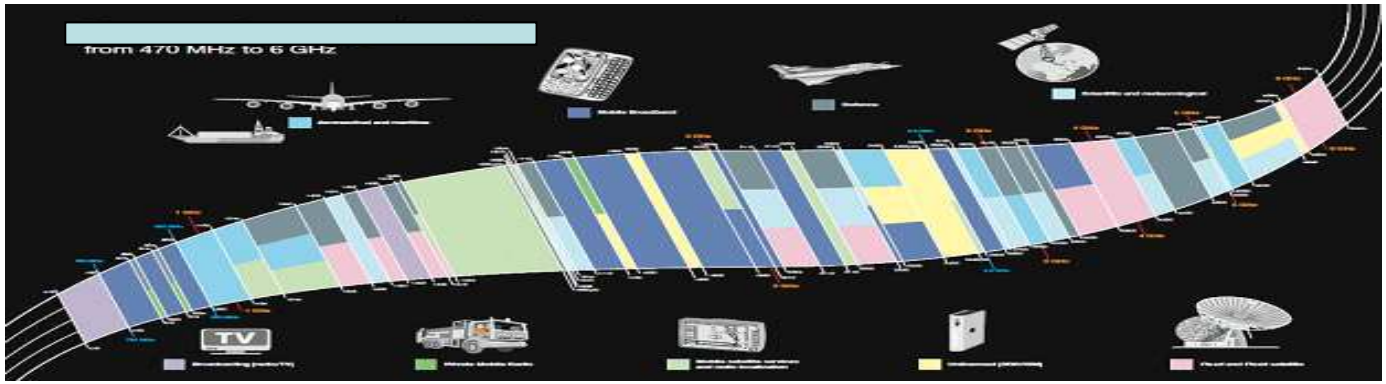
IMT spectrum for mobile broadband and way forward



Erwan Le Fur

Orange

welcome to a leader

mobile

- operating in 35 countries
- 27 million customers in France
- 59 million customers in Africa and the Middle East (up 23%)

business services

- available in 220 countries and territories
- 3,750 multinational customers
- 28 service centres for business customers

170,000

employees worldwide

internet and fixed line

- 9.2 million Liveboxes installed
- 8.5 million VoIP customers
- 4.5 million IP TV customers

networks and R&D

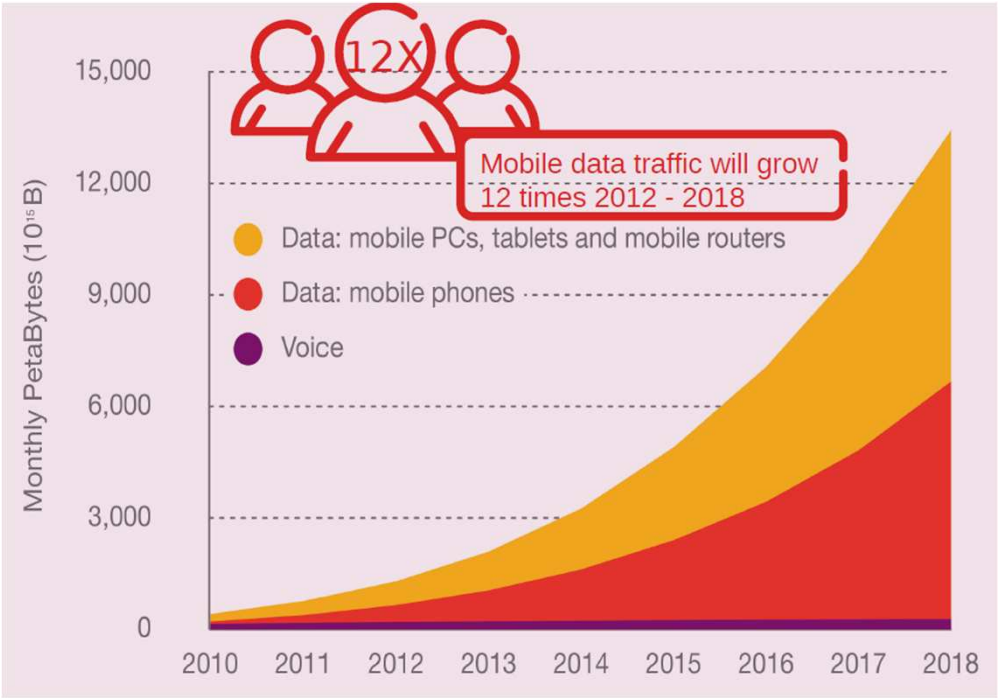
- 150,000 km of submarine cables
- 3G rolled out in 23 countries
- 7,800 patents

