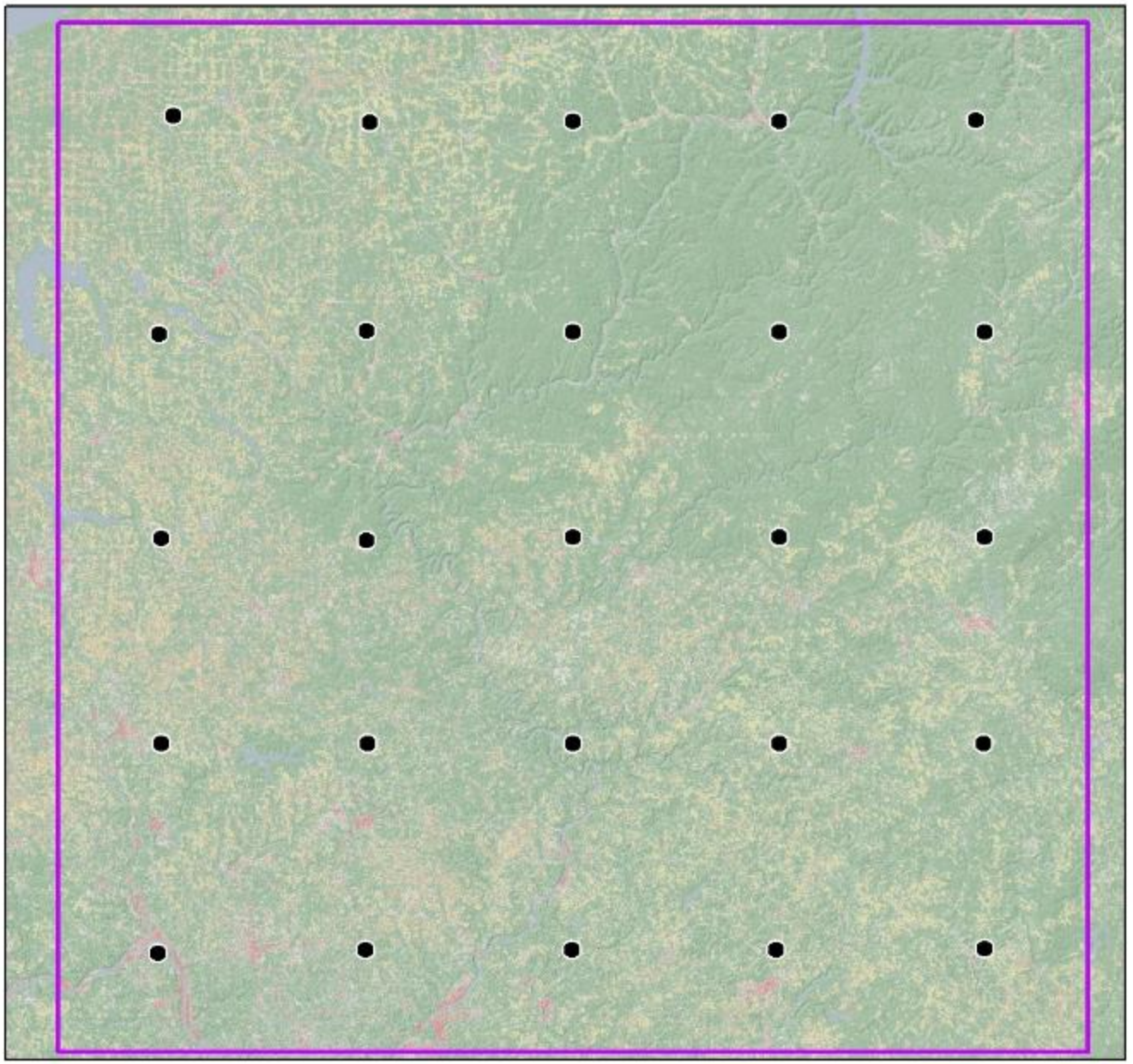
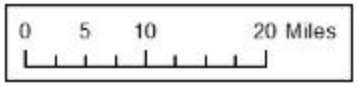
700 MHz/2.3 GHz Comparison Study

Study to show propagation comparison of 700 MHz and 2.3 GHz frequencies.

The analysis location is NE Pennsylvania.





The analysis assumes the same inputs for antenna gains, output powers, and receiver sensitivities for both frequencies. So the only difference in this exercise is based on the propagation characteristics of the 2 frequencies.

All sites are 100’ AGL with omnidirectional antennas, and CPEs are 12’ AGL.

