FCC Rules Necessary for 8-VSB Distributed Transmission

A Policy Presentation for Federal Communications Commission Staff

March 31, 2004

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Consultants in Electronic Media Technology / Management

Dual Presentation

- ✓ Technology Familiarization
  - ✓ Overview of Technology at Non-Technical Level
  - ✓ Adequate to Support Decision-Making
  - ✓ Examples of Applications
- ✓ FCC Policy & Decisions
  - ✓ Benefits with respect to Standing FCC Spectrum Policy
  - ✓ Decisions Needed to Establish Rules
  - ✓ Broadcaster Support

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Agenda

- ✓ Distributed Transmission (DTx) Systems
- ✓ Public Policy Benefits of Distributed Transmission
- ✓ Required Rule Changes
- ✓ Decisions Required in Establishing Rules
- ✓ Broadcaster Support
- ✓ Conclusions

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Distributed Transmission Systems

- ✓ Multiple Transmitters Covering an Area (SFN)
  - ✓ On-Channel Repeaters (successor to "Boosters")
  - ✓ Distributed Transmission
- ✓ Variety of Purposes
  - ✓ Gap Fillers (Filling in Shadows)
  - ✓ Service Maximization (Extending Service)
  - ✓ Creating Signal Hot Spots
  - ✓ Transmitter Diversity

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Public Policy Benefits of Distributed Xmsn

- ✓ Improved Spectrum Efficiency
  - ✓ Like Translators, But Without Another Channel
  - ✓ Stronger Signals, Less Interference
  - ✓ Improved Service to Consumers / Viewers
- ✓ FCC Approaching "Use or Lose" Decision
  - ✓ Broadcasters Need Time to Build Facilities
  - ✓ Distributed Xmsn Is Tool Needed to Enable Many Solutions

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Public Policy Benefits of Distributed Xmsn (2)

- ✓ Some Question Viability of Over-The-Air (OTA) Broadcasting
  - ✓ Loss in Audience Share to Cable / Satellite
  - ✓ Cable & Satellite as Gatekeepers for Broadcast Signals
- ✓ Interest Building In Real OTA as Alternate Delivery Method
  - ✓ "Wireless TV" Concept – John Lawson / APTS – 3/30/04
  - ✓ USDTV Launch – OTA Competitor to Cable (www.usdtv.com)
- ✓ Requires Easy Access by Consumers
  - ✓ Set Top / Indoor Antennas vs Outdoor
  - ✓ Means Higher, More Uniform Signal Levels Needed

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Required / Proposed Rule Changes

- ✓ Primary Treatment of Distributed Transmitters
  - ✓ Inclusion in Part 73 vs Part 74 in most instances
    - ✓ No Additional Spectrum Allotment Required
  - ✓ Protect Distributed Xmtr Service Area Same as Main Service
  - ✓ When Distributed Xmtrs Provide Part of Main Service
    - ✓ Filling Gaps in Coverage, Creating Hot Spots
    - ✓ Maximizing Service Area and Population
- ✓ Permit DTV Coverage Area Extensions
  - ✓ More Effective Service Maximization
  - ✓ Proposal for 50% Extension In Each Direction
  - ✓ Distributed Xmtrs Located Within Reference Contours
  - ✓ Population Increase Limited Outside Licensee's DMA

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Required / Proposed Rule Changes (2)

- ✓ Limits for Main Stations Apply to Distributed Xmtrs
  - ✓ Power
  - ✓ Antenna Height
  - ✓ *de minimis* Interference Analysis Serves as Constraint
- ✓ Eliminate Constraints of Analog Service Rules
- ✓ Interference Analysis Methods Extended
  - ✓ Modifications to Current Techniques / Software
  - ✓ Addition of 1 Field to FCC Database Records

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Decisions Required in Establishing Rules

- ✓ Locations of Distributed Transmitters
  - ✓ Within Hypothetical Maximized Service Contour
  - ✓ Within Designated Market Area (DMA)
- ✓ Service Areas Permitted
  - ✓ Always Limited by *de minimis* Rules
  - ✓ Four Choices Provided in Filed Comments
    - ✓ Limitations of Service Contours
  - ✓ Avoiding Encroachment Into Neighboring DMAs

