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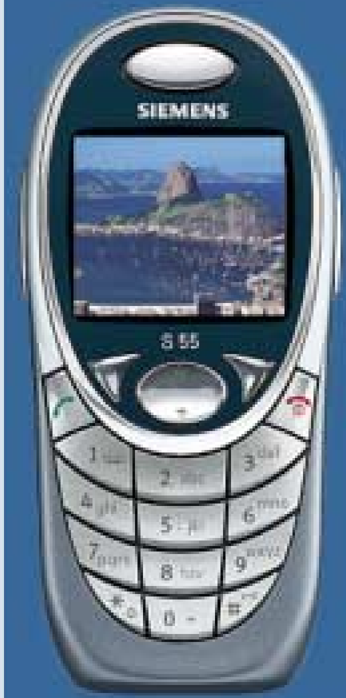
Managing a TDMA-GSM Dual Network

3GSM Americas
São Paulo
4 December 2002

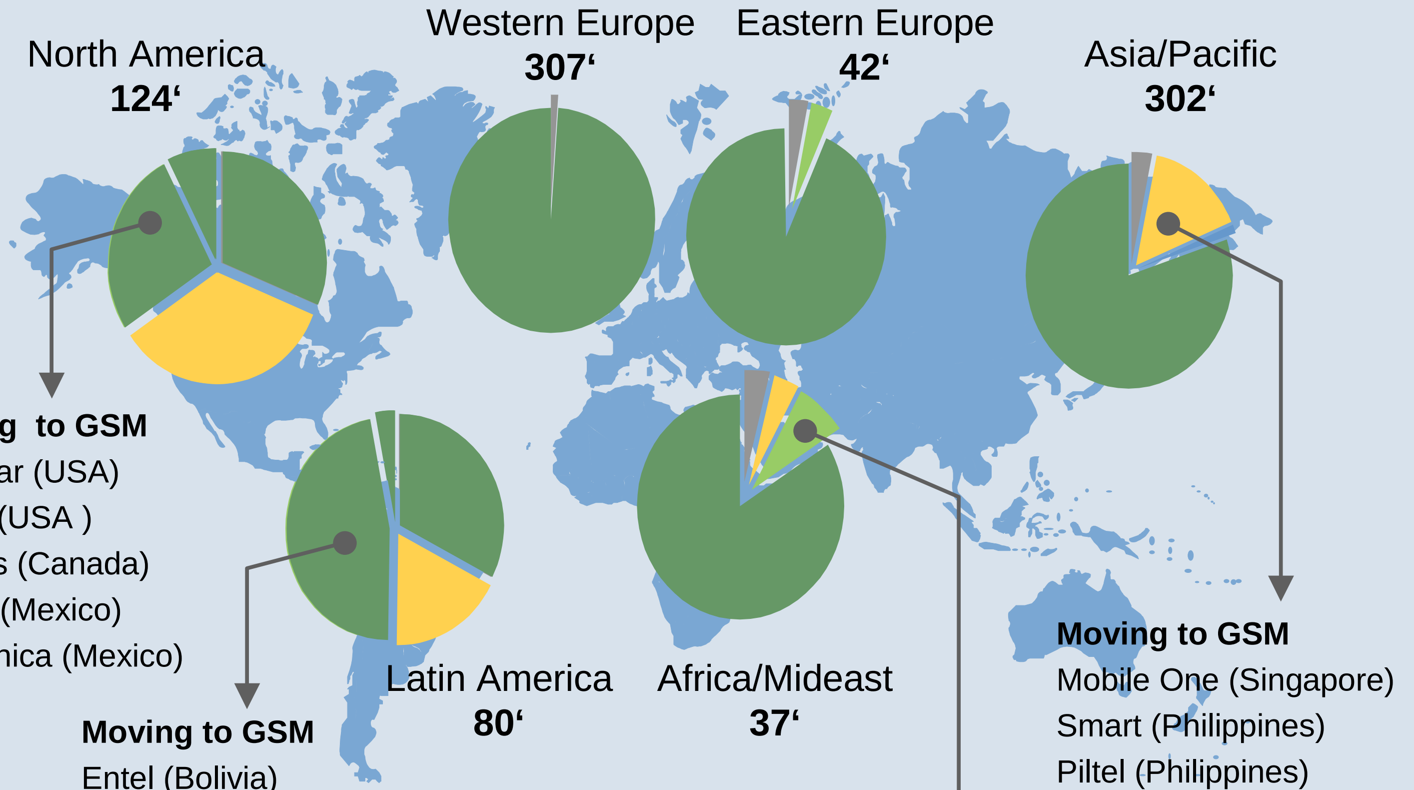
Andreas SCHROETER



Agenda

- **Facts: GSM vs. CDMA**
- **Positive Business case for TDMA → GSM migration**
- **Site and frequency re-use**
- **Fast roll-out and transition**
- **Selecting the right partner**
- **Conclusion**

World Wide Landscape: GSM dominates



Moving to GSM
Cingular (USA)
AT&T (USA)
Rogers (Canada)
Telcel (Mexico)
Telefónica (Mexico)

Moving to GSM
Entel (Bolivia)
Telecom Americas (Brazil)
TIM (Brazil)
Telefonica (Chile)
Tel. Personal (Argentina)
Telefonica (Argentina)
CTE (El Salvador)

Moving to GSM
Cellcom (Israel)

Moving to GSM
Mobile One (Singapore)
Smart (Philippines)
Piltel (Philippines)

Status: April 2002 * incl. PDC in Japan Base: Dec 2001 Source: Siemens AG

World Wide Landscape: Chile case study GSM brings market leadership

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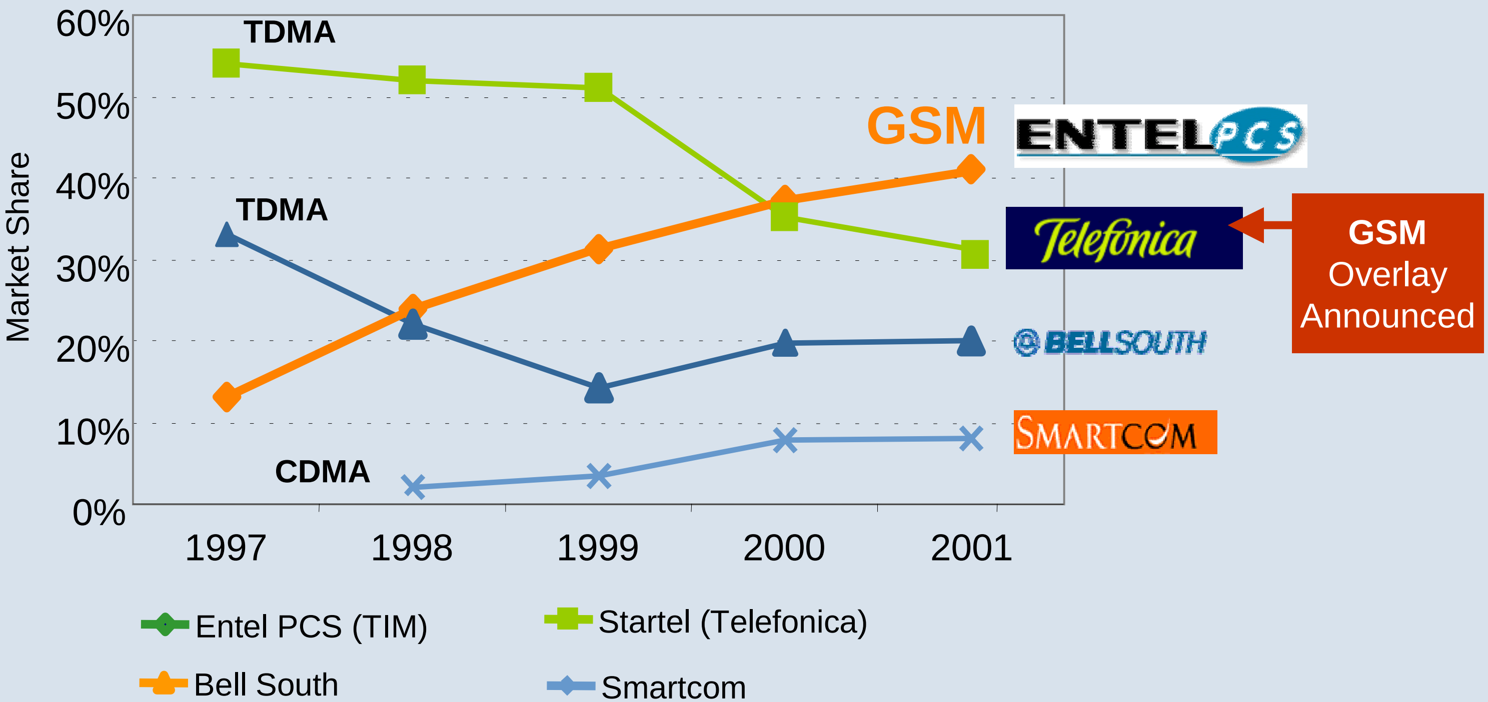
3rd entrant with GSM achieved **market leadership** in Chile within 3 years over TDMA and CDMA players



Remark:
After GSM introduction number of mobile phones has stripped out the fixed lines in Chilean market

Churn rate in Chile reached **45%,** the highest level in LAM

Source: Subtel, Siemens AG, Pyramid research

World Wide Landscape: Philippines case study CDMA -> GSM migration secures market-share

