WRC-19 and 5G Spectrum Planning

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The Main Points

The U.S. failed to achieve consensus support for several 5th Generation wireless spectrum allocations at the ITU's 2015 World Radio Conference. WRC-19 achieved progress, albeit not fast enough to satisfy a U.S. expedited timetable that already licensed 5G at 28 GHz (not even on a future WRC schedule) and used incentive auctions to clear UHF broadcast television assignments.

While unilateralism is a viable strategy, in light of short distance propagation and little likelihood for cross border transmissions, the U.S. has much to lose if it elevates non-spectrum issues such as national security and industrial policy, and fails to seek regional and global consensus.

Spectrum planning at the ITU constitutes a tedious and incremental process designed to emphasize study, consensus and trust building, and conflict avoidance at the expense of timeliness.

The U.S. created the need for expedited action not shared by most nations: doctrinal allegiance to treat spectrum as property, incentive auctions generating $10.05 billion for incumbent broadcasters and more than $7 billion to the U.S. Treasury and pending auctioning of 200+ MHz used by satellite carriers in the C-band (3.7-4.2 GHz).

The U.S. needs to return to core principles of technological optimization, trust building, harmonization, planning and consensus building or risk further alienation, delay and retaliation.

A Study in Frustration and Misunderstanding

"There is a real possibility that these practices undermined the value of future WRCs and increased the risk that the ITU will become a tool for governments and incumbent spectrum users to halt spectral efficiency and technological progress. Global spectrum harmonization for future services will be difficult, if not impossible, or, at a minimum, be years behind innovation if such practices are allowed to occur. At the same time, global technological leaders, such as the U.S., will continue to innovate outside and without input from the ITU and its many nation states. This will, in turn, make the ITU and the WRC process less relevant" (FCC Commissioner Michael O'Rielly, 2016).

"Unlike some countries, we do not believe we should spend the next couple of years studying what 5G should be, how it should operate, and how to allocate spectrum, based on those assumptions. Like the examples I gave earlier, the future has a way of inventing itself. Turning innovators loose is far preferable to expecting committees and regulators to define the future" (FCC Chairman Thomas Wheeler, 2016).

"We won't wait for the standards to be first developed in the sometimes arduous standards-setting process or in a government-led activity. Instead, we will make ample spectrum available and then rely on a private sector-led process for producing technical standards best suited for those frequencies and use cases. Leadership in networks leads to leadership in uses, which quickly moves across borders. A result of this national leadership is the creation of a home-field advantage, similar to what we experienced with 4G" (Wheeler, 2016).

ITU Spectrum Planning in a Nutshell

The ITU is the oldest, continuously operating inter-governmental organization, operating since 1875.

Now a specialized agency of the U.N., it seeks to build consensus in spectrum allocations, technical standards and ICT4D.

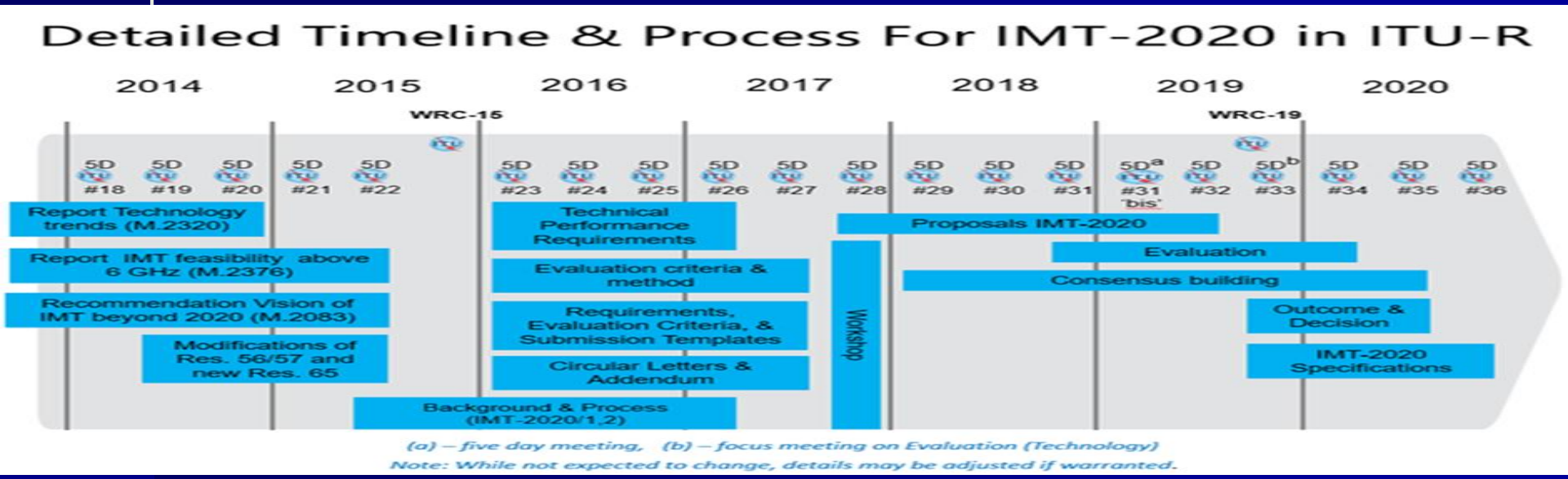
While some national commitments have treaty-level significance, much of what the ITU does lies in non-binding, but consensus driven recommendations that most nations accept and implement.

