



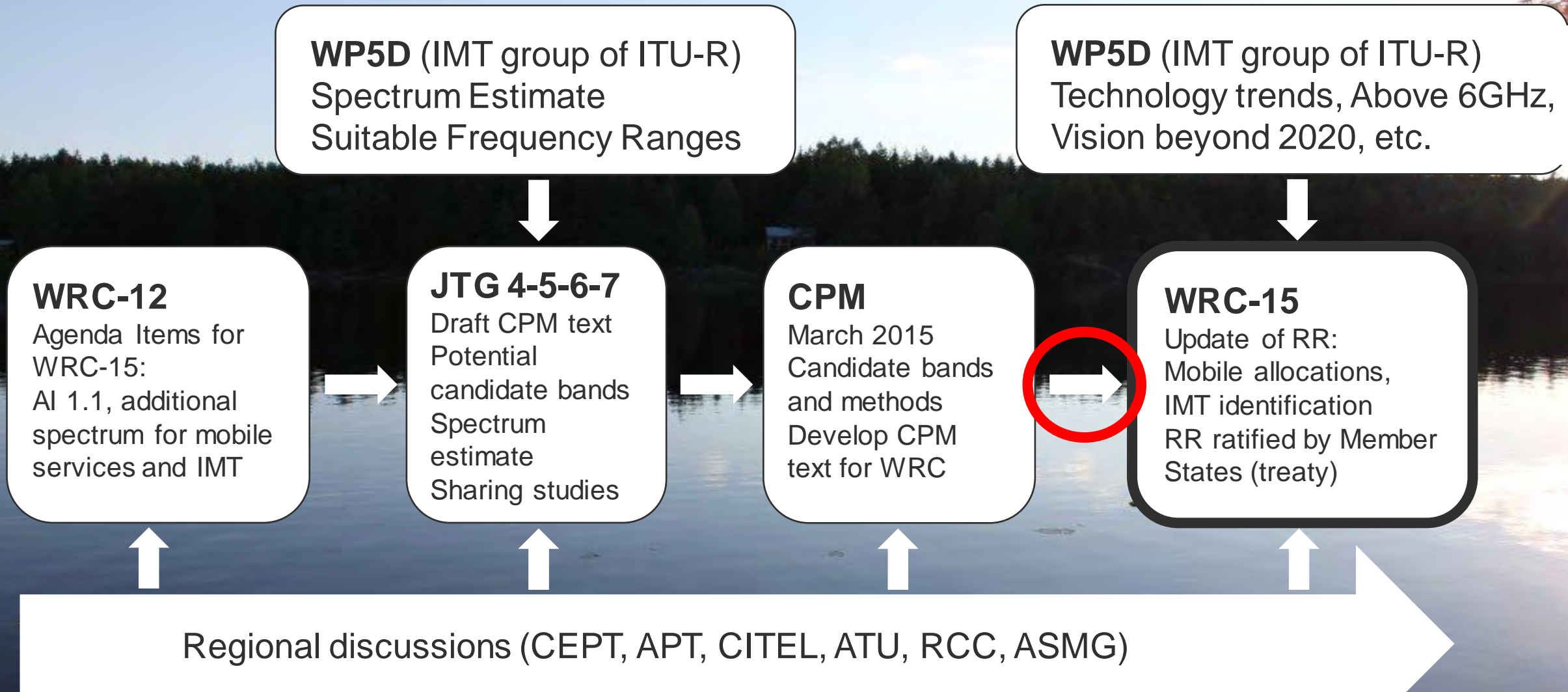
ERICSSON

“Update on ITU-R Work on IMT-2020 for 5G”

CEATEC Japan 2015 , 5G Mobile Communications Systems

Hakan Ohlsen
Vice-Chairman, ITU-R Working Party 5D
Ericsson Group Function Technology

