

Exhibit 3

GPS Re-Radiator Calculations for SRC Locations

FCC File Number: 0504-EX-CN-2019

SRC Inc. Locations

- Syracuse New York Corporate Headquarters
 - Four buildings in SRC Inc., Campus
- Chantilly Virginia
 - One location
- San Antonio, Texas
 - One location

SRC Syracuse NY Location

Building 1

Satellite Link Budget to Roof Mounted Receive Antenna for Building 1 Facility

GPS Satellite Link Budget (Down Link)

GPS Satellite Downlink Power

Frequency L1	1575.42MHz	Frequency L2	1227.6MHz
Stalellite Transmitter power	25Watts	Stalellite Transmitter power	25Watts
	13.98dBW		13.98dBW
RF Losses in transmitter path	1.25dB	RF Losses in transmitter path	1.25dB
Antenna Gain (Isotropic)	13.5dBi	Antenna Gain (Isotropic)	13.5dBi
Satellite Effective Radiated Power	26.23dBW	Satellite Effective Radiated Power	26.23dBW

Propagation Losses

Frequency L1	1575.42MHz	Frequency L1	1227.6MHz
	1.58E+09Hz		1.23E+09Hz
Distance from Satellite to Earth	2.52E+07Meters	Distance from Satellite to Earth	2.52E+07Meters
	2.52E+04Kilometers		2.52E+04Kilometers
Atmospheric and polarization loss	0.05dB	Atmospheric and polarization loss	0.05dB
Speed of Light	3.00E+08M/Sec	Speed of Light	3.00E+08M/Sec
Wavelength (C/F)	1.90E-01Meters	Wavelength	2.44E-01Meters
Free Space Pathloss	184.43dB	Pathloss	182.26dB
Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

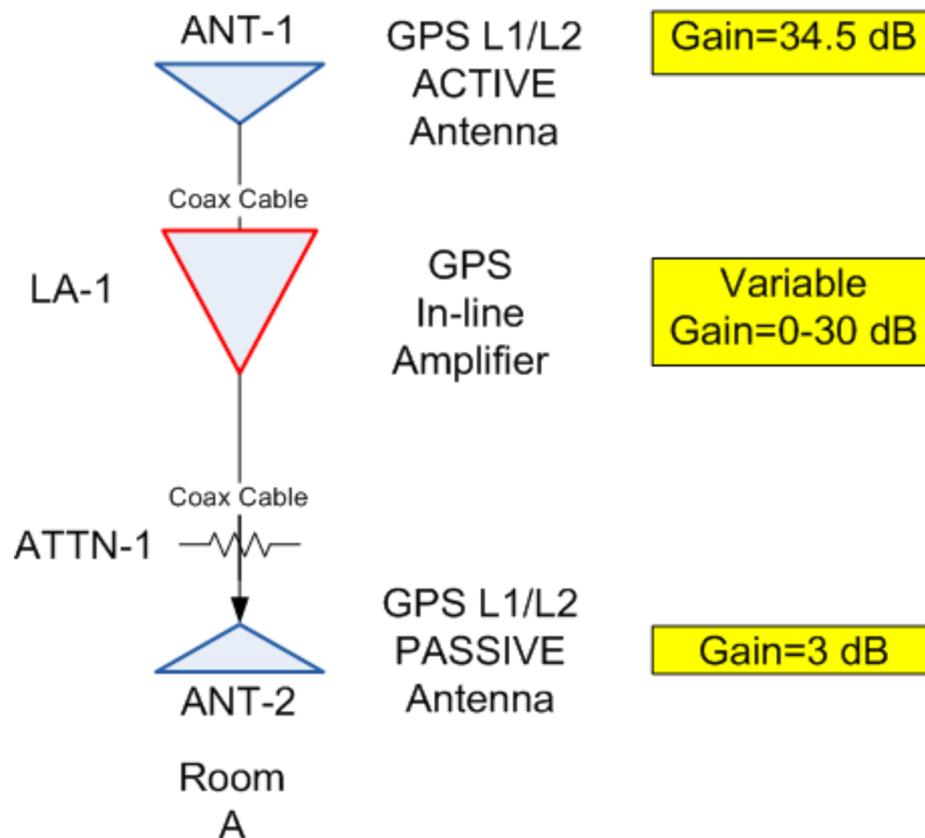
Power At Receive Antenna on Earth

Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

Data for Components Comprising SRC GPS Re-radiator Design from GPSSource

Building 1 Configuraiton				
Description	Part Number	Parmeter	Value	Units
ANTENNA 2.6" GPS L1/L2 ACTIVE, Pole Mount, NF	L1L2-2GA-PM-NF	Gain L1	34.5	dB
		Gain L2	34.5	dB
GPS In-line Amplifier Mini Housing, Variable Gain 0-30dB	A11M-V-NF	Gain L1	30	dB
		Gain L2	30	dB
ANTENNA 2.6" GPS L1/L2 PASSIVE, NF	L1L2-2GP-NF	Gain L1	3	dB
		Gain L2	3	dB

