

NextNav Basestation to RAIN Reader interference analysis

Item	Description	Adjust Factor (dB)	Urban	Rural	Units	Reference and comments
Proposed NextNav base station transmit characteristics (918-928MHz)						
1	NN poposed power limit in erp		1000	2000	W/MHz erp	NextNav Jun2024 proposed rules page A-10 for antenna height <1000ft
2	Power limit in dBm		60.0	63.0	dBm/MHz erp	Power in dBm=10log(Power in W)+30
3	Peak power above average	6.0	66.0	69.0	dBm/MHz erp	Broadband systems (see FCC §27.1507 and §27.50) define ERP as average and allow 13dB Peak-average; only 6dB peak to average used
4	Peak power in eirp	2.2	68.2	71.2	dBm/MHz eirp	Power in dBm eirp = Power in dBm erp + 2.2dB
Deployed RAIN reader receiver characteristics (typical values, not most susceptable values)						
5	RAIN reader input signal		-70	-70	dBm/MHz	Typical (not most susceptible) received signal into reader receiver
6	RAIN reader S/I requirement	10.0	-80.0	-80.0	dBm/MHz	Interference needs to be 10dB below desired signal
7	RAIN reader antenna gain	4.0	-84.0	-84.0	dBm/MHz rip	RAIN reader antennas vary with 0-9dB gain
Proposed NextNav base station transmit interfeence into deployed RAIN reader receiver (not worst case)						
8	Path loss for interfeence-free operation		152.2	155.2	dB	Minimum path loss for interference-free operation equals item 4 minus item 7
9	<i>Obstructed (e.g. dense buildings) separation distrance for interference-free operation</i>		11.7	14.6	km	HATA model, 923MHz, 100m base antenna height, 2m reader antenna height (e.g. https://www.rfwireless-world.com/calculators/Hata-model-path-loss-calculator.html)

Notes: As per FCC §15.247, RAIN reader frequency hops over 902-928MHz (26MHz band) within a 10 second period
 Above preliminary analysis is RAIN operation in 918-928MHz ("co-band") with NextNav, which occurs for 38% (10MHz/26MHz) of the time
 Other analysis for RAIN in 907-918MHz ("adjacent band") with NextNav, which occurs 42% (=11MH/26MHz) of the time, is not included
 Other analysis for RAIN in 902-907MHz ("co-band") with NextNav, which occurs 19% (=5MHz/26MHz) of the time, is not included

RAIN Reader to NextNav Mobile interference analysis

Item	Description	Adjust Factor (dB)	Value	Units	Reference and comments
RAIN reader transmit characteristics					
1	Part 15.247 conducted power limit		1	W	As per FCC §15.247
2	Power limit in dBm		30.0	dBm	Power in dBm=10log(Power in W)+30
3	Antenna gain	6.0	36.0	dBm eirp	As per FCC §15.247
NextNav mobile receiver characteristics (not most susceptible)					
4	NextNav mobile receiver		-95	dBm	3GPP TS 38.101-1 version 15.2.0 Release 15 as in reference 89 on page 28 of NextNav Petition (https://www.etsi.org/deliver/etsi_ts/138100_138199/13810101/15.02.00_60/ts_13810101v150200p.pdf)
5	Signal/Interference requirement	10.0	-105.0	dBm	Interference needs to be 10dB below desired signal
6	NextNav mobile antenna gain	0.0	-105.0	dBm rip	
RAIN reader (e.g. one deployed Part 15 device) transmit interference into proposed NextNav mobile receiver					
7	Path loss for interference-free operation		141.0	dB	Minimum path loss for interference-free operation equals item 3 minus item 6
8	<i>Obstructed (e.g. dense buildings) separation distance for interference-free operation</i>		1.0	km	HATA model, 923MHz, 2m mobile antenna height, 2m reader antenna height * (e.g. https://www.rfwireless-world.com/calculators/Hata-model-path-loss-calculator.html)

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 Above preliminary analysis is RAIN operation in 918-928MHz ("co-band") with NextNav, which occurs for 38% (10MHz/26MHz) of the time
 Other analysis for RAIN in 907-918MHz ("adjacent band") with NextNav, which occurs 42% (=11MHz/26MHz) of the time, is not included
 Other analysis for RAIN in 902-907MHz ("co-band") with NextNav, which occurs 19% (=5MHz/26MHz) of the time, is not included
 * HATA propagation model has limitations for both antennas at 2m height; separation distance maybe further
 Above preliminary analysis is for one RAIN reader; multiple co-located readers will increase separation distance