Spectrum issues for IMT-2000

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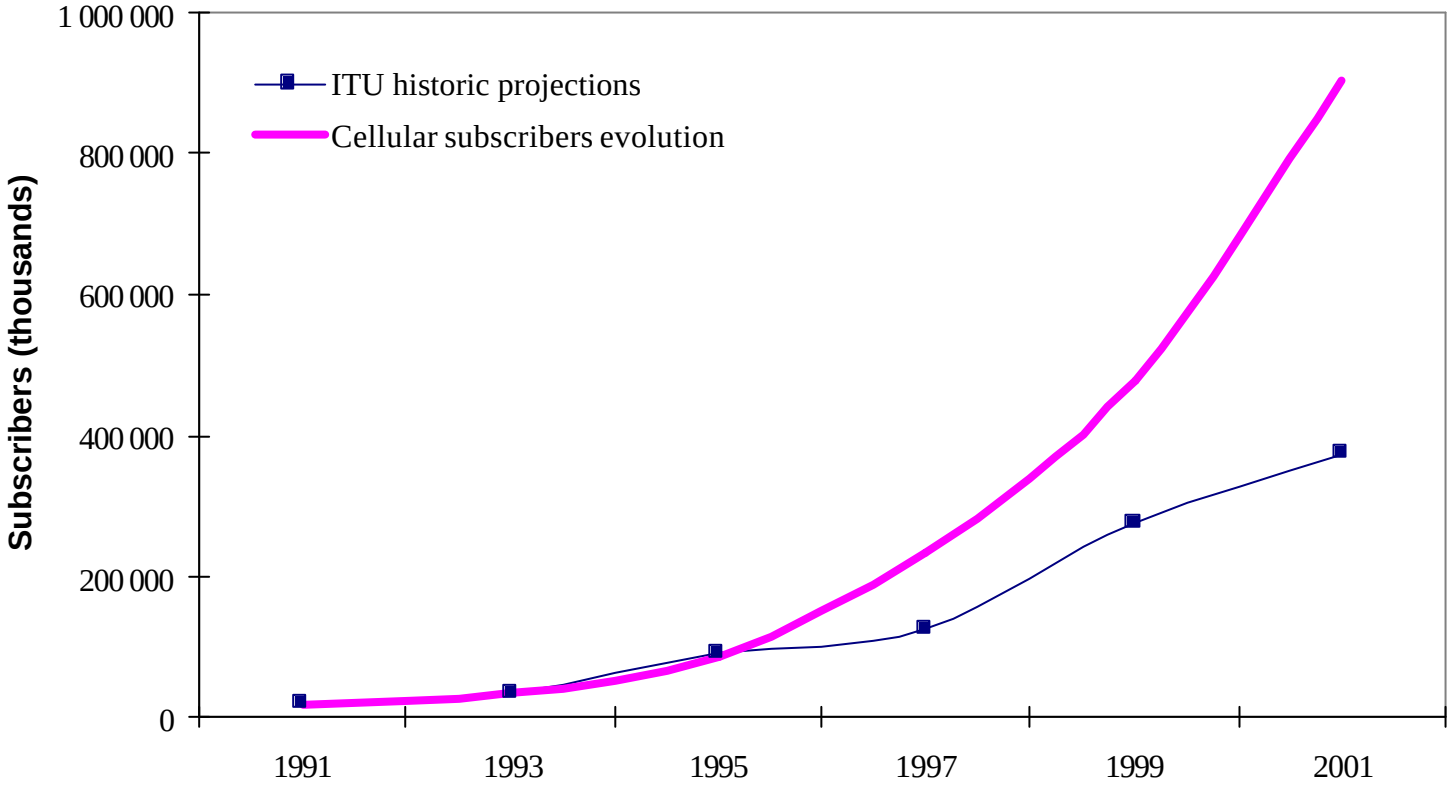
Summary

