

Mobile Broadband in India The Next Frontier



T V Ramachandran, Director General, COAI
25 September 2004 @ Ahmedabad



- ❖ Indian Regulator has identified Broadband as the next focus area.
- ❖ Expected that broadband will have an even more explosive impact on the market than cellular mobile.
- ❖ Objective is to make broadband extremely affordable in order to drive growth.
- ❖ Affordability target has to be within Rs 400 pm for achieving a good penetration.

Broadband – Importance of User Experience



- ❖ **TRAI Definition** - “An always-on connection that is able to support various interactive services, and has the capability of a minimum download speed of 256 kbps”.
- ❖ **Survey of stakeholders** -“a broadband connection should be fast enough, ‘always-on’ connection capable of quick data download along with video conferencing”.
- ❖ India should **not get entangled in jargon or measurement of speed**.....user experience of “fast enough” is the critical requirement, not a value of 256 kbps as such....a reliable, always-on, fast connection would probably satisfy our pent-up demand in the immediate years ahead.....
- ❖ **Real potential of Broadband lies** not in siloed network services, but in **simplifying the access part of the equation**.....
- ❖ For example, **corporate users**, should be able to **connect to their organization's intranet by whatever access network** available at the time – WiFi, WiMax, 3G or whatever



- ❖ **Mobile phone is fast becoming the dominant technology for voice communications.**
- ❖ **Mobile phone is becoming less & less of a narrowband device as it evolves through 2G to 2.5G to 2.75G to 3G.**
- ❖ **“the mobile phone has moved beyond being a mere device to become a key “social object” present in every aspect of our daily lives”.**

Lara Srivastava, ITU

3G probably provides the best ubiquity in broadband connectivity – always on, fast enough....

Why Mobile Broadband?



- ❖ Because **60% of world's broadband delivered over telephone networks** and only 40% over cable
- ❖ Because **Mobile networks are cheaper & easier to install, have overtaken fixed networks** in many countries & **represent the maximum growth opportunity**
- ❖ Because **significant evolutionary enhancements have taken place in mobile data capability** :GSM, CDMA one ▶▶ GPRS ▶▶ CDMA 2001x ▶▶EDGE ▶▶, WCDMA, CDMA 2000 1x EVDO ▶▶ CDMA 2000 1x EVDV ▶▶ HSDPA/3GSM.

Why Mobile Broadband?



- ❖ TRAI too recognizes the crucial role of mobile telephony:-
 - **“Mobile telephone networks may one day be the preferred broadband circuits. IMT 2000 (3G System) is sometimes called broadband for mobile phones”**

 - “Once the demand for broadband picks up, the demand for mobile broadband may also get accumulated. At that stage, services such as 3G and beyond will become attractive and affordable. This would in turn further accelerate the rollout of broadband”

