Assessment of Tactical Ground Unit Technical Signature Management Procedures

Research Question: How can a unit commander best use tactical communications to accomplish an assigned mission while remaining hard to detect by a peer threat force?

Summary: Assess existing technical signature management procedures for tactical units, using existing inventories of tactical communications and other radio-frequency emitting equipment.

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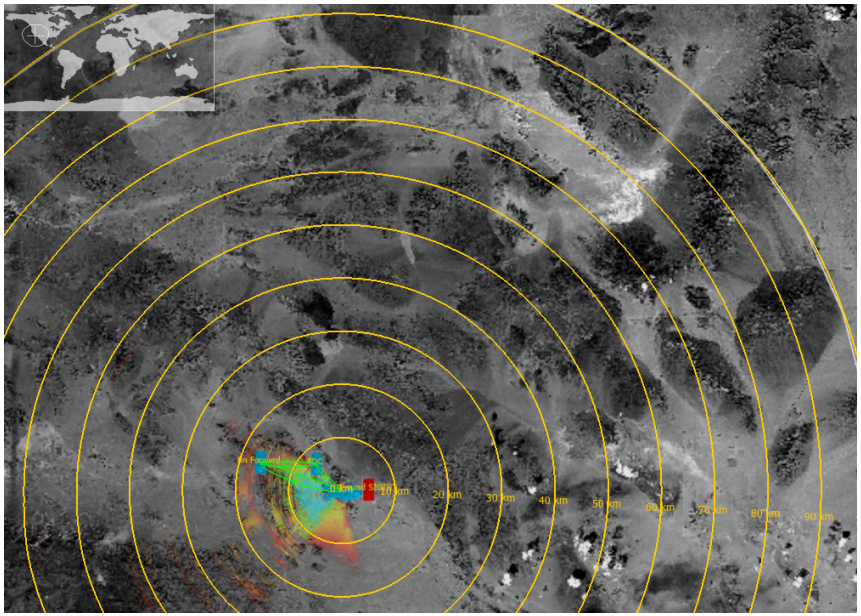