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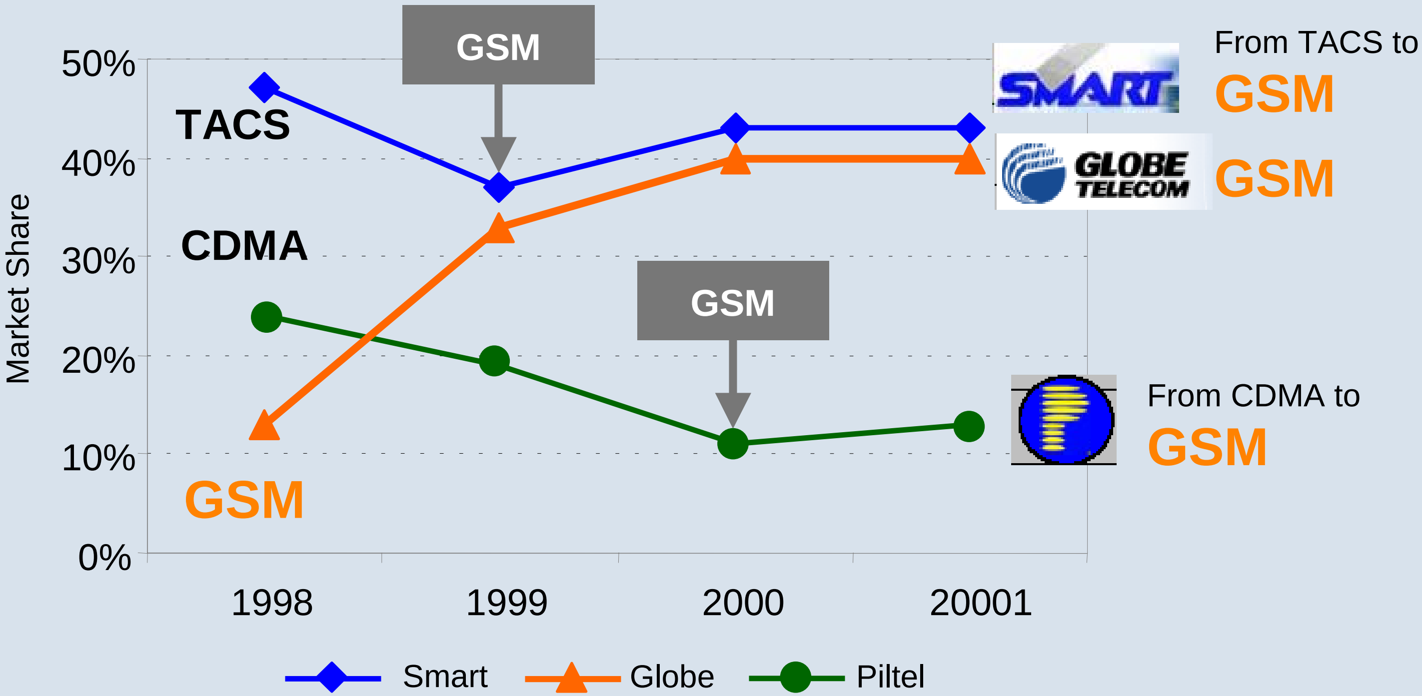
3rd entrant with GSM force the others players to overlay in order to remain competitive



CDMA operator overlaid its network with GSM after a strong erosion of its subscribers base and then **starts to growth again**

Remark: Revenue from data services over GSM represents 38% of operators revenue in Philippines

Brazilian Landscape

After consolidation there will be probably 4 players which will survive in a near future in Brazil

3 out of 4 will use GSM

Group	Technology Choice
TIM	from TDMA to **GSM**
OI + Brasil Telecom	**GSM**
Telecom Americas	from TDMA to **GSM**
VIVO	**CDMA?**

Real competition will be over GSM standard in Brazilian market

CDMA subscribers base is predicted to shrink in medium-term

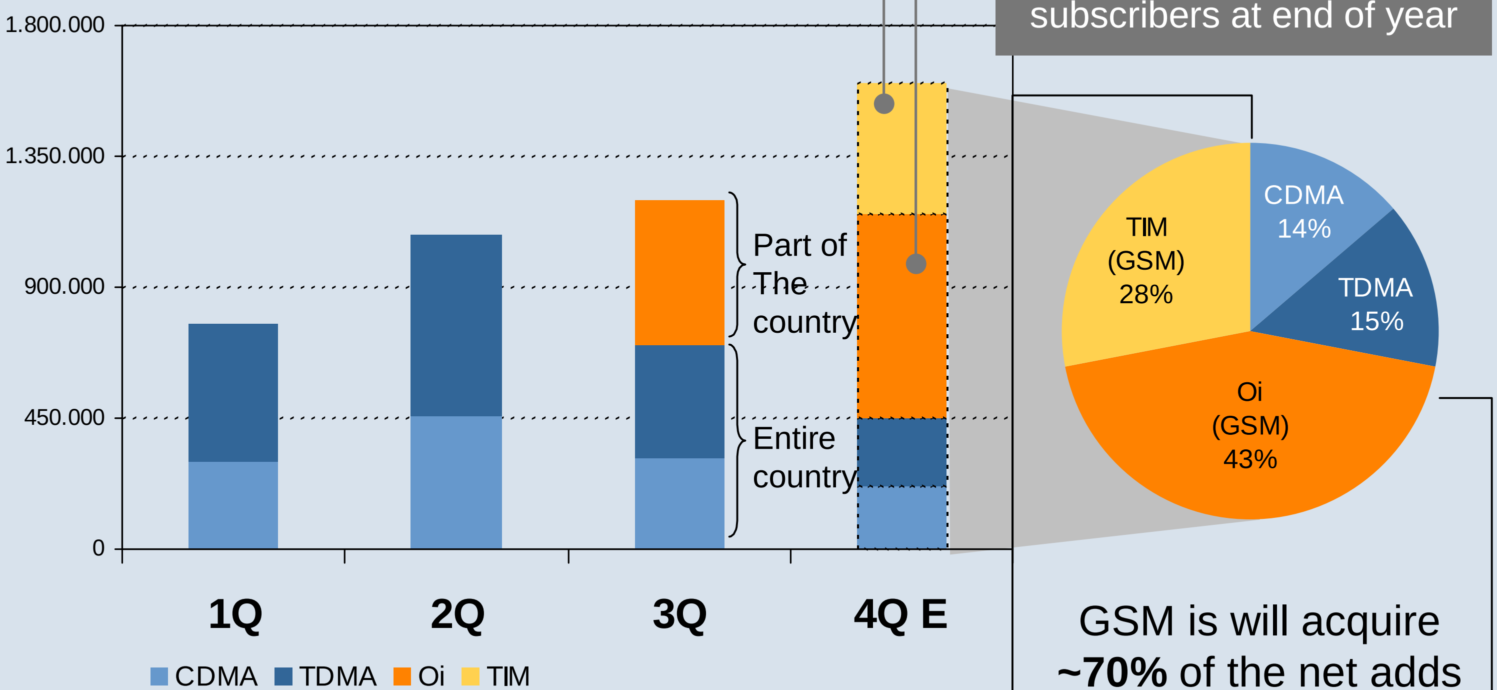
Brazilian Net addition 2002
GSM operators take market leadership at launch

GSM subscribers will dominate the Brazilian Scenario, acquiring a strong market share in 2002

TIM has announced 5.000 subscribers added per day since launching

Oi is expecting 1,2 million subscribers at end of year

Net Additions



GSM is will acquire **~70%** of the net adds in the 4Q 2002

Source: Anatel, operators 3Q 2002 quarter report, and Siemens analysis

Case Study Rio: Scenario without overlaying CDMA operator will fall from #1 to #4

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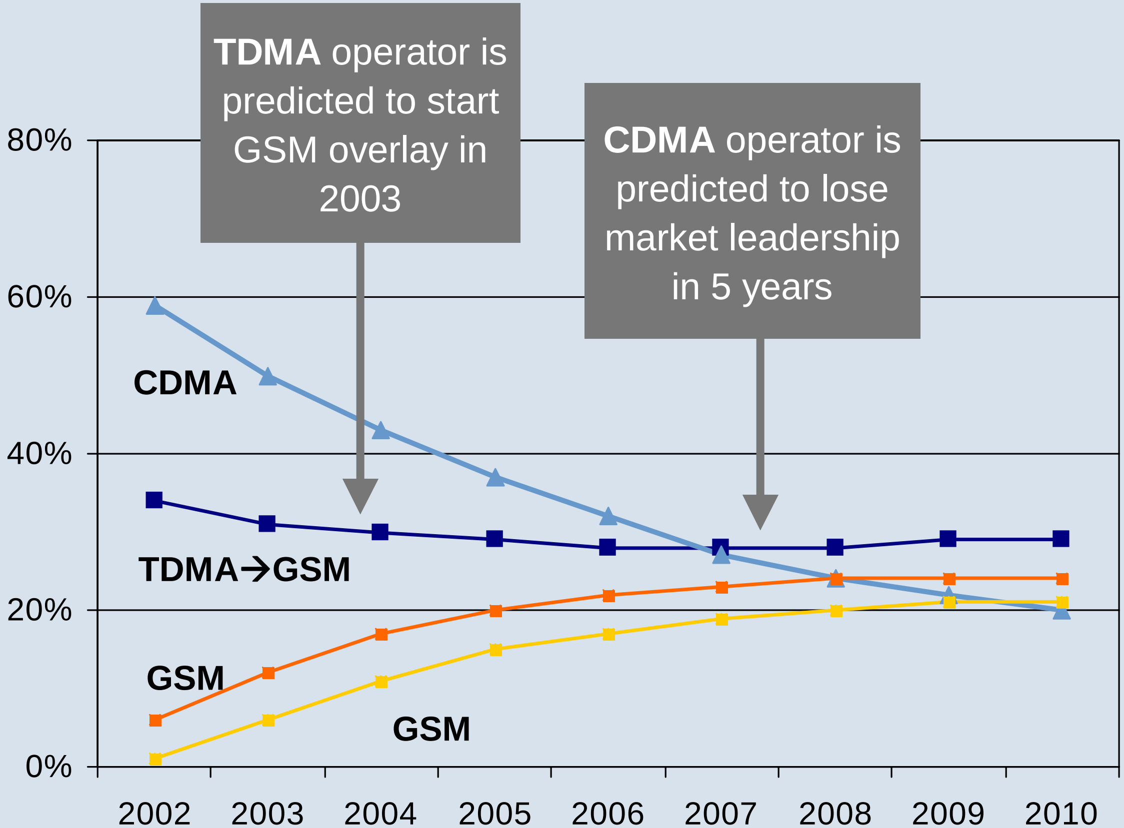
This scenario shows how fast the erosion in CDMA and TDMA market share could be facing GSM competition



