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March 22, 2013

Gene Hand, Director
Communications Department
Nebraska Public Service Commission
1200 N Street, Suite 300
Lincoln, NE 68508

Subject: Application No. C-4543/PI-186
Progression Orders No. 1, 2 and 3
FCC WC Docket Nos. 10-90, 05-337, Report and Order (*Report*) DA 12-1777, Order on Reconsideration (*Recon*) DA 13-282, Notice DA 13-456, Study Area Boundaries

Dear Mr. Hand:

In the subject Progression Order Nos. 1, 2 and 3 the Nebraska Public Service Commission (the Commission) seeks comments and statements of concern on several topics.

In response, RVW offers the following comments on certain topics of the Commission's subject progression order from an engineering perspective.

1. **Conversion Option 1.** "In this option, the ILEC requests the Commission submit the electronic boundary map in the Commission's possession to the ILEC for review. The ILEC and Staff then collaborate to compare the map to the paper map maintained by the Commission and any maps maintained by the LEC. Any proposed updates or changes to the map, if necessary, can then be done by the ILEC or in collaboration with the Staff."

   a) Will the Commission provide a softcopy (pdf) of the paper map maintained by the Commission routinely? Upon request?

2. **Policy Concern 1.** "The inclusion in the Report of a requirement that officers of a LEC certify under penalty of perjury the accuracy of the maps submitted to the FCC to the best of his/her knowledge."

   a) Paragraph 15 or the Order on Reconsideration (*Recon)* DA 13-282, Notice DA 13-456 may relieve some concerns regarding the certification but the degree of relief depends on the specific language of the certification as required by the FCC. Any language stating the specific accuracy of the boundaries may be troubling, and specific reference to +/- 40 feet accuracy of would likely be unreasonable for the reasons discussed below.

3. **Policy Concern 4.** "The FCC utilized an accuracy requirement for the electronic boundary maps submitted of within 40 feet. Is within 40 feet a reasonable margin of error? Should there be different standards of accuracy for rural vs. urban areas of the country? How do we define rural and urban for purposes of the boundary maps?"

   a) We will answer the second and third questions first as follows.

      i) In RVW's opinion there is no need for different standards of accuracy for rural vs. urban areas of the country if properly applied.

      ii) In RVW's opinion there is no need to define rural and urban for purposes of creating or maintaining boundary maps.

   b) Now regarding the first question, for several reasons discussed below, +/- 40 feet is not a reasonable margin of error for exchange or Study Area boundary lines as represented by ESRI shapefiles.

      i) USGS Fact Sheet FS-171-99, does state that "…the horizontal accuracy standard requires that the positions of 90 percent of all points tested must be accurate within 1/50th of an inch on the map. At 1:24,000 scale, 1/50th of an inch is 40 feet." However, this must be read in the context of other sections of the same brief, three page Fact Sheet which state that the USGS maintains the accuracy of its maps via a testing program in which "…USGS experts select 20 or more well-defined points… using sophisticated surveying techniques… Field survey methods are the only tests accepted for official accuracy testing…" FS-171-99 also states that "These limits of accuracy shall apply to positions of well-defined points *only*. Well-defined points are those that are *easily visible or recoverable on the ground*, such as the following: monuments or markers, such as bench marks, property boundary monuments; intersections of roads and railroads; corners of large buildings or structures or center points of small buildings… (emphasis added)" Obviously the +/- 40 feet accuracy applies only to certain features on the base maps and cannot be generally applied to study area boundaries superimposed onto the base maps.

      ii) In addition to the fundamental accuracy of the base map discussed above, there are several other factors that limit accuracy in establishing exchange and study area boundary lines including:

         (1) The precision of the conversion operator in drawing, tracing, calculating, or imputing a boundary line on a computer screen

         (2) The interpretation of 1/2, 1/4, 1/8 section and other offsets from section lines on the manually drawn boundary maps of record of various scales.

(3) Many unspecified factors such as shapefiles which may have been initially converted using older geodetic projections such as NAD 27 (North American datum 1927) which must be translated to WGS 84.

