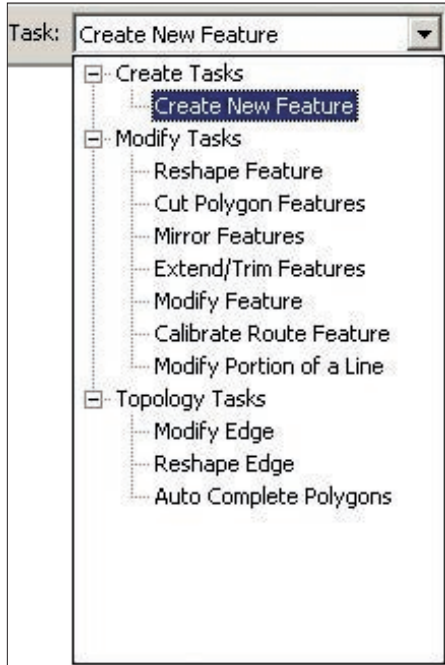
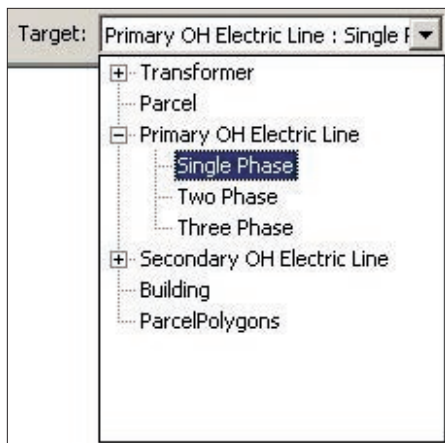


A Whole New World

By Nathan Shephard, Technical Marketing Specialist



The Edit Task is the “What am I doing now?” option.



The Target Layer displays all the currently editable layers in the map document.

ArcGIS has produced not only a huge leap in GIS technology, but has also transformed the GIS interface. Some of the biggest changes have occurred in the editing environment, particularly in the spatial (or geometry) editing tools. This article is targeted to the needs of users with limited experience editing in the ArcGIS environment, whether they are relatively new to GIS or are moving from the ArcEdit environment in Workstation ArcInfo. It introduces some of the key concepts of spatial editing in ArcGIS. For a more complete discussion of editing in ArcGIS, refer to *Editing in ArcMap*, a manual that comes with ArcGIS. For an in-depth look at defining and editing topology in ArcGIS 8.3, see Ty Fitzpatrick’s “Parcel Management Using Topology in ArcGIS 8.3,” in this issue of *ArcUser* magazine.

Old Style— The Command Line Is Your Friend

Editing in the Workstation ArcInfo environment—ArcEdit—is all about knowing command line keywords. Expert editors know scores of shortcuts for setting the display and selection environment, editable layers, and even the type of edits. Letter combinations such as DE and SEL fly from the fingertips of these users with supernatural speed. Mouse interaction can play a vital role for geometry edits and map navigation but typed commands and arguments at the command line distinguish the advanced ArcEdit user. While some additional mouse-oriented functionality can be obtained via add-ins, such as ArcTools, traditionally the mouse has not been the primary tool for editing.

New Style—The Mouse Rocks

In ArcGIS, the mouse is the primary tool in the ArcMap editing environment. Selections, edits, and navigation can all be done without the keyboard. The graphical user interface (GUI) provides navigation tools and links for regular tasks such as setting visible and selectable layers and starting an edit session. This means that editing in ArcMap doesn’t require memorizing a vast array of commands. The keyboard is now used primarily for specific data entry such as a line’s deflection angle.

However, for users who are most comfortable at the keyboard, never fear, there are still numerous shortcut keys and creating custom keyboard shortcuts is easy.

Getting Out of the Blocks

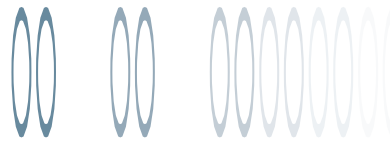
Let’s begin at the beginning—starting an edit session. Instead of specifying the edit coverage and layer at the command line, go to or open the Editor toolbar in the ArcMap interface, click on the Editor menu, and choose Start Editing. With ArcMap, any feature in any feature layer in the workspace—from a geodatabase to a directory full of shapefiles—can be edited. There is no need to change the edit coverage (or edit feature) when moving from modifying a parcel line to updating a gas valve. With ArcMap, a selected set of line, point, polygon, and annotation features can easily be moved simultaneously, regardless of the layer in which each of these types of features resides.

