Applicant:	Airbus U.S. Manufacturing Facility Greg.Rensink@airbus.com
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ATTN: Office of Engineering and Technology
Nimesh.Sangani@fcc.gov

Dear FCC,
Thank you for your reply. See below in response to your request for more information, 1) thru 6).

Sincerely,
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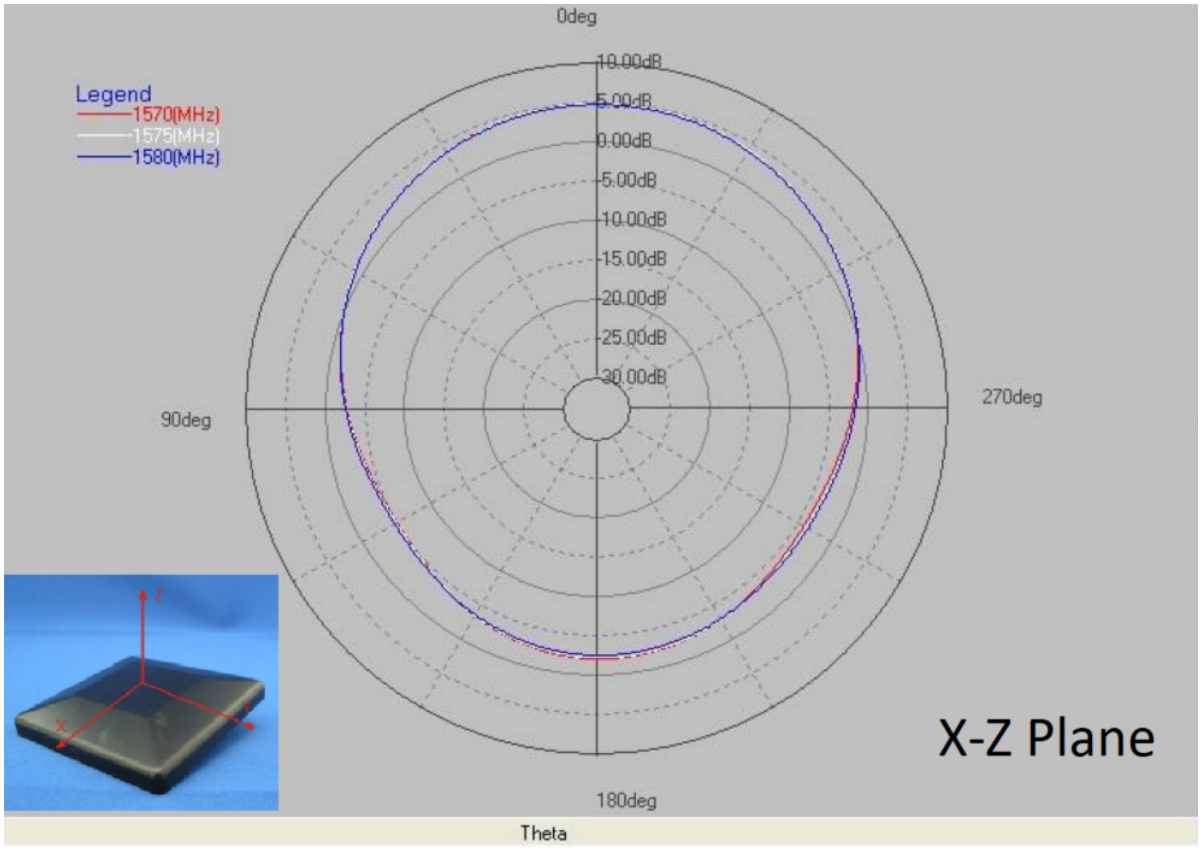
"*Your exhibit says: The Building 18 dimensions are: 92m Wide x 81m Deep x 22m High. The GPS Repeater system includes a receiving antenna that is connected to two re-radiating antennas through a splitter and two line amplifiers. The re-radiating antennas are installed 55m from the outer wall (which can fully open for aircraft ingress / egress), and pointed at the nose of the two aircraft where the aircraft GPS receiver antennas are installed. The GPS Repeater system can be easily unplugged from the ground when not needed.*"

1) Could you please explain why you used d = 55 meters in your calculation?