Agenda

- IMT spectrum for mobile broadband
- 800 MHz spectrum
- 700 MHz spectrum
- L band (1.5 GHz)
- Conclusion

IMT spectrum for mobile broadband

- Very high IMT data rates (expected around 1 Gbits/s)
- Implies very high increase of mobile data traffic
- The best solution to overcome the spectrum shortage is to identify additional spectrum for IMT at WRC-15 to ensure future deployments of mobile broadband
- First estimation from Orange indicates the need to release about 500 MHz of additional spectrum



Source : Ericsson

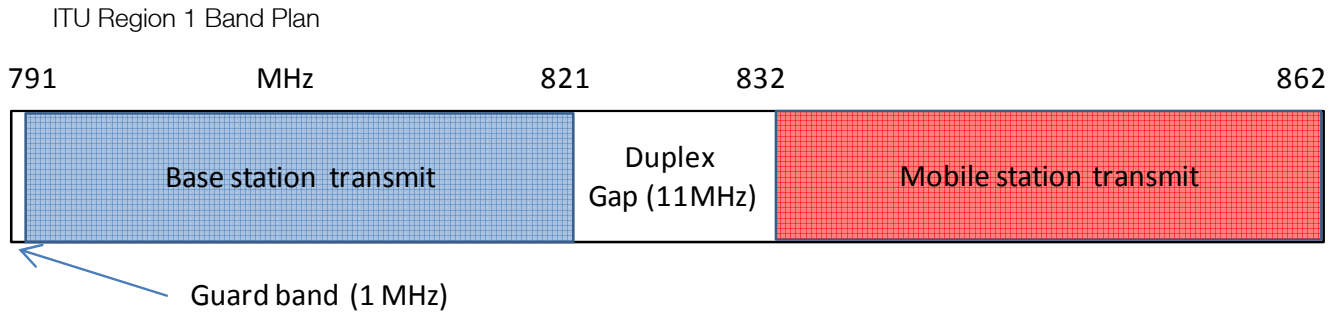
IMT spectrum for mobile broadband

- Bands already identified for IMT in the Radio Regulations
  - Current mobile bands from 450 to 2690 MHz
  - 800 MHz band (first digital dividend)
  - 2300-2400 MHz
- 700 MHz band
  - Extension of digital dividend
  - Will be identified for IMT for mobile broadband at next WRC15
- Bands that could be identified for IMT in the Radio Regulations at the next WRC15
  - L band (AI 1.1) : 1.5 GHz range
  - C band : 3400-3600 MHz / 3600-3800 MHz
  - 2700-2900 MHz

Bands already identified for IMT in the Radio Regulations

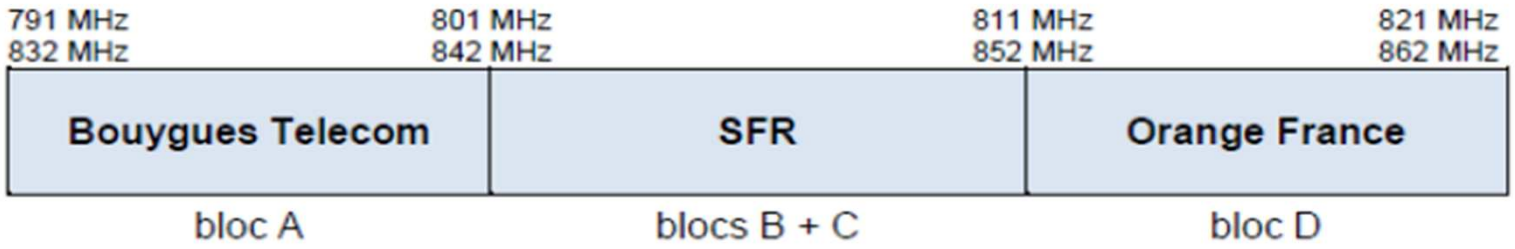
- 800 MHz, 1.8 GHz, 2.6 GHz bands :
  - Currently being deployed in Europe for LTE (e.g. UK, France, Germany, Switzerland, Belgium, Italy, Portugal, Sweden, Norway, Denmark, Moldova, Romania, Poland)
- 2300-2400 MHz :
  - Band already used in some Asian countries
  - CEPT is studying appropriate conditions to allow usage of this band