WRC-15 process

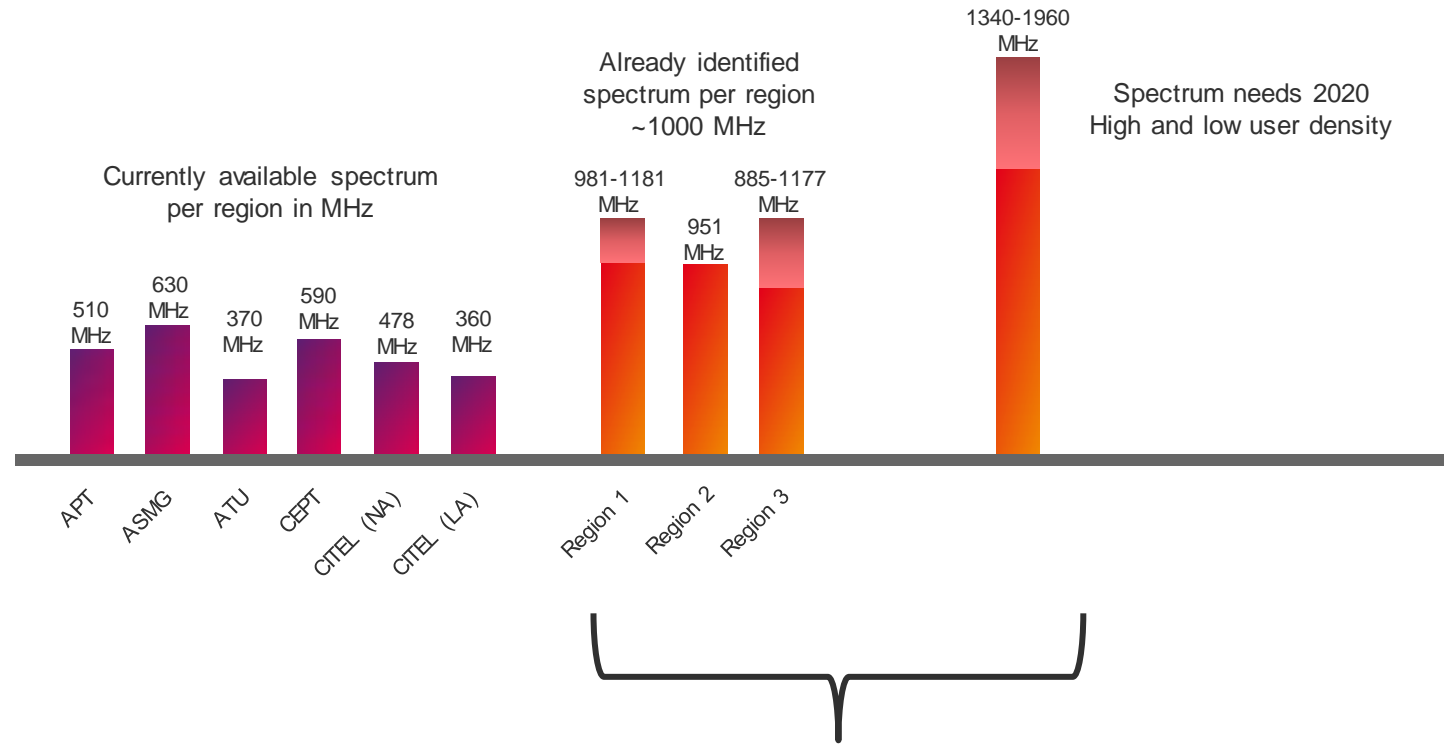


Agenda item 1.1

(IMT Spectrum estimates for 2020)



ITU-R WP5D Spectrum Estimate	Total spectrum requirements 2020
Lower user density settings	1 340 MHz
Higher user density settings	1 960 MHz



400 – 1000 MHz additional spectrum needed by 2020



4G

... new frequency bands for current IMT family members IMT-2000 & IMT-Advanced!

... and at WRC-15 define an Agenda Item for WRC-19 for IMT-2020

5G

5G Related Aspects in ITU-R Working Party 5D

(Responsible group for terrestrial IMT in ITU-R)



WP 5D initiated detailed work in 2012 towards the next generation IMT for the year 2020 and beyond (i.e., “5G”).