Main assumptions:

- CDMA won't build a GSM overlay in short term
- TDMA operator will overlay early in 2003
- 70% of new subscribers will be GSM users
- Oi will keep its aggressive marketing campaign for next 3 years
- Churn for TDMA and CDMA operators will increase 5% reaching 30%

Source: Siemens analysis

Case Study Rio: Overlaying Scenario CDMA → GSM migration protects market share

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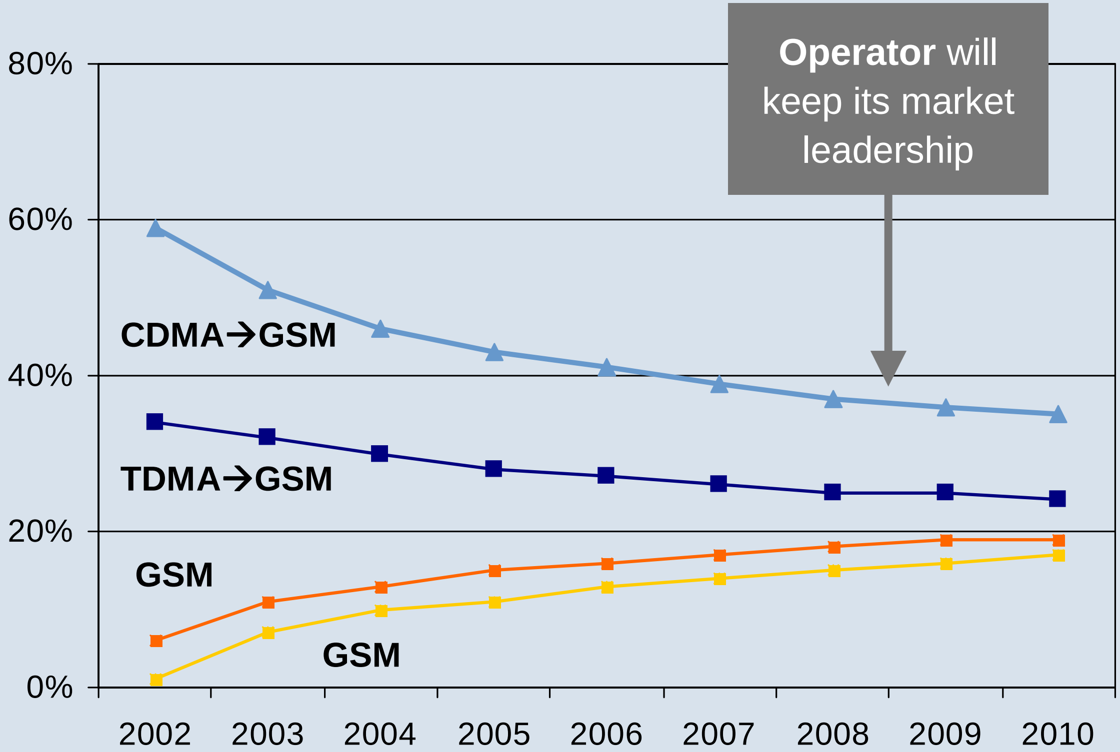
This scenario shows market evolution where CDMA operator decide to launch its network in early 2004



Main differences:

- CDMA and TDMA operator will overlay its network in early 2003
- Telefonica and ATL will defend its subscribers base in response to new GSM entrants

Network migration options for TDMA operators GSM/GPRS is the only future-proof path

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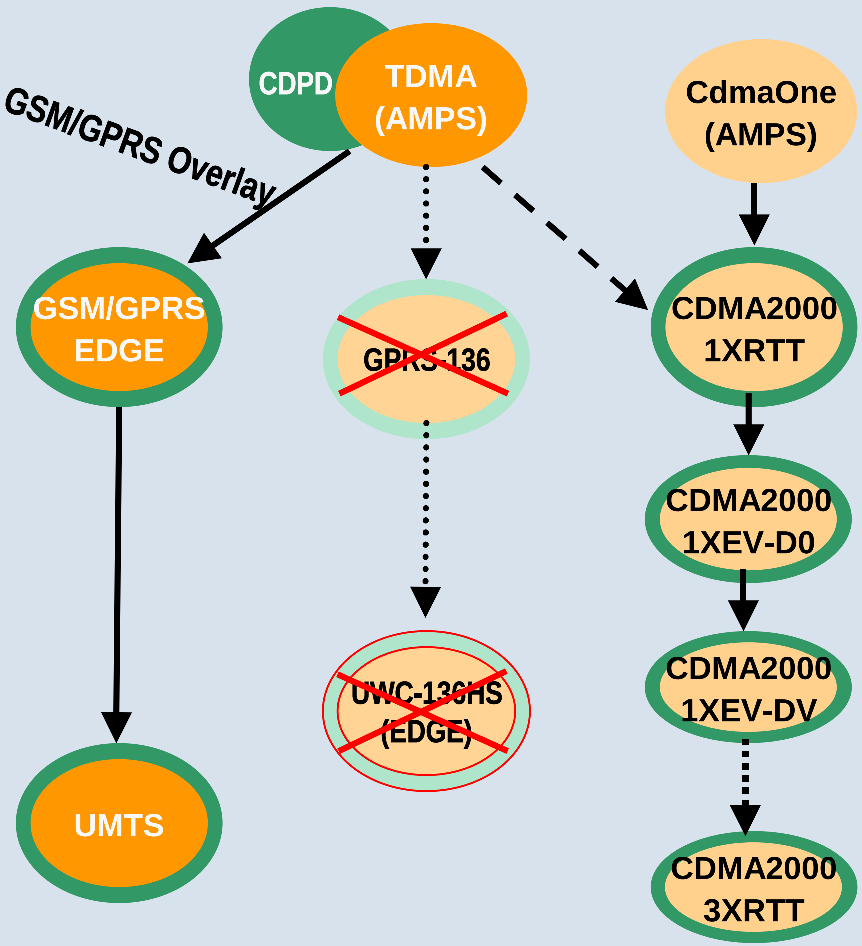
TDMA carriers may choose the GSM/UMTS or CDMA2000 path



Legend:

Packet data

AMPS	Advanced Mobile Phone System (1G)
CDPD	Cellular Digital Packet Data
TDMA	Time Division Multiple Access
CDMA	Code Division Multiple Access
1XEV	1X Evolution
DO	Data only
DV	Data and voice
HDR High	1XEV-DO is based on Qualcomm's Data Rate proposal
1XRTT	1X Radio Transmission Technology (1 carrier)
3XRTT	3X Radio Transmission Technology (3 carriers)

Source: TDMA/GSM Team

GSM/GPRS vs. 1xRTT for TDMA migration (1/2)
GSM is the best solution

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Air interface efficiency is comparable; easier migration to GSM/GPRS

	GSM/GPRS		1xRTT
Air Interface:		=	
Max data rate (theoretical, by standard)	171.2kbps ☺		☺ ☺ 625kbps
Max connection data rate („real world“)	69kbps (cell avg.) ☺		☺ 71kbps (cell avg.)
Spectral Efficiency / System Capacity	☺		☺
Spectrum availability (2.5G, 3G)	☺		☺
TDMA Migration:		+	
Ease of overlay from TDMA: CS reuse (Core Network)	☹		☺
Initial and incremental frequency band requirement	☺		☹
Network planning and radio aspects (TDMA coexistence)	☺		☹
Dual mode handset complexity (single chip solution)	☺		☹
Dual mode handset availability (with TDMA)	☺ ☺		☹
UWCC endorsed UMTS and EDGE, **not CDMA2000 1X**	☺ ☺		☹ ☹

Source: TDMA/GSM Team

GSM/GPRS vs. 1xRTT for TDMA migration (2/2) GSM is the superior – technological - solution

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GPRS boasts advantages in roaming, economics

GPRS 1xRTT

Roaming Issues:

- American Roaming in IS-41 world
- American Roaming in GSM world
- Worldwide Roaming for voice and data

+

Economics:

- Infrastructure availability (frequency ranges)
- Handset availability
- Cost of handsets: 30% cheaper
- Open Interfaces (multi-vendor capability)
- Richness of services and features
- Economies of scale (> 60% of worldmarket)
- 3G evolution (> 80% of world market for 3G evolution;)

