Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
Intelsat Inflight Licenses LLC	)	File No. SES-LIC-20201006-01096
	)	Call Sign E202171
Application for Blanket License to Operate Ka-Band Transmit/Receive Earth Stations Aboard Aircraft	)	

PETITION TO DEFER OR IN THE ALTERNATIVE IMPOSE CONDITIONS

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I. INTRODUCTION AND SUMMARY

In recent years, Verizon has invested significant financial and operational resources to bring its 5G Ultra Wideband to airports across the nation using Upper Microwave Flexible Use Service ("UMFUS") spectrum. Meeting the demands of airports and the travelling public is and will continue to be a key use case for the capacity and speed that UMFUS provides, as millimeter wave bands are ideal to support high-capacity networks in high-usage areas.[2] Airport travelers have high demand for data, including video streaming and downloads. In addition, airport vendors and airports themselves rely on high-speed coverage for M2M (machine-to-machine) and for airport enterprise operations, including maintenance, inventory, location tracking, scheduling, and security applications on the tarmac. The 28 GHz band, in particular, offers the high bandwidth, superior data transfer speeds, and low latency needed to support these intensive demands on 5G operations. Verizon has invested hundreds of millions of dollars to acquire 27.5-

[1] The Verizon companies participating in this proceeding are the regulated, wholly owned subsidiaries of Verizon Communications Inc.

[2] *See* Report and Order and Further Notice of Proposed Rulemaking, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, 31 FCC Rcd 8014, ¶ 7 (2016) ("*Spectrum Frontiers First R&O*").

28.35 GHz UMFUS licenses and has since deployed 28 GHz UMFUS base stations at more than 10 airports nationwide.

Intelsat Inflight Licenses LLC ("Intelsat") seeks a blanket license to operate aeronautical earth stations in motion ("ESIMs" or "A-ESIMs") with geostationary orbit ("GSO") Fixed-Satellite Service ("FSS") spacecraft using Ka-band frequencies, including the 28.35-28.6 portion of the 28 GHz band. If granted without conditions, Intelsat's A-ESIMs—which are intended to provide high-speed Internet to passengers *in flight*—will likely disrupt those same passengers' ability to use their 5G devices while in the terminal or at the gate, and on the airplane before departing and after arriving. Intelsat's ESIMs will also likely cause harmful interference to M2M and airport enterprise operations on the tarmac and in the terminal. Assuming Intelsat intends to operate its A-ESIMs in a manner that would cause these harms—it is impossible to tell based on the information in the Application—the Commission can protect 5G users and enable these two services to co-exist with only modest operational conditions on Intelsat's license. Accordingly, the Commission should require Intelsat to provide information demonstrating that its planned operations will not cause harmful interference to Verizon's subscribers and, if necessary, condition any grant of its Application to require adequate protection for 5G uses in the 27.5-28.35 GHz band.

II. BACKGROUND

A. U.S. Carriers Have Invested Significantly in the 28 GHz Band To Meet Increasing Consumer Demand for Wireless Services and Ensure U.S. Leadership in 5G Technology

Recognizing that American leadership in 5G requires making more spectrum available for the next generation of wireless technologies, the Commission has, in the last few years, made

auctioning high-band spectrum a priority.[3] In January 2019, the Commission concluded its first auction of 28 GHz UMFUS licenses, which raised more than $700 million.[4] The vast majority of that investment was by mobile carriers.[5]

Verizon, in particular, spent hundreds of millions of dollars to acquire its 27.5-28.35 GHz UMFUS licenses. And, since making that substantial upfront investment, Verizon has continued to commit significant resources to building its next-generation 5G network. Verizon's 5G Ultra Wideband is now available in more than 60 cities and, to expand its high-speed coverage, Verizon has deployed additional 5G cells inside high-concentration, high-demand areas, such as stadiums (including the site of the Super Bowl) and other sports and entertainment arenas. Airport coverage, too is an essential part of Verizon's 5G strategy because it provides high value to meet customers' needs and applications. To satisfy the growing demand for high-speed wireless services at airports, Verizon has deployed (and will continue to deploy) 28 GHz UMFUS base stations in 10 airports across the country, including major hubs such as Chicago

[3] *See id.* ¶ 94 (making more spectrum available for 5G wireless providers is necessary "to spark investment in 5G and significantly support deployment of new technologies that can enable high-data rate transmissions"); *see also* Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, 32 FCC Rcd 10988, ¶ 1 (2017) (taking "further actions in this proceeding to make available millimeter wave (mmW) spectrum, at or above 24 GHz, for fifth-generation (5G) wireless, Internet of Things, and other advanced spectrum-based services" to "ensure continued American leadership in wireless broadband, which represents a critical component of economic growth, job creation, public safety, and global competitiveness").

