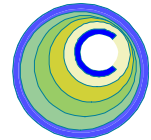


The CEDRA Corporation's COMMAND OF THE MONTH

A monthly information bulletin

July 2005


FEATURED COMMAND
Polygon Editing -
Shared Sides



Application Description

In the March issue of Command of the Month we discussed the problem of having to reshape, or modify a side of a polygon. In the application of maintaining a topological polygon database, where overlaps and gaps are not desired, it is important to have the ability to:

- Identify parcel polygons that overlap each other,
- Identify parcels that form gaps between them, and
- Modify a side of a polygon making certain that adjacent polygons have the same common geometry.

One of the tools discussed in the March issue was the Perform a Topological Operation tool, , (right-most tool in Figure 1). Since the release of the March issue two new options have been added to the Perform a Topological Operation tool to facilitate the editing of polygon sides. These new options are designed to ensure that adjacent polygons share the same side, thereby eliminating any overlaps or gaps.

Additionally, a new command called Overlapping Polygons was developed to identify those polygons which overlap other polygons.

The CEDRA Solution

To *reshape polygon features*, so that adjacent polygons share the same side, ArcGIS® users should employ the CEDRA-Polygon-Tools-2 toolbar, while



Figure 1
CEDRA-Polygon-Tools-2 Toolbar

ArcView® GIS users should activate the CEDRA-ChangeFeatures extension.

Shown in Figure 1 is the CEDRA-Polygon-Tools-2 toolbar. For ArcView® GIS users, the first three tools, starting from the left, as well as the last tool in the toolbar, are located in the CEDRA-ChangeFeatures extension.

Command Of The Month bulletin

This month's issue addresses how to force adjacent polygons to share the same side, thereby eliminating overlaps and gaps.


The Perform a Topological Operation tool, , is the last tool in the toolbar shown in Figure 1. It is this tool that can be used to force adjacent polygons to share the same side. Regardless of the platform, ArcGIS® or ArcView® GIS, this tool functions the same.



Figure 2 ArcGIS®
CEDRA-Polygon-Tools Combo-Box

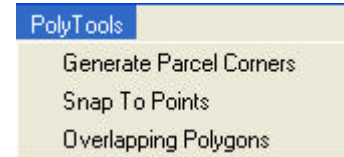


Figure 3 ArcView® GIS
CEDRA-PolyTools Menu Item


To *identify overlapping polygons*, ArcGIS® users should employ the CEDRA-Polygon-Tools toolbar, while ArcView® GIS users can activate the CEDRA-PolyTools extension. Shown in Figure 2 is the combo-box provided by the CEDRA-Polygon-Tools toolbar, while Figure 3 illustrates the menu item ArcView GIS users will find in the CEDRA-PolyTools extension.

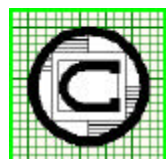
The Overlapping Polygons command can be used to identify those polygons which overlap each other.

Topological Operations Tool

The two new options which have been added to the Perform a Topological Operation tool are called: SHARED EDGE and SHARED EDGE WITH BASE FEATURE. The SHARED EDGE option will modify the first polygon that is selected with this tool, while the SHARED EDGE WITH BASE FEATURE option will modify the polygon(s) that are selected second.

To change the side of a polygon or a group of polygons, the user should:

1. Select the  Perform a Topological Operation tool at which point the user is prompted to select the



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Figure 4
Element Confirmation Query

polygon that is to act as the base feature.

2. Select said base polygon, and confirm the selection. A query similar to the one shown in Figure 4 will be posed, at which point, the user can select the button:
 - *Yes*, to confirm the selection.
 - *No*, to ignore the feature that was found, and search for another feature within the proximity of the click that was made.
 - *Cancel*, to abort the command.
3. Once the polygon has been selected and confirmed, the user is asked to select one or more polygons which are to be used in the topological operation.

These features can be selected by either making a single “click”, or by clicking and dragging to make a rectangle which touches the desired features. Once the “click”, or “rectangle” has been made, a query message box similar to the one shown in Figure 4 will be displayed asking for confirmation.

Note that this command will process both single and multipart polygon features. Furthermore, if the polygon that was selected in Step 2 is included in this selection, this polygon will be ignored. That is to say, if the user wishes to define a “rectangle” in order to select the polygons, including the base feature polygon will not cause a problem.

Once the second group of features has been confirmed, the choice list message box of Figure 5 will be displayed asking the user to specify the type of topological operation to be performed.

