Drone-based Techniques to Rapidly Characterize Broadcast Antenna Systems and Coverage

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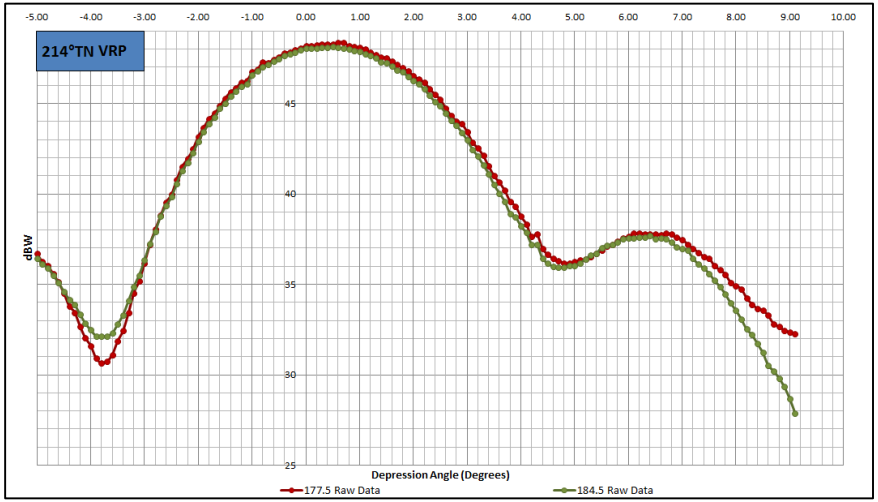
What are we measuring

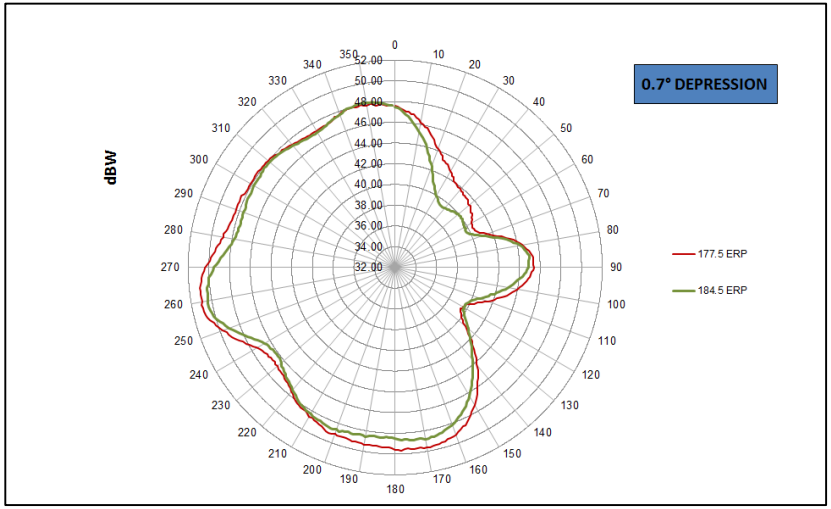
Broadcast antennas mounted on towers and masts, these usually have:

- High powers, high gains
- Narrow vertical beamwidths
- Directional patterns
- Multiple feeders
- Multiple channels across multiple frequency bands
- Different modulations (AM,FM,HD Radio, ATSC,DVBT,DAB,Analog,etc)

