

Using Map Topology Editing Tools *in ArcView*

This tutorial, written by Colin Childs, is a companion to the article “ArcGIS Topology for ArcView Users,” also by Colin Childs, that appeared in the July–September 2003 issue of *ArcUser* magazine.

Map topology helps to preserve coincident geometry between features. In this tutorial you will learn how to modify common boundaries between parcels employing the map topology tools available on the Topology toolbar in ArcMap using an ArcView license.

When you create a map topology, traditional line, point, and polygon features take on different roles for the duration of a topology editing session. Line features and polygon boundaries become topological edges. Point features, whether the end-points of lines or the places where edges intersect, become nodes.

Tutorial Overview

Although additional topology tools are available with ArcEditor or ArcInfo licenses, this tutorial was written for ArcGIS users with an ArcView license. Please ensure that you are using an ArcView license while completing this tutorial.

In this tutorial you will

- Create a map topology
- Modify, reshape, and move an edge
- Use the Auto Complete tool
- Move a parcel boundary using Split/Move Node

Data for This Tutorial

Before exploring the map topology tools and methods available in ArcView, go to the *ArcUser Online* Web site (www.esri.com/arcuser) and download the sample data set, *Maptopology.zip*.

Step 1: Start and Load Data

1. Unzip *Maptopology.zip* using a utility such as WinZip. This will install the tutorial data in `<your drive>:\MapTopologyTutorialData`.
2. Start ArcMap and open *Tutorial.mxd*, located in *MapTopologyTutorialData* folder. Investigate the data layers data in the Table of Contents. Notice that the points and lines are coincident with parcel boundaries. The *Parcels* layer contains a township subdivision. You will edit some of the parcel polygons in this layer along with the

What You Will Need

- ArcGIS 8.3, ArcView license
- Sample data from *ArcUser Online*
- An unzipping utility such as WinZip

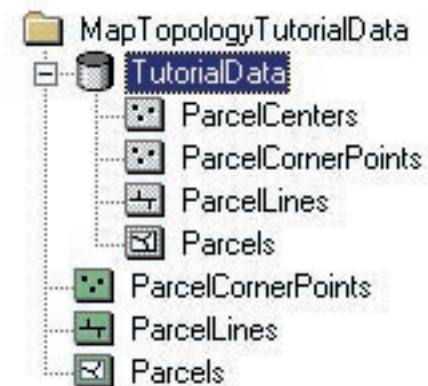


Figure 1: Unzipping the sample data archive *Maptopology.zip* will install tutorial data `<your drive>:\MapTopologyTutorialData`.

parcel boundary lines and endpoints that were used to construct the parcels.

3. Tutorial.mxd contains bookmarks that will help you locate the features you will be editing. Investigate the bookmarks by choosing View > Bookmarks. Choose the Cul-DeSac bookmark to zoom to the upper right portion of the township parcels.

Note: The same data for this tutorial is available in shapefile format in the Tutorial folder and can be used instead of the personal geodatabase feature classes, if desired.

Step 2: Adding the Topology Toolbar

In the Editor toolbar, click the Editor menu and choose Start Editing. In the Editor menu, choose More Editing Tools > Topology. The Topology toolbar appears. Dock the Topology toolbar under the Editor Toolbar. Only the Map Topology tool is active.


Step 3: Creating a Map Topology



Only the Map Topology tool will be active in the Topology toolbar.

1. In the Topology toolbar, click the Map Topology button. This will open Map Topology dialog box.
2. In the Map Topology dialog box, click Select All to ensure that all three feature classes will participate in the map topology. Click OK. This exercise uses the default cluster tolerance. However, you can set the cluster tolerance for map topology. See page 6 of this tutorial for more information on cluster tolerance.

Note: Layers, representing annotation feature classes, dimension feature classes, and feature classes that participate in geometric networks, cannot be included in a map topology.

3. Click on the Topology Edit Tool.  Click a shared boundary (edge) between two parcels in the northeast of the cul de sac to select as shown in Figure 3. Map topology is now created for the features that are visible in the current display extent. The topology edge will be displayed in magenta. You have just selected both a parcels polygon edge (shared by two polygons) and a parcel line. Now any edit you make will be reflected in both feature classes.

