DSPEd User's Guide DYNASMART-P Network Editor

Version 1.2

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Foreword

This User's Guide describes how to use DSPEd (the DYNASMART-P Network Editor). ITT Industries, Inc., Systems Division developed and is maintaining DSPEd under the direction of the Federal Highway Administration (FHWA) on Contract Number DTFH61-01-C-00005.

The DYNASMART-P technical data descriptions contained in this document were taken from the DYNASMART-P User's Guide developed by the Maryland Transportation Initiative at the University of Maryland.

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Abstract

DSPEd (DYNASMART-P Network Editor) is distributed as part of, and is designed to operate efficiently in conjunction with, FHWA's DYNASMART-P intelligent transportation network design, planning, evaluation, and traffic simulation tool. DYNASMART-P models the evolution of traffic flows in a traffic network that result from the travel decisions of individual travelers.

DSPEd is used to create models of traffic networks using a point-and-click, graphical user interface. The goal of DSPEd is to allow traffic engineers to quickly and easily layout and build networks without having to know the required data format of the analysis program that will be used to perform analysis. By displaying, editing, and storing the data in a manner that makes sense to a traffic engineer, DSPEd allows the engineer to spend time analyzing the data and making decisions rather than learning how to make the tool work. There is a very complicated relationship between the data and network. DSPEd attempts to hide these relationships where possible.

This guide:

- Introduces users to the capabilities and features of DSPEd.
- Explains in detail how to use DSPEd and how to access all of its functionality.

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1 About the DYNASMART-P Network Editor

1.1 Introduction

This User's Guide supports traffic engineers using the DYNASMART-P Network Editor, known as DSPEd, to create or modify a traffic network for the DYNASMART-P program. DSPEd is used to create traffic networks using a point-and-click, graphical user interface. It is designed to support users of the Federal Highway Administration's (FHWA's) DYNASMART-P intelligent transportation network design, planning, evaluation, and traffic simulation tool. DYNASMART-P models the evolution of traffic flows in a traffic network that result from the travel decisions of individual travelers. The network editor will be referred to as DSPEd or "the editor" throughout this document. The simulation and analysis program that uses files created by DSPEd will always be referred to as DYNASMART-P when a distinction is necessary. This guide describes neither the technical aspects of DYNASMART-P, nor the types of analyses that can be performed using the program. For more detailed information about DYNASMART-P please refer to the DYNASMART-P User's Guide.

The goal of DSPEd is to allow traffic engineers to quickly and easily layout and build traffic networks without having to know the required data format of the DYNASMART-P program that will be used to perform analysis. By displaying, editing, and storing the data in a manner that makes sense to a traffic engineer, the editor allows the engineer to spend time analyzing the data and making decisions rather than learning how to use the DYNASMART-P program. There is a very complicated relationship between the data and network. The editor attempts to hide these relationships where possible.

Internally, DSPEd stores data in an object-oriented manner rather than using the multiple file structure of DYNASMART-P's file formats. As a result you will be presented dialogs that may have data from separate DYNASMART-P files shown on a single dialog or data from one DYNASMART-P file shown on different dialogs where it makes good sense. For example, the name of a link is shown and edited on the same dialog as other link data in the Link Properties dialog even though the name is stored in a separate file from the other link related data. In the future, as inputs change, the editor and the internal data can be easily modified to reflect the changes because it is object oriented as opposed to file oriented.

In addition to hiding administrative details about the DYNASMART-P program such as file structure, the editor provides many nice features not found in other traffic network editors. Some of the features include:

- Extending a network by dragging links out from existing nodes
- Split an existing link into two links by dropping a node on the link
- Layout a network using a background image as a guide to place nodes and links.

The editor is a stand-alone program. No other program is necessary to create networks. In order to perform analysis the DYNASMART-P program is required.

Expert users that have taken many years to learn the format and usage of the DYNASMART-P analysis program may find it useful to layout the initial network with the editor and thereafter edit the text files with a text editor. There are some network editing tasks that can be done faster with a text editor by expert users.

There are many features that we have identified that would be nice to include in the editor. As time and resources permit these features may be added to the editor as FHWA dictates. Some of the features include:

- More file formats for the background image.
- More graphical field entries
- Create certain types of interchanges from a script

1.2 Hardware and Software Requirements

The editor is a Microsoft Windows stand-alone application. Therefore it will only run on Windows 95 or more recent Windows platforms. No special hardware or performance capabilities are required. This is a very small application that uses few resources. If you are working with large networks or large TIGER files or DXF files, a faster machine with a large amount of memory and with a good video processor may be nice to have. For small networks, older machines should perform adequately.

1.3 Document Organization

This User's Guide is organized to assist new users in learning how to use the editor and as a reference manual for more experienced users. The following overview describes the different sections contained in this document.