What are we measuring

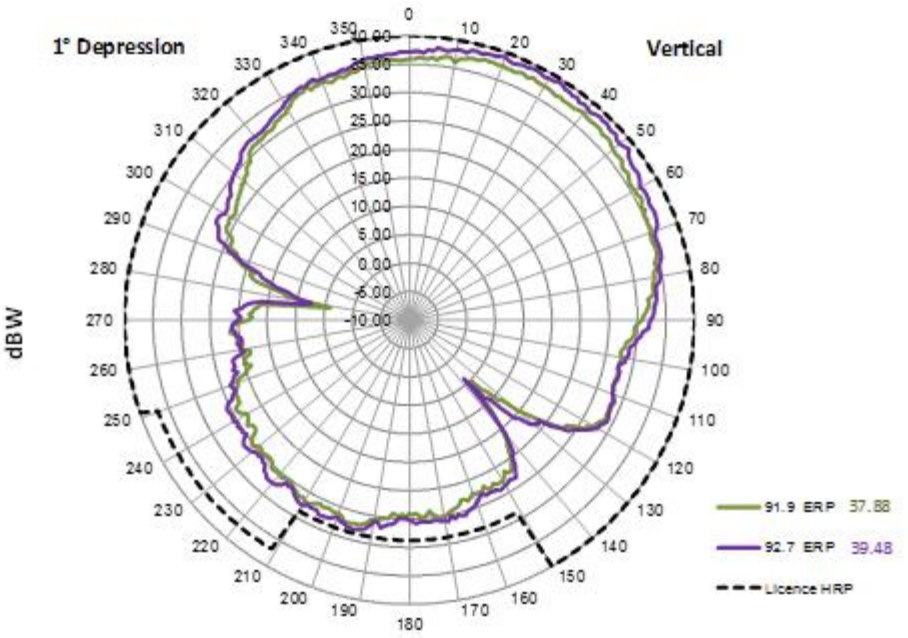
- More specifically, we measure the Horizontal Radiation Pattern (HRP), Vertical Radiation Pattern (VRP) and the Effective Radiated Power (ERP) of these antennas.





Why are we measuring

- To make sure that the antenna and transmission network is operating as per its design
  - If not, why not
- To compare differences in antenna patterns when changing channels and antennas (e.g. Pre and Post Repack)
- For legal compliancy



