

5G Huddles 13<sup>th</sup> October 2015

**Spectrum Challenges for 5G** 

**Eric Fournier** 

**Chairman, Electronic Communications Committee** 



## 5G might be introduced in existing mobile bands

- Regulation is technology neutral :
  - ✓ bands already harmonised in Europe might be used in Europe for 5G
  - Some adaptations for accommodating 5G characteristics, if needed (small cell ? BEM ?)
- Two bands have limited use so far and interesting bandwidth
  - 3400-3800 MHz
    - technical conditions reviewed in 2014
    - ✓ TDD arrangement for 3.6-3.8 GHz, preferred for 3.4-3.6 GHz
  - 2300-2400 MHz
    - Technical conditions agreed in 2014
    - Licensed shared access (LSA)

... could be envisaged for early introduction of 5G in lower bands



# Frequency bands already harmonised by ECC for broadband

Band	Size (MHz)	Ref
800 MHz	2x30	ECC DEC(09)03
900 MHz	2x35	ERC DEC(94)01 & ERC DEC(97)02 & ECC DEC(06)13
1452-1492 MHz	40	ECC DEC(13)03
1.8 GHz	2x75	ERC DEC(95)03 & ECC DEC(06)13
2 GHz	2x60	ECC DEC(06)01
2.6 GHz	2x70+50	ECC DEC(05)05
3.4-3.8 GHz	400	ECC DEC(11)06
	Sub-Total : 1030 MHz	
700 MHz	2x30 + 20	ECC DEC(15)01
2.3-2.4 GHz	100	ECC DEC(14)02
	Total : 1210 MHz	



#### WRC-19 Agenda Item on 5G spectrum

- Request from Research and Industry for 5G spectrum in higher bands
- Worldwide consensus : WRC-15 should launch studies for identification of 5G spectrum in higher bands at WRC19
- ... preferable to focus studies on certain frequency bands

But which one ?





#### ECP for WRC15 on 5G bands to be studied

	Bandwidth	Remarks – compatibility challenges	
24.5-27.5 GHz	3 GHz	Existing and future earth stations for EESS	
		and SRS (凶) and for FSS (기), P-P and P-MP	
		fixed service	
31.8-33.4 GHz	1.6 GHz	"HDFS" band in RR 5.547 - Radionavigation	
40.5-43.5 GHz	3 GHz	ECC DEC(02)04 for MWS - FSS, BSS,	
		Radioastronomy	
45.5-48.9 GHz	3.4 GHz	MSS/RNSS/FSS	
66-71 GHz	5 GHz	ISS/MSS/RNSS	
71-76 GHz	5 GHz	Fixed service, FSS/MSS/BSS	
81-86 GHz	5 GHz	Fixed service, FSS/MSS, radioastronomy	

101100101011

... and oppose studies in 27.5-29.5 GHz because of satellite broadband communications



#### Does it respond to the need ?

- How to address spectrum requirements ? Not only amount of spectrum : access/backhaul in the same spectrum, sharing opportunities ...
- Proposed band for studies respond to the requirement for wider bandwidth and higher spectrum
- Some of these bands are currently lightly used (eg, 40.5-43.5 GHz) : this might enable easier introduction of 5G
- Although, some industry have claimed for bands <20 GHz, no opportunities for bands with sufficient bandwidth

Fr	om	То		Bandwidt		
(G	iHz)	(GHz)		h (	GHz)	A
25	5.25	25.5		0.25		
3	1.8	33.4		1.6		
	39	47		8		
4	7.2	50.2		<b>P</b> <sup>G</sup> 3		
5	0.4	52.6		2.2		
	66	76		10		
	81	86		5		
	Fro	m	Т	0	Bandw	vid
	Fro (GH	m z)	T (Gl	o Hz)	Bandv h (GF	vid Iz)
	Fro (GH 25.	m z) 5	T (Gł 27	o Hz) .5	Bandv h (GF 2	vid Iz)
	Fro (GH 25. 31.	m z) 5 8	T (GI 27 33	o Hz) (.5 .4	Bandy h (GF 2 1.6	vid 1z)
	Fro (GH 25. 31. 39.	m z) 5 8 5	To (GP 27 33 41	o 1z) .5 .4 .5	Bandy h (GH 2 1.6	vid 1z)
	Fro (GH 25. 31. 39. 45.	m z) 5 8 5 5	To (GP 27 33 41 47	o 1z) 7.5 7.4 7.5 7.5	Bandy h (GF 2 1.6 2 2 2	vid 1z)
	Fro (GH 25. 31. 39. 45. 48.	m z) 5 8 5 5 5 5	To (GP 27 33 41 47 50	o 1z) 7.5 7.5 7.5 7.5 7.2	Bandy h (GF 2 1.6 2 2 2 2 1.7	vid 1z)
	Fro (GH 25. 31. 39. 45. 48. 50.	m z) 5 8 5 5 5 5 4	To (GP 27 33 41 47 50 52	o 1z) 2.5 2.4 2.5 2.5 2.2	Bandy h (GF 2 1.6 2 2 2 1.7 2.2	vid 1z)

# **SMG : > 31 GHz**

## Views of other regional groups ?

From (GHz)	To (GHz)	Bandwidth (GHz)
10	10.45	0.45
23.15	23.6	0.45
24.25	27.5	3.25
27.5	29.5	2
31.8	33	1.2
37	40.5	3.5
45.5	47	1.5
47.2	50.2	3
50.4	52.6	2.2
59.3	76	16.7

CC



#### Other spectrum challenges ?

#### • Convergence between access and backhauling

- Convergence with which kind of backhauling ? Small cells ?
- Existing backhauling may not be "convergent"

#### Sharing capabilities

- Improvement of adjacent channel/band performance. To which point ?
- New (cognitive) features for easing sharing with other applications. But which one ?

# ... but sharing conditions will be necessary in some of the WRC-19 bands



#### Timeline

- WRC-15 decision on **WRC-19 agenda item** bands to be studies
- Sharing studies in CEPT and ITU-R : 2016-2018
- Any evolution of harmonised technical regulation in existing bands
  : 2016-2018
- WRC-19
- Post 2019 : ECC activity to harmonise bands identified at WRC-19

01100101011





# Thanks ...