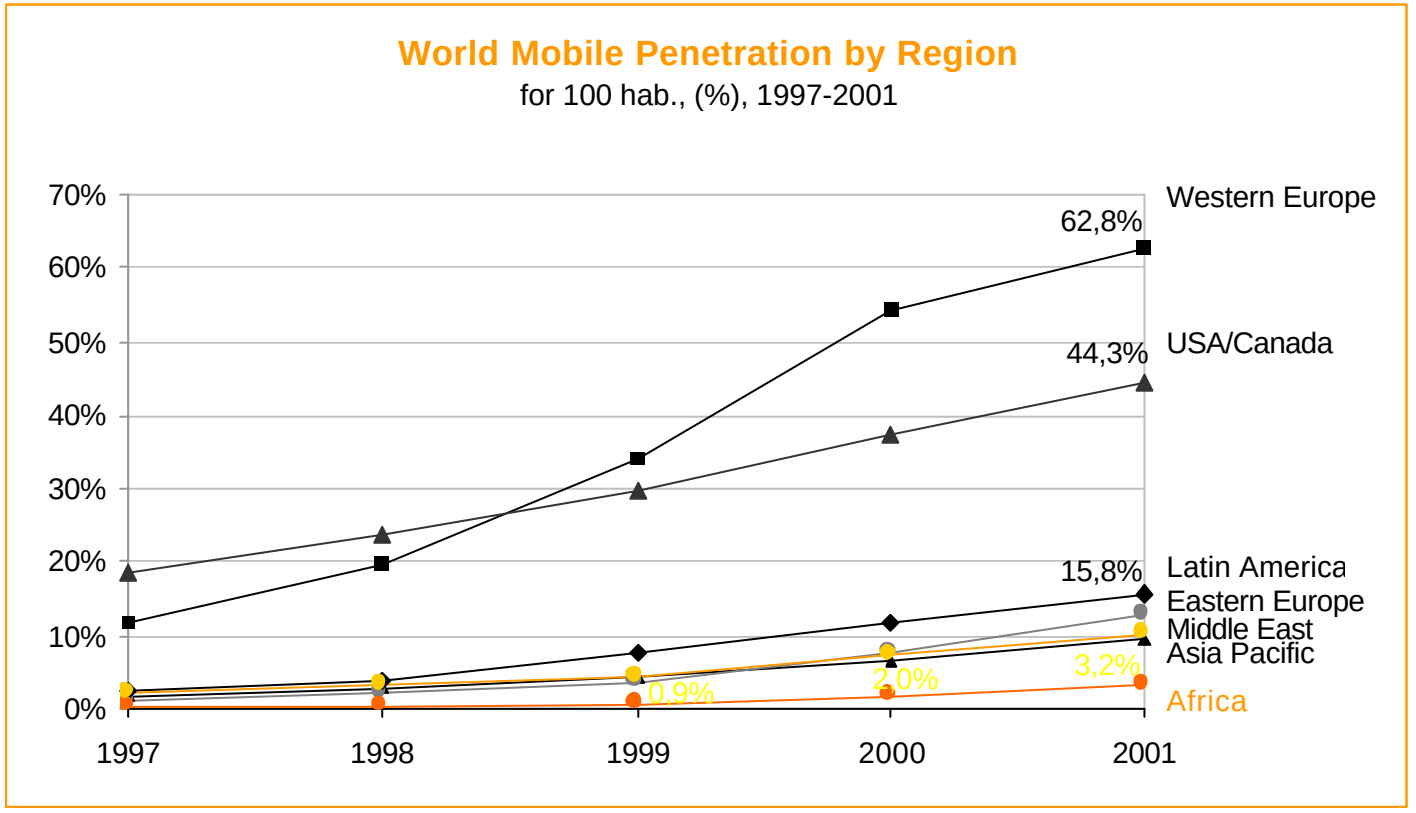
- Global mobile market and spectrum allocation process
- Spectrum for initial deployment of UMTS/IMT-2000
  - WARC-92 and WRC-2000 bands
  - Potential for global harmonisation of IMT-2000 frequency plans below 2.2 GHz
  - Possible harmonised solution for PCS countries
- Additional spectrum for further development of terrestrial UMTS/IMT-2000
  - Protection of UMTS/IMT-2000 from BSS at 2.5 GHz under WRC-03 agenda item 1.34
  - Expected harmonised usage of the 2.5 GHz band
- WRC-03 agenda item 1.22
  - Vision on Wireless World long term evolution
  - Particular requirements for low populated areas - frequency range 450-600 MHz for economic coverage
- Global harmonisation and clarification of regulations

