

CDMA2000 BENEFITS AND MARKET STATUS

IMT-2000 SEMINAR AFRICA 2002

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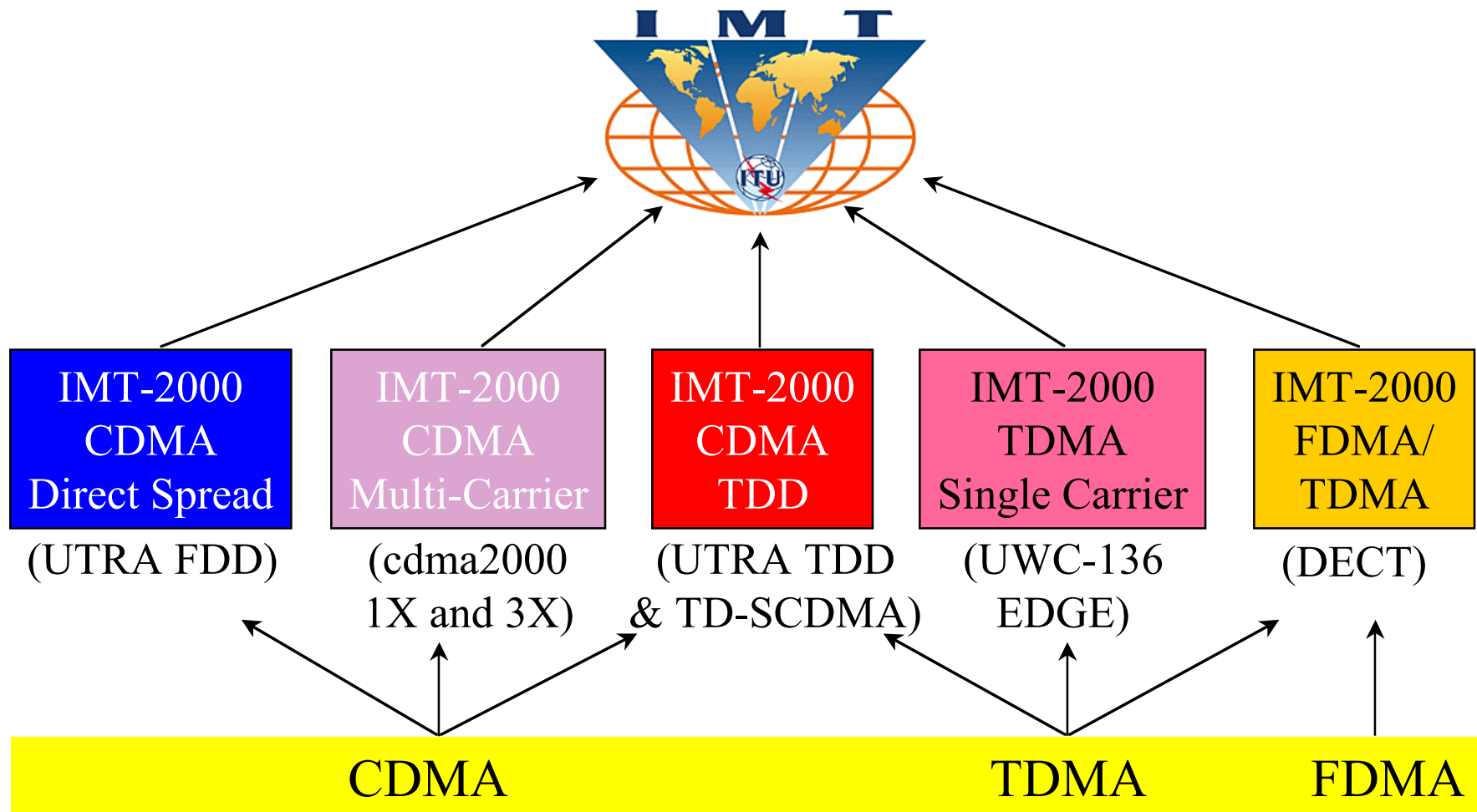
Introduction

What is 3G?

- **According to ITU, 3G should provide:**
 - **144Kbit/s high mobility (vehicular) data transmission**
 - **384Kbit/s low mobility (pedestrian) data transmission**
 - **2Mbit/s stationary (untethered) wireless data transmission**
- **The ITU also identified the following bands for IMT-2000 3rd generation services:**
 - **806 – 960 Mhz**
 - **1710 – 1885 Mhz**
 - **1885 – 2025 Mhz**
 - **2110 – 2200 Mhz**
 - **2500 – 2690 Mhz**
- **ITU announced In 2000 that any country may license 3G technology in any other frequency band that is allocated to mobile services.**
 - **Therefore we now have CDMA in 450Mhz**



IMT-2000 Terrestrial Radio Interfaces (ITU-R Rec. M.1457)



A number of factors are driving the wireless Internet and wireless information...



Societal trends

- Emerging computer literate society
- Increasing travel and mobility



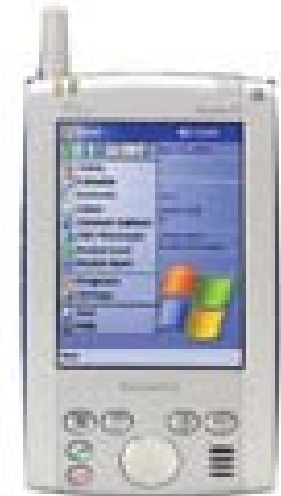
Technology enablers

- High speed, cost effective mobile systems
- Integrated multimedia applications
- Small, powerful, application-rich user devices



Market trends

- Rapid growth in mobile
- Rapid Internet adoption
- Accelerating pace of electronic commerce (aka M-commerce)
- Rapid growth of portable and palmtop computers



Development challenges...

IMT-2000 Challenges for developing countries...

- **Combined cost of IMT-2000 licenses and infrastructure**
- **Competition with developed countries for financing**
- **Need to support rural, sparsely populated areas**
- **Salvaging recent investments made in 1G and 2G mobile systems**



