

ITU-BDT Workshop, Damascus, Syria
13-15 June 2005

Migration to IMT-2000 in Developing countries:

The view of Policy Makers and Regulators and market reaction

Rajendra Singh
Advisor (Mobile Network)
Telecom Regulatory Authority of India

1

Why Migration

- Need of High speed data services
- Inadequacy of 2 G spectrum
- Need of additional operators in the market to increase the level of competition
- These additional operators could offer IMT-2000 services

2

The Key Considerations

➤ Existing Licensing Regime

- › Is it a hurdle for migration

➤ Availability of equipment

- › Is it that the equipment for IMT-2000 services is available only in a particular spectrum

➤ Technological developments

- › SDRs, Multi Tx-Rx in a single chip

3

Spectrum allocation for 2/2.5 G Cellular Mobile services

	International allocations*	Indian allocation
900 MHz	890 – 915 MHz paired with 935 – 960 MHz (880 – 890 MHz paired with 925 – 935 MHz E-GSM band)	890 – 915 paired with 935 – 960 MHz** <i>(Used by 1st, 2nd and 3rd Cellular Mobile Service Providers for GSM)</i>
1800 MHz	1710 – 1785 MHz paired with 1805 – 1880 MHz	1710 – 1785 paired with 1805 – 1880 MHz <i>(Used by 4th CMSP and for additional allocations to 1st, 2nd and 3rd CMSPs.)</i>
1900 MHz	1850 – 1910 MHz paired with 1930 – 1990 MHz <i>(North American PCS band)</i>	1880–1900 MHz is earmarked for Micro cellular technologies based on TDD

4

Spectrum allocation for 2/2.5 G Cellular Mobile services

	International allocations*	Indian allocation
450 MHz	Spectrum allocated in some countries: 452.5-457.475/ 452 – 456.475/ 450-454.8/ 411.675 – 415.850/ 415.5-419.975 479-483.48/ 455.23-459.99/ 451.310-455.730 Details are given in table	Not allocated
800 MHz	824 – 849 MHz paired with 869 – 894 MHz	824 – 844 paired with 869 – 889 MHz <i>(Used to provide WLL (M) & CDMA based mobile services)</i>

5

Spectrum for IMT-2000 Services

- **ITU-R Recommendations M.1036**
- **WARC-92 identified bands**
 - 1885-2025 MHz
 - 2110- 2200 MHz
- **WRC-2000 identified bands**
 - 806-960 MHz
 - 1710-1885 MHz
 - 2500-2690 MHz

