

LAS SOLUCIONES TECNOLOGICAS DE 3G WCDMA

OSIPTEL, LIMA

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Agenda

1. Global 3G WCDMA Market Situation (El mercado global 3G WCDMA)
 - Commercial networks, terminals, subscribers
 - Standards situation
 - Service evolution
2. 3G WCDMA Technology Update (Actualización tecnológica 3G WCDMA)
 - WCDMA call capacity, voice capacity and quality
 - HSPA peak rates, capacity and latency
 - Internet-HSPA
 - 850 vs 1900 MHz
 - Minimum bandwidth requirement
3. 3G WCDMA in Latin America (La situación de 3G WCDMA en América Latina)
 - Market characteristics
 - Terminal situation
 - Spectrum situation



Global 3G WCDMA Market Situation

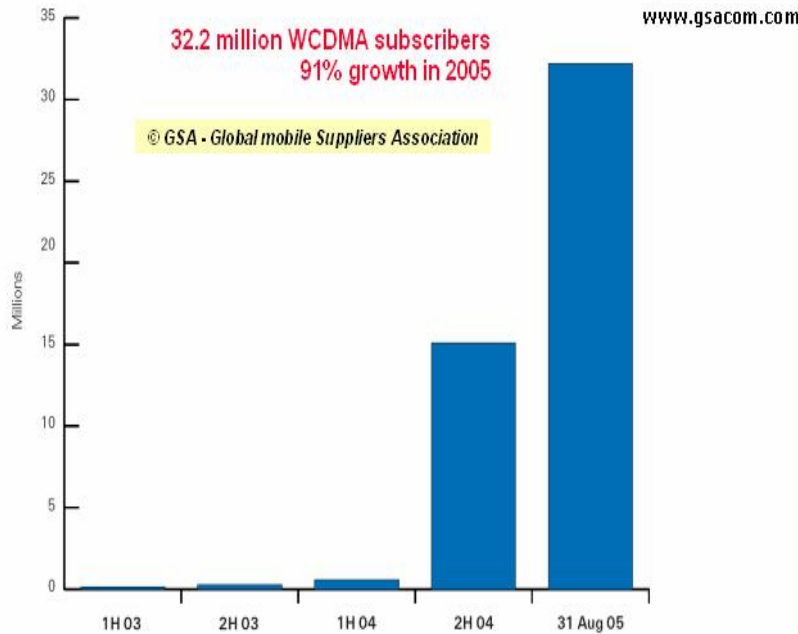


3G WCDMA Basics Reviewed

	3G WCDMA/HSPA	GSM/EDGE
Carrier	5 MHz	200 kHz + frequency hopping
Frequency bands	New and existing bands	Existing bands
Access	Wide-Band Code Division	Time Division
Max downlink speed	14.4 Mbps HSDPA specs 3.6-7.2 Mbps HSDPA terminals	480 kbps specs 240 kbps terminals
Max uplink speed	5.76 Mbps HSUPA specs 1.46-2.0 Mbps HSUPA terminals	480 kbps specs 120 kbps terminals
Network optimization	Antenna and site planning	Frequency planning
Radio network	RAN = UTRAN = Node-B + RNC	BSS = GERAN = BTS + BSC
HW capacity	700 simultaneous calls/cabinet	120 simultaneous calls/cabinet
New services	Simultaneous voice and data Low delay IP services (VoIP)	Dual Transfer Mode in 2006 Long delay IP services (PTT)
Round trip delay	<100 ms	>200 ms

WCDMA Commercial Networks, Terminals, Subscribers

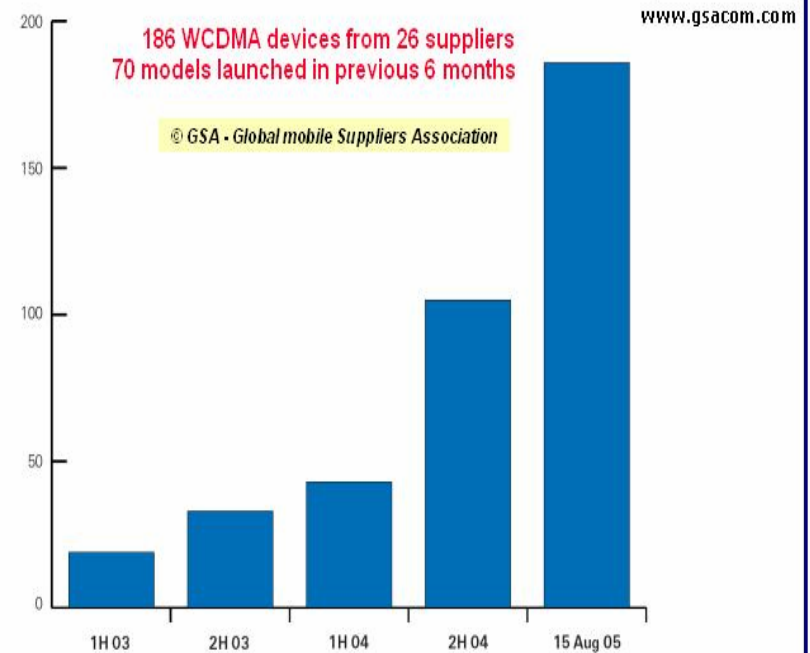
WCDMA subscriber growth



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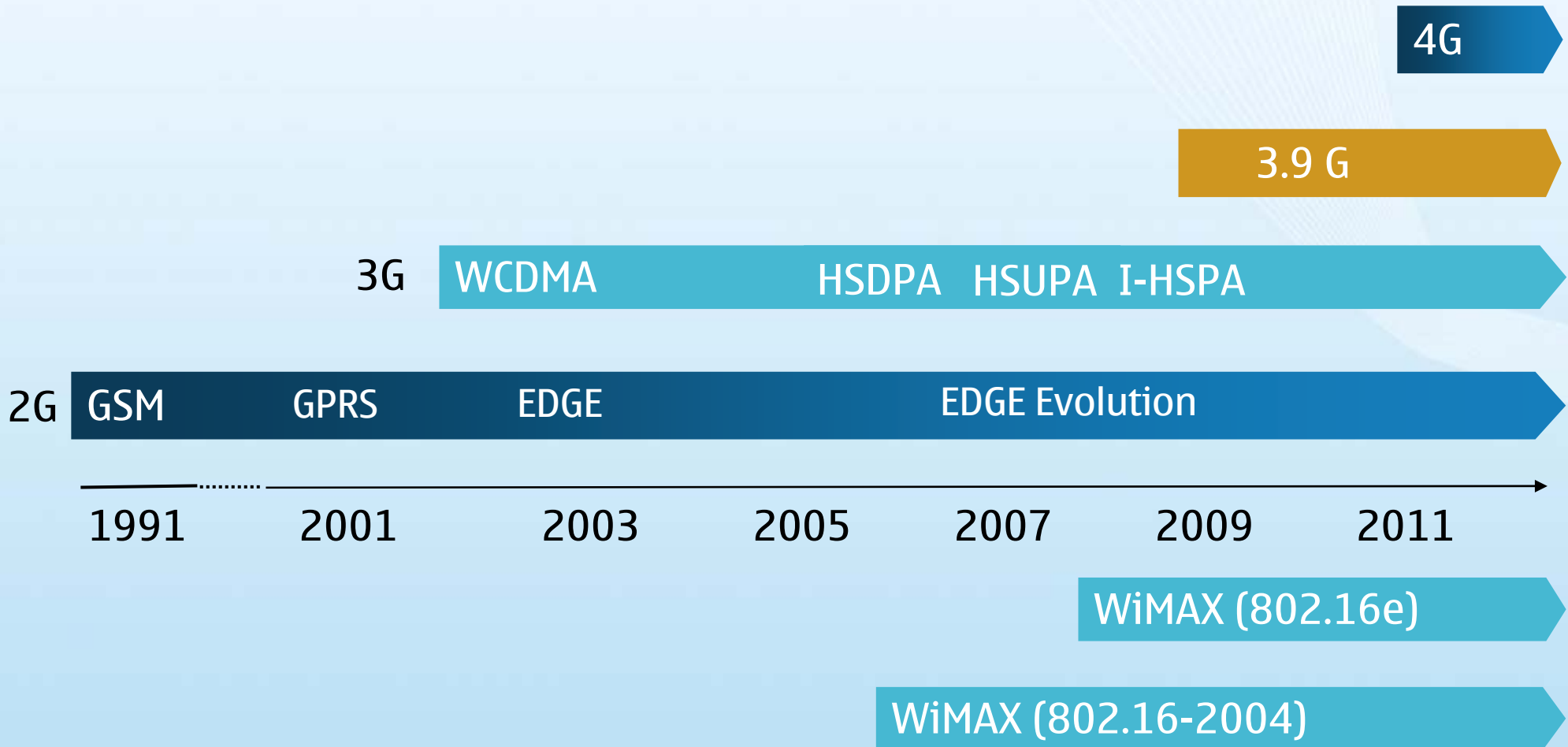


WCDMA terminal models growth



87 commercial WCDMA networks, 186 WCDMA phones, 32 M WCDMA subscribers

3G WCDMA Standards Situation



WCDMA is mature technology with significant downlink (HSDPA) and uplink (HSUPA) improvements steps emerging

WCDMA Service Evolution

			Video sharing Video telephony Real time IP Real time games High speed mobile intranet	Faster business connectivity Faster streaming Faster content download
Voice SMS	MMS WAP Download Presence Audio streaming	Web browsing Mobile intranet access Video streaming		
GSM 10-40 kbps	GPRS 30-40 kbps	EDGE 80-160 kbps	WCDMA 128-384 kbps	HSPA 1-10 Mbps

WCDMA enables real time connections, efficient business connectivity, close to WLAN bit rates and high efficiency

