GISNet (version 4.0.9)

Revision History
26 May 2011 Created by Volpe Center

The GISNet program:
1. Converts an ArcView shapefile of links to TRANSIMS node, link, and shape files.
2. Converts an ArcView shapefile of nodes to a TRANSIMS node file.
3. Provides the option to manipulate or map the data fields in the GIS link file to create or synthesize data fields in the TRANSIMS link file.
4. Provides the option to smooth the shape points on the link to avoid sharp angles and short distances that often distort lane, side or bandwidth offsets.
5. Enables the modeler to edit the link centerline generated by ArcNet using ArcGIS or other software, and then convert the changes back to TRANSIMS files.

GISNet is a console-based program that runs in a command window on either Windows or Linux. The command syntax is:

```
      GISNet [-flag] [control_file]
```

The control_file is the file name of an ASCII file that contains the control strings expected by the program. The control_file is optional. If a file name is not provided, the program will prompt the user to enter a file name. The flag parameters are also optional. Any combination of the following flag parameters can be included on the command line:

-Q[uiet]	= execute without screen messages
-H[elp]	= show program syntax and control keys
-K[eyCheck]	= list unrecognized control file keys
-P[ause]	= pause before exiting
-N[oPause]	= never pause before exiting
-B[atch]	= execute in batch processing mode

The program automatically creates a printout file based on the control_file name. If the file name includes an extension, the extension is removed and ".prn" is added. The printout file will be created in the current working directory and will overwrite an existing file with the same name.

Known Gaps in this Document

Only purposes 1 and 3 are covered herein.

Control File Examples

Example 1 Convert GIS Link File

```
TITLE              Turns shapefile into transims input.
REPORT_FILE
REPORT_FLAG
PROJECT_DIRECTORY              ./
DEFAULT_FILE_FORMAT              TAB_DELIMITED
GIS_LINK_FILE                 theme3.shp
```

```
CONVERSION_SCRIPT             GISScript.txt
NEW_DIRECTORY              ./
NEW_NODE_TABLE              C_Input_Node.txt
NEW_SHAPE_TABLE             C_Input_Shape.txt
NEW_LINK_TABLE              C_Input_Link.txt
CREATE_NOTES_AND_NAME_FIELDS              TRUE
NEW_DEFAULT_FORMAT              TAB_DELIMITED
NEW_NODE_FORMAT              TAB_DELIMITED
NEW_SHAPE_FORMAT              TAB_DELIMITED
NEW_LINK_FORMAT              TAB_DELIMITED
#GIS_NODE_FILE               Node.shp
FIRST_LINK_NUMBER
FIRST_NODE_NUMBER
MAXIMUM_SHAPE_ANGLE
MINIMUM_SHAPE_LENGTH
INPUT_COORDINATE_SYSTEM              STATEPLANE, 2001, METERS
INPUT_COORDINATE_ADJUSTMENT              0.0,0.0,1.0,1.0
OUTPUT_COORDINATE_SYSTEM              UTM, 19N, METERS
OUTPUT_COORDINATE_ADJUSTMENT              0.0,0.0,1.0,1.0

GISNET_REPORT_1               CONVERSION_SCRIPT
GISNET_REPORT_2               CONVERSION_STACK
```

Control File Parameters

Control parameters are defined using a control key followed by a string or number. The control parameters can be specified in any order. If a given key is defined more than once, the last instance of the key is used. The default value for each key is 0 or "Null". Null parameters do not need to be included in the file. Note that comment lines or extraneous keys can be included in the file. They will be ignored by the program.

The keys recognized by the **GISNet** program are listed below. These keys can be defined in a variety of different ways to perform different tasks. The first key specifies the input link shape file. The next two keys specify output TRANSIMS node and link files. They are required; other keys are optional.

Required Keys

GIS_LINK_FILE

The link file key is required. It specifies the name of a shapefile containing the links in the network. If a GIS node file is provided, the node coordinates will be extracted from the shapefile point location. If a GIS node file is not provided, the node coordinates will be extracted from the first and last points in the GIS link file.

NEW_NODE_TABLE

The node table key is required. It specifies the name of the new TRANSIMS node file within the new directory. The full path and file name for the node table is constructed by appending the value of this key to the value of the optional NEW_DIRECTORY key.

NEW_LINK_TABLE

The link table key is required. It specifies the name of the new TRANSIMS link file within the new directory. The full path and file name for the link table is constructed by appending the value of this key to the value of the optional NEW_DIRECTORY key.

Optional Keys

TITLE

Any text string can be used on this line. This text is printed on the top of each output page.

