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Wireless Industry Voices—Rysavy: Bad idea of nationalized 5G network put to rest

by *Peter Rysavy* | April 15, 2019

The government has enough difficulty maintaining the country's physical infrastructure of highways, bridges, and train tracks; how was it going to deploy some of the most advanced technological infrastructure ever invented? (Pixabay)

Originally published at: **https://www.fiercewireless.com/wireless/industry-voices-rysavy-bad-idea-a-nationalized-5g-network-put-to-rest**

On April 12, President Trump articulated the sensible approach that industry, not the government, should deploy 5G, ending speculation of the government proceeding with a nationalized 5G network.

The idea of such a network has floated around government circles since last year, when it ignited a panic in the wireless industry. Supporters of the plan believed this was the best way of countering China, which has **made deploying 5G a national priority**. Last year, Axios disclosed **preliminary details of the plan**, which focused on using 3.7 GHz to 4.2 GHz midband spectrum (C-band). A nationalized network, however, would have presented so many problems that it actually would have harmed U.S. chances for succeeding with 5G.

As the first country to deploy 4G widely, the U.S. has dominated in mobile computing. Similarly, first-to-5G will not only benefit the wireless industry but will also advance a technology ecosystem for AI, autonomous cars, advanced healthcare, smart manufacturing, drones, smart cities, and yet-to-be-invented innovations. Thus, a national priority for 5G deployment is justified.

What the plan overlooked, though, is that each major U.S. operator is already deploying 5G, with service now available in limited areas and rapid expansion expected. Given each operator's unique set of assets, such as spectrum, towers, and fiber, each is pursuing a different 5G strategy, which is logical given that 5G supports a wide number of use cases and business models.

Operators have vast expertise and capabilities in deploying radios, antennas, and other equipment across tens of thousands of cell sites and within their core networks. In contrast, a government-led effort with none of these capabilities would inevitably have proceeded at a sluggish pace. First, the FCC still has to determine a plan for accommodating the satellite industry, **which is the primary current user of C-band**. This process will likely take at least two years. Second, the government has no expertise, resources, towers, or readily available fiber to connect tens of thousands of sites, or an agency to manage such an effort.

The government has enough difficulty maintaining the country's physical infrastructure of highways, bridges, and train tracks; how was it going to deploy some of the most advanced technological infrastructure ever invented? And where would the many tens of billions of dollars come from to build the network? In addition, inevitable disagreements between political parties and different government agencies would have further delayed the process.

Even if by some miracle, government could have deployed a national 5G network and leased capacity to operators, the technical benefits were questionable. One of the incorrect claims was that users would experience better performance than if the midband spectrum were allocated in multiple blocks to multiple operators. In any real-world scenario with dozens, if not hundreds, of users active in each cell, aggregate cell throughput is purely a function of total spectrum. Whether that spectrum is allocated to just one government network or to three or four operator networks is irrelevant. In both cases, users will obtain similar sub 1-Gbps throughput rates. Higher throughputs are the domain of mmWave (24 GHz, 28 GHz, etc.) bands, not C-band.

Even worse, operators accessing a government network would have had limited access to cellular innovations that are crucial to a good end-user experience, such as dual connectivity and carrier aggregation. Dual connectivity refers to simultaneous 4G LTE and 5G radio connections, with LTE in lower bands providing continuous coverage and 5G providing enhanced throughputs. With a more fragile radio connection at a higher-frequency 5G connection, the lower-frequency LTE connection means user applications won't stall if a 5G connection suddenly drops. Such dual connectivity, however, would have required an operator core network to couple with both its own radio access

network and the government RAN. Such tight integration involving multiple commercial networks would have been extremely complex. Furthermore, 5G has multiple architectures for combining LTE and 5G operation, with different operators pursuing different 4G-to-5G migration strategies, making such integration yet more complex.

In addition, carrier aggregation, by which operators combine different bands for higher throughputs, is a key innovation for both LTE and 5G that wouldn't have worked at all. Because carrier aggregation is implemented at a low radio level (medium-access control layer), operation is restricted to a single operator. An operator with its own C-band spectrum will be able to combine other bands with C-band and even unlicensed spectrum to deliver outstanding performance, but with a government-operated 5G network, such optimization would have been out of reach. The net result is that users would have suffered with not only lower average throughputs but also less reliable connections.

Another claimed benefit was that a government-operated network would have been more secure, but 5G already has a **comprehensive security architecture**. Any security innovations available to government are available to industry, and a single government network ultimately represents a single point of vulnerability compared to a distributed multi-operator system.

Government, however, can contribute hugely toward 5G, not by building a network, but by continuing with its mmWave auction plans, enabling at least 300 MHz of **spectrum in C-band for 5G**, maintaining a sensible balance of licensed and unlicensed spectrum, and continuing to remove barriers to small-cell deployments. The latter is especially important if 5G is to move industry from the current quarter of a million cell macro sites deployed in the U.S. to an **additional million small cells that 5G will need by 2030**. For government to pursue a nationalized 5G network, however, would have been folly, if not disastrous. Let's hope that this bad idea has truly been put to rest.

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