3G The Ideal Solution for India

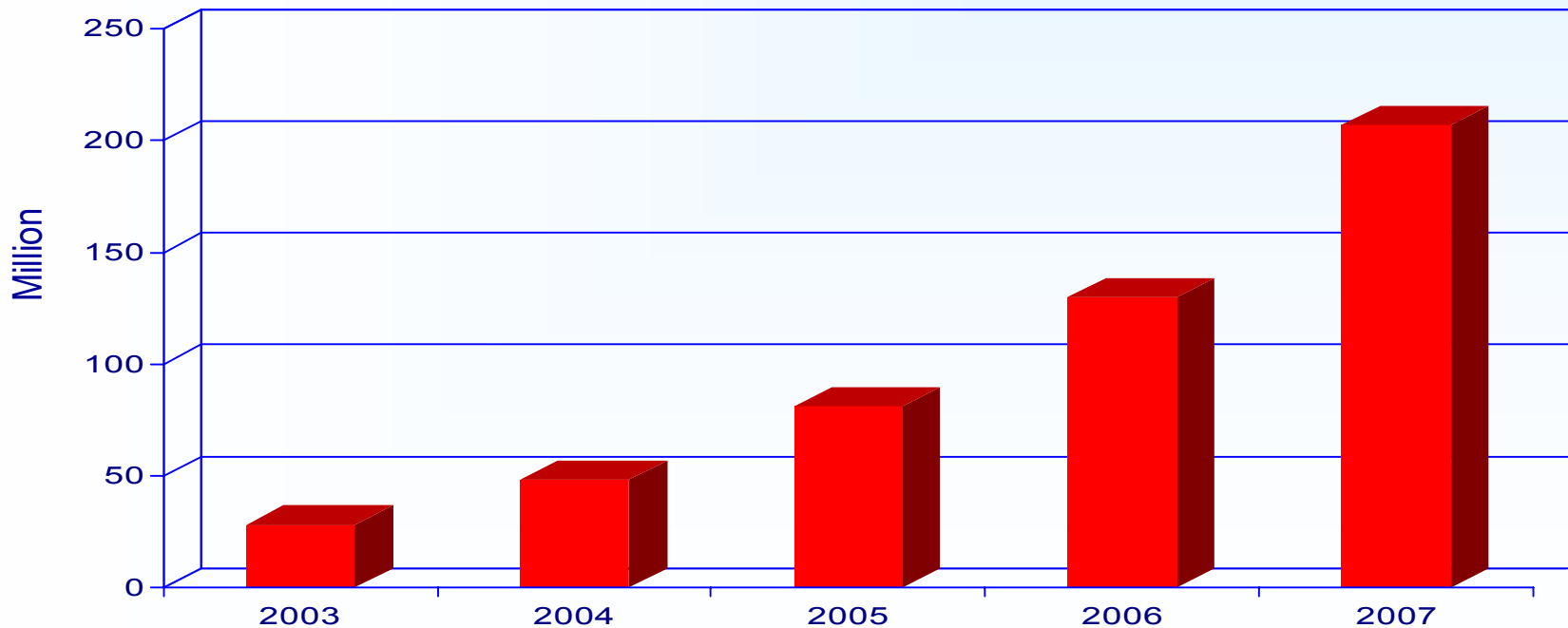


- ❖ Misapprehension that 3G is expensive – it was the exorbitant bids for 3G licenses in Europe were responsible for making the service expensive, thus resulting in its failure.
- ❖ India must learn from the 3G lessons of Europe (as also its own 2G licensing process) & avoid the auction route as it will only make 3G an expensive option which will not be able to take off in a price sensitive market like India avoid
- ❖ 3G is ideal for emerging societies such as India as it will be able to serve both the
 - High end consumers with enhanced data capabilities & speed
 - Low end subscribers whose key requirement is affordable voice services –3G service providers will be able to offer 8-10 times their present voice capacity.
- ❖ 3G can service more subscribers, offer better quality, higher speeds, more services...

3G The Ideal Solution for India



- ❖ Aggressive growth of mobile subscribers – nearly 40 million subscriber by end August 2004
- ❖ Fixed Mobile Crossover expected in 2004 itself
- ❖ Forecast to reach 200 million subscribers by end 2007
- ❖ Represents an ideal platform to deliver broadband to the Masses



Projected Growth in Mobile Subscribers

Broadband Wireless Infrastructure



1. Fixed Wireless Technologies
 - MMDS, LMDS, WiMax, CorDect
2. Satellite Technologies
3. Wireless LAN technologies
 - WiFi (802.11b), 802.11a, Hiper LAN2, 802.11g
4. Mobile Broadband
 - **IMT-2000 / 3G Technologies**
5. Etc.

3G Complements WiMax



- ❖ The Korean Govt. is promoting WiBro (Wireless Broadband), an internet-protocol based technology designed to provide hi-speed internet access at a maximum speed of 1 Mbps to receiver devices such mobile phones when user is moving at speeds upto 70 Kmph.
- ❖ While portable internet technologies like WiMax extend broadband wireless access coverage to metropolitan networks, 3G gives full mobility with wide area coverage, integral security, roaming & full integration with billing system.
- ❖ “It would be hard for WiMax to stand alone without a reliable 3G network. Wireless LAN & WiMax complement rather than compete with 3G mobile technology.

