Using Feature-based Topology for Cartographic Vector Symbology

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Abstract

Vector definitions, for representing cartographic quality map symbols, are gaining popularity in digital cartographic products and systems. The vector definitions are replacing previous raster based solutions primarily because they provide the cartographer the ability to review and edit the map feature representation, with confidence that the printed product will convey the exact digital or softcopy representation. A robust vector definition provides a foundation that gives cartographers all the necessary functionality to design and edit high quality cartographic products. Rendering (softcopy display) of the map symbology is probably the most important aspect that the foundation must provide. However, in addition to rendering and cartographic editing, the vector definition also allows for the analysis of spatial relationships between map symbols. The use of geographically referenced, feature-based topology combined with a vector definition for map symbols provides a cartographic environment capable of high quality rendering, fine control of cartographic editing and high levels of automation. In addition, this cartographic environment provides cartographers with the functionality to produce higher quality map products with reduced production times.

This paper will address the use of vector definitions for map symbols within a geographically referenced, feature-based topological environment. A comparison between raster and vector-based cartographic solutions will not be the focus of this paper. Instead the discussion will be in two key areas involving vector definitions for map symbols. 1) The storage of the vector definition and how that definition relates to the digital representation of map features and the topology, which is derived from the map features. Emphasis will be placed on feature definitions that relate point, linear and areal geometries and on topology that is updated real-time and contains constructs for nodes, edges, and faces. 2) The rendering, cartographic editing and analysis capabilities that such an environment can provide and how those capabilities can increase map quality and reduce map production timelines. The capabilities discussed will include, but are not limited to, symbol displacement, linear patterning, individual verses global symbol editing, detection of symbol overprints and alteration of symbols based on spatial relationships.