Items for Discussion on Modeling

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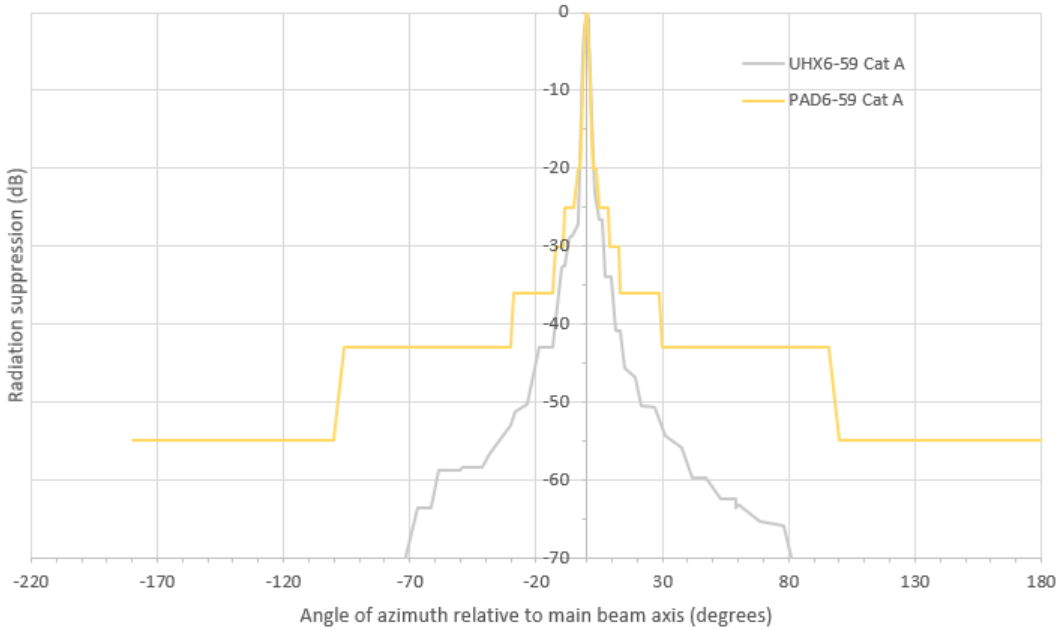
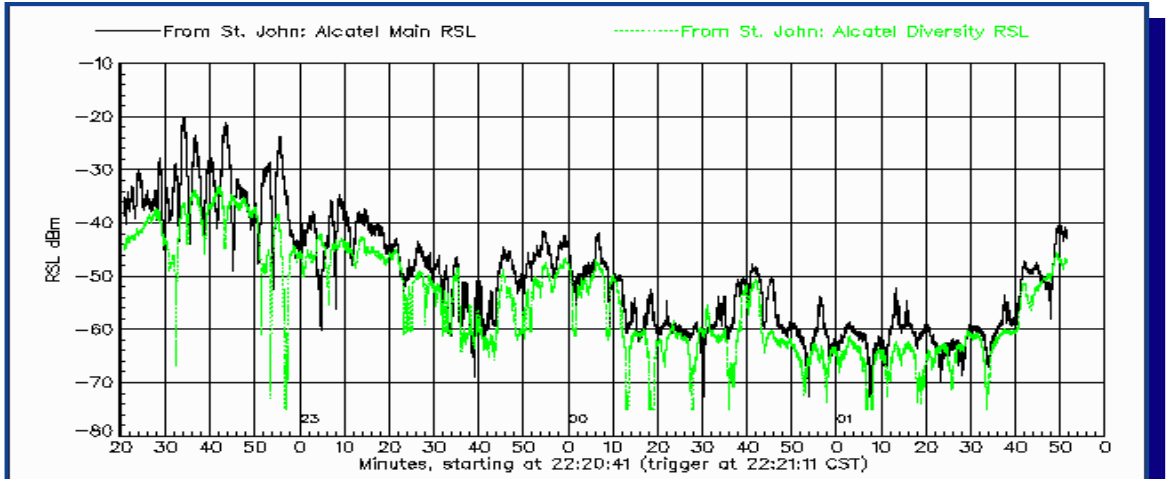
Antenna Used for RLAN Study



UHX6-59 is Obsolete, was expensive when available and not often used.
Typical Antenna is PAD6-59 Meeting FCC Category A Specification

Example of Multipath Fading

Westville Site Aug. 11, 1996



General			Transmit Output Power			Receiver Threshold
			Standard Power	High Power	High Power Plus	
RF Band	BW MHz	QAM (n)	dBm	dBm	dBm	dBm
L6 GHz	30	256	32.5	34.0	35.5*	-71.5
L6 GHz	30	512	31.5	34.0	35.0*	-68.5
L6 GHz	30	1024	31.5	33.0	35.0*	-65.0

RLAN Statement 1: “Majority of fade margin can be used dB-for-dB by RLANs from 8:00 am to midnight.

…The diagram to the left shows 20 dB fades at 10 pm.

RLAN Statement 2: “Most paths have 30-50 dB of fade margin.

… 50 dB of fade margin is not typical and was only possible for very short paths where the receive level was near overload and the throughput was very low. Newer radios with 4096 QAM cannot exceed 37 dB at max receive input and receive signals are never designed to be receiver overload.

