Missouri 700 MHz Geographic State Radio Allocation

Missouri State Highway Patrol
Communications Division

State of Missouri Goals

- To establish a statewide channel allocation using 700 MHz state geographic spectrum.
- To promote spectral efficiency when allocating state geographic channels.
- *To preserve Missouri's adjacent state border areas for states that may delay initial implementation of state 700 MHz.*

Purpose

- Items learned from previous attempts at new spectrum statewide channel allocations in Missouri (ex. 800 MHz NPSPAC) were…
  - Missouri is extremely diverse in both population and topography.
  - A formula for channel reuse needs to be implemented to maximize use of spectrum while coexisting with adjacent states assignments.
  - Missouri State government will lead any wide area initiative as they have interest in both sparse and densely populated areas.

Implementation Concept

- Established a standard geographic area of coverage for 700 MHz channels.
- Based on propagation studies using 200 ft towers, we derived an operational site radius (R) of 10 miles. Average signal strength 20 dBu.
  - Created 20 mile diameter (D=2R)
  - Per 90.541, Operational site area has been created in accordance with Safe Harbor table ERP limits of 500 watts rural/1000 watts urban (90.635, paragraphs A,B and C)

Implementation concept

- Created pattern of interlocking clusters of nine (9) hexagonal cells, lettered A thru I.
- Each cell contains eight 25 KHz channel pairs.
  - Frequencies in each cell have at least 250 KHz separation to minimize combiner expense.
- Each channel set contains pairs from both TV channels 63-68 and 64-69 allotments.
- Each channel set contains 3 “common” 25 KHz channels for State-State I/O or I/O data within state.

Channel sets

- Set A
  - 25-28
  - 145-148
  - 265-268
  - 685-688
  - 805-808
  - **925-928**
  - **929-932**
  - **933-936**
- Set B
  - 65-68
  - 185-188
  - 305-308
  - 725-728
  - 845-848
  - **925-928**
  - **929-932**
  - **933-936**

Channel sets

- Set C
  - 105-108
  - 225-228
  - 645-648
  - 765-768
  - 885-888
  - **925-928**
  - **929-932**
  - **933-936**
- Set D
  - 109-112
  - 229-232
  - 649-652
  - 769-772
  - 889-892
  - **925-928**
  - **929-932**
  - **933-936**

Channel sets

- Set E
  - 33-36
  - 153-156
  - 273-276
  - 693-696
  - 813-816
  - **925-928**
  - **929-932**
  - **933-936**
- Set F
  - 69-72
  - 189-192
  - 309-312
  - 729-732
  - 849-852
  - **925-928**
  - **929-932**
  - **933-936**

