Example Clutter Models

7-17-2018

Disclaimer

- The following example clutter models are NTIA proposals that have not been agreed upon within the government.
- The example models are meant to provide ideas for an initial structure.
- Example Models:
  1. Modified ITU-R P.2180-0
  2. Log Distance Based → Addressing Troposcatter
  3. Log Distance and Antenna Height Based --> Addressing Troposcatter and Transmitters “within” clutter

Modified ITU-R P.2108 (Clutter)

Antenna Height

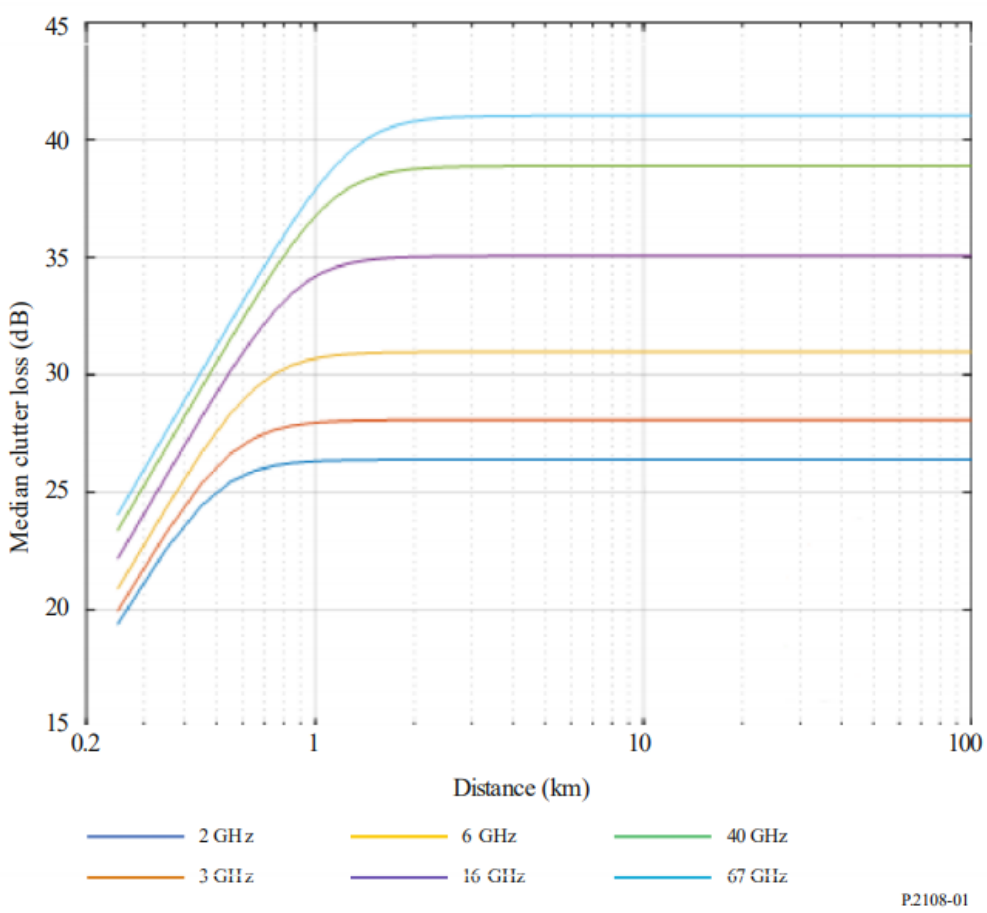
Drocella Model 3.0

ITU-R P.2108-0

- Model #2: Terrestrial terminal within the clutter
- At 3.5GHz and at a distance greater than 1km, mean clutter loss is 28dB.
- Clutter is randomized with a normal distribution around the mean.