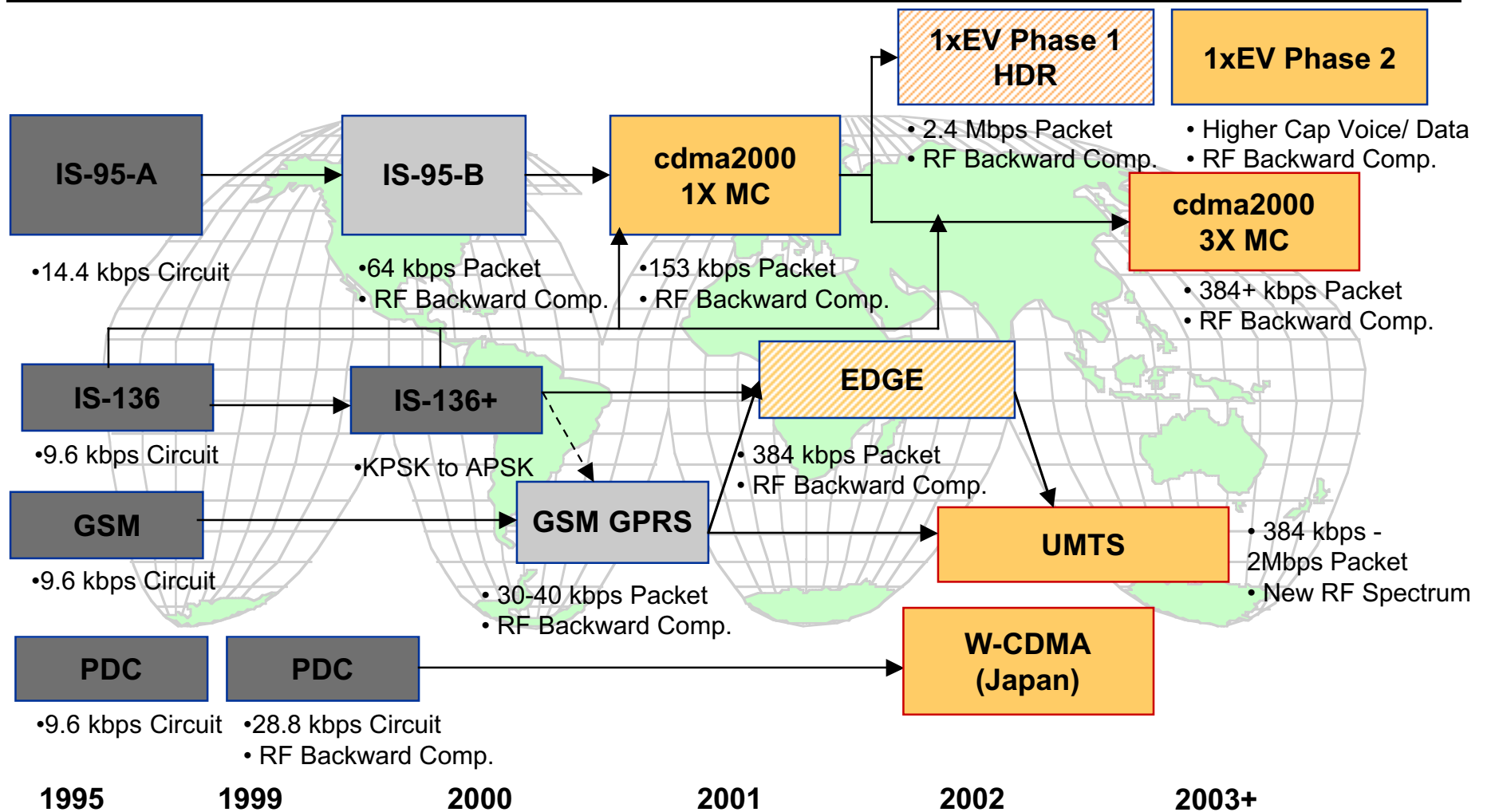
Certain factors are critical for making 3G a success

- ✓ Solutions that are globally recognized and meet adopted, international standards
- ✓ Solutions that work, enable quick time-to-market, and meet industry expectations
- ✓ Spectrum flexibility, efficiency, and cost
- ✓ Capacity to meet future demand
- ✓ Seamless and cost effective migration from today's systems
- ✓ Broad range of competitively-priced products for end-users (consumers, enterprises)
- ✓ Broad range of applications for end-users

CDMA2000 addresses each of these success factors



IMT 2000: Standards Evolution Paths



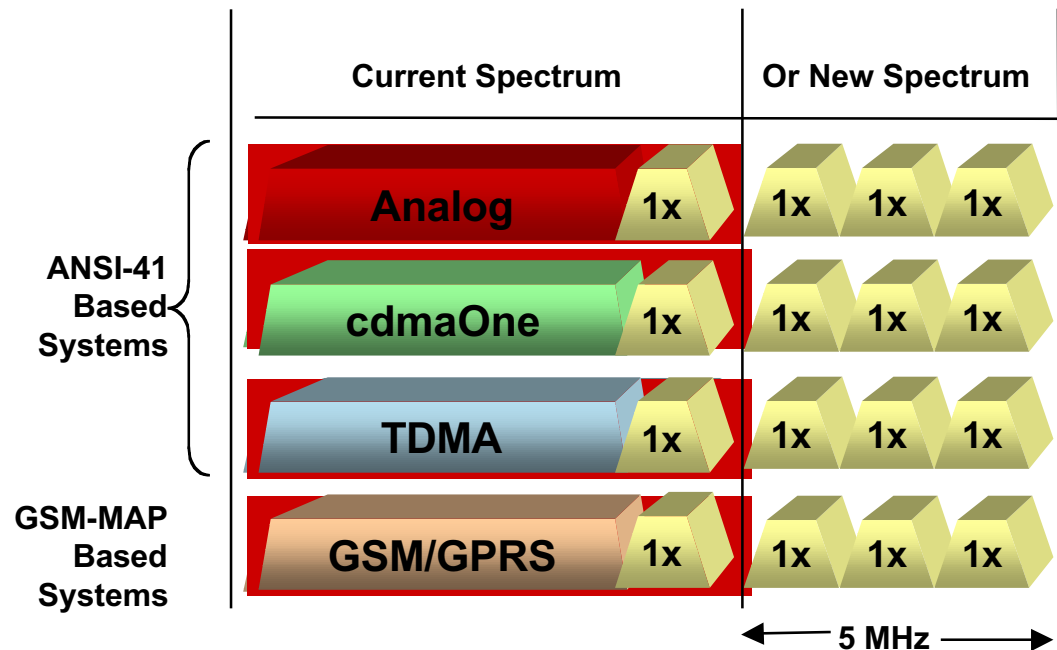
Spectrum flexibility is a key consideration for any technology...

CDMA2000 3G services in a small amount of spectrum

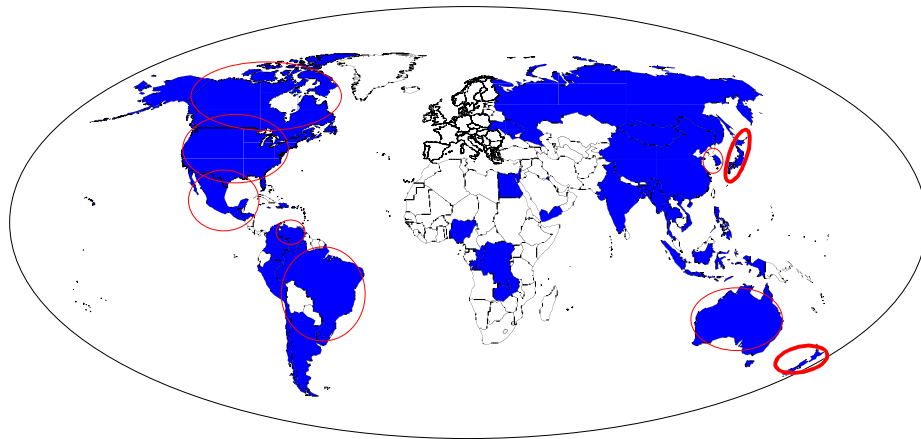
- Effective use of spectrum, significant to ALL operators
- Effective both in overlay or greenfield deployments

CDMA2000 is not constrained to only the IMT-2000 band. Defined to operate in existing and IMT spectrum:

- 450 MHz
- 700 MHz
- 800 MHz
- 900 MHz
- 1700 MHz
- 1800 MHz
- 1900 MHz
- 2100 MHz



Going forward, addressable population will be a key driver of technology market share

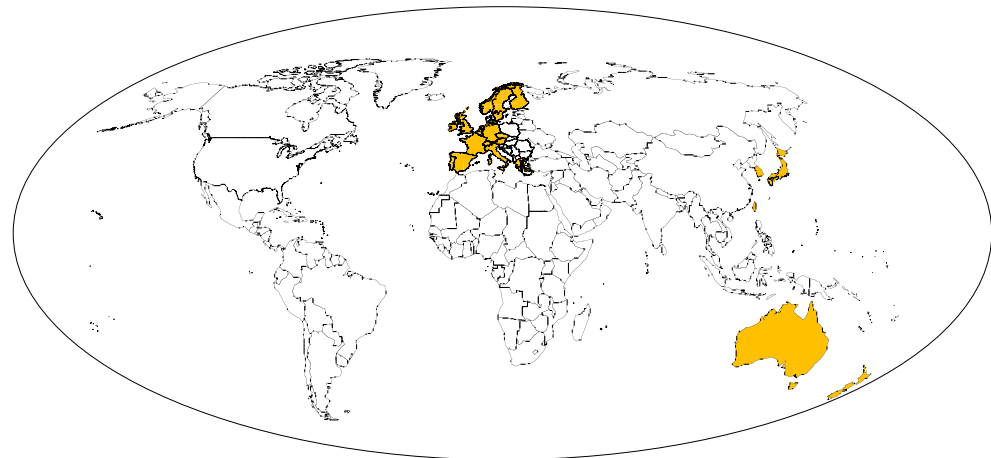


Countries able to deploy CDMA2000 in existing **cdmaOne** networks represent **over 4.428 billion** pops

Countries announcing CDMA2000 deployments represent **2.168 billion** pops

- Countries with Commercial CDMA Networks
- Countries with CDMA2000 Networks, Plans or Trials





Countries that have awarded UMTS spectrum represent only **617 Million** pops



■ Countries with **UMTS** Licensed Spectrum at 2.1 GHz



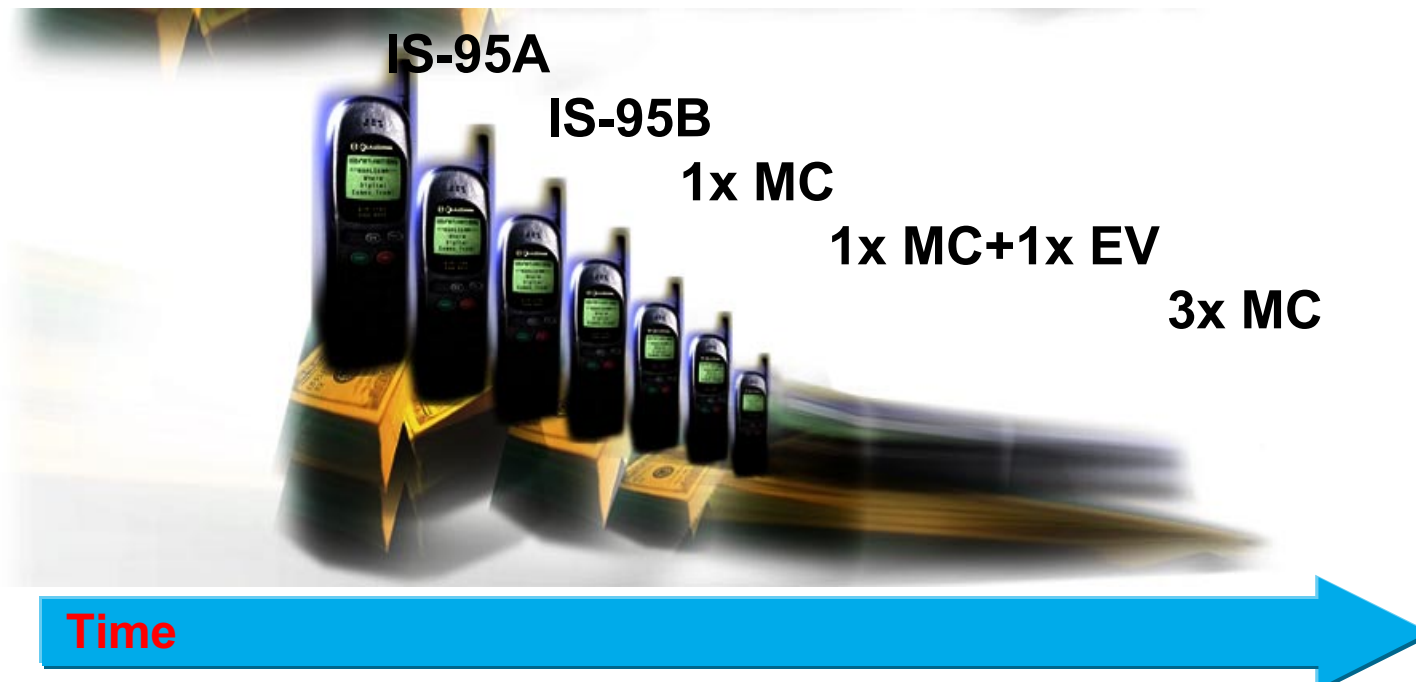
Advantages of CDMA2000 @ any Frequency

-  **CDMA2000 1x allows for unparalleled voice capacity of up to 26 erlangs per sector/carrier.**
-  **CDMA2000 1x allows for current realized data speeds of 153Kbps increasing to 307 Kbps**
-  **1xEV:DO (HDR): is a dedicated channel which will have peak speeds of 2.4 Mbps and has 5 times the data traffic capability.**
-  **The upgrade to 1xEV:DO does not require new spectrum or new base stations.**
 - **Rather, it can be implemented by adding channel cards and software to existing base stations.**
 - **It is the most cost effective solution available.**



