1 Explanation of MSCL

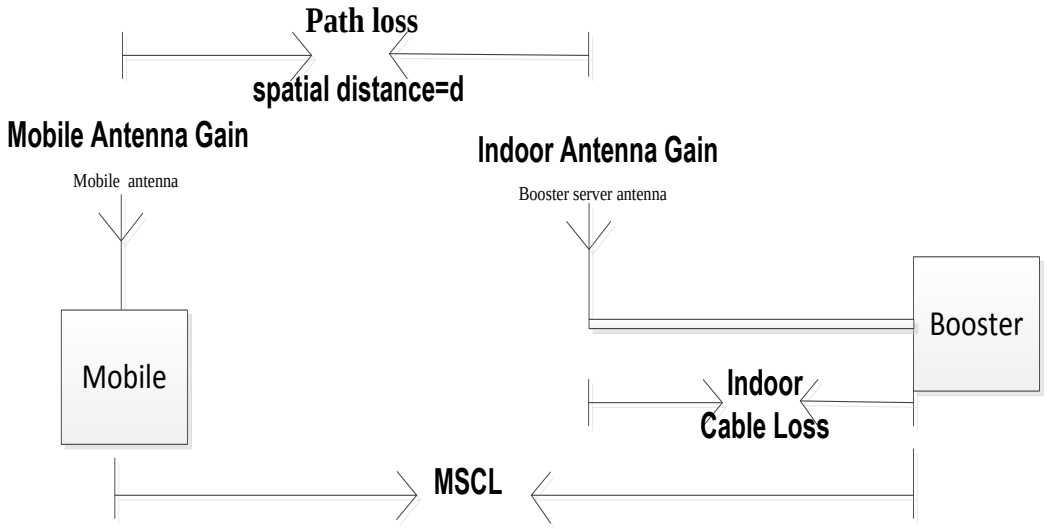


Figure 1

MSCL= Path loss + Indoor Cable Loss - Mobile Antenna Gain- Indoor Antenna Gain……①

1.1 Decibel version of free-space propagation loss equation

Path loss (dB) =20Lgf+20Lgd+32.45 ……② or Path loss (dB) =20Lgf+20LgD-27.55 ……③

f (MHz), d (km), D(m) , d=1000D

1.1.1 Operation Frequency

At PCS (1850-1910MHz) f =1850MHz

At Cellular (824-849MHz) f =824 MHz

At AWS (1710-1755MHz) f =1710 MHz

At LTE(698-716MHz) f =698 MHz

At LTE(776-787MHz) f =776 MHz

1.1.2 Minimum Separation Distances for MSCL base on FCC new rule D (m)

Minimum Separation Distances for MSCL Calculation or Measurements D(m)	
Indoor server antenna types	Minimum separation distances D (m)
Ceiling Mounted (i.e., Dome-type) Antennas	2.0
Wall Mounted (i.e., Panel or other type) Antennas	1.0 or 2.0*
Table Top Antennas	1.0

* Note:

Wall Mounted (i.e., Panel or other type) Antennas: Alternatively, if a manufacturer clearly specifies a minimum separation distance to consumer devices in the installation manual or other user documentation provided with the booster, a reasonable minimum separation distance could be up to 6 feet (or 2 meters) horizontally removed from the antenna. In this case, the user would be required to ensure this minimum separation distance for all CMRS devices authorized for use with this booster.

1.2 Mobile Antenna Gain

Mobile Antenna Gain=0dBi

1.3 Indoor Cable Loss And Indoor Antenna Gain

Indoor Cable Loss and Indoor Antenna Gain are listed in the separate submitted file of Fusion 5S Mobile Antenna Kitting .

1.4 Polarity Loss

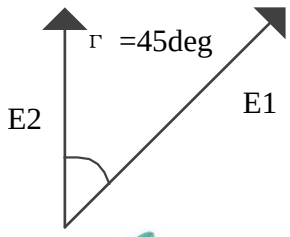
Polarity Loss dB = 10Log (E1/E2)2 dB = PL dB

PL dB= 10Log (E12/ (E1Sin (45deg)) 2) dB = 20Log (1/Sin (45deg)) dB = 3.01dB

Where:

E1 = Maximum Possible Magnitude of the Electric Field from the Mobile Device.

E2 = Magnitude of the electric field from the Mobile device with a 45deg polarity mismatch = E1Sin (r).



2 MSCL Calculations

Vehicle Kit

Fixed booster					
Indoor Antenna					
Indoor Antenna	Indoor Antenna Gain				
	At LTE-A and LTE-V (698-787MHz)(dBi)	At 800MHz(dBi)	At 1900MHz(dBi)	At 1700MHz(dBi)	At 2100MHz(dBi)
CM110W	1.1	1.1	3	3	3
MAX GAIN	1.1	1.1	3	3	3
Indoor Cable					
Indoor Cable	Indoor Cable Loss				
	At LTE-A and LTE-V (698-787MHz)(dB)	At 800MHz(dB)	At 1900MHz(dB)	At 1700MHz(dB)	At 2100MHz(dB)
CM174-10FT 10Feet	3.8	4.3	8.8	6.98	8.96
MIN LOSS	3.8	4.3	8.8	6.98	8.96