[4] Public Notice, *Auction of 28 GHz Upper Microwave Flexible Use Service Licenses for Next-Generation Wireless Services Closes; Gross Winning Bid Amounts Announced for Auction 101*, 34 FCC Rcd 75, ¶ 1 (2019); *see also* Mike Dano, *Here Are the Big Winners in the FCC's 24 GHz & 28 GHz 5G Auctions*, Light Reading (June 3, 2019) (explaining that Auction 101 generated more than $700 million in provisionally winning bids and listing total net payments due from top ten bidders), https://www.lightreading.com/mobile/5g/here-are-the-big-winners-in-the-fccs-24ghz-and-28ghz-5gauctions/d/d-id/751903.

[5] Combined, America's wireless companies will continue to invest more than $275 billion into building next-generation 5G networks. *See* Accenture Strategy, *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities* at 3 (Jan. 2017), https://api.ctia.org/docs/default-source/default-document-library/how-5g-can-help-municipalities-become-vibrant-smart-cities-accenture.pdf. Through infrastructure investment and innovative transformation of all sectors of the economy, "5G deployment will contribute $1.4 trillion to $1.7 trillion to US GDP and create 3.8 million to 4.6 million jobs in the next decade." *See* Boston Consulting Group, *5G Promises Massive Job and GDP Growth in the US* at 2 (Feb. 2021), https://api.ctia.org/wp-content/uploads/2021/01/5G-Promises-Massive-Job-and-GDP-Growth-in-the-US_Feb-2021.pdf.

O'Hare International Airport and Dulles International Airport, to serve the interior and passenger-used portions of the airport for 5G coverage.[6] Verizon has also deployed external 5G nodes to cover the tarmac areas for passengers and airport enterprise operations.

In the *Spectrum Frontiers* proceeding, the Commission created a carefully calibrated sharing framework for millimeter wave spectrum. Under the Commission's rules, Verizon's operations in the 27.5-28.35 GHz band are subject to strict out-of-band emissions ("OOBE") requirements. Specifically, to protect other operators, UMFUS terminals are required to achieve an OOBE level of -13 dBm/MHz at the edge of the assigned channel or spectrum block.[7] The rules also protect adjacent bands by prohibiting significant spill-over.[8]

B. The Commission's Recent ESIM Decision Recognizes That More Stringent OOBE Limits May Be Necessary for ESIMs To Protect UMFUS Operations in the 27.5-28.35 GHz Band

Since 2017, the Commission has made efforts to consolidate the Part 25 rules addressing ESIMs and to facilitate the deployment of ESIMs to enable the provision of high-data rate services "to mobile platforms that often cannot be served using other communications technologies."[9] The Commission's recent *Second Order and FNPRM*, however, recognized that UMFUS operators had raised legitimate concerns "about potential interference from out-of-band

[6] Other locations include: McCarran International Airport, Las Vegas, NV; Minneapolis – St. Paul International Airport, Bloomington, MN; Salt Lake City International Airport, Salt Lake City, UT; Chicago Midway International Airport, Chicago, IL; Tampa International Airport, Tampa, FL; San Antonio International Airport, San Antonio, TX; General Mitchell International Airport, Milwaukee, WI; Des Moines International Airport, Des Moines, IA. And Verizon has plans to deploy 28 GHz UMFUS base stations at more airports this year.

[7] *See* 47 C.F.R. § 30.203(a).