3G Services Uptake



Japan

%



South Korea

%



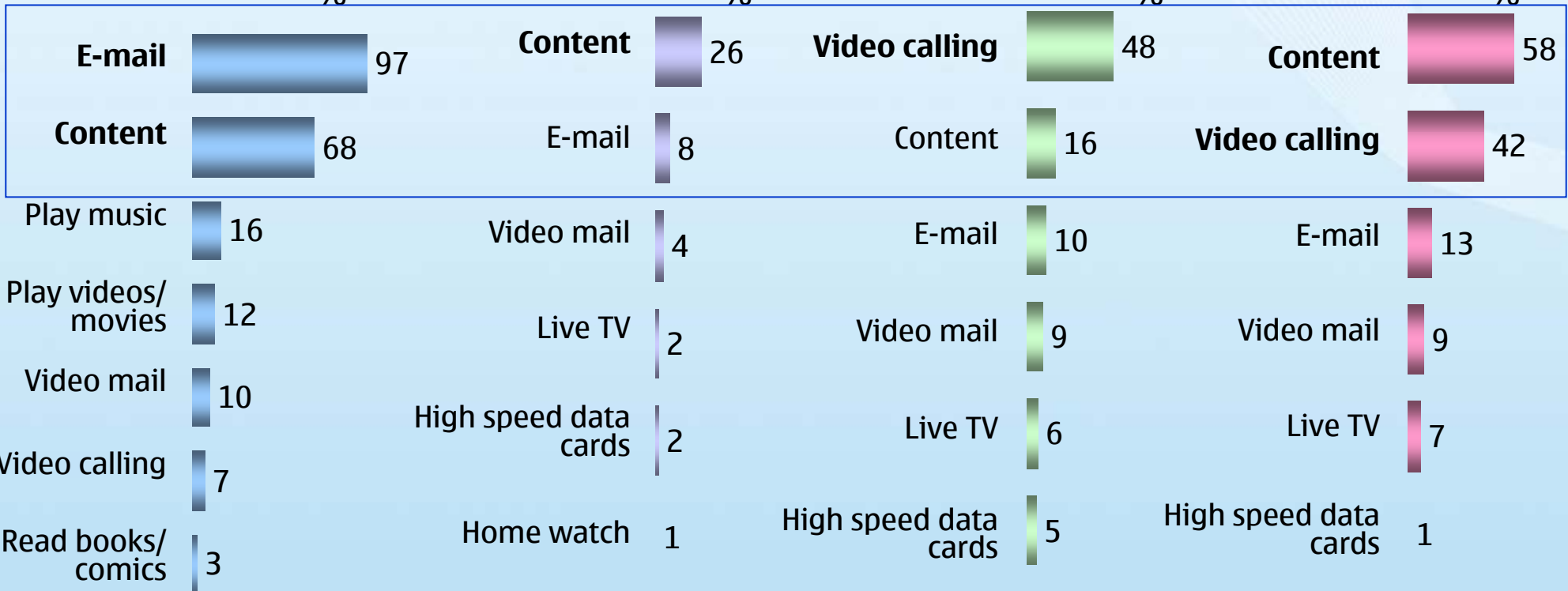
Italy

%



Hong Kong

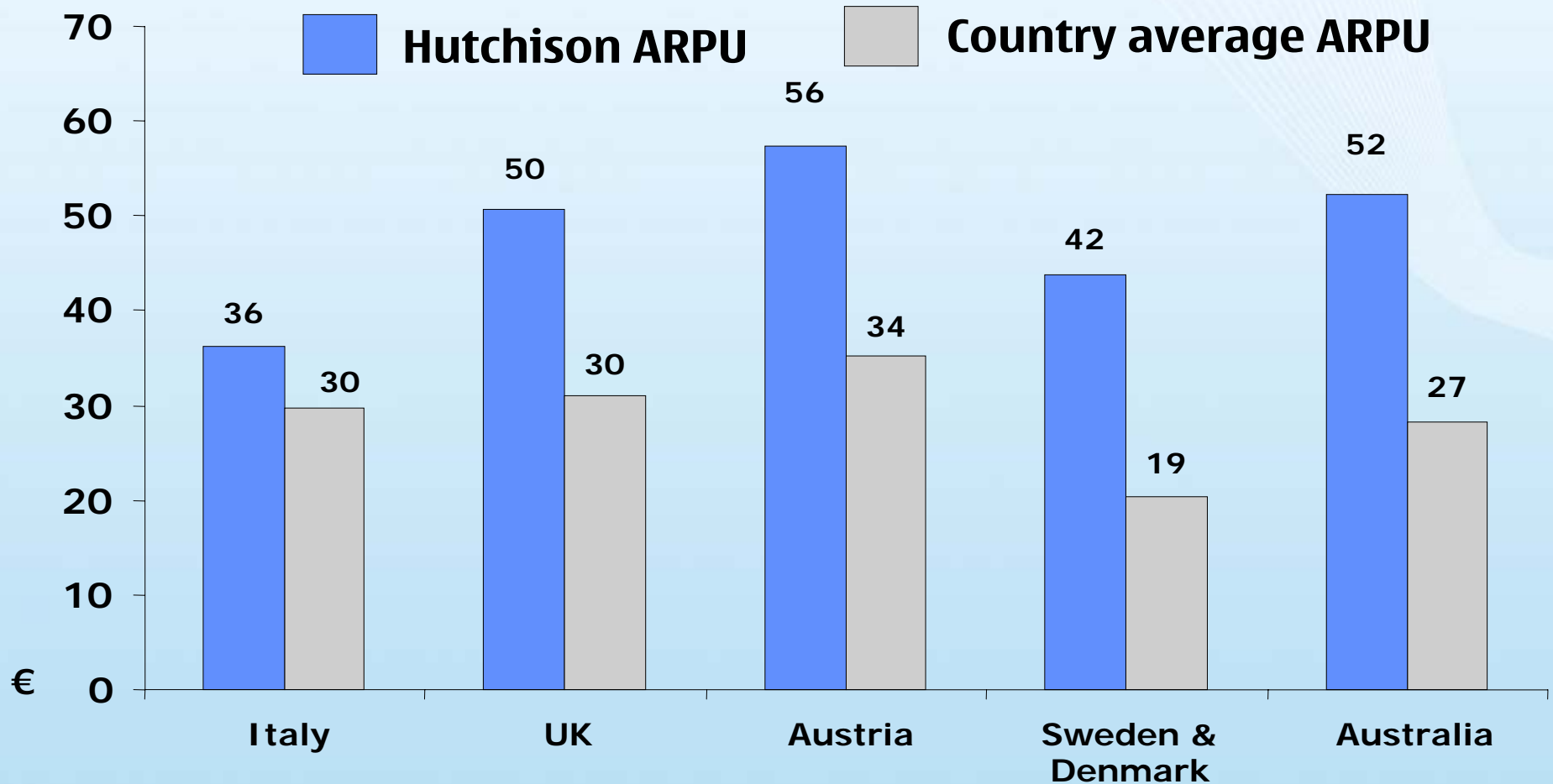
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Each market has 1 or 2 popular 3G services

Source: Nokia study June 2005, based on regular usage of several times a week. Note: Korea CDMA

3G Operators ARPU



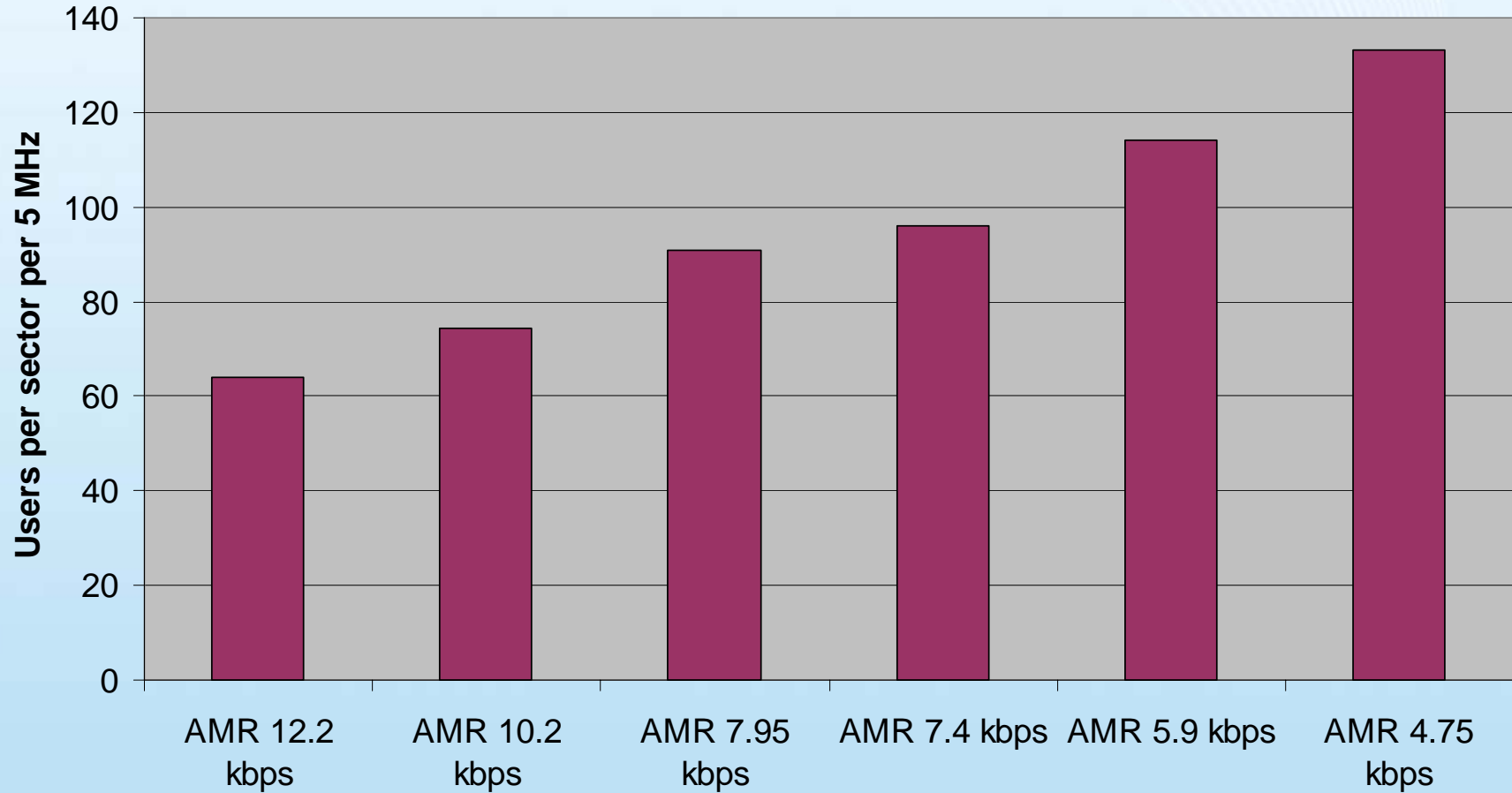
3G WCDMA operators generate higher ARPU in voice and data