REPORT_FILE

The report file name is optional. If a file name is not provided, the program automatically creates a report file name based on the input control file name. The report file will overwrite an existing file with the same name if the Report Flag key is False or not specified.

REPORT_FLAG

The report flag key is optional. Its default is FALSE. If it is specified as Yes or True, the report file or default printout file will be opened in "Append" mode rather than "Create" mode. This permits the user to consolidate the output of several programs into a single report file.

MAX_WARNING_MESSAGES

When the program generates a warning message, a counter is incremented and the total number of warning messages is reported and a warning return code (2) is set at the end of the execution. By default the program prints up to 100,000 warning messages to the print-out file. If more than 100,000 warning messages are sent, the program stops printing additional messages to the file or terminates the program with an error message based on the MAX_WARNING_EXIT_FLAG. This parameter enables the user to modify the default warning limit.

MAX_WARNING_EXIT_FLAG

If the maximum number of warning messages is exceeded, this flag directs the program in what to do. If the flag is TRUE (the default), the program is terminated with an error message about the warning messages. If the flag is FALSE, the program continues execution, but no additional warning messages are sent to the screen or written to the printout file. The warning message counter continues to count the messages and reports the total at the end of the execution.

PROJECT_DIRECTORY

The project directory key is not required. If it is specified, it is added to all non-network file names required by the program. If it is not specified, all non-network file names should fully specify the file path.

DEFAULT_FILE_FORMAT

Default format for files other than network files. Default is VERSION3. Other possible values include BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL and SQLITE3.

GIS_NODE_FILE

The node file key is optional. It specifies the name of a shapefile containing the nodes in the network. If a GIS node file is provided, the node coordinates will be extracted from the point locations in this shapefile. If a GIS node file is not provided, the node coordinates will be extracted from the first and last points in the GIS link file.

NEW_DIRECTORY

Directory for the “New_” files.

NEW_SHAPE_TABLE

[new_directory]*filename*

CONVERSION_SCRIPT

The conversion script key is a file name that includes a TRANSIMS User Program script. The programming language for the script is described in the UserPrograms documentation. By default the data field names found in the GIS link file are copied to the corresponding name in the TRANSIMS link file. If the GIS link file was created using ArcNet, this means the data from the GIS file will automatically be copied to the TRANSIMS fields (provided the input and output files are in the same general file structure (i.e., Version3 vs. Version4)). If the GIS link file includes different field names or different units of measure, a conversion script is typically used to manipulate the data or map the input field names to the output field names. The input GIS link fields are referenced as “GIS.*field*” and the TRANSIMS link fields are referenced as NewLink.*field*”.

An example of a conversion script appears below:

```
NewLink.STREET = GIS.STREETNAME
NewLink.LENGTH = GIS.SHAPE_LEN
IF (GIS.STREETOPER == 1) THEN
      NewLink.LANES_BA = 0
      NewLink.LANES_AB = GIS.NUMBEROFTR
ELSE
      NewLink.LANES_BA = GIS.NUMBEROFTR / 2
      NewLink.LANES_AB = GIS.NUMBEROFTR / 2
ENDIF
NewLink.FSPD_AB = GIS.SPEEDLIMIT
NewLink.FSPD_BA = GIS.SPEEDLIMIT
NewLink.TYPE = "LOCAL"
IF (GIS.FUNCTIONAL == 2 || GIS.FUNCTIONAL == 3) THEN
      NewLink.TYPE = "PRIARTER"
ENDIF
IF (GIS.FUNCTIONAL == 5) THEN
      NewLink.TYPE = "SECARTER"
ENDIF
IF (GIS.FUNCTIONAL == 6) THEN
      NewLink.TYPE = "COLLECTOR"
ENDIF

NewLink.NOTES = FORMAT("%",GIS.SURFACEWID)
RETURN (1)
END
```

FIRST_LINK_NUMBER

If after copying the field name and applying the conversion script, the link and/or node numbers are not defined, the program will automatically create link and/or node numbers starting from the specified first values. If not specified, the first link number defaults to 1.

FIRST_NODE_NUMBER

If after copying the field name and applying the conversion script, the link and/or node numbers are not defined, the program will automatically create link and/or node numbers starting from the specified first values. If not specified, the first node number defaults to 1.

MAXIMUM_SHAPE_ANGLE

Maximum angle permitted in the output shape file. Defaults to 45 degrees, with a range of {0, 5..120}.

MINIMUM_SHAPE_LENGTH

Minimum shape length permitted in the output shape file. Defaults to 5 meters with a range of (0..50}.