LINK BUDGET

Base Station

Transmit Power	36 dBm
Nominal Antenna Gain	12 dBd
Filter, Cable and Connector Loss	2.5 dB

Receiver Sensitivity (single Band-AMC 2x3 sub-channel)

QPSK 1/2 (repetition 2) ...	-114 dBm
QPSK 1/2 ...	-111 dBm
QPSK 3/4 ...	-108 dBm
16 QAM 1/2 ...	-105 dBm
16 QAM 3/4 ...	-102 dBm
64 QAM 2/3 ...	-96 dBm
64 QAM 3/4 ...	-94 dBm

Receiver

Maximum Transmit Power (APC)	36 dBm
Nominal Antenna Gain	11.5 dBd
Filter, Cable and Connector Loss	2.5 dB

Receiver Sensitivity (single Band-AMC 2x3 sub-channel)

QPSK 1/2 (repetition 2) ...	-114 dBm
QPSK 1/2 ...	-111 dBm
QPSK 3/4 ...	-108 dBm
16 QAM 1/2 ...	-105 dBm
16 QAM 3/4 ...	-102 dBm
64 QAM 2/3 ...	-96 dBm
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Select Spectrum

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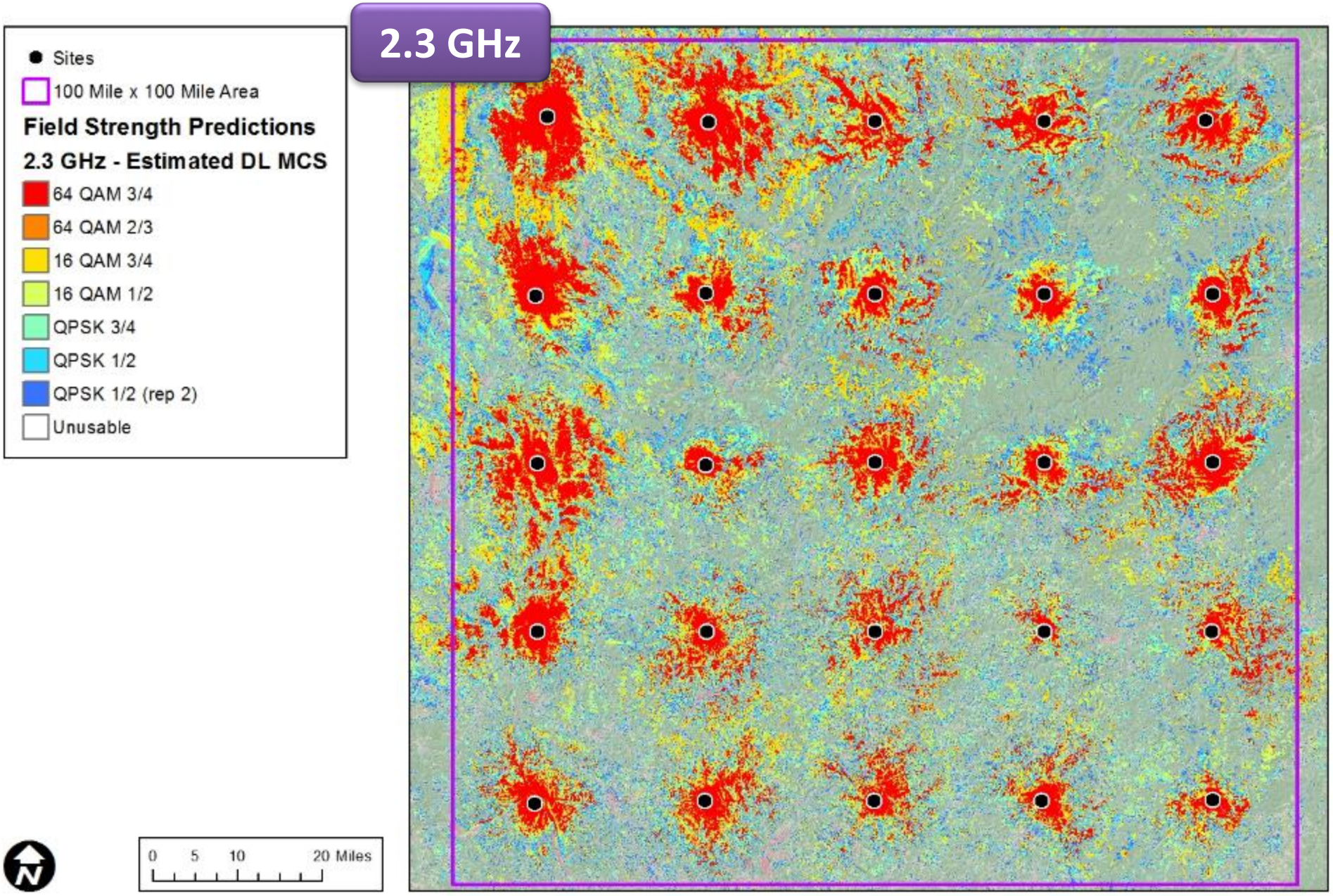
2.3 GHz



