



Globally harmonised frequency arrangements for UMTS/IMT-2000

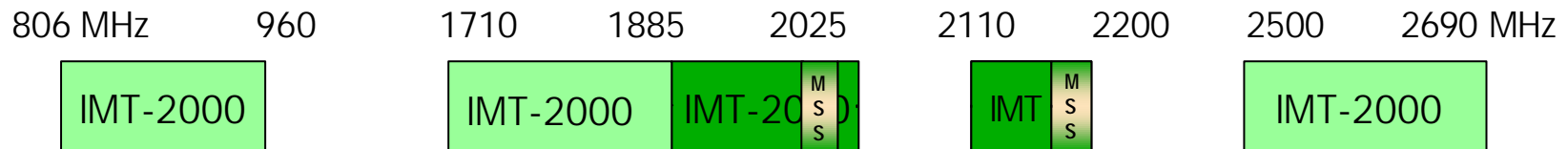


OrangeFrance - France Telecom Group, ITU Seminar on IMT-2000, Warsaw, 2-4 October 2001

Globally harmonised frequency arrangements for UMTS/IMT-2000

- IMT-2000 Spectrum
 - WARC-92 initial spectrum identification
 - WRC-2000 additional spectrum identification
- Initial deployment of IMT-2000 in a harmonised manner
 - In Core Band
 - Outside Core Band in countries where the initial IMT-2000 bands are not available
- Additional spectrum to cope with the saturation in main urban areas
 - Requirements concerning the 2500-2690 MHz band, in particular protection of IMT-2000 from BSS operating in the band
 - Early flexible definition of IMT-2000 frequency arrangements

IMT-2000 spectrum



- **WARC-92** identified the **initial bands** for IMT-2000 deployment:
1885-2025 MHz and 2110-2200 MHz
- **WRC-2000** identified three **additional bands** for terrestrial IMT-2000
2500-2690MHz
806-960MHz
1710-1885MHz

ITU-R Working Party 8F

- Following WRC-2000 a considerable amount of work on the various options and their merits for the utilisation of the 3 bands identified for IMT-2000 has been done until now within ITU-R WP8F
- Consensus on a limited number of globally harmonised frequency arrangements for IMT-2000 in these bands is expected to be reached in the forthcoming ITU-R WP 8F meetings
- Other bands
 - Some countries consider the use of the bands in the range of 470 MHz for IMT-2000 systems
 - > to evolve an existing 1st or 2nd Generation system
 - > to take advantage of coverage benefits for rural, sparsely populated or low traffic density areas
 - Some Administrations are planning to use the band 2300-2400 MHz for IMT-2000



Initial deployment of IMT-2000

- IMT-2000 systems will be deployed in the WARC-92 bands in most countries (Region 1, Region 3 and some Region 2 countries)
 - > **These** systems will be complemented by GSM 900 and GSM 1800 allowing global roaming
 - > **70** licenses are already granted in Europe
 - > **Example** of the consultation process in Venezuela
- In countries where initial WARC-92 bands are not available the 1.8 GHz band will be used to introduce IMT-2000



The 1.8 GHz band

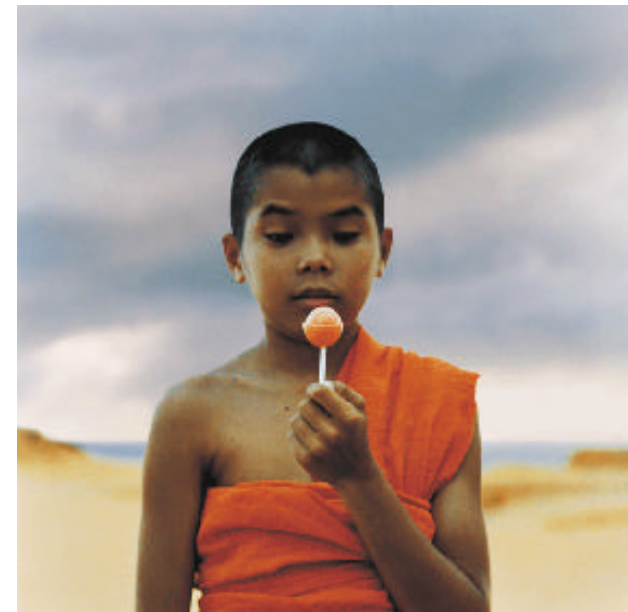
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- The 1710-1885 MHz band is intensively used by the most recent 2G networks deployed

