

Frieden, Rob

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Win, Lose and Draw: Outcomes from the 2019 World Radio Conference

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Win, Lose and Draw: Outcomes from the 2019 World Radio Conference

Rob Frieden
Pioneers Chair and Professor of Telecommunications and Law
Penn State University
102 Carnegie Building
University Park, Pennsylvania 16802
(814) 863-7996; rmf5@psu.edu
web site: <http://www.personal.psu.edu/faculty/r/m/rmf5/>

National governments (OECD, 2014), (FCC, n.d.) (NTIA, n.d.) stakeholders and even business journalists (FitzGerald & Krouse 2020), (Tracy & Fitzgerald, 2019), (Werner, 2019) recently have developed a heightened appreciation how spectrum planning has substantial impacts worthy of tracking. The rollout of fifth generation (“5G”) wireless service ¹ largely has triggered such interest, despite the time, complexity and tedium involved in thorough study, technology optimization, consensus building and global harmonization of spectrum use. 5G spectrum management also has become a factor in other peripheral matters that the United States government and domestic stakeholders have sought to inject including bragging rights about maintaining or reacquiring global wireless market supremacy (Pai, 2019), national security

¹ “5G is expected to connect people, things, data, applications, transport systems and cities in smart, networked communication environments. It will transport a huge amount of data much faster, reliably connect an extremely large number of devices and process very high volumes of data with minimal delay.

5G technologies are expected to support applications such as smart homes and buildings, smart cities, 3D video, work and play in the cloud, remote medical services, virtual and augmented reality, and massive machine-to-machine communications for industry automation. 3G and 4G networks currently face challenges in supporting these services.

These new functionalities and new services necessitate a new way of deploying advanced mobile services, as well as new approaches in making 5G technologies work together in industrial settings by machine-to-machine communications, Internet of Things (IoT) or with connected vehicles. ITU is on the front line of developing standards to allow all of these functionalities to work together” ITU News Magazine, No. 6, p. 20 (2019).

(FCC, 2019) (FCC 2020e), trade policy (FCC, 2020), and even whether a merger of wireless carriers would expedite the rollout of 5G services, particularly to rural consumers (FCC, 2019a).

Suddenly spectrum allocation decisions have become so time sensitive that the U.S. Federal Communications Commission (“FCC”) has concluded that it must deviate from first participating in intergovernmental coordination under the auspices of the International Telecommunication Union (“ITU”), followed by domestic allocation, assignment and licensing spectrum users. The FCC’s expedited reallocation and auctioning of spectrum for 5G services, constitutes a major component of the multi-faceted 5G FAST Plan for: “(1) pushing more spectrum into the marketplace; (2) updating infrastructure policy; and (3) modernizing outdated regulations” (FCC, 2018). To achieve its goal of expediting the availability of 5G spectrum, the FCC has decided to act unilaterally well before the ITU completes its work and nations can follow through with uniform, domestic spectrum reallocations and assignments.

The high stakes presented by 5G had a significant impact on the agenda at the ITU’s 2019 World Radio Conference (“WRC-19”) and in turn whether particular stakeholders achieved desired outcomes. This paper will identify the winners and losers in the WRC-19 spectrum allocation process, as well as developing trends that could affect broad public policy goals, consumers and the ongoing viability of the ITU as a trusted and reliable forum for conflict avoidance and resolution of controversies involving the use of radio spectrum.

The ITU-Managed Spectrum Planning Process

The ITU serves as the world’s oldest continuously operating inter-governmental forum for conflict avoidance and resolution of controversies involving the use of radio spectrum and satellite orbital locations (ITU, n.d. What does ITU do?). It also promulgates technical standards and devises strategies for promoting information and communications technologies in

developing nations. World Radio Conferences, convened by the ITU in four-year cycles, seek to reach consensus on spectrum allocations and reallocations (Drake, 1988), (Gregg, 1982), (Coddington & Rutkowski, 1982).

Each World Radiocommunication Conference affects the future development of information and communication technologies (ICTs) in many ways, including:

- Introducing and expanding access to the radio spectrum for new radiocommunication systems and applications;
- Protecting the operation of existing radiocommunication services and providing the stable and predictable regulatory environment needed for future investments;
- Avoiding the potential for harmful interference between radio services;
- Allowing the provision of high-quality radiocommunications while protecting vital uses of the radio spectrum, particularly for distress and safety communications; and
- Facilitating international roaming and increasing economies of scale, thereby making it possible for network and user devices to be more affordable (Maniewicz, (2019 Dec. 2)).