The snap environment is another example of an intuitive GUI replacing several command line entries (e.g., ARCSNAP, NODESNAP). The Snapping Environment dialog box in ArcGIS, accessible during an editing session from the Editor menu, is used for setting which features, and even which parts of features (e.g., vertices, edges, or ends), the editor tools should snap to.

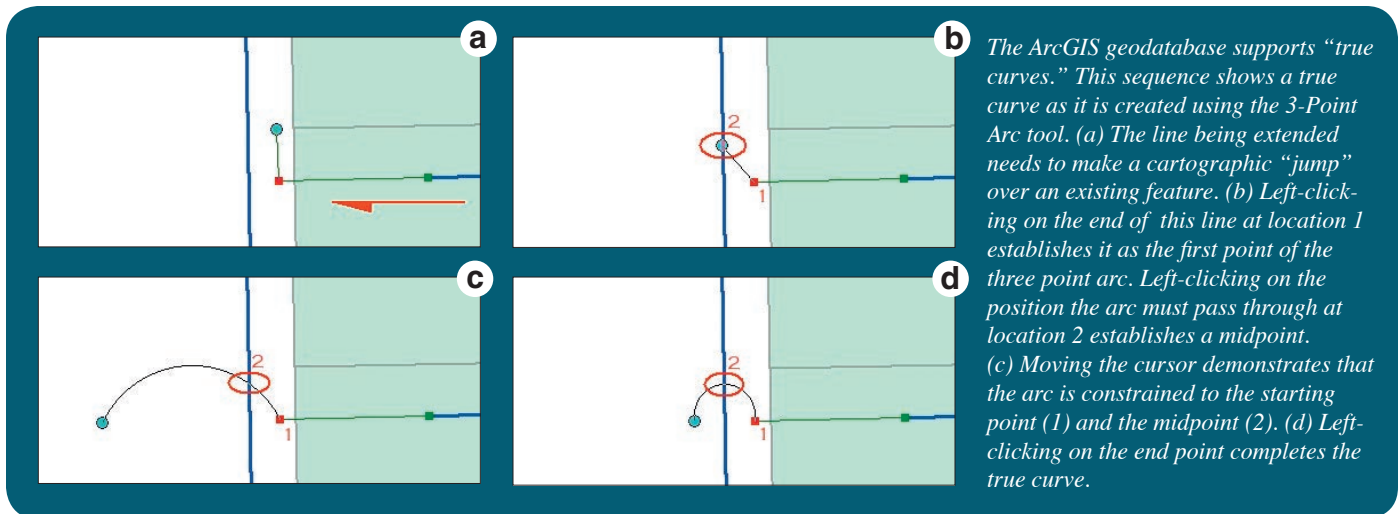
The Task/Target Combo

Once in an edit session, the two main editing settings used are Edit Task and the Target Layer. Both are prominently displayed on the Editor toolbar and feature drop-down boxes. Think of the Edit Task as the “What am I doing now?” option. This could be creating a new feature or modifying an existing one. The Target Layer is the data layer to which data will be added. Together, these two settings define the results of an edit session.

Edit Tasks are organized by type, and some tools require a selection to be enabled. For example, the Modify Feature task requires that a feature be selected before its vertices can be edited. The drop-down box next to the Target Layer lists all currently editable layers in the map document. If the feature layer has defined subtypes, these subtypes will be listed in a tree



HOT TIP: Pan and zoom while using any sketch tool by holding down the Control key and pressing Z to zoom out, X to zoom in, or C to pan.



The ArcGIS geodatabase supports “true curves.” This sequence shows a true curve as it is created using the 3-Point Arc tool. (a) The line being extended needs to make a cartographic “jump” over an existing feature. (b) Left-clicking on the end of this line at location 1 establishes it as the first point of the three point arc. Left-clicking on the position the arc must pass through at location 2 establishes a midpoint. (c) Moving the cursor demonstrates that the arc is constrained to the starting point (1) and the midpoint (2). (d) Left-clicking on the end point completes the true curve.

structure underneath the layer name. If the Edit Task results in the creation of one or more features, these features will be added into the currently selected feature layer and subtype.