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 in all countries are necessary to continue to develop the mobile market



The 1.8 GHz band

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- 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 separation
- It is crucial to define the frequency arrangements for IMT-2000 already now **to allow its use for IMT-2000 in countries where initial WARC-92 bands are not available** however they should not impose difficulties to existing and ongoing operation of 2G networks

Region 2 preparation

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- CITELEL **elaborated** "Draft recommendation CCP.III/REC.XX (XVIII-01) Spectrum Arrangements for 3G" (18th meeting, June 11-15, 2001, Ottawa, Canada)

Recommend 1 : That CITELEL Administrations to the extent possible should identify spectrum for 3G mobile systems based on the following three principles :

- a) Maximize harmonization of the IMT-2000 identified bands with existing 2G and 3G band plan pairings for implementation of 3G services
- b) Maximize the use of the entire 1710-1850 MHz band
- c) Maximize harmonization with the global 2110-2170 MHz Base Transmit Band

Region 2 preparation

2/3

- CITELE “Draft recommendation CCP.III/REC.XX (XVIII-01) Spectrum Arrangements for 3G”

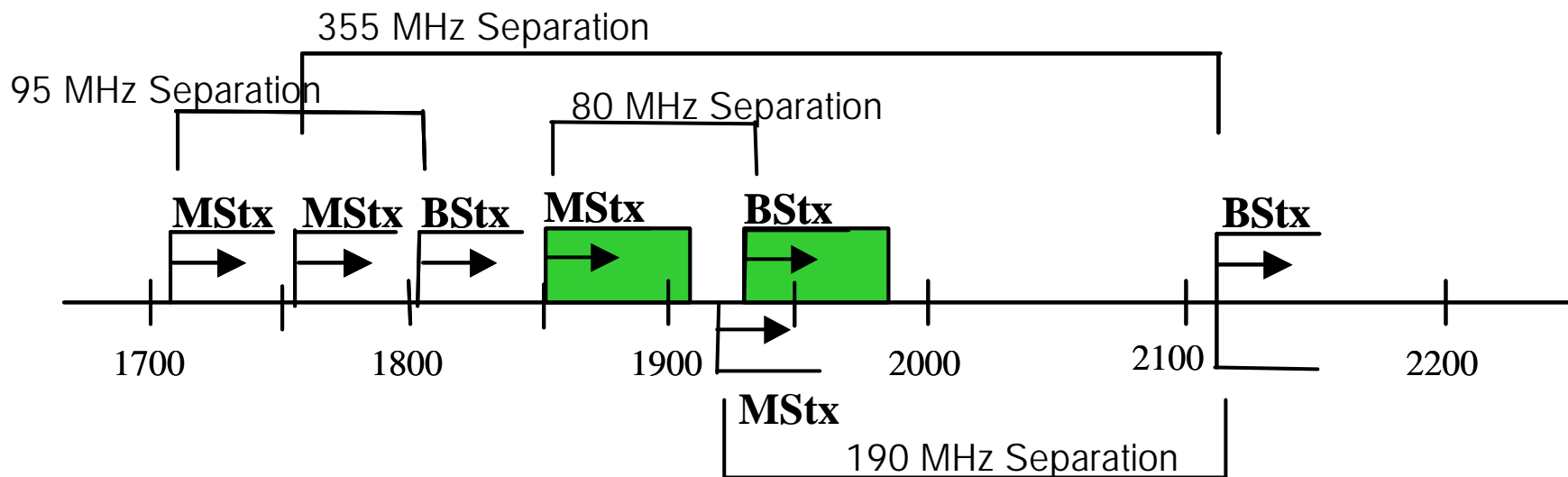
Recommend 2 : That for the purpose of economies of scale, and roaming, it is highly desirable that global bands and pairings are harmonized. For Administrations wishing to implement only part of a band, the channel pairing should be consistent with the duplex frequency separations of the full band plan.