- *Released a detailed time line and action plan for IMT for 2020 to energize and focus the industry “5G” activities through year 2020*
- *Released a detailed deliverables table on the mapping of the work by meeting of WP 5D through year 2020*
- *ITU-R Recommendations & Reports in the initial “foundation” set of deliverables were completed in 2014 and 2015*

OUTDOOR-TO-INDOOR COVERAGE



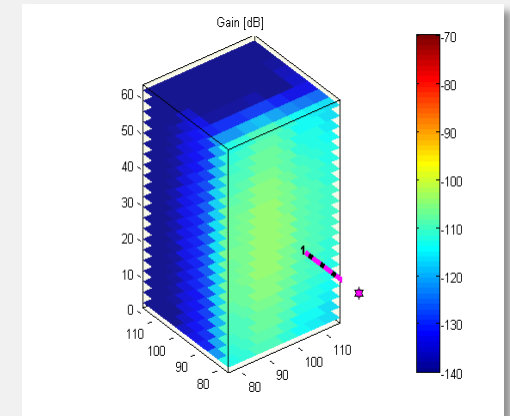
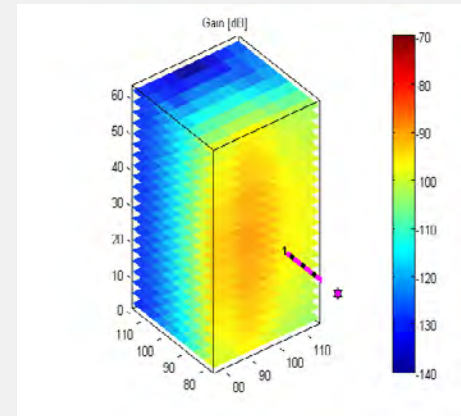
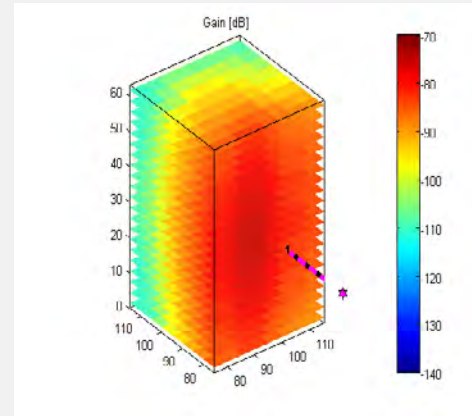
Example from ITU-R Report M.2376 “Technical feasibility of IMT in bands above 6 GHz”

10 GHz

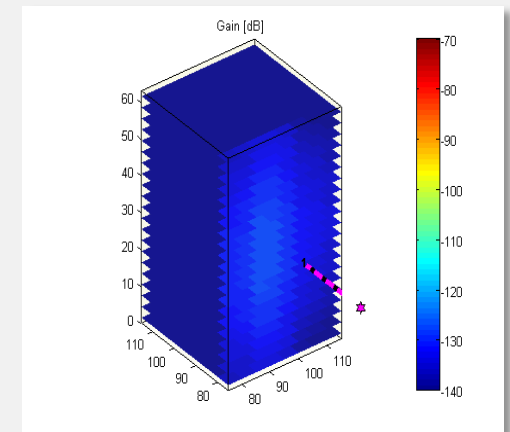
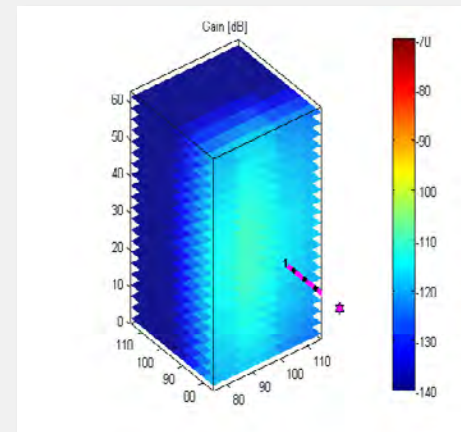
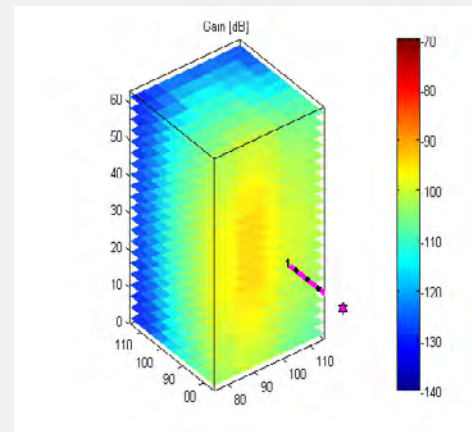
30 GHz