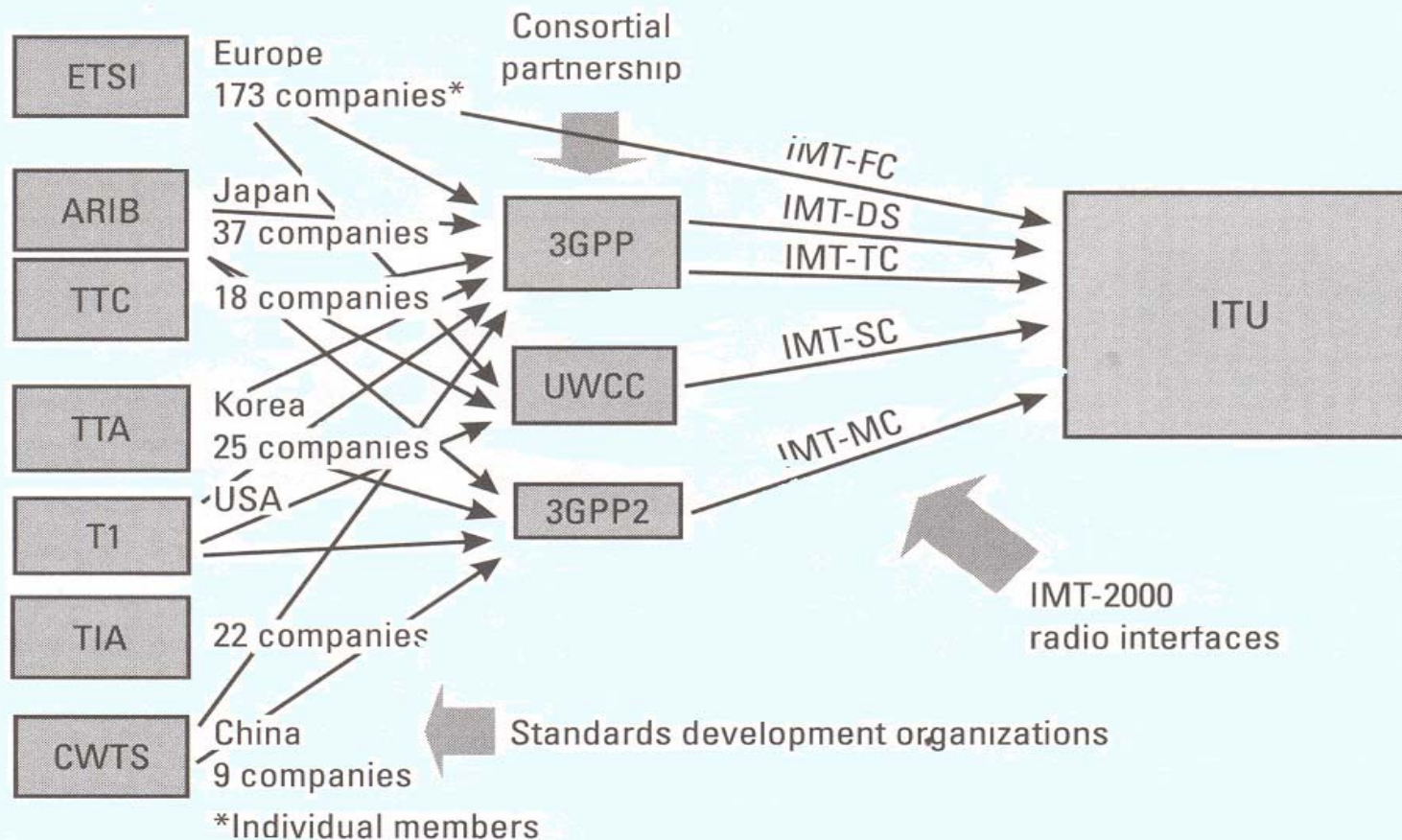


Figure 3.8 Industry collaboration on IMT-2000 radio interfaces. (Source: ITU, 2000.)

