Directional Antenna Troubleshooting Principles and Practice

Problem Types - Immediate

- Internal to Array
  - Radiating System
  - Antenna Monitoring System
- External to Array - Re-radiation

Problem Types - Gradual

- Internal to Array
  - Drifting Component Values
  - Ground System Deterioration
- External to Array
  - Seasonal Variation
  - Permanent Changes
    - Development
    - Water Table Changes

Basic Troubleshooting

- Consider Multiple Factors Simultaneously
  - Antenna Monitor Parameters
  - Monitor Point Field Strengths
  - Common Point Impedance/Transmitter Load
- Always Record Settings and Readings Before Any Action
- Keep Records

Example - Single Tower (Non-Reference) Sampling System Change

- Only Parameters of One Tower Change
- No Common Point Impedance Change
- No Monitor Point Field Strength Change

Example - Single Tower (Reference) Sampling System Change

- All Towers Suffer Parameter Changes of Same Magnitude
- No Common Point Impedance Change
- No Monitor Point Field Strength Change

Example - Single Tower Network Failure

- All Towers Suffer Parameter Changes of Differing Magnitudes
- Common Point Impedance Might Change
- Monitor Point Field Strengths Might Change
- Look For Problem In Circuit of Tower With Largest Change

Example - Single Monitor Point Change Without Parameter Change

- Re-radiation Source Near Monitor Point
- Conductivity Change Over Path to Monitor Point

Example - Multiple Monitor Point Change W/O Parameter Change

- Re-radiation Source Near the Array
- General Conductivity Change

Example - Common Point Impedance Change W/O Parameter Change

- If Sudden and/or Large - Component Failure
- If Gradual and/or small - May be Drift

Antenna Monitor Sampling System Tests

- Switching Lines on Antenna Monitor to Isolate Problem
- Visual Inspection of Pickup Devices and Lines
- Bridge Measurements into Lines connected to Pickup Devices
- Bridge measurements of Lines Alone
- Dielectric Testing of Lines

Feed System Tests

- Visual Inspection of Components
- Change Patterns (if Possible) to Rule Out Lines, etc.
- Operating Impedance Measurements of Line Terminations
  - Must Be Compared to Baseline Measurements
  - Not Necessarily Matched to Characteristic Impedance
- Bridge Measurements of Network Branches and Components

Component Replacement

- Assure Correct Rating
- Adjust the Affected Network Branch to Restore Parameters

Transmission Line Replacement (Power or Sample Line)

- Assure Proper Ratings
- Consider Velocity of Propagation

Test Equipment

- Field Strength Meter
- Operating Impedance Bridge
- Generator/Detector