800 MHz band : First digital dividend



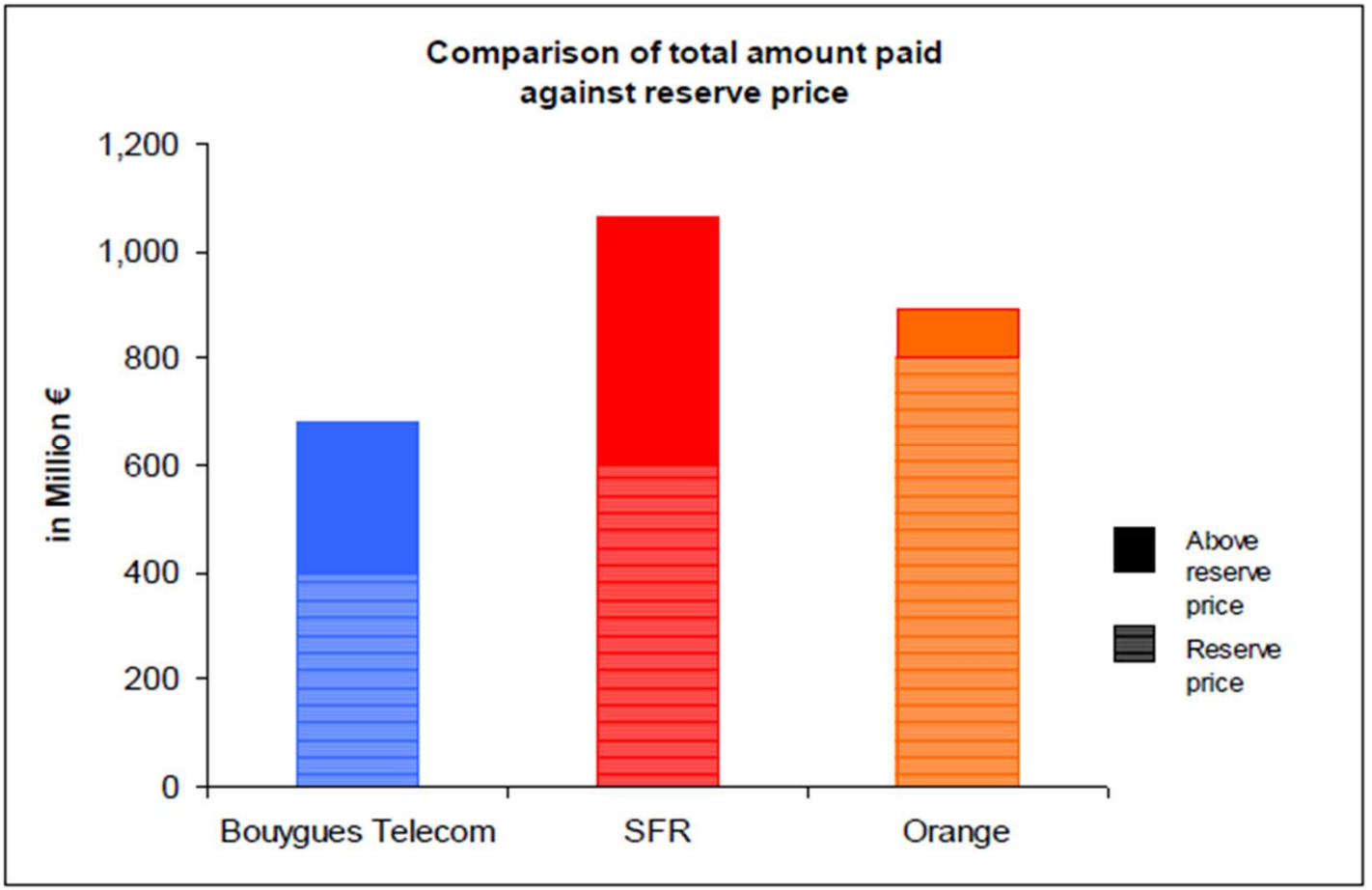
- Excellent frequency band with valuable propagation characteristics
- Success of allocations all over Europe : LTE currently deployed in this band
- Frequencies allocated in a number of European countries including :
  - Germany
  - UK
  - France
  - Spain
  - Romania

