Long Beach CSC GPS Re-radiated Power Calculations

Re-radiated Signal Strength at 100 ft outside the building

(1) $P_{Rerad} = P_{Rec} + G_1 + G_2 + A_1 - C_1 - C_2 - FL$

Where: P_{Rerad} = Re-radiated signal strength 100 ft outside the building
P_{Rec} = Received Power from Satellites = -130 dBm
G_1 = Roof Antenna Gain = 41 dBi
G_2 = Re-radiating Antenna Gain = 3.0 dBi
A_1 = Amplifier Gain = 31 dB
C_1 = Coax Attenuation, Roof Antenna to Amplifier
= 18 dB/100 ft X 80 ft
= 14.4 dB
C_2 = Coax Attenuation, Amplifier to Re-radiating Antenna
= 18 dB/100 ft X 30 ft
= 5.4 dB
FL = Freespace Loss

(2) FL = 20LogF + 20LogD + 36.56

Where: F = Frequency in MHz = 1575.42
D = Distance in Miles
= (Distance from antenna to outer wall in feet + 100)/5280
= (2 ft + 100 ft)/5280

Inserting the values for F and D into equation (2) yields

FL = 20Log(1575.42) + 20Log((2 +100)/5280) +36.56
= 66.23 dB

Inserting these values into equation (1) then becomes:

P_{Rerad} = -130 + 41 + 3.0 + 31 – 14.4 – 5.4 – 66.23
= - 141.03 dBm EIRP

Power radiated from the antenna

(3) $P_{Ant} = P_{Rerad} + FL$

Where: P_{Ant} = power radiated from the antenna

Using values from (1) and (2) above, equation (3) becomes:

P_{Ant} = -141.03 + 66.23 = -74.8 dBm EIRP

(4) $P = P_{In} [\log^{-1}(P_{Ant}/10)]$

Where: P = Power in Watts
P_{In} = Input (Reference) Power = 0.001 W

P = $0.001[\log^{-1}(-74.8/10)]$
= 3.31×10^{-11} W
= 33.1 pW EIRP