



Response to Notice of National Spectrum Strategy Implementation Plan Request for Input to the NTIA

Celona is a US based company providing industry's first AI-powered localized 5G Network Platform with a comprehensive software suite. Our innovative end-to-end solution includes all the necessary components of a localized 5G network including Radio, Core Network and Network Management Systems to provide indoor and outdoor 5G cellular coverage using private or local spectrum such as CBRS band. Celona is a pioneer and innovator of enterprise private wireless solutions. The company is credited with developing the first turnkey 5G LAN system that enables companies, for the first time, to own and operate their private wireless infrastructure. Its products and technology help organizations accelerate the adoption of business-critical applications and use cases to support a new generation of Industry 4.0 digital business initiatives.

Celona is pleased to offer comments to the Notice of National Spectrum Strategy Implementation Plan Request for Input to the National Telecommunications and Information Administration (NTIA) seeking information to expand the use of 3500 MHz of the desirable mid-band spectrum. The NTIA wants to explore the expanded terrestrial use of the band, particularly fueling the enterprise ecosystem beyond the current users on the 3.1-3.45 GHz and mobile broadband. Celona would be happy to offer support to help NTIA with any further details.

Disclaimer: please note that our responses to the RFI herein are for informational purposes only, and do not bind or commit Celona Inc or NTIA in any way.

A shared-license framework of the lightly used 3.1 GHz band (3.1-3.45 GHz) is very suitable if the NITA decides not to relocate the incumbent users to other bands. In doing so, the NTIA can propose a spectrum use coordination system designed to mitigate the interference between incumbent users. The Spectrum Access System (SAS) and Automated Frequency Coordination (AFC) framework have proven immensely successful in other bands, like Citizens Broadband Radio Service (CBRS) and unlicensed sharing of the 6 GHz band.

The US has been a significant player in the Wi-Fi market, driven by technological advancements, widespread adoption, and company innovation. However, China has made substantial progress in the cellular front, leading the cellular market. The Chinese government has been actively supporting the rollout of 5G networks. To lead the private 5G market worldwide, the US must consider spectrum policies that allow for allocating and sharing suitable frequencies for private 5G networks. Opening up shared spectrum options can promote innovation and competition in the 5G market.

5G technology has the potential of transforming many industries. Over the last few years private 5G established itself as a transformative technology. Within many enterprises and industries around the world, we've seen private cellular networks solve critical and long-standing issues that other wireless alternatives simply can't solve. For many enterprise verticals, private 5G services are no longer a nice to have but have become a strategic component for transforming business operations. In the US we witnessed the adoption of private wireless significantly accelerate thanks to the CBRS band. Leveraging the CBRS spectrum, Celona's wireless solution delivers unprecedented range and predictability of operation to mobile devices and IoT infrastructure for smart cities, schools, colleges, enterprises, and industrial settings such as factories, ports, and warehouses. These and other verticals have begun deploying private 5G networks to achieve cost-effective operational efficiency, safety, and productivity that is not achievable by exclusively licensed or fully unlicensed spectrum. As a result, the private 5G network market will grow exponentially, with an estimated revenue of USD 41 billion by 2030. Most Fortune 500 US companies invest in private 5G to deploy sensors, interconnected devices, IOTs, and AGVs, targeting increasingly sophisticated automation processes using AI and ML. If this trend continues, the 150 MHz CBRS spectrum available today cannot adequately handle the density of private 5G deployments. Therefore, we believe the NTIA should adopt shared spectrum models that are more frequency-coordinated and in the desirable mid-band frequency, like 3.1 GHz.

Celona urges the NTIA to continue to adopt spectrum-sharing models that can bring high-speed, low-cost broadband to enterprises. Firstly, we propose that inside the DoD facilities, the DoD should be the sole owner and operator of the localized 5G network to ensure security and proper network performance. Although there are sophisticated mechanisms implemented for the CBRS band with SAS with a three-tiered sharing mechanism, we suggest using a simpler and more robust Dynamic Spectrum Management System (DSMS) mechanism instead.

We propose that DoD maintains a secure and private database of DoD facility locations, stationary and airborne radars, including specific information about the base stations (RAN) that operate in the 3100-3450 MHz band (such as the locations, transmit power settings, antenna height, and orientation, etc.). If a civilian entity wants to use the spectrum (e.g., outside of DoD facilities), the specific equipment (e.g., base station) should communicate directly with the DoD database with the specifics of the equipment including the location, antenna parameters as listed above), and the time required. Then, primary DoD devices should be protected from harmful interference via SW mechanisms such as RF propagation models for the specific secondary equipment under consideration. These models would automatically determine the available spectrum for the specific secondary device in the requested location with certain restrictions on the transmit power or specific spectrum channels such that it does not create any harmful interference to primary (i.e., DoD) devices.

This spectrum management system described above can be operated by DoD or certified third parties. If, in the future, DoD wants to have new deployments beyond the reserved, DoD should have the right to use the spectrum as the primary user, and existing civilian entities that were previously allowed to use the spectrum in that specific location must move to any other available channel not used by DoD. In such cases, we can use techniques developed for the CBRS band to suspend and move lower-priority users to "remaining" spectrum channels. Also, for "**very low power**" base stations deployed indoors (such as residential use cases), we propose that the spectrum coordination requirements be relaxed. The specific power levels for these "**very low power indoor**" devices can be determined in future phases based on detailed analysis to ensure no impact of DoD devices. Such an approach can enable many indoor 5G deployments in the US today without the burden of detailed CBRS SAS requirements.

With the use of techniques already developed for the CBRS band and by leveraging the computational power provided by modern cloud architecture, the above DSS mechanism can be automated and performed dynamically by giving full control and priority to DoD for the 3100- 3450 MHz spectrum wherever and whenever it is needed.

As mentioned above, the 3.1 GHz band has great potential for shared use. When the FCC opened the CBRS spectrum, it enriched the 5G ecosystem and innovation among enterprises, community anchor institutions, and several smaller Wireless Internet Service Providers (WISPs) who wanted to break free from proprietary systems and create their private networks.

Similarly, opening the 3.1 GHz band under a DSMS architecture will enable multiple categories of users ideal for deploying the latest technological advancements, closing the digital divide, and creating new opportunities and innovation throughout the nation.

Celona does not advocate sunseting or relocating incumbent users but instead supports coexisting with the incumbents through a DSMS model. At the same time, Celona appreciates the need for a two-tier sharing scenario with incumbents, ensuring that secondary users do not interfere with incumbent operations. Ultimately, coordinated shared access to the band avoids the cost of disrupting, delaying, or relocating incumbents and also makes the band available for many verticals and enterprises mentioned above.

Celona is also interested in collaborating with the DoD for testing, innovation, and investigating sharing at low-medium power as a part of a testbed effort, where we can provide devices and base stations that support the 3.1 GHz to assess the viability of shared spectrum use. Real-time experimentation allows for practical insights and helps identify the potential challenges and opportunities to identify the various use cases.

Celona encourages the NTIA to expand the usage of 3.1 GHz as this band holds enormous potential for more intensive use. The next generation of wireless technologies will be more than just mobile broadband: digital transformation of businesses and services focusing on the orchestration and automation of processes will be key verticals that will benefit from access to spectrum licensed under rules similar to CBRS. Further delaying in usage of 3.1 GHz spectrum for the development of 5G will pose an unacceptable risk and threat to the United States national security. Hence, there is an urgency to make the spectrum available for sharing sooner than later.

Sincerely,

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