Block Diagram of GPS Re-Radiating System for Building 1



Link Budget Calculations for Building 1 Room A

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

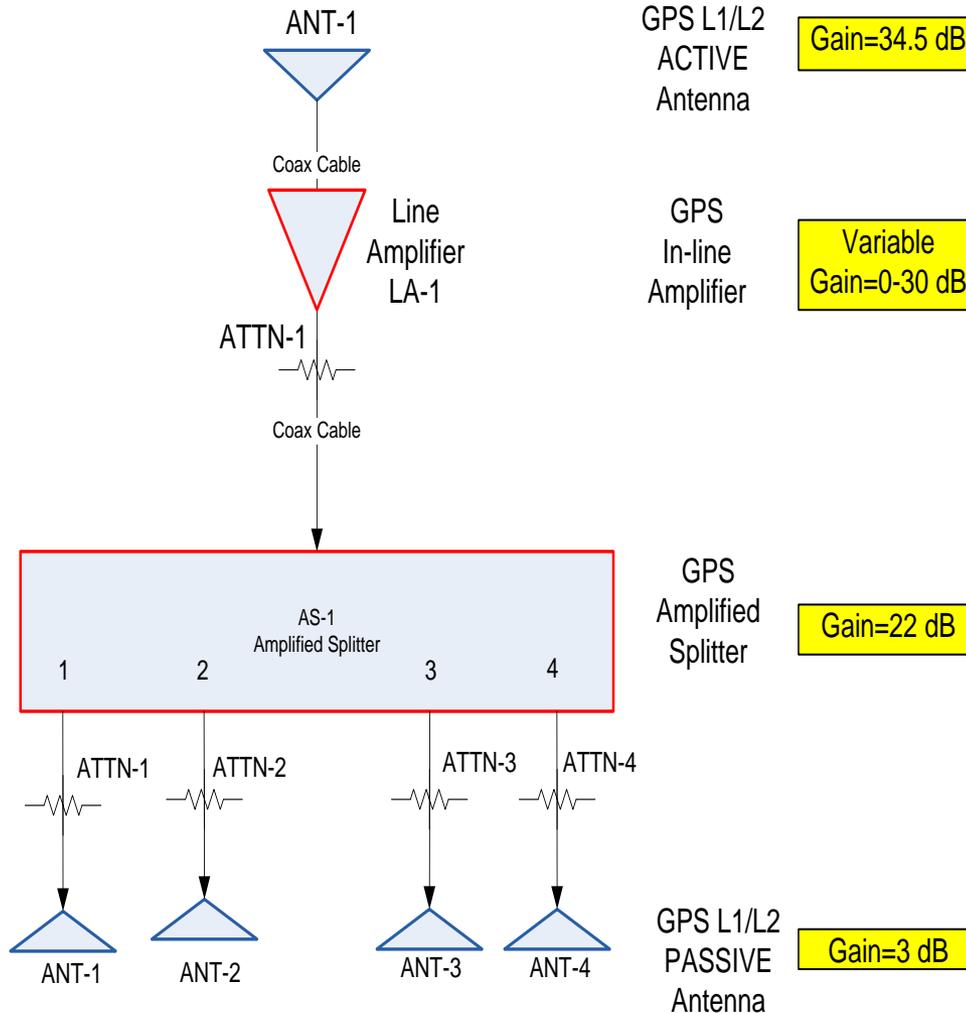
Location: SRC SYR Building 1 Facility Room A

Frequency L1	1575.42	MHz	Frequency L2	1227.6	MHz
ANT-1 Antenna Receive Gain	34.5	dBic	Antenna Receive Gain	34.5	dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2	dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2	dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27	dB	Line Amplifier Gain	27	dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2	dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2	dB
AS-1 Amplified Splitter Port 1 Gain	22	dB	Amplified Splitter Port 1 Gain	22	dB
RF Cable Loss (from Amplifier to Passive Antenna)	3	dB	RF Cable Loss (from Amplifier to Passive Antenna)	3	dB
Additional Attenuation	30	dB	Additional Attenuation	30	dB
RF Power at input to Re-radiating antenna	-103.75	dBm	RF Power at input to Re-radiating antenna	-79.58	dBm
ANT-2 Passive Re-Radiating Antenna Gain	3	dB	ANT-2 Passive Re-Radiating Antenna Gain	3	dB
Re-radiated ERP Indoors	-100.75	dBm	Re-radiated ERP Indoors	-76.58	dBm
	0.08	pW		21.98	pW
Pathloss Target Distance	100	ft	Pathloss Target Distance	100	ft
	30.480	meters		30.48	meters
Pathloss at 100 ft	66.08	dB	Pathloss at 100 ft	63.91	dB
RF Power Level at 100 ft from antenna	-166.82	dBm	RF Power Level at 100 ft from antenna	-140.49	dBm
		dBm/24			dBm/24
Required RF Power Level at 100 ft	-140	MHz	Required RF Power Level at 100 ft	-140	dBm/24 MHz

SRC Syracuse NY Location

Building 2

Block Diagram of GPS Re-Radiating System for Building 2



ANT 1, 2 – Services Room A
 ANT 3 – Service for Room B
 ANT 4 – Service for Room C