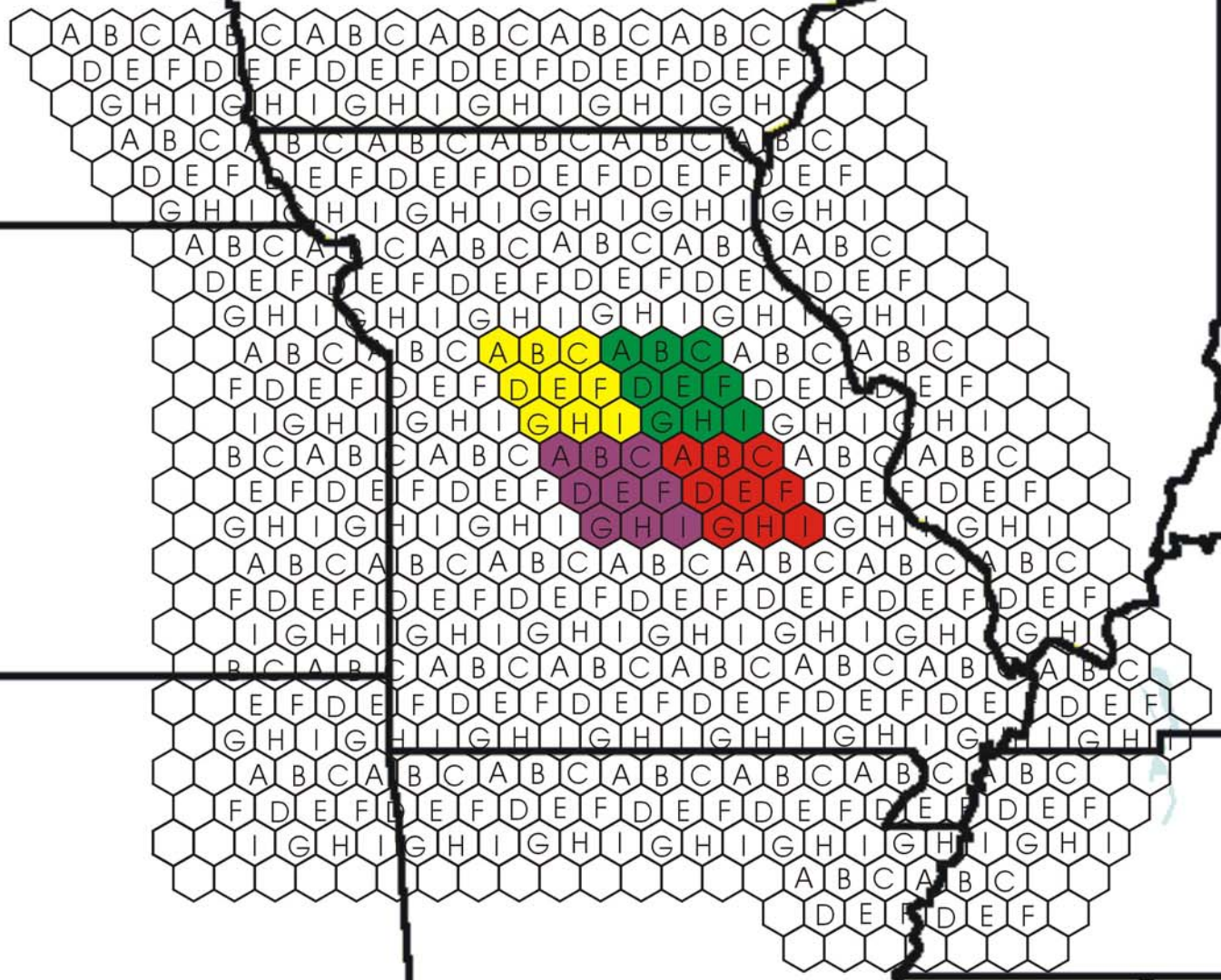
Channel sets

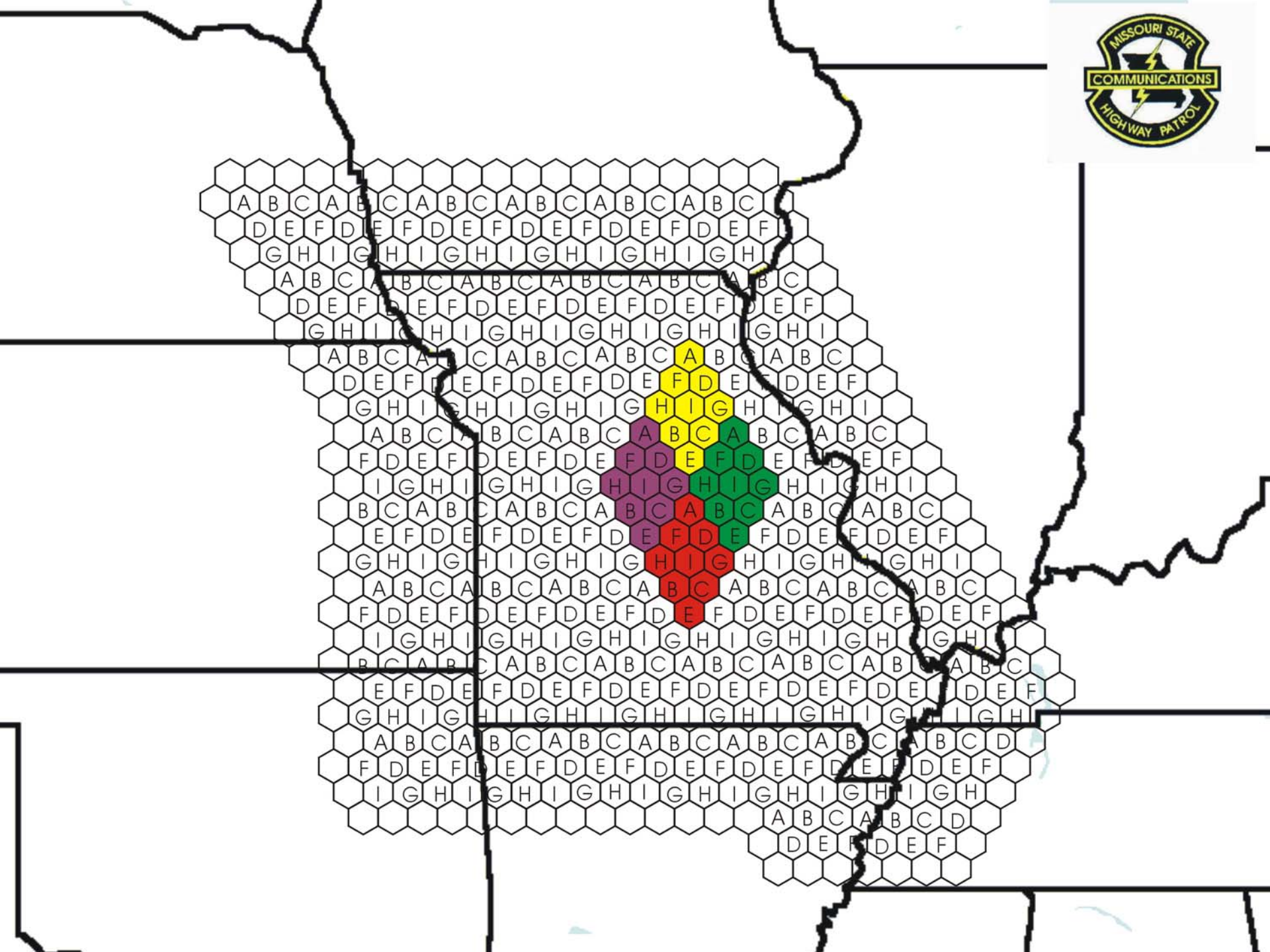
- Set G
  - 73-76
  - 193-196
  - 313-316
  - 733-736
  - 853-856
  - **925-928**
  - **929-932**
  - **933-936**
- Set H
  - 113-116
  - 233-236
  - 653-656
  - 773-776
  - 893-896
  - **925-928**
  - **929-932**
  - **933-936**