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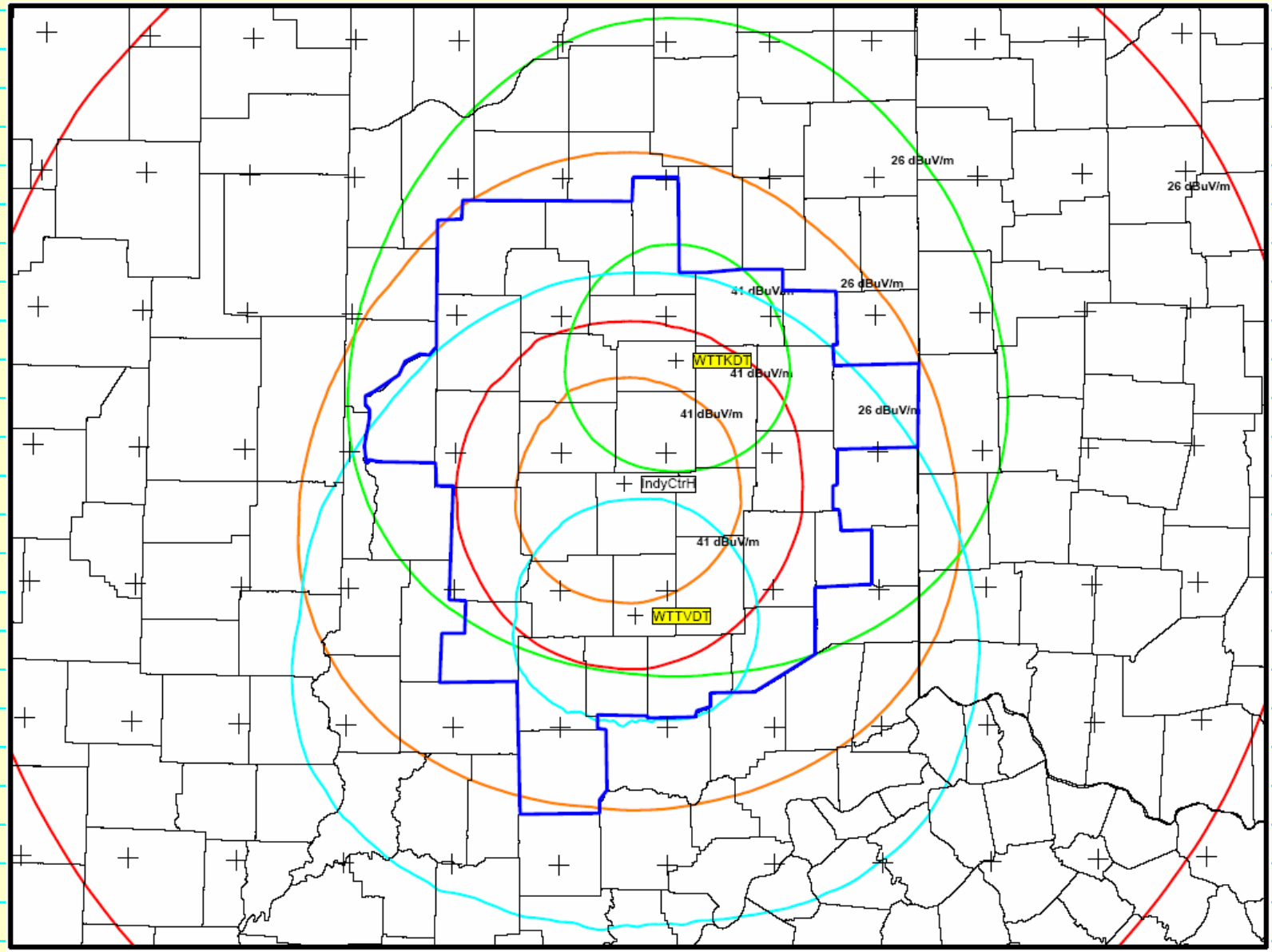
Locations of Distributed Transmitters