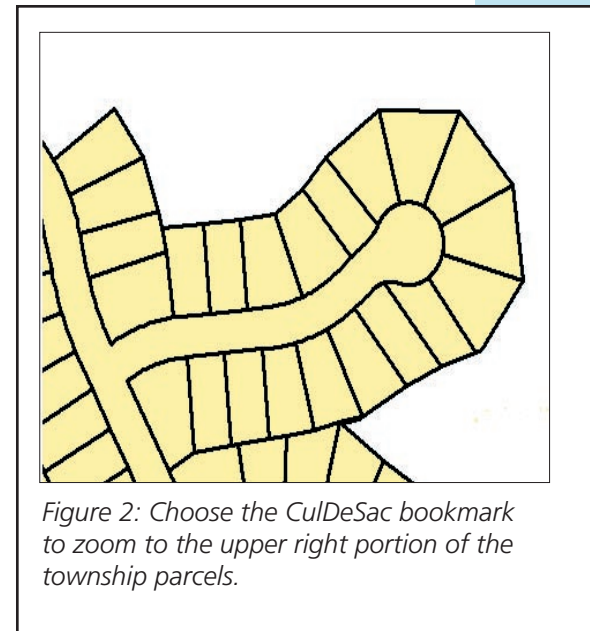


Figure 2: Choose the CulDeSac bookmark to zoom to the upper right portion of the township parcels.

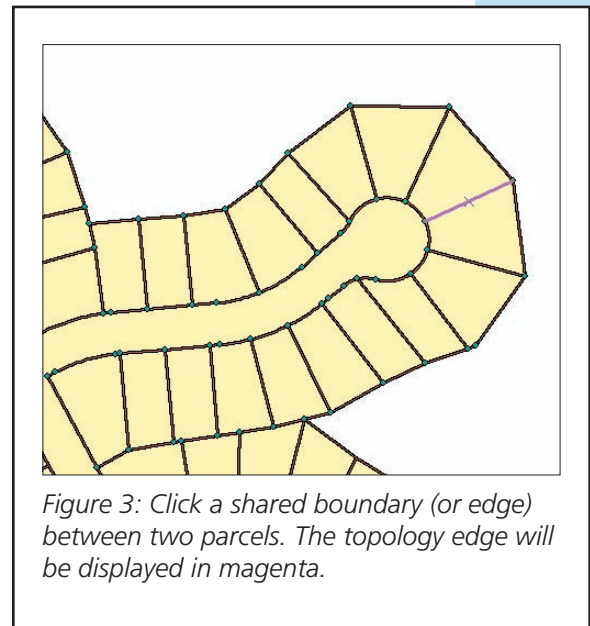


Figure 3: Click a shared boundary (or edge) between two parcels. The topology edge will be displayed in magenta.

Step 4: Modifying An Edge

Now let's modify the selected edge by inserting and moving a new vertex.

1. In the Editor toolbar, click on the dropdown box for Task and choose Modify Edge as shown in Figure 4. Right-click anywhere on the selected edge and choose Insert Vertex from the context menu. A new vertex is inserted in the selected edge.
2. Click on the newly added vertex and drag it to a new location as shown in Figure 5. Right-click on the vertex and choose Finish Sketch from the context menu. This change was applied to the parcels that shared that edge as well as the parcel lines.

Step 5: Reshaping An Edge

The next step will be to reshape a shared edge. When a feature is selected, a topology cache is built for the features in the current extent so that the shared geometry between different feature classes can be edited.

1. Select an edge between two parcels next to the one previously modified. Click the Task dropdown box on the Editor toolbar and select Reshape Edge.
2. Click on the Sketch tool on the Editor toolbar. This tool will be used to create a new shape for the selected edge.
3. Use the Sketch tool to add the jog in the parcel line as shown in Figure 6. Double-click on the last sketched vertex (i.e., the fourth vertex added). Either snap or cross the sketching line to indicate the end of the reshaped edge. The edge is reshaped and the new shape is applied to the boundaries for both the Parcels and ParcelLines layers.