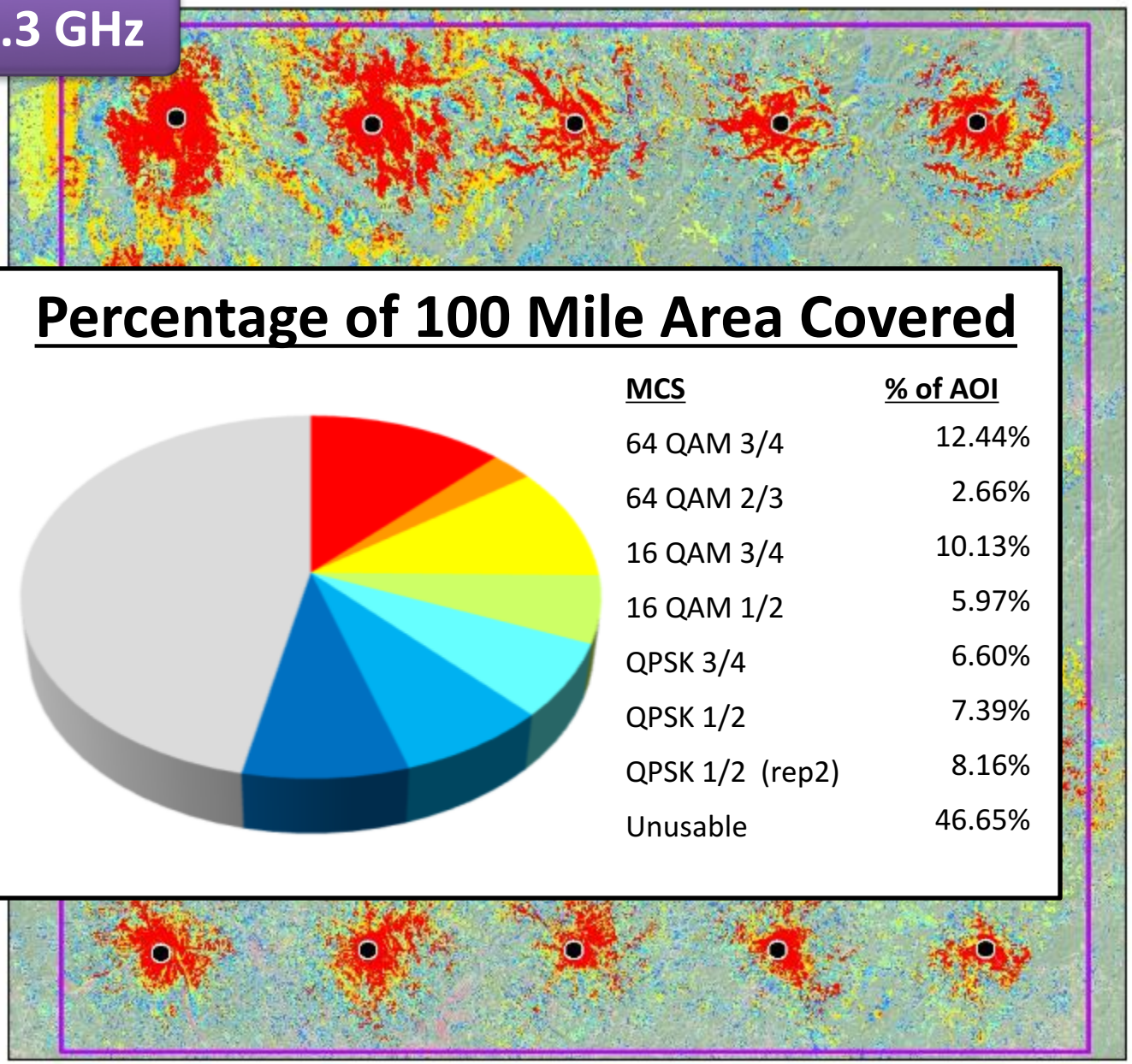
2.3 GHz

- Sites
- 100 Mile x 100 Mile Area

Field Strength Predictions

2.3 GHz - Estimated DL MCS

- 64 QAM 3/4
- 64 QAM 2/3
- 16 QAM 3/4
- 16 QAM 1/2
- QPSK 3/4
- QPSK 1/2
- QPSK 1/2 (rep 2)
- Unusable

