3GPP RAN #85
Newport Beach
16-20 September 2019

RP-191854

Agenda Item: 8.2.2

Views on 3GPP work on NR>52.6GHz for Rel-17

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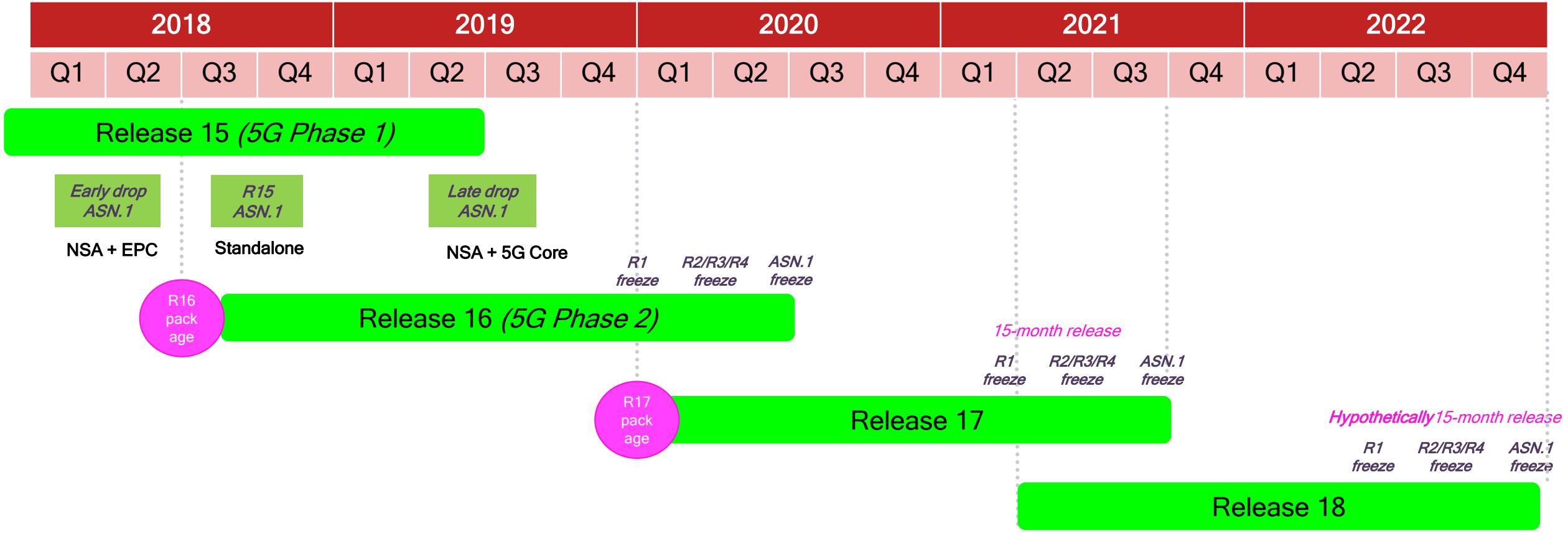
3GPP work-planning & schedule



Spectrum Expansion

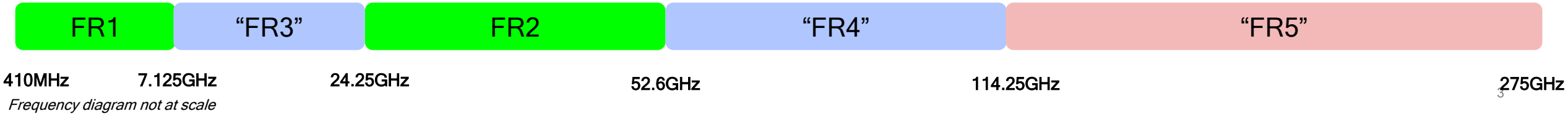
“FR3”, “FR4” & beyond

- NR Rel-15 defined FR1 (“sub7”) and FR2 (“mmW”)
  - RAN recently agreed to shift the upper limit of FR1 from 6GHz to 7.125GHz. RAN4 also extended the lower limit from 450MHz to 410MHz.