I - Global mobile market and spectrum allocation process

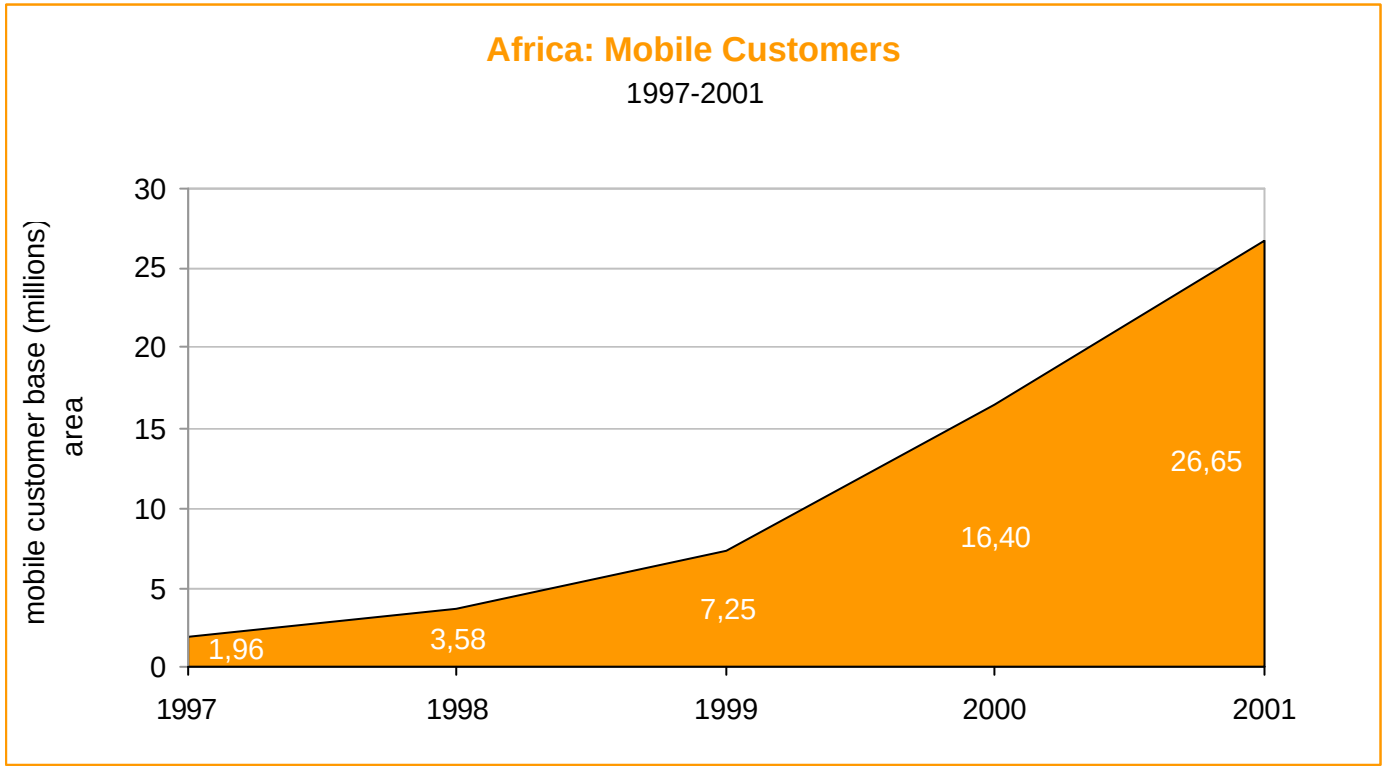
Comparison of world-wide cellular subscribers growth and previous projections