800 MHz band : example of allocation results in France



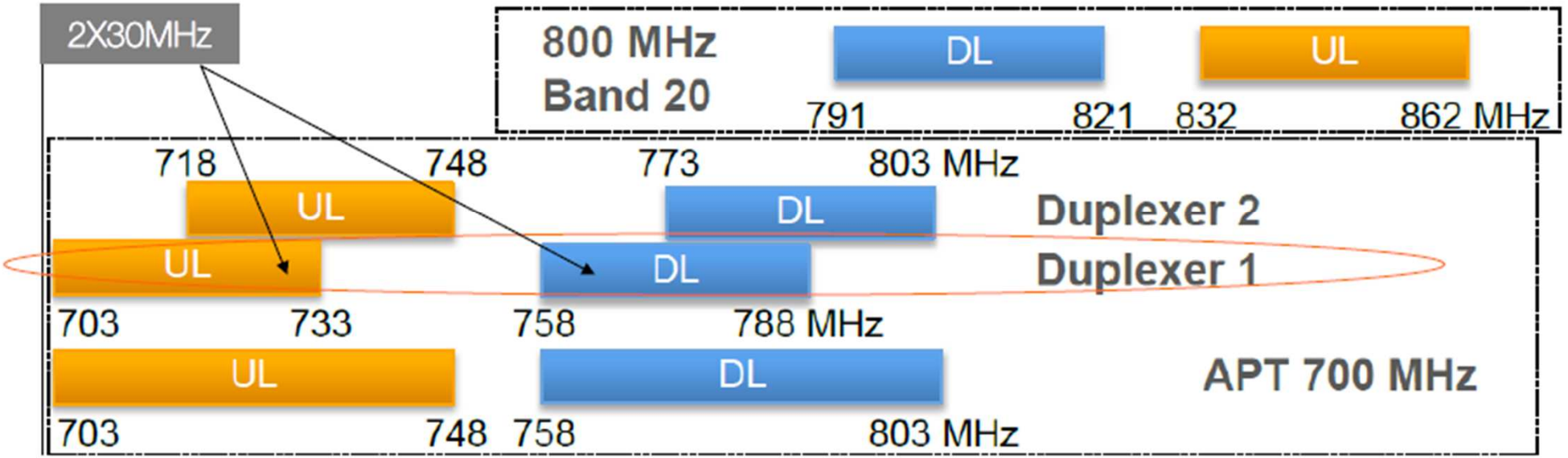
Winner	Block	Total bandwidth (MHz)	Price (€)	€cents/ MHz/ Pop
Bouygues Telecom	A	2x10 MHz	683 Million	54.9
SFR	B	2x10 MHz	1065 Million	85.6
	C			
Orange	D	2x10 MHz	891 Million	71.6
Total		2x30 MHz	2639 Million	70.7