Recommend 3 : That CITELE Administrations to the extent possible should select from the following Spectrum band pairing options (see PCC.III/doc.1992/01, Figure 1, p.4)

Region 2 preparation

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Recommended spectrum band pairing options (PCC.III/doc.1992/01, Fig.1, p.4)



MStx = Mobile station transmit band

BStx = Base station transmit band

■ = PCS band

CEPT position on the frequency arrangements for IMT-2000 in the 1710-2200 MHz band 1/4

■ European preferred options

ECC/PT1 5th meeting, September 10-11, 2001, Helsinki, Finland

- > A Mobile transmit band 1 920 – 1 980 MHz, paired with the base transmit band 2 110 – 2 170 MHz, with a 190 MHz duplex separation - some countries may wish to implement part of the band

- > B Mobile transmit band 1 710 – 1 785 MHz, paired with a base transmit band 1 805 – 1 880 MHz, consistent with a duplex separation of 95 MHz - aligned with GSM 1800 band plan. For countries having implemented scenario C, the upper edge for the mobile transmit band is 1755 MHz and for the base transmit band is 1850 MHz

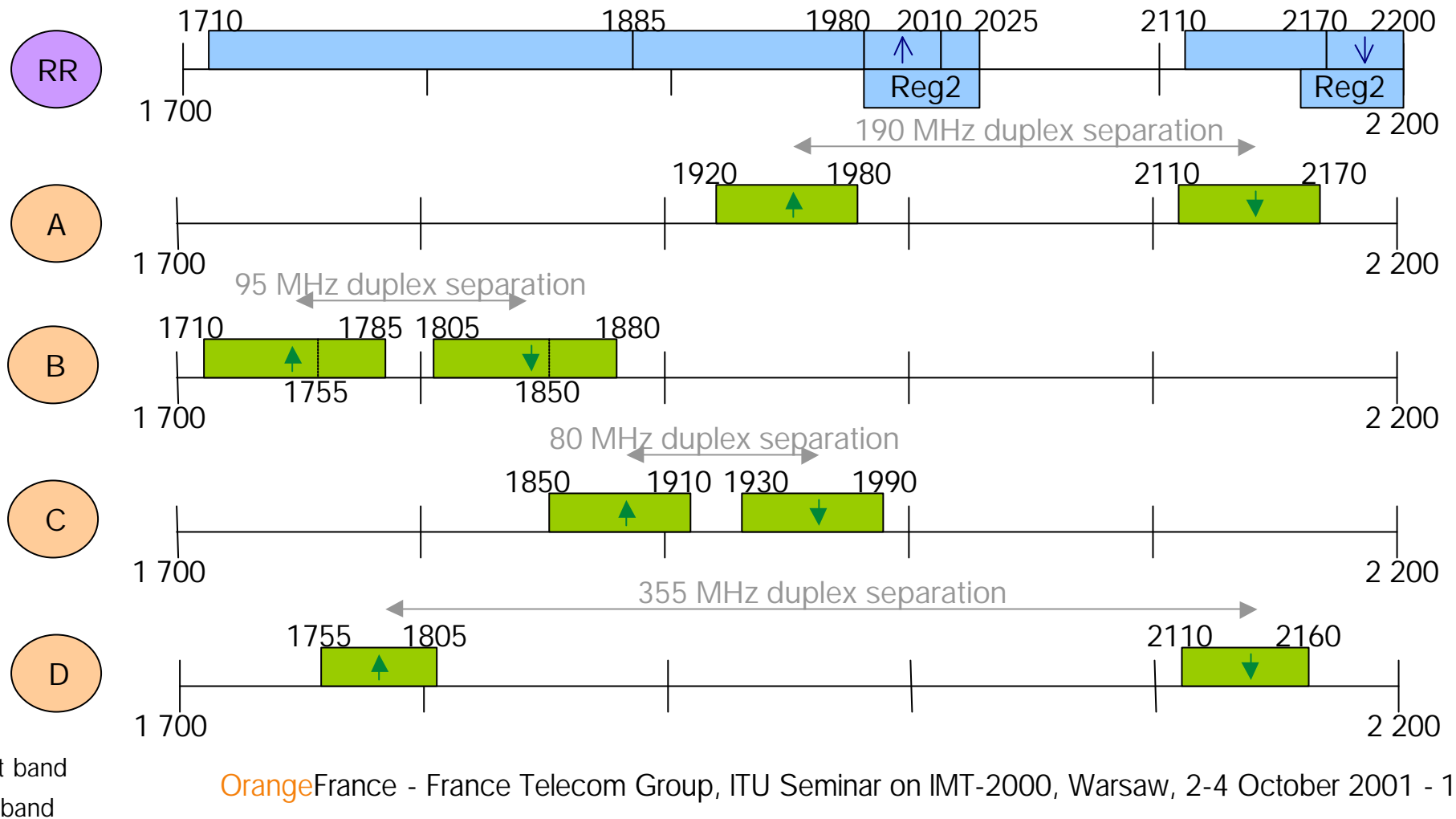
CEPT position on the frequency arrangements for IMT-2000 in the 1710-2200 MHz band 2/4