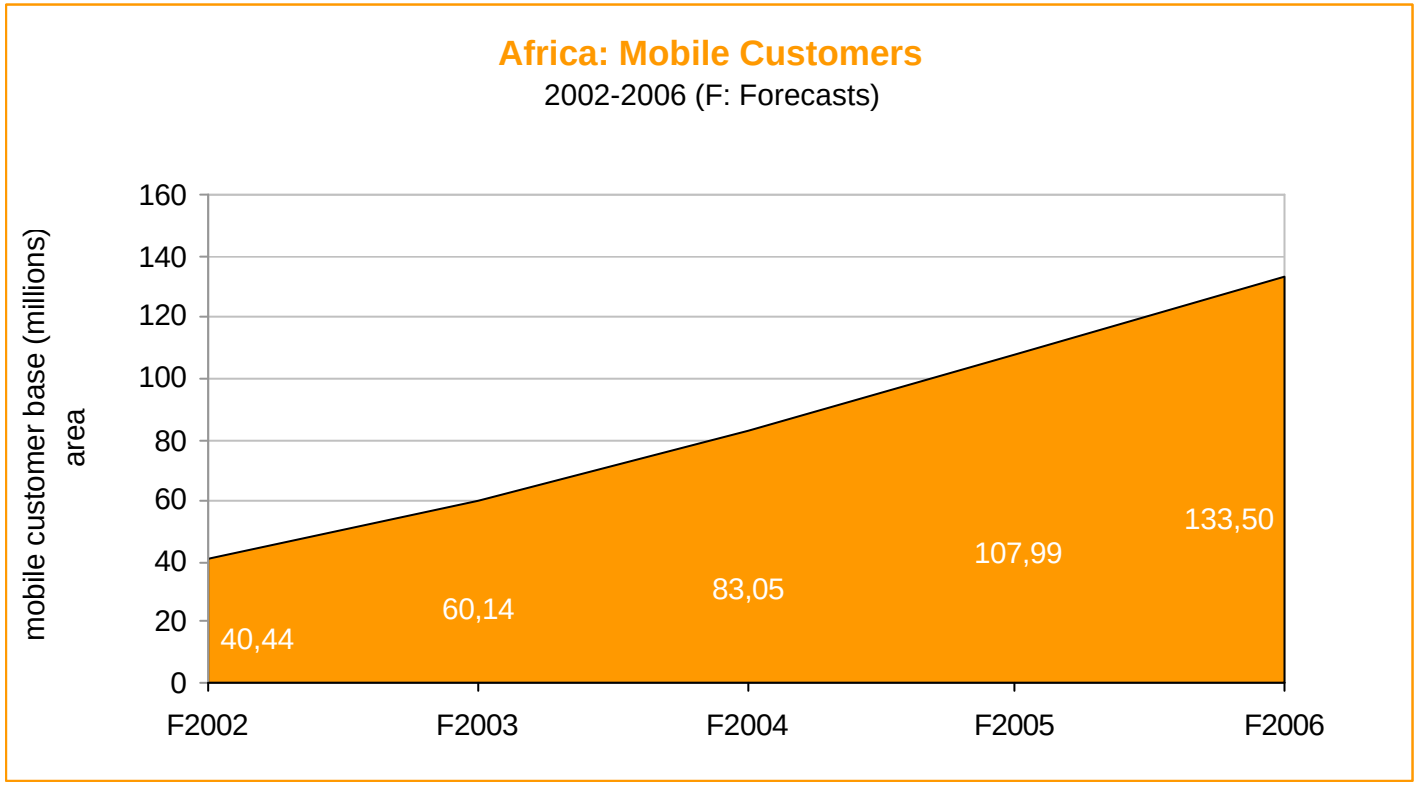
World-wide mobile market success



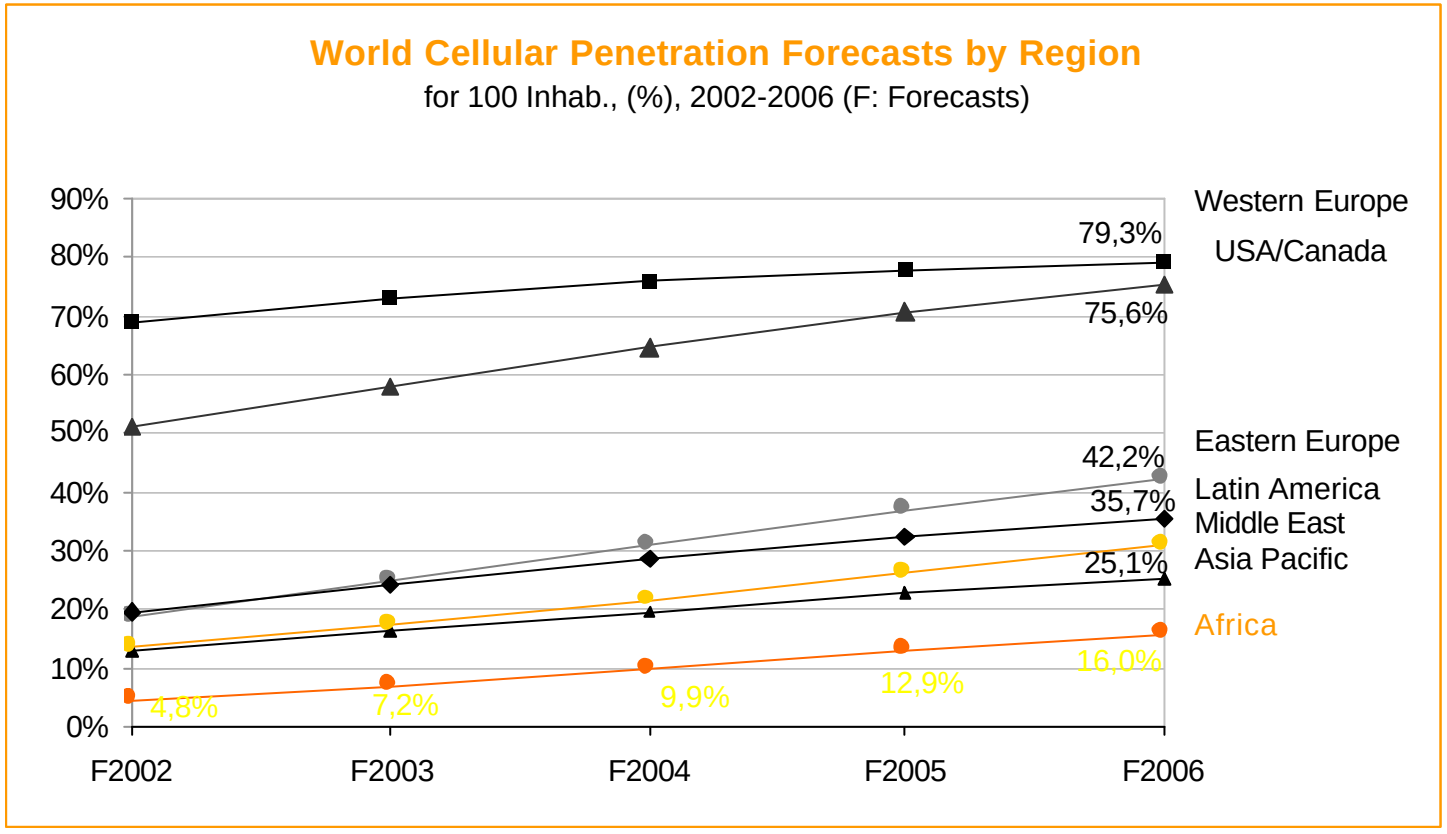
Continuous growth in Africa



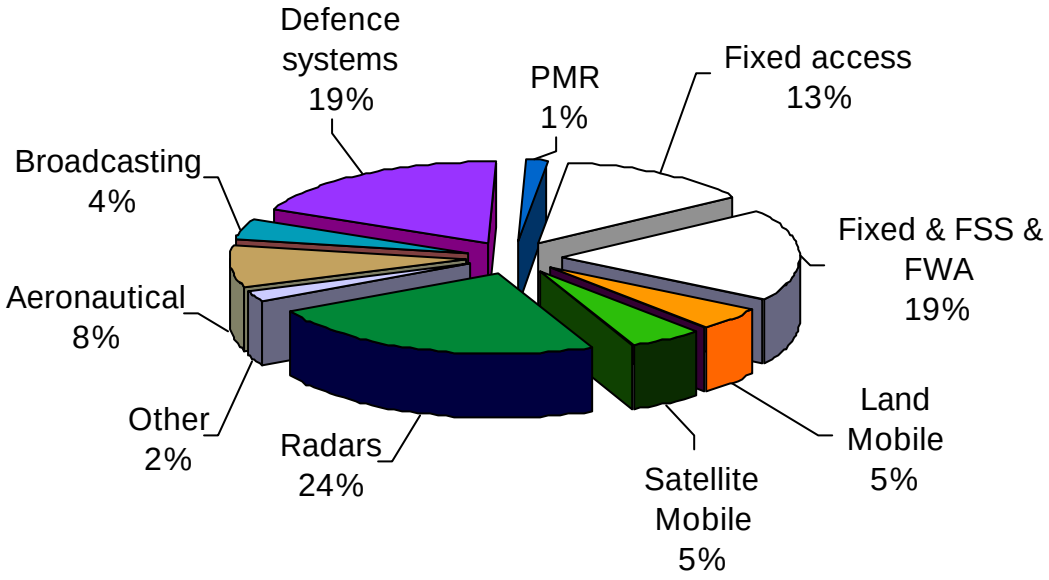
Continuous growth in Africa for coming years

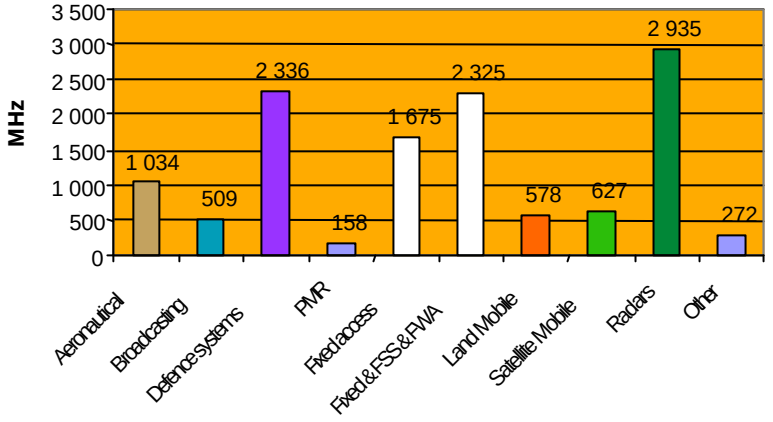


World-wide mobile penetration for next years



Spectrum segmentation in Europe from 30 MHz to 10 GHz





Spectrum allocation process

- Specific allocation is the result of a long and complex world-wide level process driven by market and technology
  - 1st step : designation by international regulatory bodies of a frequency band, with involvement of administrations, main manufacturers, main operators and other spectrum users
  - 2nd step : international agreements on harmonised frequency plans in the designated bands, technical standards and equipment production