[8] *See id.* The rule stipulates further attenuation "in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth." *Id.* There, "the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower." *Id.*

[9] Second Report and Order, Report and Order and Further Notice of Proposed Rulemaking, *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service; Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations*, 35 FCC Rcd 5137, ¶ 2 (2020) ("*Second Order and FNPRM*").

emissions of ESIMs in the 28.35-28.6 GHz band into the adjacent 27.5-28.35 GHz band."[10] To address these concerns, the Commission refused to permit non-GSO ESIM operations "in the lowest 50 megahertz of the 28.35-28.6 GHz band (28.35-28.4 GHz), subject to further consideration," and stated it would condition grants for non-GSO ESIM use of spectrum between 28.4-28.6 GHz on compliance with future decisions.[11] The Commission also stated that, "should parties have concerns about specific applications for ESIMs use, they can be addressed as part of the public comment review process for each ESIM application filed before the Commission."[12] And the Commission committed that, "[b]efore granting any of these applications, the possible need to require more stringent limits than those in section 25.202(f) . . . can be considered and addressed as appropriate."[13]

While these statements were made specifically regarding ESIM communications with non-GSO FSS space stations, the concerns apply equally to GSO ESIM operations in the 28.35-28.6 GHz band. As Verizon has explained, earth stations that use frequencies in the 28.35-28.6 GHz band for their uplink transmissions will receive downlink transmissions from space station satellites on frequencies well removed from 28 GHz.[14] Because of the frequency separation between the transmit and receive bands, there had historically been little to no risk that the OOBE from one fixed earth station would interfere with a nearby earth station. Thus, the existing Part 25 rules allow earth station OOBE to degrade far more gradually when extending out of their band than the Commission's rules allow for terrestrial wireless services (Parts 22, 24,

[10] *Id.* ¶ 30.

[11] *Id.*

[12] *Id.*

[13] *Id.*

[14] *See* Comments of Verizon & U.S. Cellular, IB Docket Nos. 17-95 & 18-315 (filed Aug. 24, 2020) ("*Verizon & U.S. Cellular NGSO ESIM Comments*"); Reply Comments of Verizon & U.S. Cellular, IB Docket Nos. 17-95 & 18-315 (filed Sept. 22, 2020) ("*Verizon & U.S. Cellular NGSO ESIM Reply Comments*").

27 and 30), including those that apply to UMFUS terrestrial services operating in the 27.5-28.35 GHz band (Part 30).[15]

Because the existing Part 25 rules allow for such significant OOBE, ESIMs operating in the 28.35-28.6 GHz band pose unique interference risks to mobile operators. Due to their mobility, ESIMs mounted on airplanes have the ability to get so geographically close to UMFUS receivers that their OOBE (particularly from the side lobes and back lobes of the ESIM antenna arrays) disrupt network coverage range and achievable data rates by interfering with both uplink and downlink 5G time division duplex ("TDD") transmissions. The mobility of ESIMs also makes it difficult for mobile operators in the adjacent 27.5-28.35 GHz band to anticipate and build-around potential sources of interference.

Notably, when the Commission concluded in 2018 that GSO ESIMs in the 28.35-28.6 GHz band would be subject to the same limits in Section 25.202(f) as fixed earth stations, it did so because "no commenter ha[d] challenged the adequacy of these OOBE limits to protect mobile services from interference from fixed earth stations."[16] The 27.5-28.35 GHz band spectrum auction was concluded in 2019; it is thus unsurprising that UMFUS operators did not raise interference concerns in response to the *GSO ESIM NPRM*.[17] U.S. carriers, including Verizon, have invested hundreds of millions of dollars to acquire UMFUS licenses in the 27.5-28.35 GHz band to support the deployment of 5G and other innovative wireless services. The Commission has acknowledged the importance that these investments represent to the American

[15] *See*, *e.g.*, 47 C.F.R. § 30.203(a).

[16] Report and Order and Further Notice of Proposed Rulemaking, *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, 33 FCC Rcd 9327, ¶ 62 (2018).

[17] Notice of Proposed Rulemaking, *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service*, 32 FCC Rcd 4239 (2017) ("*GSO ESIM NPRM*").

economy and its goal of "securing the Nation's future in the next generational evolution of wireless technology to so-called 5G."[18] Accordingly, it is imperative that OOBE issues are resolved in a manner that does not create harmful interference for existing and future UMFUS operations or undermine the Commission's priority of facilitating the deployment of 5G.

C. Intelsat's ESIM Operations Will, Without Conditions, Likely Cause Harmful Interference to Travelers, M2M, and Airport Enterprise Operations

Intelsat seeks a blanket earth station license to operate up to 1,000 A-ESIMs mounted on airplanes. As explained in more detail below, the transmissions from Intelsat's A-ESIM operations are likely to directly impair Verizon's 27.5-28.35 GHz band terrestrial network operations at airports. However, a number of factors make it difficult for Verizon to predict the exact scope of interference that Intelsat's operations will cause.