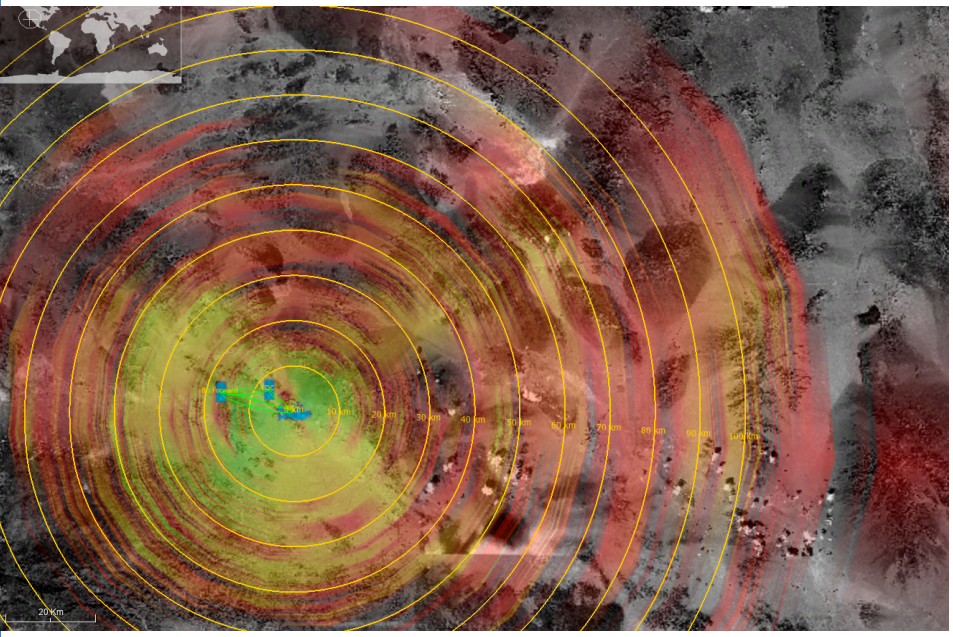

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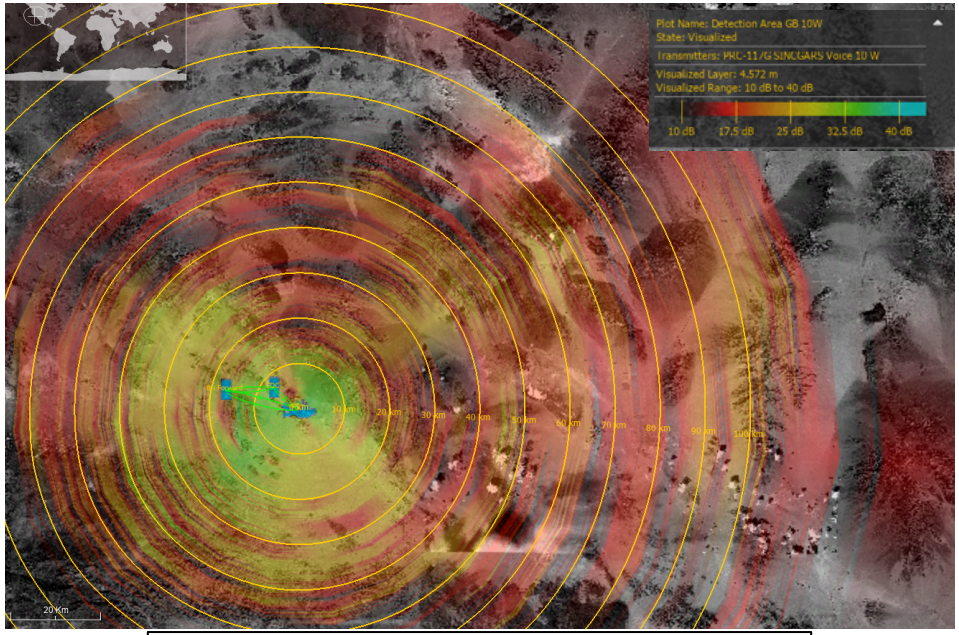
