



ARCHITECTS OF AN INTERNET WORLD

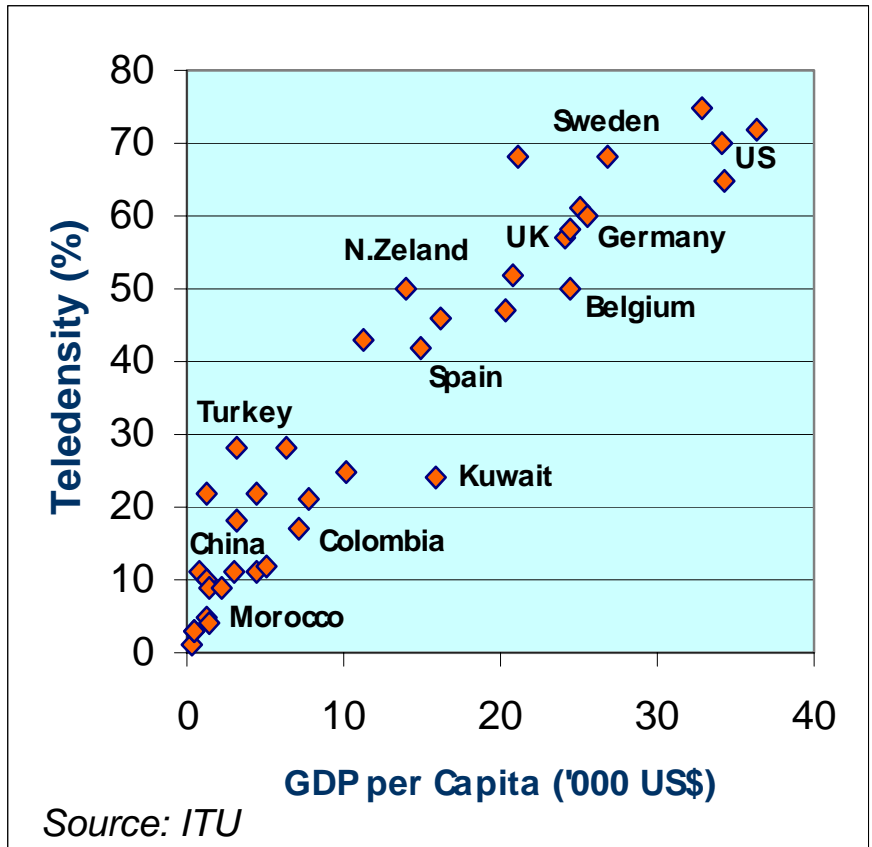


Alcatel GSM Restricted Mobility Solution for Universal Access

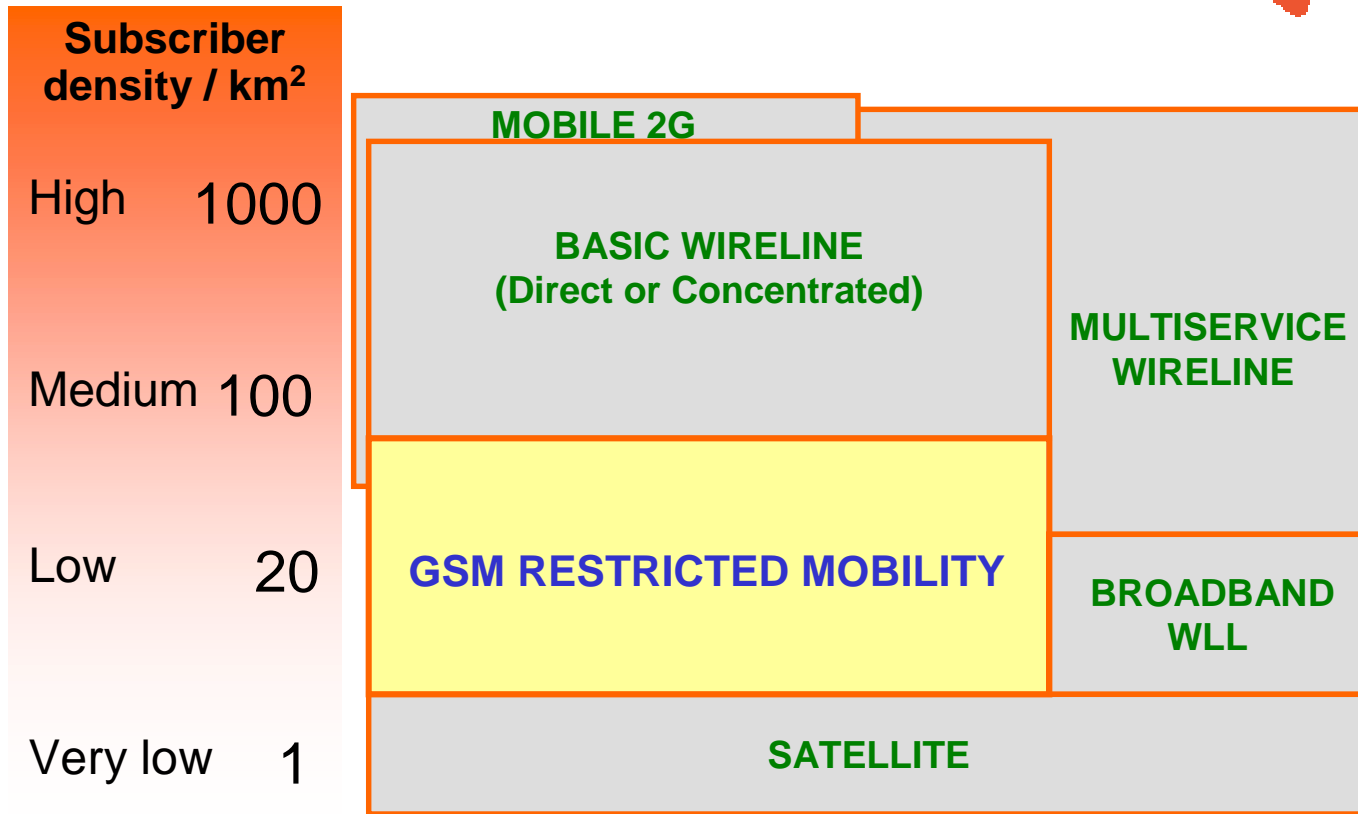


- ◆ GSM restricted mobility and its advantages
- ◆ Regulatory issues
- ◆ Alcatel GSM restricted mobility package
- ◆ ANNEX : Network impact