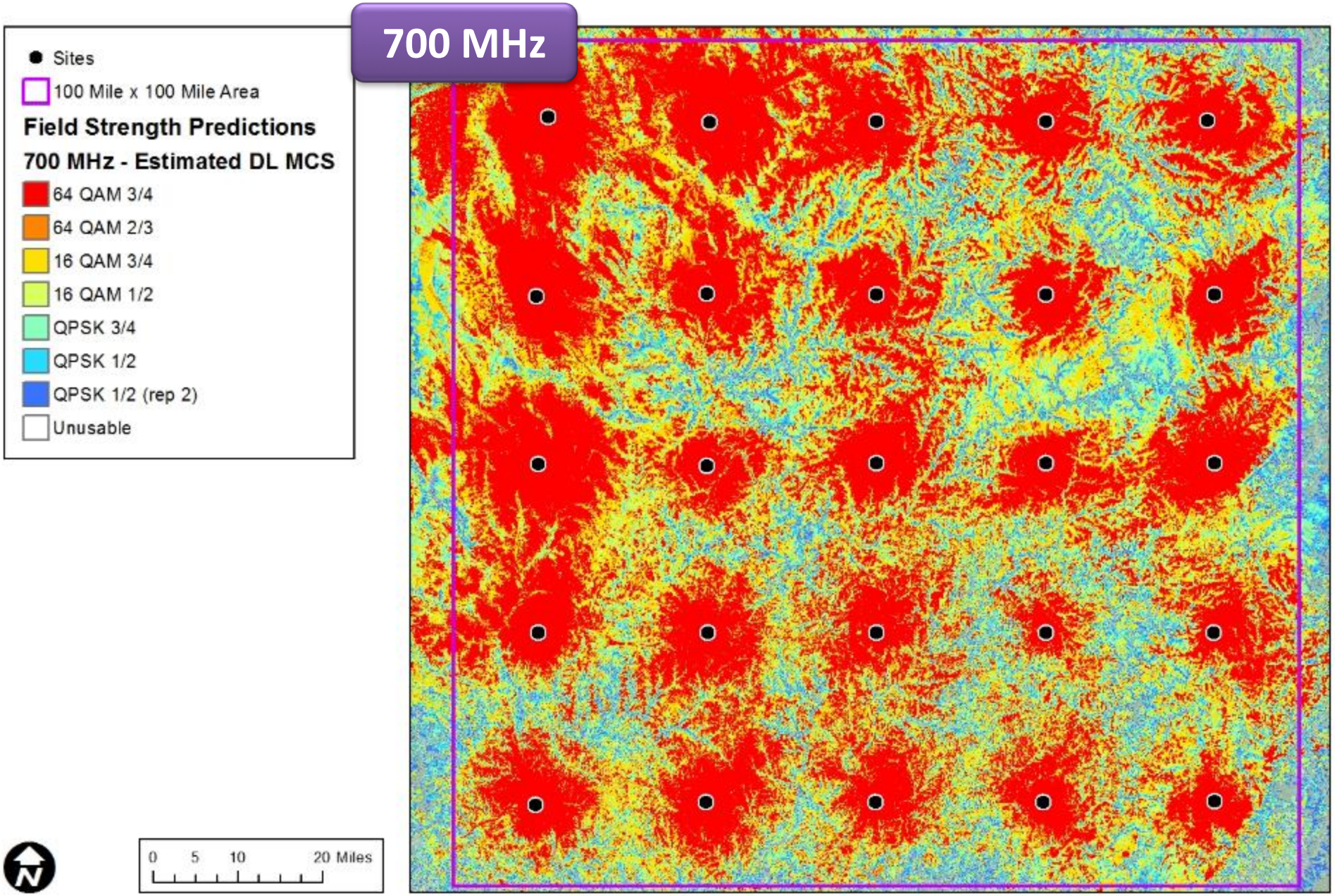


Percentage of 100 Mile Area Covered

MCS	% of AOI
64 QAM 3/4	12.44%
64 QAM 2/3	2.66%
16 QAM 3/4	10.13%
16 QAM 1/2	5.97%
QPSK 3/4	6.60%
QPSK 1/2	7.39%
QPSK 1/2 (rep2)	8.16%
Unusable	46.65%