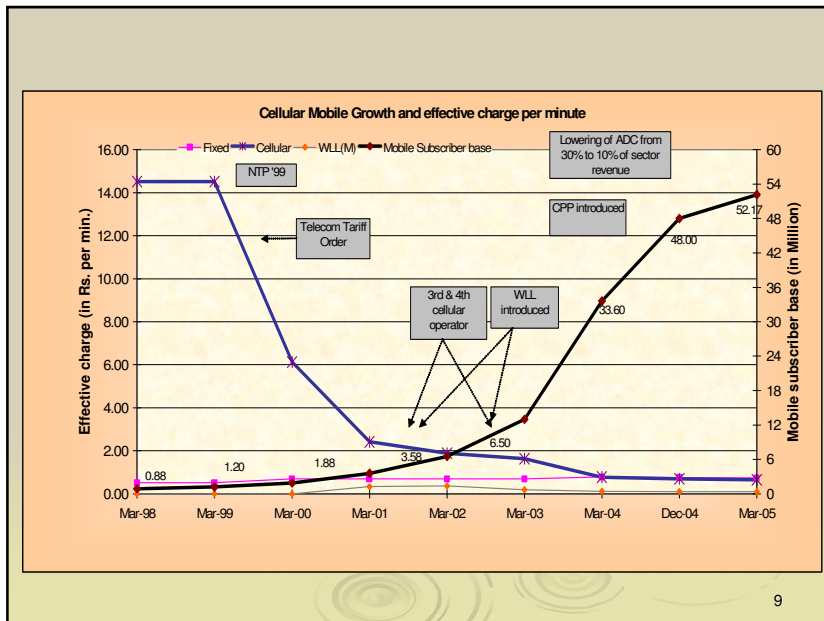
6

Frequency Arrangements in the band 1710-2200 MHz band					
<i>Frequency arrangements</i>	<i>Mobile station transmitter (MHz)</i>	<i>Centre gap (MHz)</i>	<i>Base station transmitter (MHz)</i>	<i>Duplex separation (MHz)</i>	<i>Un-paired spectrum (e.g. for TDD) (MHz)</i>
<i>B1</i>	<i>1920-1980</i>	<i>130</i>	<i>2110-2170</i>	<i>190</i>	<i>1880-1920; 2010-2025</i>
<i>B2</i>	<i>1710-1785</i>	<i>20</i>	<i>1805-1880</i>	<i>95</i>	<i>None</i>
<i>B3</i>	<i>1850-1910</i>	<i>20</i>	<i>1930-1990</i>	<i>80</i>	<i>1910-1930</i>
<i>B4 (harmonized with B1 and B2)</i>	<i>1710-1785 1920-1980</i>	<i>20 130</i>	<i>1805-1880 2110-2170</i>	<i>95 190</i>	<i>1900-1920; 2010-2025</i>
<i>B5 (harmonized with B3 and parts of B1 and B2)</i>	<i>1850-1910 1710-1755 1755-1805</i>	<i>20 50 305</i>	<i>1930-1990 1805-1850 2110-2160</i>	<i>80 95 355</i>	<i>1910-1930</i>
<i>B6 (harmonized with B3 and parts of B1 and B2)</i>	<i>1850-1910 1710-1770</i>	<i>20 340</i>	<i>1930-1990 2110-2170</i>	<i>80 400</i>	<i>1910-1930</i>

7

- ## Growth of Mobile services
- Targeted Market
 - Level of Competition
 - Current penetration level
 - Tariff
 - Affordability
 - Population coverage
 - Applications

8



TRAI's recommendations on Spectrum related issues (dated May 13, 2005)

TRAI's recommendations are based on:

- objectives of Government viz. target of 200 million mobile phones by 2007
- adequate spectrum to operators to permit longer term spectrally efficient planning
- reduced input costs for telecom services so as to increase coverage in semi-urban and rural areas and ensuring roll out of 3G services.

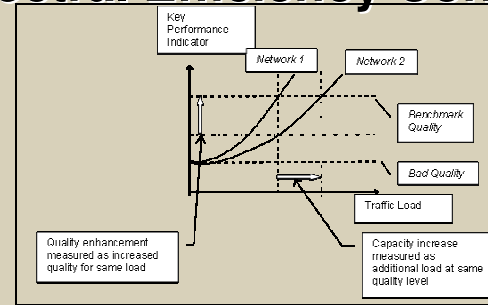
TRAI's recommendations on Spectrum related issues

- Efficient Utilisation of Spectrum
- Spectrum allocation Procedure
- Spectrum Pricing

Other related issues

- Spectrum Re-farming
- Spectrum trading
- Mergers and Acquisitions

Spectral Efficiency Concept



For cellular mobile systems, it can be expressed as

$$SUE = \frac{\text{(Traffic in Erlangs)}}{\text{(Amount of Spectrum in MHz) X (Area in Sq. Kms)}} \quad \text{For a specified GoS}$$

SUE = Spectrum Utilisation Efficiency

TRAI's recommendations on Spectrum related issues - Efficient Utilisation of Spectrum

- **Benchmarking criterion for efficient utilisation of spectrum for use as a parameter for determining the need for allocation of additional spectrum**
 - may be practically difficult to implement.
 - At this stage application of any such benchmarking criterion may not be appropriate.
 - Operators are currently having the spectrum ranging from 2 x 4.4 MHz to 2 x 10 MHz for GSM operators and 2 x 2.5 MHz to 2 x 5 MHz for CDMA operators,
 - At a later stage, this concept of benchmarking could be reconsidered.
- **Keeping in mind the current constraint in availability of spectrum and pricing (existing revenue share) as a method of ensuring efficient utilisation of spectrum the existing subscriber base approach for allocation of additional spectrum should continue.**