800 MHz band : example of allocation results in France



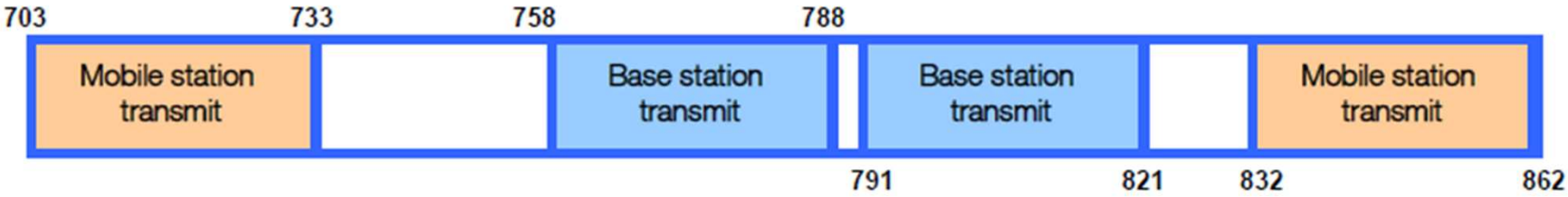
700 MHz band : extension of Digital Dividend

- Not feasible to deploy the entire 700MHz band in Europe alongside the APT band plan, due the overlap in the range 790 – 806 MHz (first Digital Dividend)
- Commonalities with the APT channelling arrangement
- Harmonised 2x30MHz (lower duplexer)



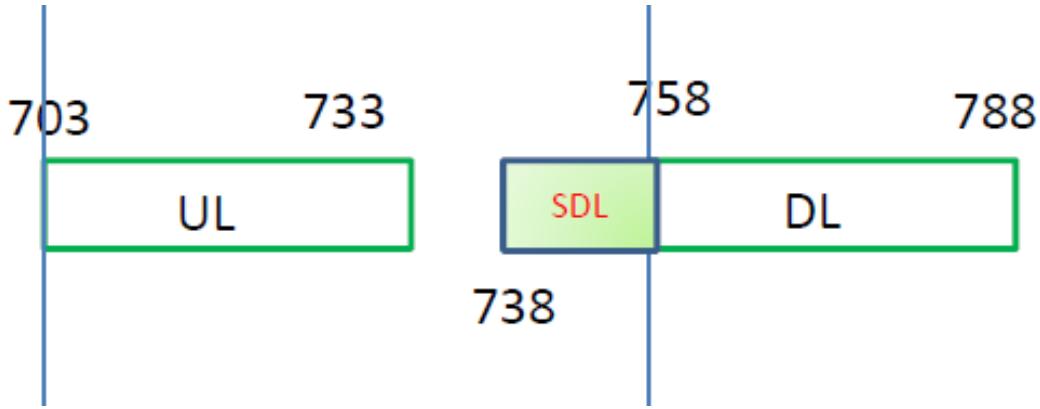
700 MHz : extension of Digital Dividend

- Need to harmonise the band plan on a global basis
  - Increase economies of scale (leverage on existing ecosystem)
  - Facilitate roaming
  - Allow the simplest design of mobile equipment
  - Reduce deployment costs and users cost



700 MHz : Orange view to optimise use of spectrum

- Technical conditions to support possible SDL of 20MHz between 738-758 MHz
  - 5 MHz guard band between LTE700 UL and SDL
  - Aggregation of 700 MHz SDL with LTE800 DL



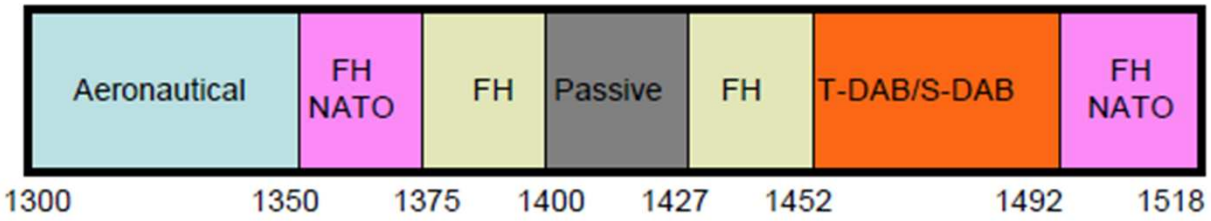
- 2x30 MHz + 20MHz (SDL) availability to optimise use of spectrum for Mobile Broadband in extension of DD
  - 80 MHz out of 96 MHz would be used (83%)