700 MHz/2.3 GHz Comparison Study

700 MHz



700 MHz

- Sites
- 100 Mile x 100 Mile Area

Field Strength Predictions

700 MHz - Estimated DL MCS

- 64 QAM 3/4
- 64 QAM 2/3
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- 16 QAM 1/2
- QPSK 3/4
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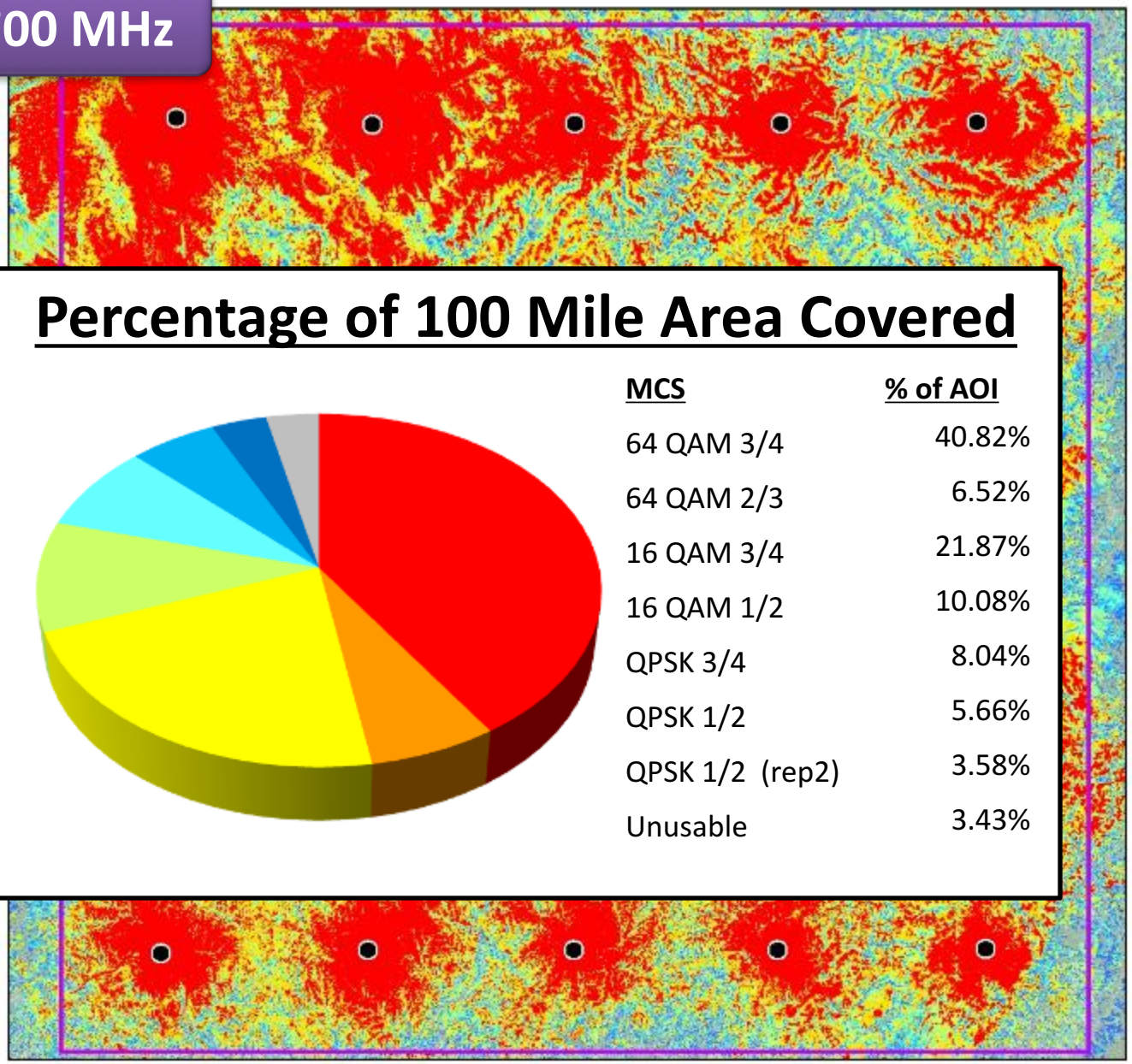
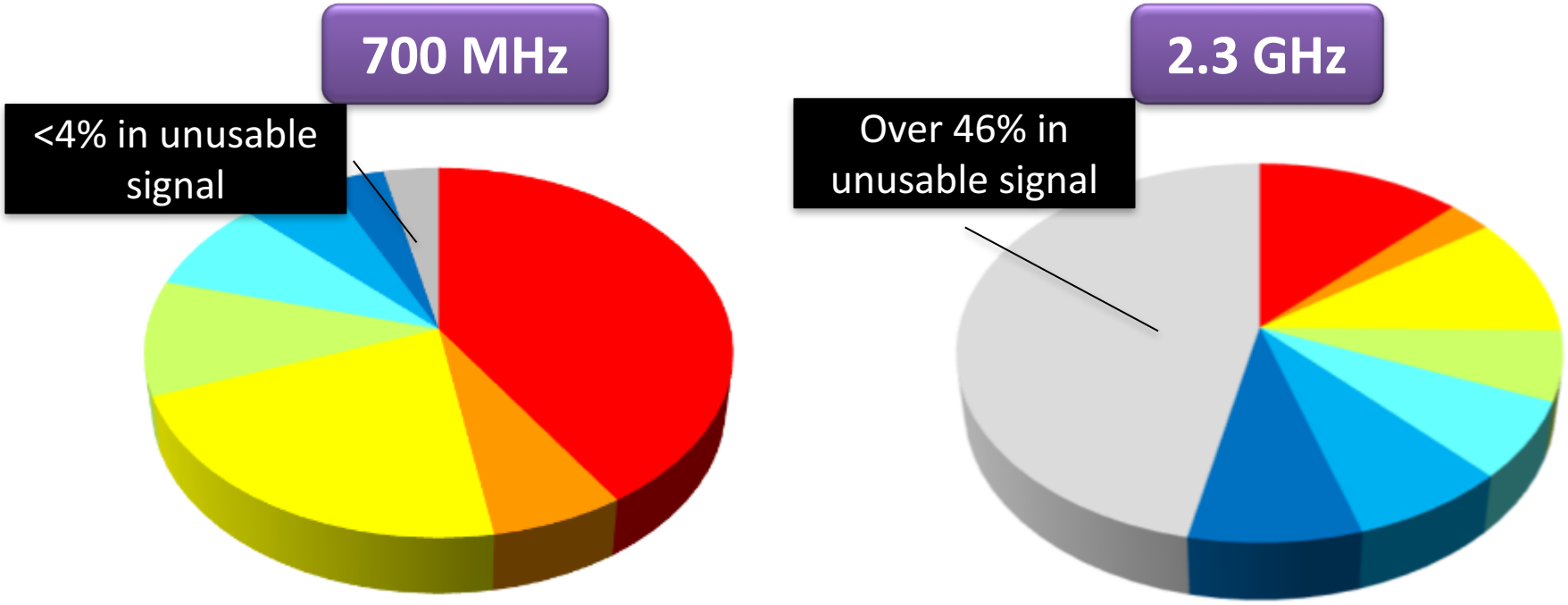
- QPSK 1/2 (rep 2)
- Unusable