Source: Hutchison, EMC database, Jun 05

3G WCDMA Technology Update

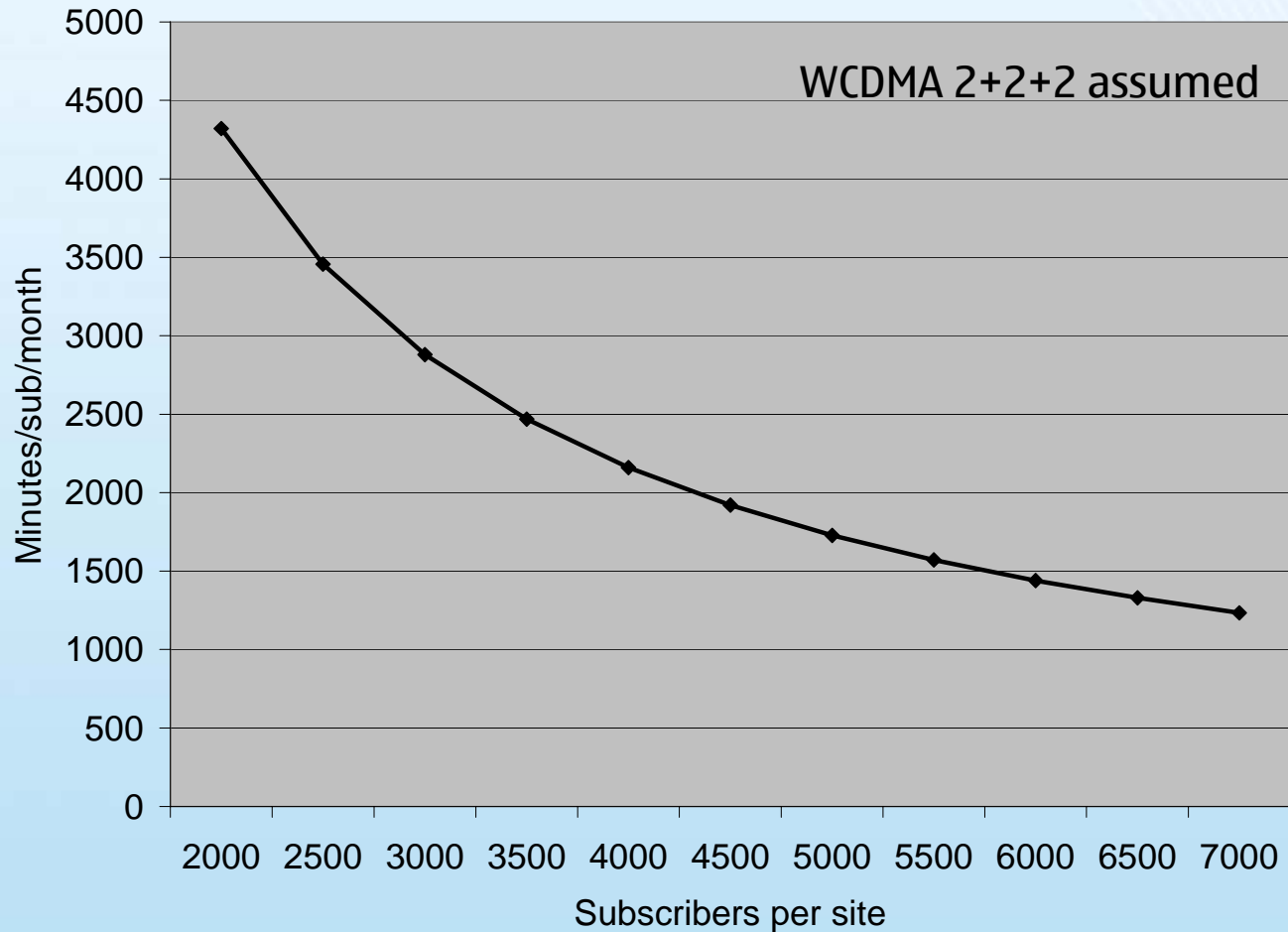


High WCDMA Call Capacity



Up to 130 simultaneous calls per sector

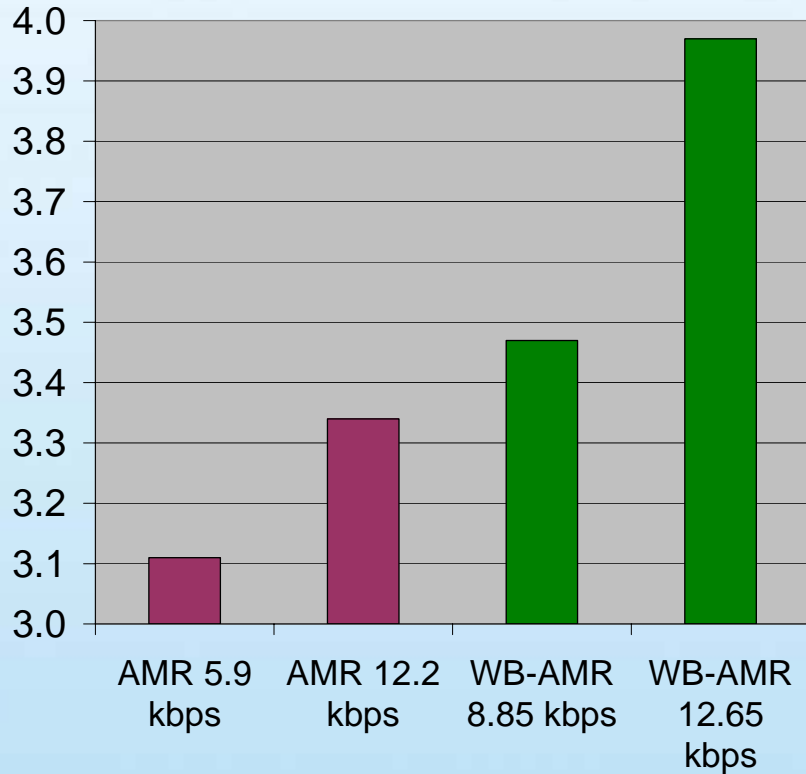
High WCDMA Voice Capacity



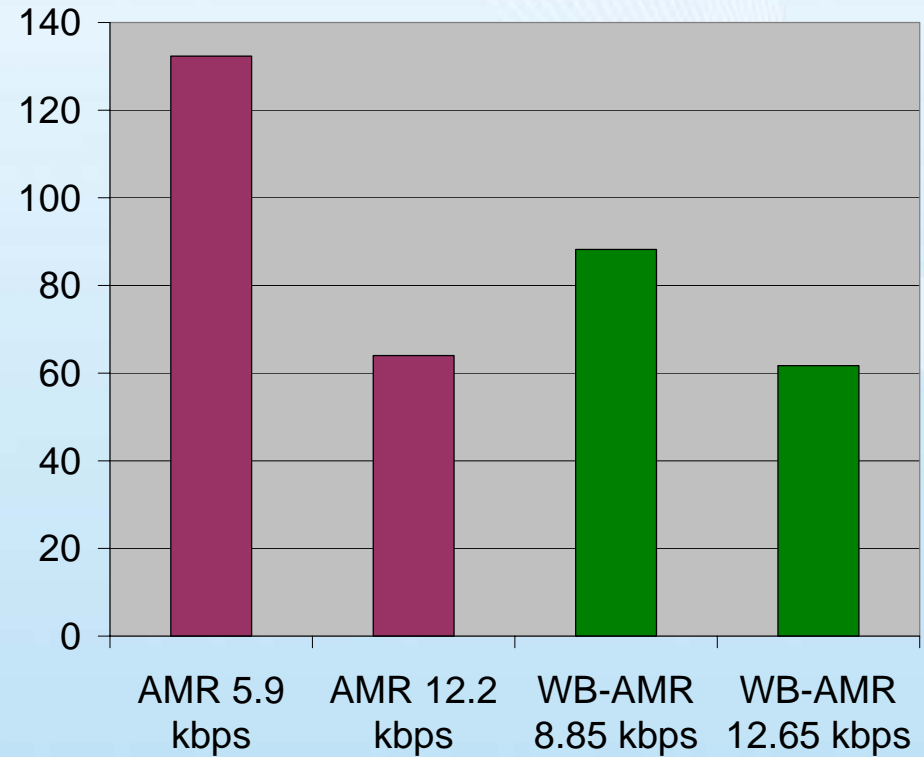
WCDMA enables >1000 minutes of usage

High Voice Quality with Wideband AMR

Quality [MOS]



Capacity [users/sector]



 = Current AMR with audio bandwidth 300-3400 Hz

 = Wideband-AMR with audio bandwidth 50-7000 Hz

WB-AMR provides 20% better voice quality without much sacrificing voice capacity

High HSPA Peak Data Rates

Downlink HSDPA

- Theoretical up to 14.4 Mbps
- Initial capability 1.8 – 3.6 Mbps

# of codes	Modulation	Max data rate
5 codes	QPSK	1.8 Mbps
5 codes	16-QAM	3.6 Mbps
10 codes	16-QAM	7.2 Mbps
15 codes	16-QAM	10.1 Mbps
15 codes	16-QAM	14.4 Mbps

Uplink HSUPA

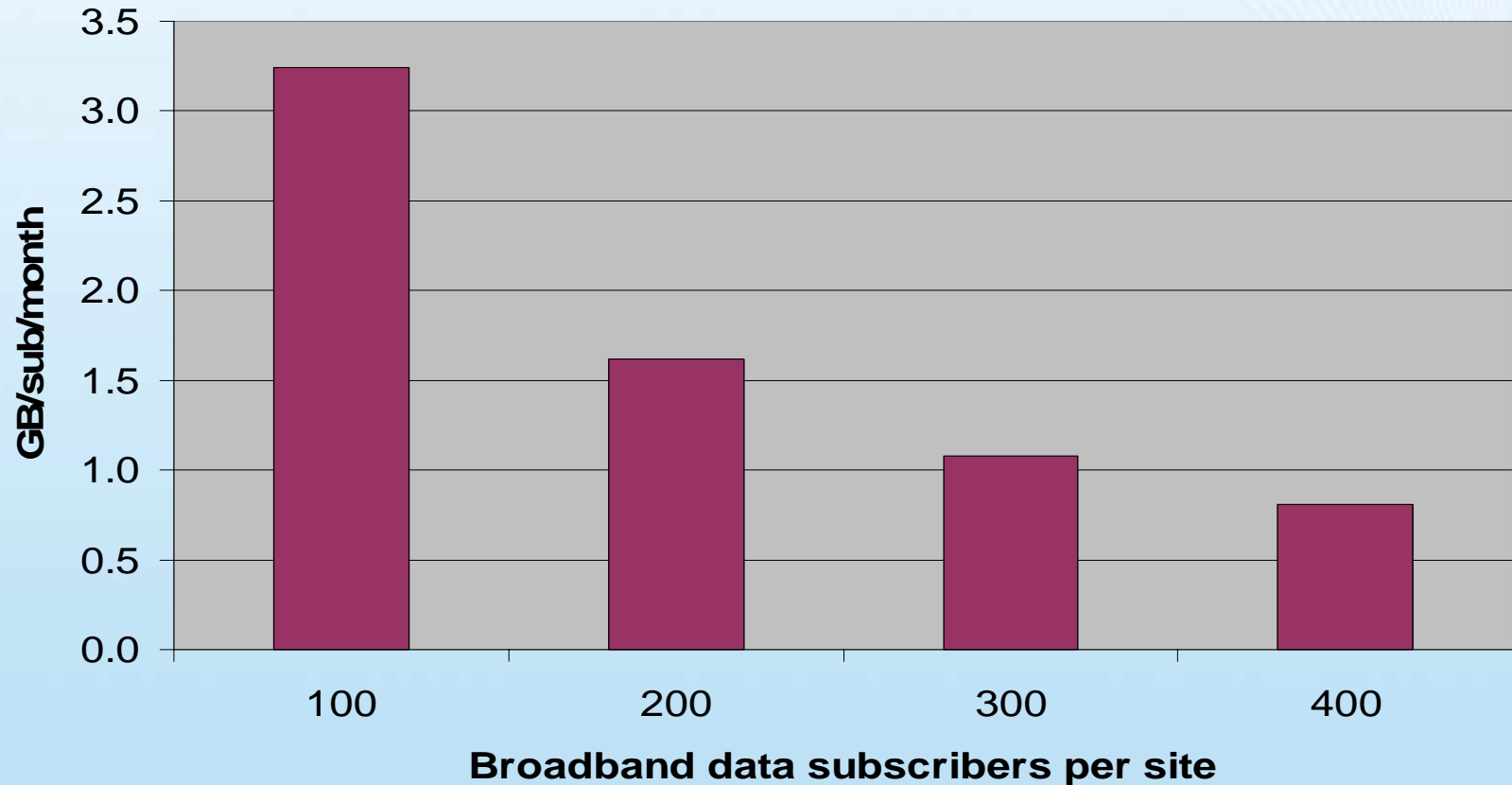
- Theoretical up to 5.76 Mbps
- Initial capability 1.46 Mbps