ITU Radio Standards for IMT-2000

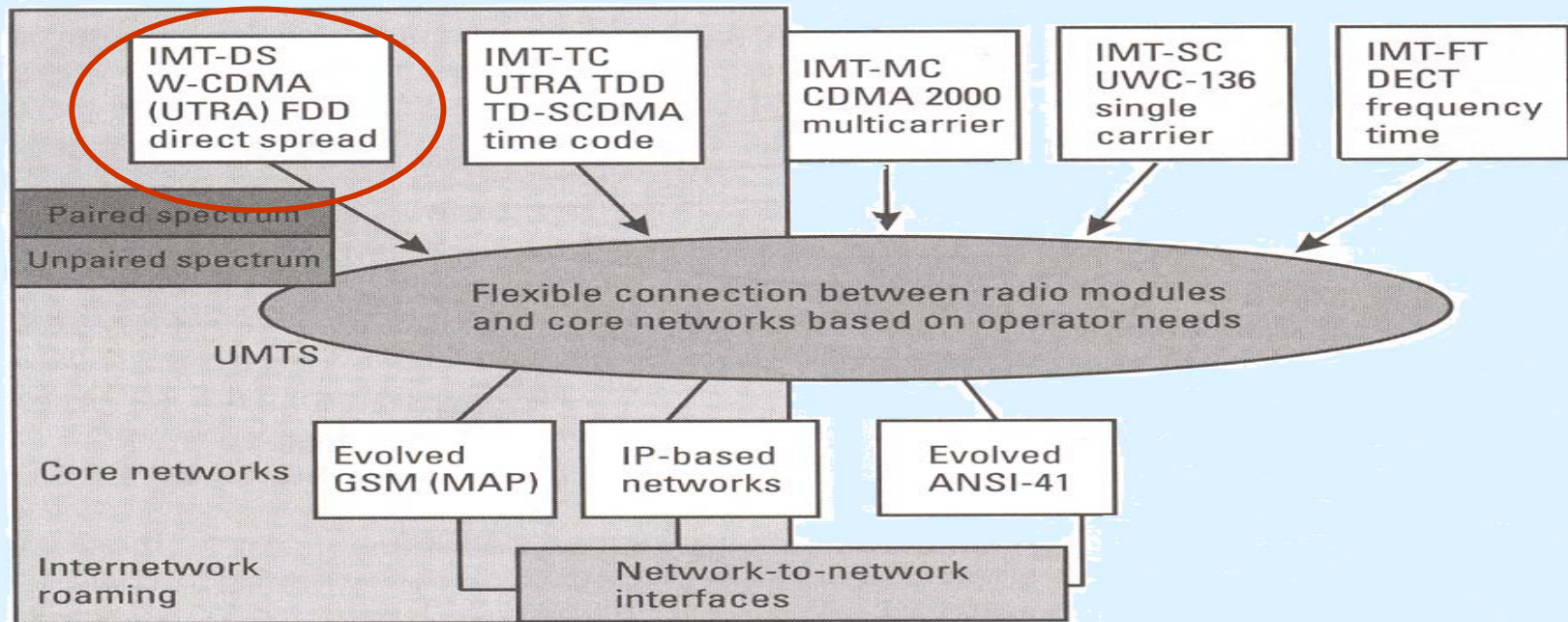


Figure 3.9 ITU-IMT-2000 terrestrial framework standards.

- ❖ IMT-2000 covers 5 possible Radio Interfaces based on 3 different Access Technologies (FDMA, TDMA & CDMA).
- ❖ Majority of Industry adoption worldwide has been Wideband CDMA or 3GSM.
- ❖ Typically, 3GSM provides data speed of 2 Mbps in indoor/low-mobility environments & 144 kbps in in regular mobility environment.

3GSM is “Fast Enough”



Transfer Time

Service Data Volume	2G-GSM	GPRS	PSTN/ISDN	3G UMTS		
	9.6kbps	50kbps	64kbps	128kbps	384kbps	2Mbps
E-mail 5KB	8 sec	1.7 sec	1.6 sec	1.2 sec	0.5 sec	0.5 sec
SMS with Photo 5KB (JPEG)	8 sec	1.7 sec	1.6 sec	1.2 sec	0.5 sec	0.5 sec
Web Page 20 KB	20 sec	4.5 sec	4 sec	2.4 sec	0.8 sec	0.5 sec
Document 100 KB	2 min	35 sec	25 sec	12 sec	4 sec	1 sec
3-min audio CD 2MB (MP3)	40 min	9 min	6.5 min	3 min	---- ^a	---- ^a
10s video clip 600 KB (MPEG-4)	10 min	2.5 min	1.5 min	45 sec	15 sec ^b	