Terminal Compatibility

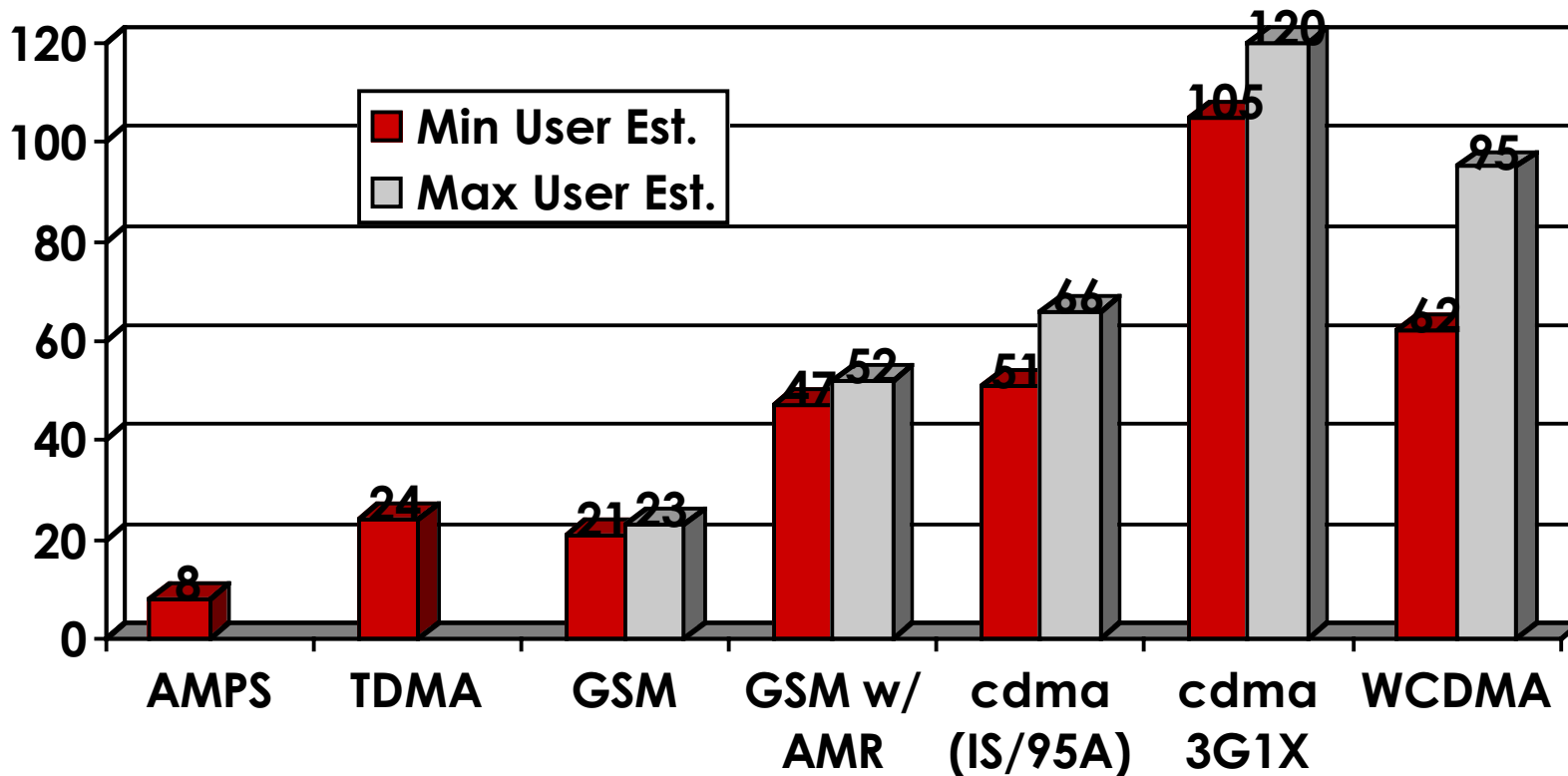
CDMA/CDMA2000



CDMA/CDMA2000 phones are forward and backward compatible. This is unique to CDMA/CDMA2000 Technology



Voice Capacity per 5MHz of Spectrum



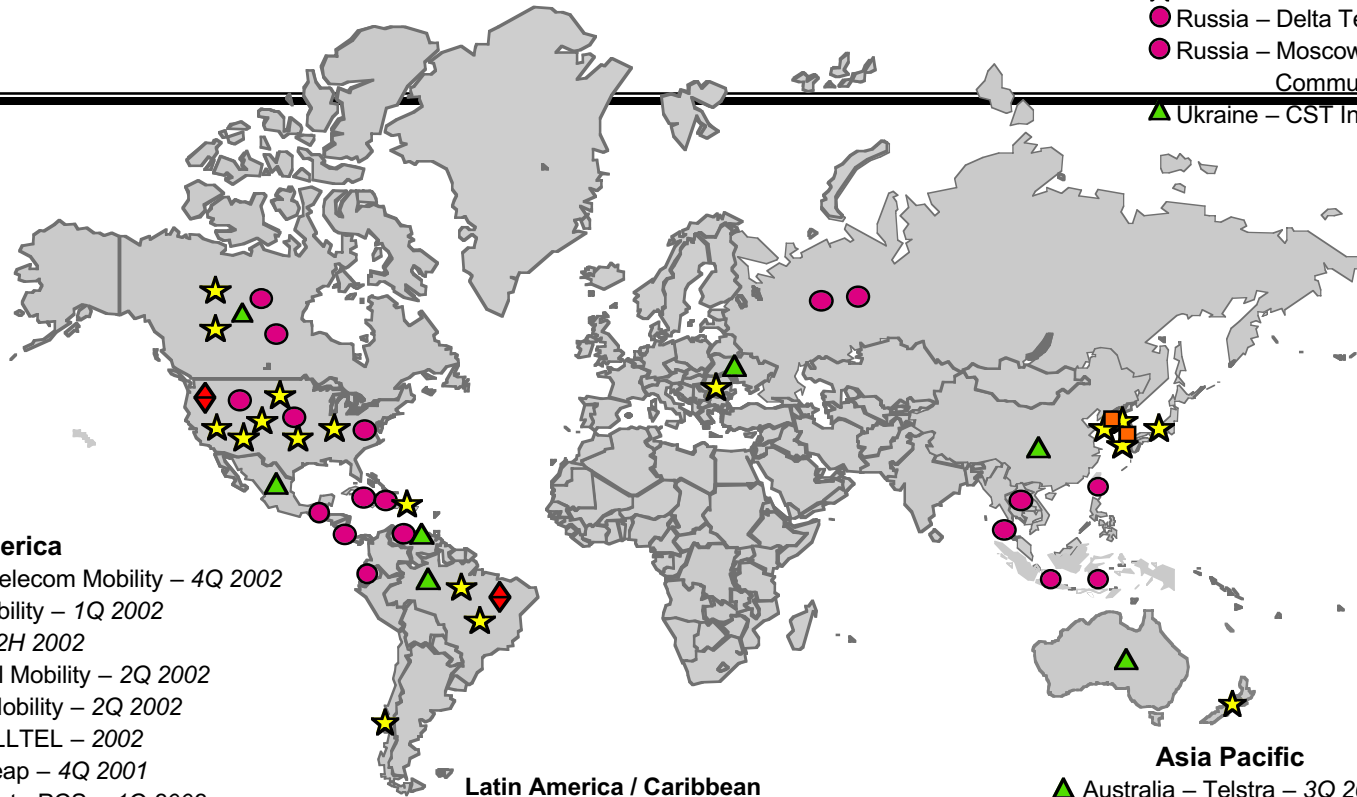
Source: Deutsche Banc Alex. Brown estimates from various sources, "The Rise of the 3G Empire," Sept. 2001.



