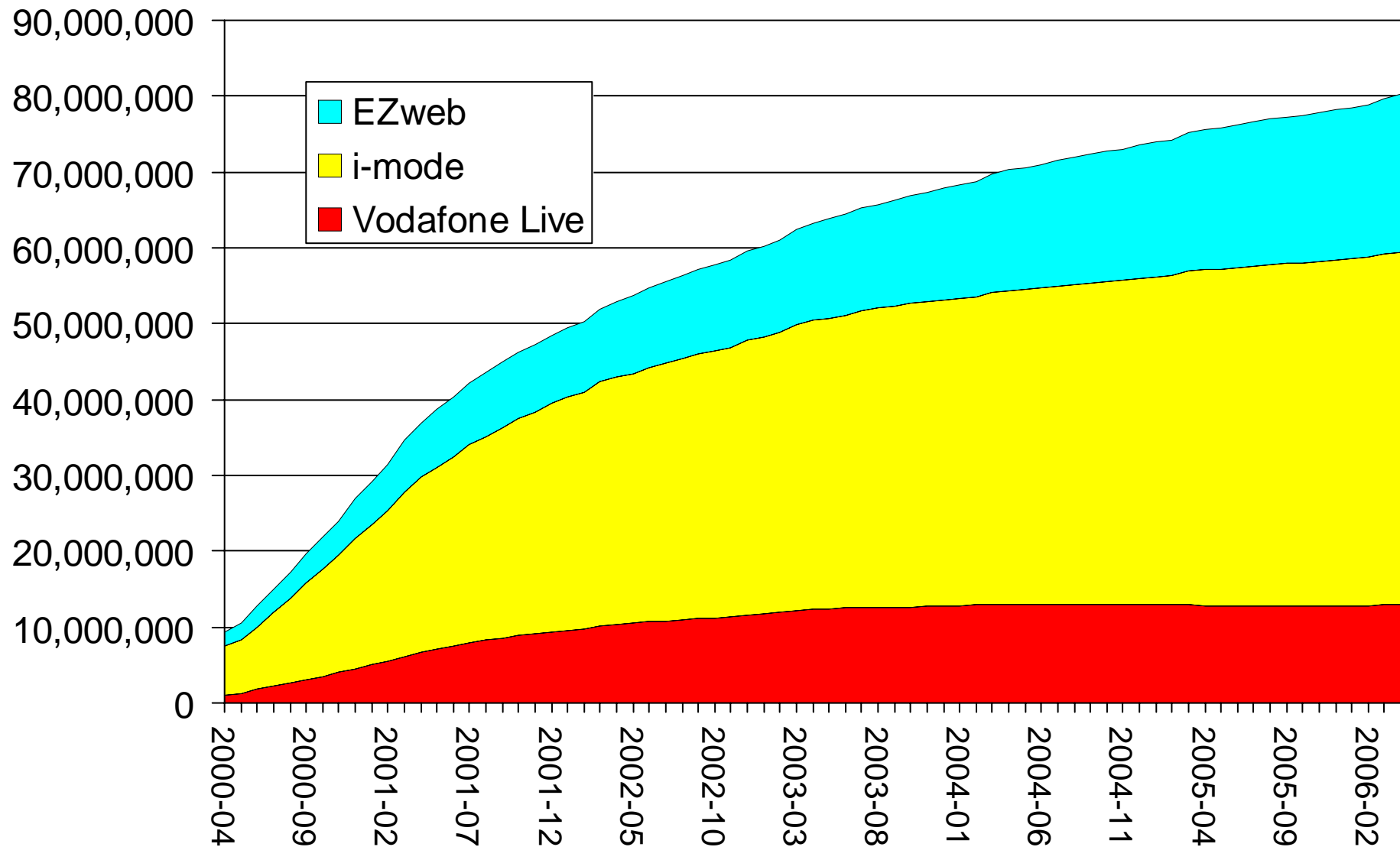


# Africa – GPRS and EDGE

- GPRS
- Available in very many handsets
- Available in many networks
- But very limited use:
  - survey data
  - spending data
- EDGE only in:
  - Algeria
  - Ghana
  - Libya
  - South Africa
  - Swaziland
  - Tunisia