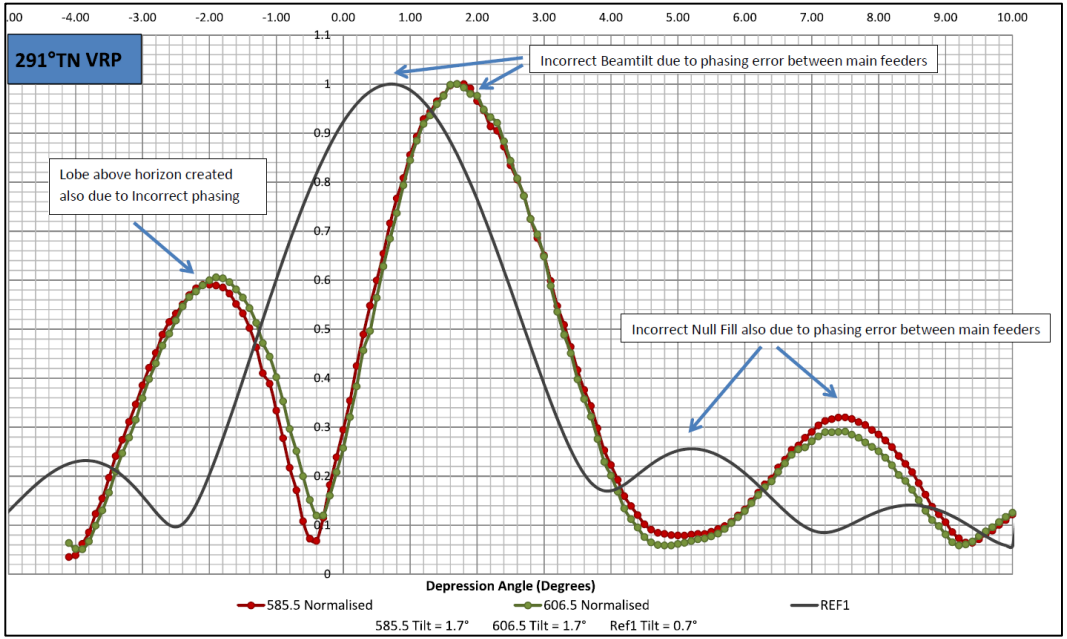
Traditional vs New

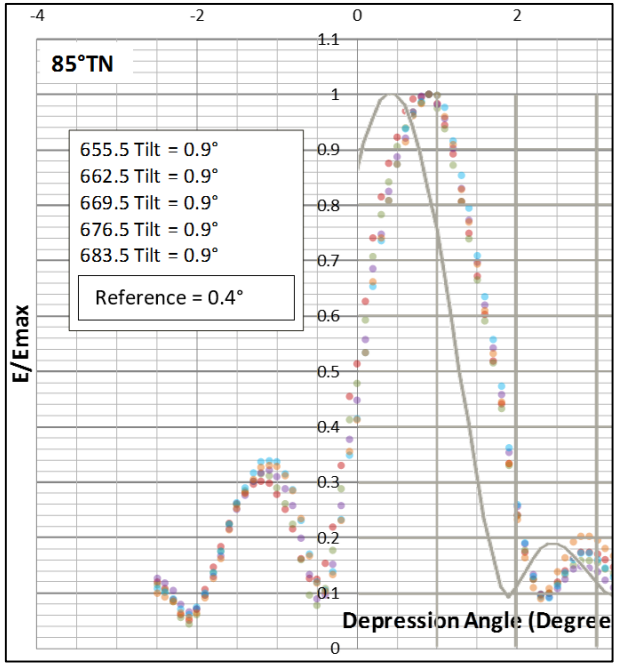
- Spot Measurements
- Time consuming
- Difficult to diagnose issues
- Limited to 30 feet (10m)
- Multipath
- Costly (heli)
- Manual Flight (heli)

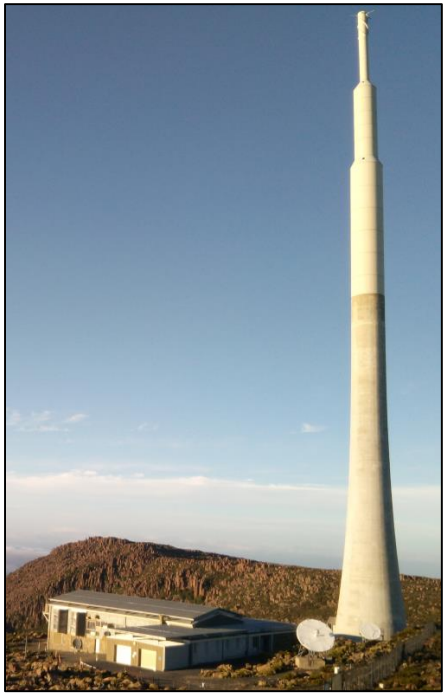
- 360 Degree Data
- Time Efficient
- Easy to Diagnose issues
- Autonomous flights
- Automated Reporting
- Live data
- Free Space

