



Looking into the Crystal Ball

ITU & APT Spectrum Activities for current and future systems

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ARFM Workshop on Spectrum Management for Mobile Systems Today and in the Future



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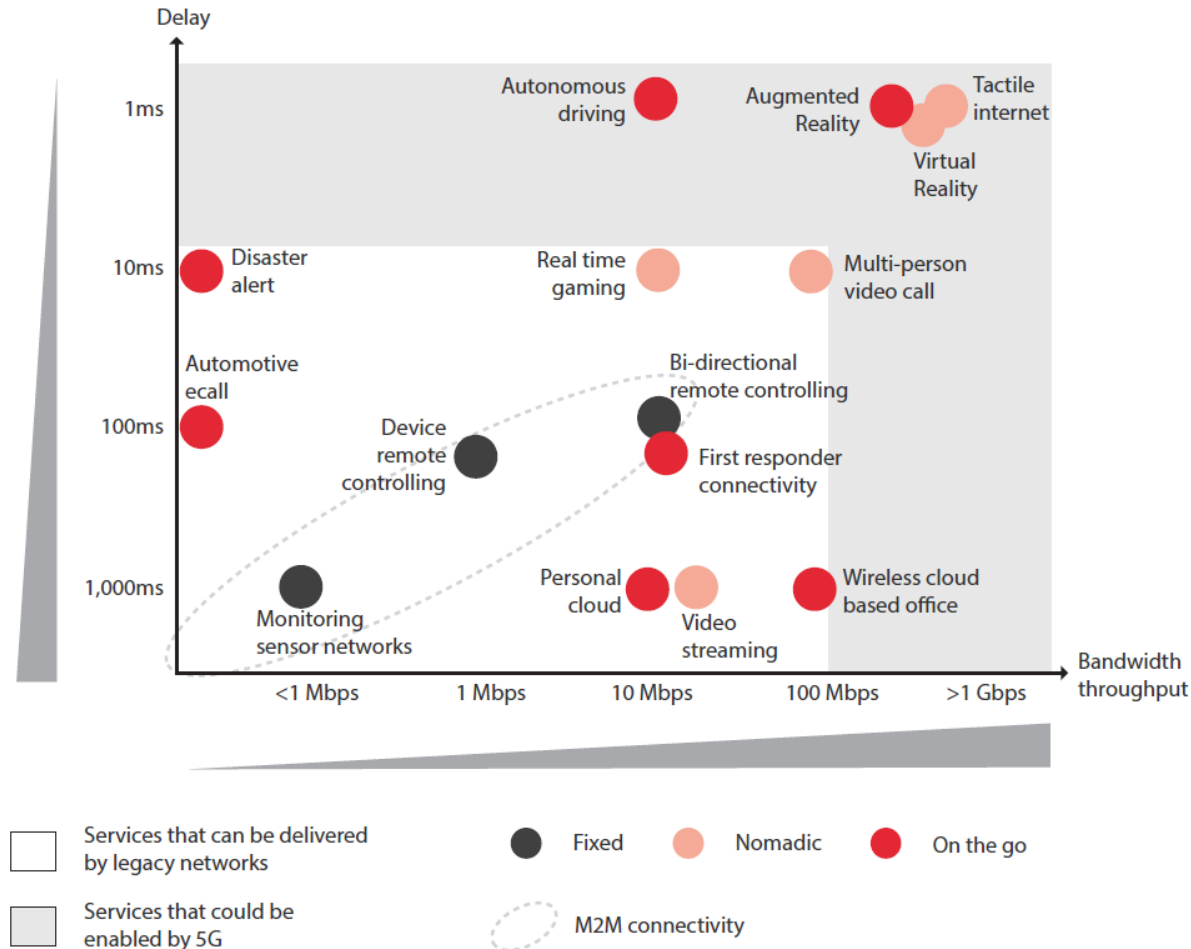


**7.5
BILLION+**
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WORLDWIDE



What Do We Need 5G For?

5G Looks To Enable New Applications, Business Models, and Even Industries



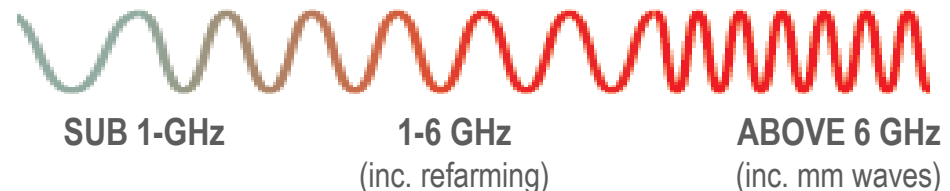


What Are the 5G Spectrum Policy Considerations?