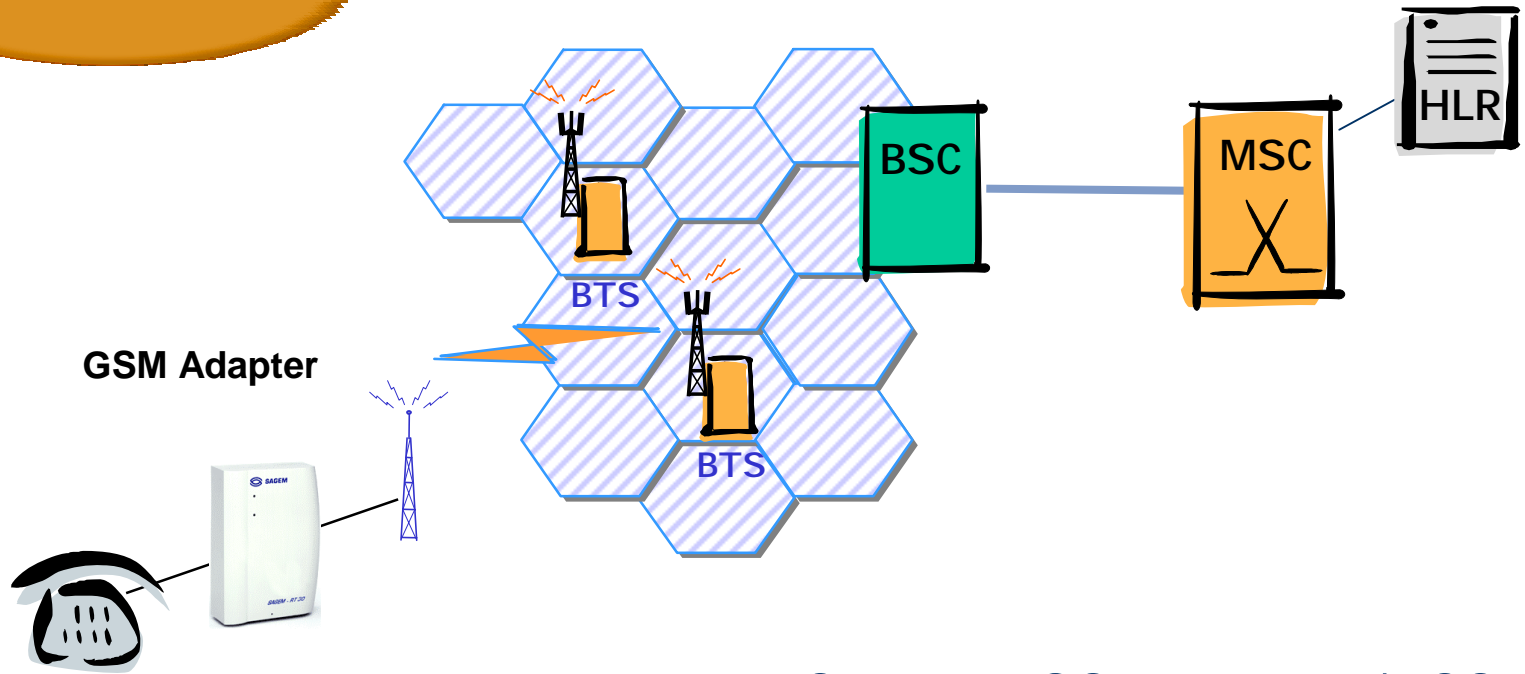
- ◆ Universal service - a major economic and political issue in developing countries
- ◆ Particularly urgent for rural and remote communities
- ◆ Today Internet access becomes as essential as telephony
- ◆ New multimedia services and technological convergence are shifting the regulatory focus to



UNIVERSAL ACCESS



Fixed GSM



GSM Adapter

Fixed Cellular Terminal

- ♦ Standard GSM network (NSS + BSS) in 900/1800/1900 MHz bands
- ♦ Terminals = Specific fixed cellular terminals

- ◆ Variety of technical solutions

- ◆ GSM Adapter + standard fixed telephone (and/or other devices : fax, PC, etc.)
- ◆ Fixed GSM Telephone with a SIM-card
- ◆ GSM Payphone

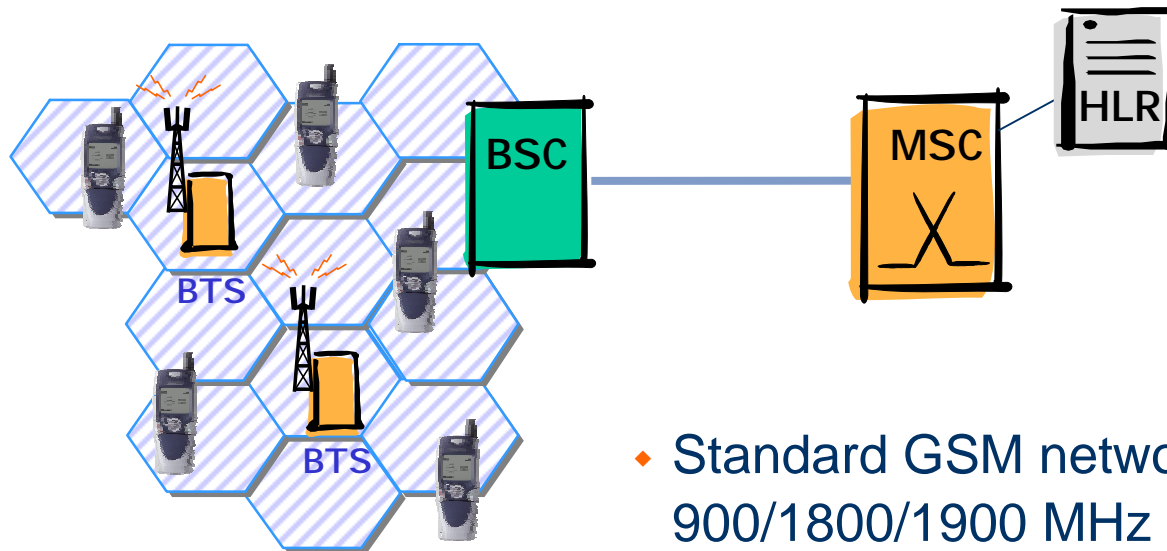


- ◆ Weaknesses of fixed GSM terminals:

- ◆ Less economical solution compared to standard GSM handsets
 - Priced at **more than 250 €/terminal**
 - Installation costs (outdoor antenna usually needed)
 - Higher maintenance costs
- ◆ Local AC power supply required
- ◆ Fewer end-user features than on mobile handsets

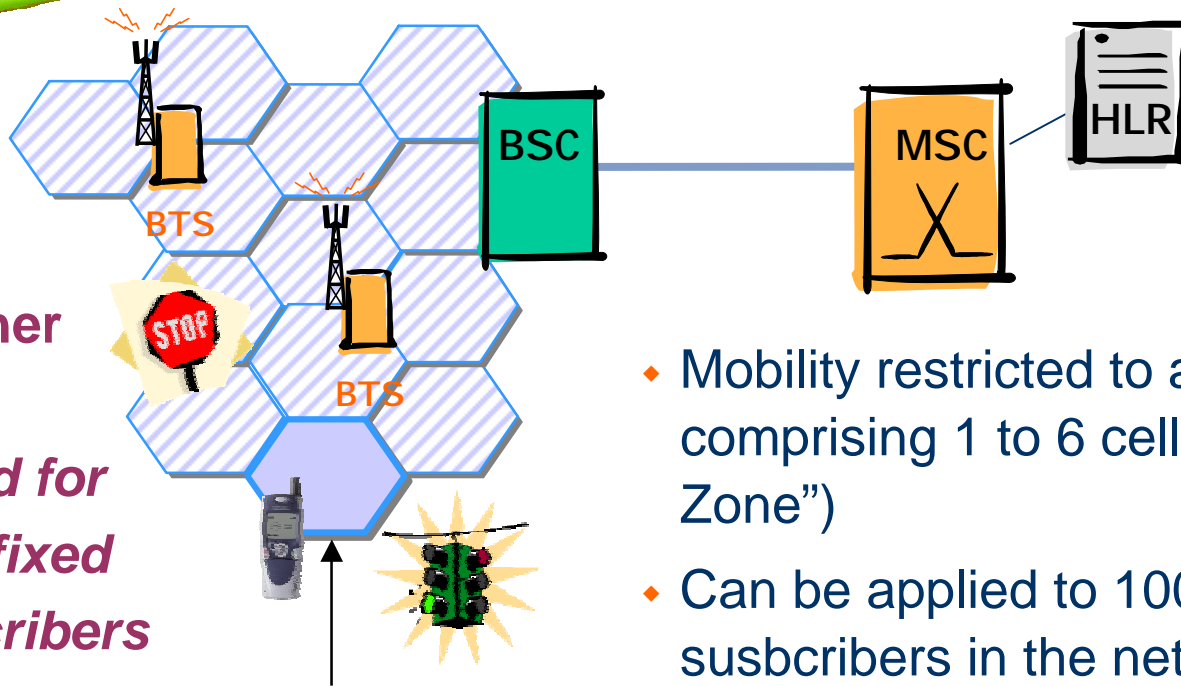
- ◆ GSM Adapters : when connection to other communication devices is needed, e.g. fax machine, small PABX
- ◆ Extention of a GSM coverage zone with an outdoor antenna
- ◆ GSM Payphones : Collective use  improved business case. Example : **Vodacom** (South Africa)
 - ◆ A Phone Shop franchise concept
 - Fully equipped telephone bureau with 5-10 GSM payphones
 - Operated by a local entrepreneur
 - Call rates well below mobile tariffs
 - ◆ 2135 Shops in service in mid-2000





- ◆ Standard GSM network (NSS + BSS) in 900/1800/1900 MHz bands
- ◆ Additional SW feature in NSS
- ◆ Terminals = Standard GSM handsets
- ◆ Solution for 850 MHz available in 2002 (BSS + terminals)

GSM Cell Mobility



All other
cells:
*Barred for
semi-fixed
subscribers*

Cell mobility:
*Allowed for semi-
fixed subscribers*

- ◆ Mobility restricted to a small area comprising 1 to 6 cells (“Fixed Zone”)
- ◆ Can be applied to 100% subscribers in the network
- ◆ Cheaper tariff, comparable to PSTN rates
- ◆ Mobile and Semi-Fixed are two distinct user profiles : do not mix

Advantages of GSM Restricted Mobility : End-User Services & Applications



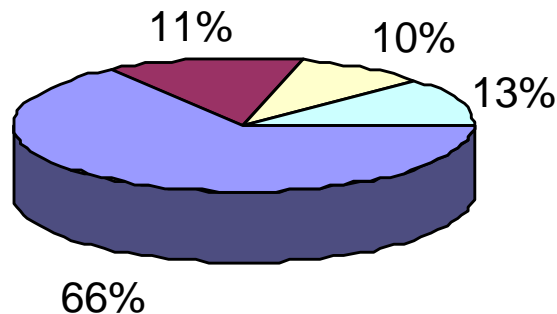
- ◆ **Mobility** (though limited)
- ◆ Easy implementation of **Pre-Paid**
- ◆ Privacy and Security due to a smart card concept (SIM)
- ◆ Mobile application platforms re-used for Semi-fixed users :
 - ◆ Voice Mail
 - ◆ SMS
 - ◆ Unified Messaging
 - ◆ IN services
- ◆ **Always-on Internet access** with GPRS
- ◆ Migration to UMTS enabling new multimedia services



Advantages of GSM Restricted Mobility : Technology



*GSM: 66% of the
world mobile market*



- GSM
- CDMA One
- TDMA
- PDC and others

- ◆ Proven, very mature, and the most widespread radio access technology
- ◆ High spectrum efficiency for voice services
- ◆ Excellent voice quality with enhanced coding
- ◆ Large range - up to 35 km in an open rural environment
- ◆ Indoor coverage is feasible
- ◆ Very stable coverage/capacity ratio
- ◆ Advanced data rates with GPRS (up to 40 kbit/s peak)
- ◆ Clear migration path to 3G