60 GHz

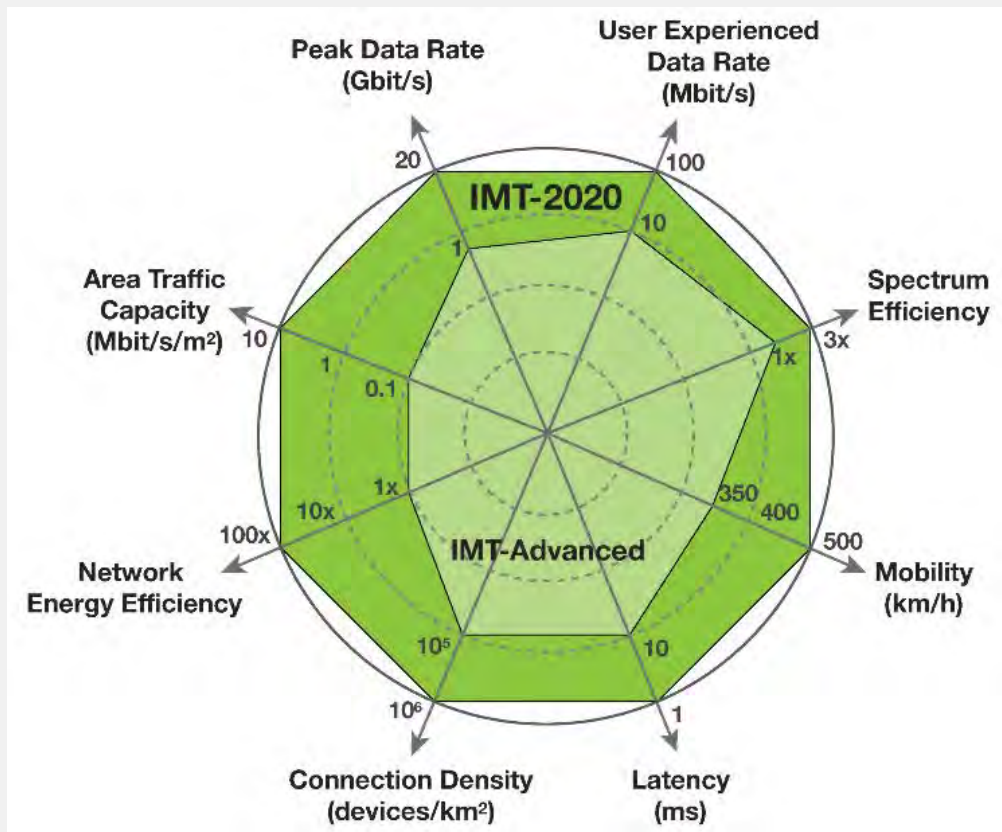
Standard glass



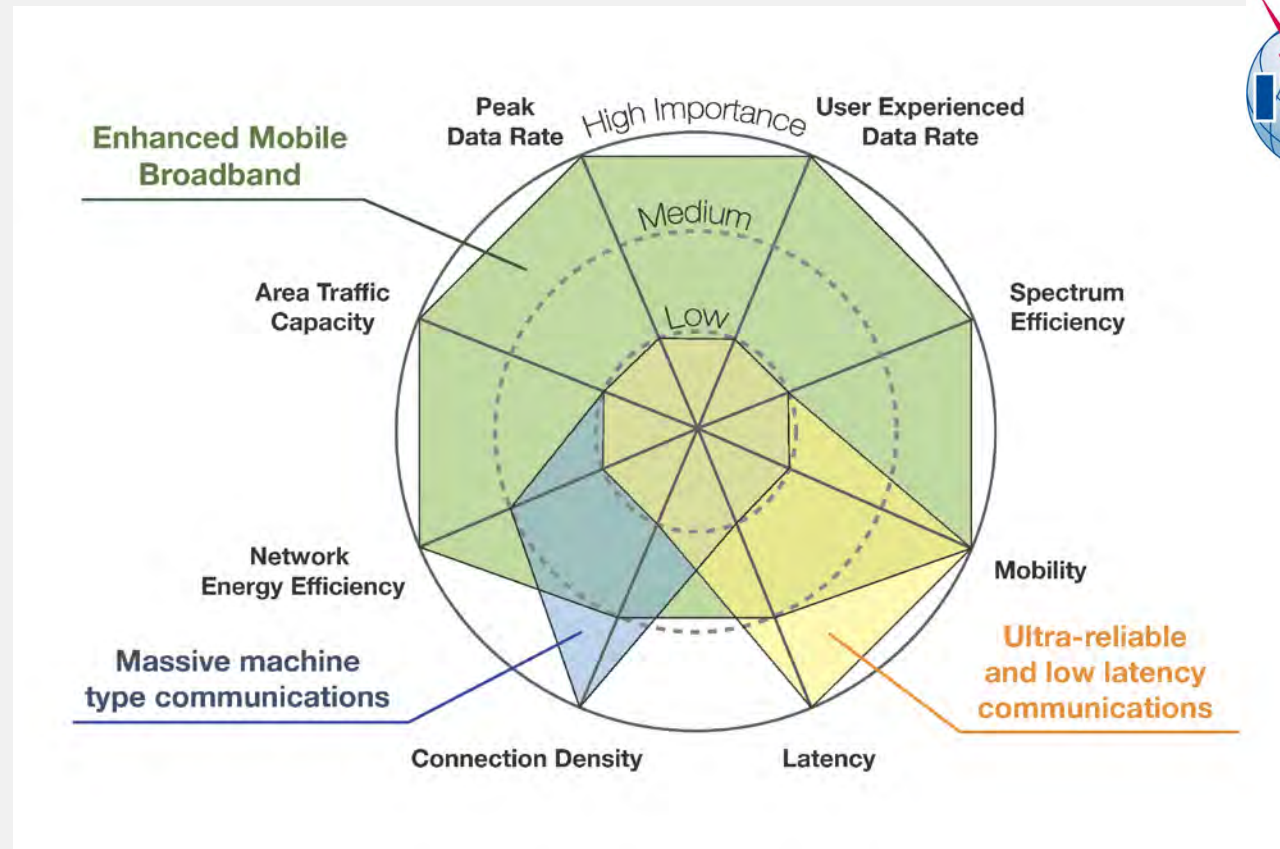
IRR glass



5G Capability Perspectives from the ITU-R IMT-2020 Vision Recommendation



Enhancement of key capabilities from IMT-Advanced to IMT-2020



The importance of key capabilities in different usage scenarios

The values in the Figure above are targets for research and investigation for IMT-2020 and may be further developed in other ITU-R Recommendations, and may be revised in the light of future studies.

Additional descriptions and further details for both Figure are in the IMT-2020 Vision Recommendation

Key Themes on the Timeline & Plan for “IMT-2020”



- Working Party 5D will essentially use the **same process and deliverable formats** successfully utilized in the development of IMT-Advanced.
 - *In the next phase, in the 2016-2017 time-frame, WP 5D will define in detail the performance requirements and evaluation criteria and methodology for the assessment of new IMT terrestrial radio interface.*
 - It is anticipated that the **timeframe for proposals** will be focused in 2018 (window spans late 2017 to mid-2019).
 - In 2018-2020 the **evaluation by independent external evaluation groups** and definition of the new radio interfaces to be included in “IMT-2020” will take place.
-

Key Themes on the Timeline & Plan for “IMT-2020”