NEW_DEFAULT_FORMAT

Format for the output files. Defaults to VERSION3. Options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL, SQLITE3

NEW_NODE_FORMAT

Format for the output node file. Defaults to the new default format. Options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL, SQLITE3

NEW_LINK_FORMAT

Format for the output link file. Defaults to the new default format. Options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL, SQLITE3

NEW_SHAPE_FORMAT

Format for the output shape file. Defaults to the new default format. Options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL, SQLITE3

INPUT_COORDINATE_SYSTEM

The input coordinate command includes three parts separated by a comma. The first part is the coordinate system description. The options include UTM, STATEPLAN, and LATLONG. The second part identified the code number within the coordinate system that relates to the local conversion parameters. For UTM coordinates these codes range from 1N to 23N. Stateplane coordinates are defined using four digit FIPS codes (e.g., Oregon North = 3601). A code is not needed for the Latitude/Longitude system. The third parameter defines the coordinate units. By default, UTM is in meters, Stateplane is in feet, and Latitude/Longitude is in degrees. The user can override these assumptions using the following keywords: FEET, METERS, MILES, KILOMETERS, DEGREES, and MILLION_DEGREES.

INPUT_COORDINATE_ADJUSTMENT

The input coordinate adjustment enables the user to manipulate the coordinates before they are sent to the input coordinate conversion calculation. This key is optional. It is only needed if the coordinates are

not in the units expected by the conversion algorithm. By default, TRANSIMS data files store coordinate data in meters that don't require any adjustments. The adjustment command includes four floating-point numbers separated by commas. The first two numbers are the X and Y offsets. The last two numbers are X and Y adjustment factors. The process adds the offset value to the coordinate and then applies the adjustment factor. In other words:
X = (EASTING + X_offset) * X_factor
Y = (NORTHING + Y_offset) * Y_factor

OUTPUT_COORDINATE_SYSTEM

The output coordinate system determines how the locations from the input shape file are converted into X-Y coordinates in the output Node, link and shape files. This key is optional. It is only needed if coordinate conversions are desired.

The output coordinate command includes three parts separated by a comma. The first part is the coordinate system description. The options include UTM, STATEPLAN, and LATLONG. The second part identified the code number within the coordinate system that relates to the local conversion parameters. For UTM coordinates these codes range from 1N to 23N. Stateplane coordinates are defined using four digit FIPS codes (e.g., Oregon North = 3601). A code is not needed for the Latitude/Longitude system. The third parameter defines the coordinate units. By default, UTM is in meters, Stateplane is in feet, and Latitude/Longitude is in degrees. The user
can override these assumptions using the following keywords: FEET, METERS, MILES, KILOMETERS, DEGREES, and MILLION_DEGREES.

OUTPUT_COORDINATE_ADJUSTMENT

The output coordinate adjustment enables the user to manipulate the coordinates after they are returned from the output coordinate conversion calculation. This key is optional. It is only needed if the output coordinates should be in units that are different from the conversion algorithm. The adjustment command includes four floating-point numbers separated by commas. The first two numbers are the X and Y offsets. The last two numbers are X and Y adjustment factors. The process adds the offset value to the coordinate and then applies the adjustment factor. In other words:
X = (X + X_offset) * X_factor
Y = (Y + Y_offset) * Y_factor

OUTPUT_XYZ_SHAPES

By default, this key is FALSE, and the output files will use X and Y coordinates. If the key is TRUE, the output file will have X, Y and Z coordinates. Possible values are {true/false/yes/no/1/0}

OUTPUT_XYM_SHAPES

By default, this key is FALSE, and the output files will use X and Y coordinates. If the key is TRUE, the output file will have X, Y and M (measure) coordinates. Possible values are {true/false/yes/no/1/0}

GISNET_REPORT_#

CONVERSION_SCRIPT
CONVERSION_STACK

Sample Printouts

Sample printout files generated by the **GISNet** program are shown below. Each printout is an ASCII text file with a maximum of 95 characters per line and 65 lines per page. The file can be viewed or printed using a variety of text editors. For best results in a word processor, use a 10-point Courier font and 0.5 inch margins on all sides.