Harmonization of spectrum allocations and technical standards typically achieves ample benefits, such as the ability of equipment manufacturers to accrue scale economies by offering globally or regionally compatible handsets and other equipment. The 193 nations, participating in ITU forums, recognize the benefits in consensus-building even though the process takes more time than the pace achievable when a national government acts unilaterally. While achieving progress on a priority goal of reaching consensus on International Mobile Telecommunications (ITU, n.d. ITU towards “IMT for 2020 and beyond”), the conference convened in October, 2019 (“WRC-19”) (FCC 2019b) represents one of several meetings needed to reach closure on a comprehensive spectrum allocation plan for a diverse array of 5G frequency bands (ITU, 2019),

(ITU, WRC-15 Resolution 238), (Waterman 2019), (World Radiocommunication Conference, 2019).

WRC-19 Highlights

WRC-19 added 17.25 Gigahertz (“GHz”) in bandwidth for 5G services (ITU News, 2019), (World Radiocommunication Conference, Provisional Final Acts, 2019) bringing the total allocated for International Mobile Telecommunications to 19.14 GHz (Maniewicz, 2016). The conference achieved significant progress in adding available 5G spectrum in the 24.25-27.5 GHz, 37-43.5 GHz, 45.5-47 GHz, 47.2-48.2 GHz and 66-71 GHz bands.

Much of the work at WRCs addresses mostly uncontroversial matters often finding spectrum for new or growing service, by reallocating frequencies or requiring shared use by two or more service types. WRC-19’s agenda included the following diverse spectrum applications:

- **Earth exploration-satellite (EESS) service** –Recommending establishment of a worldwide primary allocation 22.55-23.15 GHz for tracking, telemetry, and network control of satellites providing remote sensing of earth and atmospheric factors such as temperature and water vapor;
- **Non-Geostationary Satellites** – Formulating regulatory procedures for registering non-geostationary satellite constellations launched to provide fixed, instead of mobile services. Low earth orbiting satellites constellations, numbering in the hundreds or more, can provide globally a variety of services including telecommunications, remote sensing, space, and upper atmosphere research, meteorology and astronomy;
- **High-altitude platform stations (HAPS)** –Allocating spectrum for telecommunications and information services via blimps and other slow moving vehicles located in the stratosphere;
- **Wi-Fi Networks** – Expanding the use of carrier-provided and unlicensed user-installed devices for low powered broadband wireless service in both indoor and outdoor environments;
- **Railway radiocommunication systems between train and trackside (RSTT)** – Facilitating the deployment of railway train and trackside systems to support improved railway traffic control, passenger safety, and security;

- **Intelligent Transport Systems (ITS)** – Recommending the integration of information processing and telecommunications technologies for management of vehicular traffic including self-driving cars;
- **Broadcasting-satellite service (BSS)** – Recommending the establishment of a priority access mechanism for developing countries to secure satellite orbital slots for audio and video services delivered via satellite; and
- **Global Maritime Distress and Safety System (GMDSS)** – Expanding spectrum allocated for maritime safety and emergency services (ITU News Magazine, No. 6, 2019).

However, achieving harmonized, specific frequency band allocations used by all nations, remains a work in progress. For example, the FCC already has completed auctions for 5G services using Ultra High Frequency (“UHF”) spectrum, previously allocated for broadcast television (FCC, 2017), (FCC, 2017a), (FCC, 2017b), (FCC, 2016) (FCC, 2014). The Commission’s 5G spectrum auctions contributed over \$121.2 billion to the U.S. Treasury with an additional \$12.05 billion awarded to incumbent broadcast television licensees as compensation for quickly abandoning a channel assignment, or changing frequencies (FCC, 2020a Mar. 12), (Pai, 2019a). The FCC completed its domestic spectrum reallocation and frequency assignments well before the ITU 2023 scheduled date for beginning to address whether to reallocate this frequency band for 5G service (WRC-15, Resolution 235), (World Broadcasting Unions, 2018).

Unlike most nations, the United States can expedite domestic reallocation and reassignment by creating financial incentives for incumbent spectrum licensees to change, share, or abandon existing frequency assignments. The FCC offered incumbent UHF television broadcasters a generous share of 5G spectrum auction proceeds (FCC, 2017) (FCC, 2017a), (FCC, 2017b), (FCC, 2016) and has plans to use a similar revenue sharing formula to

compensate satellite carriers for expedited departure from frequencies in the 3.7-4.2 GHz portion of the so-called C-band (FCC, 2020a), (FCC 2020b) (FCC, 2020c) (FCC, 2020d).