Source: EMC, August 2001

Advantages of GSM Restricted Mobility : Economics



- ◆ GSM infrastructure is a very competitive industry with huge economies of scale → **LOW PRICES**
- ◆ GSM handsets bring significant cost advantages
 - ◆ Cheaper models available at **below 100 €/terminal**
 - ◆ No CPE installation and maintenance costs to the operator
 - ◆ Unavailability of AC power in every home can be overcome via battery recharging shops
- ◆ Network maintenance costs are low compared to wireline networks

Advantages of GSM Restricted Mobility : Synergies with mobile infrastructure



- ◆ Large CAPEX/OPEX synergies for an operator who has already deployed a mobile GSM network:
 - ◆ Only extension of the GSM infrastructure is needed (incremental costs only)
 - ◆ All mobile application platforms (e.g. IN) and OSS systems can be re-used for Semi-fixed subscribers
 - ◆ Trained and qualified technical personnel for installation, operation and maintenance already available
 - ◆ Spare parts



- ◆ GSM restricted mobility and its advantages

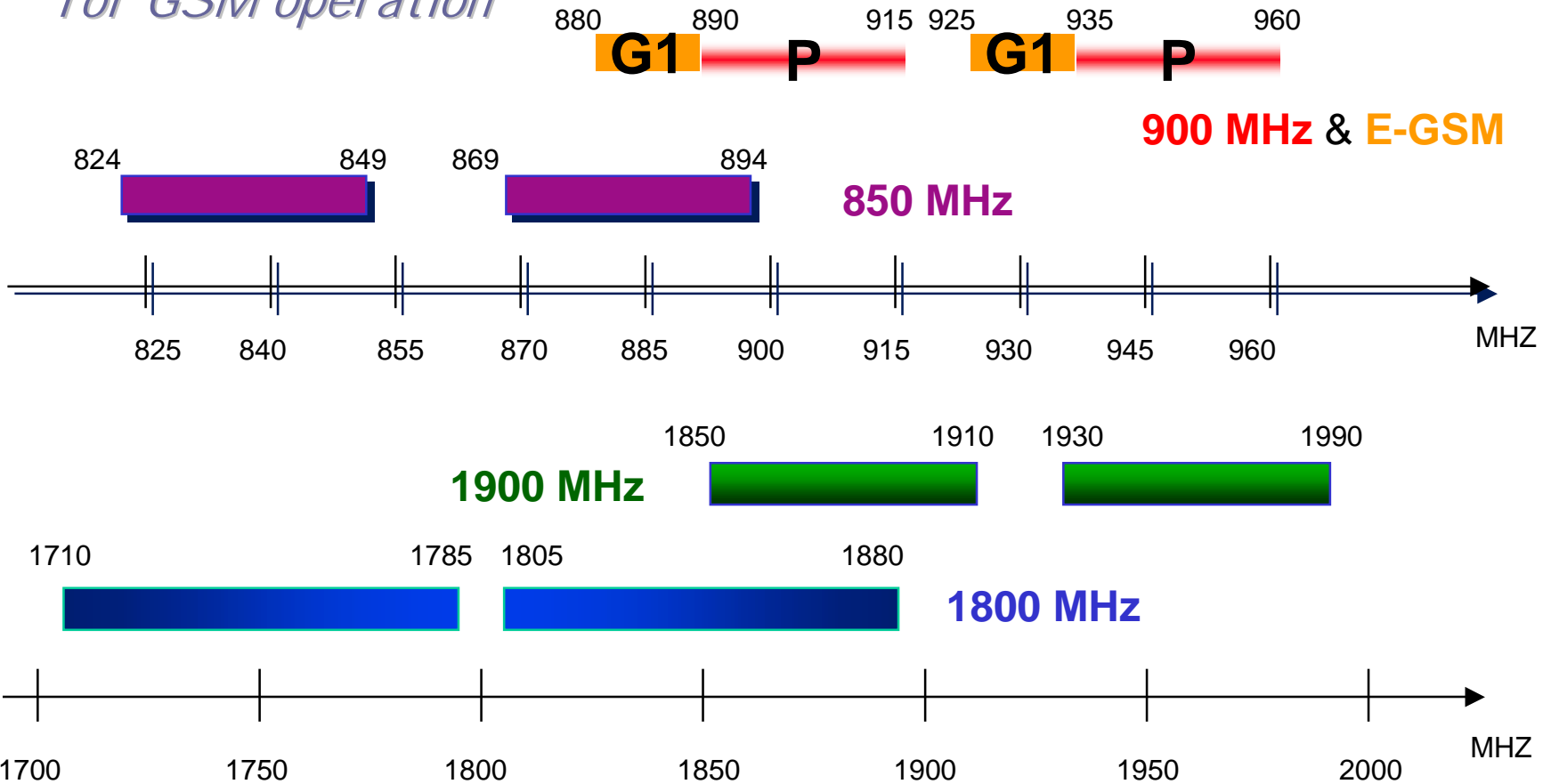
- ◆ Regulatory issues

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- ◆ ANNEX : Network impact




Available frequency bands for GSM operation



- 
- ◆ Historical position of Governments/Regulators
 - ◆ Sell GSM spectrum to mobile operators at a high price
 - ◆ Allocate non-GSM spectrum to WLL projects not to allow fixed wireless operators to enter the mobile market via a back door
 - ◆ GSM Restricted Mobility should be treated in the universal access context
 - ◆ **Rural and remote areas** not covered by commercial GSM operators due to a difficult business case
 - ◆ Services to be provided at **PSTN-like tariffs**
 - ◆ Green light should be given to any technical solution which enables more extensive and economical universal access

GSM spectrum should be made available at a low price (or even given for free) for universal access projects

- 
- A large orange arrow points from the right side of the slide towards the left, passing behind the text. On the right end of the arrow, there are several small icons: a CD-ROM, a computer monitor, and a keyboard.
- ◆ Historical position of Governments/Regulators
 - ◆ Require installation of fixed terminals when fixed operators deploy cellular systems
 - ◆ Use of mobile handsets by fixed wireless operators seen as an attempt to enter the mobile market via a back door
 - ◆ Such restriction is unnecessary in the universal services context:
 - ◆ Rural areas do not provide sufficient return for commercial GSM operators
 - ◆ Why to offer premium mobile services at regulated PSTN-like tariffs?