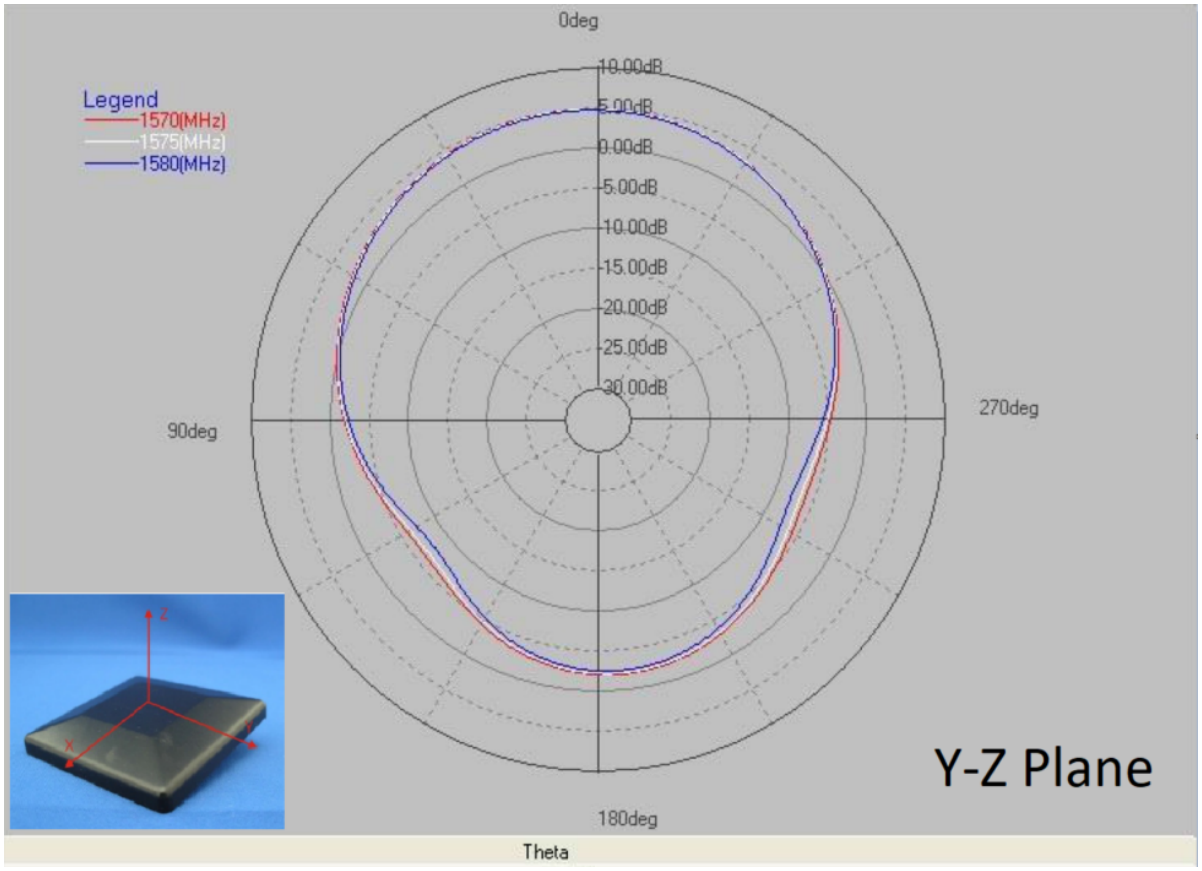
For the re-radiating antenna, the amplitude and radiation pattern of the signal depends on what direction the antenna is mounted. The strongest signal is +5.00 dB in the 0deg +Z plane, which is why they are pointed at the nose of the two aircraft. The signal strength decreases towards the edge of the antenna and becomes attenuated behind the antenna. See below hemispheric radiation patterns in the X-Z Plane and Y-Z Plane, outward from the flat base.

- Positive Gain, X-Z plane and Y-Z plane along 180deg of +Z axis (90 to 0 to 270 deg)
- Negative Gain, X-Z plane and Y-Z plane along 180deg of -Z axis (90 to 180 to 270 deg)

Indeed, the nearest exterior wall is behind the antenna (d = 23m), but in this direction the signal has < 0.00 dB of gain from the antenna. Therefore, Airbus considered the worst case scenario as the shortest distance from the antenna to the exterior wall in the direction of amplified radiation (d = 55m).



X-Z Plane: Antenna Gain <0.00 dB behind the antenna



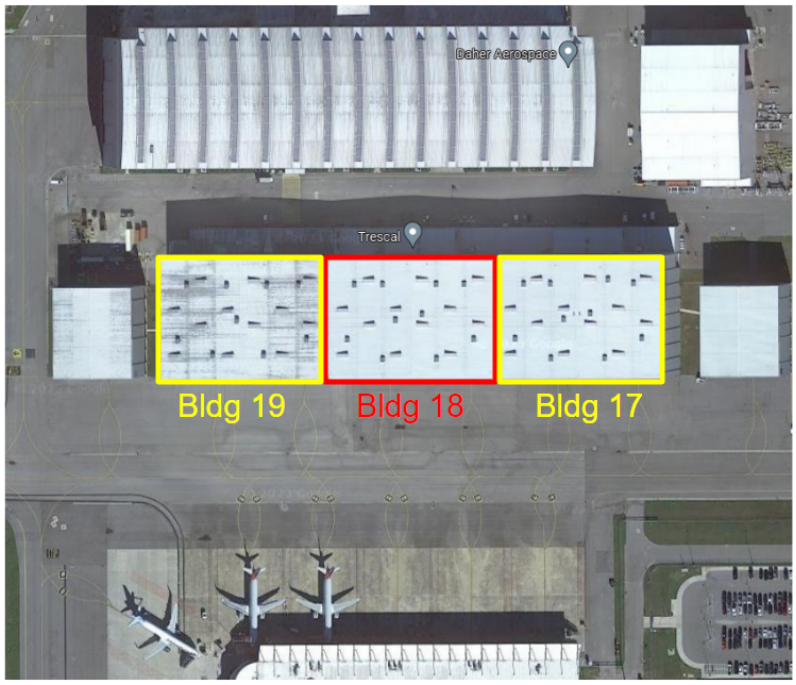
Y-Z Plane: Antenna Gain <0.00 dB behind the antenna