- Section 1: This section is an introductory section to the document.
- Section 2: Describes starting and ending DSPEd and opening and closing files.
- Section 3: Describes the basic layout of the editor including the network window, menu items, and tool bar buttons.
- Section 4: Describes working with the network window including creating links, nodes, and zones and loading and using a bitmap background to layout the network.
- Section 5: Describes the data related to DYNASMART-P and editing that data. Section 5 is organized into five major areas; Network Data, Control Data, Demand Data, Scenario Data, and System Data.
- Section 6: Glossary of terms.
- Section 7: Index.

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2 Working with Files

2.1 Starting DSPEd

After DSPEd has been installed it can be started from the Windows Start button by selecting the program from the list of programs. As DSPEd is starting it displays the following image as a "splash" screen for a few seconds.



By default a new network is created and a window with no network objects is displayed. You may begin creating new network objects in this window. Creating this new network automatically can be turned off by using the Preferences dialog.

An alternate method of starting DSPEd is by dragging a DYNASMART-P project file (*.dws) over a DSPEd shortcut icon on the desktop and dropping the file on the icon. The network will open in DSPEd and you may begin editing the network.

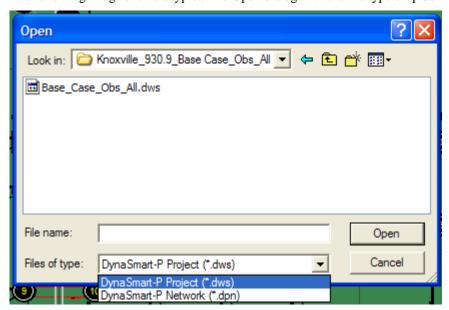
2.2 Opening an Existing File

An existing traffic network file can be opened by selecting the File | Open menu command or the Open button on the tool bar. When the File Open dialog opens, browse to the directory where the existing file exists, select the desired file and click the Open button. DSPEd will open a Network Window then read in all the necessary files and load the network in the Network Window. Multiple networks can be open at the same time. This makes it convenient to copy data from one network to another.

Traffic network files created by DSPEd have either a ".dws" filename extension (DYNASMART-P Workspace file) or a ".dpn" extension (DSPEd Network text file). The DYNASMART-P program currently requires many different files containing the data required to setup a traffic network and run the program. "network.dat," "movement.dat," and "demand.dat," are just a few of the required files. Opening an existing DYNASMART-P workspace (*.dws) file imports that file and all of the other individual files associated with the DYNASMART-P program.

Note: The files used by DYNASMART-P are text files that can be opened by multiple editing tools at the same time. They can be edited by the DYNASMART-P Graphical User Interface (GUI), by DYNABUILDER, by a text editor, or by DSPED. Use caution when editing files with different tools at the same time. Changes made in one tool may not be reflected in the other tools.

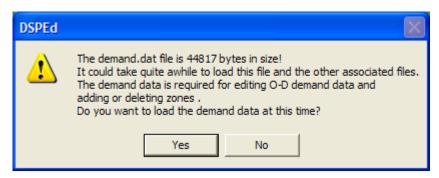
The following image shows a typical file Open dialog with the file type drop down selection displayed.



DSPEd can save all this data in one file, the DSPEd Network file (*.dpn). It may be more convenient to transfer a project from one computer to another or to another user that has the DSPEd program using just the one DPN file. Keep in mind that the DPN file is unique to DSPEd and cannot be opened by the DYNASMART-P program.

Origin-Destination demand data may have a large amount of data. Smaller networks, or networks that have a small amount of demand data, automatically load the demand data when the network is loaded. Some projects have an enormous amount of demand data. Loading that data can be delayed or not done at all. There are some circumstances that require demand data to be loaded. Opening the Demand Data dialog and creating new zones are two such instances. During the initial load or when one of the above circumstances arises, the following dialog will be displayed.

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Choosing Yes will load the demand data into memory. Once this has been accomplished it is not necessary to do it again during the course of this working session with this network. If No is chosen, you may continue to work with the network but you will not be able to perform the above mentioned tasks. If you try to perform one of those tasks you will again be prompted by this dialog.

2.3 Creating a New File

By default DSPEd opens a new network window when the program starts. This default can be turned off with the Preferences dialog. To create a new traffic network file, select the File | New menu command or the New button on the tool bar. An empty Network Window will open in the program. A new file initially contains no traffic model objects. To name the network you must save the network.

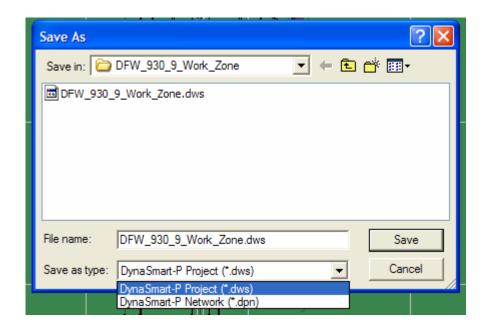
2.4 Saving the Network

To save a traffic network to a file, press the Save button or choose the File | Save menu command. If the network has not been previously saved to a file, a standard "Save As..." dialog box will appear so that you can choose a filename. If the network has been previously saved, the network will be saved to the file named in the title bar.

