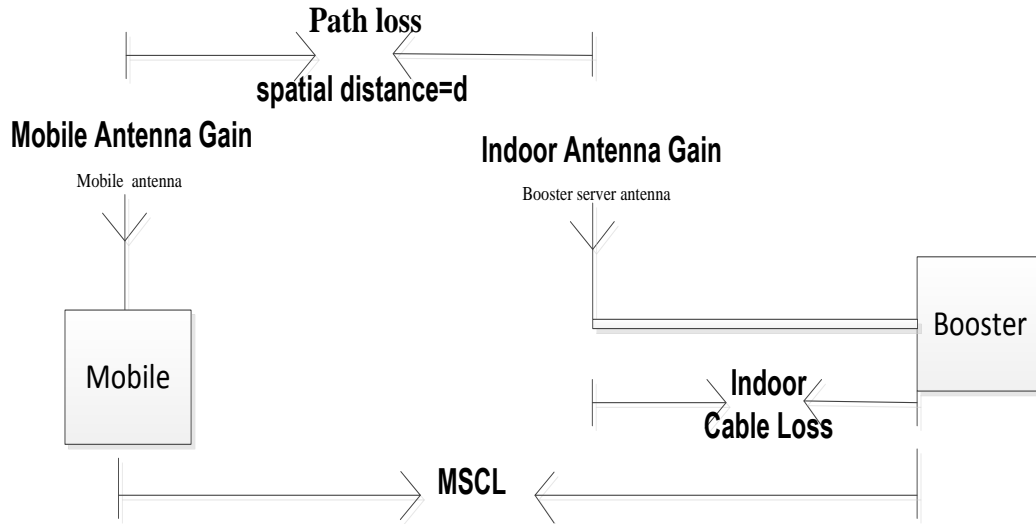


## 1 Explanation of MSCL



**Figure 1**

$$\text{MSCL} = \text{Path loss} + \text{Indoor Cable Loss} - \text{Mobile Antenna Gain} - \text{Indoor Antenna Gain} \dots\dots ①$$

### 1.1 Decibel version of free-space propagation loss equation

$$\text{Path loss (dB)} = 20Lgf + 20Lgd + 32.45 \dots\dots ② \quad \text{or} \quad \text{Path loss (dB)} = 20Lgf + 20LgD - 27.55 \dots\dots ③$$

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

#### 1.1.1 Operation Frequency

- At PCS (1850-1915MHz) 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 7 Antenna Kitting .

## 1.4 Polarity Loss

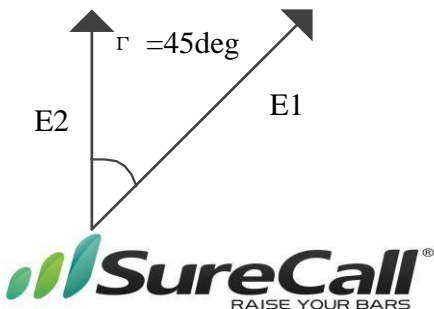
$$\text{Polarity Loss dB} = 10\text{Log} (E1/E2)^2 \text{ dB} = \text{PL dB}$$

$$\text{PL dB} = 10\text{Log} (E1^2 / (E1\text{Sin} (45\text{deg}))^2) \text{ dB} = 20\text{Log} (1/\text{Sin} (45\text{deg})) \text{ dB} = 3.01\text{dB}$$

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

Fixed booster Fusion 7					
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)
SC 222W	3	3	6	6	6
SC 248W	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)
SC400-75NN 75Feet	4.22	4.41	6.17	5.8	6.54
MIN LOSS	4.22	4.41	6.17	5.8	6.54

Path loss= $20L_gf+20L_gD-27.55$				
Operation Frequency (MHz)	f(MHz)	D(m)	Constant(dB)	Path loss(dB)
PCS(1850-1915)	1850	2	27.55	43.8
Cellular(824-849)	824	2	27.55	36.8
LTE(698-716)	698	2	27.55	35.3
LTE(776-787)	776	2	27.55	36.3
AWS(1710-1755)	1710	2	27.55	43.1

MSCL Calculations of fixed booster Fusion 7					
MSCL					
Band (MHz)	Path loss (dB)	Indoor Antenna Gain (dBi)	Indoor Cable Loss (dB)	Polarity Loss(dB)	MSCL(dB)
PCS(1850-1915)	43.8	10	6.17	3.0	43.0
Cellular(824-849)	36.8	7	4.41	3.0	37.2
LTE(698-716)	35.3	7	4.22	3.0	35.6
LTE(776-787)	36.3	7	4.22	3.0	36.5
AWS(1710-1755)	43.1	10	5.8	3.0	41.9





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

[www.surecall.com](http://www.surecall.com)