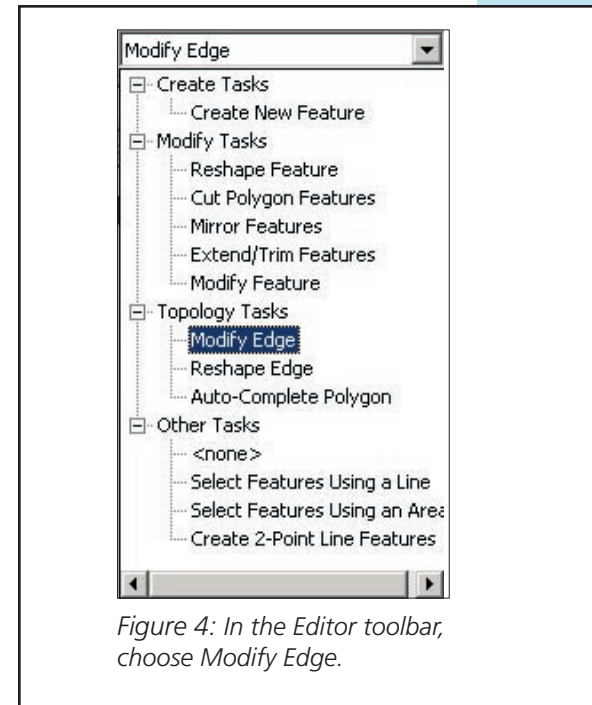


Figure 4: In the Editor toolbar, choose Modify Edge.

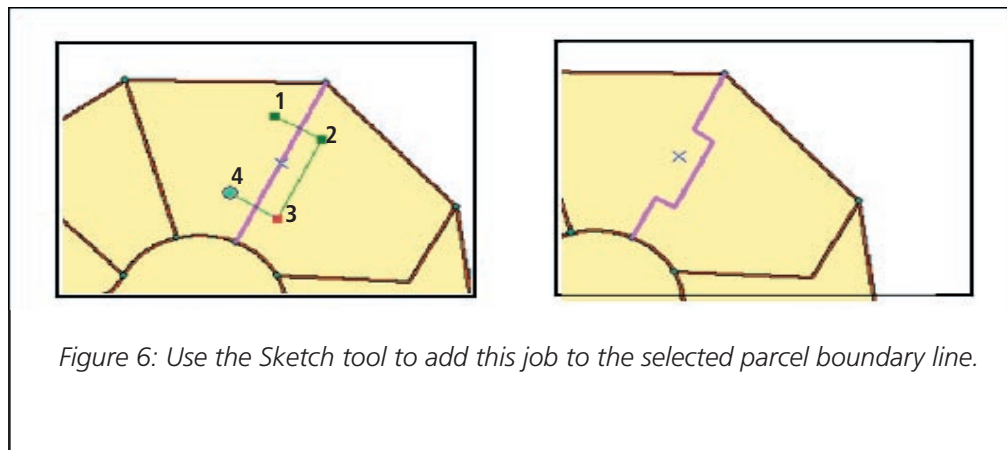


Figure 6: Use the Sketch tool to add this jog to the selected parcel boundary line.