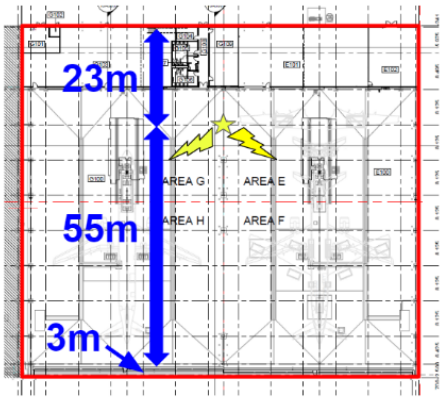
2) As per NTIA manual, d is the distance between the radiator and the closest exterior wall of the building in meters. The nearest possible wall distance would be 40.5 if your reradiating antenna was located in the center of the building. (92m Wide x 81m Deep x 22m High.)

That is correct, but the antenna is not installed in the center of the building. Airbus took into account the worst case scenario, which is the further wall in the direction of signal radiation.

3) From the drawing that you provided it doesn't appear that this will be installed in the dead center of your facility. So your distance d should be even less than 40.5 m.

Indeed, the nearest exterior wall is behind the antenna at d = 23m. The further exterior wall is at d = 55m, and there is an additional 3m not taken into account due to overlapping hangar doors. The total building depth is 23m + 55m + 3m = 81m. In addition, the other side of the nearest exterior wall is a corridor between Airbus buildings for industrial vehicles and pedestrians. The further exterior wall faces Airbus flight line operations.





Bldg 18

4) You mentioned that aircraft hangar door can be fully open for aircraft ingress or egress. Will you be transmitting while the aircraft hangar door is open? If no, then do you have a mechanism in place that would turn off transmission when the hangar door is opened?

The link budget calculation does not take into account any attenuation due to building materials. Therefore, what is presented is representative of an open hangar door or a closed hangar door. By transmitting within the allowable FCC limits, Airbus does not have a mechanism in place to turn off the transmission when the hangar door is opened.

5) Please redo your calculations for link budget.

The updated link budget calculations for d = 23m is modified to also take into account the re-radiating antenna has 0.00 dB of gain in that direction.

$P_{Tmax} = P_R + 20log_{10}f + 20log_{10}(30+d) - 27.55$
$P_R = -140dBm$, $f = 1575.42$ MHz, $d = 23m$

$P_{Tmax\ (at\ d=23m)} = -140dBm + 20log_{10}(1575.42MHz) + 20log_{10}(30m+23m) - 27.55$
$P_{Tmax\ (at\ d=23m)} = -140 + 63.95 + 34.49 - 27.55$
$P_{Tmax\ (at\ d=23m)} = -69.11\ dBm$

$P_{Tmax\ (at\ d=0)} = -140 + 63.95 + 29.54 - 27.55$
$P_{Tmax\ (at\ d=0)} = -74.06\ dBm$

Equivalent Isotropic Radiated Power (EIRP) of the GPS Repeater System installed = -71 dBm
**********See attached LINK BUDGET Calculator Spreadsheet**********

Avg Receive Power L1 dBm North America =		-130 dBm
+	Receiving Antenna Gain =	+38 dB
+	System Gain =	+33 dB
+	Nominal Antenna Gain =	+0 dB
-	Antenna Cable Insertion Loss =	-12 dB
	EIRP of GPS Repeater System =	-71 dBm

$EIRP = P_R = P_T - 20log_{10}f - 20log_{10}(30+d) + 27.55$
$EIRP\ at\ 23m = P_{R\ (at\ d=23m)} = P_T - 20log_{10}f - 20log_{10}(30+23m) + 27.55$
$EIRP\ at\ 23m = P_{R\ (at\ d=23m)} = -71dBm - 20log_{10}(1575.42MHz) - 20log_{10}(30+23m) + 27.55$
$EIRP\ at\ 23m = P_{R\ (at\ d=23m)} = -71 - 63.95 - 34.49 + 27.55$
$EIRP\ at\ 23m = P_{R\ (at\ d=23m)} = -142\ dBm$

6) The Frequency Tolerance is 10% in your Form 442 application. Is this accurate?

Yes, the frequency tolerance should be 10%. Airbus checked with the supplier of the GPS repeater equipment (GPS Networking, Inc.) to confirm.