NO CLEAR AGREEMENT ON 5G SO IMPOSSIBLE TO ACCURATELY PREDICT SPECTRUM NEEDS, BUT...

- **Spectrum discussions need to begin given long timeframe to free spectrum**
 - Numerous bands between 24 – 86GHz bands were agreed at WRC-15 for study under agenda item 1.13
 - Task Group 5/1 is responsible for sharing studies and CPM texts with inputs from Study Group 3 on propagation and Working Party 5D for spectrum needs and system characteristics
 - All stakeholders need to work closely and constructively to resolve differences
- **5G likely to require significant additional capacity spectrum**
 - 1-6GHz (inc. refarmed IMT spectrum) provide capacity but can also cover wider areas and suit macro base station use cases
- **5G will require coverage spectrum to provide nationwide services, not just urban hotspots**
 - Sub-1GHz spectrum is vital for digital inclusion, in-building penetration and also low-power Internet of Things applications
- **Wider range of mobile licensing regimes are possible with 5G**
 - Exclusive licensing: Essential to guarantee QoS and encourage network investment
 - Flexible shared licensing: Higher 5G frequency ranges suit sharing as small coverage areas mean more manageable interference

FREQUENCY RANGES
TO BE EXPLORED FOR 5G





Work Items at APT

WRC-15 Follow-up - AWG

- Initiated study items on frequency arrangements for 3300 – 3400 MHz and 4800 – 4990 MHz bands. No consensus for other new bands identified at WRC-15
- Questionnaire on “Usage and future plan of frequency bands in relation to studies on WRC-19 agenda item 1.13 in Asia-Pacific Region” was issued. Responses by AWG-21.
- To conduct sharing and compatibility studies on the following frequency bands:
 - WRC-19 related studies:
 - 1452 – 1492 MHz; 1980 – 2010/2170 – 2200 MHz
 - Studies to facilitate IMT implementation and not related to WRC-19 for the interested APT members:
 - 470-698 MHz; 1427-1452 MHz; IMT in the 1492-1518 MHz and MSS in 1518-1525 MHz
 - 3300 – 3400 MHz; 4400 – 4500 MHz; 4800 – 4990 MHz

WRC-19

- APG-1 to be held in China from 26-28 July 2016





Work Items at ITU-R

WRC-15 Follow-up

- WP5D to perform coexistence studies and develop band plans

WRC-19

- Until 31 March 2017
 - WP5D to provide spectrum needs and system characteristics
 - WPs of SG3 to provide propagation models for bands above 24 GHz
 - Other WPs to provide characteristics of incumbent services
- Between 31 March 2017 and CPM19-2
 - Sharing studies
 - CPM Text





Work Items at ITU-R

TG5/1

1st Meeting (May 2016)	Agree structure of TG 5/1
2nd Meeting (April 2017)	Begin drafting of CPM Text (Focusing on background section) Consideration of a potential format structure for sharing and compatibility studies Begin sharing and compatibility studies
3rd Meeting (Middle 2017)	Drafting of CPM Text Continuation of sharing and compatibility studies
4th Meeting (Late 2017)	Drafting of CPM Text Attempt to finalize the sharing and compatibility studies
5th Meeting (TBD 2018) (if required)	Drafting of CPM Text Finalize the sharing and compatibility studies
6th Meeting (TBD 2018)	Completion of draft CPM Text



Als overlapping with AI 1.13

AI	GROUP	TOPIC	ISSUE
1.6	WP 4A	NGSO FSS in various IMT bands	Overlaps with AI 1.13 in 40 GHz and 50 GHz
1.14	WP 5C	HAPS in the fixed service	Overlaps with AI 1.13 and 24.25-27.5 GHz in R2
9.1.9	WP 4A	FSS in 51.4-52.4 GHz	Overlaps with AI 1.13 in 52 GHz

1.6 NGSO FSS GHz	1.13 IMT GHz	1.14 HAPS GHz	[9.1 (issue 9.1.9)] GHz
	24.25-27.5	24.25-27.5 (Region 2)	
37.5-39.5 (s-E*)	37-40.5	38-39.5 (globally)	
39.5-42.5 (s-E*)	40.5-42.5		
47.2-50.2 (E-s*)	47.2-50.2		
50.4-51.4 (E-s*)	50.4-52.6		51.4-52.4 (E-s*)

* E-s: Earth-to-space; s-E: space-to-Earth.

