



April 19, 2024

The Regulatory Body for Electronic Communications and Postal Services (RATEL)  
Višnjićeva 8, Beograd 11000, Serbia

RE: Public Consultation on the Draft Regulations on the Conditions of Allocation and use of the  
Radio Frequency Spectrum

To Whom It May Concern:

Starlink d.o.o. (SpaceX) appreciates the opportunity to provide brief comments in response to The Regulatory Body for Electronic Communications and Postal Services (RATEL)'s Public Consultation on the Draft Regulations on the Conditions of Allocation and use of the Radio Frequency Spectrum in Serbia. Next-generation satellite constellations, like SpaceX's, play an essential role in meeting the connectivity needs of the modern economy, bringing high-quality broadband to Serbian residences, businesses, and industries. Among many other uses, high-speed, low-latency satellite broadband will close the digital gap for communities; connect schools and hospitals; unlock rapid emergency and disaster response; and transform industry verticals, including maritime, aviation, and ground transportation. To fully realize these benefits, SpaceX recommends RATEL consider the below best practices for next-generation satellite systems as they contemplate an updated regulation on the conditions of allocation and the use of radio frequency spectrum.

### **Background**

SpaceX is a private company founded in 2002 to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. SpaceX has achieved a series of historic milestones and is proud to have become the first private company in history to send astronauts to orbit, safely returning them to Earth.

SpaceX is leveraging its accumulated expertise in space system manufacturing, design, and operations, to develop Starlink, a constellation of satellites designed to provide high-speed, low-latency, competitively priced broadband service to locations across Europe and anywhere around the globe. SpaceX's first-generation constellation consists of non-geostationary orbit (NGSO) satellites and extensive ground infrastructure employing advanced communications and space operations technology. Starlink is designed to make efficient use of radio spectrum resources by optimizing its ability to flexibly share spectrum with other licensed satellite and terrestrial users, including through advanced beam-forming and digital processing technologies. SpaceX currently links satellites to the customer user terminals in the Ku-band for both uplink and downlink frequencies, with gateway links in the Ka-band and the E-band (70/80 GHz).



## **Spectrum Access**

Access to adequate spectrum is critical for the deployment of any communications technology, including satellite broadband. SpaceX urges RATEL to make as much spectrum available for fixed satellite earth stations as possible in order to maximize the value of satellite networks for consumers, including in rural and remote areas. To start, SpaceX suggests focusing on opening bands where the fixed-satellite service currently enjoys a co-primary allocation—including within the Ka-band (17 – 40 GHz), Q/V-band (33 – 75 GHz), and E-band (71-76 GHz / 81-86 GHz).

## **Ku-Band Spectrum**

SpaceX applauds RATEL's alignment with the current Electronic Communications Committee ECC/DEC/(17)04 for the harmonized use and exemption from individual licensing of fixed earth stations operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz and ECC/Decision/(18)05 on the harmonized use, exemption from individual licensing and free circulation and use of Earth Stations In-Motion (ESIM) operating with NGSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz.

Adoption of these forward-looking regulatory frameworks will promote efficient, widespread deployment of user terminals to meet consumer demand in Serbia without the cost and administrative burden of individual earth station licensing, allowing next-generation satellite operators, like SpaceX, to serve customers immediately with high-speed internet.

SpaceX encourages RATEL to ensure that this critical spectrum remains license exempt in Serbia under the ECC decisions listed above.

## **Ka-Band Spectrum**

SpaceX uses spectrum in the Ka-band (17-19 GHz and 27.5- 30 GHz) to backhaul user traffic from the satellite to the internet. SpaceX asks RATEL to ensure that this spectrum, for which FSS enjoys primary allocation, continues to be made available in Serbia at low cost for critical ground infrastructure operations. SpaceX also encourages RATEL to ensure these critical services are appropriately protected from emissions in adjacent bands (like 26 GHz). This could be achieved by contemplating reasonable out-of-band emissions limits to ensure protection of incumbents in adjacent bands, as set forth in ECC Decision (18)06. RATEL should ensure that any new spectrum authorizations for mobile services do not constrain satellite services from taking advantage of the full band for which they are authorized to allow Serbian citizens to get the maximum benefit from next generation satellite services.