- Working Party 5D plans to hold a **workshop in late 2017** that will allow for an explanation and discussion on performance requirements and evaluation criteria and methodology for candidate technologies for “IMT-2020” that has been developed by WP 5D, as well as to provide an opportunity for presentations by potential proponents for “IMT-2020” in an informal setting.
 - The whole process for the initial release of “IMT-2020” is planned to be **completed in 2020** when a draft new ITU-R Recommendation with detailed specifications for the new terrestrial radio interfaces of “IMT-2020” will be submitted for approval within ITU-R.
 - **Enhancement and additional capabilities for “IMT-2020” are expected to start in 2021 and be on-going.**
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5G Related Aspects in ITU-R Working Party 5D



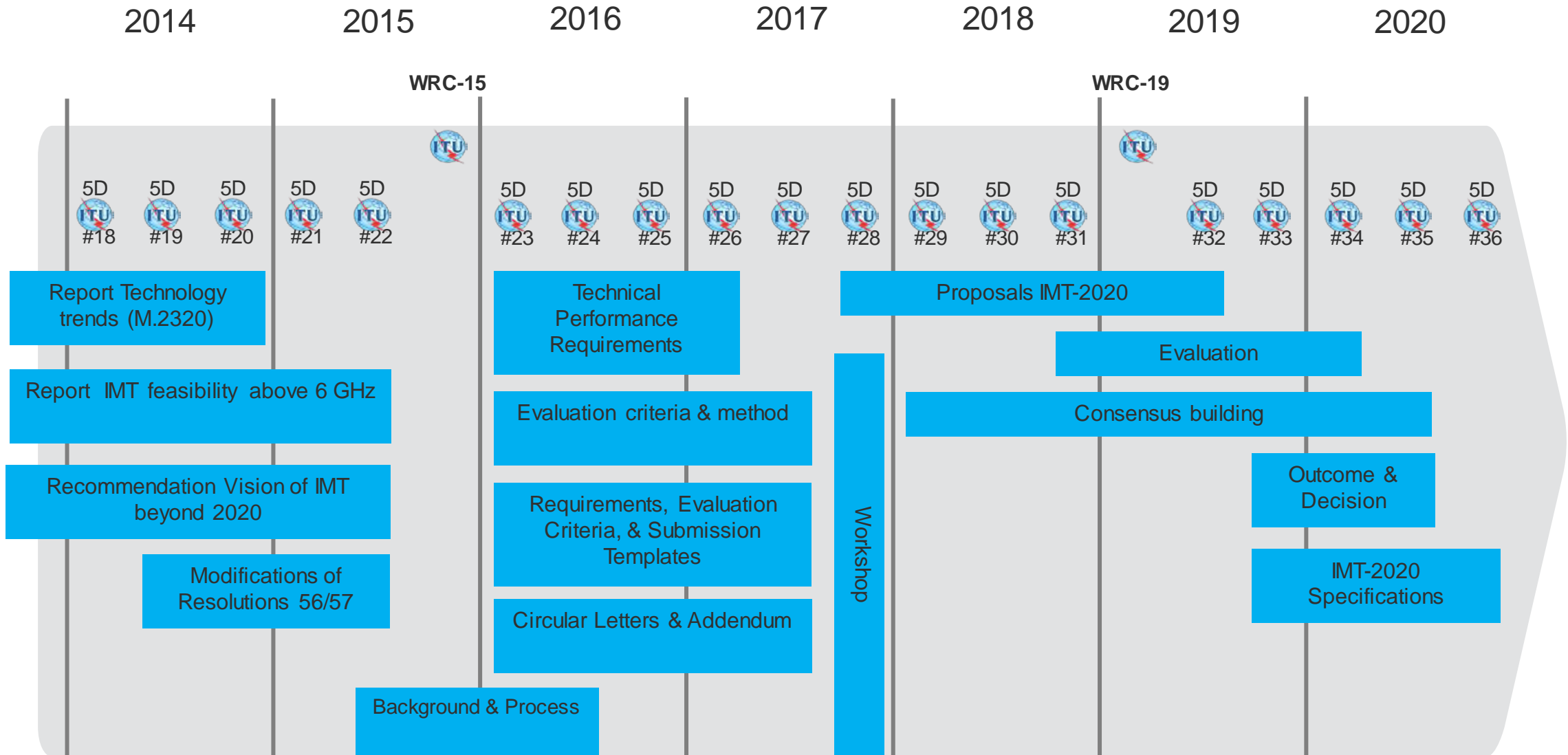
The work on the next phases of IMT-2020 will ramp up in 2016 and early aspects have been initiated towards the radio interface technology or sets of radio interface technologies