Link Budget Calculations for Building 2 Room A Antenna 1

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 2 Facility Room A

Antenna 1

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 1 Gain	22 dB	Amplified Splitter Port 1 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-81.75 dBm	RF Power at input to Re-radiating antenna	-79.58 dBm
ANT-2 Passive Re-Radiating Antenna Gain	3 dB	ANT-2 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-78.75 dBm	Re-radiated ERP Indoors	-76.58 dBm
	13.35 pW		21.98 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-144.82 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Building 2 Room A Antenna 2

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 2 Facility Room A
Antenna 2

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 1 Gain	22 dB	Amplified Splitter Port 1 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-93.50 dBm	RF Power at input to Re-radiating antenna	-93.50 dBm
ANT-2 Passive Re-Radiating Antenna Gain	3 dB	ANT-2 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-90.50 dBm	Re-radiated ERP Indoors	-90.50 dBm
	0.89 pW		0.89 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-156.58 dBm	RF Power Level at 100 ft from antenna	-154.41 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Building 2 Room B

Power At Receive Antenna on Earth

Received Power on Earth	-158.25 dBW	Received Power on Earth	-156.08 dBW
	-128.25 dBm		-126.08 dBm

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: Campbel Facility Room B

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 2 Gain	22 dB	Amplified Splitter Port 2 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-81.75 dBm	RF Power at input to Re-radiating antenna	-79.58 dBm
ANT-3 Passive Re-Radiating Antenna Gain	3 dB	ANT-3 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-78.75 dBm	Re-radiated ERP Indoors	-76.58 dBm
	13.35 pW		21.98 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.480 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-144.82 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Building 2 Room C

Power At Receive Antenna on Earth

Received Power on Earth	-158.25 dBW	Received Power on Earth	-156.08 dBW
	-128.25 dBm		-126.08 dBm

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: Campbel Facility Room C

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 3 Gain	22 dB	Amplified Splitter Port 3 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Aditonal Attenuation	30 dB	Aditonal Attenuation	30 dB
RF Power at input to Re-radiating antenna	-81.75 dBm	RF Power at input to Re-radiating antenna	-79.58 dBm
ANT-4 Passive Re-Radiating Antenna Gain	3 dB	ANT-4 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-78.75 dBm	Re-radiated ERP Indoors	-76.58 dBm
	13.35 pW		21.98 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.480 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-144.82 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

SRC Syracuse NY Location

Building 3

Satellite Link Budget to Roof Mounted Receive Antenna for Building 3

GPS Satellite Link Budget (Down Link)

GPS Satellite Downlink Power

Frequency L1	1575.42MHz	Frequency L2	1227.6MHz
Stalellite Transmitter power	25Watts	Stalellite Transmitter power	25Watts
	13.98dBW		13.98dBW
RF Losses in transmitter path	1.25dB	RF Losses in transmitter path	1.25dB
Antenna Gain (Isotropic)	13.5dBi	Antenna Gain (Isotropic)	13.5dBi
Satellite Effective Radiated Power	26.23dBW	Satellite Effective Radiated Power	26.23dBW

Propagation Losses

Frequency L1	1575.42MHz	Frequency L1	1227.6MHz
	1.58E+09Hz		1.23E+09Hz
Distance from Satellite to Earth	2.52E+07Meters	Distance from Satellite to Earth	2.52E+07Meters
	2.52E+04Kilometers		2.52E+04Kilometers
Atmospheric and polarization loss	0.05dB	Atmospheric and polarization loss	0.05dB
Speed of Light	3.00E+08M/Sec	Speed of Light	3.00E+08M/Sec
Wavelength (C/F)	1.90E-01Meters	Wavelength	2.44E-01Meters
Free Space Pathloss	184.43dB	Pathloss	182.26dB
Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