CDMA2000: Leading 3G

Europe / Russia

- ★ Romania – Telemobil – 4Q 2001
- Russia – Delta Telecom – 4Q 2002
- Russia – Moscow Cellular Communications – 2H 2002
- ▲ Ukraine – CST Invest Limited – 2Q 2002



North America

- Canada – Aliant Telecom Mobility – 4Q 2002
- ★ Canada – Bell Mobility – 1Q 2002
- Canada – MTS – 2H 2002
- ▲ Canada – SaskTel Mobility – 2Q 2002
- ★ Canada – Telus Mobility – 2Q 2002
- United States – ALLTEL – 2002
- ★ United States – Leap – 4Q 2001
- ★ United States – MetroPCS – 1Q 2002
- ★ United States – Monet Mobile Networks – 4Q 2001
- ◆ United States – Monet Mobile Networks – 2H 2002
- United States – NTELOS – 3Q 2002
- ★ United States – Sprint PCS & Affiliates – 3Q 2002
- United States – U.S. Cellular – 4Q 2002
- ★ United States – Verizon Wireless – 1Q 2002
- ★ United States – Western Wireless – 3Q 2001

Latin America / Caribbean

- ▲ Brazil – TCO – 3Q 2002
- ★ Brazil – Telefonica Celular – 2Q 2002
- ★ Brazil – Telesp Celular – 4Q 2001
- ◆ Brazil – Vesper – 2H 2002
- ★ Chile – SmartCom PCS – 3Q 2002
- Dominican Republic – Centennial Dominicana – 2H 2002
- Ecuador – BellSouth – TBA
- Guatemala – SERCOM (Telgua) – TBA
- ▲ Mexico – Pegaso PCS – 2Q 2002
- Panama – BellSouth – TBA
- ★ Puerto Rico – Centennial de Puerto Rico – 2Q 2002
- Venezuela – Movilnet – 3Q 2002
- ▲ Venezuela – Telcel – 1H 2001

Asia Pacific

- ▲ Australia – Telstra – 3Q 2000
- ▲ China – China Unicom – 1Q 2002
- Indonesia – PT Radio Telepon Indonesia – 3Q 2002
- Indonesia – PT Wireless Indonesia – 1Q 2003
- ★ Japan – KDDI – 2Q 2002
- ★ Korea – KT Freetel – 2Q 2001
- ★ Korea – KT Freetel – 2Q 2002
- ★ Korea – LG Telecom – 4Q 2000
- ★ Korea – SK Telecom – 4Q 2000
- ★ Korea – SK Telecom – 1Q 2002
- ★ New Zealand – Telecom Mobile Limited – 3Q 2002
- Taiwan – Asia Pacific Broadband Wireless Communications Inc. – 1Q 2003
- Thailand – Hutchison CAT – 4Q 2002
- Vietnam – Saigon Postel – 2H 2002

- Countries with CDMA2000
- ★ 1X Commercial
- 1X Deployment
- ▲ 1X Trial
- 1xEV-DO Commercial
- ◆ 1xEV-DO Deployment

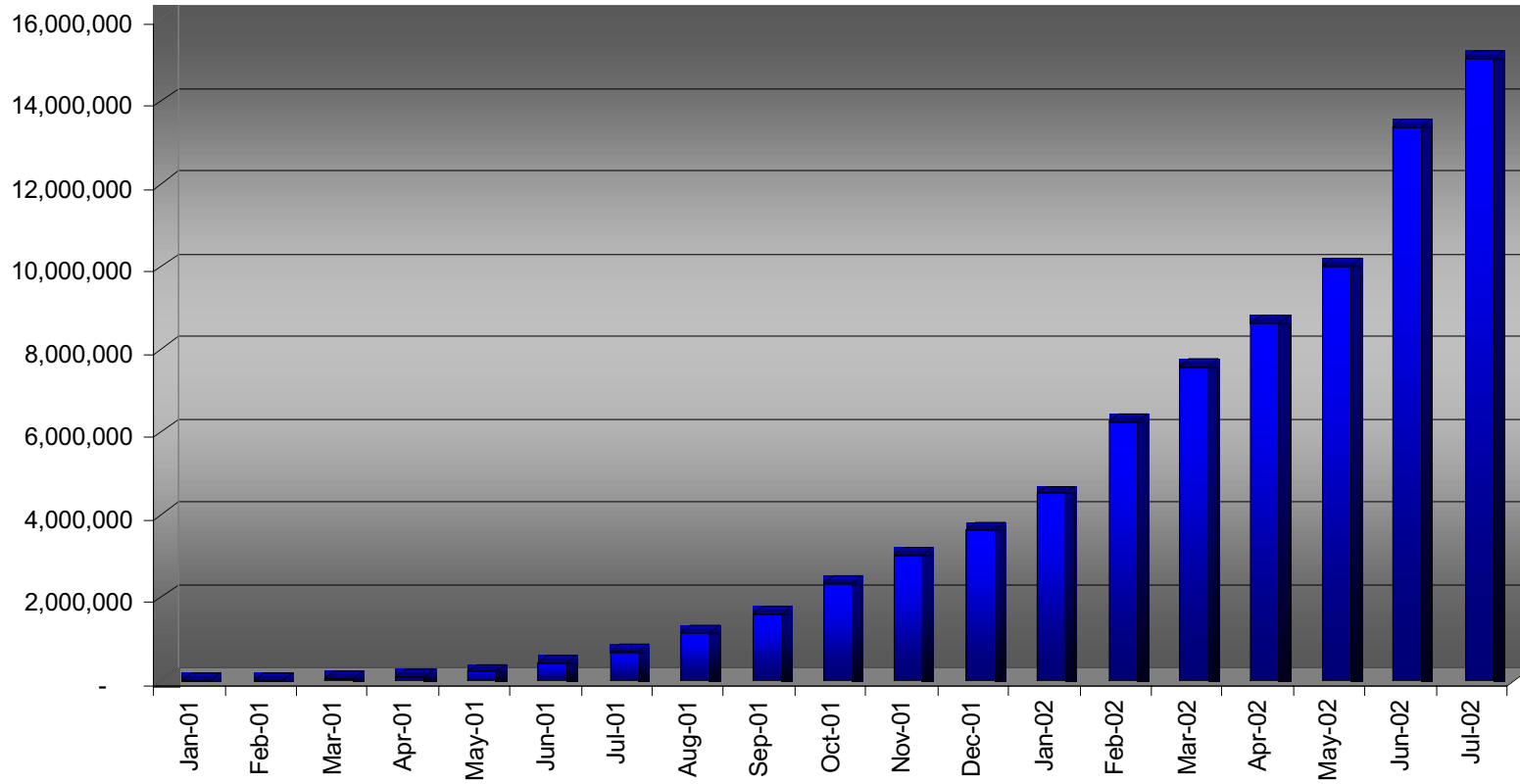
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CDMA2000 Subscriber Growth History:

January 2001 through July 2002



Why is CDMA2000 so successful?



Requires relatively small capital investment

		Total CapEx (US\$ billion)
Korea	SKT (CDMA2000 1X and 1xEV-DO)	2.4
	KTF (CDMA2000 1X and 1xEV-DO)	1.2
	LGT (CDMA2000 1X)	0.4
Japan	KDDI (CDMA2000 1xEV-DO)	2.5
	DoCoMo (W-CDMA)	10.9
U.S.	Sprint PCS (CDMA2000 1X and 1xEV-DO)	2.4
	AT&T Wireless (GSM/GPRS/EDGE/WCDMA)	4.4







Why is CDMA2000 so successful?