- “FR3” is subject of RAN4 study (SID @ RP-182884). Possible outcomes:
  - Increased ranges of currently defined FR1 (410MHz-7.125GHz) & FR2 (24.25GHz-52.6GHz)
  - Identification of regime where gNB/UE implementations can be with or without antenna connector leading to conducted and radiated testing
  - Not expecting air-interface changes specific to FR3
  - Bands falling in this regime should be agreed under 3gpp approval procedures & inheriting FR1 or FR2 characteristics

- >52.6 GHz (“FR4?”) is subject to RAN study (SID @ RP-182861)
  - Upper limit used to be at 100GHz as per Rel-14 5G study item but was extended to 114.25GHz at RAN
  - Expected to lead to the approval of RAN1-led activity in Rel-17 to define NR in this frequency range

- Discussions on >114.25GHz (“FR5??”) have not started in 3GPP but are occurring in some regulatory circles
  - Expecting later start; still as part of the 5G NR framework



Spectrum Beyond > 52.6GHz

From TR 38.807

Table 4.2.1-1: Current Licensing situation for various countries between frequency 52.6GHz and 71GHz

Region	Country	Frequency (GHz)										
		52.6-54.25	54.25-55.78	55.78-56.9	56.9-57	57-58.2	58.2-59	59-59.3	59.3-64	64-65	65-66	66-71*
ITU Region 1	Europe/CEPT					U (Mobile)						
	Israel											
	South Africa					U (Mobile)				U (Mobile)		
ITU Region 2	USA					U (Mobile)						
	Canada					U (Mobile)						
	Brazil					U (Mobile)						
	Mexico					U (Mobile)						
ITU Region 3	China							U (Mobile)				
	Japan					U (Mobile)						
	Korea					U (Mobile)						
	India											
	Taiwan											
	Singapore					U (Mobile)						
	Australia					U (Mobile)						

* **Access regime currently under discussion in CEPT**

Spectrum Beyond > 52.6GHz

From TR 38.807

Table 4.2.1-2: Current Licensing situation for various countries between frequency 71GHz and 100GHz

Region	Country	Frequency (GHz)										
		71-74*	74-76*	76-77	77-81	81-84*	84-86*	86-92	92-94	94-94.1	94.1-95	95-100
ITU Region 1	Europe/CEPT	L (Fixed)				L (Fixed)			L (Fixed)	L (Fixed)		
	Israel											
	South Africa	L (Fixed)				L (Fixed)						
ITU Region 2	USA	L (Fixed /Mobile)				L (Fixed /Mobile)			L (Fixed /Mobile)		L (Fixed /Mobile)	
	Canada	L (Fixed)				L (Fixed)						
	Brazil	L (Fixed)				L (Fixed)						
	Mexico	L (Fixed)				L (Fixed)						
ITU Region 3	China											
	Japan	L (Fixed)				L (Fixed)						
	Korea	L (Fixed)				L (Fixed)						
	India											
	Taiwan											
	Singapore	L (Fixed)				L (Fixed)						
	Australia											

*** candidate frequency band for IMT identification under WRC-19 AI 1.13**

Observations

- FR2 upper limit arbitrary: 49GHz (initially) ->52.6GHz (later)
- Common issues with these very high frequency bands:
  - GHz bandwidth → larger SCS
  - Coverage → SC, limited BW operation, BF (init access SSB/RACH, Data), mobility
- NR designed for:
  - 64 SSB beams (FR2), even more beams for Data channels
  - Possibility to operate with limited BW operation at UE (provided > SSB BW)
  - DL: OFDM
  - UL: OFDM + DFT-S
- 60GHz bands stands-out
  - Global, available today, regulations in place (ETSI actively discussing)
  - No 3GPP solution which can tap on market opportunities
    - Rel-17 (ASN.1 freeze Sept. ‘21) vs. Rel-18 (ASN.1 freeze Dec. ‘22) or later time implications

Proposal: address the subset 52.6GHz-71GHz first

Work Item

- Address the subset 52.6-71GHz first with a simple approach that extends FR2 characteristics
- Rel-17 **work item** on 60GHz band
  - It could be addressed as part of Rel-17 NR-U WI along with the access details (directional LBT, coex with 11ad, etc.)
- Define FR2x:52.6GHz-71GHz
  - Includes 60GHz (57GHz-66GHz) and extended 60GHz band (66GHz-71GHz)
  - FR2x inherits all properties of NR2 (64 SSB beams, waveform, etc.)
  - SCS is increased (TBD) - to cover 2GHz channel BW with smaller FFT size
- A study item for the waveform for range 71GHz-114.25GHz can be considered separately
  - No so much urgency

Address this in Rel-17 with a "simple approach" Work Item that extends FR2 principles

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