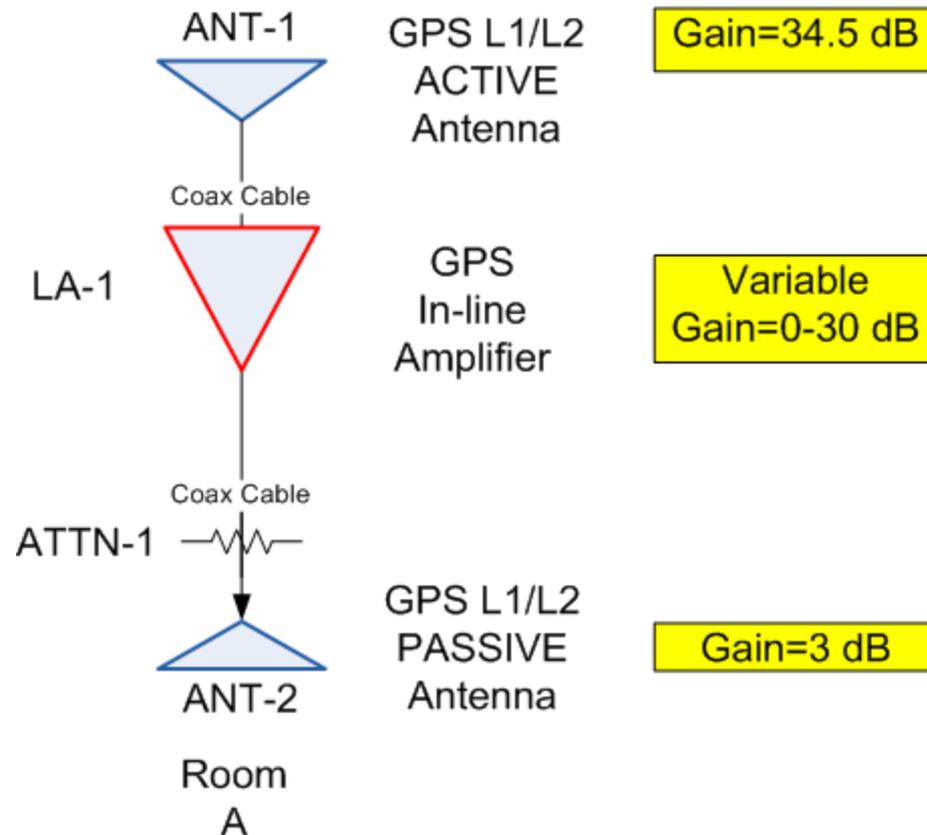
Power At Receive Antenna on Earth

Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

Data for Components Comprising SRC GPS Re-radiator Design from GPSSource

Building 3 Configuraiton				
Description	Part Number	Parmeter	Value	Units
ANTENNA 2.6" GPS L1/L2 ACTIVE, Pole Mount, NF	L1L2-2GA-PM-NF	Gain L1	34.5	dB
		Gain L2	34.5	dB
GPS In-line Amplifier Mini Housing, Variable Gain 0-30dB	A11M-V-NF	Gain L1	30	dB
		Gain L2	30	dB
ANTENNA 2.6" GPS L1/L2 PASSIVE, NF	L1L2-2GP-NF	Gain L1	3	dB
		Gain L2	3	dB

Block Diagram of GPS Re-Radiating System for Building 3



Link Budget Calculations for Building 3 Room A

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 3 Facility Room A

Frequency L1	1575.42	MHz	Frequency L2	1227.6	MHz
ANT-1 Antenna Receive Gain	34.5	dBic	Antenna Receive Gain	34.5	dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2	dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2	dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27	dB	Line Amplifier Gain	27	dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2	dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2	dB
AS-1 Amplified Splitter Port 1 Gain	22	dB	Amplified Splitter Port 1 Gain	22	dB
RF Cable Loss (from Amplifier to Passive Antenna)	3	dB	RF Cable Loss (from Amplifier to Passive Antenna)	3	dB
Additional Attenuation	30	dB	Additional Attenuation	30	dB
RF Power at input to Re-radiating antenna	-81.75	dBm	RF Power at input to Re-radiating antenna	-79.58	dBm
ANT-2 Passive Re-Radiating Antenna Gain	3	dB	ANT-2 Passive Re-Radiating Antenna Gain	3	dB
Re-radiated ERP Indoors	-78.75	dBm	Re-radiated ERP Indoors	-76.58	dBm
	13.35	pW		21.98	pW
Pathloss Target Distance	100	ft	Pathloss Target Distance	100	ft
	30.480	meters		30.48	meters
Pathloss at 100 ft	66.08	dB	Pathloss at 100 ft	63.91	dB
RF Power Level at 100 ft from antenna	-144.82	dBm	RF Power Level at 100 ft from antenna	-140.49	dBm
Required RF Power Level at 100 ft	-140	dBm/24 MHz	Required RF Power Level at 100 ft	-140	dBm/24 MHz

SRC Syracuse NY Location

Building 4

Satellite Link Budget to Roof Mounted Receive Antenna for Building 4

GPS Satellite Link Budget (Down Link)

GPS Satellite Downlink Power

Frequency L1	1575.42MHz	Frequency L2	1227.6MHz
Stalellite Transmitter power	25Watts	Stalellite Transmitter power	25Watts
	13.98dBW		13.98dBW
RF Losses in transmitter path	1.25dB	RF Losses in transmitter path	1.25dB
Antenna Gain (Isotropic)	13.5dBi	Antenna Gain (Isotropic)	13.5dBi
Satellite Effective Radiated Power	26.23dBW	Satellite Effective Radiated Power	26.23dBW

Propagation Losses

Frequency L1	1575.42MHz	Frequency L1	1227.6MHz
	1.58E+09Hz		1.23E+09Hz
Distance from Satellite to Earth	2.52E+07Meters	Distance from Satellite to Earth	2.52E+07Meters
	2.52E+04Kilometers		2.52E+04Kilometers
Atmospheric and polarization loss	0.05dB	Atmospheric and polarization loss	0.05dB
Speed of Light	3.00E+08M/Sec	Speed of Light	3.00E+08M/Sec
Wavelength (C/F)	1.90E-01Meters	Wavelength	2.44E-01Meters
Free Space Pathloss	184.43dB	Pathloss	182.26dB
Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