Use of mobile handsets improves the economics of universal access projects and should be allowed



Figure 1 – Convergence

Fixed and mobile telephone subscribers (millions)

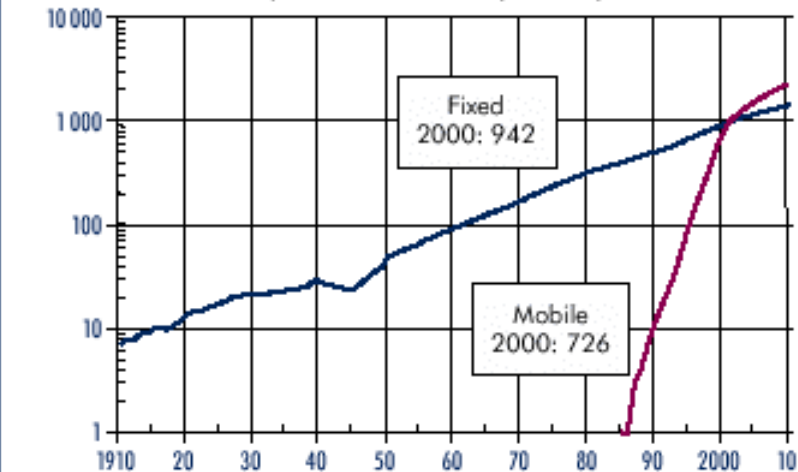


Figure 2 – More mobile economies

Economies where mobile phones have overtaken fixed ones

1993	1998	1999	2000	
Cambodia	Finland	Austria	Bahrain	Philippines
		Côte d'Ivoire	Belgium	Rwanda
		Hong Kong SAR	Botswana	Senegal
		Israel	Chile	Seychelles
		Italy	El Salvador	Singapore
		Korea (Rep. of)	Greece	Slovenia
		Paraguay	Iceland	South Africa
		Portugal	Ireland	Taiwan-China
		Uganda	Luxembourg	Tanzania
		Venezuela	Mexico	United Arab Emirates
			Morocco	United Kingdom
			Netherlands	

Source: ITU, 2001

- ◆ Telecom market reality : in a growing number of developing countries mobile infrastructure is substituting fixed networks
 - ◆ **South Africa, Morocco, Venezuela, Paraguay, Philippines, etc.**
- ◆ Proven success & efficiency of GSM as an access technology makes regulators reconsider their position on fixed/mobile convergence



◆ GSM restricted mobility solutions received regulatory approval in :

◆ **Guinea** (Conakry)

- *Sotelgui*, the incumbent operator with an **Alcatel** GSM 900 network provides mobile and restricted mobility services



◆ **South Africa**

- The telecom regulator is planning to allow *Telkom* and the future *Second National Operator* to offer fixed-mobile services

◆ **Senegal**

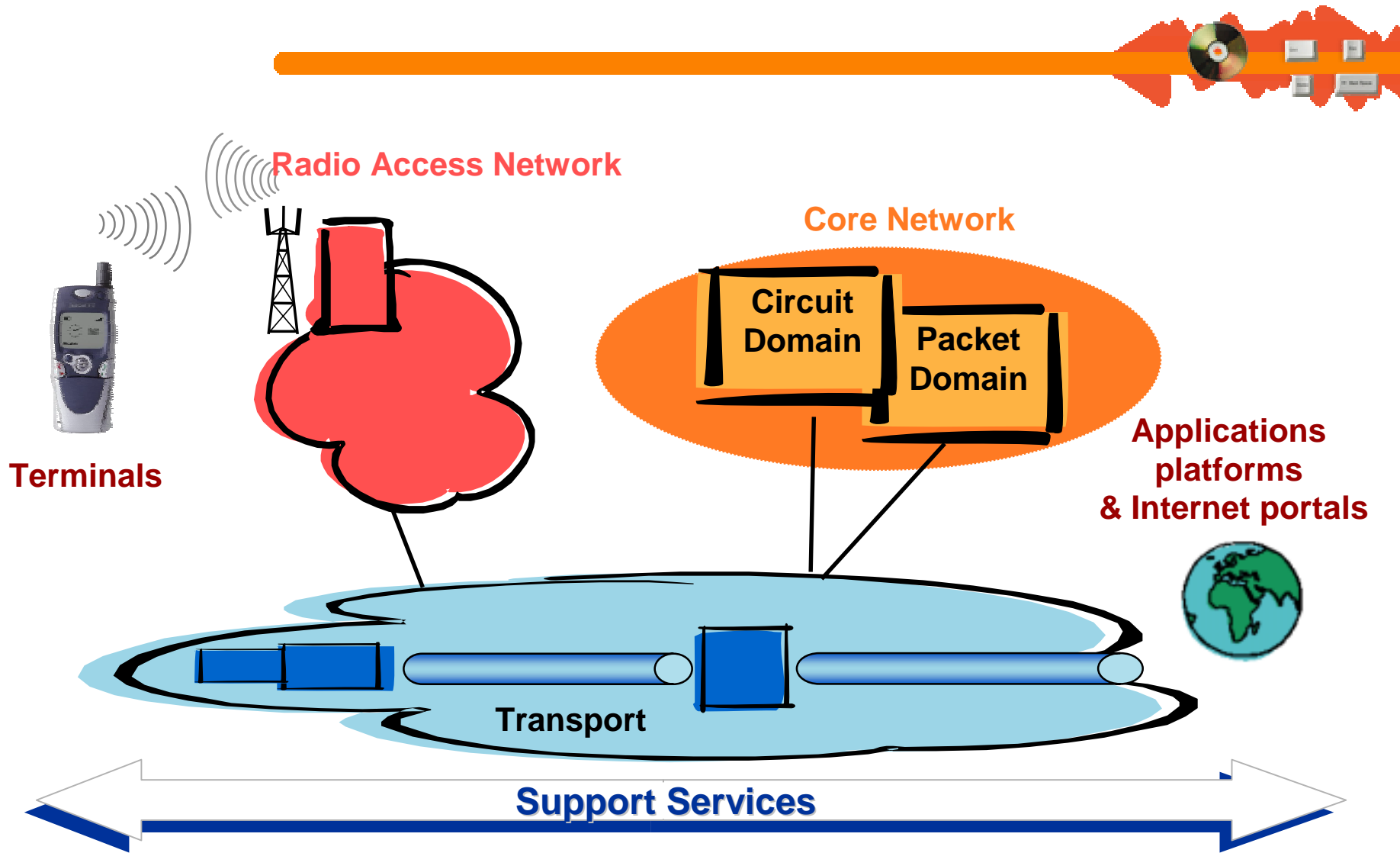
- *Sonatel*, the incumbent operator with a GSM license, will deploy GSM restricted mobility solution in rural areas