Percentage of 100 Mile Area Covered

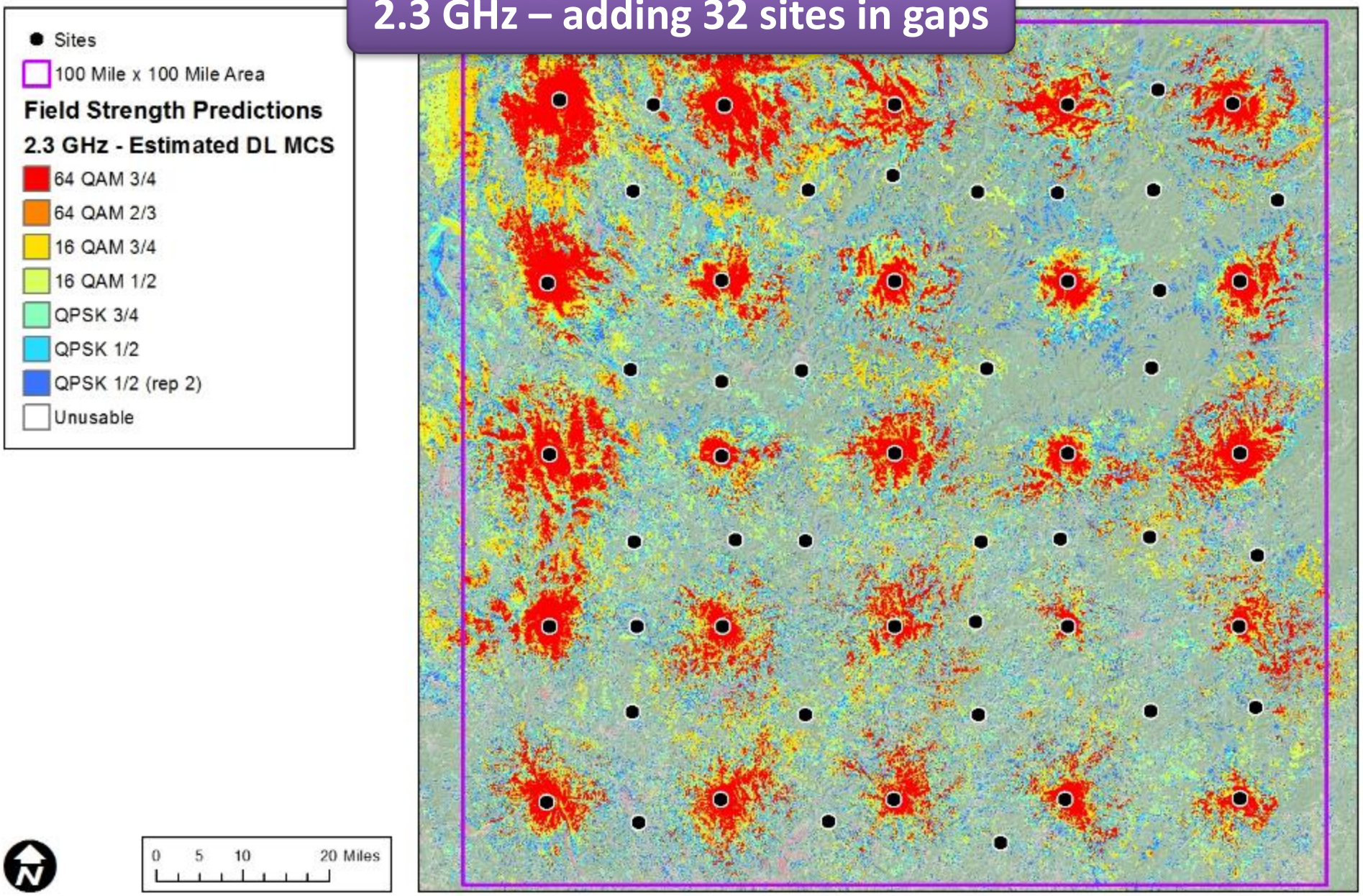
MCS	% of AOI
64 QAM 3/4	40.82%
64 QAM 2/3	6.52%
16 QAM 3/4	21.87%
16 QAM 1/2	10.08%
QPSK 3/4	8.04%
QPSK 1/2	5.66%
QPSK 1/2 (rep2)	3.58%
Unusable	3.43%