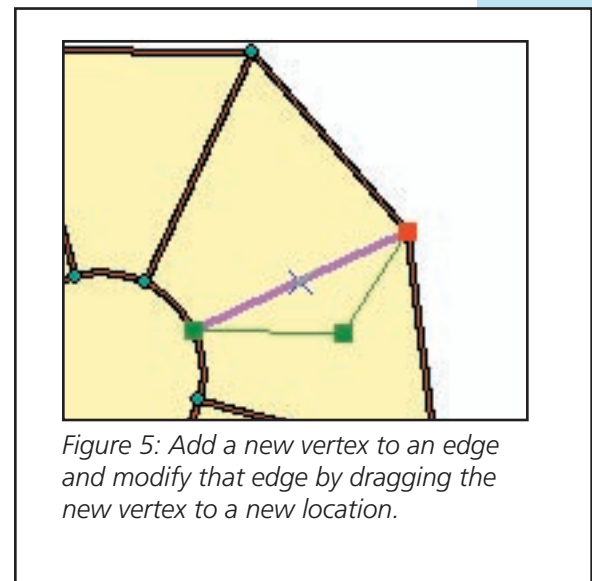
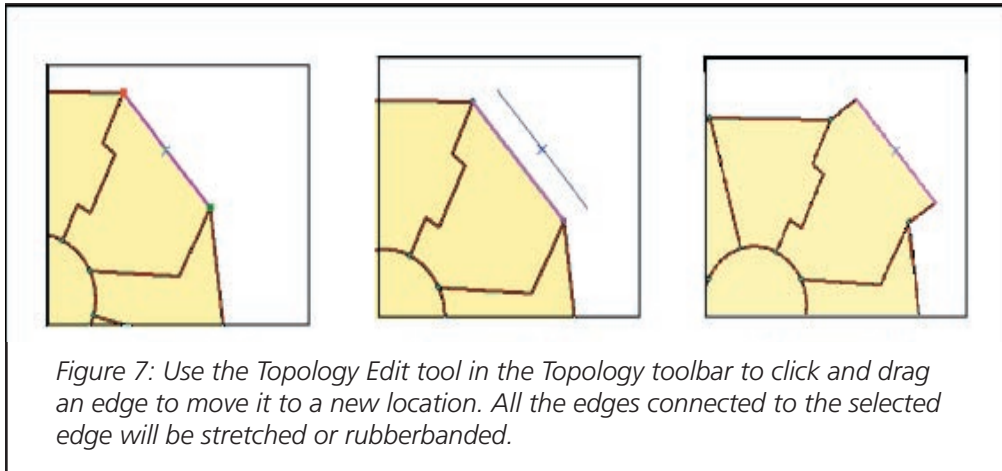


Figure 5: Add a new vertex to an edge and modify that edge by dragging the new vertex to a new location.

Step 6: Moving a Shared Edge

When using the Topology Edit tool, moving an edge will cause all the connected features to rubberband.

1. Verify that Modify Edge is the selected task in the Editor toolbar. Click the Topology Edit tool in the Topology toolbar.
2. Click on an edge to select it and drag the edge to move it to a new location. All edges connected to the selected edge you moved will be stretched to the new location. This stretching (i.e., rubberbanding) affects the parcel polygons as well as the parcel lines.



Step 7: Auto Completing Polygons Using Existing Polygon Geometry

The Auto Complete tool lets you create a new polygon that shares a boundary with another polygon without recreating the common boundary. Technically, this is not a map topology feature, but it is useful in ensuring data integrity.

1. Choose View > Bookmarks > New Parcels to zoom in on an area in which new parcels have been added.
2. In the Editor toolbar, choose Auto-Complete Polygon from the Task dropdown list. Click the Sketch tool in the Editor toolbar.
3. Start sketching at the point shown as 1 in Figure 8 and digitize a new polygon that will share a boundary with an existing polygon. Either snap or cross the digitizing line to the existing edge to indicate where to stop digitizing the boundary of the new polygon. Double-click on the last digitized vertex to finish creating the new polygon.