+

Source: TDMA/GSM Team

Agenda

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Facts: GSM vs. CDMA

Positive Business case for TDMA → GSM migration

Site and frequency re-use

Fast roll-out and transition

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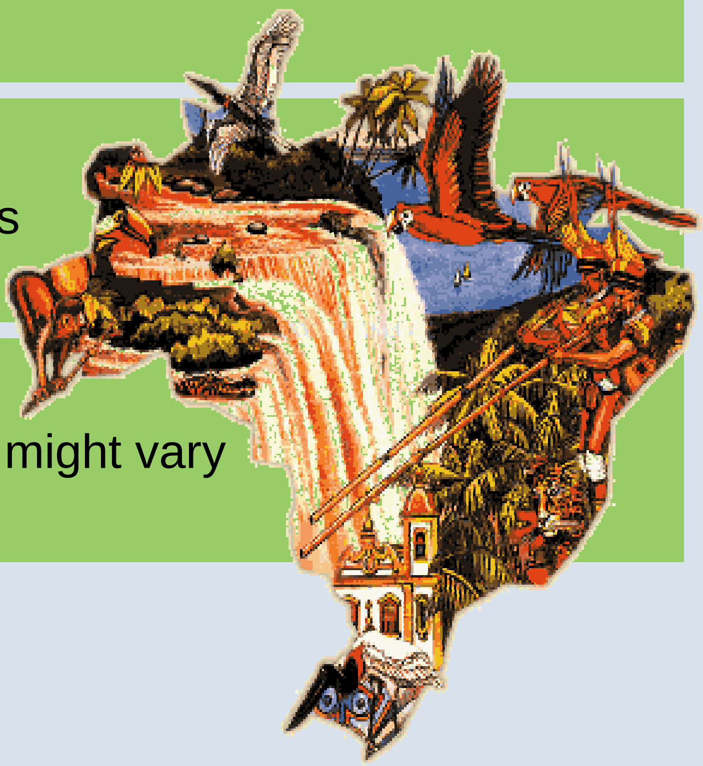
Conclusion

TDMA → GSM Migration
Studied Scenario in Brazil

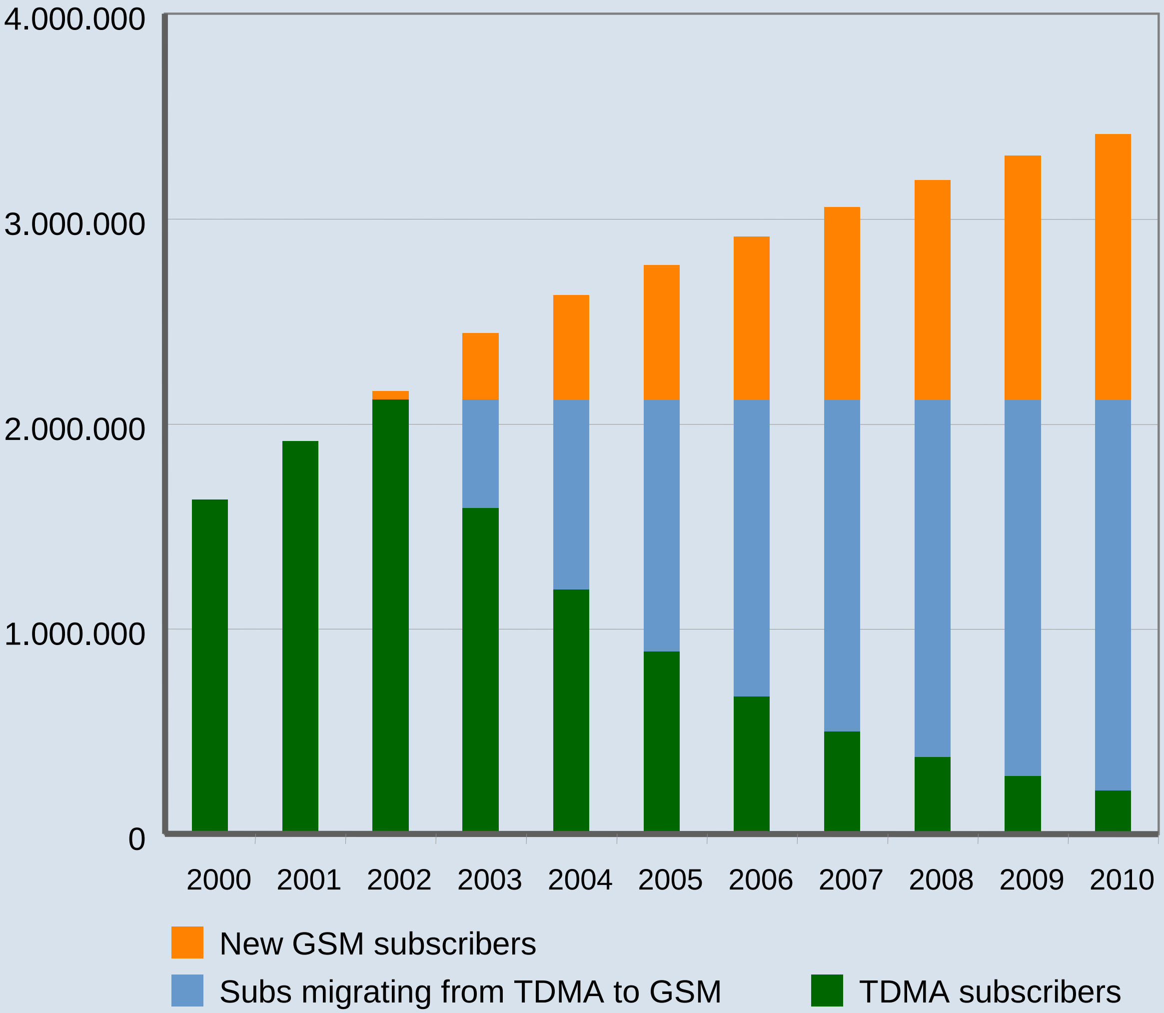
Example operator:
- TDMA operator in one region in Brazil
- #2 with 40% market share

Underlying assumption:
- Representative for most operators in Latin America

Regional differences:
- Some parameter, such as ARPU might vary
- Value drivers remain the same



Subscriber Evolution of Studied Scenario



Assumptions

- Fast migration 25% per year
- New subs 100% GSM
- Launching service for Christmas 2002

Source: Operator Annual report

International Roaming generates huge revenue for GSM operators in Latin America

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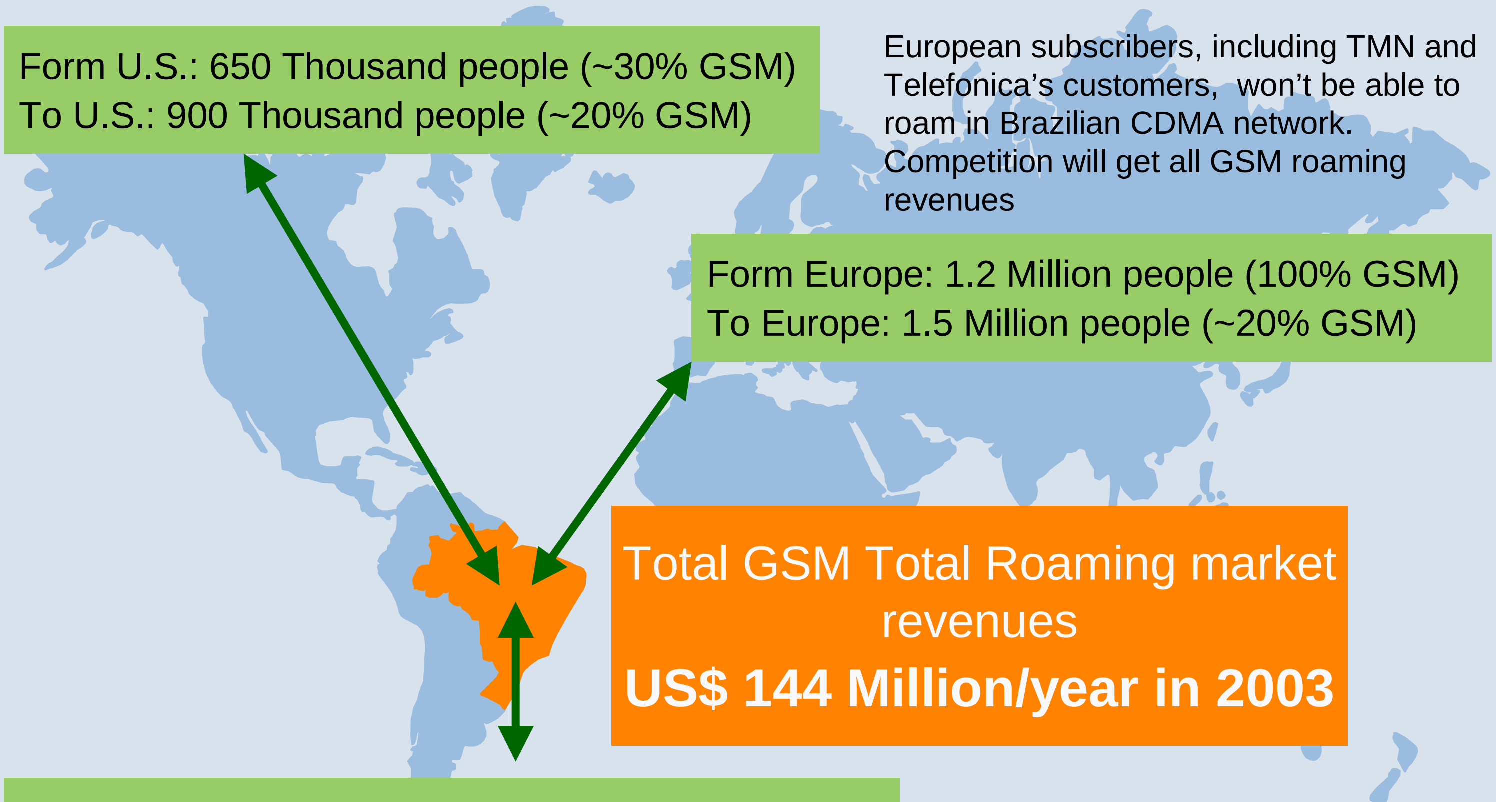
Global GSM International roaming is forecasted to be intensive