# of codes	TTI	Max data rate
2 x SF4	2 ms 10 ms	1.46 Mbps
2 x SF2	10 ms	2.0 Mbps
2 x SF2	2 ms	2.9 Mbps
2 x SF2 + 2 x SF4	2 ms	5.76 Mbps

HSPA brings 10-20 x speed compared to EDGE

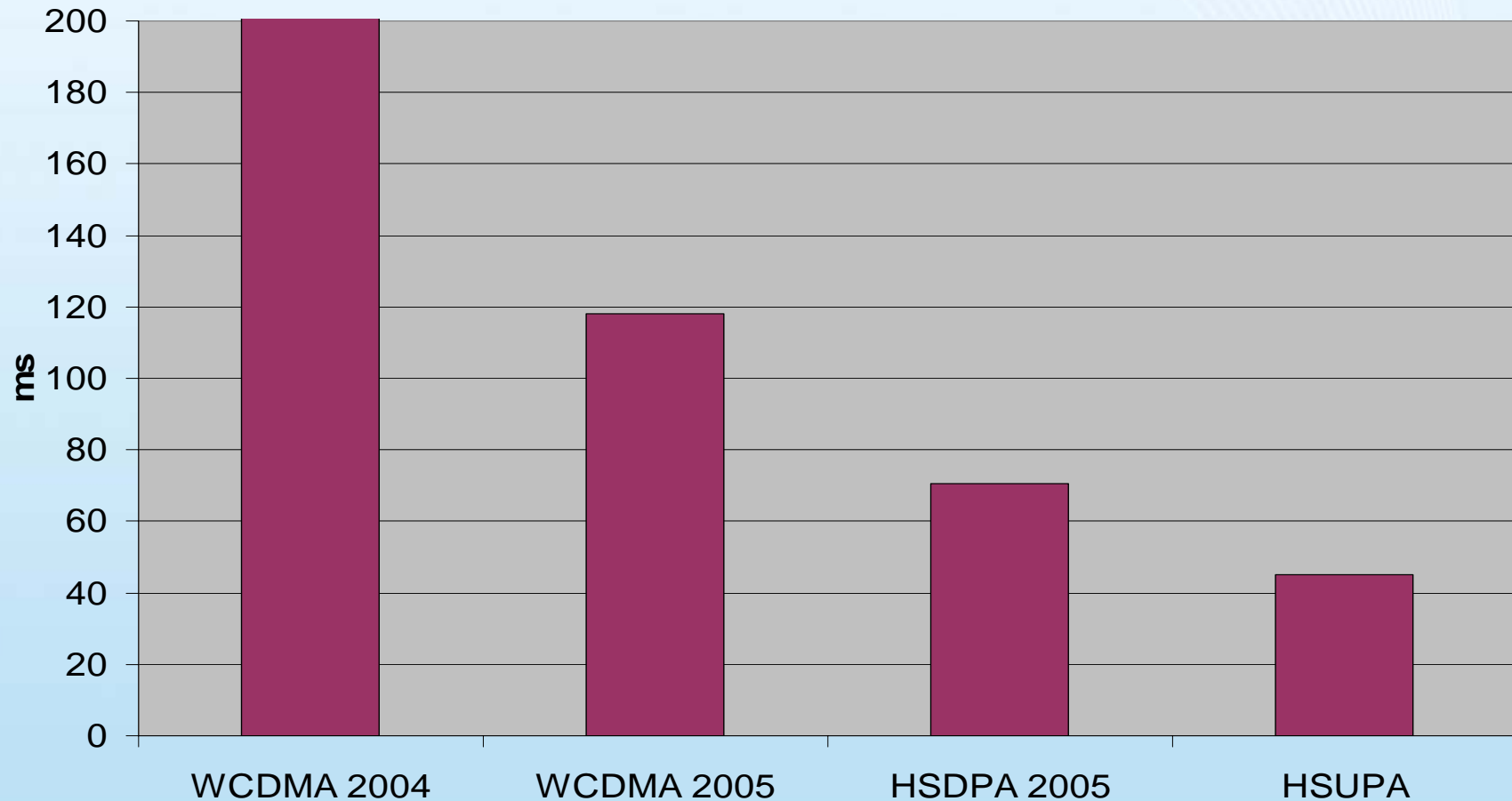
High HSDPA Data Capacity

HSDPA Data Capacity with 1+1+1 Configuration



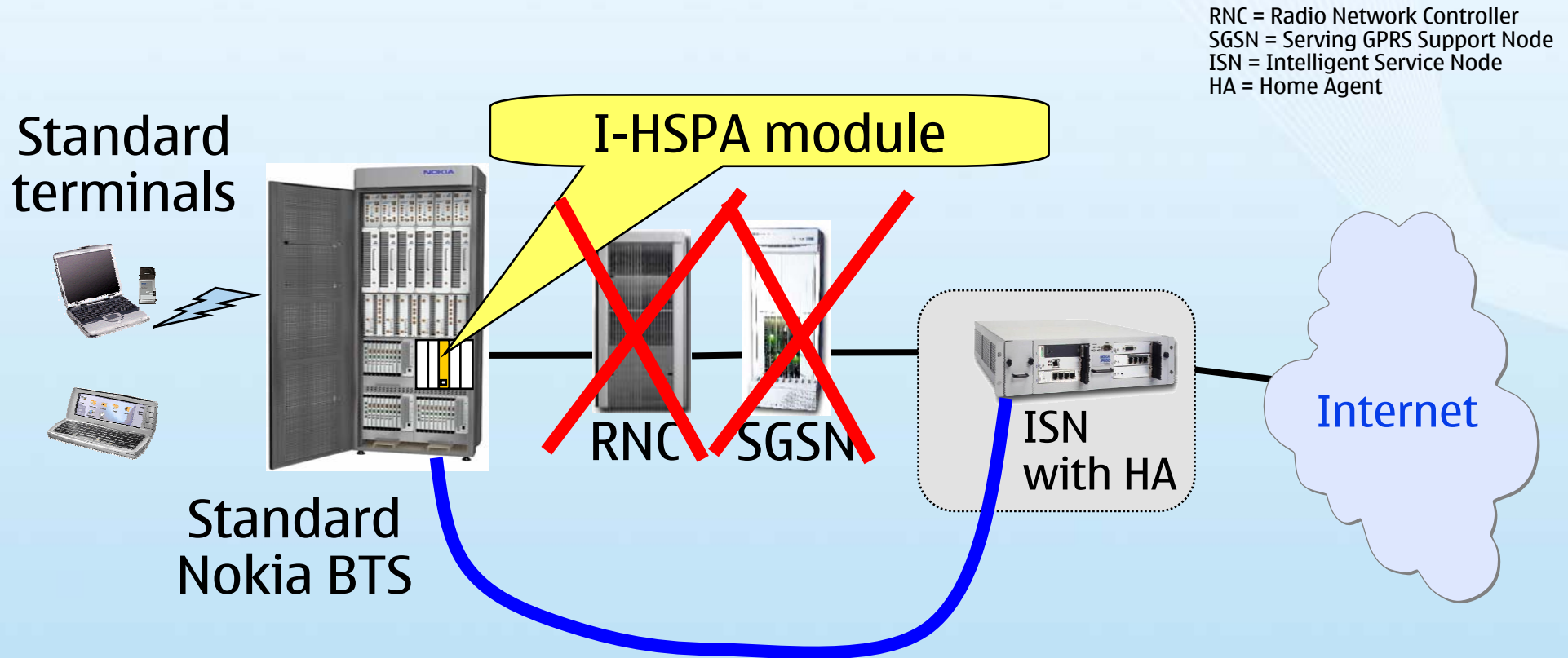
Even smallest HSDPA site enables 300 broadband wireless users, each downloading 1 GB data per month