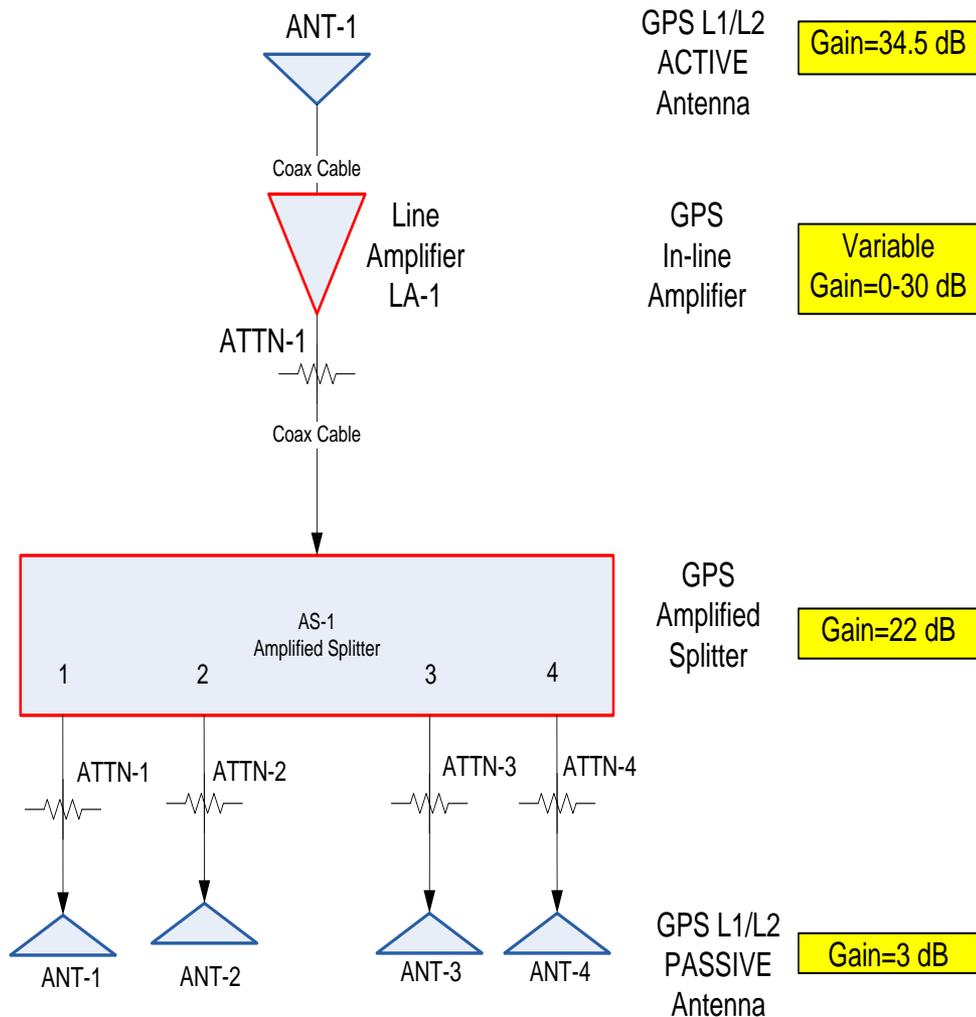
Power At Receive Antenna on Earth

Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

Data for Components Comprising SRC GPS Re-radiator Design from GPSSource

Building 4 Configuraiton				
Description	Part Number	Parmeter	Value	Units
ANTENNA 2.6" GPS L1/L2 ACTIVE, Pole Mount, NF	L1L2-2GA-PM-NF	Gain L1	34.5	dB
		Gain L2	34.5	dB
GPS In-line Amplifier Mini Housing, Variable Gain 0-30dB	A11M-V-NF	Gain L1	30	dB
		Gain L2	30	dB
GPS Splitter 4 Outputs, Amplified 21dB, Power 110/5, NF	S14-A-P110/5-NF	Gain L1	22	dB
		Gain L2	22	dB
ANTENNA 2.6" GPS L1/L2 PASSIVE, NF	L1L2-2GP-NF	Gain L1	3	dB
		Gain L2	3	dB

Block Diagram of GPS Re-Radiating System for Building 4



ANT 1, 2 – Services Room A
 ANT 3 – Service for Room B
 ANT 4 – Service for Room C

Link Budget Calculations for Building 4 Coverage Area Antenna 1

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 3 Facility Antenna 1

Frequency L1	1575.42	MHz	Frequency L2	1227.6	MHz
ANT-1 Antenna Receive Gain	34.5	dBic	ANT-1 Antenna Receive Gain	34.5	dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	1	dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	1	dB
LA-1 Line Amplifier Gain	30	dB	LA-1 Line Amplifier Gain	30	dB
RF Cable Loss (from Amplifier to Passive Antenna)	0	dB	RF Cable Loss (from Amplifier to Passive Antenna)	0	dB
Additional Attenuation	17	dB	Additional Attenuation	17	dB
RF Power at input to Re-radiating antenna	-81.75	dBm	RF Power at input to Re-radiating antenna	-79.58	dBm
ANT-2 Passive Re-Radiating Antenna Gain	3	dB	ANT-2 Passive Re-Radiating Antenna Gain	3.00	dB
Re-radiated ERP Indoors	-78.75	dBm	Re-radiated ERP Indoors	-76.58	dBm
	13.35	pW		21.98	pW
Pathloss Target Distance	100	ft	Pathloss Target Distance	100.00	ft
	30.480	meters		30.48	meters
Pathloss at 100 ft	66.08	dB	Pathloss at 100 ft	63.91	dB
RF Power Level at 100 ft from antenna	-144.82	dBm	RF Power Level at 100 ft from antenna	-140.49	dBm
Required RF Power Level at 100 ft	-140	dBm/24 MHz	Required RF Power Level at 100 ft	-140	dBm/24 MHz