Editing Geometry

Sketch tools are the basis for spatial editing in ArcGIS. They interact directly with a feature’s geometry. The geometry currently being manipulated by a Sketch tool is referred to as the “edit sketch.” An edit sketch is used to create a new nonpoint feature in ArcMap. A sketch is composed of vertices (the points at which the sketch changes direction such as corners) and segments (the lines that connect the vertices).

The standard Edit Sketch tool is designed for freehand edits and for edits that interact with geometric context functions such as Parallel, Perpendicular, and Length. After setting the Edit Task and Target Layer, left-click to add vertices to a sketch and right-click to bring up the context menu options available for the current sketch. For example, right-clicking on an existing parcel boundary and setting the sketch to Parallel will constrain the location of the next sketch vertex so that it will be parallel to that boundary.

More complex Sketch tools are available for specific types of geometry edits (e.g., straight lines, curves). Two Sketch tools, the 3-Point Arc Sketch tool and the Trace Sketch tool, are representative of the more advanced functionality available. See the ArcGIS online help for descriptions of all Sketch tools and their usage.

In a coverage, curves are stored as many connected straight line segments. The cartographic smoothness of the curve is dependent on the number of vertices used to create the curve. A curve made up of 100 points will appear smoother than one constructed with 10 points. ArcGIS supports “true curves”—curves that are created and plotted as a continuous curve, rather than just a series of linked vertices. The 3-Point Arc Sketch tool is one of the Sketch tools that allows creation of true curves. Simply left-click once to create a start point, click a second time to specify a position that the arc must pass through, and click a third time to set the end position. Other Sketch tools are available for precision true curve creation.

The Trace Sketch tool creates segments that follow along existing segments. This tool could be used for an editing operation that adds a new pipe feature offset from the front of parcel boundaries. The Trace Sketch tool can follow the current geometry exactly or at a specified offset distance.

The Joys of Rubber Banding

The geodatabase provides access to a new feature class type—the geometric network. A geometric network is a one-dimensional non-planar graph, or network, that is composed of features. These features exist in their own feature class (e.g., GasMains, Valves) but the connectivity between feature classes is maintained by the geometric network. This

means that features that participate in the geometric network know what features they are connected to. This causes a “rubber band” effect when spatially editing network features. Moving one feature interactively edits all connected features. Of course, to edit only a single feature, the Disconnect button can be used to isolate the feature while it is updated, and then the edited feature can be reconnected at its new position.

Keeping Planar

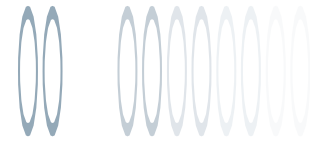
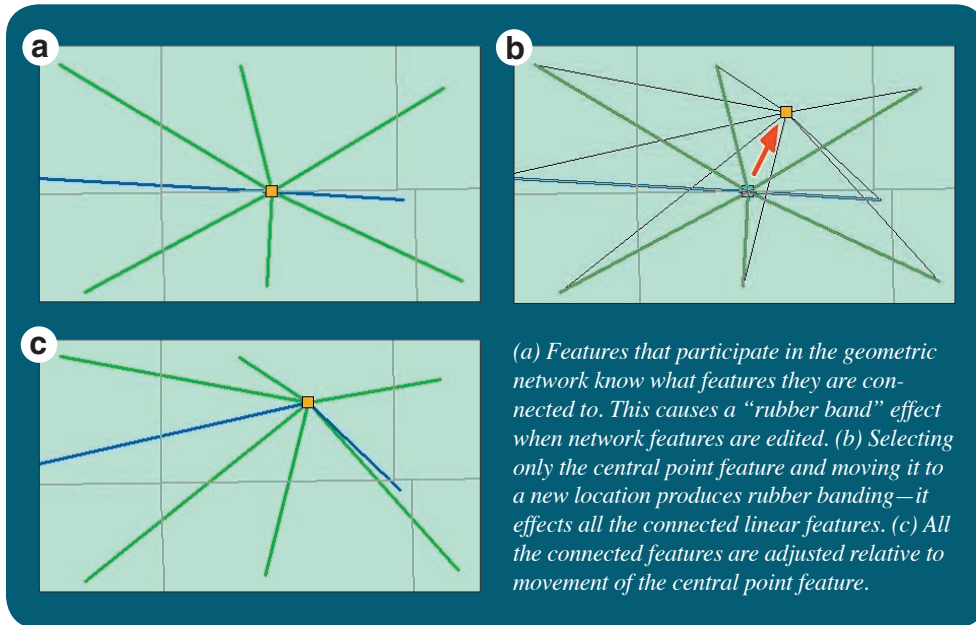
The term topology is used to describe the spatial relationships between geographic features. Each feature knows how its geometry and position relate to other nearby features. A simple example of topology is the polygon feature with a shared edge—it has a topological relationship with the polygon it borders.