- The Report on the **Technical Performance Requirements** expected that a technology would need to meet to satisfy “IMT-2020”
 - The Report on **Evaluation Criteria and Evaluation Methods** for “IMT-2020” technologies
 - The Report on Specific Requirements of the candidate technology related to submissions, the evaluation criteria and **submission templates**
 - For efficiency, the **process and deliverable formats that were effectively utilized for IMT-Advanced** will be leveraged
-

Detailed Timeline & Process For IMT-2020 in ITU-R



NOTE: THIS TIMELINE IS THE CURRENT VIEW PUBLISHED BY ITU-R WP 5D AND BEING UTILIZED BY ITU-R & INDUSTRY

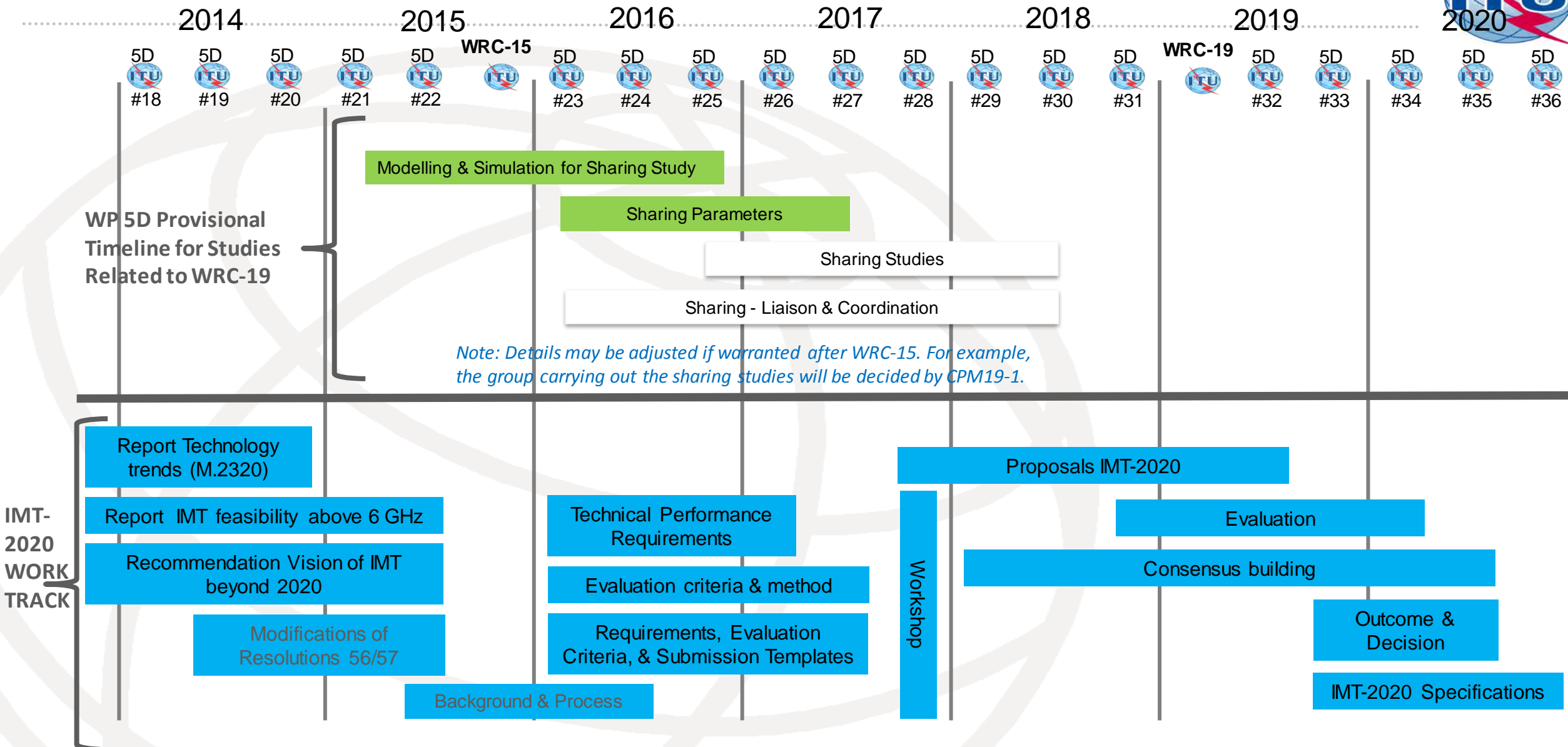


Note: While not expected to change, details may be adjusted if warranted.



- Is expected that the **final specifications for the “global core specification” from the external organizations** (the technology proponents) towards the work on Draft new Recommendation ITU-R M.[IMT-2020.SPECS] *“Detailed specifications of the terrestrial radio interfaces of “IMT-2020”* would be received into WP 5D Meeting #34 (February 2020) at the latest.
- **Transposed specifications** (from the individual regional or national transposing organizations) would be received at WP 5D Meeting #35 (June 2020) at the latest.
- The **finalization of the complete Draft New Recommendation** ITU-R M.[IMT-2020.SPECS] for the initial release of “IMT-2020” would be at WP 5D Meeting #36.
- Details of specific requests for material from the external organizations and relevant timings of the process steps will be **communicated through ITU-R Circular Letters and liaisons** and is expected to be similar to the process in Docs ITU-R [IMT- ADV/24 Rev 2](#).

Working Party 5D Work Plan Composite Perspective on Spectrum & Technology Timelines



Note: Details may be adjusted if warranted after WRC-15. For example, the group carrying out the sharing studies will be decided by CPM19-1.

Note: While not expected to change, details may be adjusted if warranted.

Minimum Performance Requirements Development (1)



5G may be different than previous efforts because of the wide range of use cases which creating distinctly different “wants” and ultimately separate sets of requirement values