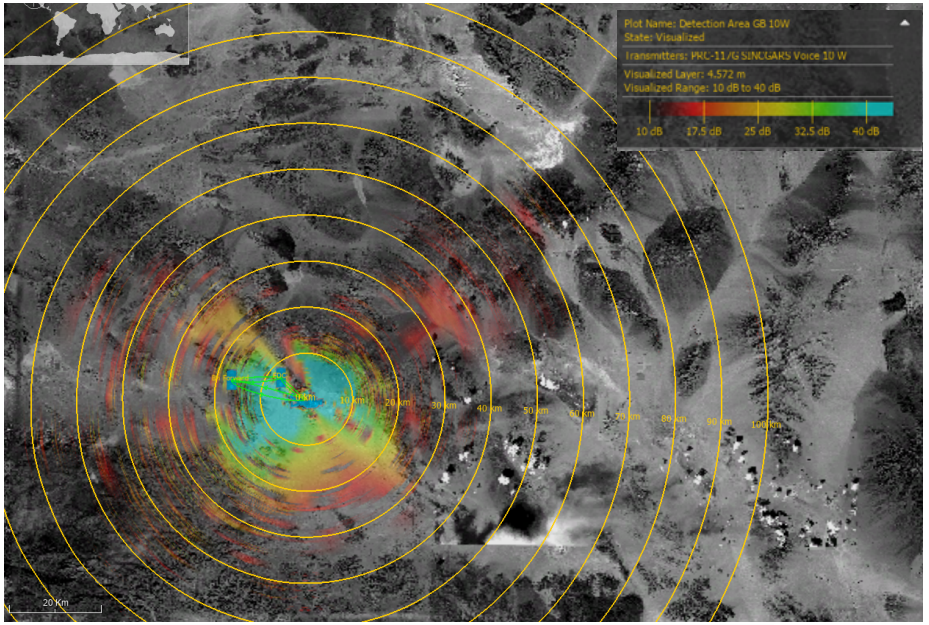
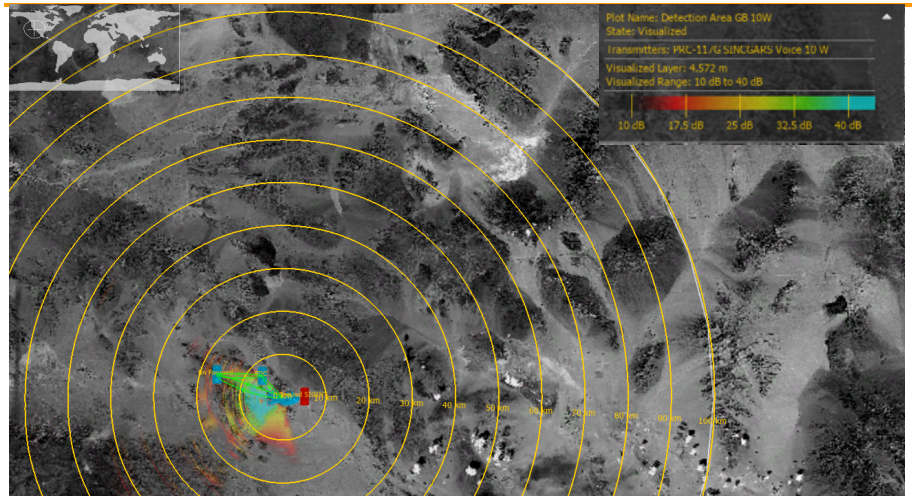
NRL Builder AN/PRC-117G Models