Source: GSA.com

# The mobile Internet in Japan



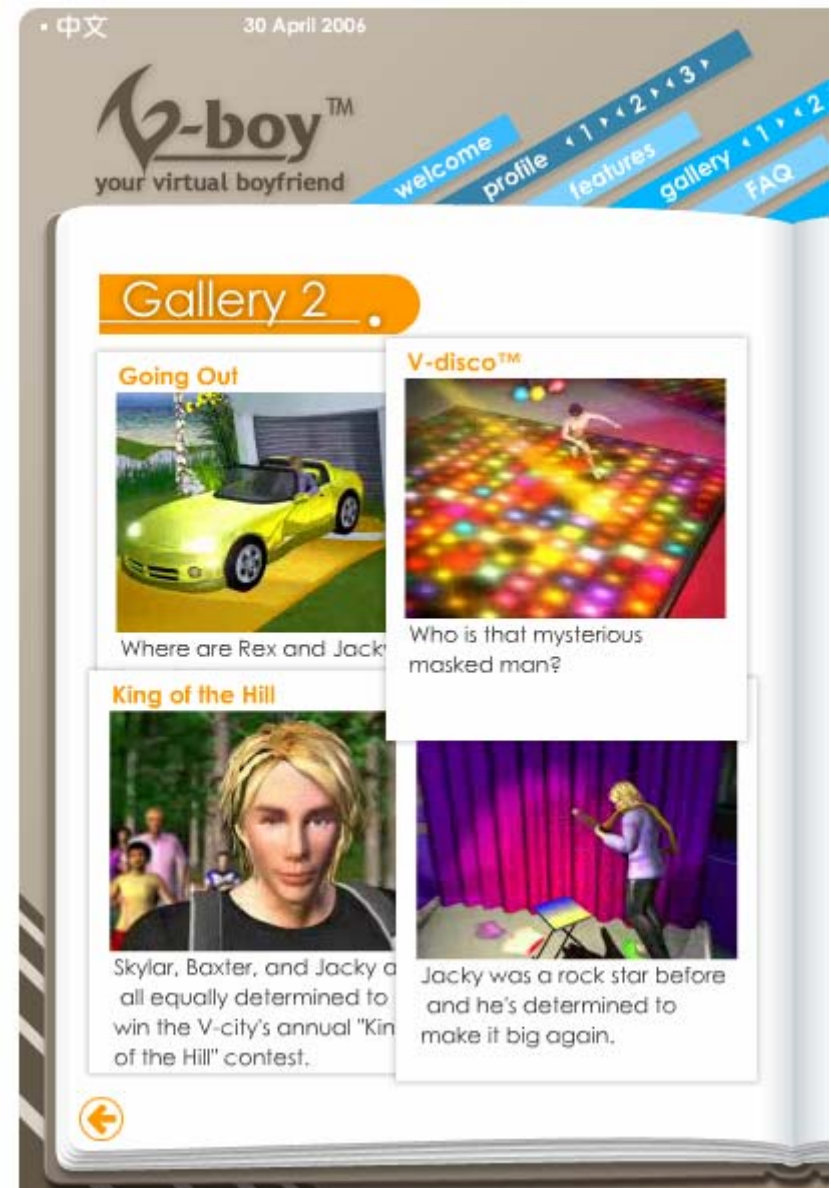
# i-mode in Japan

- Developed very early for 2G at slow speeds
- At that time there was limited fixed Internet access
- NTT DoCoMo:
  - charged customers directly on behalf of third parties
  - took a modest margin
  - passed on revenues to content producers
- Created a positive environment for content creation (similar to French Minitel)
- Seamless migration 2G -> 2.5G -> 3G -> 3.5G
  - customers
  - content providers
- However, failed to translate to foreign markets, despite extensive efforts

# Artificial Life

- Developer of games:
  - standalone
  - multi-user games
- Games within games
- Examples:
  - Virtual Girlfriend
  - Virtual Boyfriend
  - Virtual Emperor Penguin
- Launched with MNOs in:
  - Brunei
  - China
  - Hong Kong, SAR
  - Malaysia
  - Singapore
  - Taiwan