700 MHz : current status and way forward

- ITU-R WP 5D is studying the harmonised channelling arrangements for IMT “adapted to the frequency band below 790 MHz down to around 694 MHz for Region 1”
- Various FDD channelling arrangements are currently under consideration within WP 5D with the IMT uplink transmissions starting at:
  - 694 MHz, 696 MHz, 701 MHz, 703 MHz and 718 MHz
  - conventional FDD duplex arrangement (uplink below downlink)
- ITU-R WP 5D provided in the Liaison Statements to ITU-R JTG 4-5-6-7, some general elements for sharing studies, related to the proposed arrangements on the basis of the received contributions
- Next step for 700 MHz band : confirmation of IMT identification at WRC15 under AI 1.2

Bands that could be identified in the Radio Regulations : L band

- Current work at CEPT level on following bands :
  - 1452-1492 MHz
  - 1375-1400 MHz / 1427-1492 MHz
- Current work at ITU level on following band :
  - 1.5 GHz frequency range (WRC15 AI 1.1)



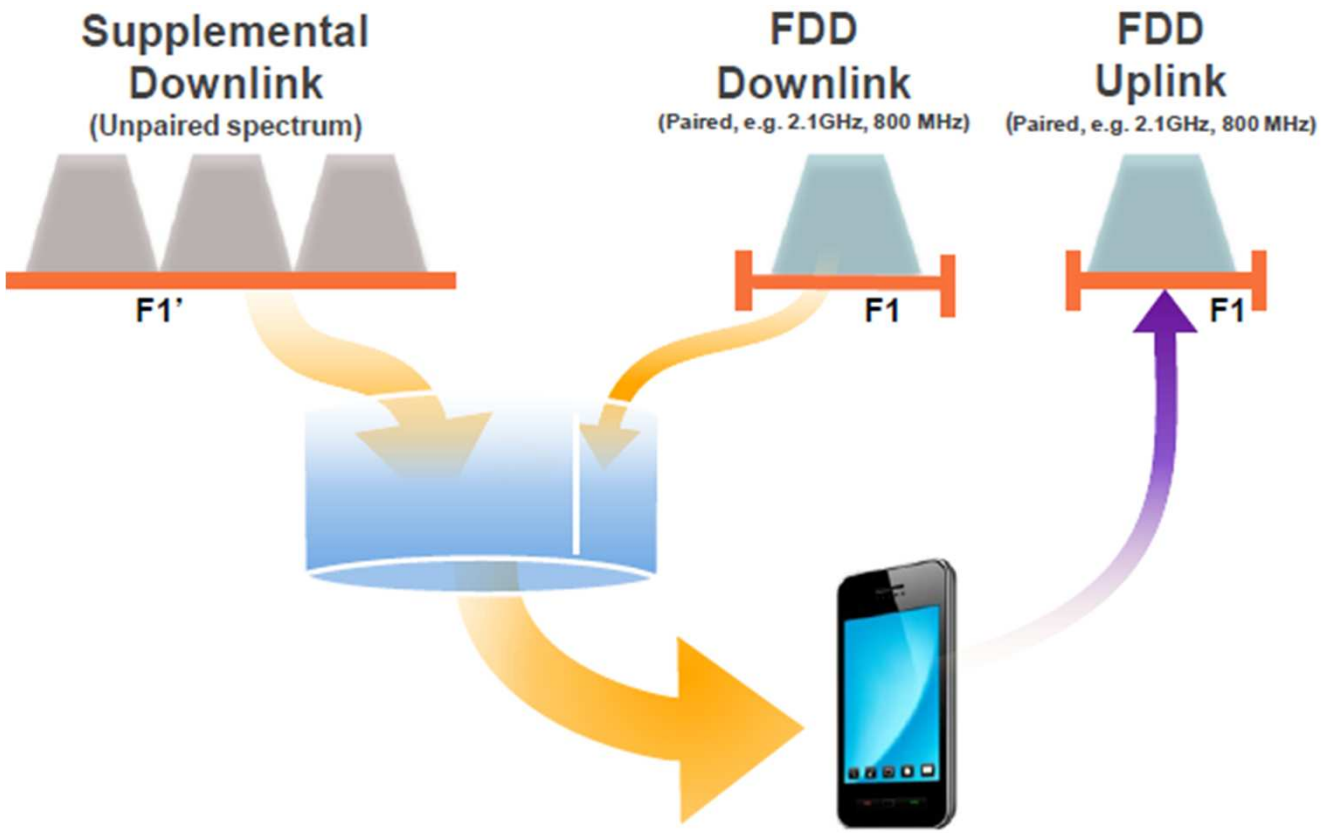
L band : focus on 1452-1492 MHz band (ECC report 188)