Low HSPA Latency



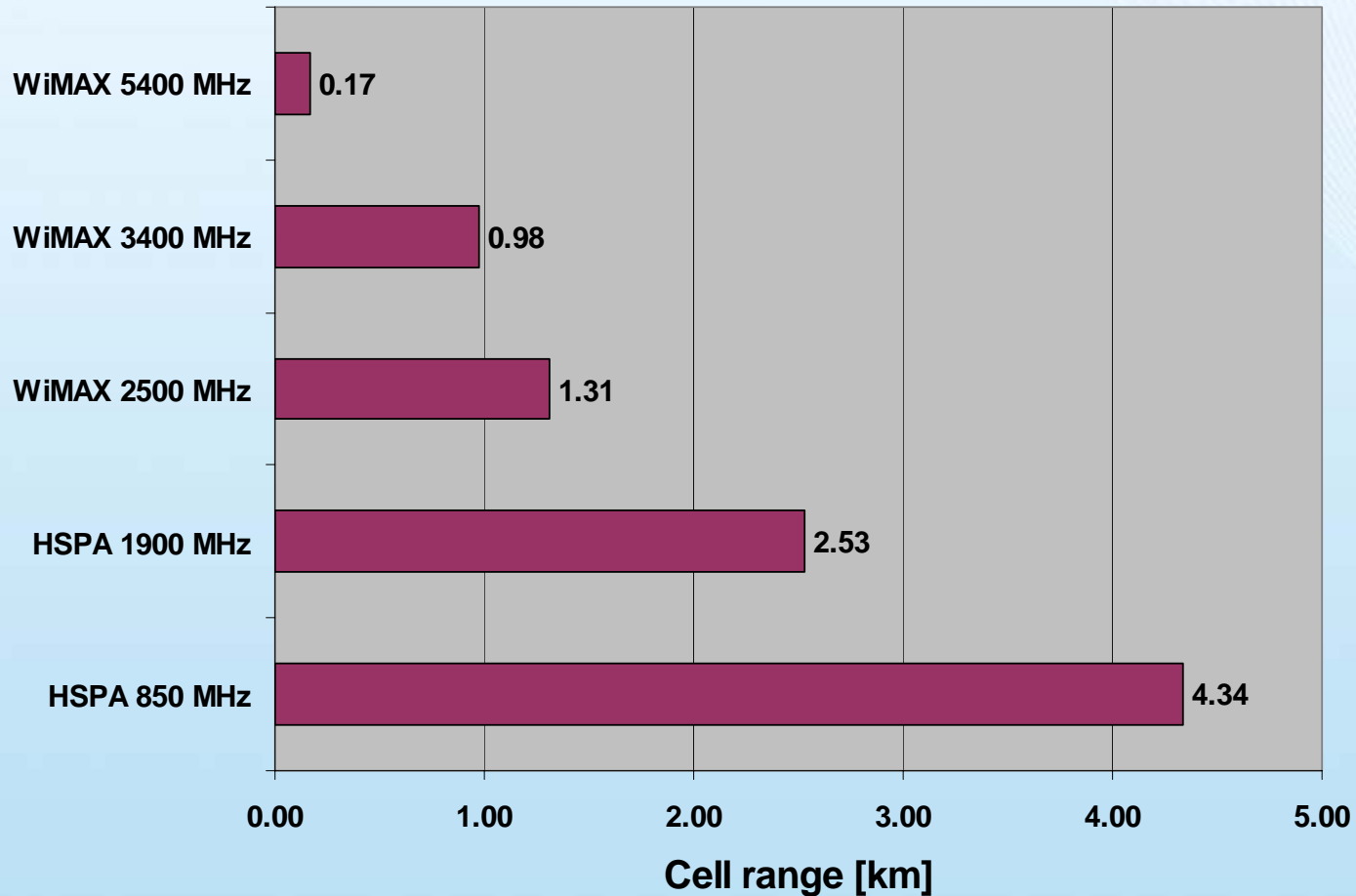
WCDMA 120 ms, HSDPA 80 ms, HSUPA 50 ms delay

Internet-HSPA



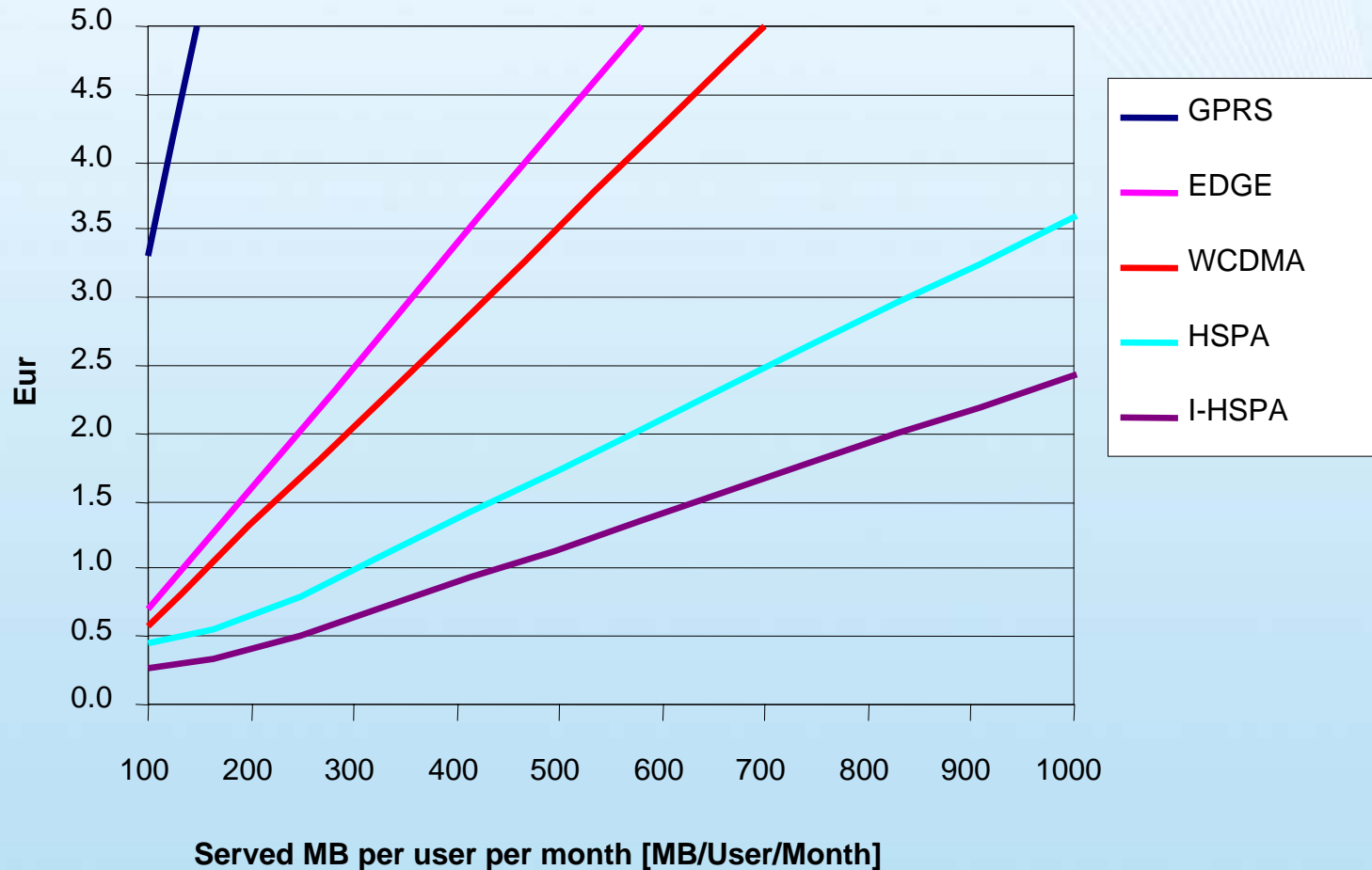
Nokia's I-HSPA innovation enables broadband wireless access business

WiMAX vs HSPA Cell Range



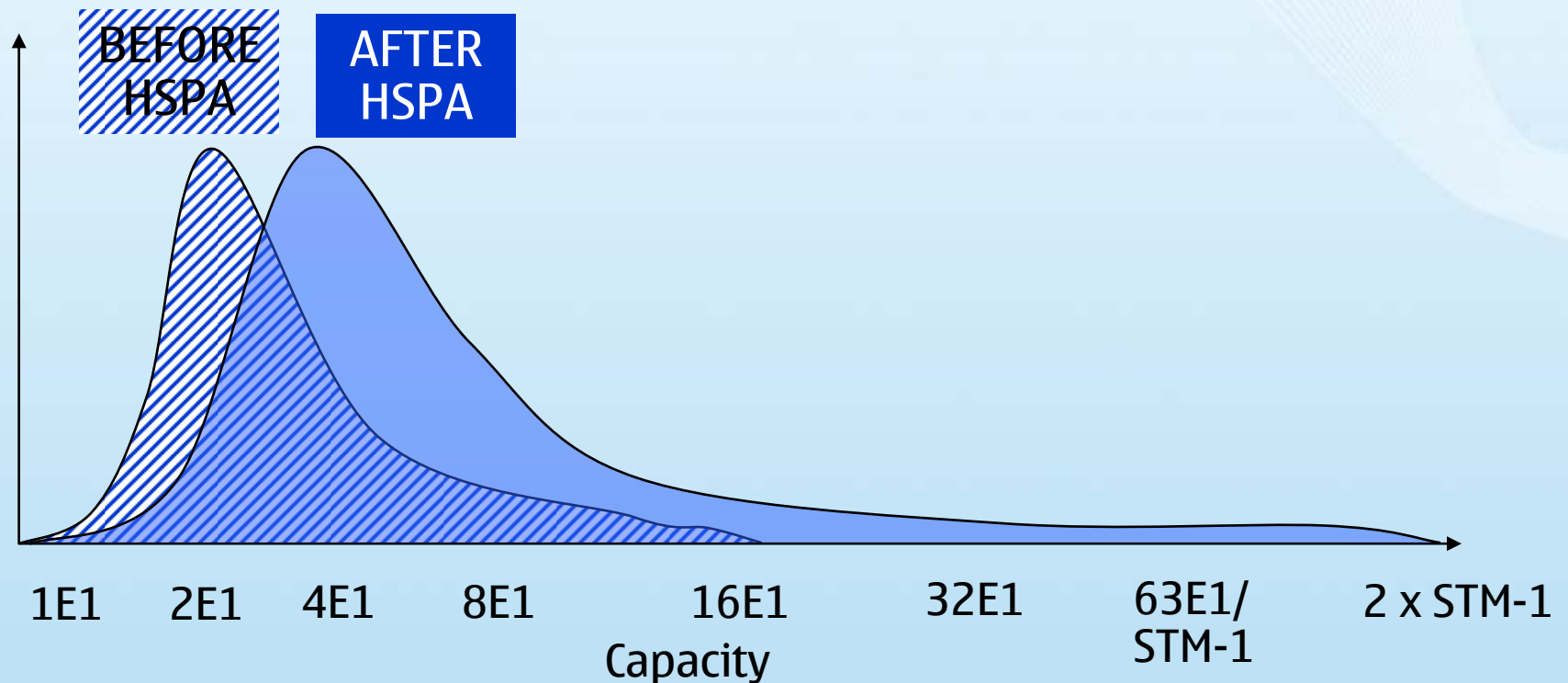
HSPA has substantially larger cell range than WiMAX