Form U.S.: 650 Thousand people (~30% GSM)
To U.S.: 900 Thousand people (~20% GSM)

European subscribers, including TMN and Telefonica's customers, won't be able to roam in Brazilian CDMA network. Competition will get all GSM roaming revenues

Form Europe: 1.2 Million people (100% GSM)
To Europe: 1.5 Million people (~20% GSM)

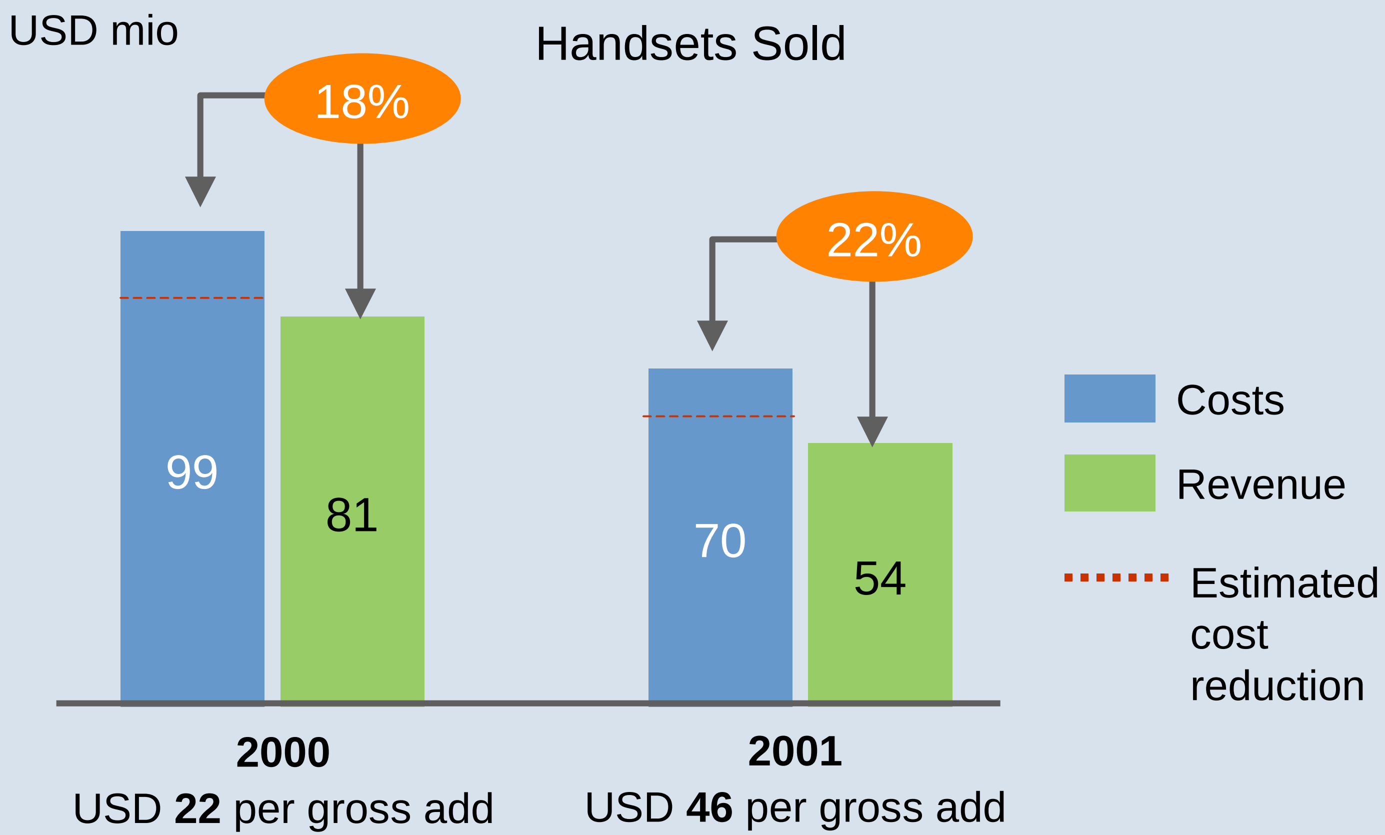
Total GSM Total Roaming market revenues

US$ 144 Million/year in 2003

Form Latin America: 3 Million people (~30% GSM)
To Latin America: 1 Million people (~20% GSM)

Source. Embratur

Subsidies Analysis: GSM vs. TDMA



GSM handset prices are **> 15% lower than TDMA** baseline, which makes it possible to subsidize less and keep the same price level

Source: Operator Annual report

Network OPEX:
Low Impact during Transition Phase

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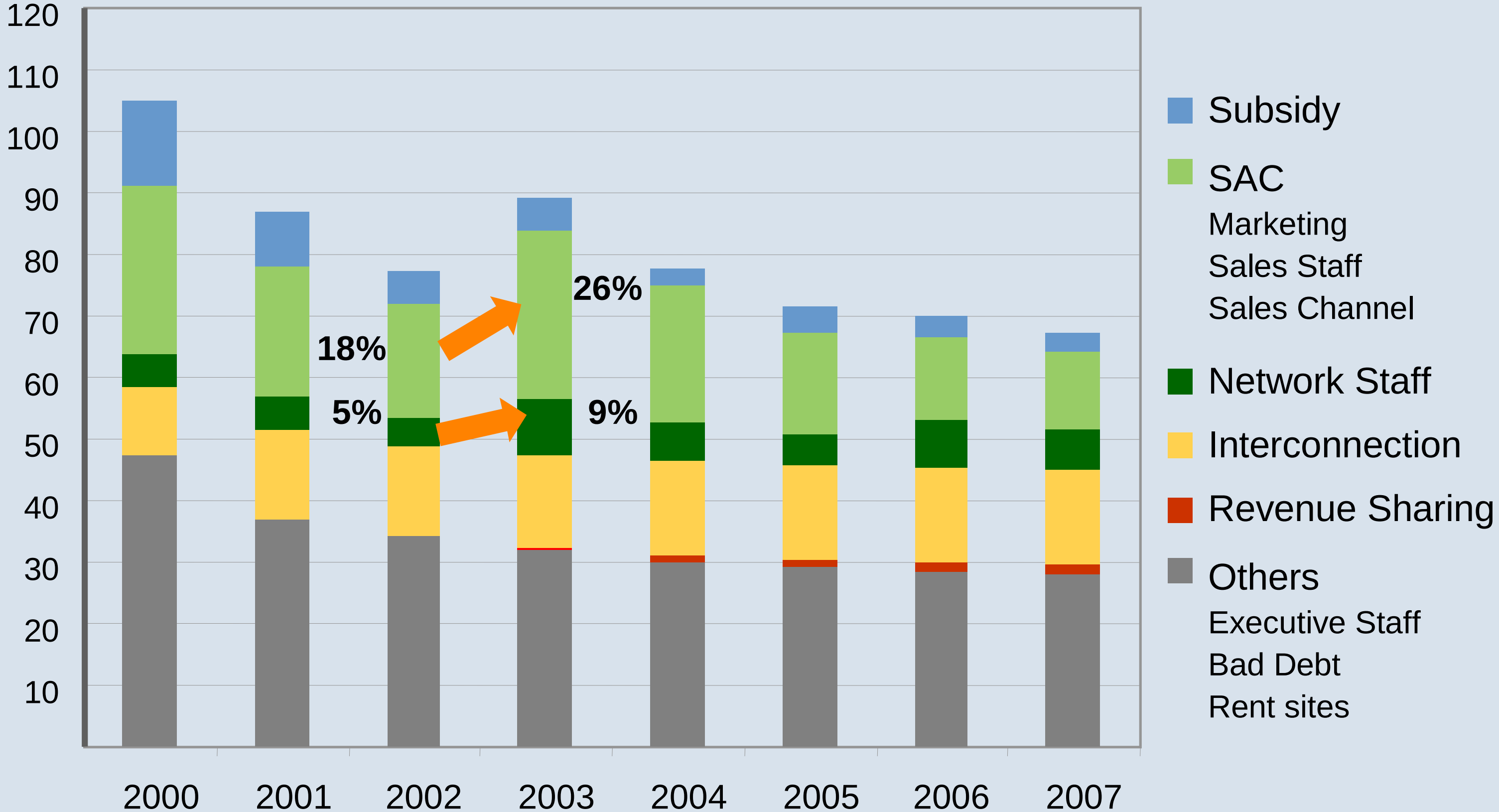
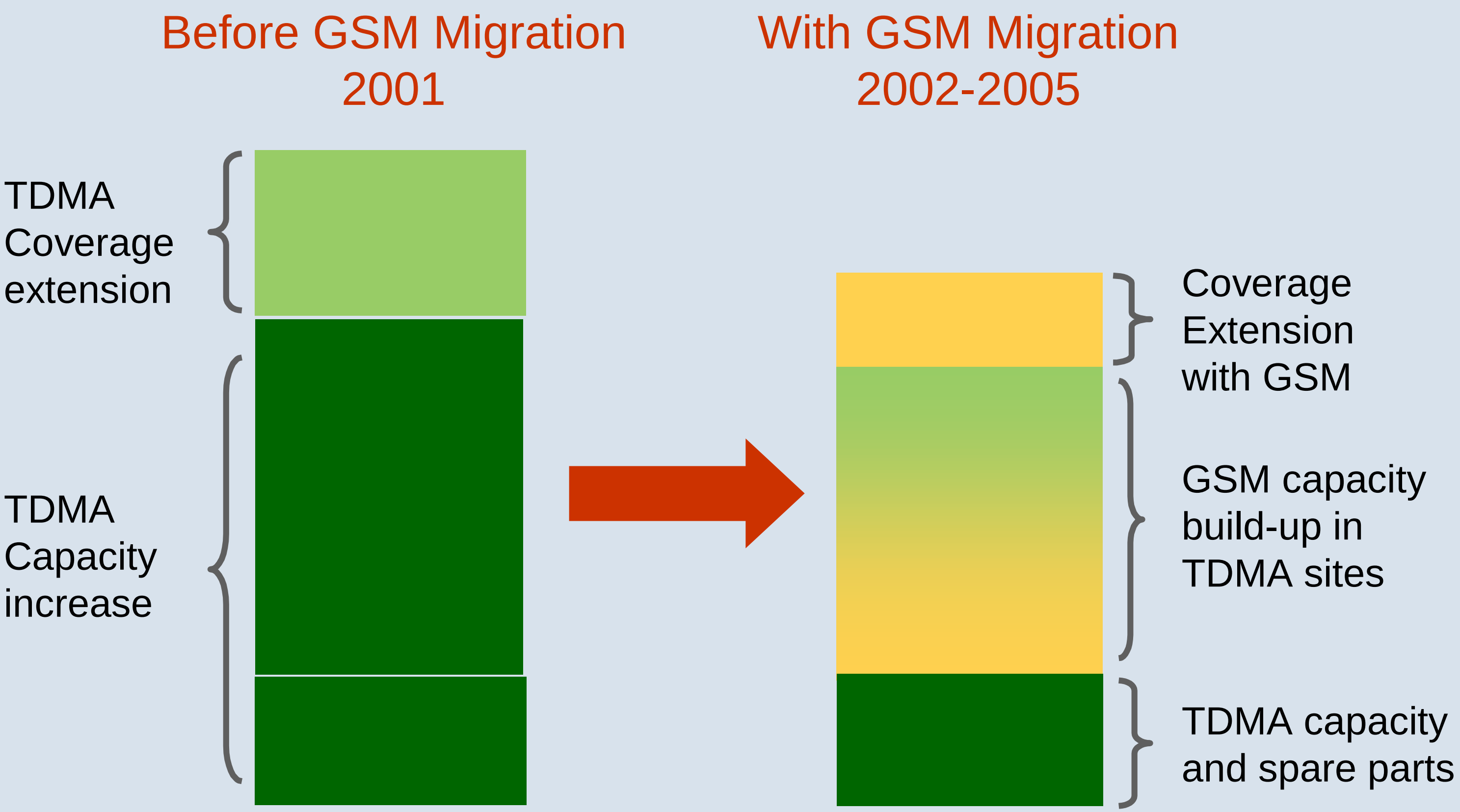


