World Class Standards

# GSM Goes to Market

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GSM…younger than ever

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# The Early Years – Europe (1992-1995)

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# Trouble with Type Approval!

- By 1991 calls had been made and networks were ready to launch:
  - No terminals had been granted type approval, leading to George Schmitt's now legendary plea "*God Send Mobiles*"
  - The requirements were complex and there was no System Simulator
  - The regulatory regime was fragmented and cross-border roaming for terminals had yet to be become a reality
- A practical solution – Interim Type Approval:
  - A simplified "Interim Type Approval" was defined and implemented
  - The GSM MoU members agreed to finance the development of the SS and later established "GSM Facilities Ltd" to share the cost
  - The GSM MoU TAP also developed procedures for IMEI allocation
- The first type approval (ITA) was granted on the 26th May 1992



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# The incredible shrinking terminals!

- Size matters…how portable is portable?
  - The early GSM terminals resembled car-phones
  - In 1992, they were 20 Watt "luggables"
  - By 1994, the first truly portable handsets had arrived
  - In 2007, we have phones that weigh less than 75g
- Cost also matters…
  - The early prototypes cost $20k!
  - As volumes went up, prices started to drop
  - Low-end GSM handsets now cost less than $25
- The role of standards in the GSM ecosystem:
  - The scale of the GSM ecosystem is unmatched by rivals
  - The use of open standards has ensured effective competition
  - …and promoted diversity

# The Rise of Roaming!

- A pre-requisite not an afterthought:
  - Unlike most predecessors, international roaming was always a key requirement for GSM
  - The Nordic operators (NMT) contributed valuable experience
  - The GSM MoU helped to provide the tools:
    - Agreement templates, charging principles, network testing, data exchange and financial settlement
- The race for roaming coverage:
  - The first international roaming agreement was signed in 1992
  - The race for roaming coverage was second only to the race for subscriber growth
  - Initial roaming negotiations involved whole teams of experts…
  - …but this quickly became “business as usual”



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# GSM Under Attack!

- Attacks in the media:
  - Early GSM opponents claimed that the system was not secure
  - There were several high-profile claims of attacks (COMP128, A5)
  - Although some were not without merit, none have proven to be a practical problem, or resulted in significant losses
  - The original GSM security has proven that it was "fit for purpose"
- Subscription fraud, the real threat in the early years:
  - Analogue-style clone fraud was never a serious problem
  - All of the real problems were actually with unpaid bills!
  - In the race for subscribers, credit-checks were minimal
  - Initial contracts had loopholes…as did terminals (e.g. remove SIM)
- The importance of Fraud Management:
  - Operators have learned much over the years and their systems are much more sophisticated…
  - …but fraudsters are as "creative" as ever (e.g. IRS fraud)



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# Roaming Fraud and its prevention

- International roaming, a new opportunity for fraud:
  - Initial TAP exchanges were infrequent and used magnetic tape!
  - Fraudsters in border regions accessed foreign networks without having to travel!
  - Lack of partial records meant that “long-hold” calls were not detected in time, call forwarding unconditional also added to the “fun”
  - Barring of high risk destinations was not possible in a roaming environment (not all roaming partners agreed which ones to block)
- Automating the TAP:
  - TAP data exchange became more frequent
  - EDI, electronic file transfer was used
  - High Usage Reports (HUR) were introduced
- Near-Real-time-Data-Exchange (NRTRDE)
  - The trend towards more real-time exchange continues today

