Panasonic Avionics Corporation
Application for Two-Year Experimental License

NARRATIVE DESCRIPTION

Panasonic Avionics Corporation ("PAC") hereby requests a two-year experimental license commencing on or before April 9, 2013 to conduct ground testing in support of Panasonic's Global Communications Suite ("GCS") featuring the "eXconnect" Ku-band aeronautical mobile-satellite service ("AMSS") off-board link and onboard connectivity for transmit portable devices ("T-PEDs). Authorization is sought to conduct the tests at two sites: Melbourne, FL International Airport and Griffiss International Airport, Rome, NY.

Panasonic currently holds an experimental Special Temporary Authorization ("STA") (Call Sign WF9XYW) to conduct GSM picocell testing at these two same sites. The current STA expires on April 9, 2013. The instant application seeks an experimental license to continue these same tests at these two sites for an additional two years.[1] Attached is a copy of the supporting Narrative Statement submitted with the application for the current experimental STA. The instant application for a two-year experimental license does not make any changes to the test sites, or technical (frequency bands, emission designators, authorized power or signal modulation) or other information previously authorized pursuant to Call Sign WF9XYW.

Attachment (Narrative Statement for application for experimental STA WF9XYW).

[1] See 47 C.F.R. § 5.61(b).

Panasonic Avionics Corporation
Application for Experimental Special Temporary Authorization

NARRATIVE DESCRIPTION

Panasonic Avionics Corporation ("PAC") hereby requests a six-month experimental Special Temporary Authorization ("STA') commencing on September 15, 2012, to conduct ground testing in support of Panasonic's Global Communications Suite ("GCS") featuring the "eXconnect" Ku-band aeronautical mobile-satellite service ("AMSS") off-board link and onboard connectivity for transmit portable devices ("T-PEDs). Authorization is sought to conduct the tests at two sites: Melbourne, FL International Airport and Griffiss International Airport, Rome, NY.

Since November 2009, the FCC has granted Panasonic a series of experimental authorizations to conduct two types of testing: (1) electromagnetic interference ("EMI") ground testing of multiple, simulated T-PED RF transmissions in the aircraft cabin in multiple frequency bands: GSM, cellular, Wi-Fi, and others; and (2) picocell systems operations in the aircraft cabin for enabling GSM communications for passengers and crew.[1] The FCC has previously authorized similar experimental tests at the same two sites.

The instant application seeks authority only to examine and gather data on the operations and performance of picocell systems in the aircraft cabin for GSM communications. Electronic magnetic interference ("EMI") testing for aircraft avionics will also be conducted for aircraft certification. All tests will be conducted inside closed cabins onboard aircraft parked at a remote location at the airfields.

Panasonic's GSM picocell system (called "eXPhone") was designed in conjunction with AeroMobile Limited ("AeroMobile"), the leading worldwide manufacturer of GSM picocell systems worldwide, which have been authorized, sold and deployed on commercial aircraft serving Europe, Middle East and Asia. The system has been operating on an interference-free basis since its inception, but the eXPhone system implementation must be independently certified in individual aircraft types.

I. PURPOSE OF EXPERIMENTAL TESTS

GSM picocell systems are already authorized to operate aboard aircraft in many foreign jurisdictions. In 2006, the European Conference of Postal and Telecommunications Administrations ("CEPT") approved ECC ("Electronic Communications Committee")

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[1] *See, e.g.*, ELS File No. 0225-EX-PL-2010 (Call Sign WF2XLF); ELS File No. 035-EX-ST-2010 (Call Sign WE9XMG); ELS File No. 0224-EX-ST-2011 (Call Sign WE9XVM); ELS File No. 0531-EX-ST-2011 (Call Sign WF9XCS); ELS File No. 0671-EX-ST-2011 (Call Sign WF9XGL); ELS File No. 0123-EX-ST-2012 (Call Sign WF9XNT); ELS File No. 0092-EX-ML-2012 (Call Sign WG2XEE).