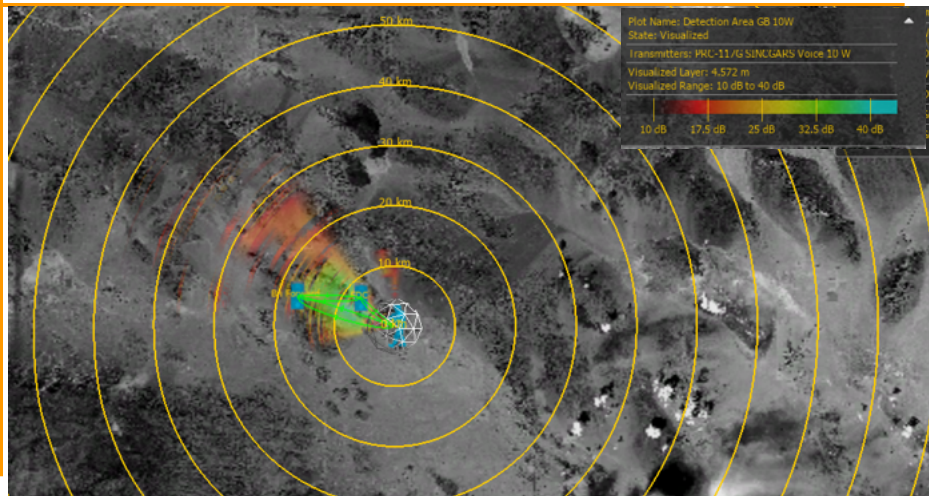
Baseline SNR Plot for AN/PRC-117G



Reduced Power AN/PRC-117G



Terrain Masked AN/PRC-117G



Directional Antenna AN/PRC-117G

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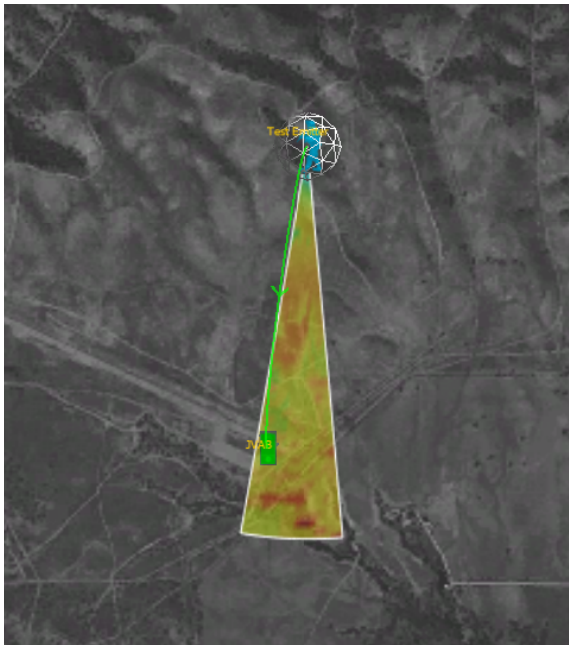
COTS Emitter Experiment Outline



NRL Builder SNR Plot from McMillan Airfield Point 5

Objective: Validate Builder Models

- Experiment 1 – Baseline Test
  - Measure Signal Strength along a single azimuth at various ranges, while varying:
    - Frequency (VHF, UHF)
    - Power
    - Body position
- Experiment 2 – Varying Terrain Test
  - Identify any trends in Builder that contribute to inaccurate models of TTPs
    - Line of Sight vs. Non-LOS
    - Elevation
    - Range

Description: Validate NRL Builder Models

- Use spectrum analyzers to capture measurements of known COTS emitters to validate computer models as an applicable planning tool
- Experiment Variables:
  - Range/Terrain
  - Frequency
  - Power
- Measure signal strength at various ranges; adjust frequency and power, compare data to computer simulation

Key Participant: Joint Vulnerability Assessment Branch

Experiment Deliverables

- Validating models or identifying any inaccurate trends by comparing measured data with Builder plots
- Provide insight into TTPs through spectrum analysis
- Education on real-world spectrum analysis and direction-finding systems to understand application of TTPs against enemy threats
- Provide methodology for conducting Own Force Signature Assessment for future analysis of Marine Corps unit signatures