Example 1

```
********************************************
|                                          |
|          GISNet - Version 4.0.9          |
|   Copyright (c) 2009 by AECOM Consult    |
|         Thu May 26 14:13:14 2011         |
|                                          |
********************************************

Control File = GISNet.ctl
Report_File  = GISNet.prn (Create)

Turns shapefile into transims input.

Project Directory = ./

Default File Format = TAB_DELIMITED

Input Coordinate System = STATEPLANE, 2001, METERS
Input Coordinate Adjustment = 0.0,0.0,1.0,1.0
Output Coordinate System = UTM, 19N, METERS
Output Coordinate Adjustment = 0.0,0.0,1.0,1.0

GIS Link File = ./theme3.shp

Conversion Script = ./GISScript.txt

Maximum Shape Angle = 45 degrees
Minimum Shape Length = 5 meters

New Network Directory = ./
New Node File = ./C_Input_Node.txt
New Shape File = ./C_Input_Shape.txt
New Link File = ./C_Input_Link.txt

Notes and Name Fields will be Created

GISNet Reports:  1. CONVERSION_SCRIPT
                 2. CONVERSION_STACK


Conversion Script

NewLink.STREET = GIS.STREETNAME
NewLink.LENGTH = GIS.SHAPE_LEN
IF (GIS.STREETOPER == 1) THEN
NewLink.LANES_BA = 0
NewLink.LANES_AB = GIS.NUMBEROFTR
ELSE
NewLink.LANES_BA = GIS.NUMBEROFTR / 2
NewLink.LANES_AB = GIS.NUMBEROFTR / 2
```

```
ENDIF
NewLink.FSPD_AB = GIS.SPEEDLIMIT
NewLink.FSPD_BA = GIS.SPEEDLIMIT
NewLink.TYPE = "LOCAL"
IF (GIS.FUNCTIONAL == 2 || GIS.FUNCTIONAL == 3) THEN
NewLink.TYPE = "PRIARTER"
ENDIF
IF (GIS.FUNCTIONAL == 5) THEN
NewLink.TYPE = "SECARTER"
ENDIF
IF (GIS.FUNCTIONAL == 6) THEN
NewLink.TYPE = "COLLECTOR"
ENDIF

NewLink.NOTES = FORMAT("%",GIS.SURFACEWID)

RETURN (1)
END

Conversion Stack

  1) String       GIS.STREETNAME
  2) Assign       =
  3) String       NewLink.STREET
  4) Real         GIS.SHAPE_LEN
  5) Assign       =
  6) Real         NewLink.LENGTH
  7) Integer      GIS.STREETOPER
  8) Integer      1
  9) Relation     EQ
 10) Logical      If False, Jump to 18
 11) Integer      0
 12) Assign       =
 13) Integer      NewLink.LANES_BA
 14) Integer      GIS.NUMBEROFTR
 15) Assign       =
 16) Integer      NewLink.LANES_AB
 17) Logical      Jump to 28
 18) Integer      GIS.NUMBEROFTR
 19) Integer      2
 20) Math         /
 21) Assign       =
 22) Integer      NewLink.LANES_BA
 23) Integer      GIS.NUMBEROFTR
 24) Integer      2
 25) Math         /
 26) Assign       =
 27) Integer      NewLink.LANES_AB
 28) Integer      GIS.SPEEDLIMIT
 29) Assign       =
 30) Real         NewLink.FSPD_AB
 31) Integer      GIS.SPEEDLIMIT
 32) Assign       =
 33) Real         NewLink.FSPD_BA
 34) String       "LOCAL"
 35) Assign       =
 36) String       NewLink.TYPE
 37) Integer      GIS.FUNCTIONAL
 38) Integer      2
 39) Relation     EQ
 40) Integer      GIS.FUNCTIONAL
 41) Integer      3
 42) Relation     EQ
 43) Relation     OR
 44) Logical      If False, Jump to 48
 45) String       "PRIARTER"
 46) Assign       =
 47) String       NewLink.TYPE
 48) Integer      GIS.FUNCTIONAL
 49) Integer      5
 50) Relation     EQ
 51) Logical      If False, Jump to 55
 52) String       "SECARTER"
 53) Assign       =
 54) String       NewLink.TYPE
 55) Integer      GIS.FUNCTIONAL
 56) Integer      6
 57) Relation     EQ
 58) Logical      If False, Jump to 62
 59) String       "COLLECTOR"
 60) Assign       =
 61) String       NewLink.TYPE
 62) String       "%"
 63) Integer      GIS.SURFACEWID
 64) In/Output    FORMAT
 65) Assign       =
 66) String       NewLink.NOTES
 67) Integer      1
 68) Return       Integer
 69) End


Number of GIS Link File Records = 28
Number of Input Shape Points = 135

Number of New Link File Records = 28
Number of New Node File Records = 25
Number of New Shape File Records = 80
Number of Links with Shape Points = 17

Thu May 26 14:13:14 2011 -- Process Complete (0:00:00)
```