 = User Acceptance 15 sec

Source : Huber & Huber on “UMTS & Mobile Computing

a-Optimal CD quality streaming=128 Kbps

b- Video streaming

Spectrum Bands for IMT-2000



❖ WARC-92

- 1885-2025 MHz
- 2110-2200 MHz

❖ WRC-2000

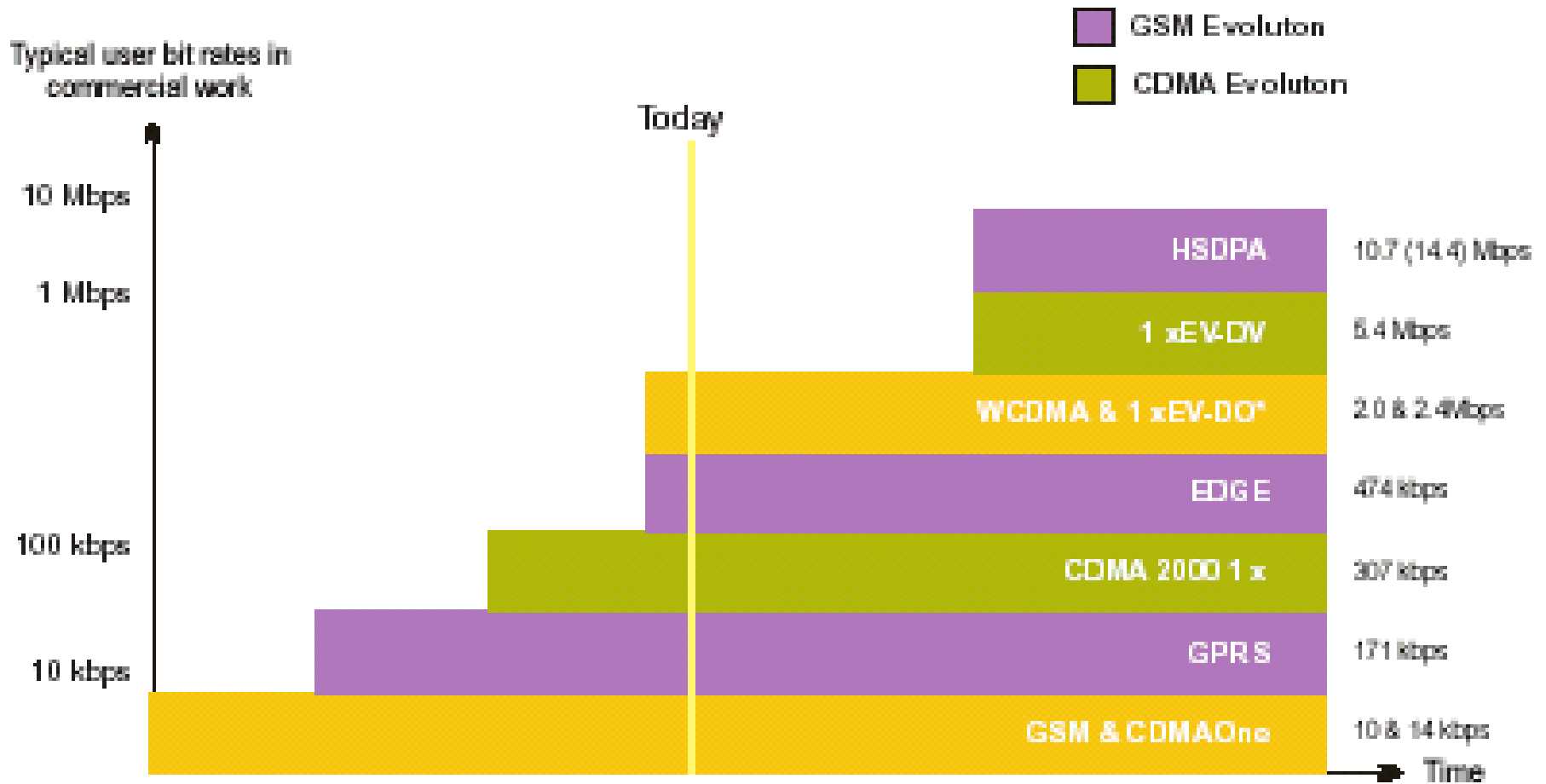
- 806-960 MHz
- 1710-1885 MHz
- 2500-2690 MHz

- ❖ Core Band – 1920-1980 MHz p/w 2110-2170 MHz globally harmonized for interference free co-existence of all technologies, equipment also available for both GSM & CDMA
- ❖ NFAP –2002 too earmarks Core Band for IMT-2000 (3G) applications.