<http://www.artificial-life.com/>  
<http://mobileindustry.biz/>

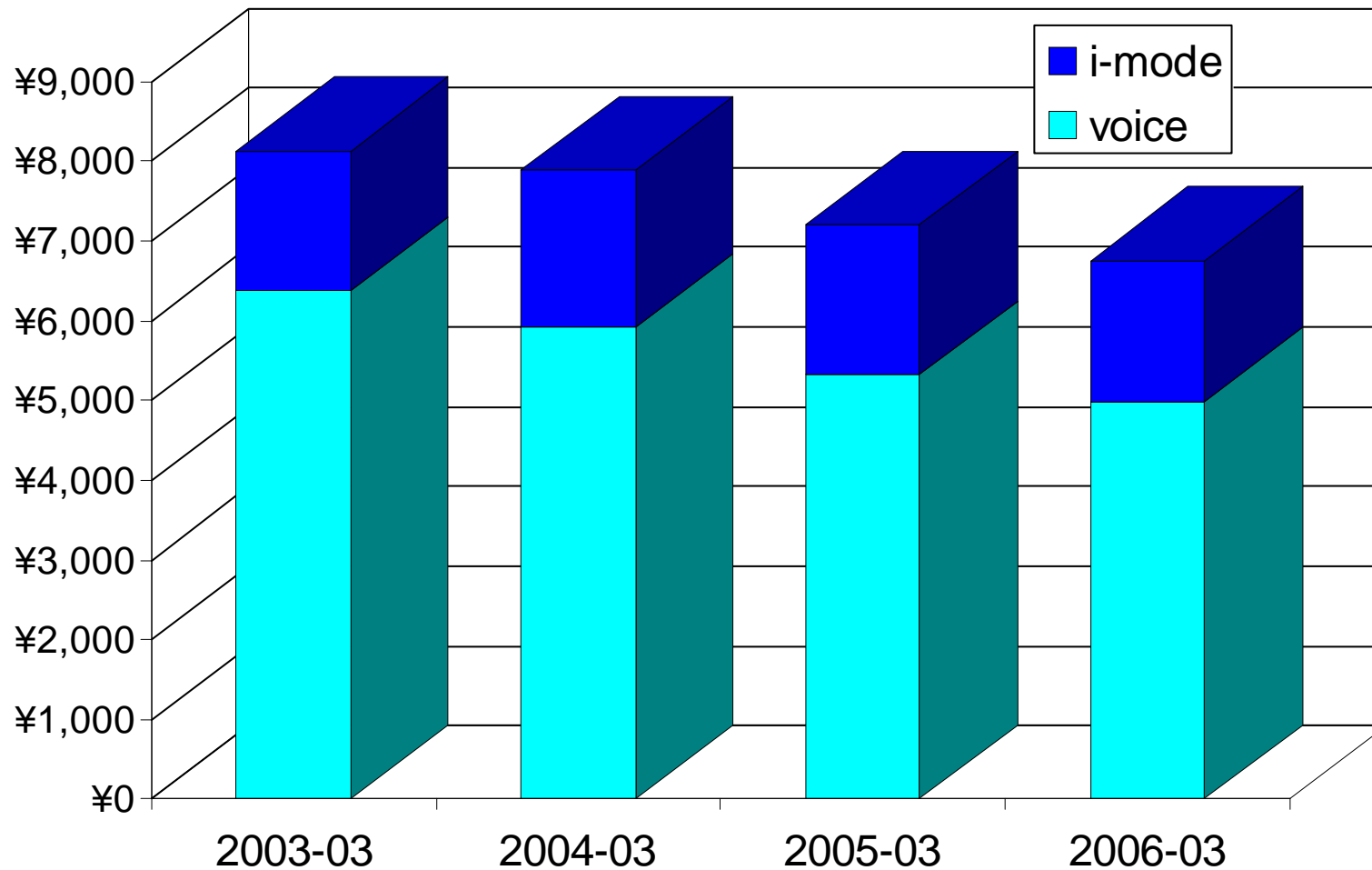


# Mobile content

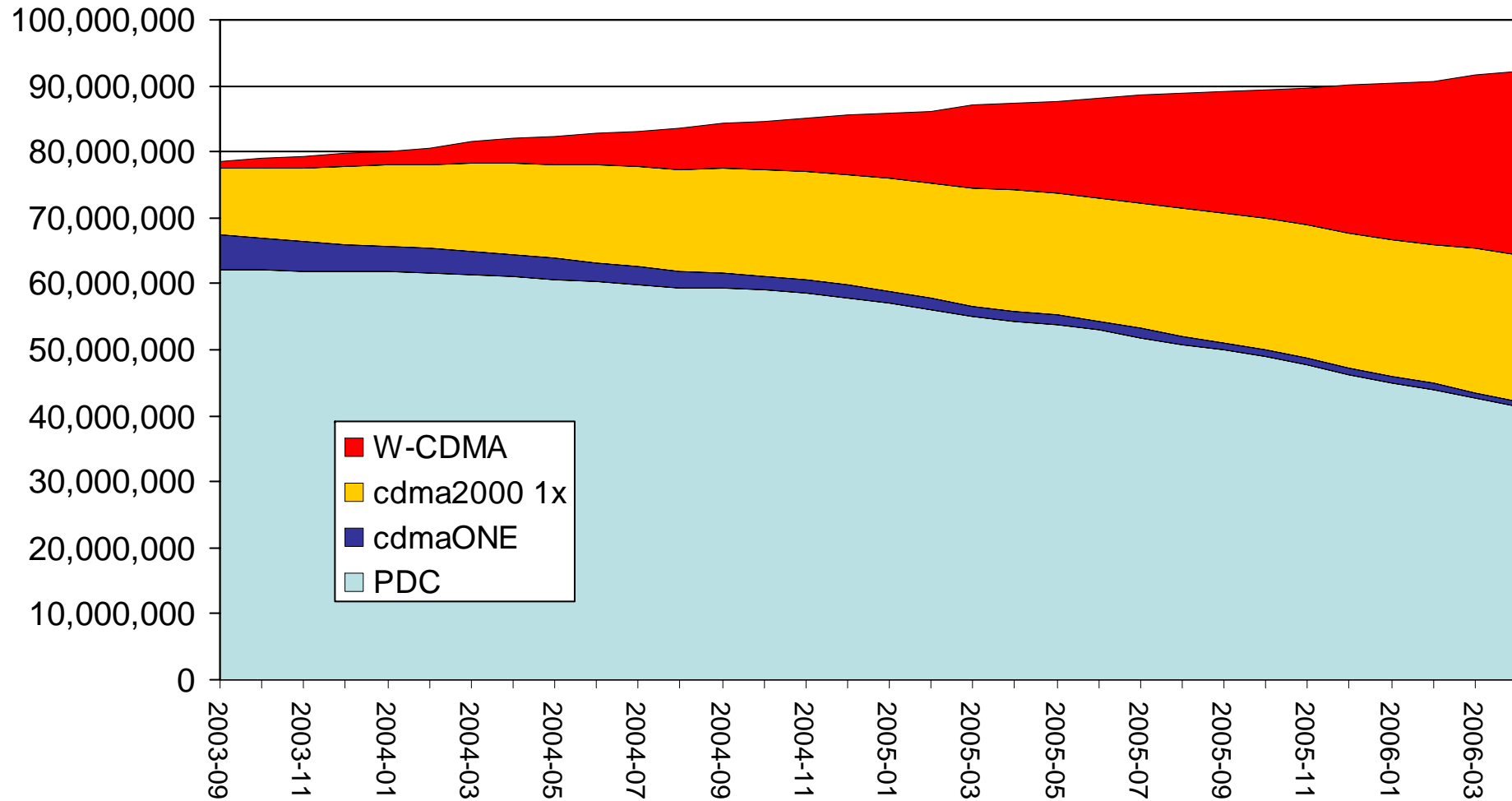
- Sport
- Games
- Betting
- News
- Music (downloads and streaming)
- Television (broadcasts and “mobisodes”)
- The content that nobody talks about

Is it one device or many?  
iPod or cellphone?