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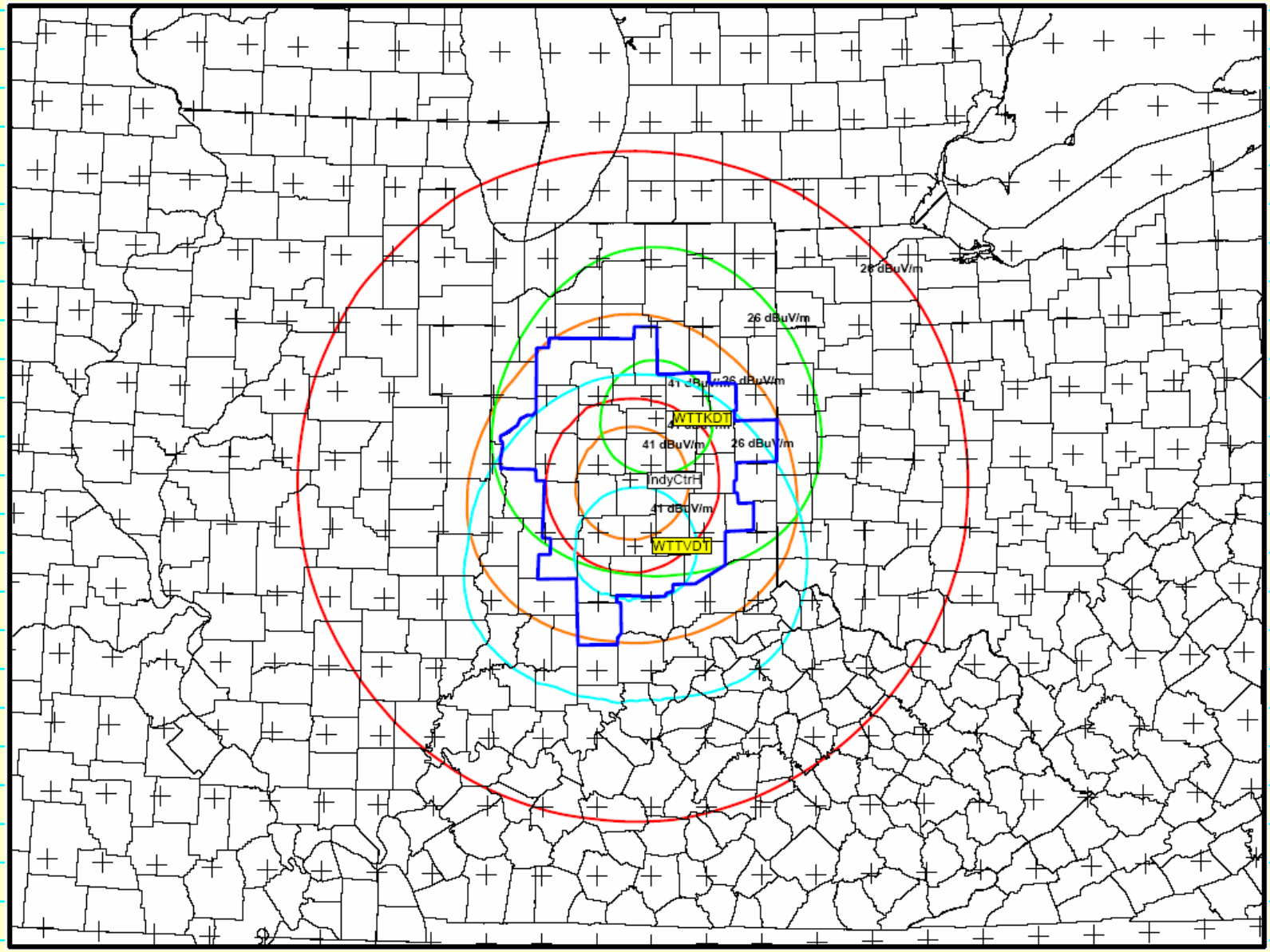
Locations of Distributed Transmitters (2)