Fresnel Zones and Reflections

Reflections from odd numbered Fresnel zones will add in phase

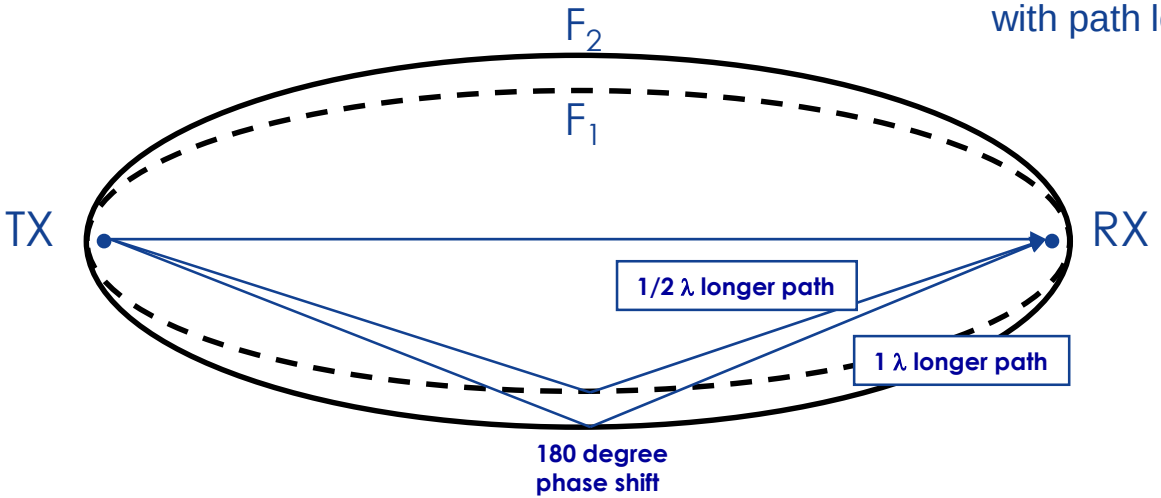
F_1 = 1/2 λ shift at reflection + 1/2 λ longer path length

Reflections from even numbered Fresnel zones will cancel

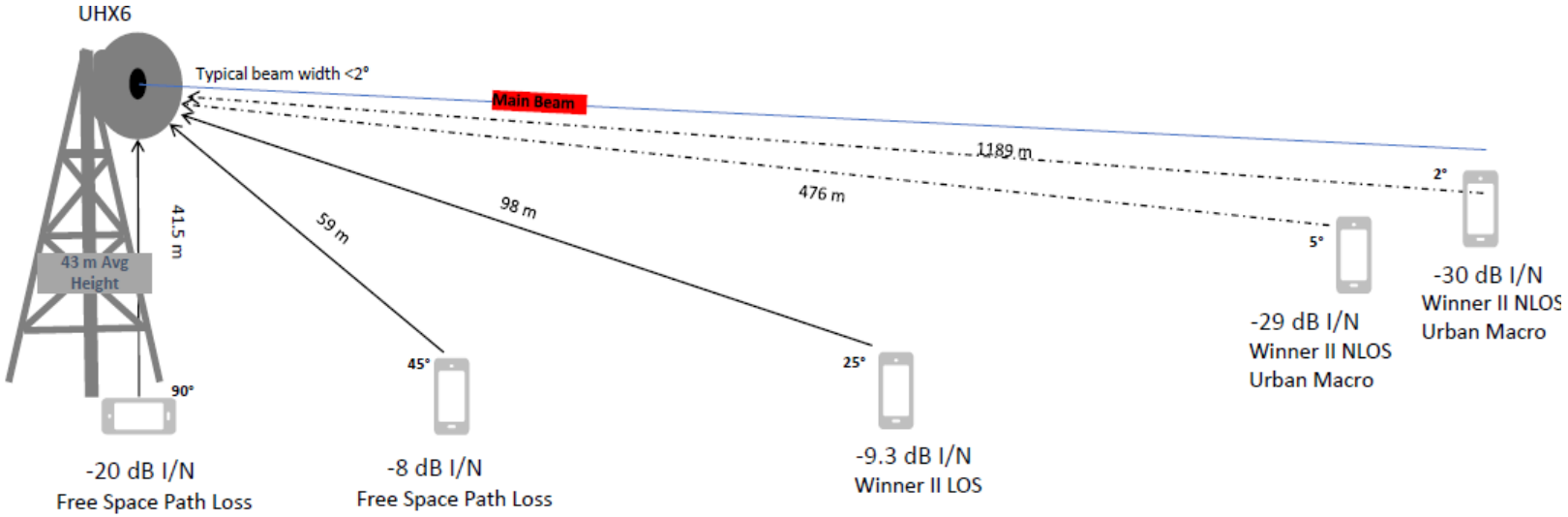
F_2 = 1/2 λ shift at reflection + 1 λ longer path length

$F_1 = 17.3\sqrt{((d1d2)/f_{GHz}D)}$

At 2 km of a 35 km path, the zone is about 9.5 m. In the middle it is about 20.5 m. Max width increases with path length.



Paths Designed for F1 Clear



The main beam and the Fresnel zone around it are designed to be clear of obstructions. Even though the handset may not be within the 3 dB beamwidth of the antenna, if it is in the Fresnel Zone, it will NOT be nLOS. It is also unlikely that all handsets will be nLOS when beyond 476 m from the tower.

Cumulative Interference

- 73.5% of 97,573 FS receivers identified by RLAN study as “barren” locations (67,694 receivers) so presumably there will be no handsets located there.
- 967,000,000 handsets to be introduced into areas covered by the remaining roughly 30,000 FS receivers.
- Potential for tens of thousands of handsets causing cumulative interference on urban paths. How to model?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