## E-band Spectrum

To meet evolving consumer needs for high-speed broadband service, SpaceX is currently launching and deploying its next iteration of its Starlink commercial satellite service. This next-generation technology includes upgraded end-user terminals, new satellite technology, and improved gateway ground stations that will provide customers with even higher speeds. For example, ground stations in this next generation of deployment will be able to use 71-76 GHz and 81-86 GHz frequencies (the “E-band” or “70/80 GHz bands”) for gateway communications and will support higher capacity and faster speeds for the Starlink network. SpaceX encourages RATEL to consider allowing satellite use in the 70/80 GHz band, in line with the ITU table of frequencies, where the E-band is allocated to Fixed Satellite Services on a co-primary basis.

To maximize the value of these bands for Serbian consumers and businesses, SpaceX encourages RATEL to implement a process for the 70/80 GHz bands to accommodate both fixed links and narrow “pencil beam” fixed-satellite service gateways in a common light-licensing framework. This simple framework would allow operators to register ground equipment on a first-come, first-served, site-by-site basis under a single set of technical rules, and would only require a minor adaptation of current rules and online processes. SpaceX believes reporting should be simple, consistent, and not require much administrative work on the part of the operator or RATEL. The most critical reporting metrics are the site or link location, and any relevant technical parameters as well as regular checks to ensure the site or link are still operational and have not been relocated.

This technology neutral approach would have several important benefits. Specifically, a multi-service light-licensing approach in higher frequency bands such as the 70/80 GHz bands enables a faster review and approval timeline by automating basic compliance and coexistence checks; reduces administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitates coordination between different co-primary services through a common platform; and promotes rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting people and businesses alike. This model could dramatically improve both the satellite earth station licensing process in Serbia while providing better connectivity for Serbian consumers.

In summary, RATEL should consider adopting a database-enabled, light-licensing framework for the 70/80 GHz band that enables all co-primary “pencil beam” services, including fixed-satellite service gateways, to use the band on a first-come, first-served basis. SpaceX recommends that this light-licensing framework have the following characteristics:

- **Link Registration Database.** SpaceX recommends that RATEL adopt policies and software-driven processes for links in the 70/80 GHz band that facilitate efficient network planning, coordination, coexistence, and rapid deploy to consumers. To that end, SpaceX urges RATEL to develop and publish a public database of 70/80 GHz links in Serbia—including links that have been deployed under the existing exclusive licenses—that enables meaningful analysis and self-coordination between users of the band.<sup>1</sup>

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<sup>1</sup> The database should include the latitude, longitude, altitude, and azimuth of the transmitting and receiving antennas and the radiofrequency properties of each link (e.g., center frequency, bandwidth, antenna input power density, antenna maximum gain, antenna gain pattern, receive noise figure, polarization).



- **Flexible Channelization.** RATEL should adopt a flexible channelization for the 70/80 GHz band consistent with the ITU and CEPT band plans that permits operators to aggregate channels up to the full 10 GHz band. Allowing larger channels will maximize the value of the band to consumers of both 5G mobile services and other networks by enabling higher capacity backhaul links without meaningfully impacting the interference environment.
- **Technology Neutrality.** RATEL should ensure that its 70/80 GHz framework accommodates emerging co-primary services on a technology neutral basis. To do so, The RÚ should add an allocation for the fixed-satellite service in the band and include fixed-satellite service gateways in the above-mentioned light-licensing framework on a technology neutral basis. This technology neutral approach would have several important benefits. Specifically, a multi-service light-licensing approach in higher frequency bands such as the 70/80 GHz band speeds review and approval time by automating basic compliance and coexistence checks; reduces administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitates coordination between different co-primary services through a common platform; and promotes rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting people and businesses alike.
- **Low Spectrum Fees.** Because links in the 70/80 GHz band create small, predictable coordination areas even when they use wide channels, one link almost never excludes another link from operating. Consequently, there is no reason to auction licenses for the spectrum or impose consumption-based fees. RATEL should ensure that its light-licensing framework includes low, flat fees assessed on an administrative cost-recovery basis. Low fees will allow operators to focus their limited resources on serving customers through network deployment and innovative service offerings.