Link Budget Calculations for Building 4 Coverage Area Antenna 2

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 4 Facility Antenna 2

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 1 Gain	22 dB	Amplified Splitter Port 1 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-93.50 dBm	RF Power at input to Re-radiating antenna	-93.50 dBm
ANT-2 Passive Re-Radiating Antenna Gain	3 dB	ANT-2 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-90.50 dBm	Re-radiated ERP Indoors	-90.50 dBm
	0.89 pW		0.89 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-156.58 dBm	RF Power Level at 100 ft from antenna	-154.41 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Building 4 Coverage Area Antenna 3

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 4 Facility Antenna 3

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 1 Gain	22 dB	Amplified Splitter Port 1 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-93.50 dBm	RF Power at input to Re-radiating antenna	-93.50 dBm
ANT-2 Passive Re-Radiating Antenna Gain	3 dB	ANT-2 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-90.50 dBm	Re-radiated ERP Indoors	-90.50 dBm
	0.89 pW		0.89 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-156.58 dBm	RF Power Level at 100 ft from antenna	-154.41 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Building 4 Coverage Area Antenna 4

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: SRC SYR Building 4 Facility Antenna 4

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	34.5 dBic	Antenna Receive Gain	34.5 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	2 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	27 dB	Line Amplifier Gain	27 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	2 dB
AS-1 Amplified Splitter Port 1 Gain	22 dB	Amplified Splitter Port 1 Gain	22 dB
RF Cable Loss (from Amplifier to Passive Antenna)	3 dB	RF Cable Loss (from Amplifier to Passive Antenna)	3 dB
Additional Attenuation	30 dB	Additional Attenuation	30 dB
RF Power at input to Re-radiating antenna	-93.50 dBm	RF Power at input to Re-radiating antenna	-93.50 dBm
ANT-2 Passive Re-Radiating Antenna Gain	3 dB	ANT-2 Passive Re-Radiating Antenna Gain	3 dB
Re-radiated ERP Indoors	-90.50 dBm	Re-radiated ERP Indoors	-90.50 dBm
	0.89 pW		0.89 pW
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-156.58 dBm	RF Power Level at 100 ft from antenna	-154.41 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

SRC Chantilly VA

Avion Parkway Facility

Satellite Link Budget to Roof Mounted Receive Antenna for SRC Chantilly VA Avion Parkway Facility

GPS Satellite Link Budget (Down Link)

GPS Satellite Downlink Power

Frequency L1	1575.42	MHz	Frequency L2	1227.6	MHz
Satellite Transmitter power	25	Watts	Satellite Transmitter power	25	Watts
	13.98	dBW		13.98	dBW
RF Losses in transmitter path	1.25	dB	RF Losses in transmitter path	1.25	dB
Antenna Gain (Isotropic)	13.5	dBi	Antenna Gain (Isotropic)	13.5	dBi
Satellite Effective Radiated Power	26.23	dBW	Satellite Effective Radiated Power	26.23	dBW

Propagation Losses

Frequency L1	1575.42	MHz	Frequency L1	1227.6	MHz
	1.58E+09	Hz		1.23E+09	Hz
Distance from Satellite to Earth	2.52E+07	Meters	Distance from Satellite to Earth	2.52E+07	Meters
	2.52E+04	Kilometers		2.52E+04	Kilometers
Atmospheric and polarization loss	0.05	dB	Atmospheric and polarization loss	0.05	dB
Speed of Light	3.00E+08	M/Sec	Speed of Light	3.00E+08	M/Sec
Wavelength (C/F)	1.90E-01	Meters	Wavelength	2.44E-01	Meters
Free Space Pathloss	184.43	dB	Pathloss	182.26	dB
Received Power on Earth	-158.25	dBW	Received Power on Earth	-156.08	dBW
	-128.25	dBm		-126.08	dBm

Power At Receive Antenna on Earth

Received Power on Earth	-158.25	dBW	Received Power on Earth	-156.08	dBW
	-128.25	dBm		-126.08	dBm

Data for Components Comprising SRC GPS Re-radiator Design from GPS Networking

Chantilly VA Equipment Serving Room A, B, and C				
Description	Part Number	Parameter	Value	Units
L1/L2 VARIABLE GAIN RE-RADIATING KIT WITH LCD DISPLAY-N/5/110 (FOR 3 ROOM)	L1/L2VGLCDHN	Gain L1	34.5	dB
		Gain L2	34.5	dB
GPS HI-ISOLATION AMPLIFIED ANTENNA SPLITTER-4 OUTPUTS-N	HIALDCBS1X4	Gain L1	22	dB
		Gain L2	22	dB
L1/L2 VARIABLE GAIN PORTABLE NETWORKED GPS RERADIATING KIT WITH LCD DISPLAY IN 1dB INCREMENTS-N/5/110 (FOR OTHER 2 ROOMS)	L1/L2VGLCDPN	Gain L1	34.5	dB
		Gain L2	34.5	dB