In the coverage data model, topology is generated when line features are built into polygon features using the CLEAN and BUILD commands. In ArcGIS, the term topology refers to exactly the same concept, but the implementation is different. Foundation line features no longer need to be edited before creating polygons from them. Each feature exists in its own right. Interaction between feature classes (e.g., parcel boundary line features and parcel polygon features) is handled via topology rules. These rules can be enforced during an edit session to ensure that data remains topologically correct. An

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HOT TIP: You can change between the Sketch tools at any time, so different sections of the geometry can be built using different tools.

example of a topology rule could be that parcel boundary line features must be coincident with the outline of parcel polygons. Topology rules can be defined within a feature class (e.g., parcel polygons cannot contain gap or sliver polygons or tessellate).

Note: The ArcMap button *Construct Features* replicates the essence of the *CLEAN* and *BUILD* methodology of Workstation ArcInfo. This means you can still generate polygons based on line features if required.

ArcMap contains several topology-editing tools that provide functionality for maintaining topological features. Using the parcel lines and parcel polygons example, the boundary between two parcels will probably be updated at some point. In Workstation ArcInfo, this would mean editing the construction line, then rebuilding the topology to regenerate the polygons using *CLEAN* and *BUILD*. In ArcGIS, the two polygons and one line feature are simply edited simultaneously using the Topology Editing tool and the Reshape Edge Edit task. Verifying that the edits have not broken any topology rules is as simple as a single click of the Verify Topology button.

Conclusion

While the editing environment, terminology, and work flow have changed with the release of ArcGIS, the types of edits have not. The ArcGIS editing environment provides all the tools needed to maintain clean and precise data, and it does so in an intuitive way. Context menus, task grouping, and job-specific toolbars combine to supply the user with a huge array of tools that are just a click away.

About the Author

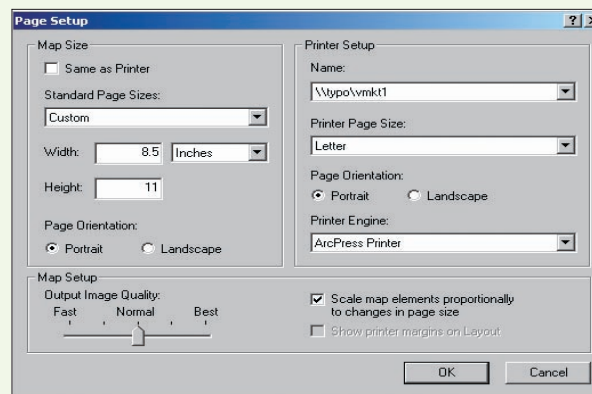
Nathan Shephard has a bachelor of computer science (GIS) from Curtin University in Western Australia. He worked for three years with ESRI Australia and has been in technical marketing with ESRI Redlands since 1999.

Moving to ArcGIS

Copying a Map Document to CD-ROM

When copying an ArcMap document to CD-ROM or other media for use on another computer, you can maintain the desired paper size and avoid an error message, such as “The HP LaserJet 5Si printer is not found, using default....,” caused when ArcMap looks for, and cannot locate, the printer specified by ArcMap when the document was created.

1. Before copying the map document to CD-ROM or other media, choose File > Page Setup.
2. In the Page Setup dialog box, in the Map Size section, uncheck “Same as printer.” Save the map document before copying it to CD-ROM.



Use the Page Setup dialog box to adjust parameters before copying map documents to CD-ROM.