  - 3rd step : effective freeing, country by country, of the designated bands and allocation to operators e.g. mobile operators
  - 4th step : licences granted to operators to deploy a network using part of the designated bands to offer a given service
- Spectrum for terrestrial mobile services is like oxygen for human beings

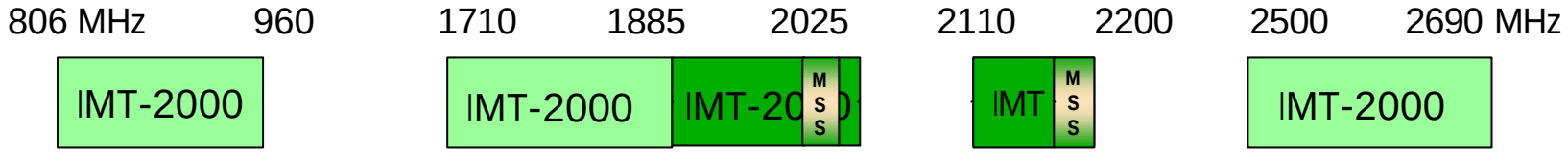
Evolution of spectrum allocations

- According to market needs spectrum allocations have to be renegotiated timely
- Main criteria
  - market needs
  - world-wide harmonisation
  - clear regulatory status
  - timely availability
  - low co-ordination constrains
  - no interference
  - spectrum fees at a level that cover spectrum management costs