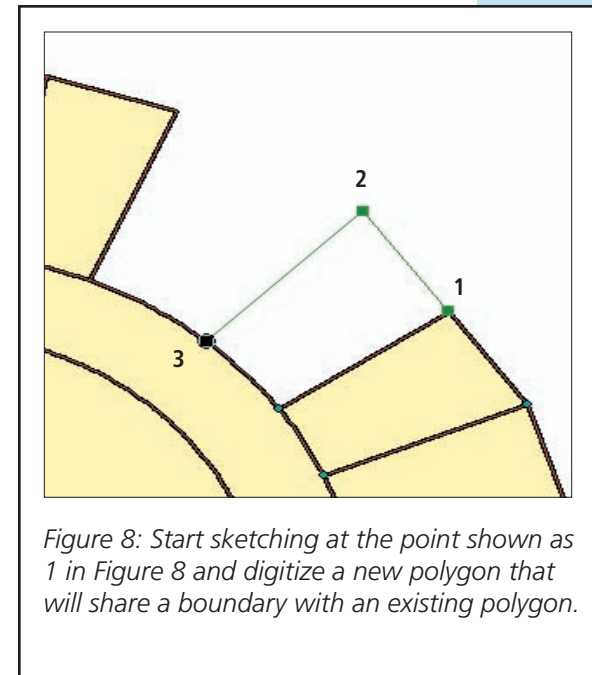




Figure 10: The Topology Edit tool allows you to move the shared boundary between two parcels without rubberbanding the connected edges.

Step 8: Moving a Parcel Boundary Using Split/Move Node

In this step, you will use the Topology Edit tool to move the shared boundary between two parcels without rubberbanding the connected edges. The snapping properties should be set first.

1. In the Editor toolbar, set Task to Modify Edge and choose Editor > Snapping. In the Snapping Environment dialog box, check the boxes under Edges for the ParcelLines and Parcels layers.
2. In the lower portion of the Snapping Environment dialog box, check the box next to Topology nodes, listed under Topology Elements as shown in Figure 9.
3. Choose View > Bookmarks > SplitMove to zoom to the target parcel for this editing operation.
4. Click the Topology Edit tool from the the Topology toolbar. Hold down the N key, select one end node of the parcel boundary, and hold the Shift key and select the related edge.
5. Press and hold the S key while moving the selected node. Snap the node to another part of the north border of the parcel. The node and edge will move to the new location without rubberbanding the edge.
6. Perform the same operation for the node at the south end of the same selected edge. The parcel boundary, parcel lines, and parcel points will be moved without rubberbanding connected edges as shown in Figure 10.
7. From the Editor menu in the Editor toolbar, choose Stop Editing. Click No so that edits will not be saved and choose File > Exit and do not save the map document.

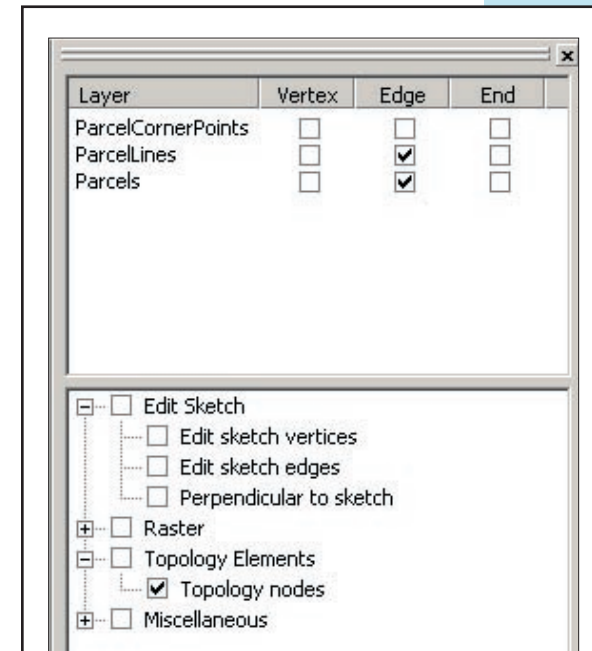


Figure 9: In the main menu, choose Editor > Snapping. In the Snapping Environment dialog box, check the boxes under Edges for the ParcelLines and Parcels layers.

Summary

In this tutorial you learned how to use various map topology editing tools available in ArcGIS with the ArcView license to modify the coincident geometry. You can incorporate these tools into your data maintenance procedures to ensure data quality and integrity.

Cluster Tolerance

The cluster tolerance is the distance in which coordinate locations are considered identical, rather than the maximum distance a vertex can move. Increasing the cluster tolerance may cause additional features to be considered coincident and snapped together. An inappropriate cluster tolerance may reduce the spatial accuracy of data. As a rule of thumb, the cluster tolerance is set to one tenth of the coordinate accuracy.

