Purpose of Directional Antennas?

- Daytime: Groundwave Interference
- Nighttime Protection:
  - Groundwave Service of Class B and C Stations
  - Skywave Service of Class A Stations
- Coverage Improvement

Directional Antenna Pattern Features

- Nulls (or, more properly, Minima)
- Major Lobes
- Minor Lobes

Theoretical Parameters

- Geometry
  - Spacing
  - Orientation
  - Antenna Tower Electrical Height
- Electrical Parameters
  - Field Ratio
  - Field Phase

Operating Parameters

- Antenna Monitor
  - Tower Current Sample Ratio
  - Tower Current Sample Phase
- Base Current
- Common Point Current

FCC Rules - Operation

- Keep MP's within Limits
- Antenna Monitor Parameters
  - ±3 degrees phase angles, ±5% current ratios
- +5%, -10% Power

Directional Antenna Tests and Measurements

- Proof of Performance (Known as a “Full Proof”)
- Partial Proof of Performance
- Monitor Point Field Strengths
  - “Radial Partial Proof” to change a monitor point location

An Inquiry into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification MM Docket 93-177

- Traditional Full Proof-of-Performance
  - ~ 125 Page
- New Full Proof-of-Performance
  - ~ 40 Page
- This rulemaking provides these major simplifications to the "DA Proof" process:
  Reduction in the required number of measurement radials to as few as 6
- Reduction in the distance of measurements from 34 km to 15 km
- Reduction in the minimum number of total (DA and non-DA) measurement points from 18 to 15
- Elimination of the requirement for filing the measurement location maps

Partial Proof of Performance Measurement Simplifications:

- Reduction of the total number of radials required to minimum of 4, including monitored radials and (if necessary) adjacent radials
- Reduction of total points per radial from 10 to 8
- If DA/non-DA measurements are appropriate, new points may be used

Monitor Point Change Simplifications:

- If a point from the original proof is used, new measurements on that point
- If a new point is used, “partial proof” measurements on the affected radial
- No monitor point map required

Most Importantly for the Future of AM Radio:

- The Commission issued a “Further Notice of Proposed Rulemaking on the Use of Computer Modeling to Predict Antenna Performance”

New Requirements for Partial Proof-of-Performance

- Minimum 4 Radials
- Radials at All Monitor Point Azimuths
- Less Than 4 Monitor Points – Measure Nearest to Monitored Radials
- 8 Measurement Point Per Radial

Partial Proof-of-Performance Analysis Options

- DA/DA Comparison to Last Proof
- DA/ND With New Data – ND Field from Last Proof
- DA/ND With New Data – New ND Analysis

  Additional Close-In Measurements (< 3 km) and Graphical Analysis Required

New Uses For Partial Proofs-of-Performance

- May Select New Measurements Points Not From Full Proof

  DA/ND Analysis Required
- May Establish New Monitor Points Not From Full Proof

  DA/ND Analysis Required
- Monitor Point Limit Can Be Changed With Single-Radial Measurements
- Pattern Augmentation

  Additional Close-In Measurements (< 3 km) and Graphical Analysis Required

Construction Rule - 73.1615

- (If no Frequency Change)
  - Reduced Power, MP's in Limits
  - non-DA, 25% of DA Licensed Power
  - DA as Necessary for Field Strength Meas.
  - DA w/ New Pattern "Substantially Adjusted"
  - Up to 30 Days without Prior Authority

STA Rule - 73.1635

- DON’T LIE
- STA Request Due to Damage can be made Electronically (Confirm in Writing)
- Be Specific - What Happened, How Do You Propose to Operate?
- Extended Hours Operation ONLY per Emergency Operation Rule 73.3542