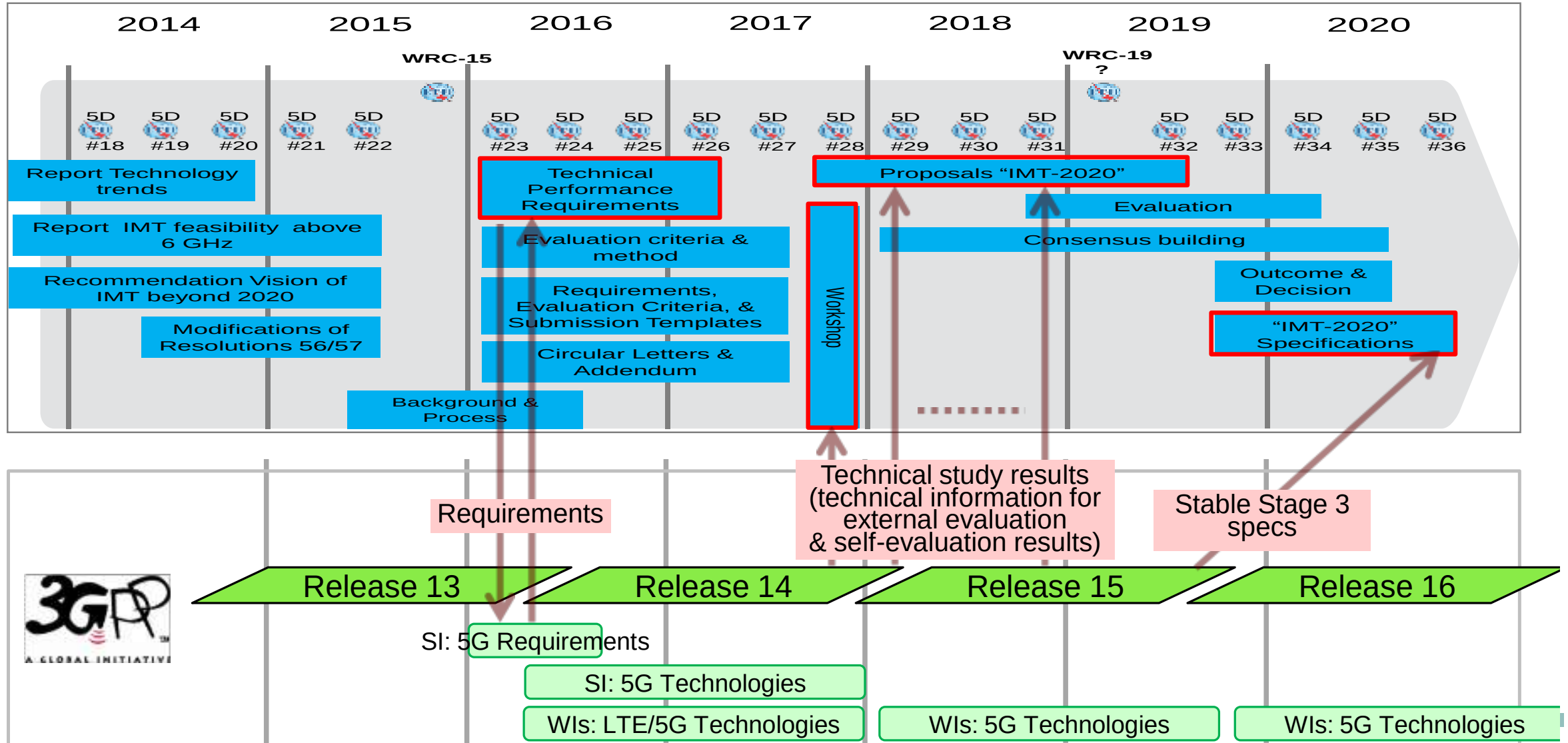


Other AIs relevant to the IMT

AI	GROUP	TOPIC	ISSUE
1.3	WP 7B	METSAT in 460-470 MHz	Clashes with 450-470 MHz
1.11	WP 5A	Railway radiocommunication systems	Could look for IMT bands within the mobile allocation for railway systems
1.12	WP 5A	Intelligent Transport Systems (ITS)	Could look for IMT bands within the mobile allocation for railway systems
1.16	WP 5A	RLANs in 5150-5925 MHz	Item of interest
9.1.1	WPs 4C, 5D	IMT and MSS in 2 GHz	Sharing with existing MSS
9.1.2	WPs 4A, 5D	IMT and BSS (sound) in R1 and R3	Possible impact on the use of L-band by IMT
9.1.3	WP 4A	NGSO FSS in C-band	Possible impact on the use of C-band by IMT
9.1.8	WP 5D	IOT	Can the spectrum needs be satisfied under IMT?