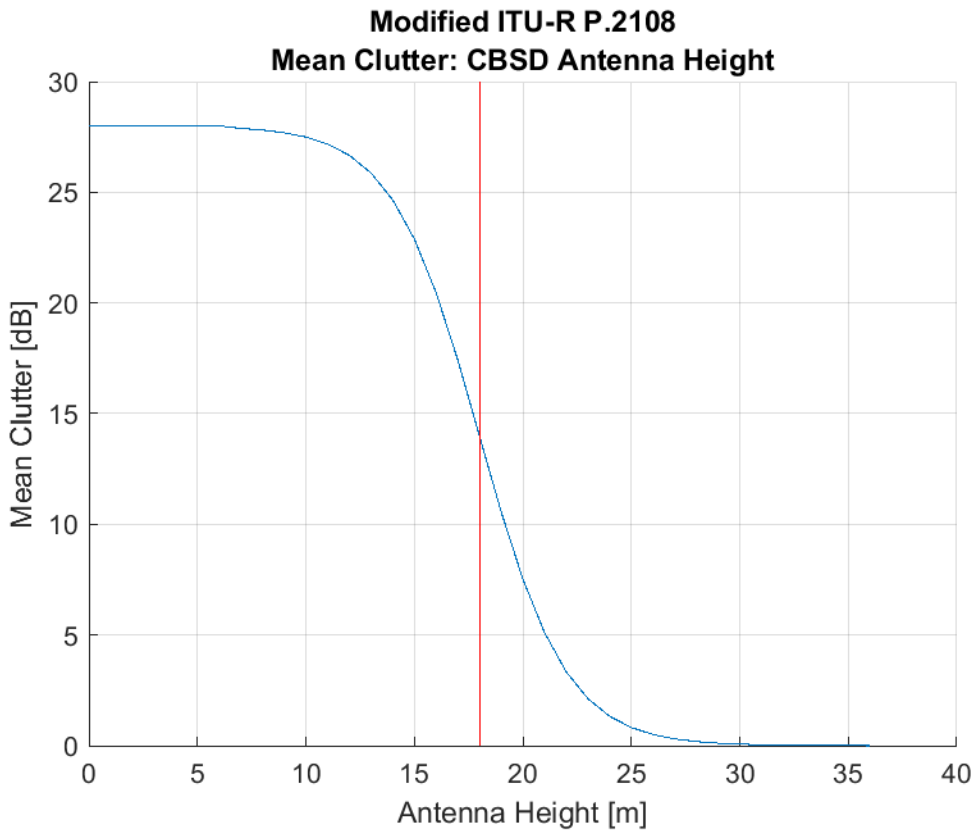
FIGURE 1

Median clutter loss for terrestrial paths



Modified ITU-R P.2108

- To account for CBSD antenna height:
  - CatB CBSD Antenna Height:
    - 6m: 28dB (Full Clutter)
      - Minimum CatB Height
    - 18m: 14dB
      - Antenna Height Threshold for Clutter in NTIA 15-517
    - 36m: 0dB
- As CBSD height increases, the mean clutter loss decreases.
- Variable Placeholders: 6m, 18m, 36m