Channel sets

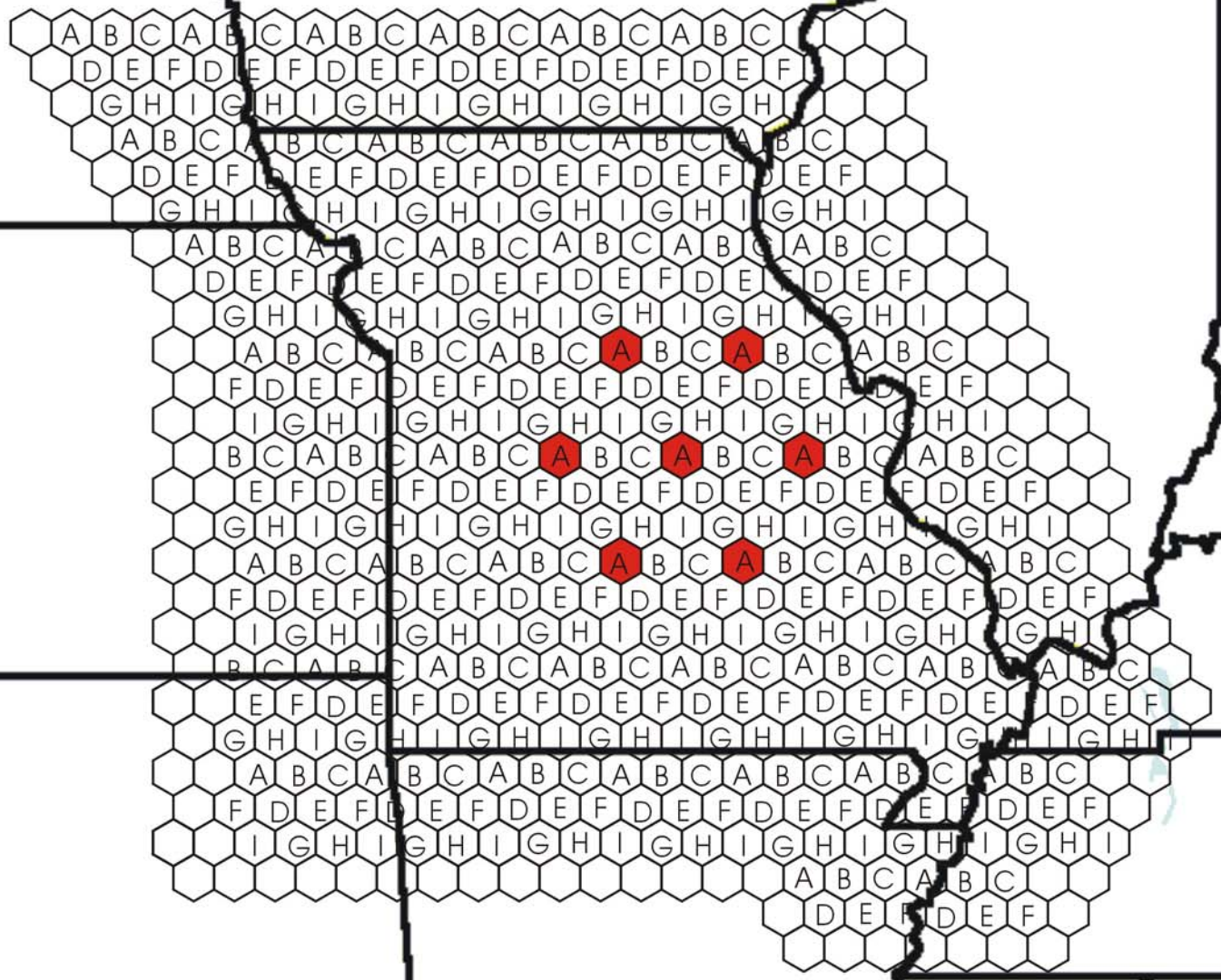
- Set I
  - 29-32
  - 149-152
  - 269-272
  - 689-692
  - 809-812
  - **925-928**
  - **929-932**
  - **933-936**