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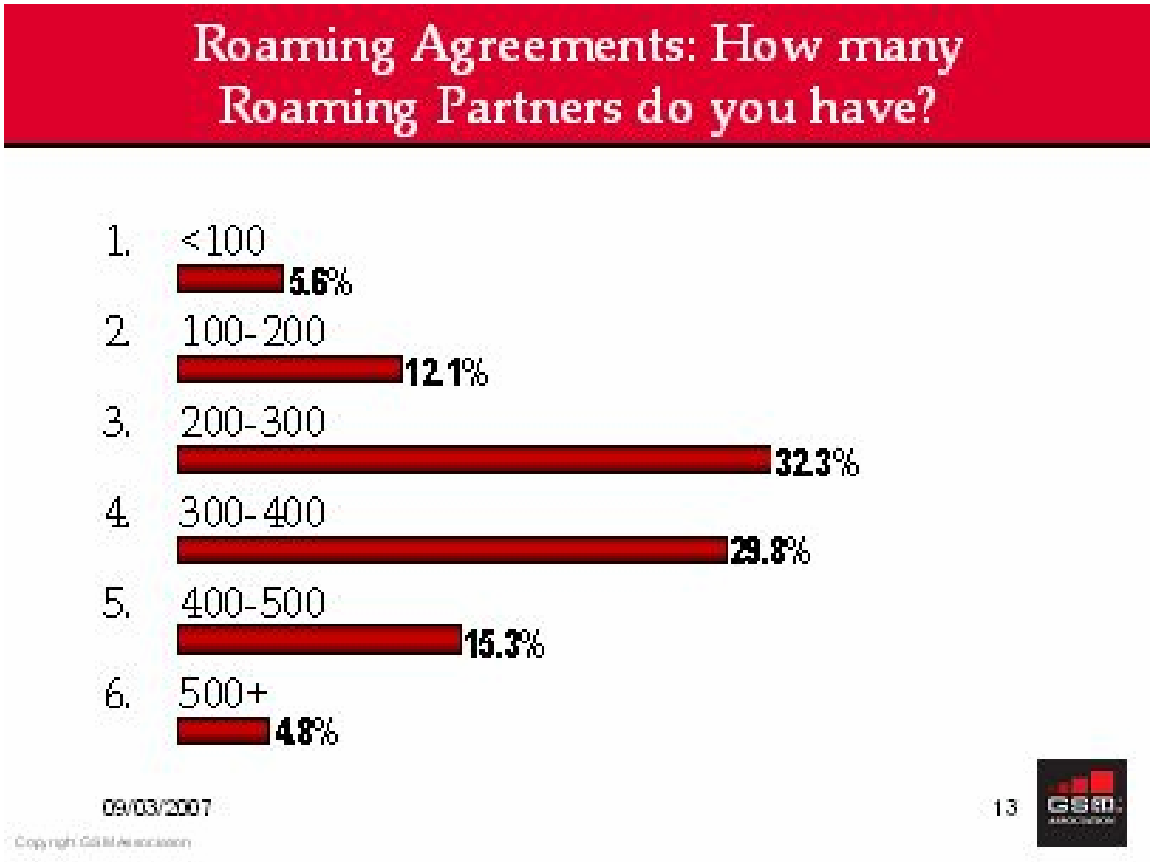
# Roaming today

- More than 100k active GSM roaming agreements
  - The average no. of agreements per operator is 300-350
- More than 120 Billion roamer records exchanged per year



# GSM Goes Global 1995 - 2007

# First steps outside Europe

- The work of the early GSM pioneers in Europe created a sizeable market and a digital system that could rival any other
- In the early 90's many countries were beginning to look at replacing their existing analogue systems, or indeed going straight to digital
- European countries were also allocating additional licenses
- This sparked a frenetic period of bidding for foreign licenses and was the birthplace of the operator groups that we have today
- In 1993, Telstra became the first non-European MoU Signatory and launched the first GSM service outside Europe, one of 32 networks live in 18 countries
- In 1995, the MoU was formally registered as an Association, with 117 networks on air



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# GSM crosses the Atlantic

- In December 1994, the FCC began the first of its PCS auctions and the first 99 licenses were awarded in March 1995
- This sparked a period of intense lobbying on both sides of the Atlantic and the opening shots in the "*technology wars*"
- The first PCS licenses in Canada were also granted in Dec 1995
- …but the first dual-mode (900-1900) handsets did not hit the market until 1997
- By May 1997, there were 15 PCS 1900 operators with more than 400k subscribers
- By the end of 2006, GSM had a 39% market share in North America, more than 90m subs. and a growth rate of 24% p.a.

Source: 3G Americas, operator data

# GSM and the Indian Market

- In August 1995, India awarded 2 GSM licenses in each of 20 regions ("circles")
- …this introduced some interesting challenges for interconnect and roaming
- The Cellular Operators Association of India (COAI) was created in 1995 and the first networks went live in the same year
- The introduction of "Calling Party Pays" and free incoming calls in 2003 helped to accelerate an already impressive growth rate
- In 2007, GSM has 77% market share in India with 115m subscribers and is growing at a rate in excess of 5 million new users per month!

Source: COAI

# GSM and China

- The first GSM operator in China was China Telecom
- There are currently 413m GSM subscribers in China, which represents a market share of more than 91%
  - A single operator, China Mobile, has more than 300m subs.
- GSM subscriber growth rate in China is nearly 6 million new subscribers per month!