Report 093,[2] which addresses the compatibility between GSM onboard aircraft equipment systems ("GSMOBA Systems") and terrestrial networks. On the basis of this report, the ECC finalized a Decision (ECC/DEC/(06)07) in December 2006[3] ("ECC Decision") that addresses the free circulation and harmonized usage of GSMOBA Systems[4] and sets out the technical limits which must be observed to ensure that these systems and their use do not cause harmful interference to terrestrial networks. Based on the ECC Decision, the European Telecommunications Standards Institute ("ETSI") has developed a harmonized standard (ETSI EN 302 480) for GSMOBA System equipment.[5] This standard is a *de facto* type-approval standard that covers the essential requirements for placing radio equipment on the European market.

Panasonic, in conjunction with its partners, desires to test picocell systems for eventual authorization and operation onboard foreign-registered aircraft, as well as those registered and operating in the United States as may be permitted under FCC and FAA rules. The purpose of the requested experimental STA is to verify the performance of the picocell systems and to conduct EMI testing to confirm non-interference of T-PEDs into aircraft avionics.

II. DESCRIPTION OF EXPERIMENTS

The testing of the picocell system will be conducted by Panasonic in conjunction with its approved contractors, including AeroMobile. The eXPhone system will be temporarily installed onboard Boeing 747-400 and 777-200 aircrafts. The GSM picocell system will transmit at very low power levels on the identified test bands while the aircraft is parked on the ground at the airfields. As the tests must be conducted with the aircraft engines running, the aircraft will be placed in a closed area at a remote location at the airfields and not in a closed hanger. Only qualified and approved individuals will have access to the test area and aircraft.

The GSM picocell system consists of three pieces of equipment: a base transceiver radio frequency unit ("BTSRFU"), a cellphone radio frequency management unit ("CRFMU"),

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[2] CEPT ECC Report 093, "Compatibility between GSM equipment on board aircraft and terrestrial networks," September 2006.

[3] CEPT ECC Decision (06)07, "ECC Decision of 1 December 2006 on the harmonised use of airborne GSM systems in the frequency bands 1710-1785 and 1805-1880 MHz," December 2006.

[4] While the ECC work focused on GSM-based systems, the same criteria and methodology are expected to apply to similar systems based on other mobile phone technologies.

[5] "Electromagnetic compatibility and Radio spectrum Matters (ERM); Harmonized EN for the GSM onboard aircraft system covering essential requirements of Article 3.2 of the R&TTE Directive".

and an antenna combiner unit ("ACU"). The BTSRFU acts as the equivalent of a terrestrial cell tower on the airplane, providing the RF connection to the mobile phones seeking to operate onboard a flight.

The CRFMU provides the RF management aboard the aircraft to ensure that onboard phones do not receive signals from terrestrial networks but communicate only with the BTRSRFU. The CRFMU, in effect, desensitizes the onboard mobile phones from connecting to a terrestrial network using an RF "shield." System software and GPS information ensures that the CRFMU operates in bands used by terrestrial networks over which a plane is flying, thus preventing the mobile phones from communicating with or causing interference to the terrestrial networks. The ACU combines the transmitted signals from the BTSRFU and CRFMU for transmission in the aircraft cabin using a "leaky feeder cable" to provide sufficient RF coverage throughout the airplane cabin. The maximum transmit power for the GSM devices is limited to the power requested in this experimental STA request.

III. TEST LOCATIONS

Panasonic is seeking authorization to conduct the proposed testing at two sites: Melbourne, FL International Airport (geographic coordinates: 28-06-10 NL; 80-38-43 WL), and Griffiss International Airport, Rome, NY (geographic coordinates: 43-14-01 NL; 75-24-25 WL). The FCC has previously granted experimental authorizations to Panasonic at both airfields for related tests.[6]

IV. TEST FREQUENCIES AND INTERVALS

Table 1 below lists the requested test frequencies and related technical information.

TABLE 1[7]

Band Lower Limit (MHz)	Band Upper Limit (MHz)	Modulation Type	Target ERP (mW) (without aircraft attenuation)	Emission Designator
450	470	Chirp[8]	0.12303	20M0DXN
869	894	Chirp	0.35481	25M0DXN
921	960	Chirp	0.35481	39M0DXN

[6] *See, e.g*. ELS File No. 0671-EX-ST-2011 (Call Sign WF9XGL0); ELS ELS File No. 0123-EX-ST-2012 (Call Sign WF9XNT); ELS File No. 0092-EX-ML-2012 (Call Sign WG2XEE).