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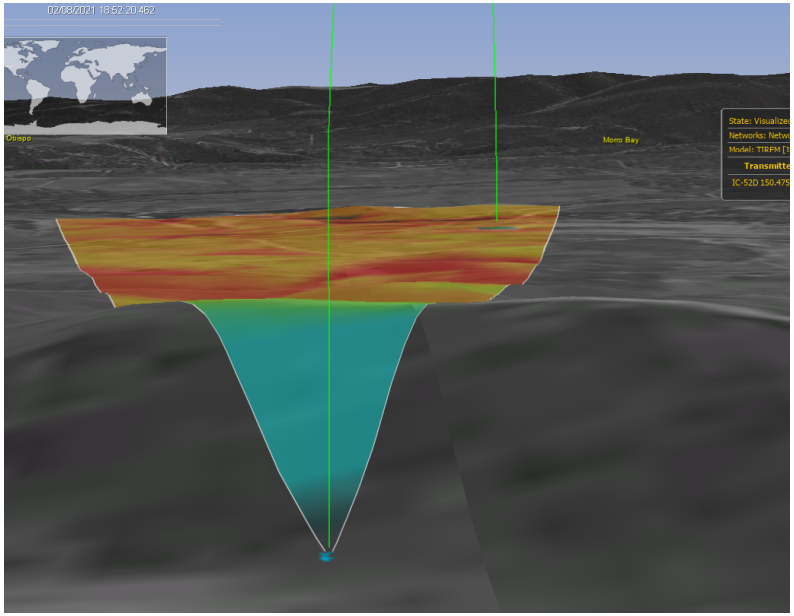
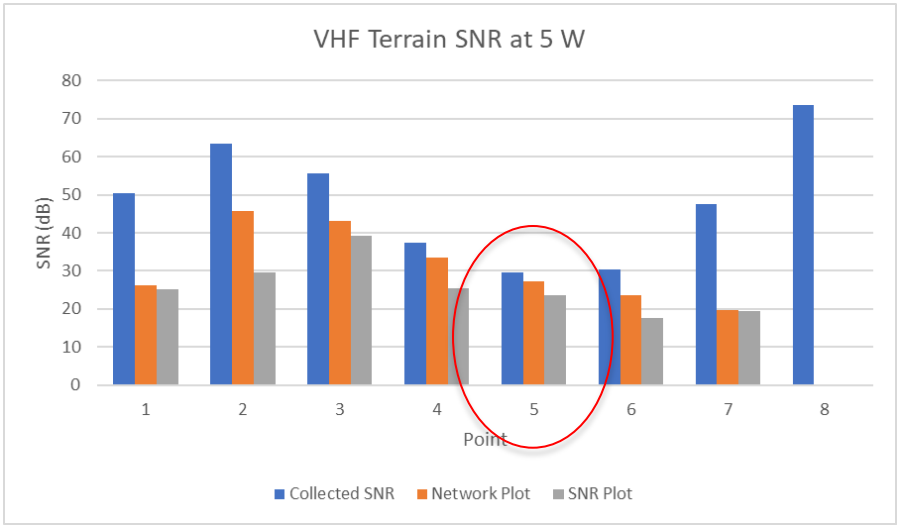
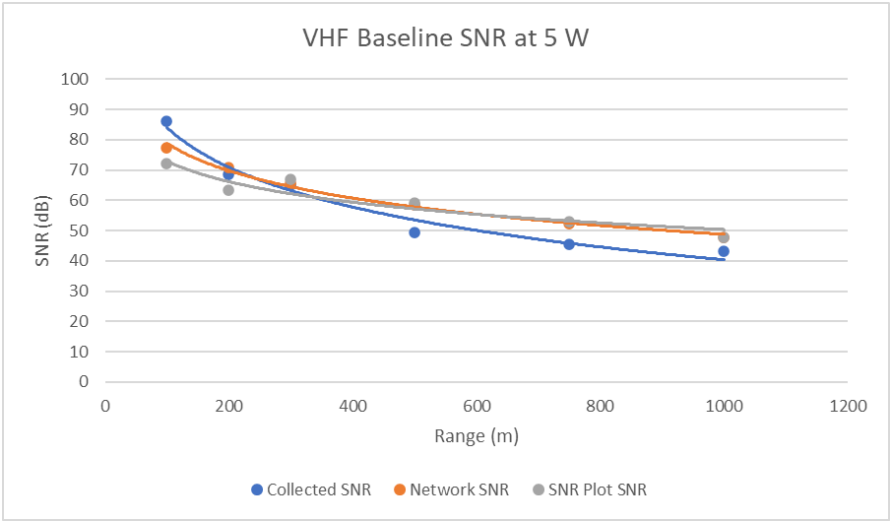
Data Processing







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Future Work

- Thorough analysis of Marine Corps Communications-Electronics Equipment
  - HF
  - MUOS/SATCOM
- Application of Threat Analysis (Tradeoff of Bandwidth vs. Resolution vs. Scan time)
- Comparison of RF Modeling and Simulation Programs
  - SPEED
  - STK
  - Other Software/Programs
- Analysis of Future/Emerging Communications methods and Real-Time analysis tools

Equipment

- 1 x R&S DDF05A with ADD053 (20-1300 MHz) antenna
  - Spectrum analysis
- 3 x Persistent Systems Wave Relay (MPU-5)
- 2 x Midland GXT900K (UHF Handheld)
- 3 x ICOM IC-52D (VHF Handheld)
- 3 x Garmin Rhinos 530HCx
  - GPS
- 2 x Instant Eye SUAS

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