→Total impact during transition phase is not over **12% of total OPEX**

Fast Roll-Out !
Redirection of Investment to GSM pays off

Operator Investment Plan

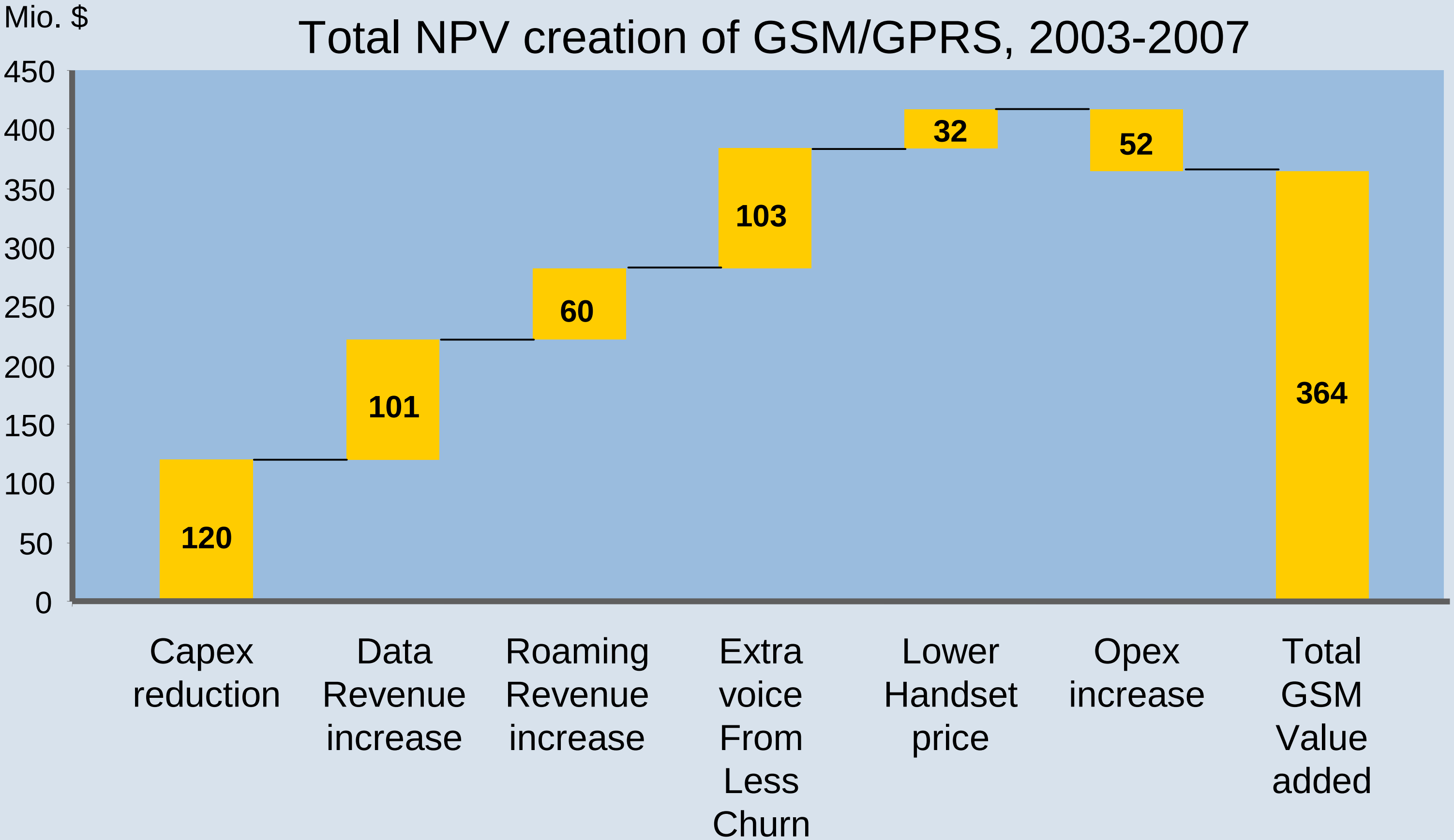


Source: TDMA/GSM Team

GSM migration creates huge additional value

Period 2002 - 2007

Total NPV creation of GSM/GPRS, 2003-2007



Source: Siemens Overlay Team

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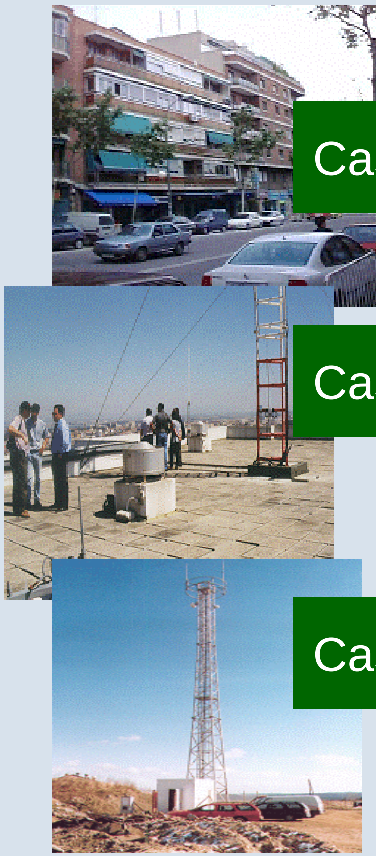
Frequency options for TDMA → GSM migration
Fast roll-out in new bands recommended