Link Budget Calculations for Chantilly VA Room A

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: Chantilly Room A

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	38 dBic	Antenna Receive Gain	38 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB
LA-1 Line Amplifier Gain (Variable 0 - 30 dBm)	13 dB	Line Amplifier Gain	13 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB
AS-1 Amplified Splitter Port 1 Gain	3 dB	Amplified Splitter Port 1 Gain	3 dB
RF Cable Loss (from Amplifier to Passive Antenna)	5.1 dB	RF Cable Loss (from Amplifier to Passive Antenna)	5.1 dB
Additional Attenuation	0 dB	Additional Attenuation	0 dB
RF Power at input to Re-radiating antenna	-82.75 dBm	RF Power at input to Re-radiating antenna	-80.58 dBm
ANT-2 Passive Re-Radiating Antenna Gain	4 dB	ANT-2 Passive Re-Radiating Antenna Gain	4 dB
Re-radiated ERP Indoors	-78.75 dBm	Re-radiated ERP Indoors	-76.58 dBm
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.48 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-144.82 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Chantilly VA Room B

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: Chantilly Room B

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	38 dBic	Antenna Receive Gain	38 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB
LA-1 Line Amplifier Gain	13 dB	Line Amplifier Gain	13 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB
AS-1 Amplified Splitter Port 2 Gain	3 dB	Amplified Splitter Port 2 Gain	3 dB
RF Cable Loss (from Amplifier to Passive Antenna)	5.9 dB	RF Cable Loss (from Amplifier to Passive Antenna)	5.9 dB
Additional Attenuation	0 dB	Additional Attenuation	0 dB
RF Power at input to Re-radiating antenna	-95.30 dBm	RF Power at input to Re-radiating antenna	-80.58 dBm
ANT-3 Passive Re-Radiating Antenna Gain	4 dB	ANT-3 Passive Re-Radiating Antenna Gain	4 dB
Re-radiated ERP Indoors	-91.30 dBm	Re-radiated ERP Indoors	-76.58 dBm
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.480 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-157.38 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

Link Budget Calculations for Chantilly VA Room C

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: Chantilly Room C

Frequency L1	1575.42 MHz	Frequency L2	1227.6 MHz
ANT-1 Antenna Receive Gain	38 dBic	Antenna Receive Gain	38 dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3 dB
LA-1 Line Amplifier Gain	13 dB	Line Amplifier Gain	13 dB
RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB	RF Cable Loss (from Amplifier to Amplified Splitter Input)	0.1 dB
AS-1 Amplified Splitter Port 3 Gain	3 dB	Amplified Splitter Port 3 Gain	3 dB
RF Cable Loss (from Amplifier to Passive Antenna)	11.8 dB	RF Cable Loss (from Amplifier to Passive Antenna)	11.8 dB
Additional Attenuation	0 dB	Additional Attenuation	0 dB
RF Power at input to Re-radiating antenna	-101.20 dBm	RF Power at input to Re-radiating antenna	-80.58 dBm
ANT-4 Passive Re-Radiating Antenna Gain	4 dB	ANT-3 Passive Re-Radiating Antenna Gain	4 dB
Re-radiated ERP Indoors	-97.20 dBm	Re-radiated ERP Indoors	-76.58 dBm
Pathloss Target Distance	100 ft	Pathloss Target Distance	100 ft
	30.480 meters		30.480 meters
Pathloss at 100 ft	66.08 dB	Pathloss at 100 ft	63.91 dB
RF Power Level at 100 ft from antenna	-163.28 dBm	RF Power Level at 100 ft from antenna	-140.49 dBm
Required RF Power Level at 100 ft	-140 dBm/24 MHz	Required RF Power Level at 100 ft	-140 dBm/24 MHz

SRC San Antonio TX Location

Northwest Loop Facility

Satellite Link Budget to Roof Mounted Receive Antenna for SRC San Antonio Tx Northwest Loop Facility

GPS Satellite Link Budget (Down Link)

GPS Satellite Downlink Power

Frequency L1	1575.42MHz	Frequency L2	1227.6MHz
Stalellite Transmitter power	25Watts	Stalellite Transmitter power	25Watts
	13.98dBW		13.98dBW
RF Losses in transmitter path	1.25dB	RF Losses in transmitter path	1.25dB
Antenna Gain (Isotropic)	13.5dBi	Antenna Gain (Isotropic)	13.5dBi
Satellite Effective Radiated Power	26.23dBW	Satellite Effective Radiated Power	26.23dBW

Propagation Losses

Frequency L1	1575.42MHz	Frequency L1	1227.6MHz
	1.58E+09Hz		1.23E+09Hz
Distance from Satellite to Earth	2.52E+07Meters	Distance from Satellite to Earth	2.52E+07Meters
	2.52E+04Kilometers		2.52E+04Kilometers
Atmospheric and polarization loss	0.05dB	Atmospheric and polarization loss	0.05dB
Speed of Light	3.00E+08M/Sec	Speed of Light	3.00E+08M/Sec
Wavelength (C/F)	1.90E-01Meters	Wavelength	2.44E-01Meters
Free Space Pathloss	184.43dB	Pathloss	182.26dB
Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