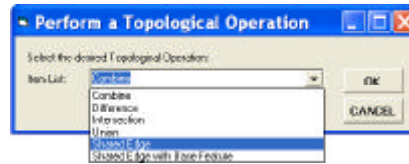


Figure 5
Topological Operation Choice List

4. Select the desired operation, and click at the:
 - *OK* to continue.
 - *Cancel* button to abort the command without any modification to the polygon initially selected.

Selection of the *Shared Edge* or *Shared Edge with Base Feature* option displays the dialog box of Figure 6 prompting the user for a vertex proximity tolerance value (see the discussion below regarding proximity tolerance).

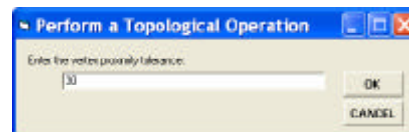


Figure 6
Vertex Proximity Tolerance Query

5. Enter the proximity tolerance value in world units, and click at the:
 - *OK* to perform the specified topological operation.

- *Cancel* button to abort the command without any modification to the polygon initially selected.

Match Points And Proximity Tolerance

In determining a shared edge between adjacent polygons, these options search for two vertices on the second selected polygon that are within a user-defined proximity tolerance to two vertices on the first selected polygon. These vertices are referred to as match points.

Shown in Figure 7 are two adjacent polygons. The polygon in black represents the first selected polygon, while the polygon in green denotes the second selected polygon. Points A and B represent the match points. The blue circles indicate the proximity tolerance for vertex matching. If a vertex on the green polygon falls within the blue circle, a match is made. Certain rules are then applied to determine the limits or end points of the common side.

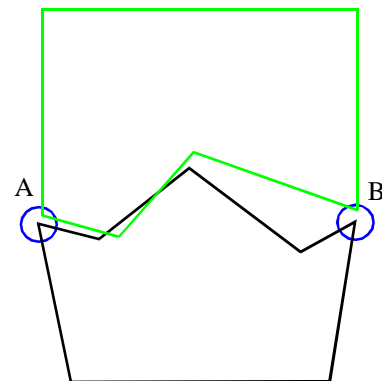


Figure 7
Adjacent Polygons Common Side

Note that in determining a common side or edge, the polygons do not need to have the same number of vertices on the common side, they only need to have two vertices, at a minimum, within the proximity tolerance.

Under the *Shared Edge* option, all vertices on the second selected polygon between the match points, inclusive, form the common side or edge. The first

feature selected is then modified by incorporating the common side or edge between vertices A and B.

Under the *Shared Edge with Base Feature* option, the above process is reversed. That is, all vertices on the first selected polygon between the match points, inclusive, form the common side or edge. The second selected polygon is then modified by incorporating the common side or edge between vertices A and B.

Shared Edge option

Under this option, the command, after determining the common side, displays in the color red the modified shape of

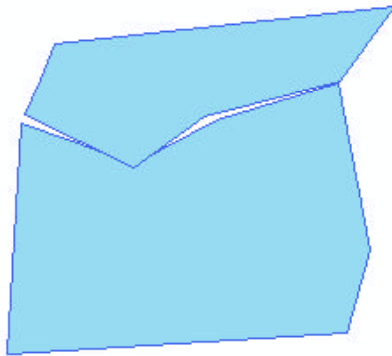


Figure 8
Adjacent Polygons

the first selected polygon. Shown in Figure 8 is an example of two adjacent polygons which are to be processed.

Using this command with this option, the south-most polygon is selected first. The north-most polygon is then se-

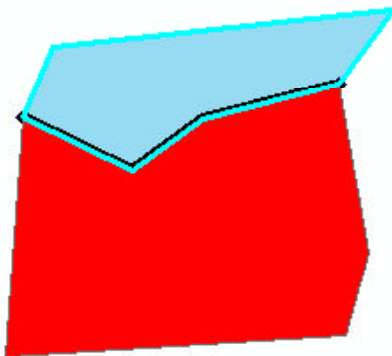


Figure 9
Modified Polygon with Common Side

lected second. Shown in Figure 9 is the modified south-most polygon, in red, with the common side displayed in a thick black line.

Note that if a thick black line is not displayed, it denotes that no common side could be found. Once the command is terminated, this thick black line disappears.

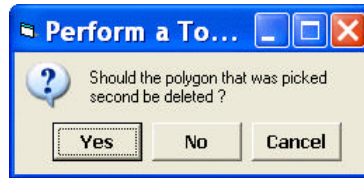


Figure 10
Delete Second Set of Polygons Query

The command will now query the user, see Figure 10, as to whether the polygons that were selected second, the features used in the topological operation, are to be deleted, or not.