Internet- HSPA for Mass Data Traffic



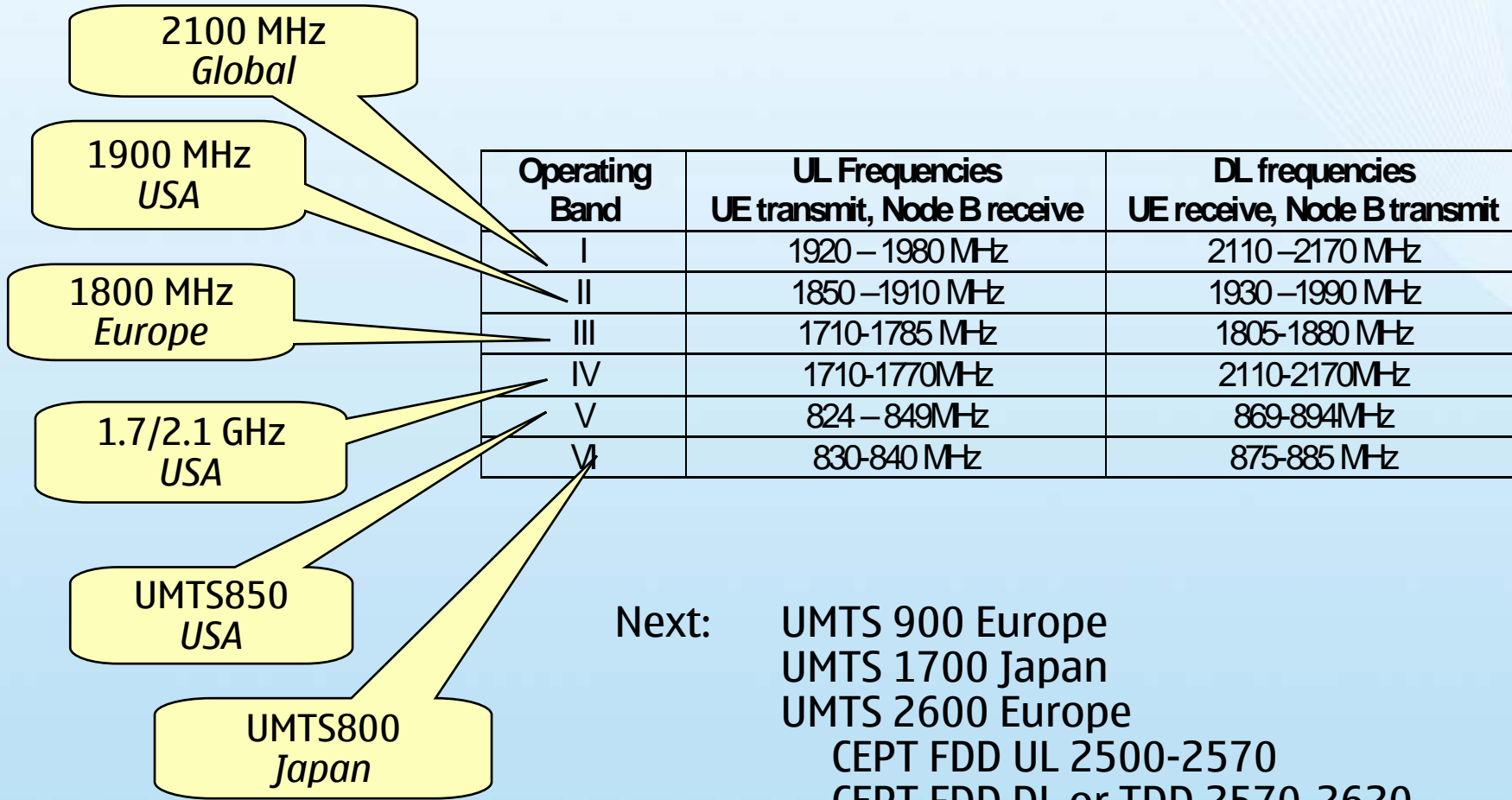
Nokia's I-HSPA innovation lowers capital expenditure significantly

3G Impact to Base Station Backhaul



2-3 x backhaul transmission needs to be planned for high HSPA traffic

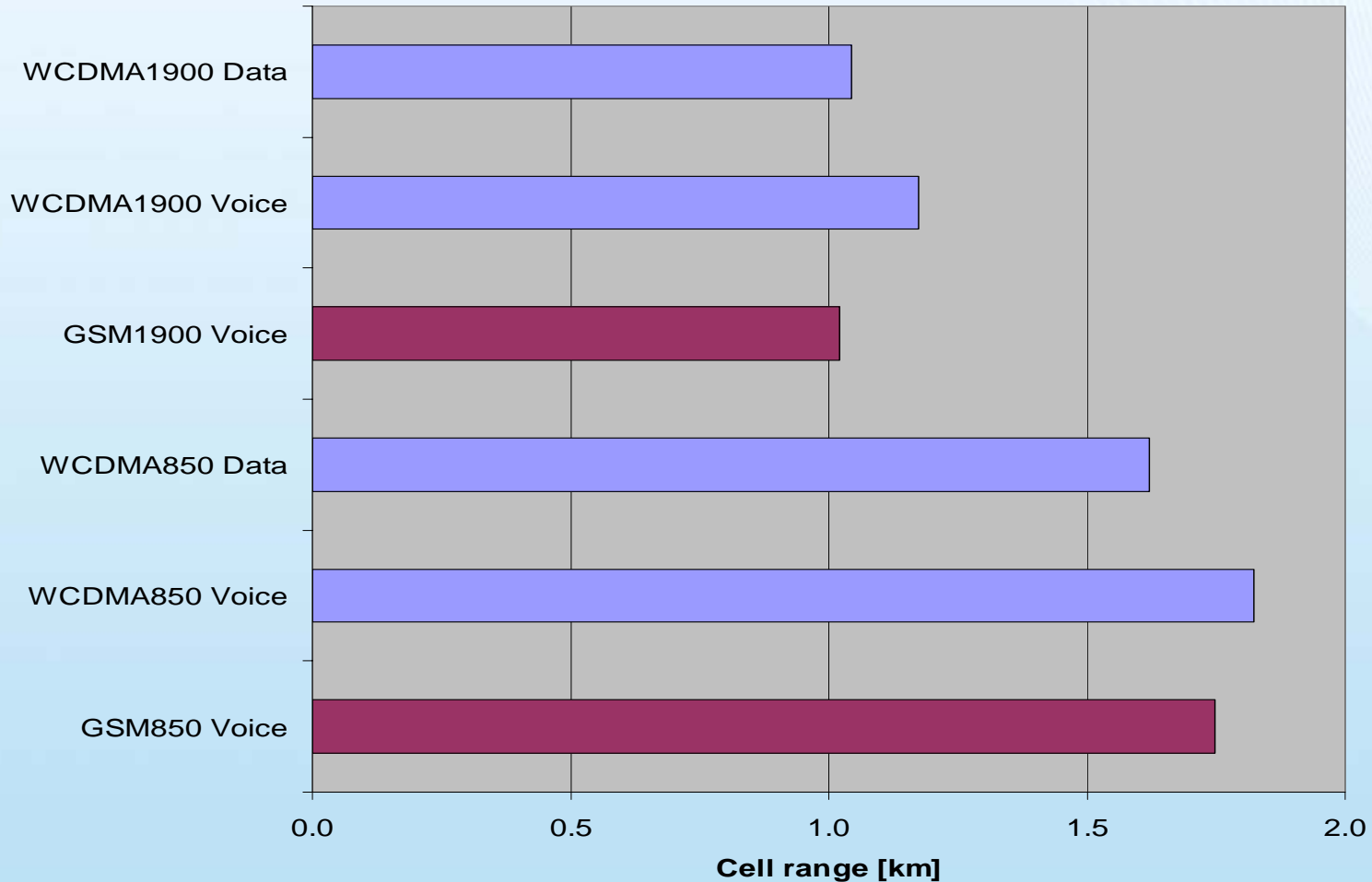
WCDMA Frequencies



Next:

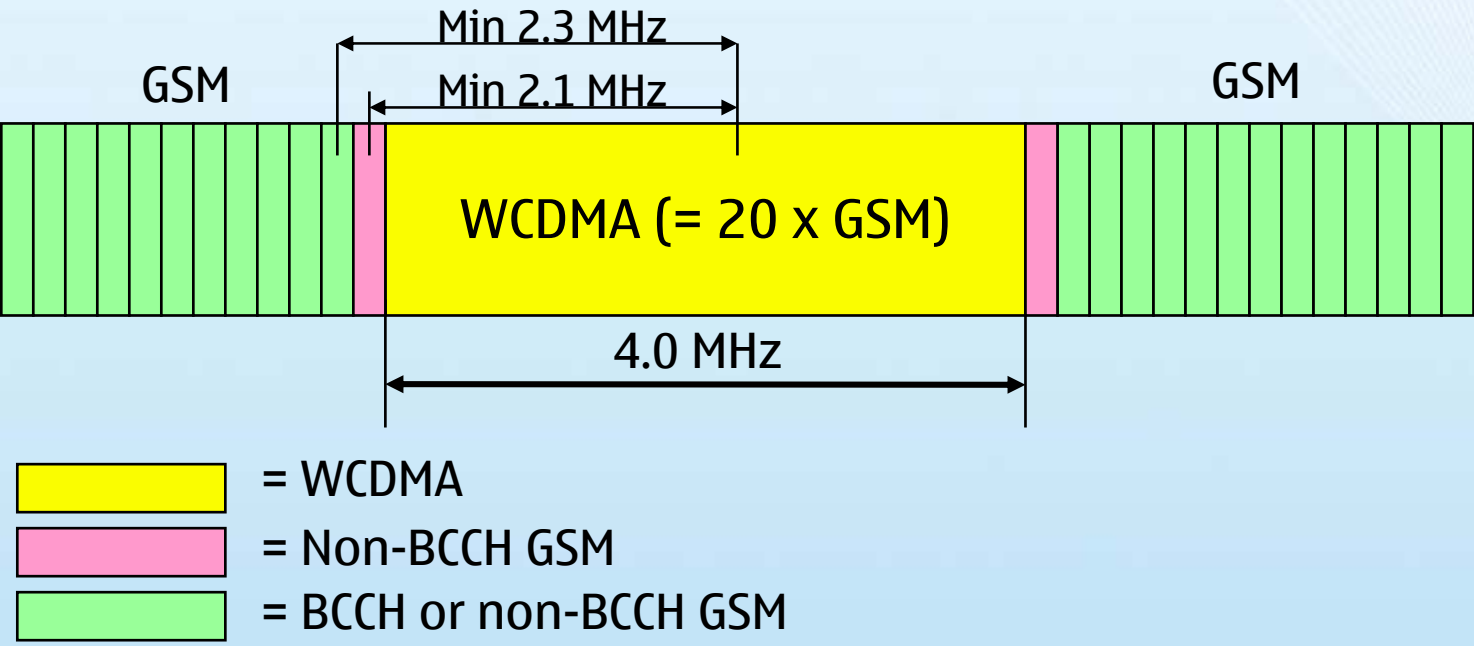
- UMTS 900 Europe
- UMTS 1700 Japan
- UMTS 2600 Europe
- CEPT FDD UL 2500-2570
- CEPT FDD DL or TDD 2570-2620
- CEPT FDD DL 2620-2690

