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May 24th, 2023

Mr. Roger Noel,
Chief, Mobility Division
Wireless Telecommunications Bureau,
Federal Communication Commission
445 12th St SW
Washington, DC 20554

Re: WAVIER REQUEST – EMS Technologies Canada, Ltd. Request for Waiver of Part 87 Rules to Allow Equipment Certification of Aeronautical Mobile Satellite Service Transceiver (Small SATCOM + 5G, Pending FCC ID K6KSATCOM5G)

Dear Mr. Noel:

EMS Technologies Canada, Ltd. ("EMS") a wholly owned subsidiary of Honeywell International Inc., pursuant to section 1.925 of the Commission's rules, hereby requests waiver of Sections 87.131, 87.133, 87.137, 87.139(i)(1) and 87.141(j) of the Commission's rules to permit certification of its next generation Aeronautical-Mobile Satellite Service ("AMSS") transceiver, Small SATCOM + 5G. The transceiver supports the SwiftBroadband aircraft communications service for use with, but not solely confined to, unmanned aircraft e.g. drones, UAVs.

Under Section 1.925, the FCC may grant a waiver if "[t]he underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the waiver would be in the public interest or; [i]n view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative."[1]

Similar waivers of Part 87 rules have been granted to EMS, Honeywell International, Inc, and Rockwell Collins Inc.[2] Such equipment is intended for use on aircraft to provide high-speed Internet, voice and video conferencing capabilities in the cockpit, in the cabin and at the gate. Similar waivers of Part 87 rules have also been granted to Omnipless Manufacturing (PTY) Ltd.[3] and to EMS's previous generation of this equipment[4], for UAV applications. These waivers have found that the "waiver would be in the public interest" because "current Part 87 rules do not allow for the wider bandwidth, higher transmission speeds and more efficient modulation techniques of newer AMSS systems."[5] A grant here would provide the same public interest benefits and allow EMS's next generation transceiver to deliver high-speed data in support of UAV applications.

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[1] 47 C.F.R § 1.925(b)(3)

[2] *See* EMS equipment authorization for FCC ID K6KHSD-440, FCC ID K6KA781-MK4 Honeywell International Inc, equipment authorization for FCC ID G8BHD-128, and Rockwell Collins Inc equipment authorization for FCC ID AJK8222232 and AJK8222234.

[3] *See* Omnipless Manufacturing (Pty) Ltd. authorization for FCC ID 2AS39-AVIATORUAV200.

[4] *See* EMS equipment authorization for FCC ID K6KSMALLSATCOM.

[5] *See* Request of EMS for Waiver of Part 87 Emission Mask to Allow Certification and Use of Aeronautical Mobile Satellite Service Transceiver, 26 FCC Rcd 8824 (WTB 2011).

Description of the equipment

The Small SATCOM + 5G transceiver supports Inmarsat SwiftBroadband signals using QPSK as well as 16-, 32- and 64-point Quadrature Amplitude Modulation (16-QAM, 32-QAM, 64-QAM). The Small SATCOM + 5G transceiver operates in either Inmarsat Class 15 or Class 7 modes, depending on the connected antenna, and provides one communication channel capable of supporting full-duplex SwiftBroadband non-voice data functionality. The System functions in the 1525- 1559 MHz receive band and transmit bands of 1626.5-1660.5 and 1668-1675 MHz. The transmit band of 1668-1675 MHz is not supported in the USA or Canada.

The Small SATCOM + 5G transceiver builds on the functionality of the previous generation with the addition of 5G cellular and Wi-Fi connectivity.

The Small SATCOM + 5G transceiver will meet the technical requirement of Part 87 AMSS rules with respect to output power, spurious emissions and intermodulation. As the FCC has acknowledged, Inmarsat's SwiftBroadband service "offers higher data rates by utilizing more efficient modulation techniques."[6] Grant of the instant waiver request would serve the public interest because the Part 87 rules have not yet been updated to reflect the Inmarsat SwiftBroadband emission types and bandwidths.

Requested Waivers – Part 87

87.131 Authorized Emissions

Section 87.131 authorizes G1D, G1E and G1W for aircraft earth stations. The SwiftBroadband services, use 16-, 32- and 64-Point Quadrature Amplitude Modulation (16-QAM, 32-QAM, 64-QAM) and QPSK modulation schemes, with emission types G1W and D1W. Therefore, EMS requests a waiver of the authorized emissions in section 87.131 of the Commission's rules to employ D1W in addition to the G1W emission authorized under Section 87.131.

87.133 Frequency Stability

Pursuant to Section 87.133(a), the frequency tolerance of an aircraft earth station operating in the 1626.5-1660.5 MHz band is +/- 320 Hz. For purposes of bench testing for certification, a tolerance of +/- 160 Hz applies to the reference oscillator of the transmitter. The EMS transceiver contains a on board reference oscillator with an accuracy that has been shown in testing to have a worst-case error of 845Hz. Therefore, EMS requests a waiver of Section 87.133(a) of the Commission's rules for this reason.