A summary of the cumulative effect of these limitations follows in tabular form:

Summary of Study Area Boundary Shapefile Error Estimates

Error Mode	**Low Range**	**High Range**
Accuracy of land base per USGS FS-171-99	± 40 feet	± 40 feet
Conversion technician locating boundary on land base without specific visible reference on the land base and without field verification	± 60 feet Based on 1/30 inch at scale of 1 inch = 2,000 feet which is the scale of standard 1:24,000 USGS 7.5 minute map	± 60 feet Based on 1/30 inch at scale of 1 inch = 2,000 feet which is the scale of standard 1:24,000 USGS 7.5 minute map
Digitizing from manual boundary maps, including typical 1/2 and 1/4 section offsets from PLSS section lines	± 330 feet	± 660 feet
Unspecified errors such as incremental conversions using different geodetic projections, etc.	± 40 feet	± 131 feet (40 meters)
Total Cumulative Error	**± 470 feet**	**± 891 feet**

iii) There has been considerable concern and discussion about the accuracy required in the *Order*. The FCC's Order on Reconsideration (*Recon*) DA 13-282 in paragraph 2 purports to clarify the standards of accuracy laid out in the *Study Area Boundary Order*. However, *Recon* does not provide much clarity except that as stated in paragraph 13, the FCC plans to take a flexible approach in administering accuracy in the initial year.

4. The Commission also encourages comment on any additional concerns raised by the *Report* or discussed in the workshop. In response RVW offers the following:

a) It should be noted that the vast majority of overlaps and voids are <u>not</u> caused by a lack of accuracy of even crude manual mapping systems but by lack of coordination between historical boundary maps, or in some states of metes and bounds descriptions, of the adjoining service providers which have evolved over many decades. Therefore, rather than spending any more time and resources than necessary on accuracy, it would be better to develop a two-step process of first better coordinating the boundary lines at the state level, then snapping together the vertices of adjoining system boundary polygons thus totally eliminating unintended overlaps and voids regardless of the absolute accuracy of the maps as represented by ESRI shapefiles. This solution is not without its own concerns.

i) Who would be responsible for facilitating the required collaboration and who would be responsible for snapping the vertices together, especially in states where the state regulatory agency is not involved or does not have the necessary resources? How much time and how many resources would this effort take? These are important questions that will have to be answered, most likely at the state level, but the required coordination would have to be done anyway.

ii) Due to the extremely aggressive timeframes required by the FCC in the *Public Notice* DA 13-456 dated March 18, 2013, it may not be practical to properly coordinate adjoining system boundaries initially. However, *Recon* already acknowledges that the initial boundary submittals may need future improvement and encourages state commissions and state telecommunications associations to participate in the reconciliation process.

b) Visual presentation of a raw shapefile is simply a polygon, a closed perimeter of lines and vertices. Although the polygon has graphical significance, it needs to be associated with (overlaid on) a base map or land base to make sense visually to a person, so that a person could check the shapefile against a paper boundary map or exchange plant map. The FCC's *Report* and *Recon* focus on USGS 1:24,000 scale maps as the reference for base maps. These maps are a great resource for many applications especially when topographic features and vertical contours are essential. However, in much of the

United States (31 states), the Public Land Survey System (PLSS) is a much more desirable and efficient tool for use in boundary line applications.

i) The PLSS has evolved from the original surveys of public lands that developed our Township, Range and Section system. PLSS Township First Division (first) data set has all the graphical information necessary for boundary applications, is highly accurate, can be directly downloaded for entire states in ESRI shapefile format and as a result is very efficient in terms of file size. This land base can also be overlaid on readily available aerial photography and Google Earth. The First Division land base for the entire state of Nebraska can be downloaded as a free 32 Mbyte zipped file set from the Bureau of Land Management. Using equivalent USGS 1:24,000 base maps would require downloading approximately 1,000 each 13 Mbyte map files or approximately 13 Gbytes of data to download, store and process. The USGS 1:24,000 maps would also require more processing steps once downloaded. The PLSS First Division land base is entirely adequate for creating ESRI shapefiles for exchange and study area boundaries and would facilitate having the shapefiles for all ILEC exchanges and study areas in the state developed using a common base map system. This would in turn facilitate coordination of boundaries among various ILECs.

ii) RVW recommends the use of the PLSS Township First Division land base for efficiently developing and maintaining ESRI compatible shapefiles for exchange and study area boundaries in Nebraska.

Thank you for the opportunity to provide comments on this important subject.

Very truly yours,

RVW, Inc.

Robert J. Tupper, Chief Telecommunications Engineer

cc: M. Massman, A. Noyd