II - IMT-2000 spectrum for initial deployment

IMT-2000 spectrum

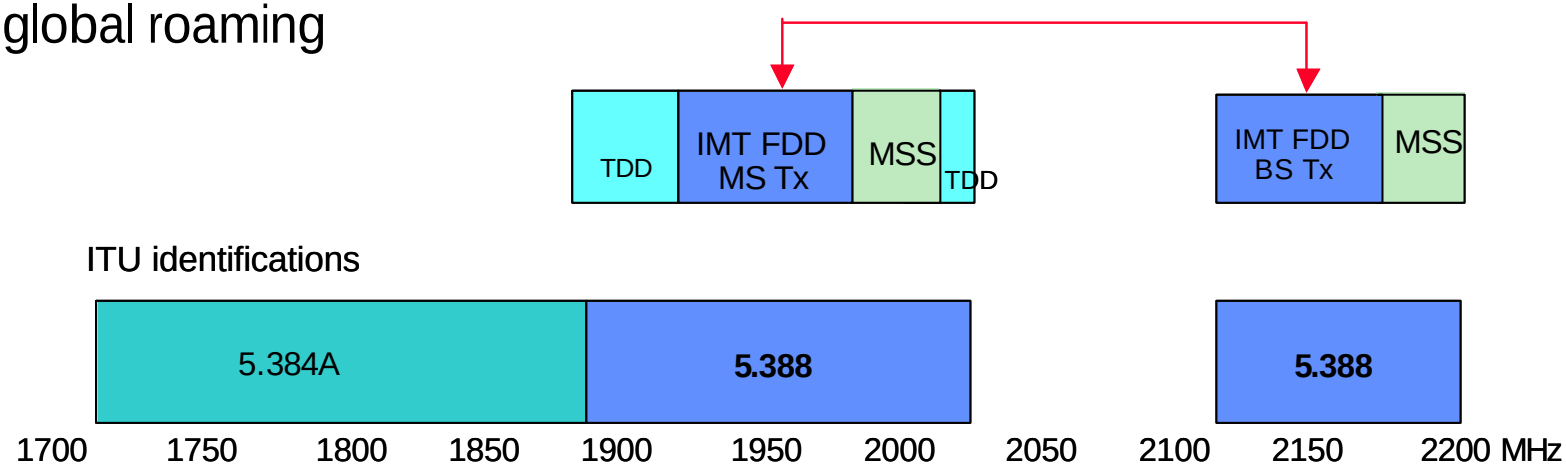
- WARC-92 identified the initial bands for IMT-2000 deployment i.e. 1885-2025 MHz and 2110-2200 MHz
- WRC-200 identified three additional bands for terrestrial IMT-2000 i.e. 2500-2690MHz, 806-960MHz and 1710-1885MHz



Spectrum for initial deployment of UMTS/IMT-2000 1/2

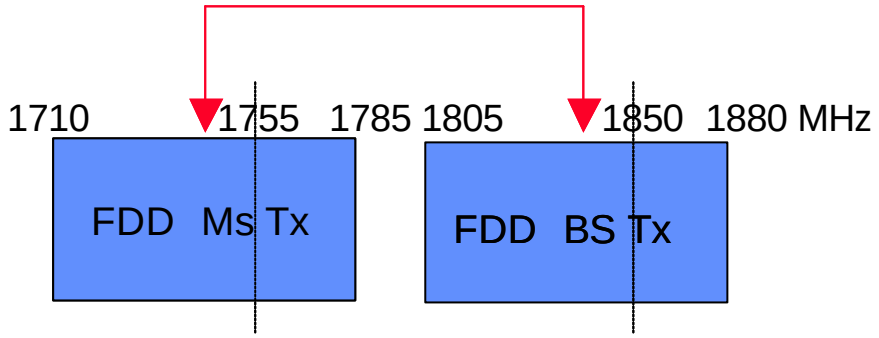
- UMTS/IMT-2000 will first be implemented in WARC-92 bands in a harmonised manner in most countries world-wide (Europe, Asia and some Region 2 countries)

  These systems will be complemented by GSM 900 and GSM 1800 allowing global roaming



Spectrum for initial deployment of UMTS/IMT-2000 2/2

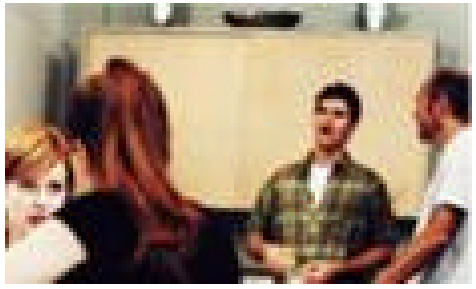
- The GSM1800 bands (or parts) could be used for implementation of UMTS/IMT-2000 in those countries where the WARC-92 bands are not available i.e. PCS countries



This solution could support global harmonisation in the longer-term and should not impose difficulties to existing and ongoing operation of 2G networks

Long term transition from 2G to 3G

- It should be noted that the 1710-1885 MHz band is intensively used by the most recent 2G networks deployed
  in 1710-1785/1805-1880 MHz
  and also partly in 1850-1910/1930-1990 MHz



- The present and ongoing investments engaged for the pre-IMT-2000 systems are necessary to continue to develop the mobile market
- The smooth transition from pre-IMT-2000 systems to IMT-2000 in this band will be possible in the longer term and will be facilitated by having frequency arrangements in line with the existing usage
  > maintaining the transmit directions and the duplex distance

III - Additional spectrum for further development of terrestrial UMTS/IMT-2000

Spectrum for further development of UMTS/IMT-2000

The band 2500-2690 MHz is the only additional spectrum identified for IMT-2000
not yet used by 2G systems in Europe

A timely refarming of this band in Europe is required since it is currently being used for a wide range of services

