Tare Brisibe
Senior Legal & Regulatory Counsel APAC

Malaysian Communications and Multimedia Commission
MCMC HQ Tower 1
Jalan Impact, Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan
Malaysia
Email: spectrumplanning@mcmc.gov.my

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Public Consultation on Wireless Local Area Network (WLAN) In The 6 GHz Frequency Band

Dear Sir or Madam,

SES World Skies Singapore Pte Ltd, on behalf of the broader SES Group ("**SES**"), hereby provides its comments on the Malaysian Communications and Multimedia Commission ("MCMC") *Public Consultation on Wireless Local Area Network (WLAN) In The 6 GHz Frequency Band* released August 2021 ("("PC Paper").[1]

SES is a global satellite operator that operates a fleet of nearly 70 satellites in geostationary orbit as well as the innovative O3b Ka-band constellation of High Throughput Satellites in medium Earth orbit. In 2021, SES will begin launching the next generation of O3b satellites called "O3b mPOWER" which will provide even higher throughput and unmatched flexibility.

SES provides its comments below in response to MCMC's specific questions posed in the PC paper.

Question 1 ***MCMC seeks your views and comments on the demand for spectrum for Wi-Fi in the 6 GHz frequency band.***

SES Response: SES expresses no view on the demand for spectrum for Wi-Fi use in the 6 GHz band. SES simply notes that the case for more Wi-Fi spectrum is based on "congestion" in existing Wi-Fi bands, and as is acknowledged in the PC paper at paragraphs 14, 5, and 16[2], driven largely by the sheer number of Wi-Fi devices deployed under the current Class Assignment[3]. Such that interference among many Wi-Fi devices is limiting the achievable throughputs.[4] Analogously, as Wi-Fi deployments increase in the 6 GHz band, this same aggregate interference will pose a threat to primary Fixed Satellite Service ("FSS") uplinks, and adequate

[1] *See* https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/PC_WiFi.pdf.
[2] Page 3, 4 of the PC Paper.
[3] Issued pursuant to section 169 of the Communications and Multimedia Act 1998.
[4] See: https://spectrum.ieee.org/telecom/wireless/why-wifi-stinksand-how-to-fix-it.

SES World Skies Singapore
501 Orchard Road
#18-00 Wheelock Place
Singapore 238880

Tel. +65 6593 3600
Fax +65 6593 3610
tare.brisibe@ses.com
www.ses.com

Company Register No. 200914437G

measures are therefore required to limit the potential for such impact, details of which are discussed below in response to related questions posed in the PC paper.

Question 2 ***MCMC seeks your views and comments on the emerging technologies utilising the 6 GHz frequency band.***

SES Response: SES expresses no view on this question.

Question 3 ***MCMC seeks your views and comments on the frequency range within the 6 GHz frequency band that could be considered for Wi-Fi under the Class Assignment in Malaysia. Should MCMC consider allowing Wi-Fi to operate in the entire 1200 MHz (5925 MHz to 7125 MHz frequency band) or only in the 500 MHz (5925 MHz to 6425 MHz frequency band)?***

SES Response: SES notes the PC papers acknowledgement, at paragraph 19, that some countries have allowed or planned to allow the 6 GHz frequency band for the use of Wi-Fi through different technical and regulatory arrangements. In this regard, SES is not opposed to MCMC's consideration to allow Wi-Fi to operate in the entire 1200 MHz (5925 MHz to 7125 MHz frequency band).

SES is however of the view that such Wi-Fi use should be subject to low power indoor and very low power outdoor deployments. Noting the PC paper's reference at paragraph 19 to a maximum, 24 dBm EIRP, 11 dBm/MHz EIRP density for low power indoor (LPI), and 14 dBm EIRP, 1 dBm/MHz EIRP density for very low power outdoor (VLP). Being the operating conditions studied and adopted in South Korea as well the UK, Australia and New Zealand. In the same vein, studies conducted by the CEPT adopted a maximum 23 dBm EIRP, 10 dBm/MHz EIRP density for LPI. The CEPT levels present even more appropriate operating conditions for the protection of FSS uplinks in the band and provide a suitable baseline for MCMC's consideration of associated conditions for Wi-Fi use in this band MCMC may also want to consider whether out-of-band emission limits adopted by the CEPT are appropriate.

Furthermore, consistent with Class Assignment principles, SES expects that Wi-Fi use in this band would be on a non-interference non-protected basis vis-a-vis primary services such as the FSS, that would continue to be protected and can be deployed without constraints in the future.

Question 4 ***MCMC seeks your views and comments on:***
i. the coexistence between Wi-Fi and incumbent services (i.e. fixed service and fixed-satellite service);
ii. the potential interference mitigation between these services

SES Response: FSS systems operate across the full 6 GHz band and satellite operators have long term plans for the use of the band, particularly the upper 6 GHz band, where for instance 6425 - 6575 MHz is used for feeder uplinks for MSS systems, supporting safety of life services such as GMDSS and AMS(R)S. Furthermore, the band 6725-7025 MHz has a special status

SES World Skies Singapore
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under the ITU Radio Regulations. As the uplink band (Earth-to-space) for the ITU Appendix 30B Allotment Plan, this spectrum allocation is intended to ensure all countries have access to spectrum and orbital resources for satellites.