[7] Attached as Exhibit 1 is a spreadsheet with supporting technical calculations illustrating the effect of aircraft attenuation on the proposed tests.

[8] Attached as Exhibit 2 is a description of the "Chirp" modulation.

1805	1880	Chirp	0.39811	75M0DXN
2110	2170	Chirp	0.72444	60M0DXN

For each aircraft type, the total duration of the tests will be approximately 40 hours conducted at intervals over five days. For the EMI testing for aircraft avionics, each aircraft subsystem is tested in turn in a repetitive manner. The GSM picocell system transmitters will be operating during the duration of the tests for each interval.

V. CONCLUSION

The planned GSM picocell system tests will provide important information to Panasonic and its partners regarding the operation, performance and effect on aviation avionics from the system. In addition, the proposed tests will enable Panasonic to evaluate and verify the eXPhone system for eventual authorization and operation in the United States. Panasonic respectfully requests an experimental STA for a period of 180 days commencing on September 15, 2012 at the Melbourne, FL International Airport and Griffiss International Airport, Rome, NY.

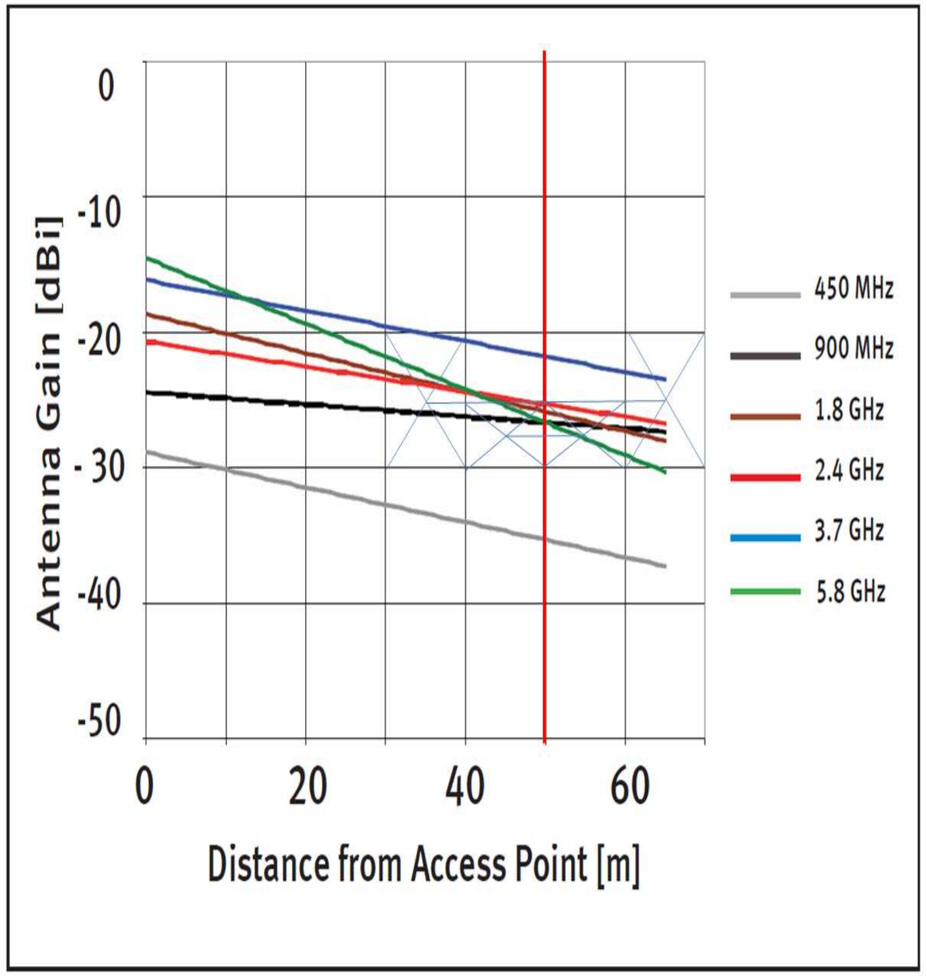
EXHIBIT 1

Supporting Technical Calculations

					D= Field Strength Distance (m)					1	With Aircraft Attenuation		Without Aircraft Attenuation	
	Freq (MHz)	MAX Total NCU Power (dBm) in Total Band	Combiner and Cable Losses (dB)	Aircraft Isolation (dB)	Leaky Feeder Gain (dB) @ Xmtrs (mid of the aircraft)	ERP (dBm) with Aircraft Attenuation	ERP (mW) with Aircraft Attenuation	ERP (dBm) without Aircraft Attenuation	ERP (mW) without Aircraft Attenuation	Free Path Loss (dB) at Dmtrs	Field Strength in V/M @ Dmtrs	Field Strength in dBuV/m	Field Strength in V/M @ Dmtrs	Field Strength in dBuV/m
NCU450	421	25	2.6	16	-31.5	-25.1	0.00309	-9.1	0.12303	24.9	9.630E-03	79.67	6.076E-02	95.67
	494													
NCU800	869	25	3.5	16	-26.0	-20.5	0.00891	-4.5	0.35481	31.2	1.643E-02	84.31	1.037E-01	100.31
	960													
NCU 900	921	25								31.7	1.643E-02	84.31	1.037E-01	100.31
	960													
NCU1800	1805	28	9.5	12	-22.5	-16.0	0.02512	-4.0	0.39811	37.6	2.732E-02	88.73	1.088E-01	100.73