◆ Regulators have ongoing discussions with operators & vendors in

⋮



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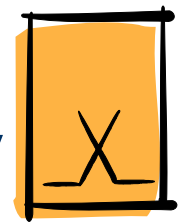
Evolium™ radio solutions



- ◆ Coverage
- ◆ Transmission inside:
 - ◆ IDU (Indoor unit) microwaves board integrated in the same cabinet
- ◆ Compactness
 - ◆ Up to 16 TRX per outdoor cabinet
- ◆ Voice Quality
 - ◆ EFR, HR & AMR features

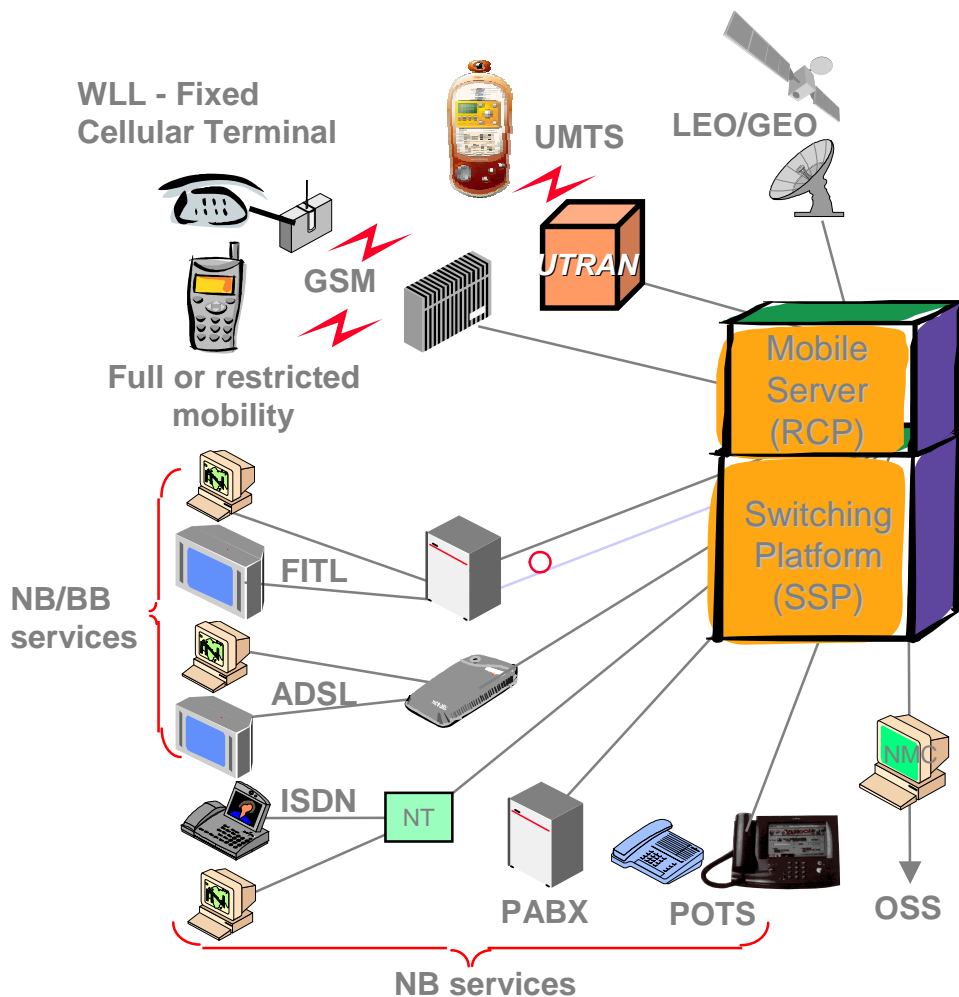
Evolium™ 800 MHz solution available in Q1 2002

Evolium™ core-network solutions



- ◆ Scalability & high capacity
- ◆ Multi-functional Switch
 - ◆ Allows fixed-mobile convergence
- ◆ Secure inter-working with services environment
 - ◆ Added value services (Camel, GPRS, optimal routing...)
 - ◆ Field-proven resistance to IN

Cell Mobility feature available since 2001



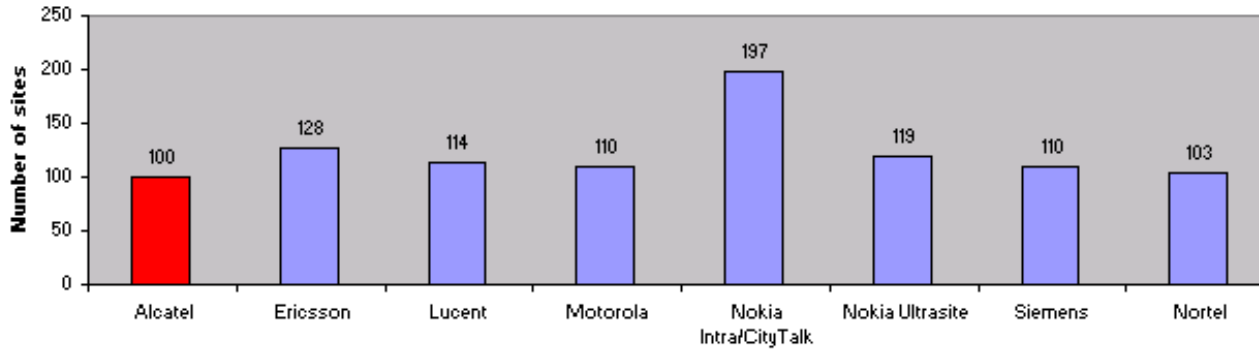
Unique switching platform
(HW+SW)
+
Unique IN platform
(SCP, SCE, SMP)
+
Unique NM platform (NMC)