As indicated above, SES is not opposed to MCMC's consideration to allow Wi-Fi to operate in the entire 1200 MHz (5925 MHz to 7125 MHz frequency band). In as much as SES is of the view that such Wi-Fi use should be subject to low power indoor and very low power outdoor deployments.

SES is however, opposed to outdoor deployments of Wi-Fi under "standard power" (i.e., higher powered) whether under the control of an automatic frequency coordination (AFC) system or not. Unlimited deployment of Wi-Fi, especially outdoors and at high power, poses a long-term threat of aggregate interference to FSS uplinks in the 6 GHz band. While no single Wi-Fi transmitter is expected to cause interference, an FSS uplink beam on a satellite will "see" all Wi-Fi transmitters within its coverage area. At large enough levels of Wi-Fi deployment within such coverage area, especially outdoors, aggregate interference into FSS uplinks will be observed and lead to degradation of satellite link performance.

The ECC studied aggregate interference from Wi-Fi into FSS uplinks in the 6 GHz band. It found that by 2025, at high levels of outdoor Wi-Fi deployment (5% outdoors), aggregate interference from Wi-Fi would cause FSS uplinks to experience an I/N approaching or even exceeding the I/N allowed to be caused by a co-primary service in the same band under Recommendation ITU-R S.1432 (i.e. an I/N of -10 dB, apportioned between the Fixed Service and Wi-Fi). In principle, Wi-Fi devices operating under Class Assignment are subject to non-interference non-protected conditions and thus should not be allowed to cause as much interference into primary FSS. Following this study, the ECC established LPI and VLP limits to… "*help ensure long term protection of FSS space stations from aggregate interference from WAS/RLAN devices*." [5]

In SES's view, the U.S. approach of allowing much higher powered "standard power" Wi-FI devices to be deployed outdoors (at up to 36 dBm EIRP and 23 dBm/MHz EIRP density for access points) discounts the risks of aggregate interference into FSS uplinks. In effect, this approach assumes that levels of outdoor deployments would be similar to historical levels of outdoor Wi-Fi deployment (i.e., lower than 5%) and would never be so great as to ever pose an aggregate interference problem for FSS space stations. This is an odd assumption, as one would expect that the creation of a special class of unlicensed high-powered device for outdoor usage would result in much higher than historical levels of outdoor Wi-Fi deployments. In turn, the deployment of more outdoor Wi-Fi access points will likely lead to greater outdoor use of client Wi-Fi devices (operating at up to 30 dBm EIRP and 17 dBm/MHz EIRP density).

The U.S. did impose an EIRP limit (21 dBm) in the skyward direction (at more than 30 degrees elevation) on unlicensed outdoor Wi-Fi access points to provide some protection for the FSS against aggregate interference. However, this reduced EIRP limit is no substitute for the attenuation that would be expected from an indoor use requirement. This skyward EIRP limit

[5] ECC Report 302, at 4. *See* ECC Decision 20(01) at Table 1 and Table 2.

SES World Skies Singapore
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also does not apply to outdoor client devices (which may continue to operate at up to 30 dBm), and remains much higher than the outdoor very low power EIRP limit (14 dBm) adopted by the ECC for the long-term protection of the FSS.

The AFC system adopted by the U.S. to manage standard power outdoor Wi-Fi access point devices is specifically not intended to provide protection against aggregate interference into the FSS. Instead, it is intended only to ensure that Wi-Fi devices protect primary Fixed Service receivers operating in the same band using a database of licensed Fixed Service locations and frequencies. SES notes, however, that an AFC system *could* (in theory) be designed to control aggregate interference into FSS uplinks by, for example, enforcing a nationwide limit on the total number of emitters operating at a given time.

SES is therefore of the view, there can be no assurance that Wi-Fi operating under class assignment would remain “low interference potential” with respect to the primary FSS without indoor restrictions and low- or very low- power limits, especially when there is no reliable means of capping the aggregate emissions from Wi-Fi.

Question 5 ***MCMC seeks your views and comments on the potential technical and operational conditions to be imposed if the 6 GHz frequency band is introduced for Wi-Fi under the Class Assignment. Should part of the frequency band be limited to indoor operation? Should standard power devices operating under the Automatic Frequency Coordination (AFC) system be adopted in Malaysia?***

SES Response: SES refers to and reiterates our response in Questions 3 & 4 above.

Question 6 ***What other key issues need to be considered in introducing Wi-Fi in the 6 GHz frequency range?***

SES Response: None at this time.

Please contact the undersigned if you have any questions.

Yours Sincerely,

/s/
Tare Brisibe
Senior Legal & Regulatory Counsel APAC
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