CDMA2000 handsets are readily available and relatively inexpensive compared to other 3G devices

Devices available today

-  **Over 100 handset models**
-  **More than 20 other devices such as PDAs, modem cards**
-  **Color displays, MP3 players and cameras, supporting high-speed data access**
-  **CDMA2000 devices are backward compatible with cdmaOne devices**

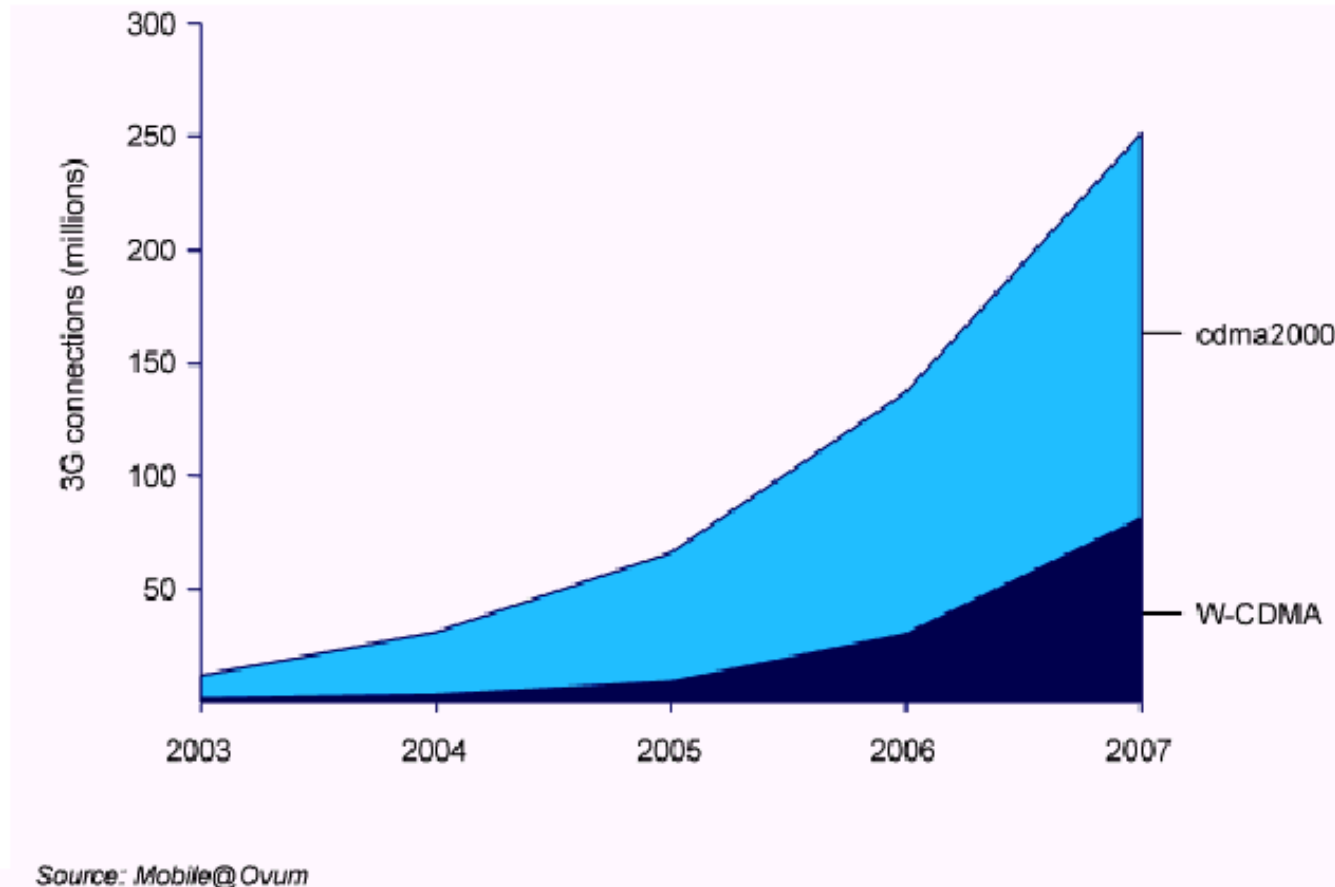


Handset pricing and performance

	CDMA2000 1X (SKT, KTF)	CDMA2000 1xEV-DO (SKT, KTF)	W-CDMA (DoCoMo)
Wholesale price	\$200-400	\$400-500	\$600-\$750
Speed (kbps)			
Maximum	144	2400	64-384
Average	100-120	400-800	80-90
Battery life	250 hours	N/A	55 hours



3G Connections Worldwide (2003-2007) – Ovum Study



New data from European industry consultants, Ovum, shows the potential growth of CDMA2000