Despite WRC's reputation for slow deliberation, WRC-19 included several proactive initiatives that reached closure on spectrum allocations and operational recommendation well before entrepreneurial ventures expect to migrate from test and demonstration projects to offering commercial service (ITU Press Release), ITU News (2019 Nov. 22), (ITU News, 2019a Nov. 20), (ITU News, 2019b Nov. 20). The conference identified additional frequency bands for High Altitude Platform Station (HAPS) systems (ITU 2019a) that will provide signal relays, located in the stratosphere around 20 kilometers above earth, for broadband access by users in a large geographical area, including remote locales with small populations. The conference also addressed technical coordination issues for mobile satellite broadband transceivers (ITU, 2019b), Additionally, WRC-19 provided timely guidance on how nations can coordinate the launch and operation of small satellite constellations, numbering in the hundreds or more, operating in low earth orbits (ITU News, 2019b Nov. 20).

WRC-19 Winners

The winners at WRC-19 benefit from the conventional ITU spectrum planning process and include both incumbents and newcomers willing to work within known constraints in longstanding international "rules of the road." These limitations require perseverance in advocating positions presented by national delegations primarily comprising government officials with portfolios in technology management and international affairs. U.S. delegations are led by an Ambassador-level chair who works within the State Department and coordinates with delegates from other government agencies, such as the FCC and the Commerce

Department's National Telecommunications and Information Administration, as well as private industry.

As a consensus-driven organization, the ITU must sacrifice efficiency and timeliness in the quest to reach global agreements among its 193 Member countries and more than 800 non-Member state entities, including private companies and academic institutions. While some of the organization's actions are recognized as having the same legal standing as a treaty, much of what it does relies on voluntary cooperation to seek the common good. Accordingly, WRC-19 winners include both incumbents and newcomers willing to play the "long game," by embracing rather than trying to circumvent the lengthy process of formulating positions, advocating them before the conference with governments in nearby and far off locations. An appreciation for the status quo may come across as cavalier and insensitive to the upside opportunities accruing from streamlined and expedited administrative procedures. Nevertheless, the conventional ITU conference procedure has passed the test of time and has delivered positive, albeit incremental, progress.

Patient stakeholders reap ample dividends. For example, WRC-19 legitimized the role of low earth orbiting ("LEO") satellite carriers, recognizing their status as a new type of fixed satellite service provider, separate from legacy providers operating in geostationary ("GEO") orbits 22,300 miles above earth. ² This recognition provides LEO carriers with the right to coordinate their satellite constellations on an equal footing with GEO satellites. It took considerable time for later in time LEO ventures to secure official ITU recognition, but the effort

² "A stable regulatory framework was defined for non-geostationary satellite orbit (non GSO) systems based on a milestone process enabling mega constellations to rapidly come to fruition. This will ensure that more affordable means of connectivity can be offered to citizens of all countries" ITU News Magazine, p. 19 (2019).

will prove worthwhile. LEO operators no longer will have to negotiate as subordinates vis a vis GEO satellites. Legitimacy at the ITU can translate into greater commercial viability and in turn better odds for operational success, because the potential to encounter or cause harmful signal interference will diminish significantly going forward.

The ITU's conferral of legitimacy also extended at WRC-19 to the concept of an Internet of Things, a large array of sensors, devices and other types of equipment providing infrastructure for the information society (ITU, 2017a). WRC-19 allocated a large swarth of spectrum at extremely high frequencies optimized for short distance, low latency links that Internet sensors and devices will use.

WRC-19 Losers

The losers at WRC-19 include incumbents burdened by having to make do with less exclusive or shared spectrum in light of the large blocks of frequencies reallocated for 5G services. Some incumbents face a largely symbolic loss, because they can free up spectrum ("band clear") without significant inconvenience and cost, while also compressing their actual frequency use ("repack"). Additionally, U.S. UHF television broadcaster and C-band fixed satellite carriers have, or will soon qualify for billion dollar financial inducements to dissuade them from asserting legal, moral and public service arguments for maintaining their frequency assignments.