IMT-2000 and BSS in the 2.5 GHz band

- The band 2500-2690 MHz is identified for IMT-2000 expansion, but is also partly allocated to Broadcast Satellite Service (BSS) and to BSS sound in some countries

Non-GSO BSS (sound) allocation is limited to national systems in one Region 1 country and eight Region 3 countries

However

> There is a risk of interference to a much larger number of countries

> Adequate protection of IMT-2000 terrestrial services without constraint on their deployment and operation is required

UMTS protection at 2.5 GHz from broadcasting satellite service

- For each publication to ITU for a broadcasting satellite network, Administrations whishing to operate IMT-2000 in future in the 2,5 GHz band should :
  1- Exclude its territory from service area (article S23)
  2- Disagree on transmission frequencies of space station and reception frequencies of earth stations (article S9.21)
  3- Notify to ITU characteristics of terrestrial stations allowing IMT-2000 protection when applying procedures S9.11, S9.17 and Resolution 33

Under WRC-03 agenda item 1.34

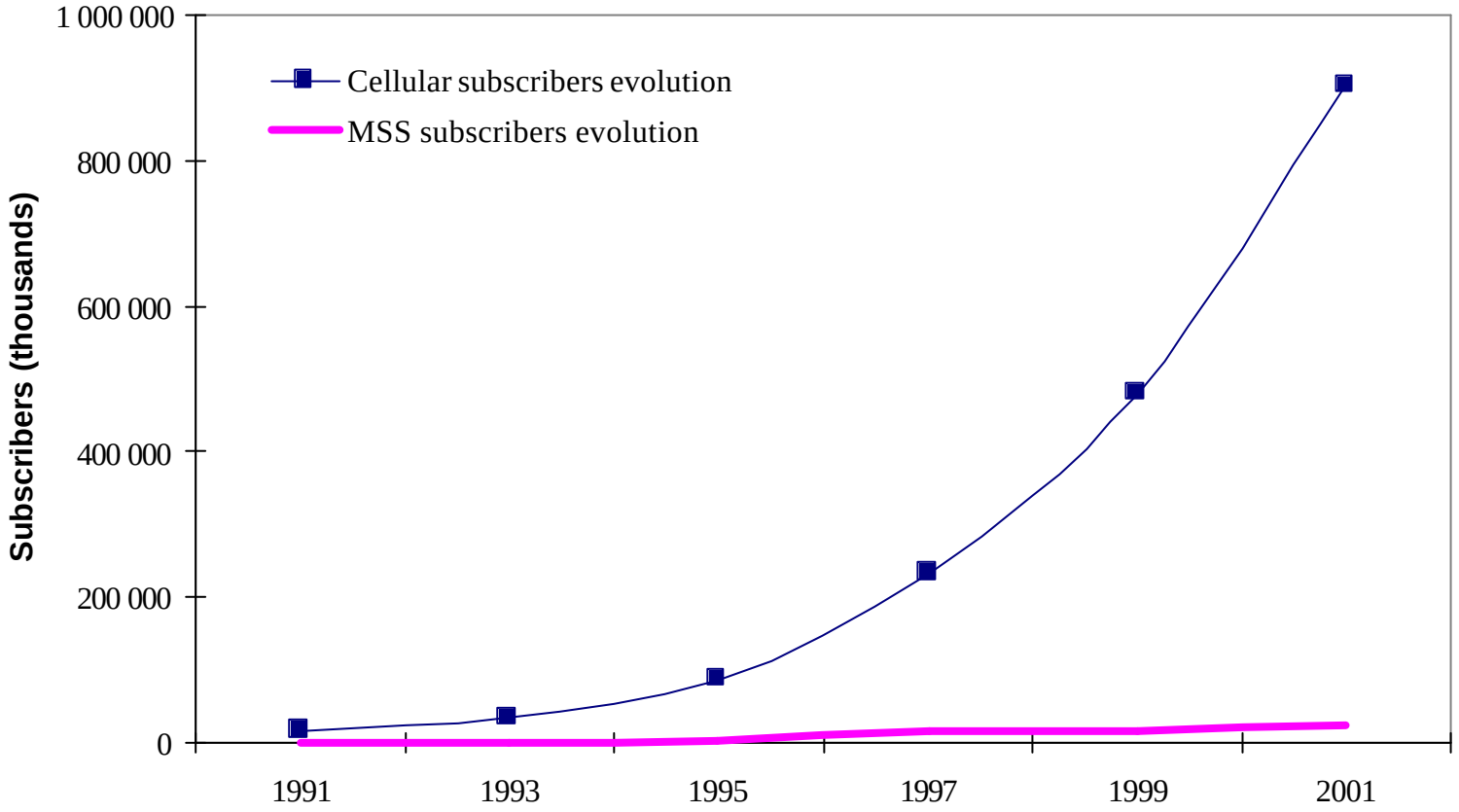
to ensure future protection of IMT-2000 terrestrial services
in the band 2500-2690 MHz

clear regulatory procedures

adequate power limits

Need to be adopted !!!