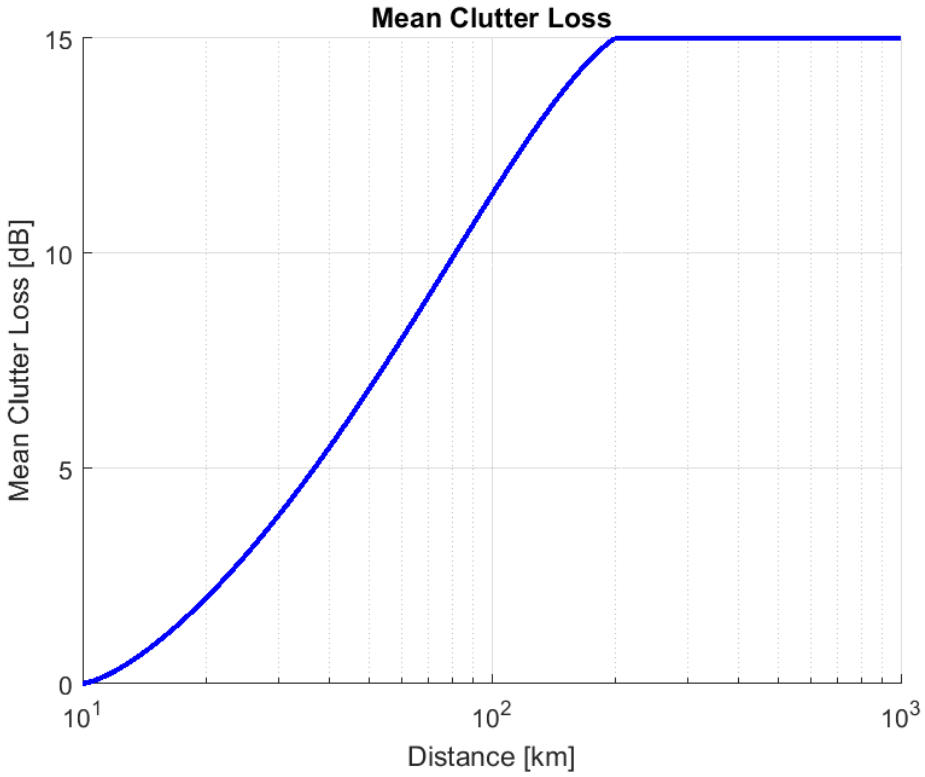
Example Clutter Model 1.0

Log Distance

Drocella Model 1.0

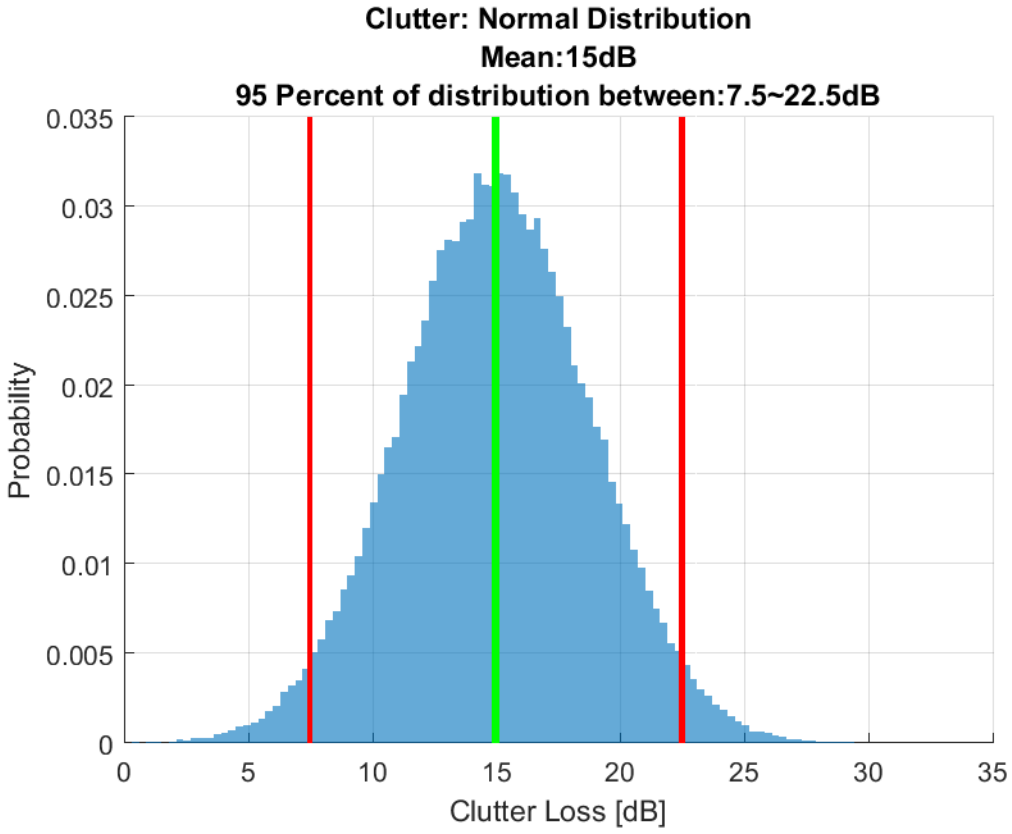
Clutter Loss Model 1.0 (Troposcatter)