Positive network externalities favor shared standards, uniform “rules of the road” conflict avoidance and resolution supporting single global product lines, fewer incompatible frequency assignments and tech standards.

Spectrum planning is a time consuming, methodical process involving: 1) development of an agenda of new allocations and reallocations, first subject to study and analysis; 2) opportunities for national delegations to articulate their position; 3) consensus building and development of national commitments, to reduce the number of non-conforming footnotes to specific spectrum allocations by individual nations; 4) formal designation of frequency allocations for one or more specific services by the ITU and individual nations; and 5) the eventual registration of radio spectrum uses and satellite orbital locations by the ITU

Challenges to the ITU's Legitimacy and Relevancy

Increasing dissatisfaction with the pace of progress by inter-governmental agreements instead of market forces operating on "Internet time." See https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2017/Aug-ISS2017/PAPER_S2_Workshop_Attila_Matas.pdf

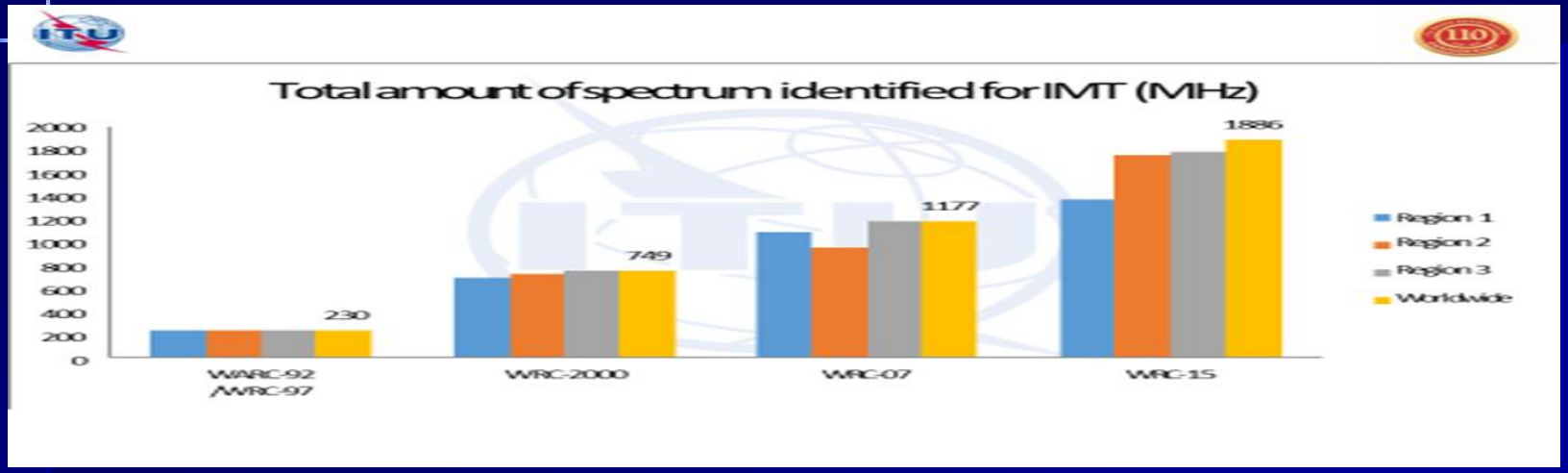


Real or perceived "mission creep" by ITU senior management to expand the agency's wingspan and mission while also accommodating initiatives of some nations (Russia, China, Iran, Cuba) to assert sovereignty and limit Internet freedoms.

WSIS-12 vote favoring a direct role for the ITU to include Internet governance in its treaty-specified mission, possibly including cybersecurity.

Mixed Results for the U.S. 5G Agenda at WRC-15/19

The positive trend continues for expanding aggregate spectrum allocated for fixed and mobile wireless voice, data and video. WRC-19 added 15.35 GHz in bandwidth with emphasis on extremely high, millimeter wave spectrum.



Agenda item 1.13 – IMT above 24 GHz

- IMT-2020/5G needs larger bands -> millimeter bands are considered
  - High capacity: ensure high data rates and area traffic capacity
  - Convenient for MIMO and small cells (micro-, pico-, femto- cells)
  - WRC-19 consider 11 bands 24.25 - 86 GHz for IMT-2020