Affordable IMT-2000/3G

The case for 450 MHz

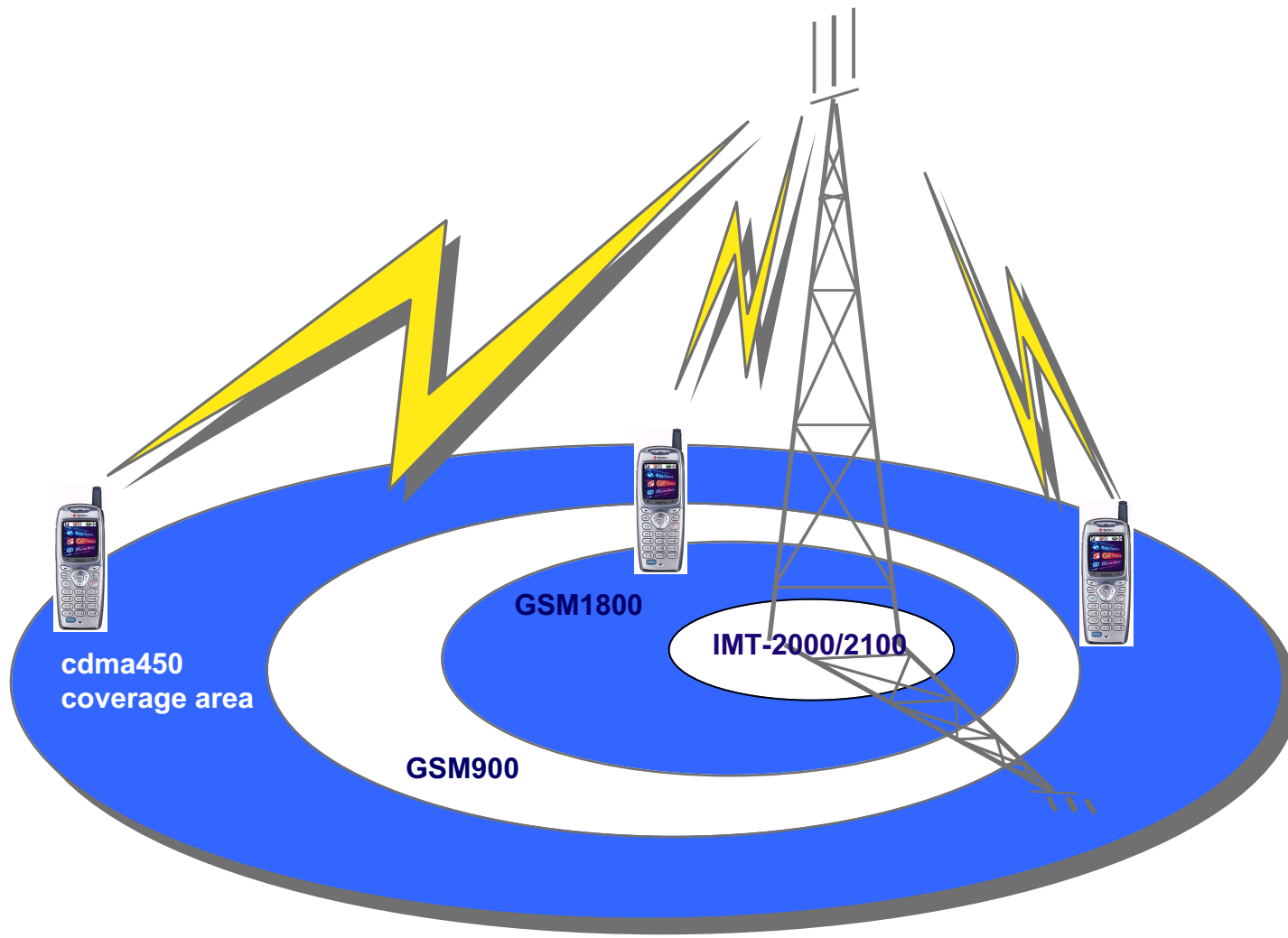


Implementing IMT-2000 in the 450 MHz band ...cdma450

- 450 MHz is good spectral “real estate”
 - *better propagation = fewer base stations*
- IMT-2000 provides mobile Internet access
- Many developing countries have 450MHz band licensed for mobile applications or available for licensing
- Timing coincides with first 3G availability
- About cdma450
 - cdma450 =>CDMA-MC operating in the 450 MHz band
 - *cdma450 fully complies with ITU-R IMT-2000 Recommendations and detailed specifications*
- CDMA-MC is the only “CDMA” IMT-2000 radio interface that fits into the NMT450 licenses