Chief among these factors is that Intelsat's transmitters are not restricted from operating in very close physical proximity and frequency proximity to Verizon's UMFUS receivers and that Intelsat has not provided any information regarding expected deployments. For example, Intelsat has provided no information regarding whether it intends to use these A-ESIMs while the airplanes are below 10,000 feet. Nor has Intelsat provided any information regarding which operational bandwidth(s) will be deployed, their placement(s) within the allowed band portion, the number of carriers that will be used (if multiple simultaneous carriers are transmitted), nor the typical OOBE masks that can be achieved by their transmitters.

[18] *Spectrum Frontiers First R&O* ¶ 1; *see also* Notice of Proposed Rulemaking and Order Terminating Petitions, *Promoting Investment in the 3550-3700 MHz Band*, 32 FCC Rcd 8071, ¶¶ 2-4 (2017) (recognizing that, "[t]o maintain U.S. leadership in the global race for 5G, we must ensure that the service rules governing bands that are critical for 5G network deployments—including the 3.5 GHz Band—keep up with technological advancements, create incentives for investment," and seeking "to develop a thorough record about the investment-backed expectations of all interested stakeholders").

Intelsat's Application also includes insufficient technical information regarding worst case antenna performance in the lowest portion of the 28.35-28.6 GHz band, which would allow Verizon to evaluate sidelobe and backlobe OOBE levels. Intelsat's Application also includes no technical information regarding worst case IMD or transmitter linearity performance in order to evaluate the amount of OOBE radiated splatter that would typically occur. Verizon requested this additional information from Intelsat before filing this Petition. Intelsat has not provided it.

III. ARGUMENT

A. Compliance with the Part 25 Rules Is Not a Sufficient Basis To Grant Intelsat's Application Without Conditions Because Its Operations Will Likely Interfere with 5G Services at Airports Across the Nation

In its most recent decision addressing the deployment of ESIMs, the Commission recognized that UMFUS providers have legitimate concerns regarding spill over from ESIM operations into the 27.5-28.35 GHz band and that the Commission would take these concerns into account when ruling on individual applications.[19] Consistent with that recognition, Verizon raises its concerns here regarding Intelsat's Application, as the ESIMs for which it seeks a blanket earth station license are likely to directly impair Verizon's 27.5-28.35 GHz band terrestrial network operations at airports, even using extremely conservative assumptions.

As shown in Diagram 1 below, under Section 25.202(f), an ESIM operating in close proximity to an UMFUS receiver has great potential to elevate the cell site's noise and interference floor because the ESIM emissions are not required to be attenuated to -13 dBm/MHz until they reach 250 percent of the channel bandwidth.[20] In particular, the Section 25.202(f)

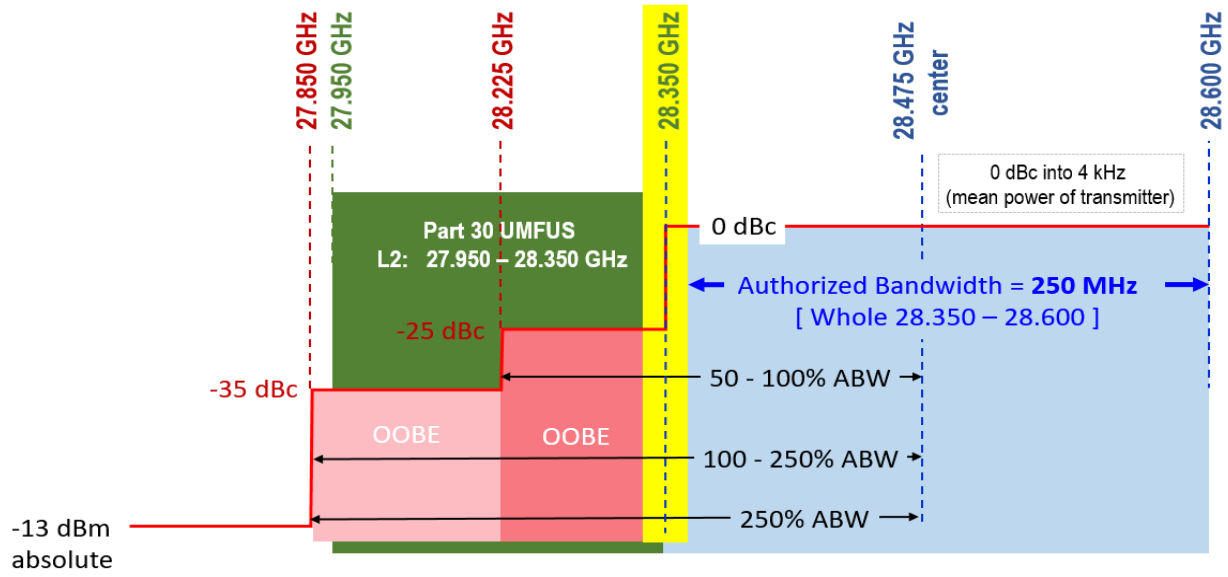
[19] *See Second Order & FNPRM* ¶ 30.