Performance of Cellular Technologies



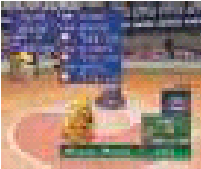
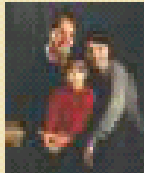


Performance of cellular technologies



Source : Global Mobile Suppliers Association

GSM Data Evolution



File Size	Service Example	Indicative Response Times
20kB	Small application 	<ul style="list-style-type: none"> GPRS (3 TSL, 30kbps): 6.3 sec EDGE (2 TSL, 80kbps): 3.0 sec WCDMA (300kbps): 1.5 sec
40kB	Photo 	<ul style="list-style-type: none"> GPRS (3 TSL, 30kbps): 11.7 sec EDGE (2 TSL, 80kbps): 5.0 sec WCDMA (300kbps): 2.1 sec
100kB	WAP Browsing (xHTML) 	<ul style="list-style-type: none"> GPRS (3 TSL, 30kbps): 27.7 sec EDGE (2 TSL, 80kbps): 11.0 sec WCDMA (300kbps): 3.7 sec
300kB	Web Browsing 	<ul style="list-style-type: none"> GPRS (3 TSL, 30kbps): 81.0 sec EDGE (2 TSL, 80kbps): 31.0 sec WCDMA (300kbps): 9.0 sec

Typical Data Rates

- GPRS (3 TSL, 30kbps)
- EDGE (2 TSL, 80kbps)
- WCDMA (300kbps)

EDGE delivers the content 3 times faster than GPRS

WCDMA delivers content 4-5 times faster than EDGE

Source : Global Mobile Suppliers Association

Source: Nokia

Performance of Evolved GSM & CDMA Versions



- ❖ EDGE produces end-user bit rates & spectral efficiency that are about 50% higher than the corresponding CDMA product – CDMA 2000 1x. This has been widely demonstrated in the commercial EDGE & CDMA 2000 1x networks.
- ❖ Both 3GSM (WCDMA) and 1xEVDO produces typical best rates of around 300-350 Kbps in commercial networks, based on live network measurement.
- ❖ However, only 3GSM (WCDMA) supports QoS management, bit rate guarantee & low latency & hence it can support vertically any data service.
- ❖ 3GSM/HSDPA & 1x EVDV provide significant enhancements to the respective GSM and CDMA equivalents and are standardized by 3GPP and 3GPP2.
- ❖ HSDPA provides typical average bit rates range between 1.0 and 3.0 Mbps in commercial networks with peak bit rates upto 10.7 Mbps. **Both peak & typical bit rates with HSDPA are therefore 2 to 3 times higher than with 1x EVDV.**



- ❖ Data transfer speeds on WCDMA can now be turned up sharply with high speed data on the downlink or to the mobile, with hi-speed data packet access (HSDPA) a technology that is now standardized in the 3GPP Release 5 of WCDMA.
- ❖ Unlike CDMA 2000's 1x EVDO, HSDPA does not use a separate carrier or data channel for high speed transmissions.
- ❖ The technology is expected to be available in the market during the 2nd half of 2005.
- ❖ Even in the initial stages, realized speeds are expected to be 10 Mbps as against the theoretical speed of 14.2 Mbps. This full mobility broadband is expected to give shift competitive to alternative technologies like WiFi.