- IoT
- “Typical” Wireless Broadband
- Video and other higher bandwidth applications

From an ITU perspective, a Circular Letter, (information & call for inputs) will be initiated at ITU-R WP 5D #23 in February 2016

- This CL will focus on formally announcing the process and the immediate next steps

Minimum Performance Requirements Development (2)



Liaisons from WP 5D to External Organizations will solicit information seeking:

- Understanding of the key characteristics to define the overall detailed requirement universe and subsequently the detailed information necessary to establish the actual parameter values

A consensus driven process will set the actual values, or range of values

- As noted above, there may be more than one set of value

The resulting Key Characteristics and their values will be merged in to an ITU Report

- These values will be used as part of the evaluation criteria
- Evaluation methodology and environments must be taken into account in the development of the requirements to ensure consistency

Requirements Overview



The IMT-2020 [5G] requirements provide the industry with a technical baseline

Examples (not exhaustive) of some minimum requirements could be:

- Spectral efficiency
- Bandwidth
- Throughput; Peak & User Data Rates
- Mobility
- Latency
- Capacity
- Support of IoT
- QoS
- Energy Efficiency

and other factors such as:

- Test Environments (e.g., indoor, microcellular, base coverage urban, high speed...)
- Representative Frequency Bands

Summary

- Working Party 5D has developed an overarching and **coordinated plan**
- Continues the **Partnership with industry** as the success model for 5G
- Much **foundation work** has already been completed
- **A lot of work** is still required
- Next steps are to **define the radio interface technology minimum performance requirements and evaluation details**
 - 5G requirements will come from many different sources
 - More complex paradigm for development of requirements
 - Requirements provide a technical baseline for industry
 - Aggressive timeline



DOMO ARIGATO GOZAIMASU!