# Japan - DoCoMo ARPU



# Japan switches to 3G



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

# China

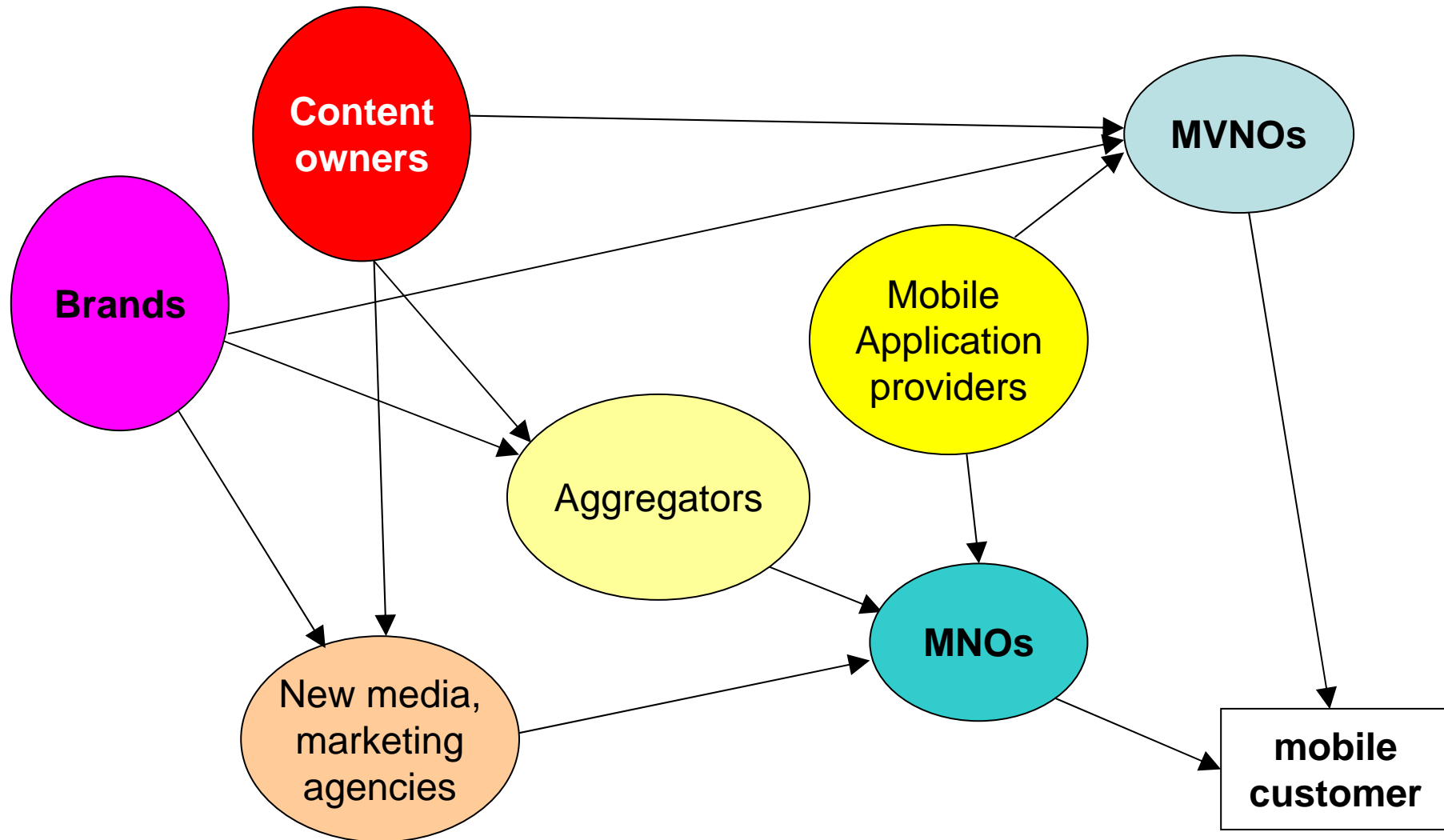
- Beijing Olympics opening on 08/08/08 will be a showcase for 3G
- Everyone is waiting for the licences
- Ministry of Information Industries (MII) seems undecided between:
  - technology neutrality
  - support for TD-SCDMA
- A lot of foreign and domestic lobbying
- Forecasts of 50 to 100 million customers 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 nomadcity 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