- NTIA TR 15-517 (3.5GHz Exclusion Zone)
  - For Rural CBSD Base Stations, an additional clutter factor of 0-15dB, with a uniform distribution, was randomly applied.
- Custom Clutter Loss (for these Sims)
  - For all CatB CBSDs, clutter loss was added, with mean clutter loss based upon a log distance relationship between Transmitter and Receiver
  - Clutter Loss Input Parameters
    - 10km: 0dB (Distance from coast to DPA inner edge)
    - 200km: 15dB (Rough distance where ITM is troposcatter)

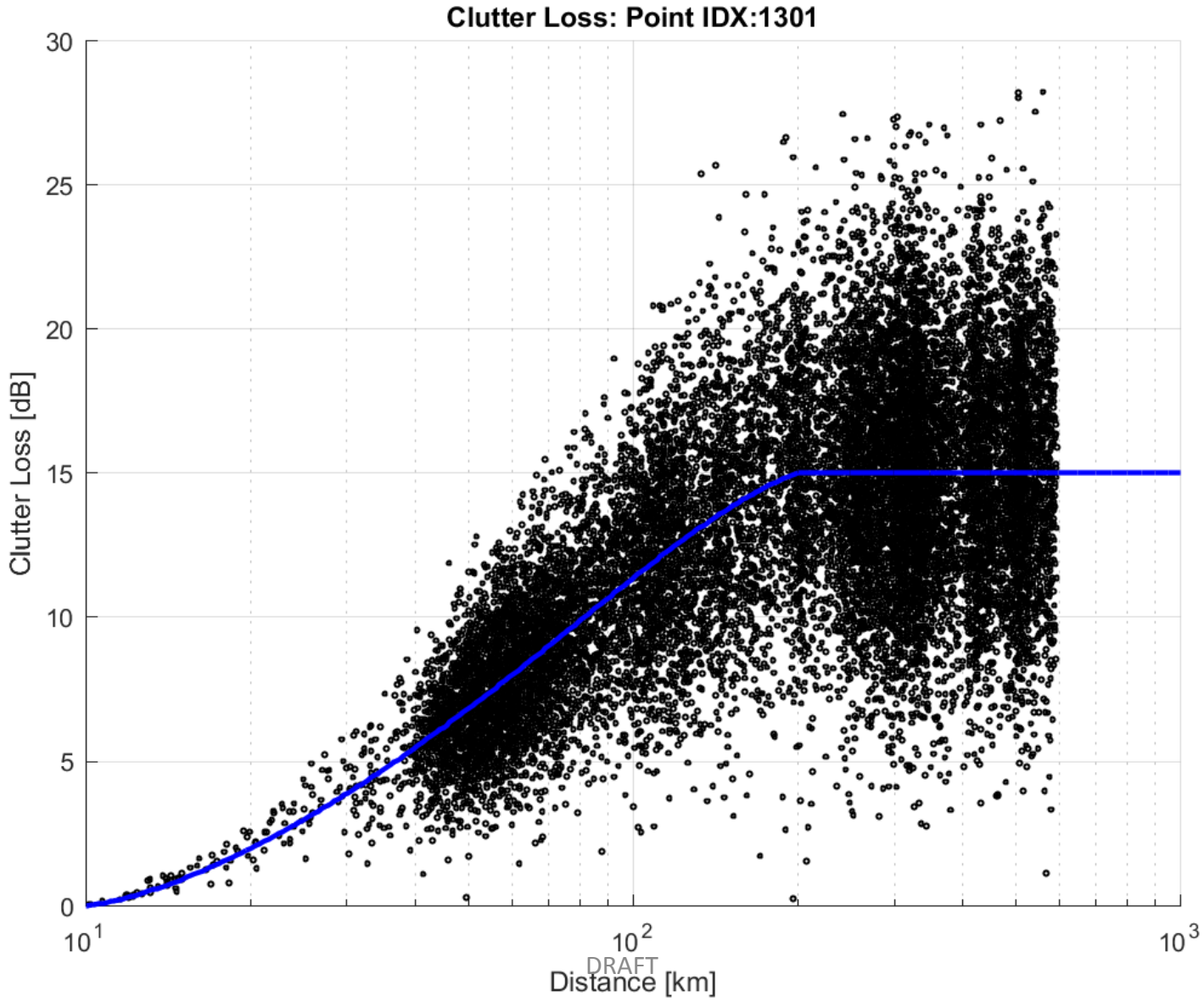


Example: Normal Distribution from Mean Clutter

- A Normal Distribution of clutter is randomized based upon the mean clutter loss.
- 95 Percent of distribution is between 0.5xMean and 1.5xMean
  - Mean Clutter Loss 15dB → 7.5 to 22.5dB Loss



