Thoughts from the Spectrum Americas Conference

On October 1st-2nd, the annual Spectrum Management Conference, organized by Forum Global, took place in Washington D.C. It covered a wide scope, mostly via detailed panel discussions, on topics such as CBRS, WRC-27 goals, spectrum sharing, satellite networks and spectrum for 5G Advanced and 6G.

Speakers came from a diverse range of organizations, including FCC Commissioners Gomez and Carr; industry associations such as CTIA, NCTA, GSMA, and GSOA; and companies such as Verizon, Nokia, Qualcomm and Amazon's Project Kuiper.

There were too many themes covered to discuss in a single article, but one repeated question was of particular importance to discussions around spectrum sharing: Will the FCC return to auctioning new spectrum bands for high-power, exclusive use once it regains authority? Or will it pivot further to new methods of spectrum allocation and assignment, either with smaller, focused auctions, or other mechanisms such as a "price lists" for chunks of spectrum shared in time or location?

Unsurprisingly, much of the discussion hinged on the concept of a "pipeline" of spectrum bands being lined up for auctions, primarily aimed at existing carriers for exclusive high power use. As seen before with C-band and other releases, this involves clearing existing incumbent users, and then organizing bidding for access to the new frequencies. Yet in many ways, the industry – and the US in general – would be better served by a smart and precise "spectrum sprinkler," delivering the right amount of frequencies at the appropriate places and times.

In that spirit, Commissioner Gomez noted that "*CBRS has demonstrated that shared spectrum schemes are not only possible, but successful, and can scale up to incorporate developments, protect incumbents, create more access, and encourage new market entrants.*"

The CTIA and mobile industry – and some on Capitol Hill – seem very keen to return to that cycle as rapidly as possible. They are especially keen to see movement on the 3.1-3.45GHz and 7.1-8.4Ghz bands identified as possible options in the National Spectrum Strategy.

Other stakeholders are more oriented towards a methodical process of analyzing the needs of the incumbent users (primarily the DoD), and investigating new dynamic sharing options, including the "moonshot" research and trials promised by NTIA. There is also a suggestion that more unlicensed spectrum would be useful, after the 6GHz band is put to more intensive use.

The first group of "mobile traditionalists" want policymakers to adopt an attitude of "perfect is the enemy of good" and focus on well-known 5G models and eventual transition to 6G, while the latter take the stance of "if a job's worth doing, it's worth doing well".

What was absent from the conference was any form of real analysis and argument about why such spectrum (or a pipeline of it) was actually required for 5G or especially 6G,

particularly for wide-area high-power exclusive use. There is a fundamental non-sequitur between assertions of mobile usage and the assertion that "therefore more spectrum is needed."

Most of the arguments seem to boil down to cliches such as:

- "Other countries are providing more spectrum for 5G, so we should too."
- "6G will need new frequencies, because that's how new G's work."
- "It's vital for competitiveness."
- "Overall aggregate traffic is growing, so obviously more spectrum is needed."
- "New use cases such as AI and XR mean that 5G needs more spectrum."

There is at least one, and perhaps two or three missing links in each of those assertions, especially for a logical leap to a demand for exclusive and high-power spectrum for wide-area use.

While it's unreasonable to expect anyone to pinpoint a future "killer app," pipeline advocates struggle to even offer meaningful commentary about *where* future significant traffic growth might come from – or indeed, where recent growth has come from. This is important as it helps determine what frequencies would be most useful, where the "pressure points" lie and how applicable sharing or low/medium power alternatives would be.

For instance, there's a huge difference between spectrum choices optimal for:

- Vehicular applications, which need high capacity and high mobility / handover, so ideally fairly good range and coverage. This includes a mix of connections for the vehicle itself, plus passengers / drivers.
- Outdoor and simple indoor use (for instance in a café), typically on a smartphone or other personal device.
- Indoor use inside public venues (e.g., stadiums or airports) or business premises such as offices and factories.
- Indoor use at home, where broadband + Wi-Fi is likely to be easily available.
- Fixed-wireless access (FWA), either to an external terminal or one inside a window.
- Aviation, rail or maritime use, including ships, aircraft, drones or trains.

All of these have very different radio requirements and external trends, which translate to different spectrum appropriateness. For example, increasingly well-insulated buildings are hostile to radio propagation through walls and windows, either from a cell-site towards indoor users, or especially from a handset transmitting to an outdoor receiver. However, they are good for higher levels of "frequency reuse," as it is comparatively easy to install many small-cells or radio elements.

In developed markets such as the US and most of Europe, growth of normal mobile broadband traffic for smartphones has flattened off, despite the widespread adoption of unlimited data plans. What the retail industry calls "like-for-like" growth is now trending

down towards 10% per year or lower[1][2]. While CTIA cites overall growth in volumes, our analysis suggests the bulk of this comes from FWA, not mobile broadband. Even China, despite an over-abundance of licensed spectrum, is now at 8% per-user data growth, with its largest operator China Mobile reporting Q2'2024 handset data as less than 1% higher than Q2'2023[3][4].

However, the top-level aggregate traffic data carriers often cited at major conferences and in regulatory filings masks the important detail needed for good spectrum policy. In other words, we are not asking the right questions about the data. Instead, it is becoming increasingly clear that 6G development – while very important – is largely being driven by equipment manufacturers wanting another refresh cycle and its attendant capex, rather than by actual or projected demand trends.

Meanwhile, most carriers in North America and Europe are saying that they would prefer 6G to appear rather later than expected – say, 2032 rather than 2028-30 – as they are still hoping to benefit from returns on their 5G investments, which have been lackluster (at best) so far.

Various commentators and analysts have started debating whether 6G will actually be more aimed towards near models of service delivery, rather than today's wide-area, full-power coverage. There seems to be more appetite for 6G offering high-performance enterprise private networks, integrated terrestrial and satellite coverage, low-energy consumption shared infrastructure and better indoor service provision.

All of those – as well as more futuristic concepts such as combined communications and sensing – would use a very different pattern of spectrum availability.

In summary, carriers' urgent demands for a "spectrum pipeline" fail to include any specific, granular detail illustrating exactly where they currently face constraints. Data traffic growth is slowing and becoming much more localized. The mobile industry's reliance on top-level soundbite numbers and non-sequiturs seems aimed at distracting policymakers from this lack of real demand.

On the other hand, 6G needs far more clarity on timelines, likely industry structural trends and broad stakeholder needs, before a spectrum strategy can be explored. It is quite possible that today's model of national carriers and undifferentiated, wide-area networks will stay on 5G, with other approaches more relevant to 6G until the mid-2030s.

We shouldn't rush into 6G with old spectrum models in mind because they are familiar and have generated some measure of success in the past. The spectrum needs of tomorrow demand a closer look, including models of sharing. We should wait for a proper analysis of 6G, as well as experiments with new "moonshot" approaches to coexistence. Let's get it right.

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[1] https://www.linkedin.com/posts/luke-kehoe_5g-fwa-ran-activity-7254009261976907776-5CVr
[2] https://www.linkedin.com/pulse/end-telecoms-history-william-webb-1xzqe
[3] https://techblog.comsoc.org/2024/07/26/chinas-mobile-data-consumption-slumps-apples-china-market-share-shrinks-no-longer-among-top-5-vendors/
[4] https://www.chinamobileltd.com/en/ir/operation_q.php?year=2024&scroll2title=1