- 1452-1479.5 MHz harmonised for Terrestrial Digital Audio Broadcasting systems (T-DAB) since 2002
- 1479.5-1492 MHz harmonised for Satellite Digital Audio Broadcasting (S-DAB) since 2003
- 1452-1492 MHz band has remained unused in most European countries for the past decade
- Therefore CEPT decided to study the use of the band for other applications => ECC report 188

Focus on 1452-1492 MHz : conclusions of report 188

- The chosen application was finally Mobile Fixed Communication Networks (MFCN) Supplemental Downlink
- An ECC decision on 1452-1492 MHz band is being finalised
- The ECC/DEC/(03)02 Decision « *which currently harmonises the sub-band 1479.5-1492 MHz for Satellite Digital Audio Broadcasting within CEPT*" will be suppressed

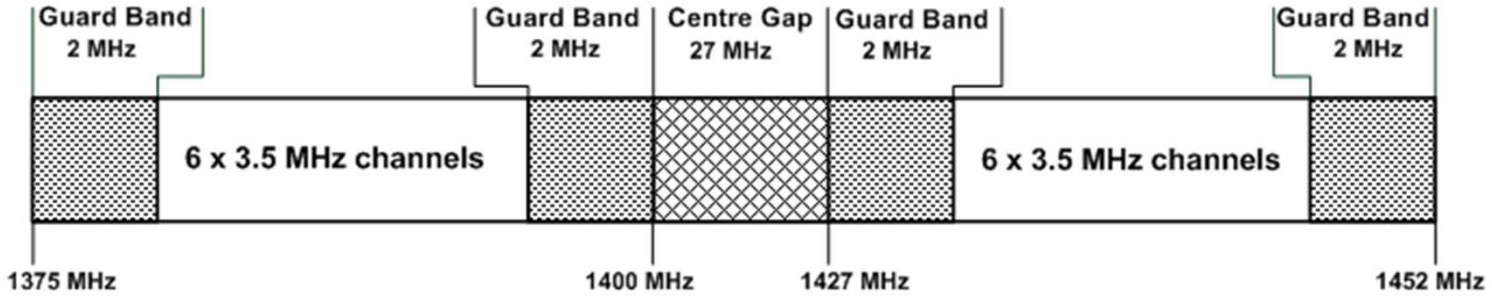
Focus on 1452-1492 MHz : Supplemental Down Link principle



Focus on 1452-1492 MHz : Orange SDL trial

- Trial in Toulouse (France) using the Orange network (2.1 GHz band) with Qualcomm and Ericsson (1484-1492 MHz)
- The trial is a way for Qualcomm, Ericsson and Orange to show to observators that SDL technology is rapidly usable in the L band
- Great success of this event with the presence of some regulators :
  - ECC chairman Eric Fournier
  - French regulators (ANFR and ARCEP)

Focus on 1375-1400 / 1427-1452



- Fixed links within 1375-1400 / 1427-1452 MHz band
- Passive within 1400-1427 MHz :
  - Earth exploration-satellite
  - Radioastronomy
  - Space research
- The passive systems within 1400-1427 MHz need to be protected from IMT emissions

Conclusion

- The 800 MHz allocations are the final outcomes of a successful harmonisation process at ITU level
  - The 800 MHz first digital dividend is a good example of what should be done for the 700 MHz band harmonisation
- 700 MHz band is a very important frequency band with very highly valuable propagation characteristics
- L band, C band : CEPT decisions are expected to help the worldwide ITU process of harmonisation of these bands for IMT
- The harmonisation processes at ITU level are of first importance for mobile industry : by giving access to new frequency spectrum, it will help to face the foreseen tremendous increase of mobile data traffic and will bring to the final consumer the best services at the lower price