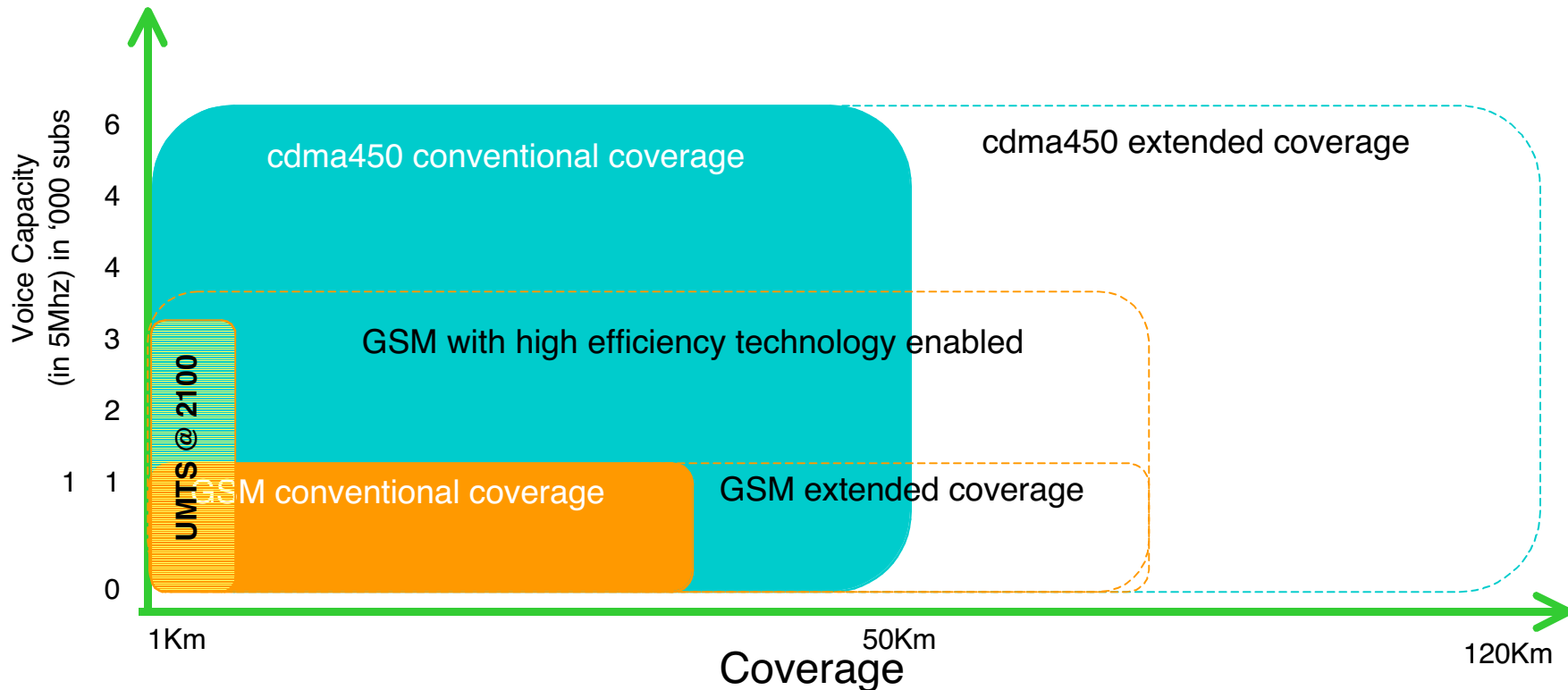


Using RF Propagation to its best advantage

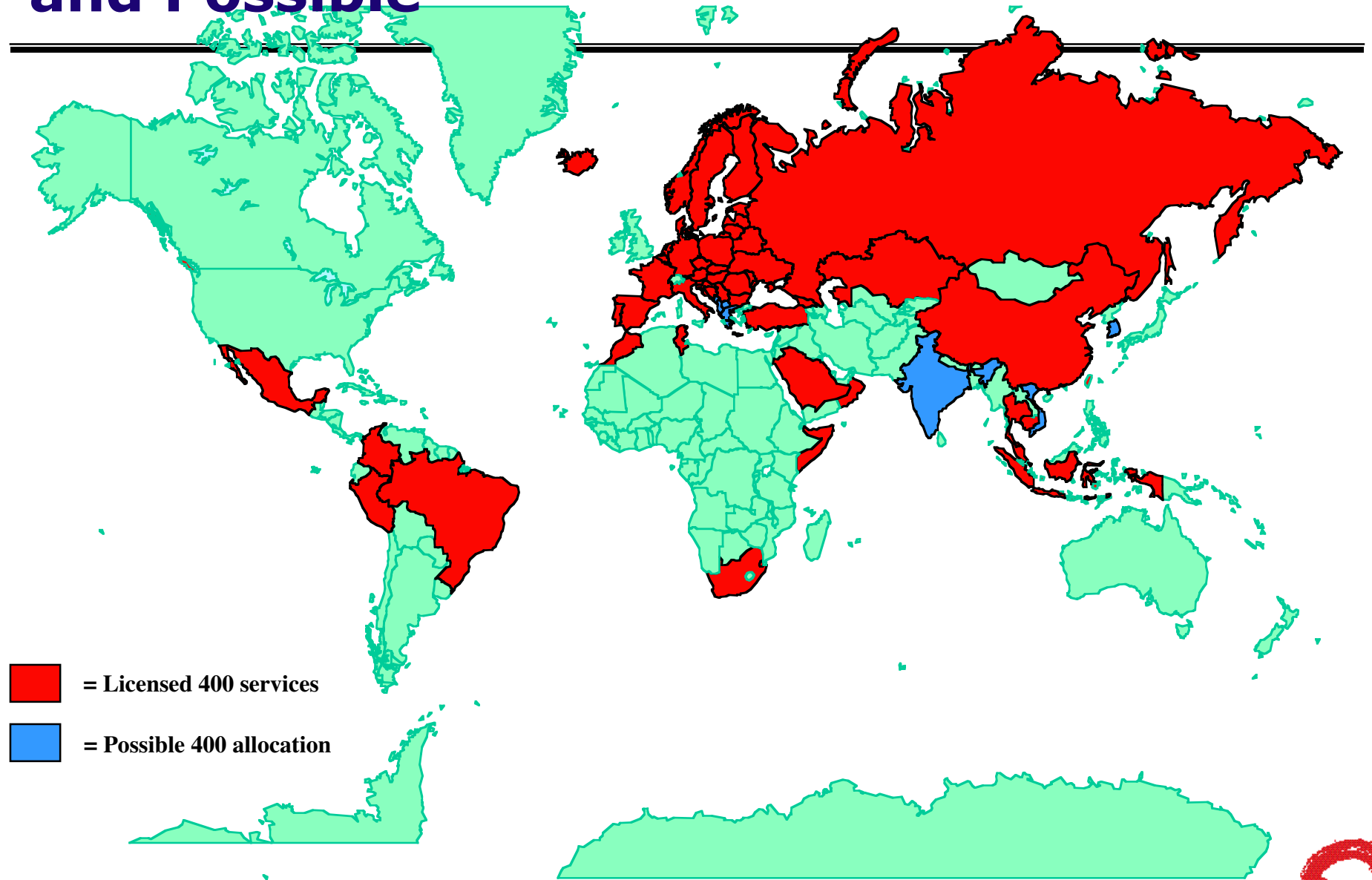


Why is cdma450 so important?

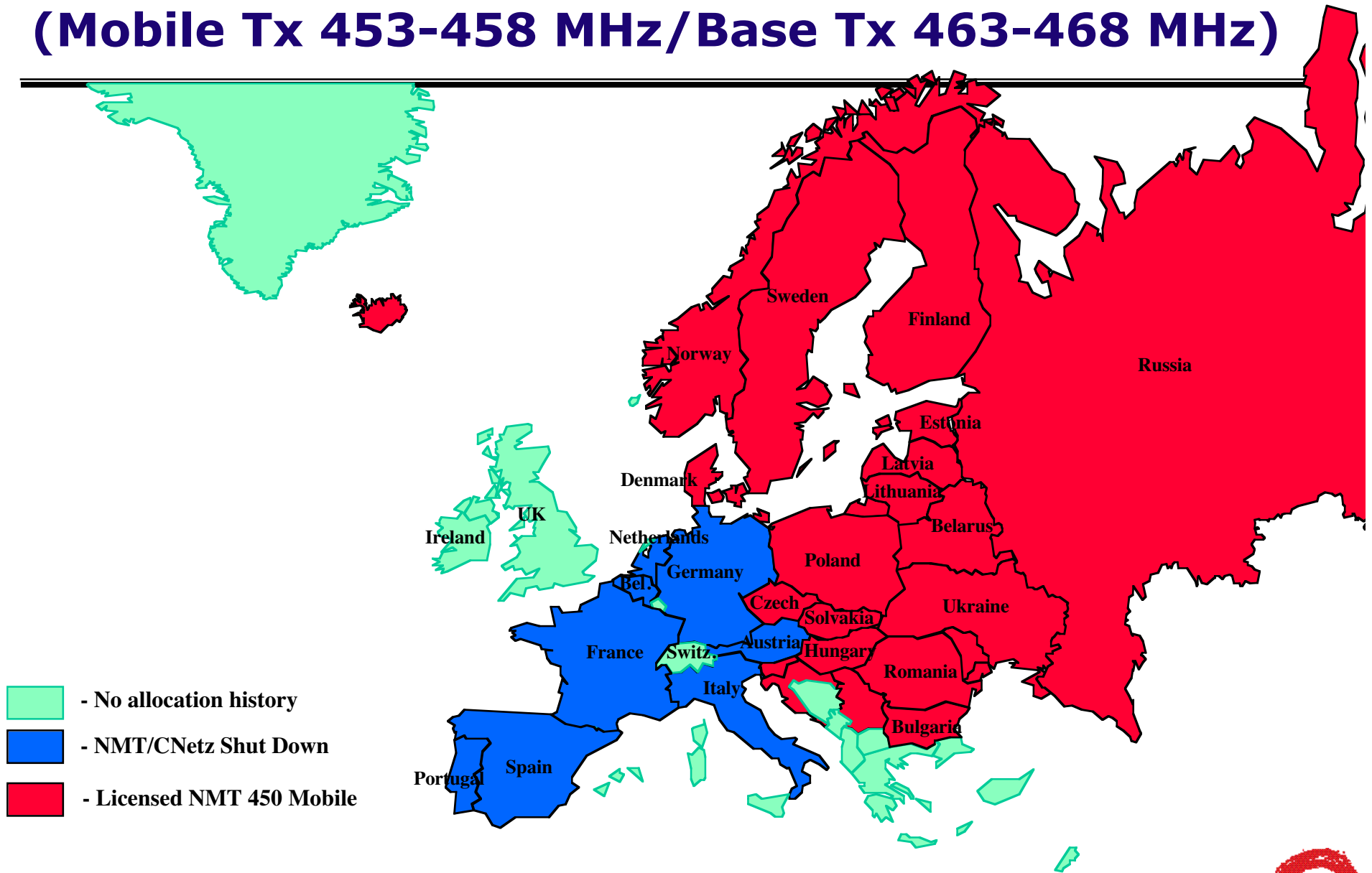
Fact: The lower the frequency the greater the cell range.



The 400 MHz Footprints: Past, Present, and Possible



Europe: NMT 450 (Mobile Tx 453-458 MHz/Base Tx 463-468 MHz)



IS-2000 NMT-450 Band (Band Class 5) Frequency Plan

System Designator	Band Subclass	Transmit Frequency Band (MHz)	
		Mobile Station	Base Station
A*	0	452.500-457.475	462.500-467.475
B*	1	452.000-456.475	462.000-466.475
C	2	450.000-454.800	460.000-464.800
D	3	411.675-415.850	421.675-425.850
E	4	415.500-419.975	425.500-429.975
F	5	479.000-483.480	489.000-493.480
G	6	455.230-459.990	465.230-469.990
H*	7	451.310-455.730	461.310-465.730

* Current Product support



What are we to conclude?

-  **The world needs a more “economical” 3G solution for rural coverage.**
-  **Lower frequencies are the key to reducing cost.**
-  **The 400 MHz range has multiple bands available in many countries.**
-  **We need your support to have the 400 MHz range recognized by the ITU as an identified 3G band.**