Real-World Case Studies

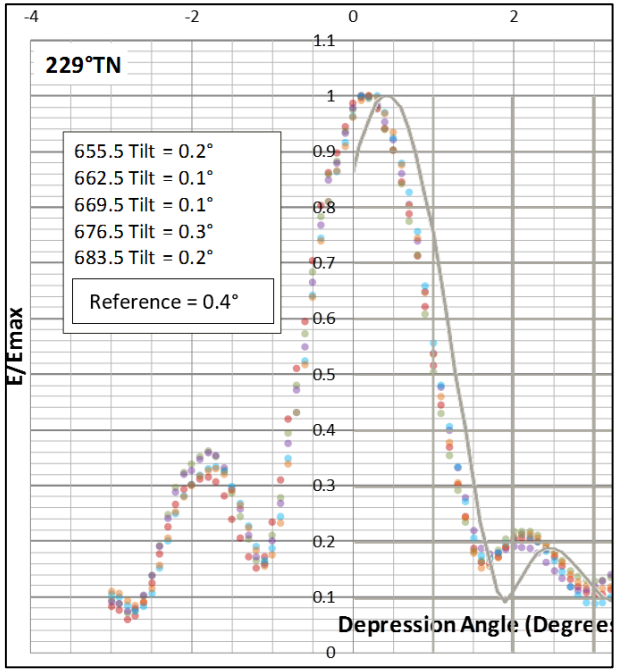
Incorrect Feeder Phasing



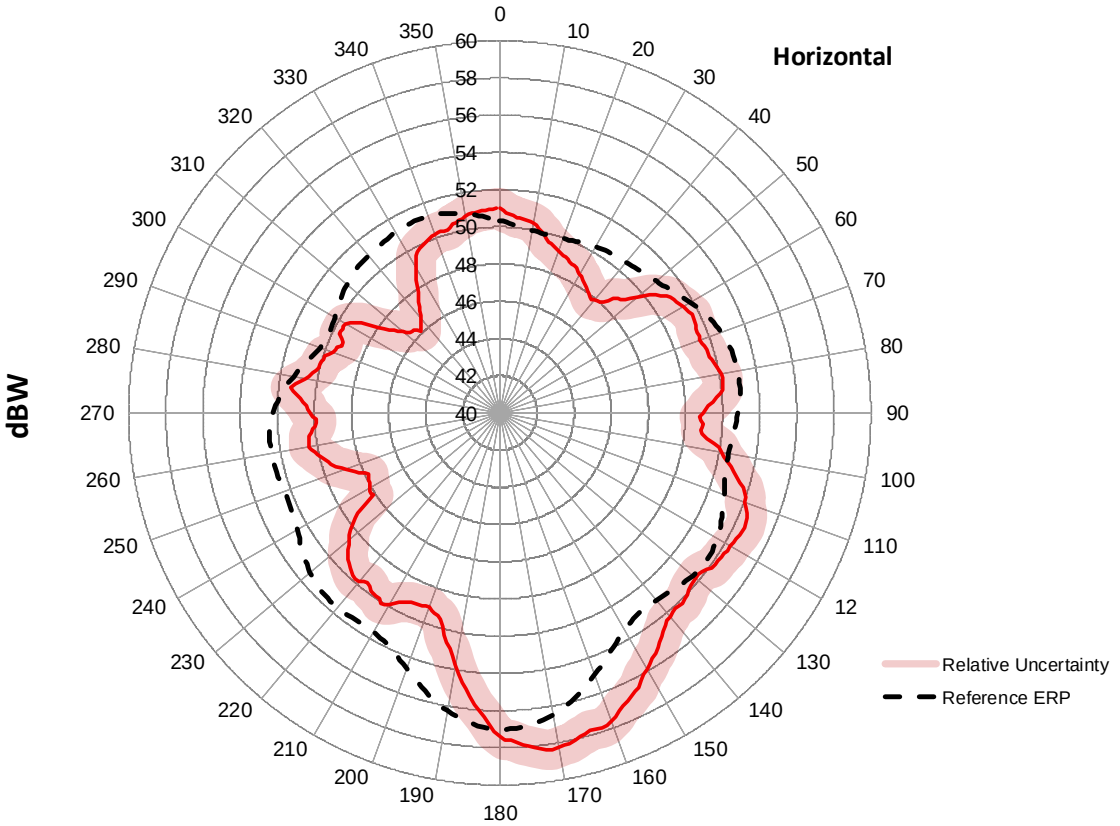




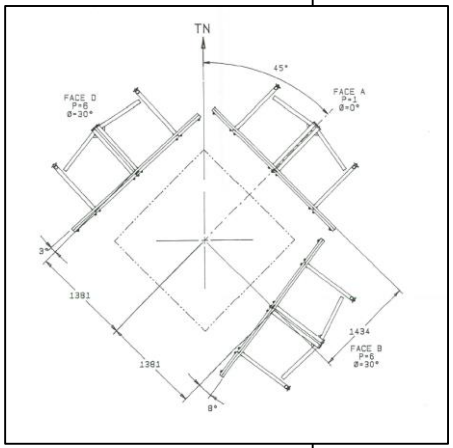
Mechanical Lean

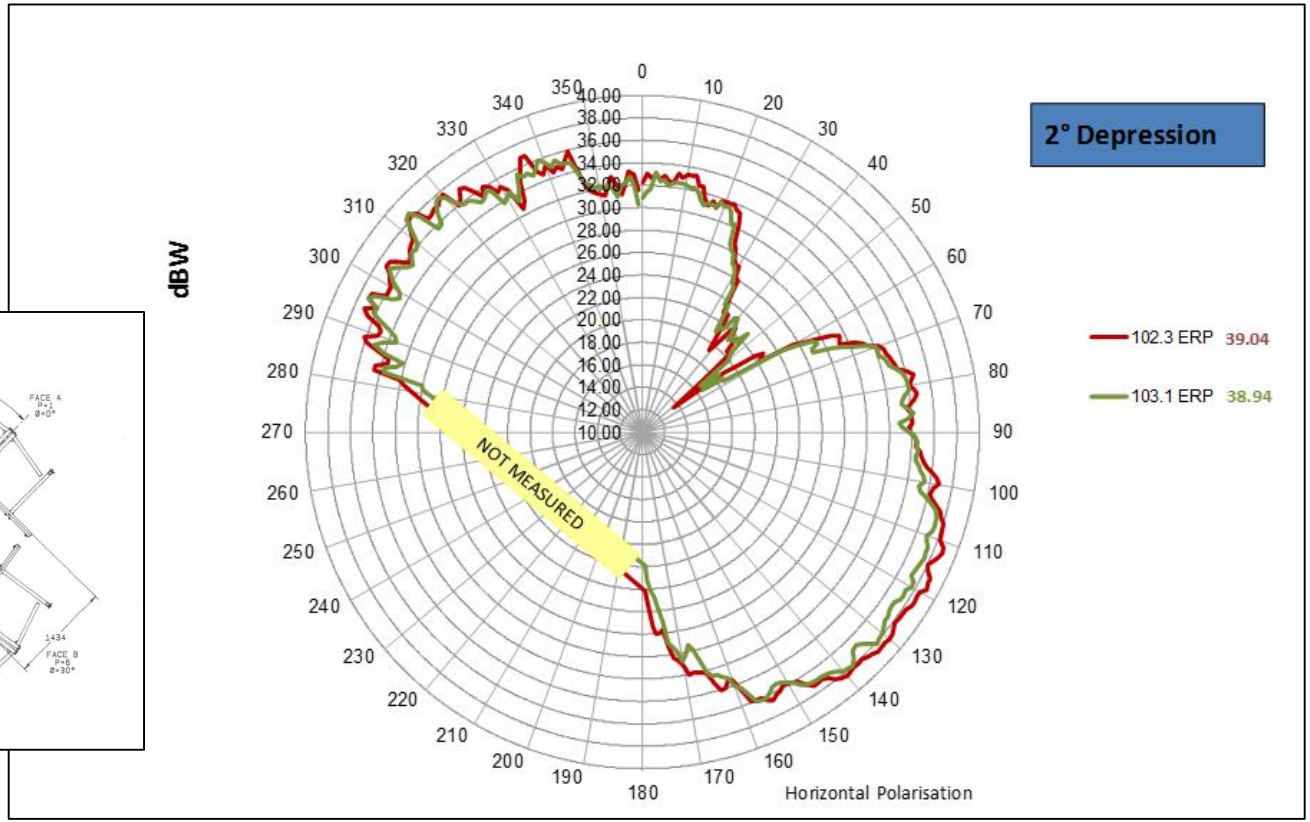


Incorrect Orientation

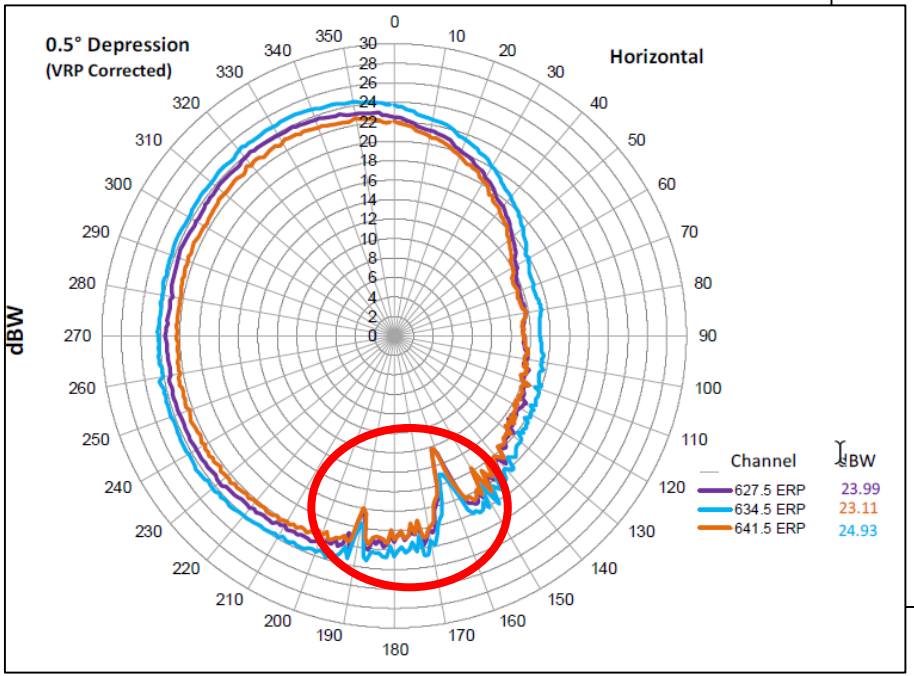