850 vs 1900 MHz Band



1900 MHz requires 2-3 x more sites than 850 MHz

Minimum Bandwidth Requirement for WCDMA



2 x 4.0 MHz is sufficient for WCDMA if close to friendly GSM

Nokia WCDMA Technology Milestones

- WCDMA

- Commercial WCDMA network deliveries since September 2001
- More than 50 WCDMA trials conducted 2001-2002
- First dual mode GSM/WCDMA and triple mode GSM/EDGE/WCDMA terminals
- Supplier for approximately half of the 86 commercially opened WCDMA networks
- 51 WCDMA network deals
- WCDMA-GSM Intersystem handovers available first in the market
- First commercial end-to-end 3GPP IP Multimedia Subsystem used in 3G
- Market leader in R4 core networks globally and in Latin America

- HSPA

- Six public and 15 non-public HSDPA network deals
- Nokia will deliver approximately 10 HSDPA trials during 2005
- First to demonstrate HSUPA, in 3GSM Cannes February 2005
- Launched Internet-HSPA, an HSPA innovation, in March 2005

Nokia is technology leader in 3G WCDMA & HSPA

3G WCDMA in Latin America



Latin America Market Characteristics re 3G WCDMA

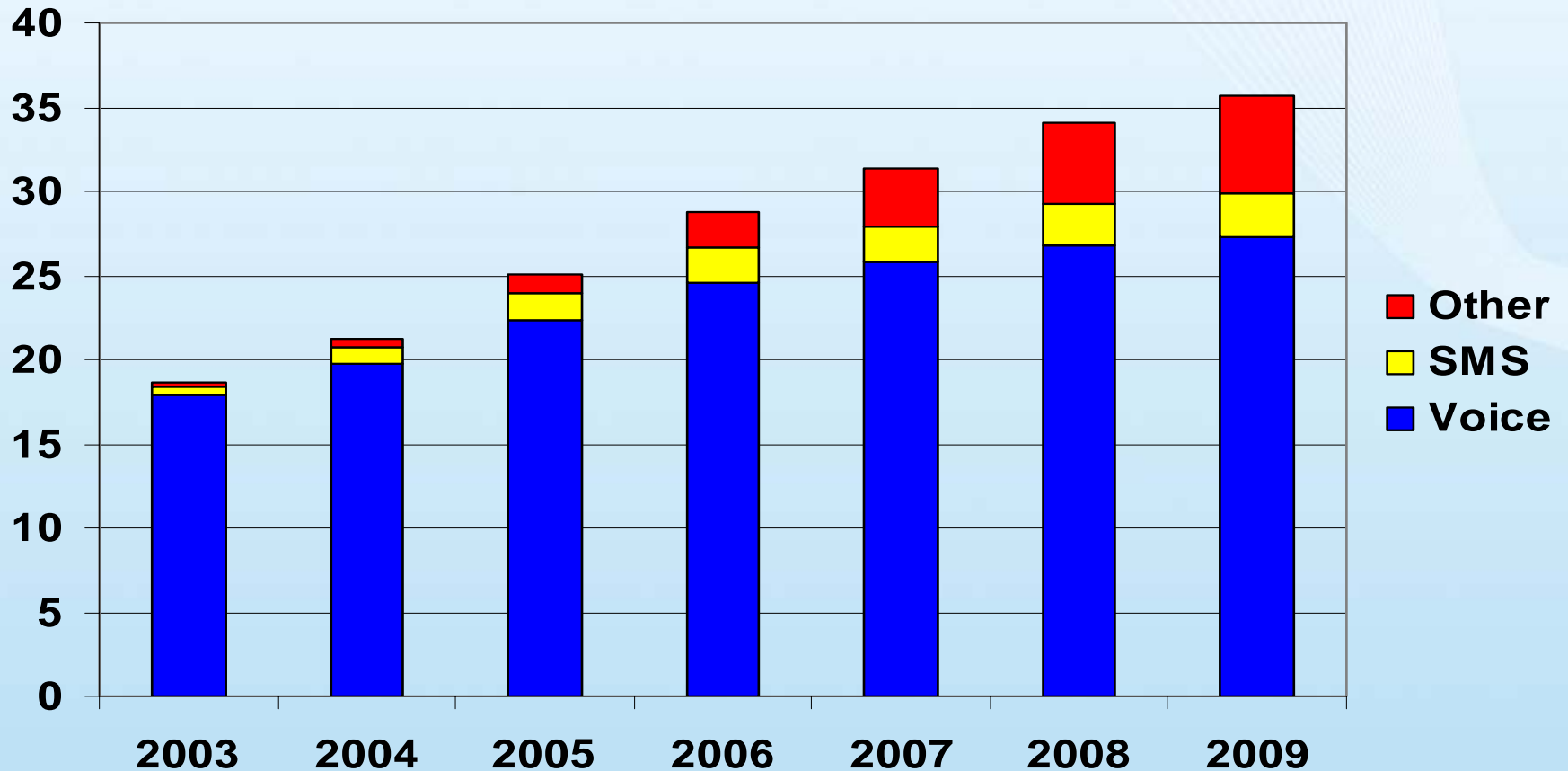


- Consolidated market
- High growth potential
- Operators seek differentiation
- Urbanized population
- Mainly US frequencies 850 & 1900

WCDMA wave after operators start seeking new revenues streams and differentiation

Latin America Service Revenues

Billion EUR

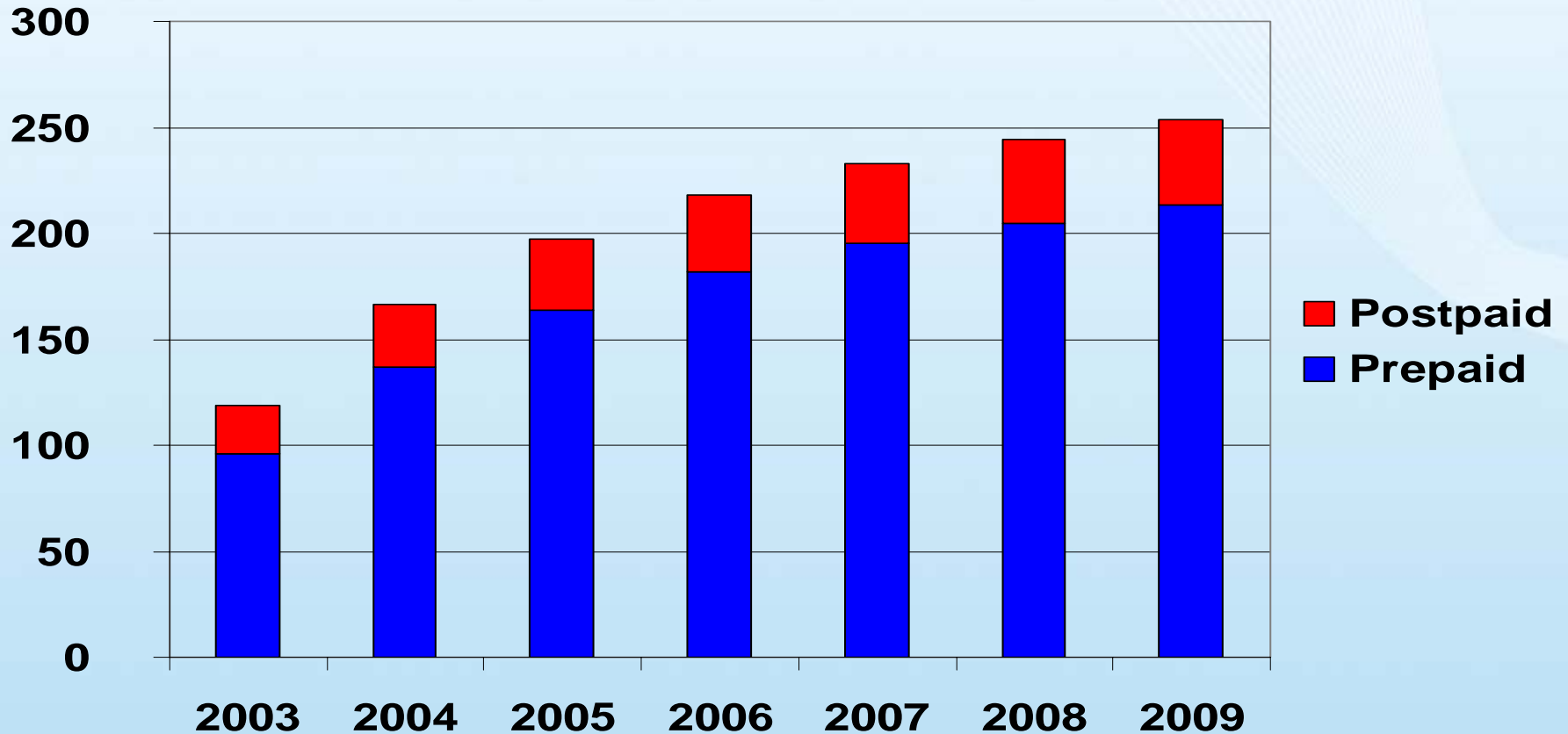


2G enabled services (voice & SMS) dominate operator revenue streams.
Other services largely possibly with EDGE