Channel Pattern

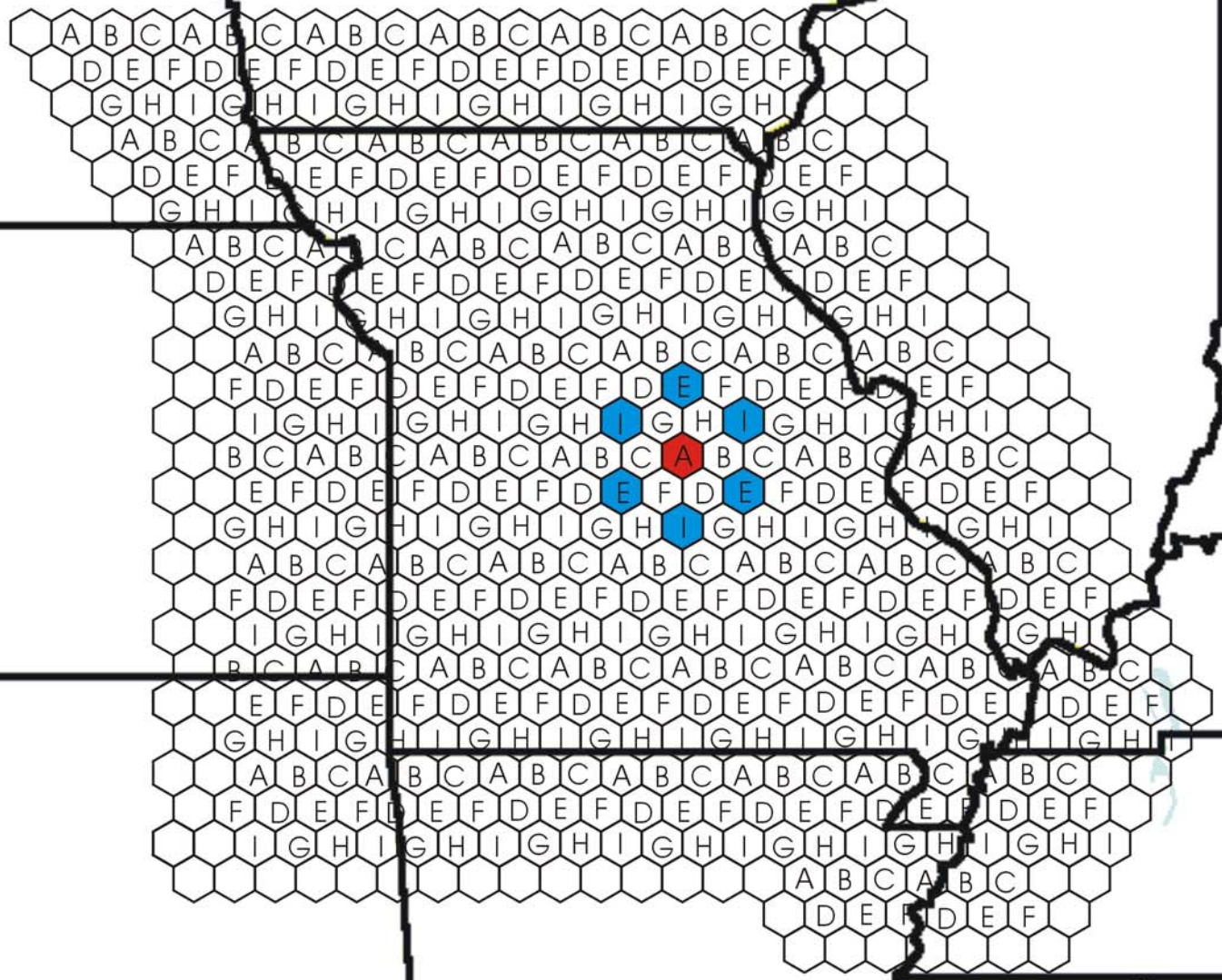



MISSOURI STATE
COMMUNICATIONS
HIGHWAY PATROL

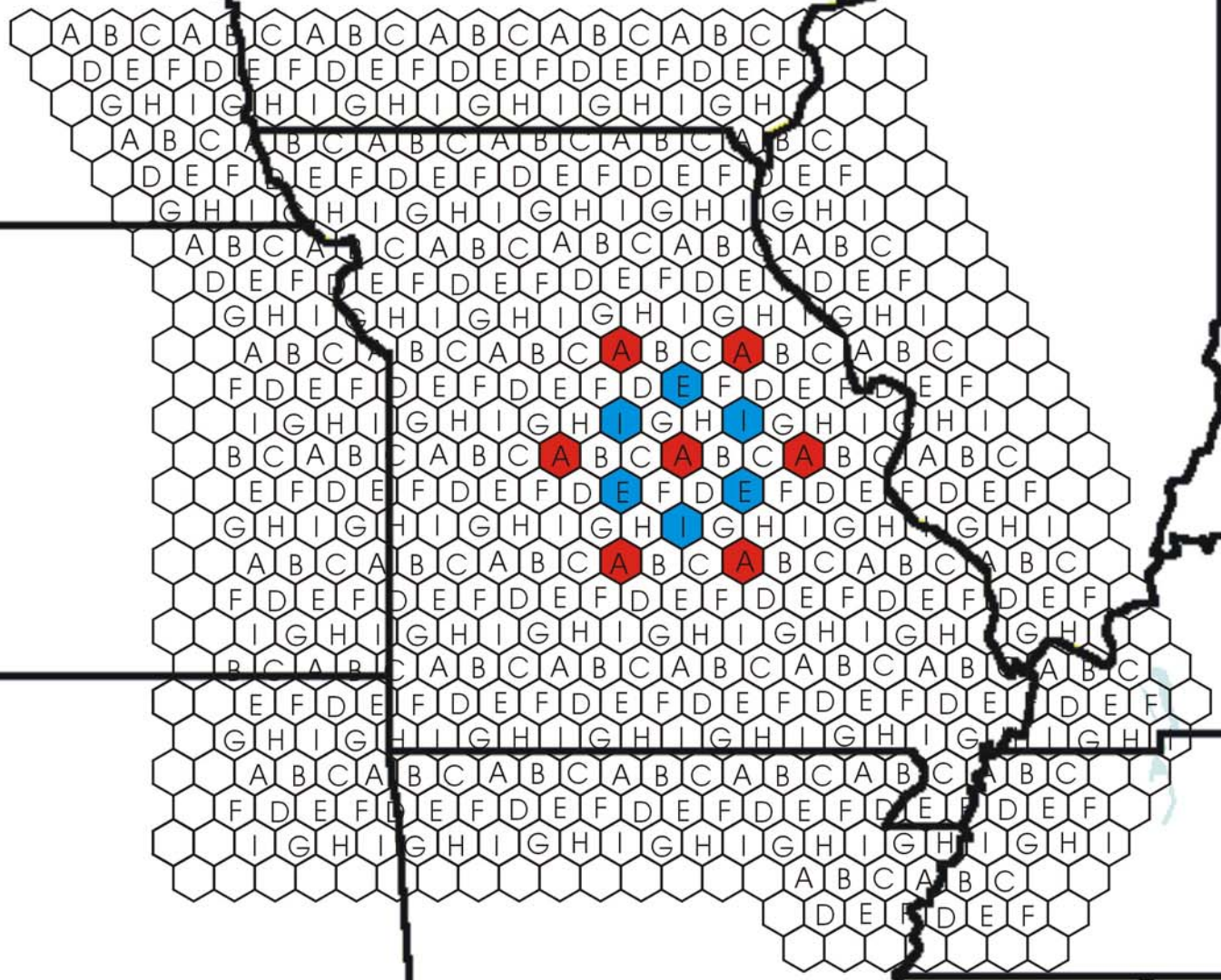
Co-Channel Separation



Adjacent Channel Separation



Adjacent/Co-Channel



Diamond pattern

- The diamond pattern above offers maximum reuse using forty-five (45) of the forty eight (48) 25 KHz State License channels. 9 groups have been established with 5 channels in a group *plus three common channels.*
  - Co channel site separation = 60 miles (Cell center to Cell center)
  - Adjacent channel site separation = 30 miles (Cell center to Cell center)
- 25 KHz channel bandwidths allow for neutral technology systems to be implemented in Missouri's adjacent states.

Implementation methods

- Given the site is in the center of a cell, tower-tower distance (adjacent cell sites) is 30 miles.

By planning channel reuse every 60 miles, the region obtains maximum spectral efficiency.

County allotments can be created from channel groups in each cell.

Implementation methods

- No adjacent cells will contain adjacent channels. The goal is to develop a consistent grid of cells that can be used to effectively protect a states adjacent region borders.
- Even if all channels are not implemented initially, this provides the separation needed for long term spectral efficiency.
- With all of the states allocated the same 2.4 MHz spectrum in the 700 MHz band, this method can “coordinate” adjacent state borders with 25 KHz channels.

State License requirements

- 700 MHz state geographic licensees are responsible to meet certain operation and construction requirements.
  - 5 year construction/operation benchmark starts January 1, 2007
  - State needs to provide *(or be prepared to provide)* substantial service to one third of their population by January 1, 2012 and two thirds by January 1, 2017.

Contact

- Any questions regarding this presentation, contact:
- Stephen Devine, Projects Section
- Missouri State Highway Patrol
  Communications Division
  P O Box 568
  Jefferson City, MO 65102
- 573 526 6105
- sdevine@mail.state.mo.us