[20] *See* 47 C.F.R. § 25.202(f):

> (f) *Emission limitations*. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this

mask has a first fixed breakpoint defined at 100% allocated bandwidth away from band edge (transition from -25 dBc to -35 dBc) and a second breakpoint at 250% allocated bandwidth (transition from -35 dBc to a fixed floor at -80 dBc or to -13 dBm absolute, whichever is more lenient).[21] This mask is illustrated for satellite operations in 28.35-28.6 GHz in Figure 1 below.

Figure 1: Impact of Section 25.202(f) OOBE Limits in 27.5-28.35 GHz Band



Thus, the Section 25.202(f) OOBE limits that apply to Part 25 services in the 28.35-28.6 GHz band are inadequate to protect 5G deployments from potential ESIM operations in the adjacent 27.5-28.35 GHz band. As shown, the permitted Part 25 OOBE splatter covers the entire Part 30

section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

[21] *See id.*

L2 allocation. Mere compliance with Section 25.202(f)'s OOBE limits, therefore, can have significant consequences for airport travelers and operations. Intelsat does not provide enough information for Verizon to fully assess the extent to which its operations will interfere with Verizon's network.[22] But based on conservative assumptions, interference from Intelsat's ESIM operations is likely to significantly disrupt network services used by customers who are within 400 meters of an A-ESIM aircraft during takeoff, landing, taxiing, and gate operations.

Table 1 below provides an analysis of the interference Intelsat's operations could cause.

Table 1: Intelsat A-ESIM Interference Analysis Based on § 25.136 PFD Contour

Intelsat A-ESIM Interference Analysis Based on § 25.136 PFD Contour[23]			
A-ESIM Max EIRP at Horizon	P_T	-14.3	dBW/4kHz
A-ESIM Channel Bandwidth	B	15	MHz
A-ESIM Transmitter Antenna Height Above Ground	H_T	15.00	m
§25.202(f) Emission Limitations	G_T	-25	dBi
Center Frequency of Channel	F	28357.5	MHz
A-ESIM Distance to Boundary of PFD Contour	**D**	**0.40**	**km**
Atmospheric Losses per km	L_a	0.10	dB/km
P.2108 Clutter Loss	CL	29.20	dBm
Free Space Loss	FSL	113.5626921	dB
Signal Level at Receiver Antenna	RSL	-116.3430	dBm
PT' = PT - 10 log BMHz	PT'	9.699087409	dBW/MHz
Spectral Power Density at the Boundary	spd	-158.10	dBW/MHz
Area of Isotropic Receiving Antenna	A	8.90629E-06	m^2
A-ESIM -77.6 dBm/m2/MHz PFD Contour	PFD	-77.600887	dBm/m^2 in 1 MHz

[22] Indeed, ESIM operators have had numerous opportunities to provide technical and operational parameters, but have chosen not to do so. *See, e.g.*, *Verizon & U.S. Cellular NGSO ESIM Comments* at 11-13; *Verizon & U.S. Cellular NGSO ESIM Reply Comments* at 9-10; Letter from Daudeline Meme, Vice President & Associate General Counsel, Verizon, to Marlene H. Dortch, Secretary, FCC, IB Docket Nos. 17-95 & 18-315 (filed May 4, 2020); GSA Reply Comments, IB Docket No. 17-95 (filed Aug. 30, 2017).