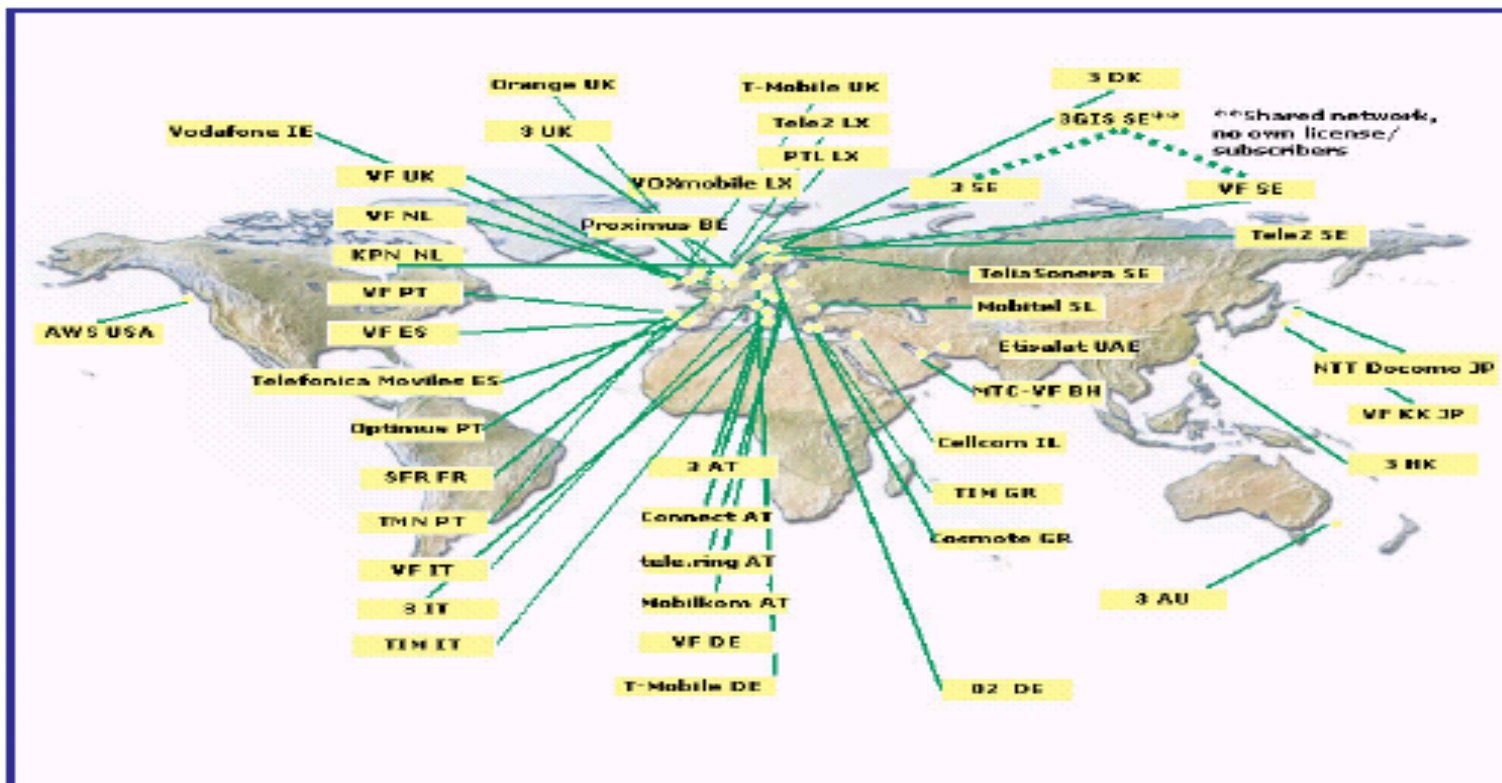
WCDMA Fact Sheet – 20 August 2004



43* WCDMA networks in service in 22 countries

- a further 10* networks at pre-commercial phase
- over 8 million WCDMA subscribers
- 120 WCDMA licenses awarded in 40 countries

(* at 6 August 2004)



A commercial WCDMA network is defined as meeting all of the following criteria:

- Anyone can subscribe to service (not a limited trial or selected customers only)
- WCDMA phones or terminals are available to users
- WCDMA phones are sold to subscribers (not rented only)
- The operator has made a public announcement
- The service is charged for