Click at the:

- *Yes* button to delete the features that were selected second.
- *No* button to not delete the features that were selected second.

Once the appropriate response is given, the command terminates, but it remains active, so that the user is able to select another first polygon for processing. That is, the command is ready to start from its very beginning.

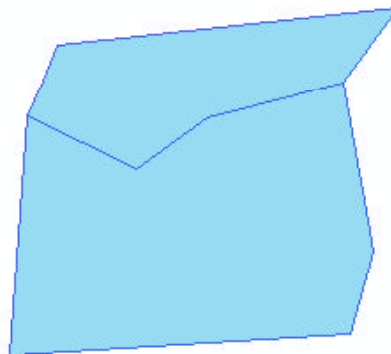


Figure 11
Final Result of Shared Edge Option

Figure 11 shows the result of this command with the second polygon that was selected not deleted. Note that since the south-most polygon was picked first, it was modified to match the common side with the north-most polygon.

Shared Edge with Base Feature option

Under this option, the command, after determining the common side, displays in the color red the modified shapes of

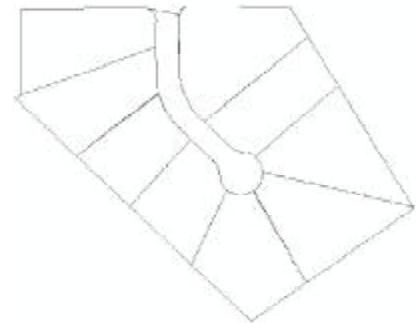


Figure 12
Original Set of Adjacent Polygons

the second set of polygons that were selected. Shown in Figure 12 is an example of adjacent polygons which are to be processed.

Using this command with this option, the street R.O.W. polygon is selected first. The polygons which represent the parcels are then selected second. Under this option, the polygons which are picked second will be modified to match their common side with the street R.O.W. polygon.

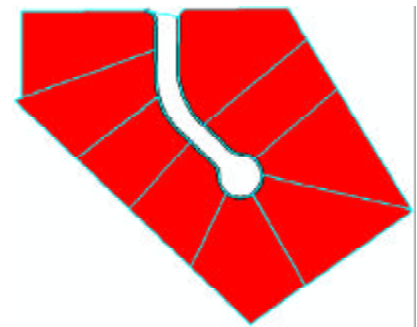


Figure 13
Second Set of Polygons Modified

Shown in Figure 13 are the modified parcels, in red, with the common side displayed in a thick black line.

Note that if a thick black line is not displayed, it denotes that no common side could be found. Once the command is terminated, this thick black line disappears.

The command will now inform the user as to how many polygons, of those that were selected second, had a common side with the first selected polygon. Shown in Figure 14 is the information message box that is displayed when all of the secondly selected polygons have a common side with the first selected polygon.



Figure 14
Information Message Box

In the case where no common side can be found, the polygon which is to be modified is left unaltered. This condition occurs when there are no two vertices (match points) on the polygons within the specified proximity tolerance.

An example of this would be the polygons of Figure 15 where the specified proximity tolerance is so small that two match points can not be found.

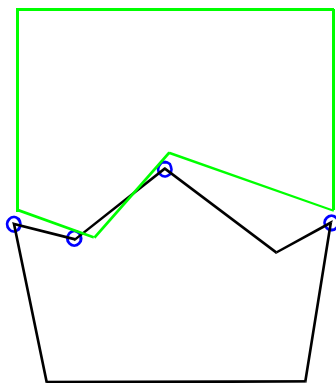


Figure 15
Adjacent Polygons Common Side

Another condition in which a common side will not be found is shown in Figure 16. In this condition, one parcel (the black one) extends partly along one of the sides of another parcel (the green one), with no corresponding vertex on the latter parcel.

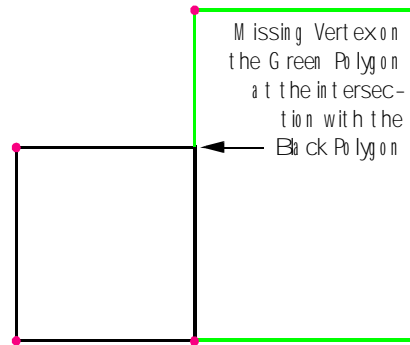


Figure 16
No Common Side will be Found

In this case, the Relocation 1 tool can be used to insert a vertex on the green polygon as shown in Figure 17.