Case 1

Only TDMA 800 band available
Introduce GSM 850

TDMA 800

TDMA800
GSM850

Case 2

1800/1900MHz extension band available Introduce GSM 1800

TDMA 800

GSM 1800/1900

Case 3

1800/1900MHz extension band available
Introduce GSM 850 and
GSM 1800/1900

TDMA 800

TDMA800
GSM850

GSM
1800/1900

Flexible Co-Siting leaves operators free to choose best Migration Roll-out

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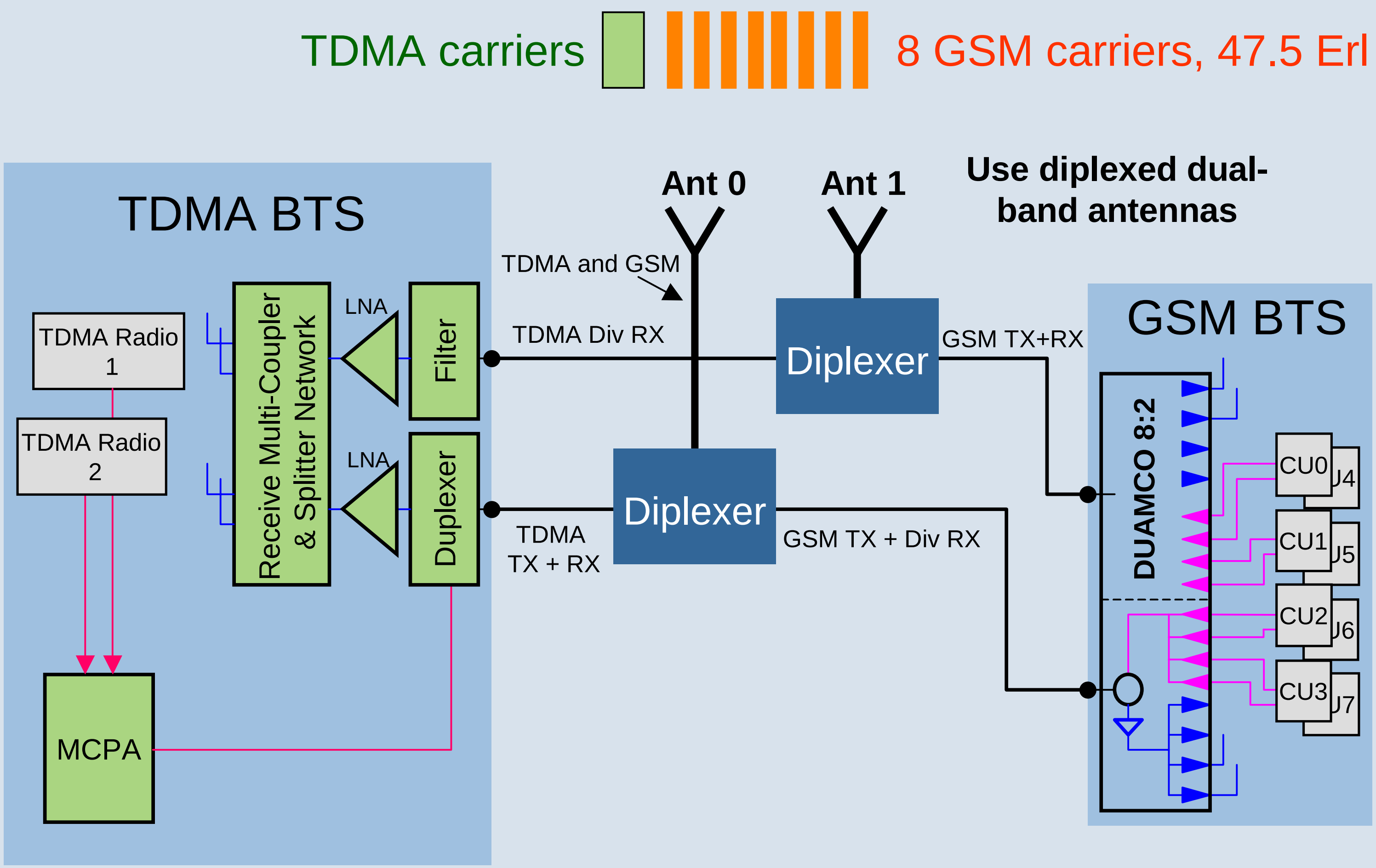
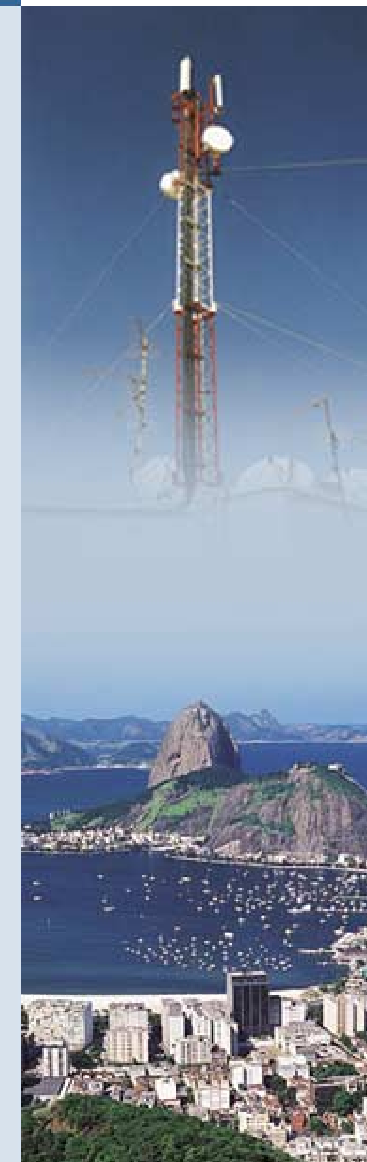
BACKUP



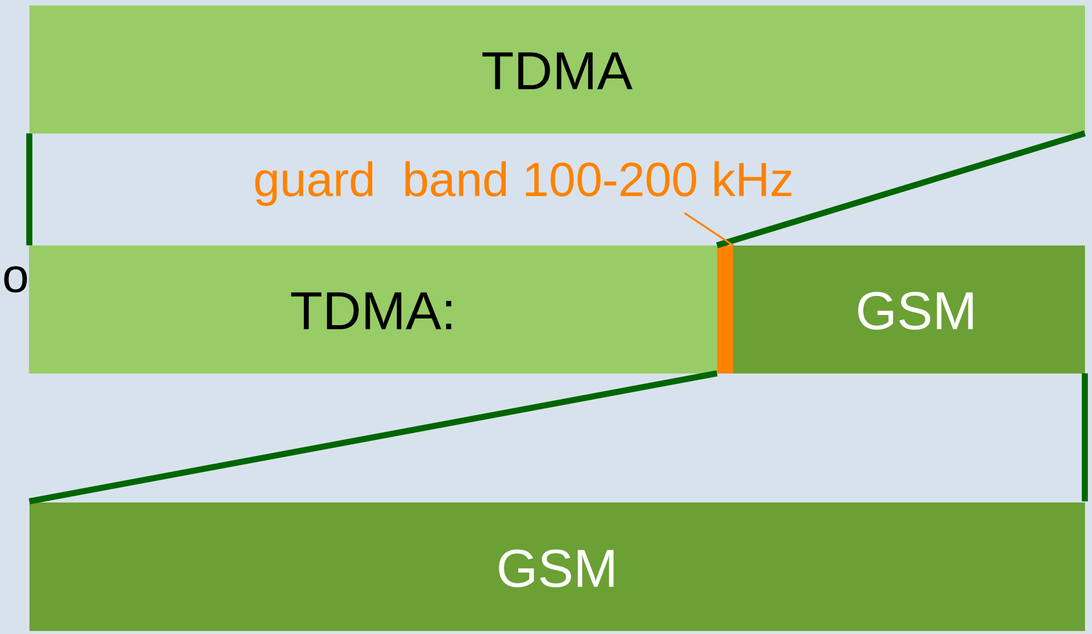
GSM & TDMA share 850 bands



Initial situation
(only TDMA)

Intermediate situatio
(TDMA and GSM)

Final situation
(only GSM)



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Siemens market leadership in Turnkey network roll-out by standardized processes and tools

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TPM	Milestones	CAPRI 2000
Phase I Site Identification & Evaluation	1 Search Area Map Issued 2 Site Acquisition Report Compl 3 Site Evaluated	Radio Planning Site Acquisition
Phase II Leasing & Tech. Site Survey	4 Technical Site Survey 5 Site Selected 6 Site Leased	Site Acquisition
Phase III Permitting & Design	7 Permit Submitted 8 Building Permit Granted	Permit +Design
Phase IV Construction	9 Construction Start 10 Ready for Installation	Construction
Phase V Implementation	11 Material Available 12 Installation Completed 13 Commissioning Complete	Implementation
Phase VI Acceptance	14 Unit Accepted 15 PAC received 16 NE Integrated 17 Site On-Air 18 Cluster Accepted 19 Network Accepted 20 FAC received	Acceptance