for

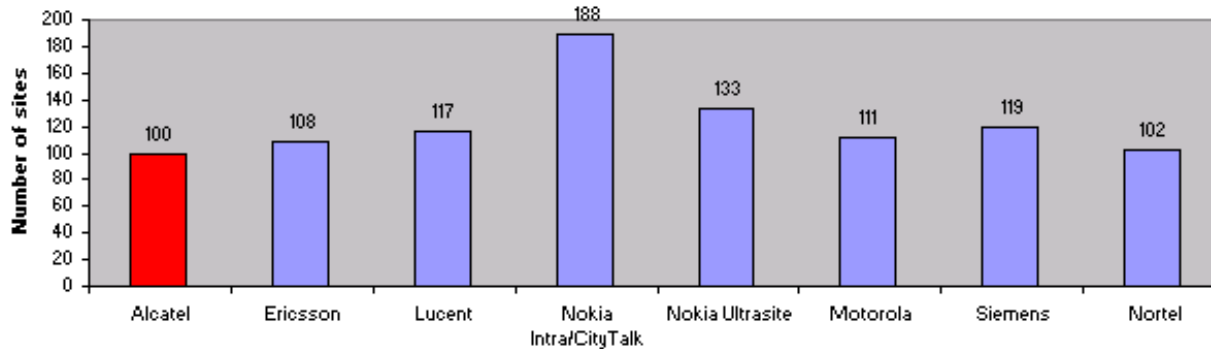
- ◆ Mobile Switching Center
- ◆ Local Exchange
- ◆ Transit Exchange
- ◆ IN Services and Features



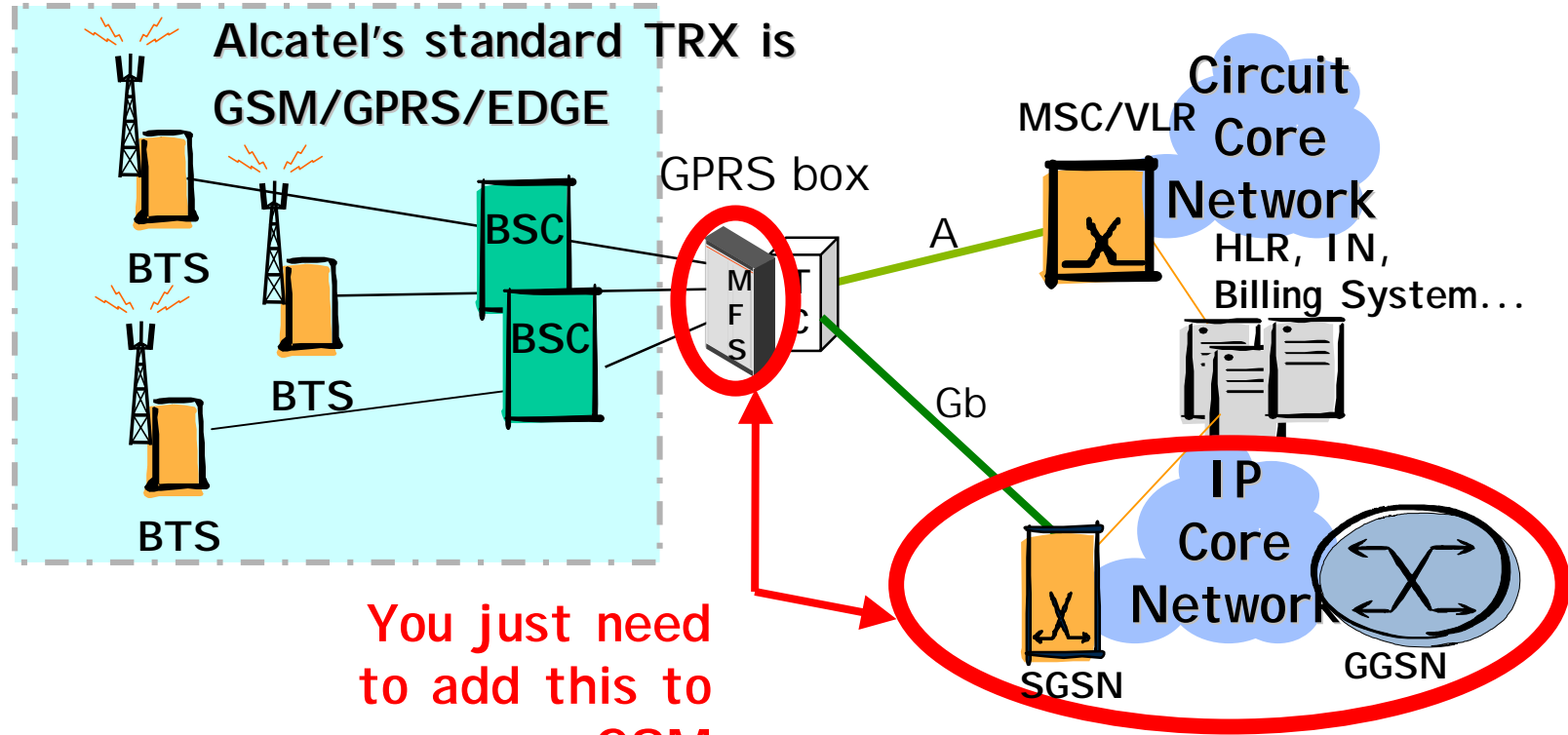
Rural environment GSM 900



Rural environment GSM 1800

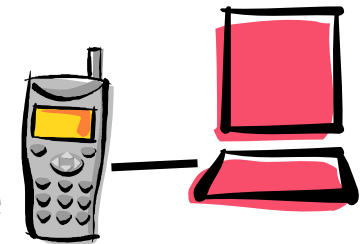


On a 3x2 TRX 900 or 1800 MHz rural an EVOLIUM™ BTS provides up to 49% gain on sites comparing to the other BTS available on the market.



You just need to add this to a GSM network!