87.137 Types of Emissions

Section 87.137(a) of the Commission's rules authorizes for aircraft earth stations emissions designator 21K0G1D and the authorized bandwidth for aircraft earth station emissions above 50 MHz is 25 kHz. Lower values of necessary and authorized bandwidths are also permitted. SwiftBroadband service utilizes QPSK, and 16-, 32-, and 64-QAM modulation schemes, with emissions class G1W and D1W. Due to the increased symbol rates for QPSK, 16-QAM, 32-QAM and 64-QAM a larger authorized bandwidth is necessary. An adequate bandwidth for SwiftBroadband is 225 kHz.

Therefore, EMS seeks waiver of Section 87.137(a) of the Commission's rules to authorize the following emissions designators for the Small SATCOM transceiver:

[6] EMS Stamp Grant, at 2

Inmarsat Bearer	Class	Modulation Type	Symbol Rate (ksym/s)	Data Rate (kb/s)	Necessary Bandwidth (kHz)	FCC Designator	Authorized Bandwidth (kHz)
R5T1XD	15 & 7	16QAM	33.6	134.4	50	50K0D7W	225
R5T2XD	15 & 7	16QAM	67.2	268.8	100	100KD7W	225
R5T4.5XD	15 & 7	16QAM	151.2	604.8	200	200KD7W	225
R20T1XD	15 & 7	16QAM	33.6	134.4	50	50K0D7W	225
R20T2XD	15 & 7	16QAM	67.2	268.8	100	100KD7W	225
R20T4.5XD	15 & 7	16QAM	151.2	604.8	200	200KD7W	225
R5T2QD	15 & 7	4 QPSK	67.2	134.4	100	100KG7W	225
R5T4.5QD	15 & 7	4 QPSK	151.2	302.4	200	200KG7W	225
R20T0.5QD	15 & 7	4 QPSK	16.8	33.6	25	25K0G7W	225
R20T1QD	15 & 7	4 QPSK	33.6	67.2	50	50K0G7W	225
R20T2QD	15 & 7	4 QPSK	67.2	134.4	100	100KG7W	225
R20T4.5QD	15 & 7	4QPSK	151.2	302.4	200	200KG7W	225
FR80T2.5X16	7HDR	16QAM	84	336	110	110KD7W	225
FR80T5X16	7HDR	16QAM	168	672	200	200KD7W	225
FR80T2.5X32	7HDR	32QAM	84	420	110	110KD7W	225
FR80T2.5X64	7HDR	64QAM	84	504	110	110KD7W	225
FR80T5X32	7HDR	32QAM	168	420	200	200KD7W	225
FR80T5X64	7HDR	64QAM	168	504	200	200KD7W	225

87.139(i)(1), note 2 Emission Limitations

Section 87.139(i)(1) of the Commission's rules provides the required attenuation for a modulated carrier and note 2 provides an absolute offset of +/- 35 kHz. Under the required designs for the new modulation techniques, in many cases, ninety-nine percent of the occupied bandwidth exceeds the +/- 35 kHz offset. Inother words, the new modulation schemes used for SwiftBroadband make meeting the offset impossible.

EMS requests a waiver of Section 87.139(i), note 2 to permit an absolute offset of +/- 560 kHz. The +/-560 kHz is derived from the relationship of the symbol rates. HDR has a maximum symbol rate of 168 ksps compared to 10.5 ksps for the services defined in part 87.

(168 ksps / 10.5 ksps) x (+/-35 kHz) = +/- 560 kHz

+/- 35 kHz was based on a carrier with a symbol rate of 10.5 ksps. Hence, for the new bearer with a symbol rate of 168 ksps, the exclusion zone works out to be +/- 560 kHz from the carrier centre.

87.141(j) Modulation Requirements

Section 87.141(j) of the Commission's rules requires transmitters used as aircraft earth stations to employ BPSK for transmission rates up to and including 2400 bps, and QPSK for higher rates. Due to the requirements of the SwiftBroadband, the Small SATCOM transceiver uses additional modulation schemes that does not meet this requirement, 16-, 32- and 64-QAM. EMS therefore requests waiver of Section 87.141(j) of the Commission's rules to permit the use of these additional modulation schemes.

Conclusion

EMS requests that the Commission waive the requirements of Part 87 described above to permit certification of its Inmarsat AMSS transceivers. The Commission has granted similar waivers to EMS, Rockwell Collins, Honeywell and others so that aircraft passengers and crew can receive high speed voice and data communications. In addition, a waiver has been granted to Omnipless, and to EMS's previous generation of this equipment, for UAV applications. Such waiver will not cause harmful interference to other services and is in the public interest.

Sincerely,

Subhadeep Pal

Subhadeep Pal,

SR Director Engineering