Siemens Network Operation Services are best to manage dual TDMA-GSM networks

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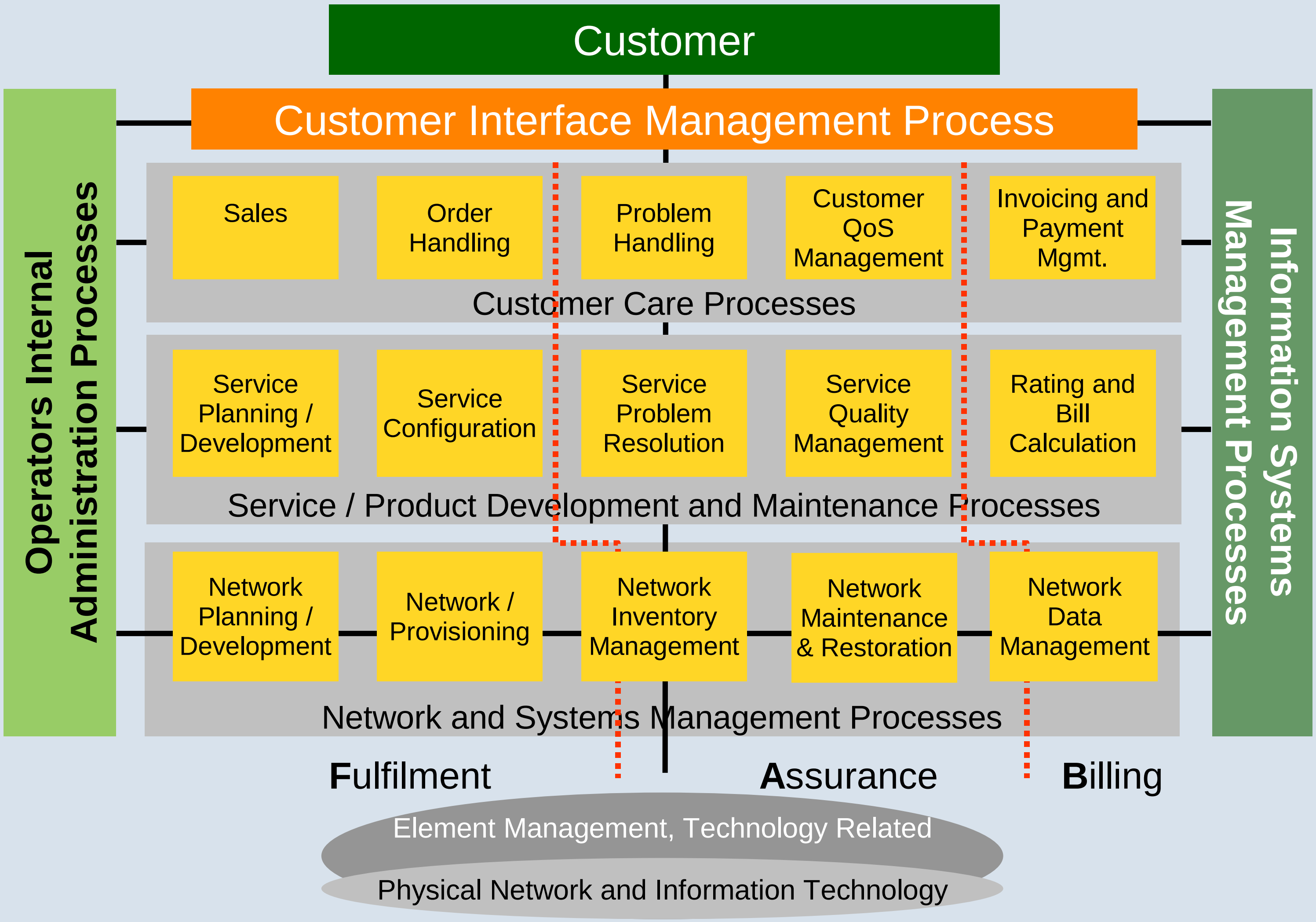
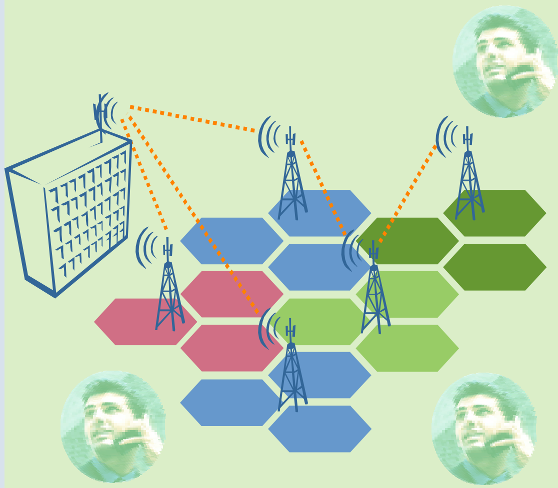


Source: TeleManagement FORUM - Telecom Operations Map (Evaluation release 1.1)

Continuous Network Optimization is a must in the transition phase

Network after handover to the customer...



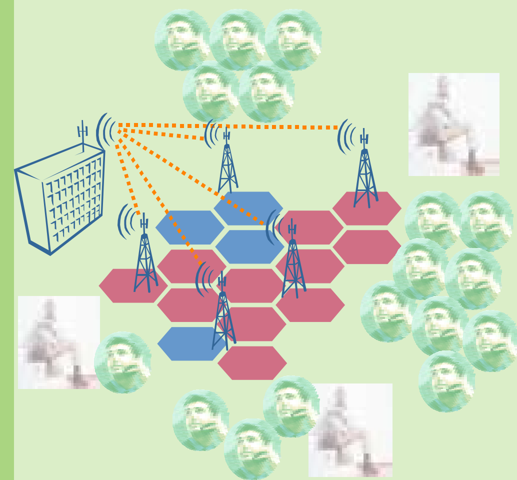
Changes

- Launching of new application
- Implementation of new services
- Higher Subscriber amount than expected
- Consumer behaviour
- ...

Consequences

- Dropped Calls
- High Blocking Rate
- Unsatisfied customers
- Higher churn rate
- Revenue losses
- Interference

...one year later



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Siemens strong Commitment in the Americas is the basis of our success

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Entry into key markets:

Mexico: 1894

Brazil: 1899

Argentina: 1908

Colombia: 1954

Employees per region:

Mexico and Central America: ~13,500

Colombia/Peru/Venezuela/ Ecuador: ~1,900

Brazil/Bolivia/Paraguay: 7,200

Argentina/Chile/Uruguay: ~3,300

* Figures from year 2000
Source: ICN BTC RC LA; ICN ISA Rhub LA; Siemens Telecomunicaciones Uruguay

Credit Rating ICM Peer-Group
Siemens has best rating among all competitors

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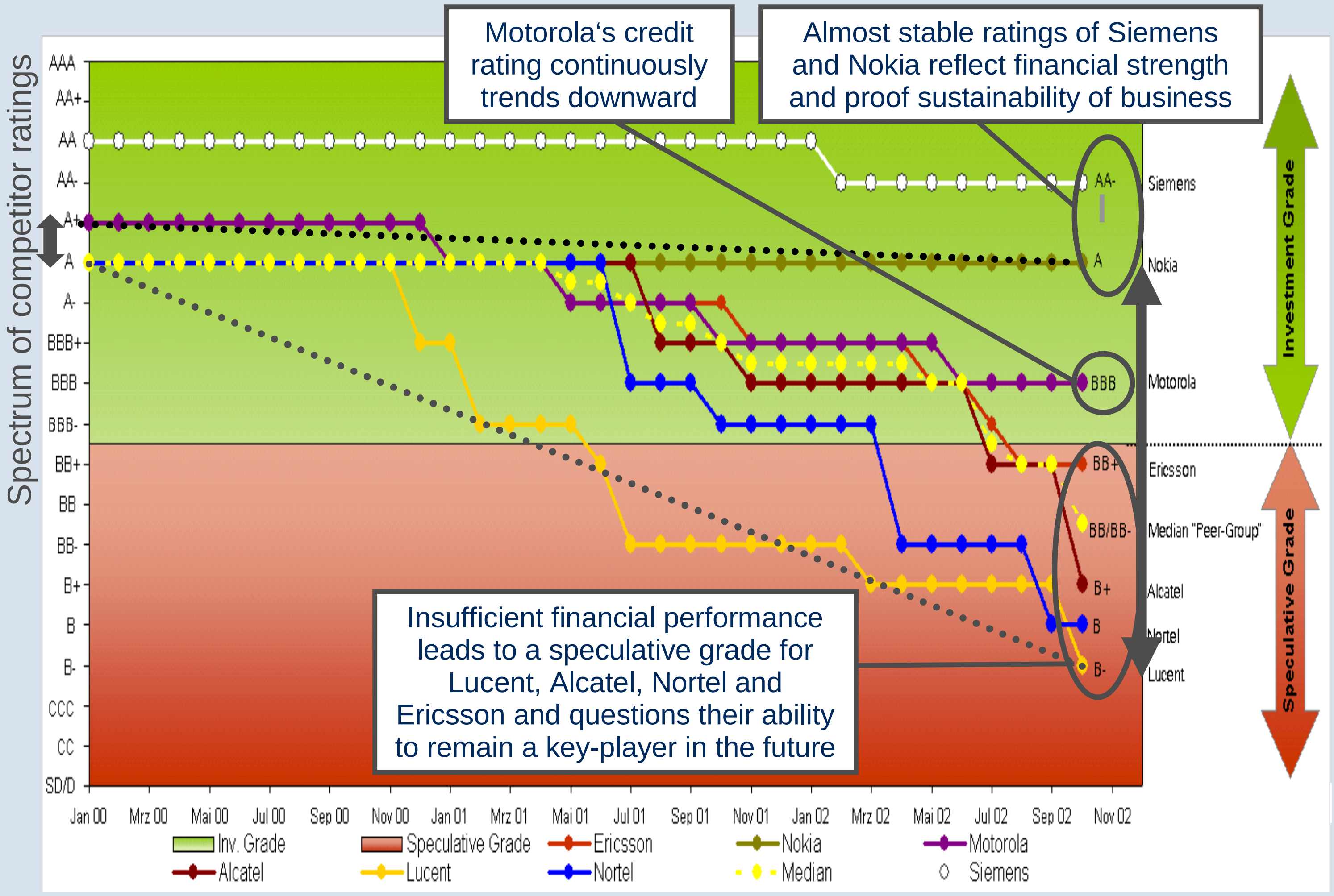
... In tough time like today, financial stability becomes a competitive advantage!



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Conclusions

Positive business case for TDMA/CDMA → GSM migration

Negative business case for not migrating towards GSM

GSM dominates over TDMA and CDMA

Fast migration strongly recommended (at least in Brazil)

Re-use your sites and manage a fast cost efficient roll-out

Select the right (stable) partner

Source: GSM Overlay Team

Siemens mobile - the right partner for you

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