Source: Operator data

# GSM and Russia

- First GSM licence was awarded in Nov. 1993 and commercial service commenced in Moscow & St. Petersburg in 1994
- Today there are three pan-national GSM operators in Russia (MTS, Vimpelcom and MegaFon) and several regional ones
- Given the size of Russia (11 time zones), all operators in Russia have national intra-network roaming
- There are currently 153m GSM subscribers in Russia, with more than 95% market share and a growth rate of 16% per annum

Source: ACM Consulting

# GSM and Latin America

- In 1998, GSM was launched in Latin America by ENTEL (Chile)
- Migration from TDMA had 2 options – CDMA and GSM
- GSM only really took off in 2001 when both America Movil and Telefonica decided to move to GSM
- GSM is now the leading standard in Latin America, with more than 200m subs. ;a market share of 69%; and a growth rate of 63% p.a.

Source: 3G Americas, operator data

# Current GSM Coverage

- 700 operators in 218 countries/territories
- GSM has 84% of the world market and it is still increasing
- Not bad for an "*outdated French standard*"



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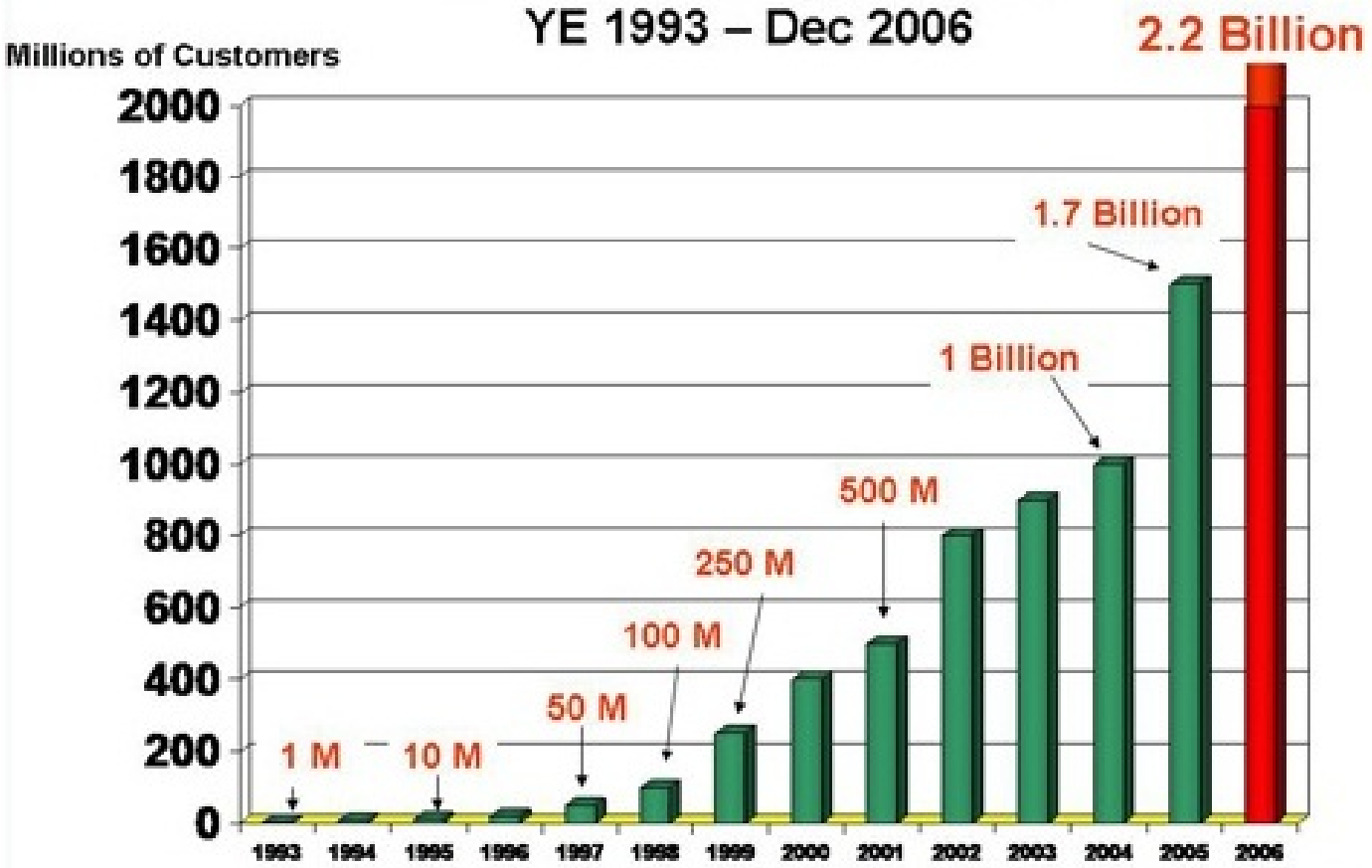
# …but the final chapter has yet to be written…




Source: Informa Telecoms & Media, WCIS, Dec 2006

- GSM is still growing at an impressive rate
- More GSM equipment is being shipped than ever before