Comparison of world-wide cellular subscribers growth and world-wide MSS subscribers growth



At the end of 2001: total of 423 000 MSS subscribers and more than 1 000 000 000 mobile users

Entire 2500-2690 MHz band for **terrestrial** UMTS/IMT-2000

- 2500-2520/2670-2690 MHz are allocated to both terrestrial and satellite IMT-2000
- The important increase in number of subscribers and in traffic volumes of 2nd generation mobile services through the world today
  is expected to continue on 3rd generation with the growth of
  - > voice services by existing and new customers and with the higher usage of new non-voice services
- The entire 2500-2690 MHz band will be needed for terrestrial UMTS to cope with the expected saturation
  - > in high density populated areas
  - > in particular in Europe by 2008 for those areas

Towards efficient and harmonised usage of the 2.5 GHz band 1/2

- There is an opportunity to design common frequency arrangements with the potential to be harmonised world-wide since there are currently no mobile channelling arrangements in the band

> An early definition of
> a global frequency arrangement
> for terrestrial UMTS/IMT-2000
> in the 2500-2690 MHz band
> is required,
> at the latest in 2004

Towards efficient and harmonised usage of the 2.5 GHz band 2/2

- Satellite UMTS services could **complement the coverage of Terrestrial UMTS** in remote areas
  - offering business consumers high data rate broadband services such as handheld Internet access and videoconferencing
  - extending the coverage of Terrestrial UMTS for niche market
- **S- UMTS** will have enough spectrum in the MSS bands already identified for IMT-2000 below 2.5 GHz
- 2x20 MHz in the band 2500-2520/2670-2690 MHz should be used only for terrestrial UMTS/IMT-2000

IV - WRC-03 agenda item 1.22

WRC-03 agenda item 1.22

- "to consider progress of ITU-R studies concerning future development of IMT-2000 and systems beyond IMT-2000, in accordance with Resolution 228 (WRC-2000)"
- ITU-R WP 8F develops the recommendation "Vision" addressing the future development of IMT-2000 and systems beyond
- We believe that both, future development of IMT-2000 and its evolutions as well as systems beyond IMT-2000 should be considered together
- Inter-working and backward compatibility are essential for easy and transparent evolution for users of UMTS/IMT-2000

Wireless World long term evolution 1/2

- Expected continuous and compatible evolution of UMTS/IMT-2000 networks will progressively introduce enhancements to its technical capabilities and the range of available services
- IMT-2000 and its evolutions must be considered as a whole including
  - > future development of IMT-2000 and
  - > systems beyond IMT-2000, which could be adequately renamed "**IMT- 2000 broadband**"

  and not as separated systems

  at a standardisation, regulatory and ITU levels

Wireless World long term evolution 2/2

- Identification of new spectrum at an appropriate date (WRC-06 or WRC-09)
  - should be based on the growth of the mobile multimedia market until year 2005
- Quantity of spectrum :
  - sufficient to allow operators to extend the capacities and capabilities of their **existing networks** to continue to offer, according to market needs, the best mobile services
- Spectrum with **exclusive usage** for operators
  - best to ensure quality requirements at this stage of the technology development rather than shared spectrum

- Adequate trade-off between bit-rates, spectrum range and range of transmitters is essential for the future success of “IMT-2000 broadband” and requires studies

IMT-2000 spectrum - particular requirements for low populated areas 1/2

- IMT-2000 offering basic communication services to a majority of End-users should be made accessible
  - in most areas within national territories including sparsely populated and low traffic density areas
  - within an appropriate timeframe
  - under reasonable economic conditions
- Specificity of UMTS/IMT-2000 deployment in low populated areas
  - requires identification of spectrum in an appropriate frequency range on a world-wide basis

providing economies of scale
allowing cost-effective deployment
facilitating global roaming

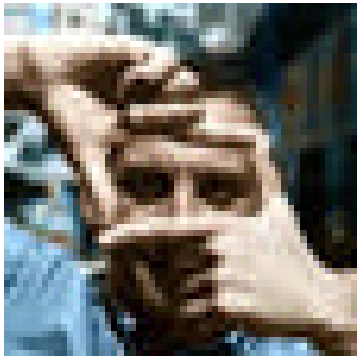
IMT-2000 spectrum - particular requirements for low populated areas 2/2

- The bands below 1 GHz identified by WRC-2000
  - are used by 2G networks recently deployed in developing countries
  - could be made available for IMT-2000 only in the longer term
- The maximum cell size in the bands above 1 GHz already identified for IMT-2000 is appropriate for high traffic density areas
  - The frequency range below 600 MHz is better suited to provide rural coverage through the use of large cells due to propagation characteristics
- Frequency range 450-600 MHz for UMTS/IMT-2000 is the most appropriate for economic coverage
  - There is also a need to allow a smooth transition from the 1st generation analogue mobile systems that operate in many countries in the bands other than those identified for 3rd generation

V - Conclusion

Global harmonisation and clarification of regulations

- Evolution of frequency allocation should take into account the evolution of the market and not only evolution of technology
- Evolution of regulations should tend towards clarification - this should be an objective for next WRCs
- Harmonisation is a key issue for roaming, interoperability and economies of scale
- Global harmonisation is still more then necessary
- ITU is the most appropriate international body to answer this need



Thank you