Path loss=20Lgf+20LgD-27.55				
Operation Frequency (MHz)	f(MHz)	D(m)	Constant(dB)	Path loss(dB)
PCS(1850-1910)	1850	0.4	27.55	29.8
Cellular(824-849)	824	0.4	27.55	22.8
LTE(698-716)	698	0.4	27.55	21.4
LTE(776-787)	776	0.4	27.55	22.3
AWS(1710-1755)	1710	0.4	27.55	29.1

MSCL Calculations of fixed booster					
MSCL					
Band (MHz)	Path loss （dB）	Indoor Antenna Gain （dBi）	Indoor Cable Loss （dB）	Polarity Loss(dB)	MSCL(dB)
PCS(1850-1910)	29.8	3	8.8	3	38.6
Cellular(824-849)	22.8	1.1	4.3	3	29.0
LTE(698-716)	21.4	1.1	3.8	3	27.1
LTE(776-787)	22.3	1.1	3.8	3	28.0
AWS(1710-1755)	29.1	3	6.98	3	36.1

Marine Kit

Indoor Antenna					
Indoor Antenna	Indoor Antenna Gain				
	At LTE-A and LTE-V (698-787MHz)(dBi)	At 800MHz(dBi)	At 1900MHz(dBi)	At 1700MHz(dBi)	At 2100MHz(dBi)
CM248W	7	7	10	10	10
MAX GAIN	7	7	10	10	10
Indoor Cable					
Indoor Cable	Indoor Cable Loss				
	At LTE-A and LTE-V (698-787MHz)(dBi)	At 800MHz(dBi)	At 1900MHz(dBi)	At 1700MHz(dBi)	At 2100MHz(dBi)
CM240-20FN 20Feet	2.06	2.29	3.56	3.36	3.76
MIN LOSS	2.06	2.29	3.56	3.36	3.76

Path loss=20Lgf+20LgD-27.55				
Operation Frequency (MHz)	f(MHz)	D(m)	Constant(dB)	Path loss(dB)
PCS(1850-1910)	1850	0.9	27.55	36.9
Cellular(824-849)	824	0.9	27.55	29.8
LTE(698-716)	698	0.9	27.55	28.4
LTE(776-787)	776	0.9	27.55	29.3
AWS(1710-1755)	1710	0.9	27.55	36.2

MSCL Calculations of fixed booster					
MSCL					
Band (MHz)	Path loss （dB）	Indoor Antenna Gain （dBi）	Indoor Cable Loss （dB）	Polarity Loss(dB)	MSCL(dB)
PCS(1850-1910)	36.9	10	3.56	3	33.4
Cellular(824-849)	29.8	7	2.29	3	28.1
LTE(698-716)	28.4	7	2.06	3	26.5
LTE(776-787)	29.3	7	2.06	3	27.4
AWS(1710-1755)	36.2	10	3.36	3	32.5

SureCall® RAISE YOUR BARS

48346 Milmont Drive Fremont, CA 94538 Phone: 510-770-0469 Fax: 510-996-7250
www.surecall.com

Desk top RV Kit

Fixed booster					
Indoor Antenna					
Indoor Antenna	Indoor Antenna Gain				
	At LTE-A and LTE-V (698-787MHz)(dBi)	At 800MHz(dBi)	At 1900MHz(dBi)	At 1700MHz(dBi)	At 2100MHz(dBi)
CM120W	1.2	1.2	3	3	3
MAX GAIN	1.2	1.2	3	3	3
Indoor Cable					
Indoor Cable	Indoor Cable Loss				
	At LTE-A and LTE-V (698-787MHz)(dB)	At 800MHz(dB)	At 1900MHz(dB)	At 1700MHz(dB)	At 2100MHz(dB)
	0.3	0.3	0.3	0.3	0.3
MIN LOSS	0.3	0.3	0.3	0.3	0.3

Path loss=20Lgf+20LgD-27.55				
Operation Frequency (MHz)	f(MHz)	D(m)	Constant(dB)	Path loss(dB)
PCS(1850-1910)	1850	0.6	27.55	33.3
Cellular(824-849)	824	0.6	27.55	26.3
LTE(698-716)	698	0.6	27.55	24.9
LTE(776-787)	776	0.6	27.55	25.8
AWS(1710-1755)	1710	0.6	27.55	32.7

MSCL Calculations of fixed booster					
MSCL					
Band (MHz)	Path loss （dB）	Indoor Antenna Gain （dBi）	Indoor Cable Loss （dB）	Polarity Loss(dB)	MSCL(dB)
PCS(1850-1910)	33.3	3	0.3	3	33.6
Cellular(824-849)	26.3	1.2	0.3	3	28.4
LTE(698-716)	24.9	1.2	0.3	3	27.0
LTE(776-787)	25.8	1.2	0.3	3	27.9
AWS(1710-1755)	32.7	3	0.3	3	33.0

SureCall® RAISE YOUR BARS

48346 Milmont Drive Fremont, CA 94538 Phone: 510-770-0469 Fax: 510-996-7250

www.surecall.com