### **V-band Spectrum**

SpaceX continues to explore innovative approaches to expand its service capacity, including exploring spectrum bands that are not traditionally used by satellite operators, including the 42 GHz band. In October 2023, The Federal Communications Commission (FCC) granted SpaceX a license to launch satellites capable of operating in the V-band: 37.5-42.5 GHz (space-to-Earth); and 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) (“V-band frequencies”). This license will allow SpaceX to augment its broadband service capabilities and leverage its next-generation (“Gen2”) satellite constellation for satellite internet users around the world.

As SpaceX deploys V-band satellites, SpaceX asks RATEL to make the above-listed bands available for next-generation satellite systems, like Starlink, to bring the benefits from this high-capacity spectrum to the people of Serbia. SpaceX will add V-band capabilities to satellites in its Gen2 system and leverage SpaceX’s existing ground equipment as well as add new equipment that aims to optimize performance for consumers.

As RATEL contemplates rules for use of the V-band, including spectrum sharing and licensing mechanisms, SpaceX urges RATEL to consider a licensing framework for satellite services in these bands that enables co-existence with other services, as contemplated in ECC Decision (22)06. SpaceX intends to use these bands to use the entire 37.5-42.5 GHz band to communicate between the Starlink



satellites and SpaceX gateway earth stations at a small number of locations in Serbia, not on a nationwide basis, making coordination between SpaceX and other users feasible. The availability of contiguous spectrum is critical for FSS gateway use, and while this consultation is focused on use of the range 40.5-43.5 GHz, SpaceX believes RATEL should more broadly support FSS assignment at specific locations in the 37.5-42.5 GHz range for space-to-Earth connectivity for next generation satellites in addition to supporting Earth-to-space communication in the ranges 47.2-50.2 and 50.4-51.4 GHz.

To facilitate spectrum sharing and co-existence in the V-band, SpaceX encourages RATEL to consider developing the multi-service light-licensing approach listed above as it will enable a speedy and efficient review and approval timeline through the implementation of automated basic compliance and coexistence checks. This approach would reduce administrative cost and labor associated with manual reviews for all but the most complex interference scenarios; facilitate coordination between different co-primary services through a common platform; and promote rapid deployment of ground equipment for high-speed, low-latency wireless networks, benefitting Serbian citizens, government agencies and businesses. This model could dramatically improve both the satellite earth station licensing process in Serbia while providing better connectivity for Serbian consumers and enterprises.

SpaceX encourages the development of a database for operators to register ground equipment on a first-come, first-served, site-by-site basis under a single set of technical rules that would only require a minor adaptation of current rules and online processes. To this end, SpaceX believes reporting should be kept simple, consistent, and not significant administrative work on the part of the operator or RATEL. The most critical reporting elements are the site/link location, relevant technical parameters as well as regular checks to ensure the sites or links are still operational and have not been relocated. This approach can facilitate co-existence between existing and future operators in the band.

SpaceX applauds RATEL for its on-going work on updating its national spectrum allocation regulation and welcomes the opportunity to work closely with RATEL as it develops frameworks for licensing and spectrum sharing in Serbia.

Please do not hesitate to reach out with any questions or for further information.

Sincerely,

A handwritten signature in blue ink that reads "Brett Tarnutzer". The signature is written in a cursive, slightly slanted style.

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