[23] *See* 47 C.F.R. § 25.136. This model was used to determine the interference contour of an Intelsat A-ESIM at Dulles Airport based on parameters provided by Intelsat, the Part 25 rules, clutter models and other calculated figures. The Intelsat A-ESIM EIRP at the horizon is from page 20 of Intelsat's Application; channel bandwidth is from page 17 of Intelsat's Application; and transmitter antenna height above ground was assumed based on aircraft type. This calculation assumes the use of one single 15 MHz channel at the band edge of 28.35 GHz. However, if the calculation assumed use of the entire authorized bandwidth of 250 MHz as provided in Section 25.202(f), the interference would be 16 times as wide into the adjacent 27.5-28.35 GHz band. Additionally, if Intelsat used a carrier bandwidth that was significantly wider than 15 MHz, Intelsat would have to increase their transmitter power proportionally to have the same energy level per bit. This would create a carrier N times wider, with N times as much energy, creating N times as much interference into the adjacent 27.5-28.35 GHz band.

Based on Verizon's calculations, operations of A-ESIM at 400 meters or closer to an UMFUS base station or receiver will violate the -77.6 dBm/m2/MHz PFD floor and present a significant interference threat at closer distances. It is important to note that Verizon's interference distance calculation is very conservative in predicting interference because it accounts for protection only to the Section 25.136 specified level for PFD of -77.6 dBm/m2/MHz (which is already 8 dB above that noise floor considering the noise figure of a realistic 27.5-28.35 GHz UMFUS receiver). Based on Intelsat's Application, the actual noise floor PFD is -85.551239 dBm/m2/MHz. If this PFD contour is scaled for a 15 MHz bandwidth, it would be 11.7 dB higher (15x 1 MHz) or -65.9 dBm/m^2/15 MHz. Accordingly, the -77.6 dBm/m2/MHz PFD protection criteria is 19.65 dB (85.55 – 65.9) above the actual noise floor. Alternatively, this is 11.65 dB above the realistic UMFUS receiver sensitivity (the realistic UMFUS receiver's practical noise figure, assuming a practical UMFUS receiver noise figure of 8 dB above the noise floor). In sum, this is a very conservative calculation as it is only protecting to within 11.65 dB of the practical sensitivity of an UMFUS receiver.

Moreover, because 27.5-28.35 GHz UMFUS terrestrial outdoor propagation will be predominantly line-of-sight, the 29.2 dB clutter loss determined by Verizon's analysis is extremely conservative. Generally, P.2108 is used in urban and suburban areas, while airports are mostly open spaces with high probability of line-of-sight between ESIM and UMFUS stations. If this clutter loss were removed, and line-of-sight only were considered, the calculated interference distances would be much greater at 10,370 meters.

Figure 2 below illustrates the conservatively calculated scope of interference that two ESIMs (represented by red dots) could cause for travelers at Dulles Airport or ground crew relying on 5G-enabled enterprise operations. The yellow circles represent Verizon's 5G

antennas at Dulles Airport and the large red circles illustrate the conservative 400 meter standoff range where interference from A-ESIMs to Verizon's 5G antennas would exceed -77.6 dBm/m2/MHz PFD.[24]

Figure 2: Conservative Estimate of Scope of A-ESIM Interference at Dulles Airport

As Figure 2 illustrates, just two A-ESIMs could cause significant interference to travelers and enterprise operations at Dulles Airport.

Significantly, no matter what filter designs or equipment characteristics for its UMFUS receivers are implemented, Verizon could not reduce interference from Intelsat's A-ESIMs. Verizon's UMFUS receivers have been designed to account for interference created in adjacent bands by pre-existing operations but, here, the interfering out-of-band emissions would be *within*

[24] While the locations of the A-ESIMs are assumed and the interference areas are provided for illustrative purposes, the locations of Verizon's 5G antennas reflect their actual locations. And, while the diagram shows only two A-ESIMs, there could be active A-ESIMs on other airplanes shown in the satellite photograph, as well as on other airplanes taxiing at the airport.

the 27.5-28.35 GHz UMFUS L2 operational band. Interference is impossible to predict or mitigate if the interfering signal falls within the assigned channel of the victim UMFUS receiver. Verizon's receivers will receive spill-over energy from Intelsat's A-ESIMs in the uplink or downlink signals within the intended 27.5-28.35 GHz TDD reception band. And, when this energy is at a high enough level because of the ESIMs' proximity to the receiver, the ESIMs' OOBE will raise the noise and interference floor throughout the UMFUS cell coverage area. This, in turn, will disrupt Verizon's 5G network coverage range and achievable data rates.