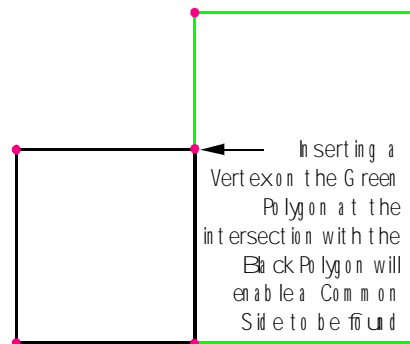


Figure 17
Common Side will be Found

Overlapping Polygons Command

The Overlapping Polygons command can be used to identify the polygons which overlap other polygons. This command requires the selection of parcels belonging to one specific polygon theme which has been activated in the table of contents.

This command processes only the selected polygons in the active theme. Only one theme can be active at the time

this command is selected. An appropriate error message is displayed if:

- There is no active polygon theme in the table of contents.
- There are more than one active polygon theme in the table of contents.
- There are no selected polygons in the active theme.

To check for overlapping polygons, the user should:

1. Activate in the Table of Contents the theme or layer that contains the parcels to be processed.
2. Select the polygons which are to be processed.
3. Select the Overlapping Polygons command.

Upon activation, the Overlapping Polygons command begins to check for a single active theme with selected polygons. If none can be found an appropriate message is displayed. If there are selected polygons, the command will begin checking for overlapping polygons.

If there are no overlapping polygons, the information message box of Figure 18 will be displayed.



Figure 18
Information Message Box

Example - Overlapping Polygons

Shown in Figure 19 is a set of selected polygons which are to be checked for overlaps. After selecting the polygons, the Overlapping Polygons command is

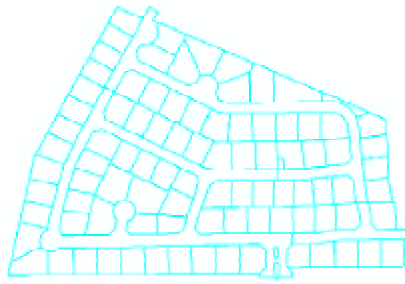


Figure 19
Information Message Box

activated, at which point, the processing begins.

Once the processing is complete, the command displays in the selected feature color those polygons that overlap each other, and displays a list message box containing the OIDs of the overlapping polygons.

In this example, there happens to be five overlapping polygons. Specifically, the street right-of-way (R.O.W.) polygon overlaps three parcel polygons and the north-most traffic island polygon located at the bottom of the figure. Note that there is no overlap with the south-most traffic island, because its polygon is not highlighted completely.

Shown in Figure 20 are the polygons which overlap each other drawn in the selected feature color.

Figure 21 shows the corresponding list message box, which contains the OIDs of the overlapping polygons.

Given this information, the Perform a Topological Operation tool can be used to force the common side between these

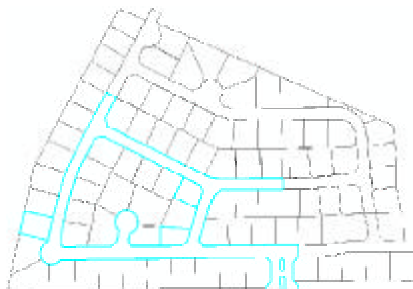


Figure 20
Information Message Box

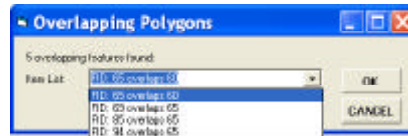



Figure 21
Information Message Box

polygons and the street R.O.W. to be the same, thereby eliminating the overlap. The process for performing this modification would be:

1. Select the  Perform a Topological Operation tool.
2. Select the street R.O.W. polygon and confirm the selection.
3. Drag a rectangle that touches the polygons to be modified and confirm the selection. If more polygons are selected than desired, this will not cause a problem.
4. Select the Shared Edge with Base Feature option and click the OK button.

If a polygon is selected that does not have a common side with the base feature (street R.O.W. polygon in this example), the polygon will be left in tact (unaltered). If a polygon is selected that already shares a common side with the base feature, it too will be left in tact since the same common side will be found.

5. Enter the proximity tolerance value in world units, and click the OK button. In this example, we would use a value of 0.25'.

The topological operation will now be performed and a progress bar illustrating the status of the operation will be displayed in the status bar area.

6. Review the information describing the number of features which were found with a common side and click the OK button.

Summary

For those users who are involved in maintaining topological databases, the Overlapping Polygons command and the Perform a Topological Operation tool provide excellent tools to identify and correct overlapping polygons, and polygons with gaps.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.