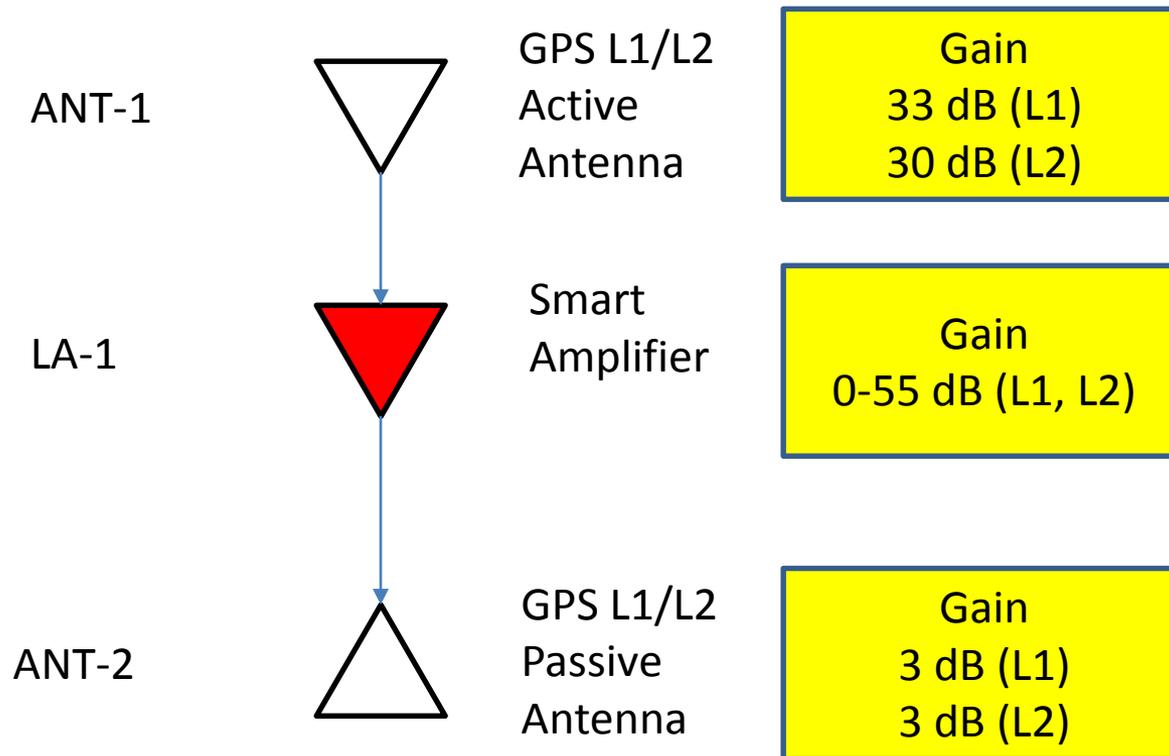
Power At Receive Antenna on Earth

Received Power on Earth	-158.25dBW	Received Power on Earth	-156.08dBW
	-128.25dBm		-126.08dBm

Data for Components Comprising SRC GPS Re-radiator Design from GPSSource

San Antonio Configuration				
Description	Part Number	Parameter	Value	Units
GNSS Active Antenna - GNSS-3A	GNSS-3A	Gain L1	33	dB
		Gain L2	30	dB
The "Smart" GPS Amplifier System	METRO RK	Gain	55	dB
ANTENNA 2.6" GPS L1/L2 PASSIVE, NF	L1L2-2GP-NF	Gain L1	3	dB
		Gain L2	3	dB

Block Diagram of GPS Re-Radiating System for San Antonio



Link Budget Calculations for Building 4 Room A

Indoor Link Budget (Receive antenna to Re-radiating Antenna)

Location: San Antonio Room A

Frequency L1	1575.42	MHz	Frequency L2	1227.6	MHz
ANT-1 Antenna Receive Gain (GNSS-3A Antenna)	36	dBic	Antenna Receive Gain (GNSS-3A)	33	dBic
RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3	dB	RF Cable Loss (from Receive Antenna to Amplifier Input)	3.3	dB
GLI-METRO Smart Amplifier (0-55 dB Gain)	20	dB	GLI-METRO Smart Amplifier (0-55 dB Gain)	20	dB
RF Cable Loss (from Amplifier to Passive Antenna)	5.1	dB	RF Cable Loss (from Amplifier to Passive Antenna)	5.1	dB
Additional Attenuation	0	dB	Additional Attenuation	0	dB
RF Power at input to Re-radiating antenna	-80.65	dBm	RF Power at input to Re-radiating antenna	-81.48	dBm
ANT-2 Passive Re-Radiating Antenna Gain	4	dB	ANT-2 Passive Re-Radiating Antenna Gain	4	dB
Re-radiated ERP Indoors	-76.65	dBm	Re-radiated ERP Indoors	-77.48	dBm
Pathloss Target Distance	100	ft	Pathloss Target Distance	100	ft
	30.480	meters		30.48	meters
Pathloss at 100 ft	66.08	dB	Pathloss at 100 ft	63.91	dB
RF Power Level at 100 ft from antenna	-142.72	dBm	RF Power Level at 100 ft from antenna	-141.39	dBm
Required RF Power Level at 100 ft	-140	dBm/24 MHz	Required RF Power Level at 100 ft	-140	dBm/24 MHz
	21.6444	pW			

Using GPSOURCE Hardware