IMT-2020 candidate bands under AI 1.13

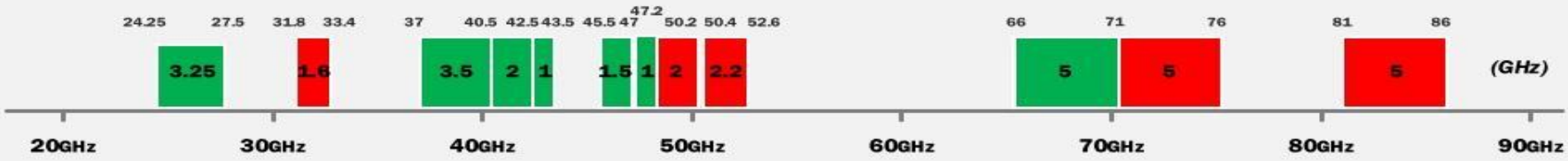
Existing mobile allocation	No global mobile allocation
24.25 GHz – 27.5 GHz	31.8 – 33.4 GHz
37 – 40.5 GHz	40.5 – 42.5 GHz
42.5 – 43.5 GHz	
45.5 – 47 GHz	47 - 47.2 GHz
47.2 -50.2 GHz	
50.4 – 52.6 GHz	
66 – 76 GHz	
81 – 86 GHz	

Mixed Results for the U.S. 5G Agenda at WRC-15/19 (cont.)

ECC

METIS : BANDS IDENTIFIED FROM 40 TO 86 GHz

Band (GHz)	Size [GHz] Priority
40.5 – 42.5	Earth Stations, Fixed, MWS
42.5 – 43.5	Earth Stations, Fixed, MWS, radioastronomy
43.5 – 45.5	Defence, radionavigation, radionavigation satellite
45.5 – 47.0	Radionavigation radionavigation satellite
47.2 – 50.2	Earth stations, PMSE, HAPS, fixed
50.4 – 52.6	Fixed, radioastronomy, earth stations
55.78 – 57.0	Fixed, passive sensors
57 – 66	Fixed, SRD, Wideband data, Passive satellite, radars
66 – 71	Satellite services
71 – 76	Short and Long range radars, fixed
81 – 86	Fixed service, radioastronomy, Defence



WRC-19 candidate frequency bands: 24.25-27.5; 31.8-33.4; 37-40.5; 40.5-42.5; 42.5-43.5; 45.5-47; 47-47.2; 47.2-50.2; 50.4-52.6; 66-76; 81-86 GHz

Success of IMT identification	Failure of IMT identification
24.25 – 27.5 GHz (globally harmonized)	31.8 – 33.4 GHz
37 – 43.5 GHz (globally harmonized)	48.2 - 50.2 GHz
45.5 – 47 GHz	50.4 – 52.6 GHz
47.2 – 48.2 GHz	71 – 76 GHz
66 – 71 GHz (globally harmonized)	81 – 86 GHz

Mixed Results for the U.S. 5G Agenda at WRC-15/19 (cont.)

The negative trend continues with WRC-19 reallocating 24.25-27.5 GHz, all but guaranteeing spectrum incompatibility for U.S. carriers and equipment manufacturers worldwide that have focused on the 28 GHz band already auctioned by the U.S. Federal Communications Commission ("FCC") for domestic 5G service.

Additionally, the FCC already expects to allocate several other bands, as high as 95 GHz, well before the ITU starts or concludes the incremental steps leading to a reallocation.

Few nations have created incentive auctions to expedite incumbent spectrum departure, change in transmission frequency, or sharing of channels. Most non-U.S. broadcasters have ongoing public service missions; some are government-owned.

Many national governments just beginning to consider 5G policy. "What's the rush?"--2023 accepted as date for addressing more UHF reallocation for mobile telecommunications.

Reasons for the Mixed Results

Aggressive action by the FCC to expedite (if not cut short through preemption of state and local jurisdiction) accommodation of 5G operational needs including tower sites, pole attachments, permitting "shot clock" deadlines.

Failure to appreciate significant, albeit incremental progress with allocations for fixed and mobile terrestrial wireless increasing from 230 MHz in 1992 to 1901.35 MHz post WRC-19.

U.S. philosophical ambivalence with inter-governmental, multi-stakeholder decision making, ascending influence of economists, distrust of ITU senior management.

Nations perceiving the U.S. as attempting to "railroad" a self-serving agenda and injecting extraneous industrial policy (5G global leadership) and national security (Huawei espionage).

11th hours squabbling within the U.S. delegation, e.g., terrestrial vs. satellite stakeholders, military concern about losing C-band spectrum, weather satellites at risk?

Key U.S.-based, multinational ventures increasingly frustrated with internal battles, e.g., between the FCC and Department of Commerce. The Executive Branch's lead spectrum policy advisor nudged/pushed to resign.

Conclusions and Recommendations

The U.S. should eschew “go it alone” unilateralism: senior FCC managers from both political parties have underestimated the benefits of consensus building and the negative consequences of unilateralism and global distrust.

Recognize the balance of power has shifted from the U.S., E.U. and Japan to a larger set of nations, each having an equal vote at the ITU, as well as increasing NGOs including, manufacturers of IOT and autonomous vehicles, fintech, smart cities, e-health, etc.

Do not forget the lessons from WSIS-12 where on an 89-53 vote the majority favored revision of the treaty-level International Telecommunications Regulations to include Internet governance and access control by individual nations.

Reemphasize best practices, including pre-conference, consensus building within the U.S. delegation and regional forums, such as CITEL.

Tread lightly, if at all, on extraneous matters such as 5G global technology leadership and questionable concerns about espionage.

Lower expectations and rhetoric.