Attractive terminals boost the subscriber uptake

~8.7 million WCDMA subscribers mid August

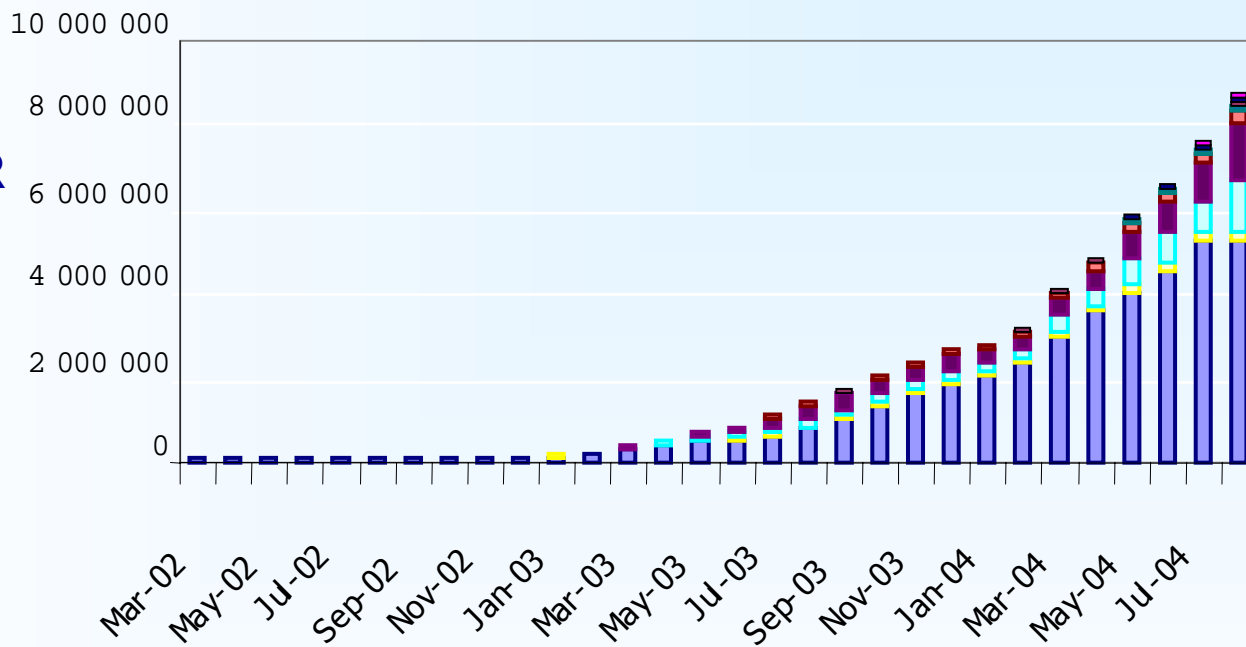


❖ By far the highest growth rate of any mobile technology today – 800% CAGR

❖ Faster subscriber growth than in GSM in its early days

❖ After slow start, growth now driven by mature technology, more attractive terminal selection and better WCDMA network coverage

WCDMA subscribers



- | | |
|---------------|---------------|
| ■ Etisalat | ■ 3 Austria |
| ■ Mobitel | ■ 3 Australia |
| ■ MTC VF | ■ 3 Italy |
| ■ 3 Hong Kong | ■ 3 UK |
| ■ 3 Denmark | ■ Vodafone KK |
| ■ 3 Sweden | ■ NTT Docomo |
| ■ mobilkom | |

India's Path to Mobile Broadband



- ❖ India's path to Mobile Broadband must be through 3G in the WARC-92 identified Core Band of 1920-1980 MHz p/w 2110-2170 MHz because :
 - Only band globally harmonized for interference free co-existence of both GSM & CDMA
 - Equipment available for both technologies in this band
 - Majority of countries have opted for 3G in the Core Band
 - Japan & Korea live examples where GSM & CDMA are co-existing in the Core Band
- ❖ India by choosing this globally adopted spectrum band will be able to avail of
 - Economies of scale – lower tariffs
 - Seamless roaming
 - Inter-operability
 - Interference free operations
- ❖ **India being a country where both GSM & CDMA co-exist must choose a 3G path which allows for the co-existence as well as future growth & development of both technologies**



THANK YOU!
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