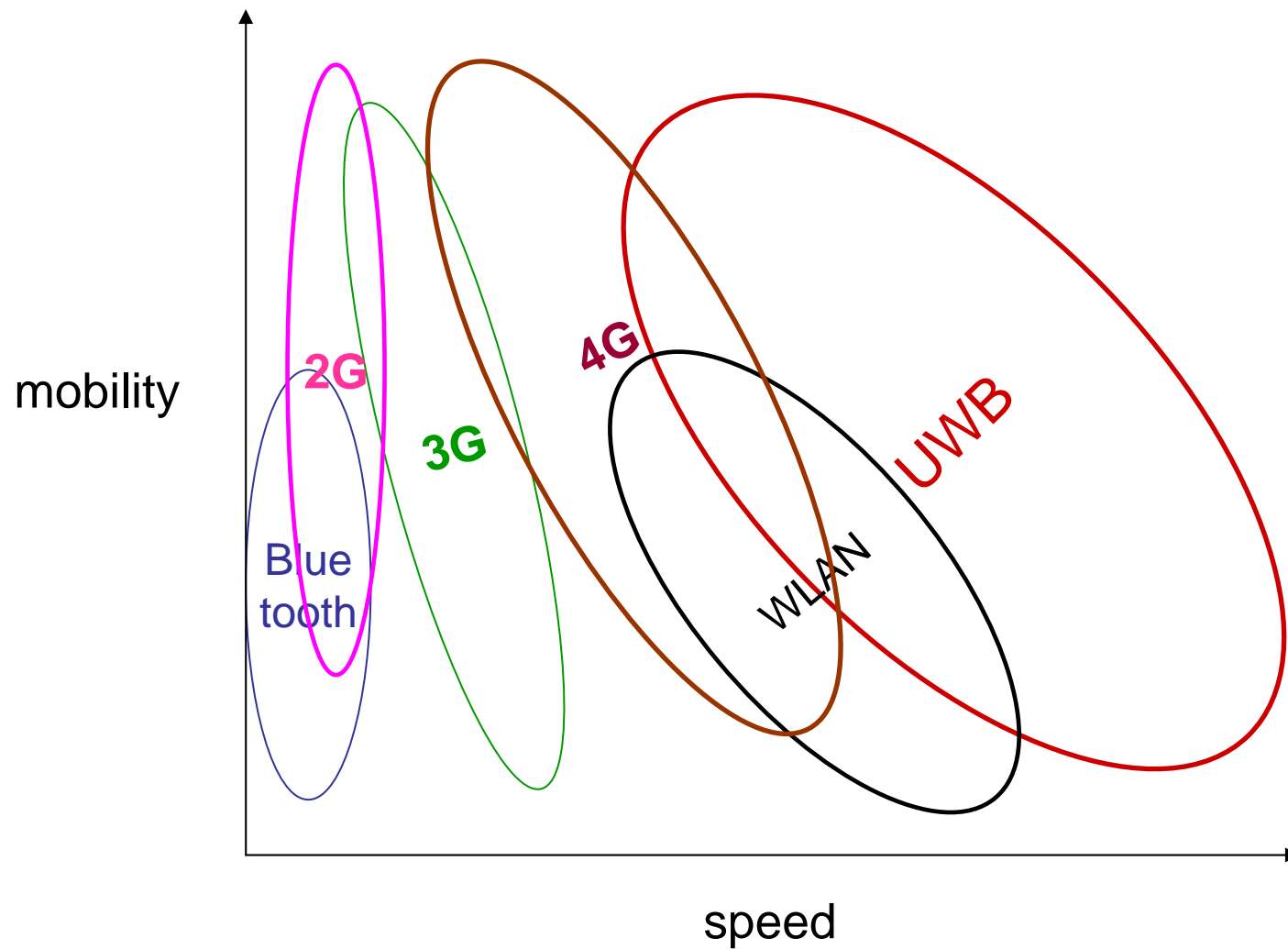
# WiMAX

- 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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