Percentage of 100 Mile Area Covered

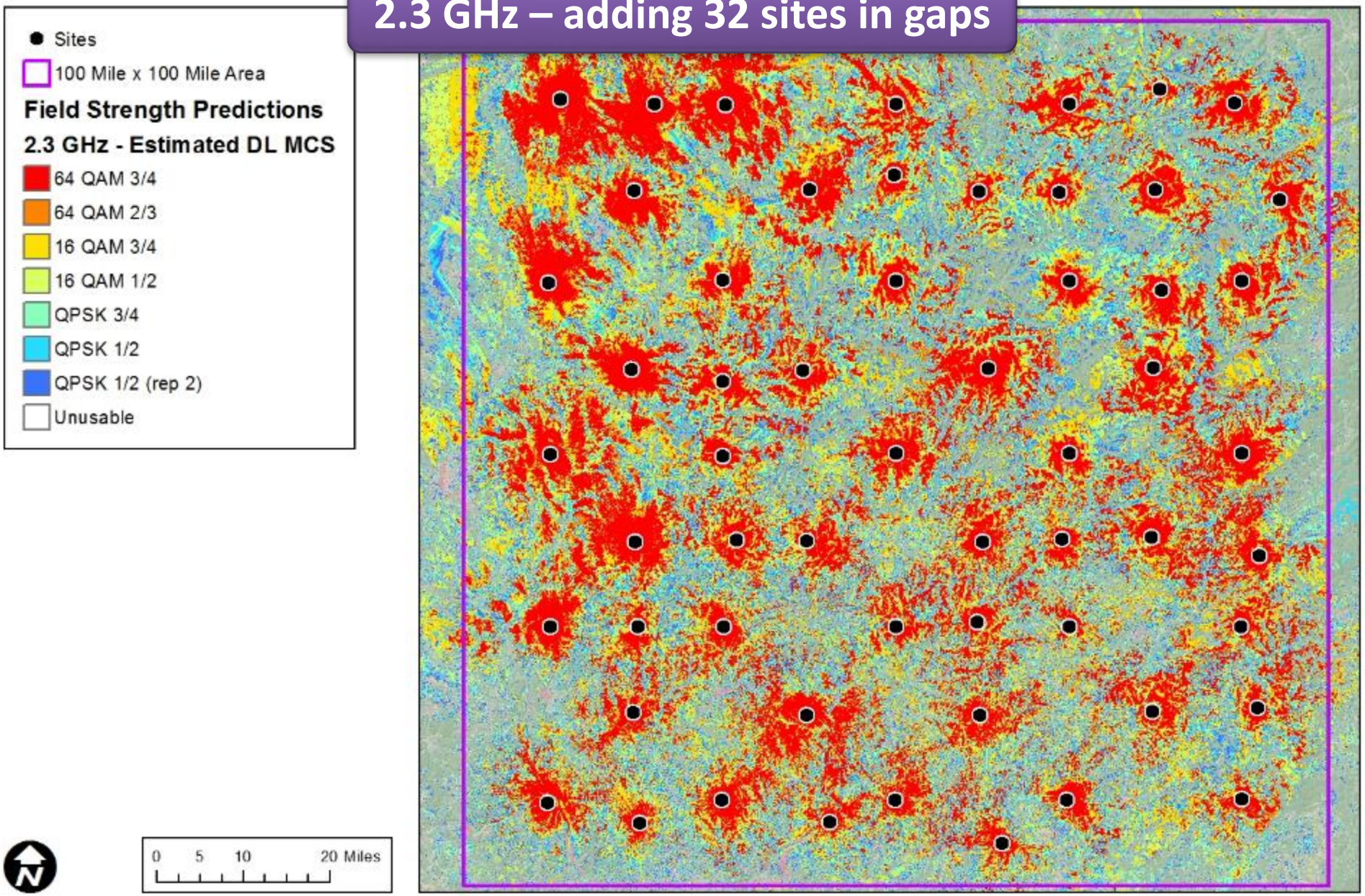


The 700 MHz coverage from the 25 sites estimates to cover over **96%** of the area of area of interest with at least QPSK. The 2.3 GHz estimates to serve just over **53%** of the area to the same signal level.