Source: Nokia Mobile Services Forecast - March 2005

Latin America Post vs Prepaid Subscribers

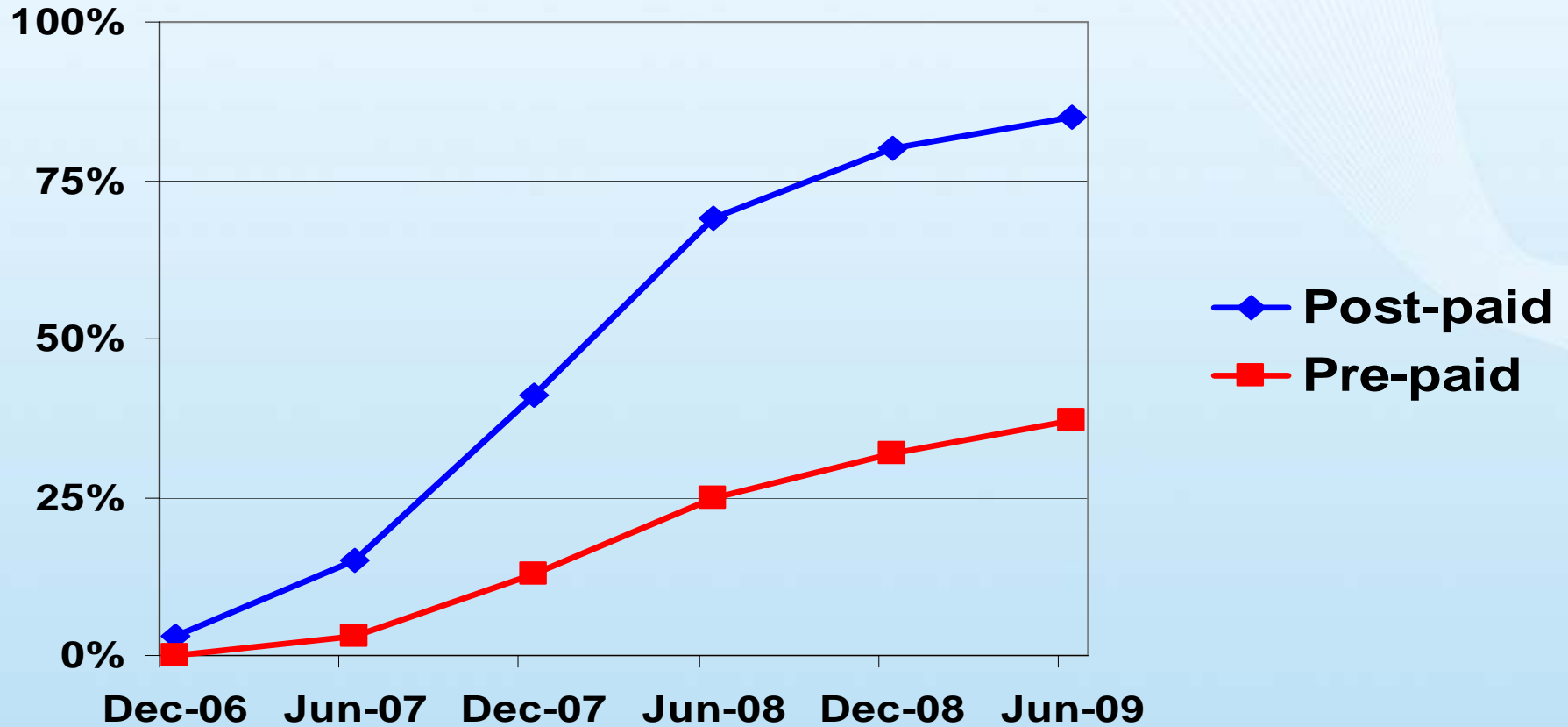
Million



Postpaid segment is natural for WCDMA. Postpaid is >15% of total customer base with >35 USD ARPU compared with prepaid <10 USD ARPU

Source: Pyramid Latin America Mobile Demand 1Q2005

WCDMA Capability in New Phones

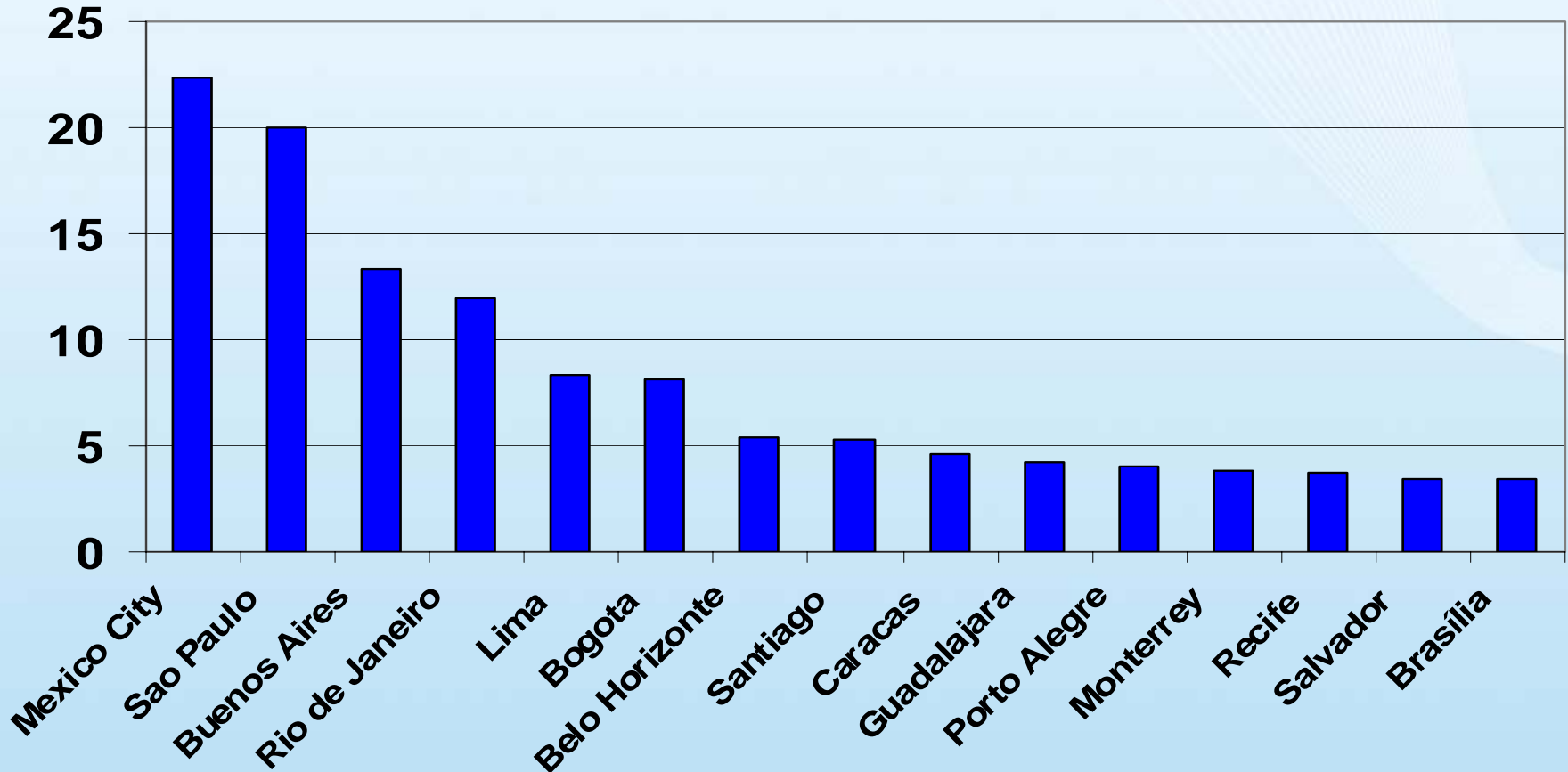


WCDMA will be built-in functionality in most mid to high end phones

Source: Nokia

WCDMA for Urban Latin America

Million

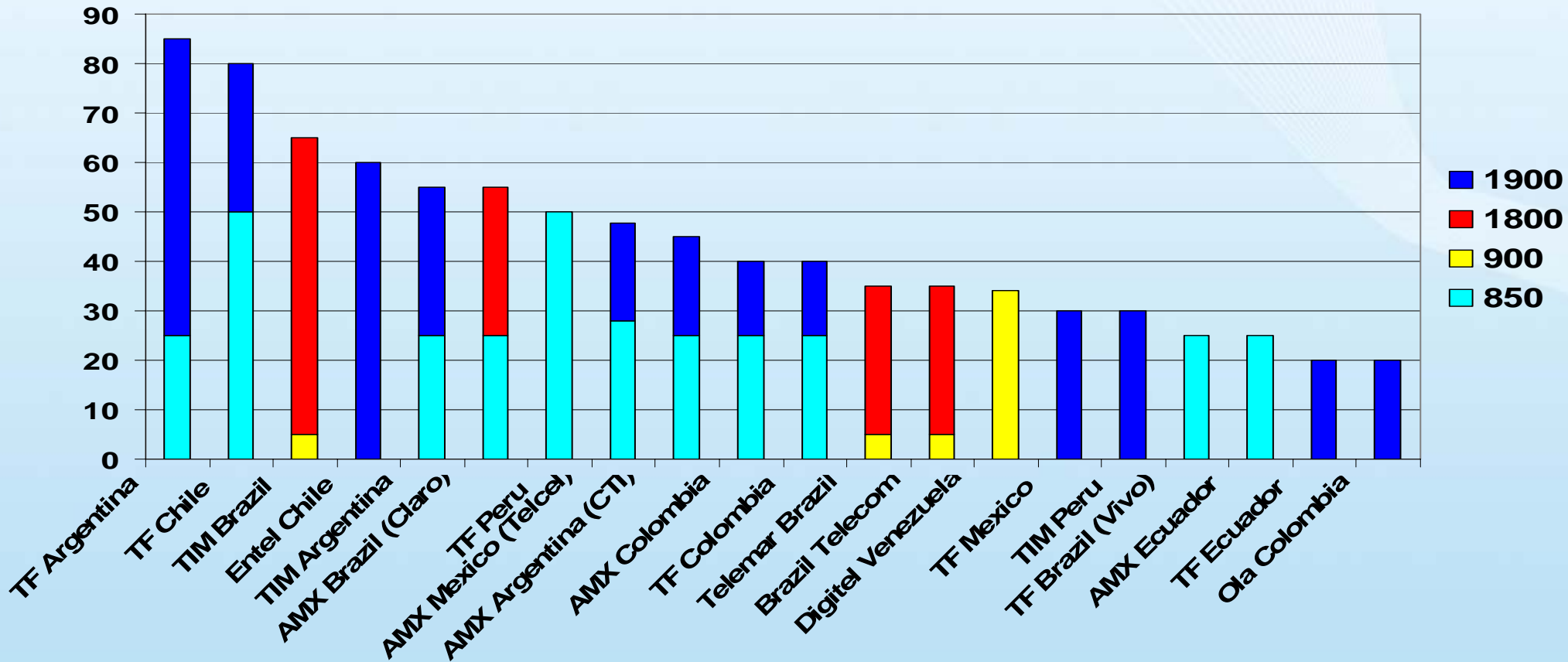


Latin America is 75% urbanized, therefore an ideal WCDMA environment

Source: www.citypopulation.de

Latin America Spectrum Situation

MHz



Current 2G spectrum is sufficient for 3G in most countries

Source: Nokia

Summary



Summary

- Global 3G WCDMA Market Situation
 - 87 commercial networks, 186 terminals, 32 million subscribers
 - 3G WCDMA is welcomed evolution to 2G and has established itself globally
 - HSDPA and HSUPA are key enhancements to WCDMA available shortly
 - Dramatic expansion of new services to end-users (video call, fast downloads)
- 3G WCDMA Technology Update
 - WCDMA is lowest cost cellular network technology for voice and data
 - WCDMA enables >1000 minute voice packages
 - WCDMA enables 20% better voice quality
 - Nokia's I-HSPA enables broadband wireless access business
 - 2 x 4.0 MHz is sufficient for WCDMA if close to friendly GSM
- 3G WCDMA in Latin America
 - Postpaid segment is natural for WCDMA
 - Most mid to high end phones will have build-in WCDMA/HSPA functionality in 2007
 - Notebooks will have integrated HSDPA capability starting 2006
 - Huge urban agglomerations are ideal environment for WCDMA
 - Current 2G spectrum sufficient for 3G in most countries initially
 - New spectrum 1700/2100 or 2100 and 2600 needs to be reserved for future 3G

¡Muchas gracias!