Such a result is not in the public interest. In-flight WiFi is a valuable service that will benefit consumers, but the Commission should ensure that the provision of this service does not interfere with the mobile technologies that consumers already pay for and rely on daily. Put simply, the promise of faster in-flight WiFi should not come at the expense of frustrating customers' expectations of using their faster 5G service while waiting to depart or after they land, especially considering that airports are densely populated areas that allow limited time to use mobile services. Nor should in-flight WiFi be allowed to interfere with airports' and businesses' reliance on 5G service to power their enterprise operations.

B. Verizon's and Intelsat's Use Cases Can Operate in Harmony with Appropriate License Conditions

As Verizon has acknowledged in its discussions with Intelsat regarding the Application, it is possible that Intelsat's A-ESIM operations will not cause harmful interference to Verizon's network. For example, if Intelsat intends for these A-ESIMs to operate only while the airplanes on which they are mounted are above 10,000 feet—consistent with current customer expectations—the interference threat of OOBE from A-ESIM antenna arrays is greatly diminished. It is also possible that Intelsat plans to abide by other limits that will eliminate Verizon's interference concerns. However, Intelsat has not provided this information to Verizon

or the Commission. The Commission should defer ruling on Intelsat's Application until the interference environment posed by its operations is clear.

Alternatively—or if additional information provided by Intelsat demonstrates that interference to the 27.5-28.35 GHz band will occur based on Intelsat's intended A-ESIM operations—the Commission should impose license conditions that will protect UMFUS operations. While Intelsat has not provided sufficient information for Verizon to suggest specific restrictions that would, with certainty, eliminate its inference concerns, such conditions could include a 10,000-foot altitude limit, a requirement that Intelsat use other uplink bands, a guard band,[25] or a requirement that Intelsat comply with the more stringent OOBE limits with which terrestrial operators must comply.[26] Failing to require such conditions would undermine the Commission's and wireless providers' significant investments in millimeter wave spectrum as a key component of 5G operations in the United States.

IV. CONCLUSION

For the reasons set forth above, the Commission should defer ruling on Intelsat's Application until Intelsat has provided sufficient information to enable Verizon to suggest license restrictions that would mitigate interference issues. Alternatively, the Commission should impose license conditions that will protect UMFUS operations in the 27.5-28.35 GHz band.

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[25] Again, it is unclear, based on the information provided in Intelsat's Application, what size guard band would be sufficient to protect Verizon's 5G operations in the 27.5-28.35 GHz band—the Commission's current restriction of a 50 MHz guard band for non-GSO ESIM operations, or a different figure. The calculation is specific to the application, which includes the bandwidth, the power level, and the energy level at the horizon.

[26] *See Verizon & U.S. Cellular NGSO ESIM Comments* at 6 ("Joint Commenters recommend that the Commission, as suggested in the *FNPRM*, require NGSO ESIM operators to meet the out-of-band emissions limit for adjacent band UMFUS licensees of -13 dBm/MHz below 28.35 GHz, consistent with OOBE limits on operations across all commercial wireless services."); *Verizon & U.S. Cellular NGSO ESIM Reply Comments* at 3 ("To ensure that UMFUS operators can make full use of their spectrum, Verizon and U.S. Cellular recommend that NGSO ESIM operators be required to meet the out-of-band emissions limit for adjacent band UMFUS licensees of -13 dBm/MHz below 28.35 GHz, consistent with OOBE limits on operations across all commercial wireless services.").

Respectfully submitted,

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February 12, 2021

AFFIDAVIT

Pursuant to 47 C.F.R. § 25.154, I hereby certify that I am the qualified person responsible for preparation of the information contained in this filing, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the information submitted in this filing, and that it is complete and accurate to the best of my knowledge and belief.

Respectfully submitted,

/s/ Max Solondz
Max Solondz

CERTIFICATE OF SERVICE

I hereby certify that on February 12, 2021, the foregoing PETITION TO DEFER OR IN THE ALTERNATIVE IMPOSE CONDITIONS was served by via electronic mail[*] on the following:

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[*] Pursuant to Section 1.47(d) of the Commission's rules, Intelsat has agreed to service by electronic mail of Verizon's Petition.