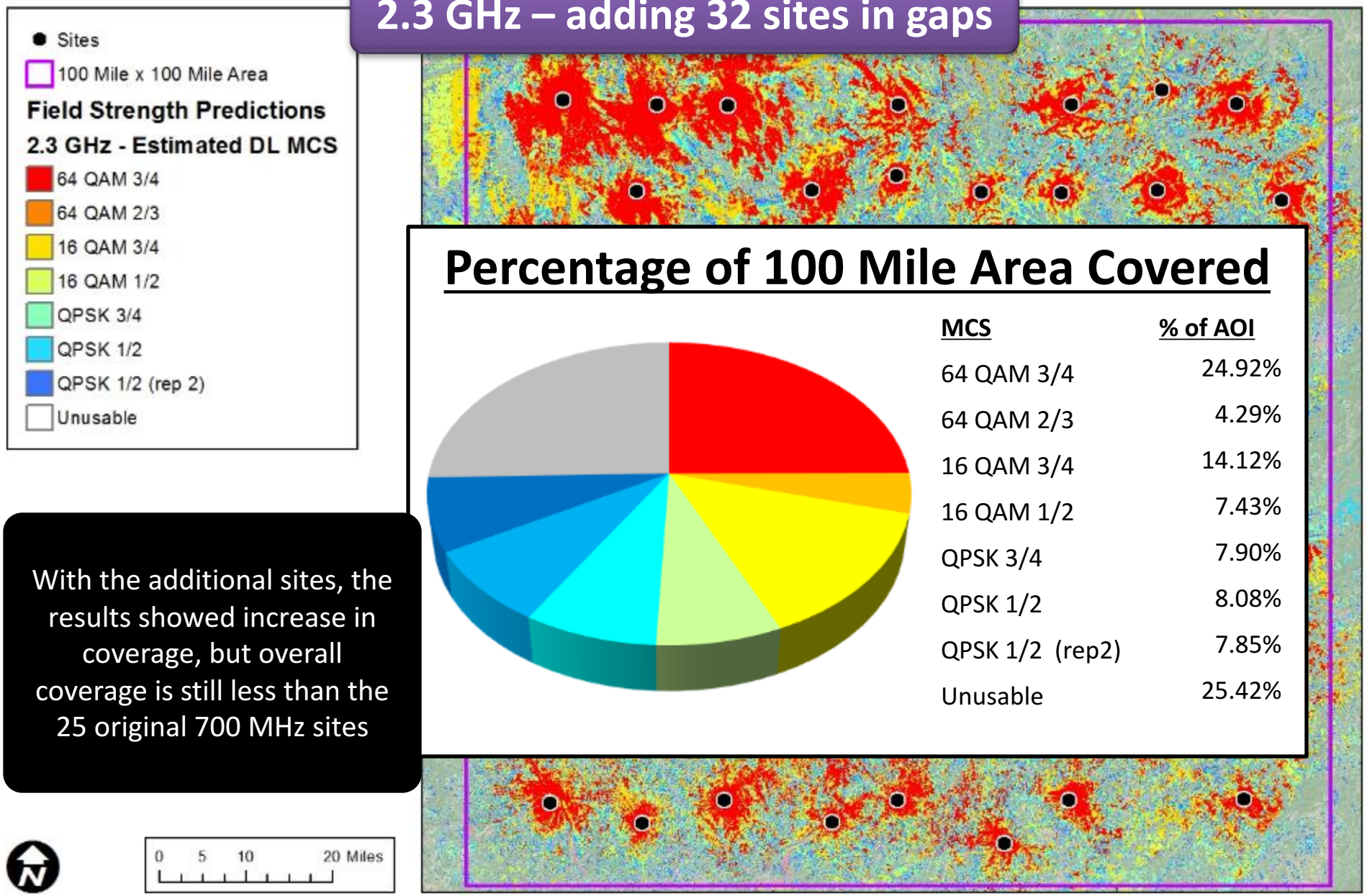
2.3 GHz – adding 32 sites in gaps



2.3 GHz – adding 32 sites in gaps



2.3 GHz – adding 32 sites in gaps



Percentage of 100 Mile Area Covered

MCS	% of AOI
64 QAM 3/4	24.92%
64 QAM 2/3	4.29%
16 QAM 3/4	14.12%
16 QAM 1/2	7.43%
QPSK 3/4	7.90%
QPSK 1/2	8.08%
QPSK 1/2 (rep2)	7.85%
Unusable	25.42%

With the additional sites, the results showed increase in coverage, but overall coverage is still less than the 25 original 700 MHz sites