The community Internet access service is an application example

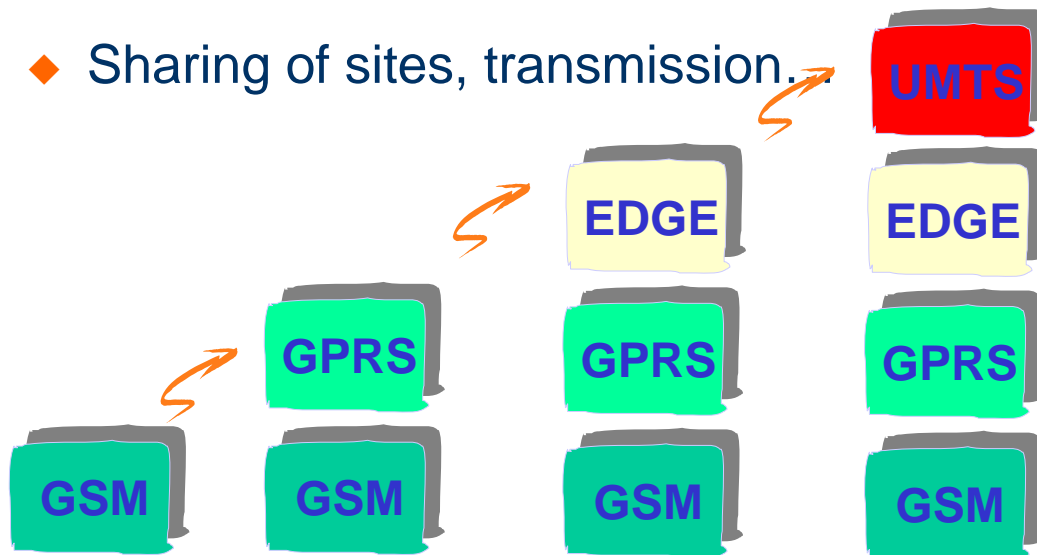


The most flexible solution :

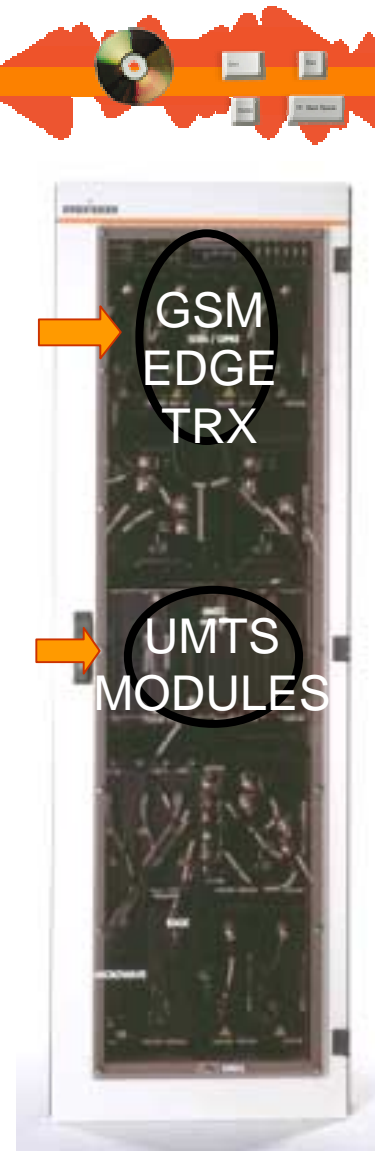
◆ Multi-standard

- ◆ GSM, GPRS, EDGE & UMTS in the same base station
- ◆ GSM/GPRS core network evolves to UMTS

◆ Sharing of sites, transmission.



Since 1998
 **Evolium**
protects investment





Low-cost terminals and wide variety



- ◆ Unresolved issue of **universal access** demands new, innovative approaches
 - ◆ This position is strongly supported by the World Bank
- ◆ GSM has emerged as **the winning radio access technology**
 - ◆ Very efficient for residential communication needs
 - ◆ Most economical access solution for medium/low density areas
- ◆ Regulators should accept this market reality and facilitate the use of **GSM Restricted Mobility** for universal access
- ◆  **Evolium** brings additional advantages to GSM Restricted Mobility
 - ◆ **Flexible, integrated end-to-end solution**
 - ◆ Evolium™ solution is **Internet-embedded**





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Solution Impact Summary

SOLUTIONS	Average Traffic	Number of hand-overs	Location Updates	Signalling Traffic	Average n° of subscribers (3x2 TRX)
Mobile	10-15 mErl.	+++	+++	High	550
Cell Mobility	60-80 mErl.	+	+	Small	115
Fixed GSM Terminal	80-120 mErl.	-	-	Very small	82
GSM Payphone (for comparison)	Up to 800 mErl. (peak hours)	-	-	Very small	-



General traffic impact compared to a full mobile design:

New traffic and user pattern	Design impact	BSS impact
Higher traffic per user	Fewer subscribers per cell	Increased number of TRX and/or BTS sites
Users are mostly residential	Deep indoor coverage may be requested (increased margin between 15dB and 30dB)	May lead to increased number of BTS sites
Reduced or no mobility	Low level of interference	Better speech quality

Design impacts for GSM Cell Mobility compared to a full mobile design

ALCATEL

GSM Cell Mobility

- ◆ Impact on NSS
 - ◆ HLR Software feature: An OSS mark forbids any communication of the mobile outside its identified cell
 - ◆ VLR Software feature
 - First localisation: VLR identification
 - Later localisation: OSS mark testing & discrimination between allowed & non-allowed Originating Calls
 - ◆ OMC-S Software feature
 - Inclusion in Call Data Records of OSS mark for differ. tariffs
- ◆ Forced hand-over in VLR/RCP for Mobile at Cell boundary
 - ◆ Failed hand-over ☒ Subscriber to be rejected, not allowed
 - ◆ Successful hand-over ☒ Cell boundary of allowed subscriber



Fixed GSM

◆ Impact on NSS

- ◆ Re-dimension the SSP capacity due to increased traffic & BHCA
- ◆ Increased capacity of RCP/VLR due to limited Mobility functions

◆ Numbering impacts

- ◆ Requirement of specific “pq” prefixes for discrimination at PSTN toll exchange between:
 - GSM subscriber and PSTN subscriber (translation)
 - GSM mobile subscriber (0nn) and GSM fixed subscriber (0mm)

◆ Impact on Billing System



Number of charging rates doubled



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