Example Clutter Loss



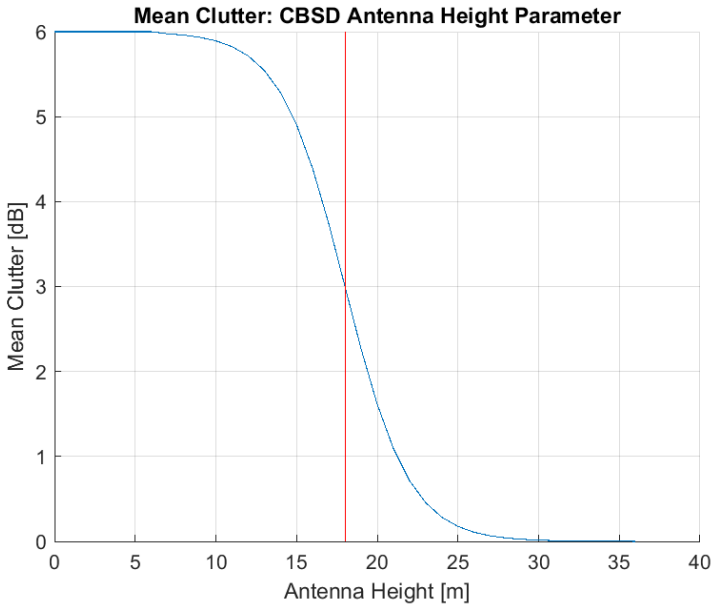
Example Clutter Model 2.0

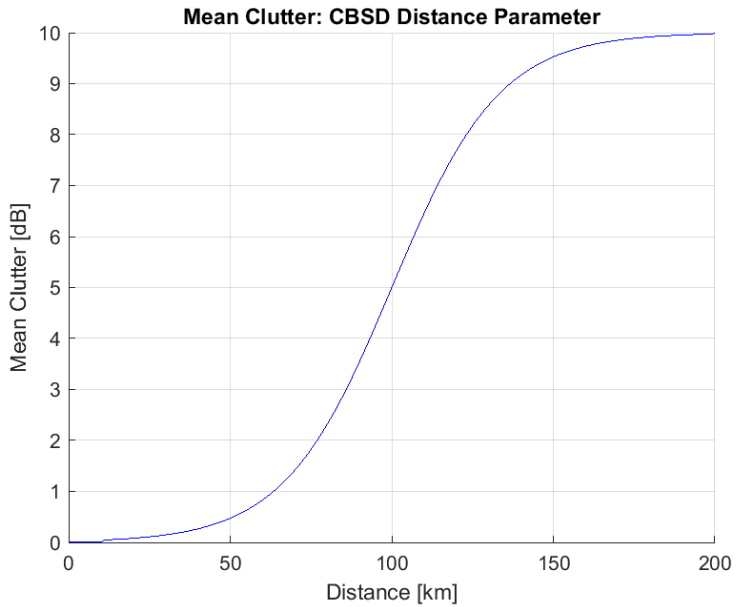
Log Distance and Antenna Height

Drocella Model 2.0

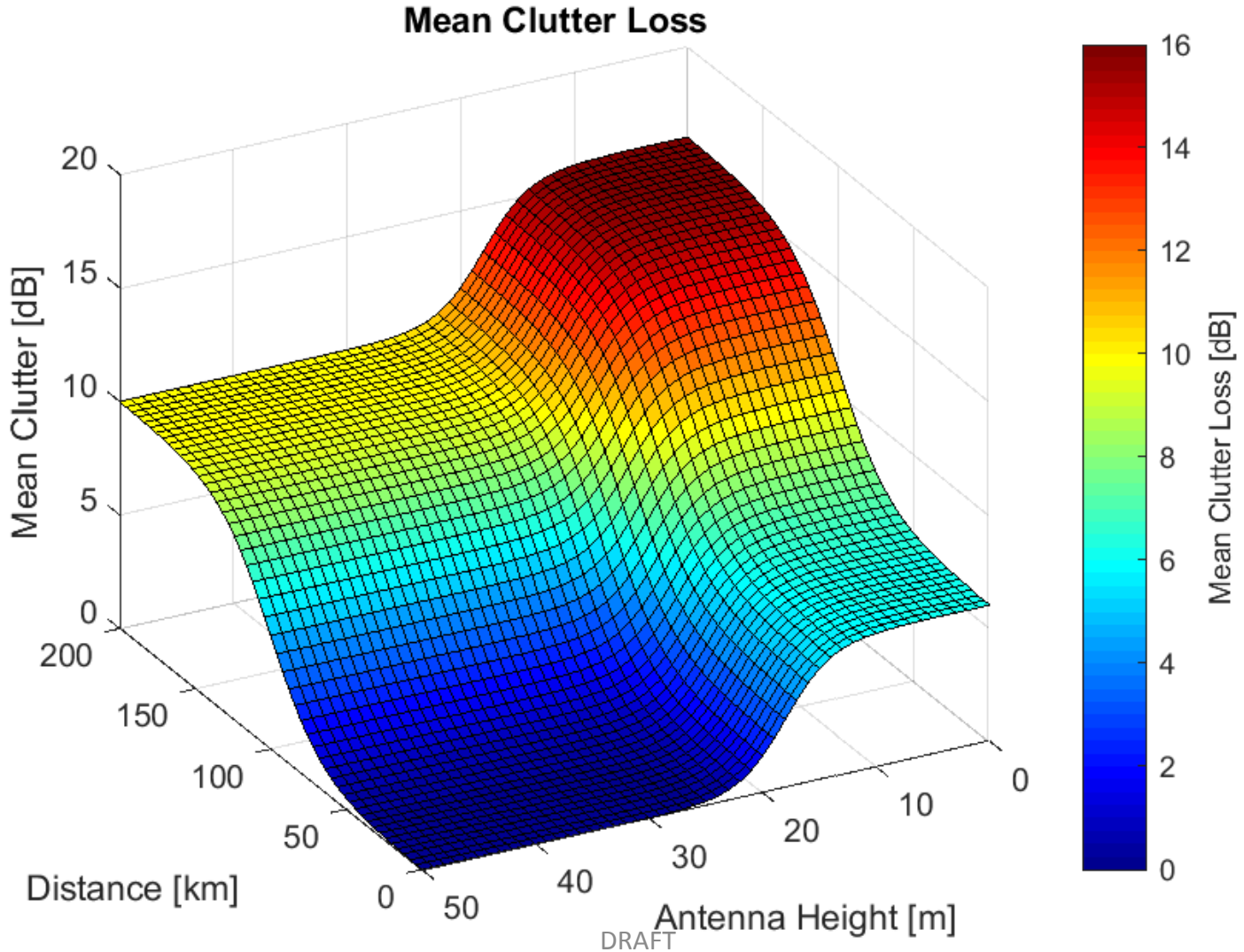
Clutter Model: Log Distance and Antenna Height

- NTIA TR 15-517 (3.5GHz Exclusion Zone)
  - For Rural CBSD Base Stations, an additional clutter factor of 0-15dB, with a uniform distribution, was randomly applied.
- Custom Clutter Loss
  - CatB CBSD Antenna Height:
    - 6m: 6dB
      - Minimum CatB Antenna Height
    - 18m: 3dB
      - 15-517 Extended Hata Cutoff Height
    - 50m: 0dB
- For CatB CBSDs Antenna Heights <50m, additional clutter is added based upon distance
  - Separation Distance Parameters
    - 10km: 0dB
      - Distance from coast to DPA inner edge
    - 200km: 10dB
      - Rough distance where ITM is Troposcatter





Mean Clutter Loss



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