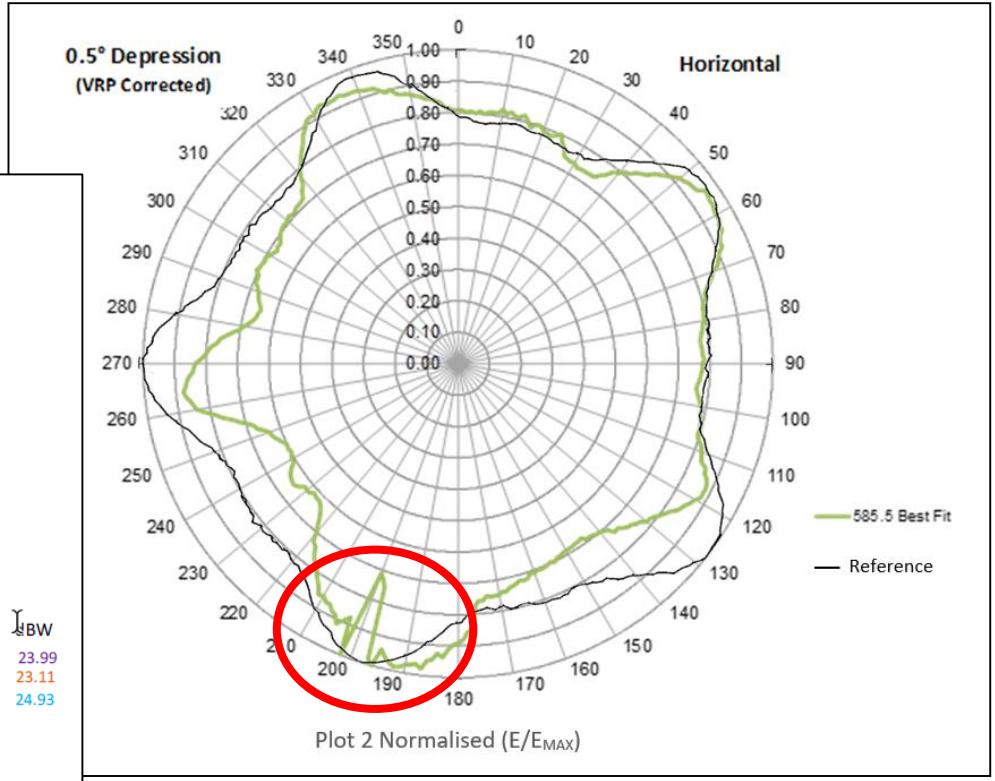
Inverted Panels



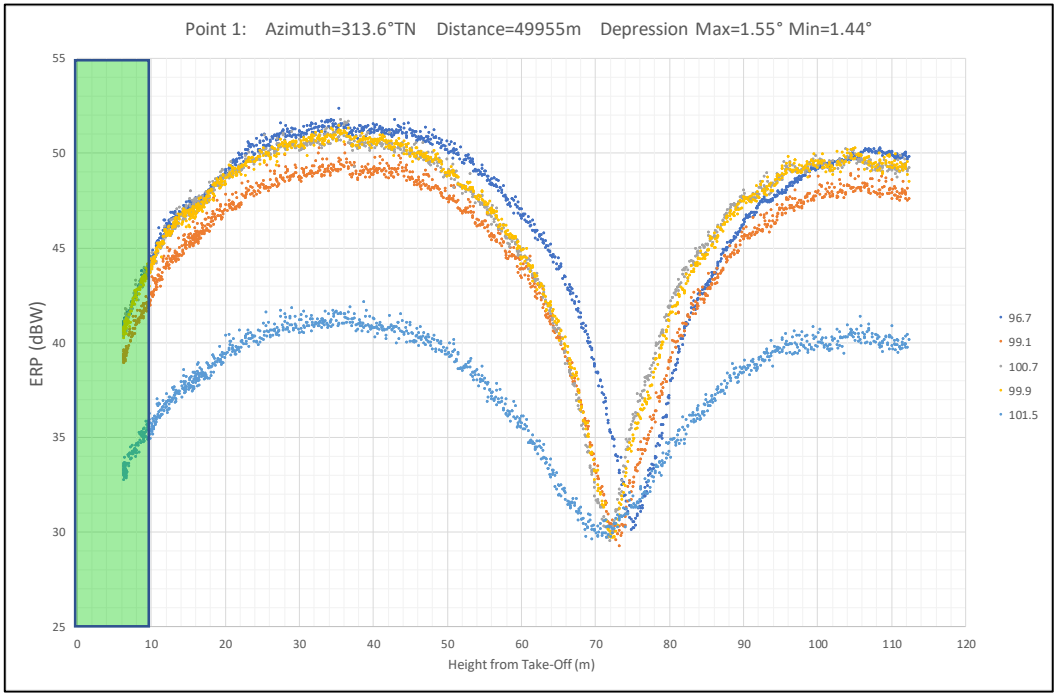


Effects of adjacent structures





In-Field Coverage Checks



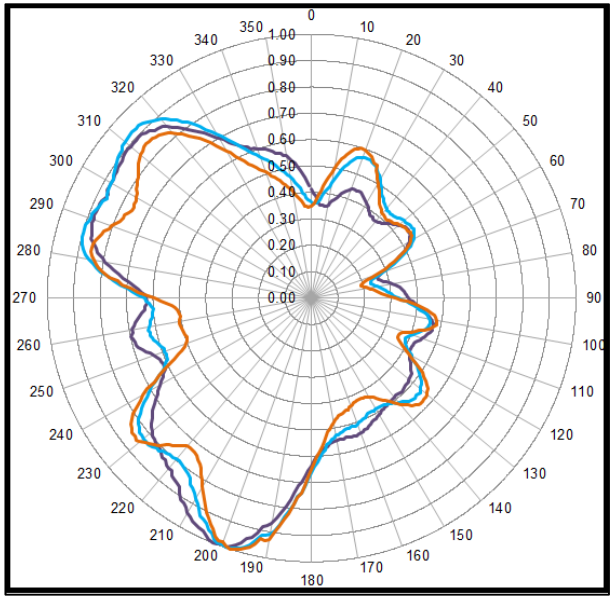
Typical Scenario (New Repack Antenna & Channel)

- Pre-change UAV-based antenna verification (insurance policy)
  - Coverage prediction plot
- Installation crews change the antenna and switch frequency
- Post-change UAV-based antenna verification (while technical crews are still on-site)
  - Coverage prediction Plot
- Coverage Verification

Why Measure .... Again

- Poor performing antennas ultimately means less population covered, less advertising penetration, less revenue stream, etc
- We measure to find and eliminate the issues
- To protect an investment that costs $$$$$$$$$$$$$ with a service that costs $

QUESTIONS



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Or email Jason@sixarms.com