



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)



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 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**

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”

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)

Roaming Fraud and its prevention

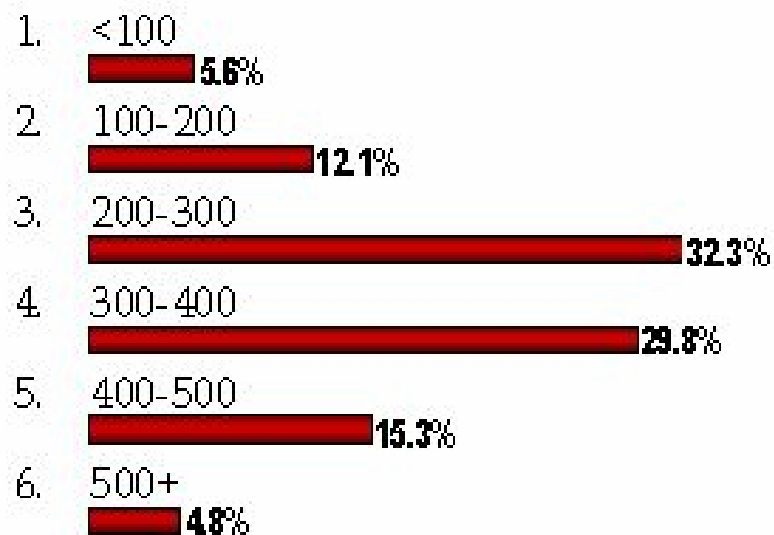
- ❑ **International roaming, a new opportunity for fraud:**
 - Initial TAP exchanges were infrequent and used magnetic tape!
 - Fraudsters in border regions accessed foreign networks without having to travel!
 - Lack of partial records meant that “long-hold” calls were not detected in time, call forwarding 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



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

Roaming Agreements: How many Roaming Partners do you have?



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GSM Goes Global 1995 - 2007

GSM Goes to Market

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



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.



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!



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!



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**



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.

Current GSM Coverage

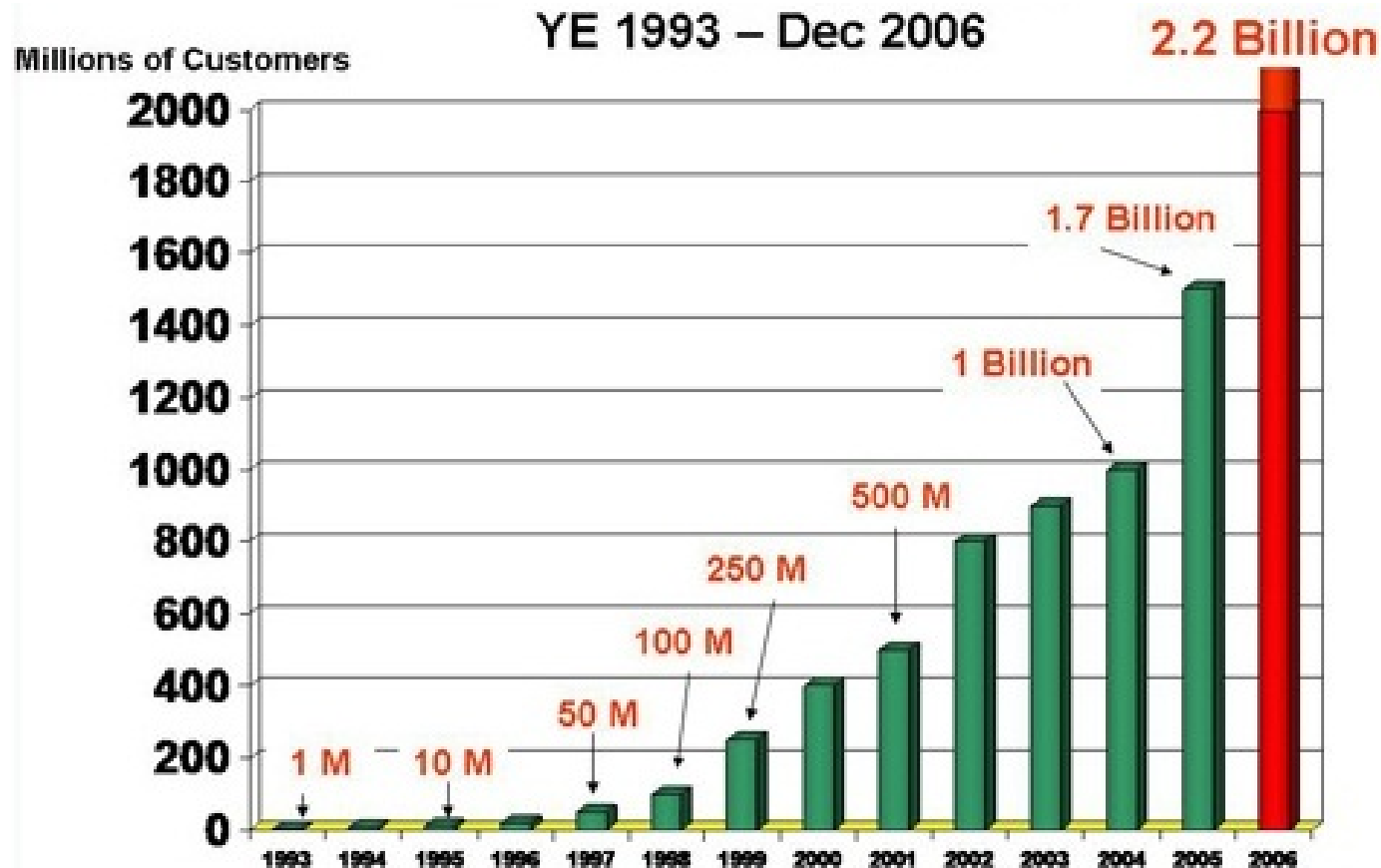


- ❑ 700 operators in 218 countries/territories
- ❑ GSM has 84% of the world market and it is still increasing
- ❑ Not bad for an “*outdated French standard*”



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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