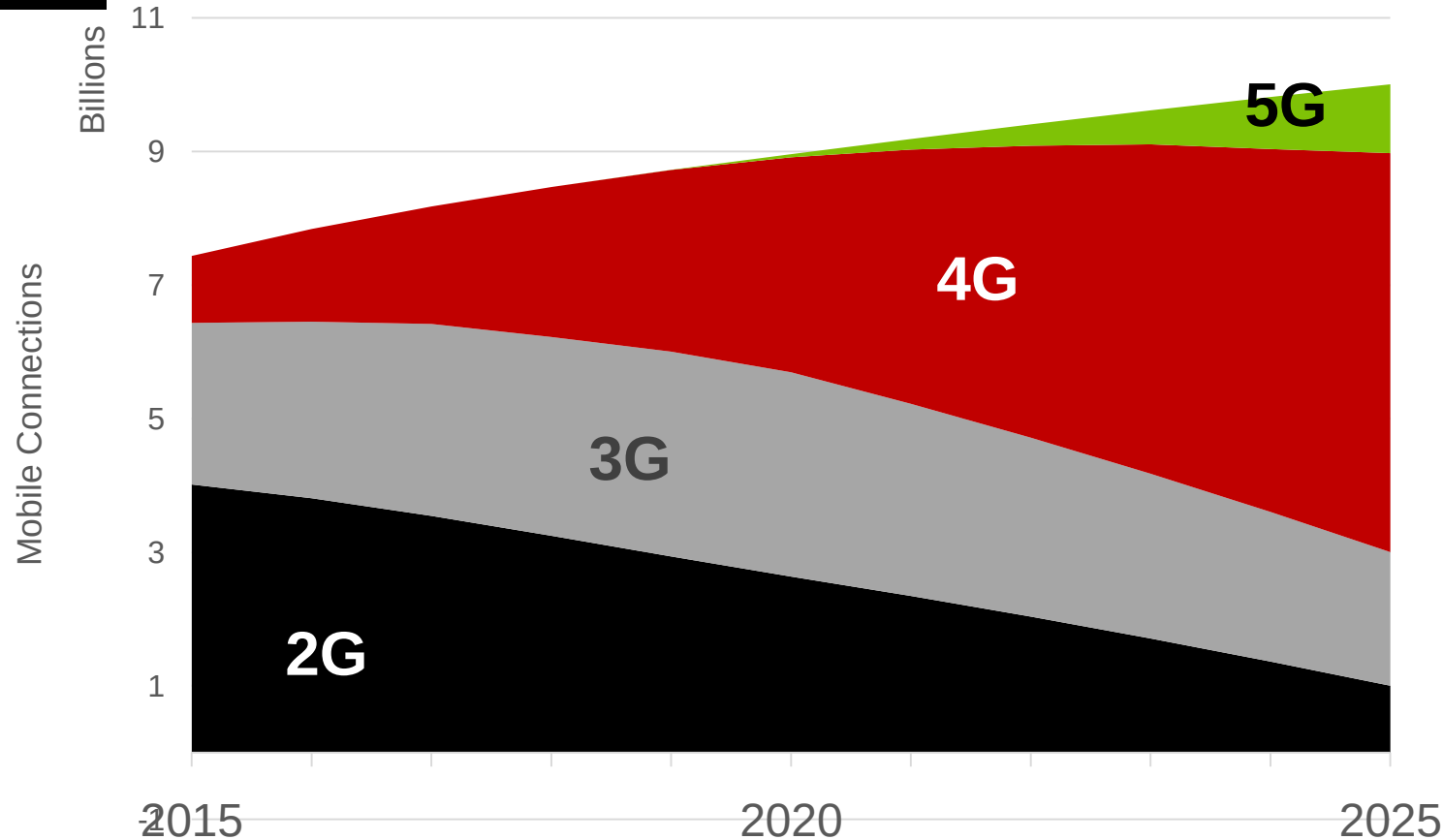


What is The 3GPP and ITU-R Timeline?





Network Evolution Forecast



- ❖ \$1.7 Trillion invested in 2G/3G/4G networks 2012-2020
- ❖ Cost to sustain 3-4 networks, drives decommissioning plans
- ❖ Does not include Internet of Things >25Bn connections in 2020

Note: This is for **illustration only** and is not the GSMA's definitive forecast for 5G. The trend assumes that in the first 7 years, 5G connections will grow at same rate as 3G



Thank You

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