On the other hand, some incumbents will incur significant and probably uncompensated costs in having to share or abandon spectrum. In the worst case scenario, an incumbent becomes dislodged from "mission critical" spectrum and forced to relocate to a different, probably higher frequency band. For example, military and weather forecaster users of C-band spectrum have balked at the prospect of having to relocate to higher satellite frequencies. The C-band spectrum

has favorable propagational characteristics particularly for maritime users operating in rainy, tropical locations. Moving to higher frequencies adds risks of so-called rain fade, when moisture reduces or eliminates the ability to transmit and receive possibly mission critical traffic.

ITU delegations, dissatisfied with the pace of progress and the emphasis on consensus building and harmonized, global spectrum allocations, also did not fare well. The U.S. in particular, experienced now familiar push back from other delegations unwilling to embrace an expedited 5G spectrum reallocation agenda covering a broad range of low, middle and high Gigahertz: frequencies below 1 GHz, e.g., the UHF television band at 600-700 MHz; between 2-6 GHz, e.g., portions of the fixed satellite C-band, and largely unused, millimeter wave (mmWave) spectrum in double-digit GHz frequency bands such as 24.25-27.5 GHz, 37-43.5 GHz, 45.5-47 GHz, 47.2-48.2 and 66-71 GHz allocated at WRC-19.

Despite significant, albeit incremental progress at WRC-19 an FCC Commission in attendance offered the following lament and provocative proposal:

Despite meeting some of our goals to a certain extent, WRC-19, like WRC-15, raised some fundamental concerns that ultimately call into question the continued value of future conferences. In particular, it was very evident that certain foreign delegations were sent with clear directions to oppose the United States and other forward-thinking nations. This appeared, from my viewpoint, to be done for larger geo-political purposes and to protect domestic industries from competition from U.S.-based companies. . . . And, such conduct went far beyond normal negotiation strategy, serving to further sour many other participants' perspectives regarding the value of WRC and, more fundamentally, the ITU itself.

It should be commonly accepted that international spectrum harmonization, especially in a 5G universe, is incredibly valuable. It must not, however, come at the expense of U.S. interests and those of like-minded countries. . . .

[T]he U.S. is not without options if certain member nations of the ITU continue to disrupt existing processes and slow progress towards a next-generation wireless world. Consider what would happen to the

organization if the United States worked with Japan, which happen to be the ITU's two largest funders, to force change or even cut off annual funding. Ultimately, we should not let ourselves be obstructed by rogue nations that have little interest in global wireless development or are willing to undermine progress for purposes of a larger self-interested agenda. This is one reason I think the U.S. should explore the formation of a G7-like organization or loose coalition of leading wireless nations, as an alternative to the ITU (O'Reilly, 2019).

FCC Commissioner O'Reilly, and former FCC Chairmen from both political parties ³ have advocated a multi-faceted “go it alone” campaign that few nations have the legal capacity, or inclination to embrace. Instead of adhering to the tradition of methodical and incremental spectrum planning, the United States now has opted to act unilaterally with an eye toward speedy completion of domestic spectrum reallocations and auctions, well before the ITU completes its work and nations can follow through with domestic spectrum reallocations and assignments.

U.S. unilateralism risks push back from other nations, particularly during times when stakeholders and the U.S. government appear willing to consider 5G global leadership as something worth pushing aggressively (Trump, 2019 Apr. 12), despite the potential for countervailing harms. Recently, the FCC has sought to restrict or deny domestic market

³ “Securing United States leadership in 5G is a national priority. . . . [C]ountries around the world are jockeying for global leadership in 5G. Whoever sets the pace globally will become the frontrunner in the development of the 5G ecosystem and attract the jobs, growth, and consumer benefits that come with that status. And I want the past to be prologue: I want America's success in 5G to match our leadership in 4G.

. . .
The goal of leading the world in 5G is too urgent, the need to close the digital divide too pressing for us to put off action indefinitely. The time to act is now. And we are acting (Pai, 2019).

“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.” (Wheeler, 2016 p.3).

opportunities for non-U.S. 5G equipment manufacturers (Trump, 2019 May 15), (FCC, 2019c) and carriers (FCC, 2020e Apr. 27), (FCC, 2020f Apr. 24), (FCC, 2019d) ostensibly on national security grounds (FCC, 2020g June 30) (FCC, 2020h June 30).