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Recommendations for Required Decisions

- ✓ Locations of Distributed Transmitters
  - ✓ Combination of Hypothetical Service Contour & DMA Boundary
    - ✓ Whichever extends further in any given direction
- ✓ Service Areas Permitted
  - ✓ Always Limited by *de minimis* Rules
  - ✓ Maintain Interference Contours Within Hypothetical IX Contour
  - ✓ More Than ½ of Population Served Must Be Within DMA
    - ✓ Evaluated for each distributed transmitter
    - ✓ When extending outside hypothetical maximized service contour

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Broadcaster Support

- NAB President Eddie Fritts – March 30, 2004
  - "We need to provide services that exploit all the advantages of over-the-air transmission-and reach the greatest audience possible with a reliable, received signal. For example, ATSC's work on a standard for distributed transmission is commendable. The idea of synchronized multiple transmitters has the potential to help increase the reliability of over-the-air broadcast service."
    - Speech at ATSC Annual Meeting

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Broadcaster Support (2)

- ✓ "The undersigned 17 organizations … jointly urge the Commission to consider formally the authorization of Distributed Transmission techniques for use in digital television operations."
- ✓ Letter to FCC from 17 Organizations – June 6, 2002
  - ✓ NAB
  - ✓ APTS
  - ✓ Cosmos
  - ✓ Tribune
  - ✓ Pappas
  - ✓ Peak Media
  - ✓ MSTV
  - ✓ PBS
  - ✓ Cox
  - ✓ Penn State
  - ✓ Sinclair
  - ✓ Cascade
  - Zenith
  - Harris
  - Linx
  - Rohde & Schwarz
  - MWG

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Conclusions

- ✓ DTx Systems Provide Solutions to Significant Problems
- ✓ DTx Provides Significantly Increased Spectrum Efficiency
- ✓ DTx Systems Allow Service Extension
  - ✓ "Propagationally Challenged" Areas
  - ✓ Service Maximization
  - ✓ Extended Service Offerings
- ✓ Broadcasters Implementing DTV Facilities Now
- ✓ Rules Needed Now to Enable DTx Operation
- ✓ Request Media Bureau to Writes Rules for DTx

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FCC Rules Necessary for 8-VSB Single-Frequency Networks

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DTx Standards Development

- ✓ ATSC Candidate Standard CS/110A
  - ✓ Defines Synchronization Methods
  - ✓ Part of ATSC Enhanced VSB Initiative
  - ✓ Integrates with E-VSB Techniques / Standards
  - ✓ WPSX-DT Facility / Equipment Built to CS/110A
- ✓ ATSC SFN Recommended Practice Being Drafted
  - ✓ Covers Systems Using DTx Techniques
  - ✓ Addresses Issues of Receiver Technology / Sensitivities
  - ✓ Due for Consideration at T3 Committee June Meeting

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Interference Analysis Methods

- ✓ Based on Current Techniques
  - ✓ Longley-Rice Propagation Model
  - ✓ OET Bulletin 69
  - ✓ *de minimis* Interference Thresholds
    - ✓ Embodied in the Rules – Whatever They May Become
- ✓ Must Protect Neighbors from DTx Systems
  - ✓ All Transmitters Taken Together
- ✓ Must Protect DTx Systems from Neighbors
  - ✓ Must Avoid Double Counting
- ✓ Modification of Current Software

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Software Modifications

- ✓ Interference FROM DTx System
  - ✓ Main & Distributed Xmtrs Analyzed Together
  - ✓ Can Be Done Manually — Turn On/Off Together
    - ✓ Method Used for Application Now On File with FCC
  - ✓ Link Distr Xmtrs to Main for Automated Analysis
- ✓ Interference TO DTx System
  - ✓ Treat Main & Distr Xmtrs As Single Service Area
  - ✓ Generate Analysis "Cells" from Single Reference Point
  - ✓ Analyze D/U Ratios Using Highest Signal Level as "D"
  - ✓ If D/U Below Threshold, Count Population from Cell
    - ✓ Avoids Double-Counting Population Losses to Interference

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