■ European preferred options

ECC/PT1 5th meeting, September 10-11, 2001, Helsinki, Finland

- > C Mobile transmit band 1 850 –1 910 MHz, paired with a base transmit band 1 930 –1 990 MHz, consistent with a duplex separation of 80 MHz - aligned with PCS1900 band plan
- > D Mobile transmit band 1 755 – [1 805] MHz, paired with the base transmit band 2 110 – [2 160] MHz, with a 355 MHz duplex separation

CEPT position on the frequency arrangements for IMT-2000 in the 1710-2200 MHz band 3/4

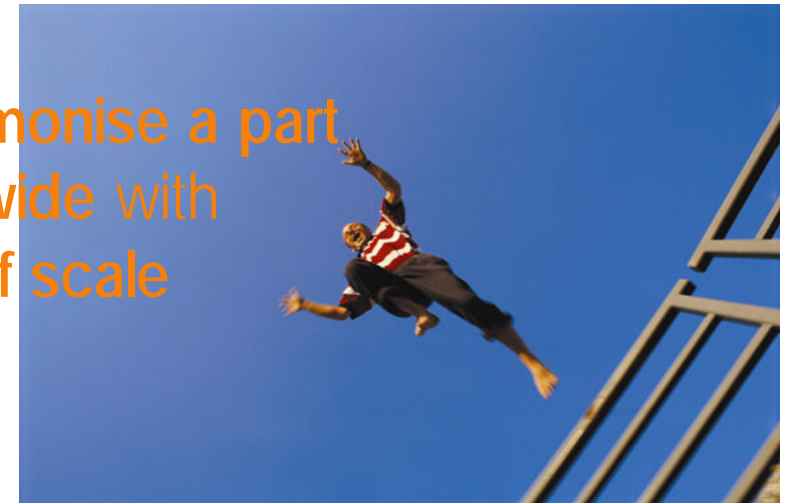


CEPT position on the frequency arrangements for IMT-2000 in the 1710-2200 MHz band 4/4

- Any of the arrangements in options "A" to "D" may be implemented in a country or a region according to availability and market demand, taking due consideration of co-existence issues
- Mobile terminals may be designed for the arrangements in each of the options
 - > in order to facilitate roaming between countries with different frequency arrangements, mobile terminals should be able to operate on the frequencies in two or more of the options, depending on market developments
 - > Selectable/Variable duplex technology could be one possible technique that can be used to combine frequency bands to achieve global and convergent solutions

Towards Global Harmonisation of spectrum arrangements in 1710-1850 MHz

- The countries where 2G systems are already in operation in the bands 1850-1910 MHz/1930-1990 MHz could use a portion of the 1.8 GHz frequency range and pair them in a manner that maintains the GSM-1800 duplex direction and duplex spacing of 95 MHz : 2 x 45 MHz at 1710 – 1755 MHz (up-link) with 1805 – 1850 MHz (down-link)
- This scenario will allow all countries to **harmonise a part** of the mobile spectrum allocations **world-wide with** benefits of global roaming and **economy of scale**
- ITU-R WP 8F is working on this issue with the aim to achieve the global solution



Additional spectrum

Spectrum
not used for the initial deployment
of **UMTS/IMT-2000**
will be needed to **cover capacity needs**
in **urban areas**



2.5 GHz band in Europe

The **2500-2690 MHz band** is the **only additional spectrum** identified for IMT-2000 **not yet used** by 2G systems in Europe and will be needed to cope with the saturation of the UMTS from around year 2005/2006 in major cities

Frequency arrangements in the 2.5 GHz band

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- There is an opportunity to design common frequency arrangements with the potential to be harmonised world-wide