Mixed and Longer Term Impacts

Non-U.S. UHF television broadcasters fit in the category of incurring mixed, or not yet occurring impacts from WRC-19. While the FCC has created financial incentives for domestic incumbents to vacate, share, band clear and repack (FCC, 2017a), (FCC, 2016) (FCC, 2014), most nations have not done so thereby bolstering the resolve of UHF broadcasters, outside the U.S., to resist incentives for expedited clearing of their spectrum for 5G. Recognizing the controversial nature of any UHF spectrum reallocation, Member nations opted to postpone consideration until 2023 (WRC-15, Resolution 235).

Currently, it appears that the FCC's incentive auctions of UHF spectrum have generated a first mover boost for 5G expanded spectrum use in the U.S.. However, it remains unclear whether other nations will adopt the FCC model and in so doing generate increased motivation for the ITU-23 to reallocate the 600-700 MHz frequency band for 5G, thereby harmonizing the future use of this spectrum on a global basis. If nations balk, perhaps because UHF incumbent broadcasters retain significant political clout with government decision makers (World Broadcasting Unions, 2018), WRC-23 may not follow the FCC's lead.

Longer term consequences of incompatible spectrum allocations can have harmful impacts on consumers, equipment manufacturers and the ITU. A single wireless handset may not support all frequency assignments thereby depriving consumers the ability to "roam" globally and manufacturers the opportunity to accrue scale economies by producing equipment

usable throughout the world. Fragmented production lines may increase the cost of handsets and the proliferation of chipsets may add weight and increase battery drain.

The ITU risks losing some degree of relevancy and legitimacy, if Member states see greater benefits in unilaterally making domestic spectrum allocations. If nations no longer patiently wait for one or more WRCs to complete intergovernmental coordination and consensus building, the probability falls for a uniform spectrum allocation in all nations. If more nations see the upside benefits in making domestic spectrum allocations and conducting auctions, without regard to the status of intergovernmental coordination, then the perceived need for a single, global forum may decline.

It is quite unlikely that FCC Commissioner O'Reilly's proposal to create a new spectrum planning coalition of a few major developed nations in lieu of the ITU forum for 193 nations. However, the combination of sanction-free unilateralism, with no readily apparent short term harm, may embolden the U.S. government to expand its disregard for the intergovernmental "rules of the road" it was instrumental in creating.

Conclusions

National governments and private stakeholders regularly question the efficacy, efficiency and motivations of the ITU and its senior managers. Spectrum planning constitutes a difficult, often tedious and time consuming endeavor, often resulting in both winners and losers. Despite growing technological ways for multiple users to share the same spectrum without harmful interference, no incumbent likes being forced to make do with less, particularly without the financial inducements offered by the FCC to reduce the dislocation.

The ongoing campaign to satisfy the nearly insatiable demand for wireless video and other 5G-mediated applications increases both the financial stakes involved and the sense that

governments are performing far slower than what marketplace forces could achieve. On the other hand, most national governments recognize that radio spectrum has certain characteristics that differentiates it from products and services easily bought and sold. Even though some national governments have used auctions to squeeze out monetary value for some wireless services such as mobile radio, the majority continue to exempt many uses from marketplace resource allocation. National defense, space exploration, national security, satellite orbital slots and public service broadcasters typically qualify for dedicated spectrum assignments free of competitive bidding. While national governments can and will force incumbents to clear frequencies and repack spectrum use, a grand migration to market-based spectrum allocation does not appear forthcoming.

Put another way, U.S. experimentation with a market driven process can and will occur, but not to the point where the ITU has no remaining mission and relevancy. Arguably, developing trends appear likely to generate greater needs for the “good offices” of the ITU to serve as a usually fair minded forum for conflict avoidance and equitable resolution of disputes. Bear in mind that 5G applications will involve a variety of industry segments that heretofore have not used radio nor participated in the ITU. New players include manufacturers of autonomous vehicles, Internet of Things monitors and sensors, and devices that improve the provision of financial, government, educational and other services.

Additionally, one cannot dismiss the likelihood that the ITU and in particular, its spectrum management mission, will be subjected to new stressors having little to do with optimizing technology and harmonizing frequency allocations. Rarely does a day pass without some reference in the media about the importance of 5G in terms of trade, national security and industrial policy. If a nation so prioritizes 5G global market dominance, and spectrum constitutes

a key medium for 5G service, then it seems likely that what the ITU does will become even more essential and subject to greater scrutiny. As the stakes increase at ITU conferences, a wise national government doubles and redoubles its preparations.

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