	1880													
NCU 2100	2100	24	2.9	12	-22.5	-13.4	0.0.4571	-1.4	0.72444	38.9	3.686E-02	91.33	1.467E-01	103.33
	2170													

Antenna Length (m)	25.0	X in above Table

Antenna Gain 421MHz (dBi)	-31.5
Antenna Gain 800/900MHz (dBi)	-26.0
Antenna Gain 1800/1900/2100MHz (dBi)	-22.5



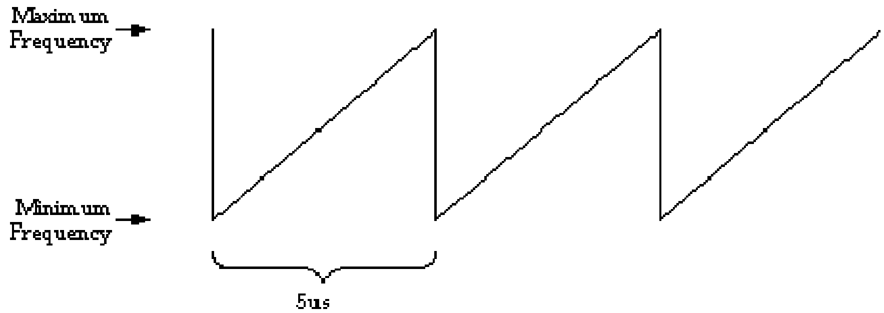
Antenna Gain [dBi]
0
-10
-20
- 30
-40
-50
0
20
40
60
Distance from Access Point [m]
450 MHz
900 MHz
1.8 GHz
2.4 GHz
3.7 GHz
5.8 GHz

EXHIBIT 2

Description of "Chirp" Modulation

Description of "Chirp" Modulation

The signal in each band takes the form of a chirp, *i.e.*, a swept frequency waveform. The effective sweep waveform is a "sawtooth" triangular wave as indicated in the figure below:



Frequency Sweep Waveform

The sweep repeats at a rate of 200 kHz. This repeat rate is the same as the channel frequency width for each mobile phone. The maximum and minimum frequencies are programmable, with a maximum swept bandwidth of 75MHz.

There will be two CRFMUs operating on the aircraft at the same time. A slight dither, called the "M sequence" is applied to avoid the units beating and creating standing waves. This is achieved by applying a pseudo random sequence to the synthesiser reference oscillator of the RF PCBs (basically FM modulating the waveform).

A "windowing" technique is used to minimize the out-of-band emissions and improve in-band flatness. This requires the amplitude of the chirp signal to be slightly smaller (and tapered) for the extreme frequencies.

The simple sinusoidal chirp signal of constant amplitude will generate signals in every channel of the swept bandwidth. By modulating the amplitude and phase of that signal, a 'notch' in the spectrum can be produced. Within the notch frequencies the noise will have lower power. Ideally the notch should cover one section of the bandwidth, without affecting the power in the other sections. The notch section is the same frequency as the BTS, and programmable.

The CRFMU can be programmed for various start and stop frequencies in each cellular and for the BTS operation a notch can be generated to give additional S/N ratio.