13

TRAI's recommendations on Spectrum related issues (Contd)

Spectrum allocation Procedure

- **Present spectrum allocation criterion for both GSM and CDMA operators to be technology neutral within one month of acceptance of these recommendations.**

Annual Spectrum charge

- **Existing ceiling on annual spectrum charges of 6% AGR to be brought down to 4% of AGR.**

14

TRAI's recommendations on Spectrum related issues (Contd)

Strategy for availability of additional spectrum

- **Present level of spectrum allocated to Mobile operators**
 - Much below the International averages &
 - Need for immediate time bound action for making more spectrum available.

- **Difficulty in getting additional 2G spectrum vacated by existing users in a reasonable time frame.**
 - Immediate constitution of a very high level group at the level of ministers assisted by professionals
 - To draw up and oversee implementation plan to achieve guaranteed spectrum availability by 2006.
 - Even then, TRAI visualizes shortage of 2G spectrum.
 - Partial mitigation of spectrum constraints through introduction of services in IMT-2000 spectrum.

- **Spectrum shortage is not likely to be faced in too many cities and certainly not all over the country.**
 - Area specific (city level or even specific area within a city) co-ordination may be required to ensure availability of adequate spectrum.

15

TRAI's recommendations on Spectrum related issues (Contd)

- **IMT-2000 (3G) services in the 2GHz band for both GSM and CDMA for reasons of spectrum availability.**
 - US-PCS 1900 MHz band for CDMA operators cannot be vacated by defence
 - Interference problems in mixed allocation of 1900 MHz US-PCS and IMT 2000 2 GHz spectrum.

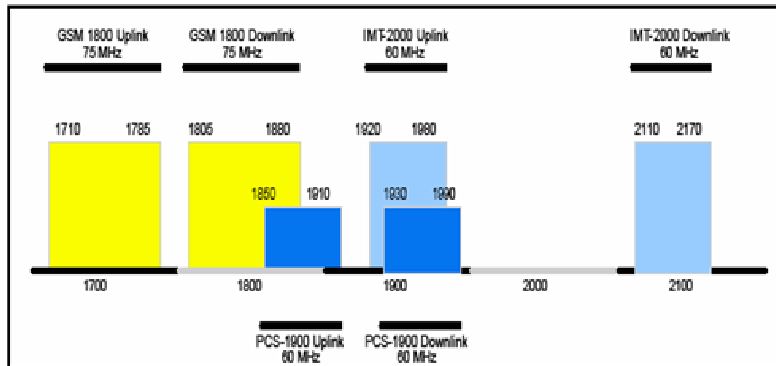
- **IMT-2000 2GHz spectrum allocation to the existing operators as extension of 2 GHz spectrum allocation**
 - No one time entry fee

 - Additional annual per MHz charge till service provider rolls out IMT-2000 services.

 - Cancellation of IMT-2000 spectrum if IMT-2000 (3G) services are not rolled out within 2 years from the date of allocation of spectrum

16

Interference Issue: IMT-2000 2 GHz Vs. 1.9 GHz band



BaseStation to Base Station Interference:: CDMA2000 TX will cause interference into the WCDMA RX
 Mobile Station to Mobile Station Interference: WCDMA TX will cause interference into CDMA 2000 RX

17

TRAI's recommendations on Spectrum related issues (Contd)

- New operators to be allowed in areas where spectrum requirements of existing operators have been met and additional spectrum is available.
- CorDECT spectrum delinked from mobile spectrum and distributed rationally.
- Spectrum trading may be considered at a later stage through a consultation process.
- Spectrum charging for terrestrial wireless links rationalized. This will help in increasing internet and broadband penetrations. For shorter distances and lower spectrum bandwidth discounts from 50% to 98%.

18

THANK YOU

19