- > **Currently** there are no mobile channelling arrangements in the band

- > **In Europe** this band is being used for a wide range of different services and its **timely** refarming is required from around year 2005-2006 in urban areas

Goal : to harmonise usage and achieve global roaming in the longer term



Frequency arrangements in the 2.5 GHz band

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- Early definition of the frequency arrangements for IMT-2000 in the 2500-2690 MHz band in a flexible manner is required
 - allowing further evolution depending on

- > the available technology
- > traffic characteristics
- > required level of asymmetry
- > use of the MSS bands



MSS in 2.5 GHz

Resolves 2 of Resolution 225/WRC-2000
states that
the bands 2500-2520 and 2670-2690
may be used by Administrations
wishing to implement the satellite component of IMT-2000;
however depending on market developments
these bands may be used in the longer term
by terrestrial component of IMT-2000

Other issues concerning the 2.5 GHz band

- Protection of IMT-2000 from BSS operating in the 2.5 GHz band

Non-GSO BSS (sound) allocation is limited to nine Region 3 countries and to national systems; however there is a risk of interference to a much larger number of countries

Adequate protection of terrestrial services without constraint on their deployment and operation is required and studied under WRC-03 Agenda Item 1.34

Generic principle for the use of the 2.5 GHz band

- Three basic arrangements to meet the expected demand for additional IMT-2000 traffic

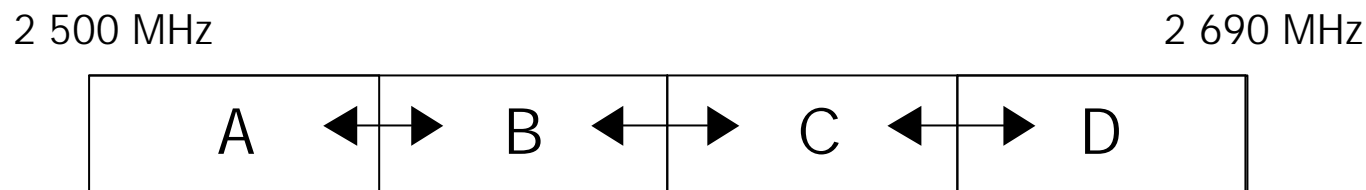
FDD up-link and down-link including a centre gap with TDD

FDD down-link only

TDD only

can be combined in the extension band 2500-2690 MHz

- Scenario derived from the generic principle with four sub-bands



A : FDD up-link paired with D

B : TDD

C : FDD down-link paired with another band

D : FDD down-link paired with A

Width of the sub-bands may be unequal (can be set to zero)

Possible flexible scenario for UMTS/IMT-2000 in 2.5 GHz band

2500 MHz

2690 MHz

SUB-BAND A	SUB-BAND B	SUB-BAND C	SUB-BAND D
FDD Up-Link paired with D	TDD	FDD DL paired with another band	FDD Down-Link paired with A
Scenario 1 : Internal pairing			
$60 \leq A \leq 80$ MHz	$30 \leq B \leq 70$ MHz	$C = 0$	$D = 190 - A - B$ et $D \geq A$
Scenario 2 : Internal and external pairings			
$A = 60$	$B = 0$	$C = 60 + 10$ MHz guard bands	$D = 60$
Scenario 3 : External pairing			
$A = 0$	$60 \leq B \leq 130$ MHz	$C = 190 - B$	$D = 0$
Scenario 4 : No pairing			
$A = 0$	$B = 190$ MHz	$C = 0$	$D = 0$
Scenario 5 : External pairing Only			
$A = 0$	$B = 0$	$C = 190$ MHz	$D = 0$

Conclusion on the 2.5 GHz band

- Each of these potential frequency arrangements will require an analysis to determine the nature and extent of any technical issues that may arise
- Information from deployed UMTS/IMT-2000 systems will help final decision on frequency arrangements in the 2.5 GHz band
- a quick start of technical evaluation by standardisation bodies of possible implementation of frequency arrangements proposed by ITU WP8F would allow timely design and manufacturing of equipment

Globally harmonised spectrum use for everyone's mobile future





Thank you



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OrangeFrance - France Telecom Group, ITU Seminar on IMT-2000, Warsaw, 2-4 October 2001