If a previously saved file is to be saved to a different filename, choose the File | SaveAs menu command. By default the editor will save the network as a DWS file and save all the files necessary to run the network with the DYNASMART-P program. If you wish to save the network as a DPN, select the DPN item from the "Save as type:" drop down list box.

Note: A DYNASMART-P project consists of many files. Each project should reside in its own file directory. The DWS workspace file is the only uniquely named file that differentiates one project from another. For example, all projects will have a "network.dat" file. Use caution when saving a project to ensure there are no other project files in the directory that will be overwritten while saving.

The following image shows a typical Save As dialog with the file type drop down selection displayed.



2.5 Closing the File

To close a Network Window, choose either the File | Close menu command or click on the close × button located at the far right of the Network Window's title bar. Note that the editor, which contains the Network Window, has its own close × button located on the application's title bar, clicking that button exits the editor rather than just closing the Network Window.

When closing a network with unsaved changes, a dialog appears asking if the work is to be saved. Pressing the Yes button will save the network to a set of DYNASMART-P project files or a DSPEd network file before closing the window. Pressing the No button will discard unsaved changes and close the window. Pressing the Cancel button will leave the Network Window open.

2.6 Closing DSPEd

To close the editor select the File | Exit menu command or click on the close X button located at the far right of the program's title bar.

When closing the editor with a network or networks with unsaved changes, a dialog appears asking if the work is to be saved. Pressing the Yes button will save the network to a set of DYNASMART-P project files or a DSPEd network file before closing the window. Pressing the No button will discard unsaved changes and close the window. Pressing the Cancel button will leave the editor and the Network Window open. The same sequence will be repeated for each unsaved Network Window.

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3 The Basics of the Editor

3.1 Overview

DSPEd is a tool for creating and editing traffic networks. The following activities might occur during a typical session with the editor:

- Create a new project with the editor, or open an existing project. Each file represents a traffic network, which may include surface streets and freeways, and parameters such as capacity.
- Create links and nodes based on an image underlay.
- Create new links, nodes, and other objects "from scratch" using a pointing device (such as a mouse).
- Edit properties of objects like links and nodes.
- Edit properties required to run the simulation.
- Save the traffic network.
- Close the network file.

When you have finished editing the network you can run the simulation by opening the network with the DYNASMART-P program. This process may be repeated many times to achieve the desired results.

3.2 Traffic Model Objects

Traffic model objects are simply the elements that make up a traffic network. These include links and nodes and other objects. Links and nodes determine the geometry of the roadway network. Other traffic model objects may include zones for example.

Traffic model objects can be manipulated graphically within the network window or their properties can be edited in their respective property dialogs. Refer to Creating Links, Creating Nodes, and Creating Zones for more information.

3.3 The Physical Layout of DSPEd

The editor has the following physical components:

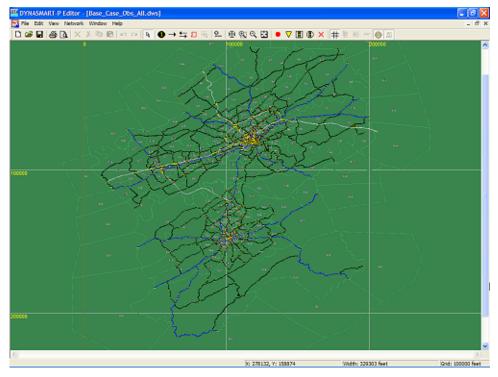
■ Network Window: the area displaying the traffic network. This is the main workspace where the traffic model objects can be edited graphically by creating and dragging the objects with a pointing device such as a mouse. Most objects in the window can be clicked on to open a dialog that shows that objects properties. This is discussed in further detail in later sections.

- Title Bar: the area at the top of the application containing the name of the application and the name of the open file in the Network Window that has focus. If the data associated with the Network Window with focus has been changed since the last time it was saved, an asterisk will be shown at the end of the file name.
- Menu Bar: the standard Windows menu bar allows users to operate the many aspects of the program. This is discussed in further detail below.
- Tool Bar: the set of buttons with icons depicting different aspects of the editor. Using the buttons allows faster access to the programs functionality. This is discussed in further detail below.
- Status Bar: the area at the bottom of the application. This area displays messages and mouse cursor position information. This is discussed in further detail below.

The physical components will be described in the following sections.

3.4 The Network Window

The Network Window displays the actual file opened, as illustrated below.



The following is a partial list of actions that can be performed within the window to create and manipulate a traffic network:

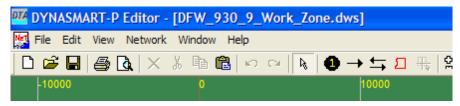
- Create traffic network objects.
- Zoom in or out of the Network Window.
- Edit the properties of an object.
- Move objects within the Network Window.
- Delete objects.
- Cut, Copy, and Paste objects both within a single Network Window and between Network Windows.

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You can have more than one network open at a time. In general, menu commands, such as File | Save, and hot keys, such as CTRL+S, only affect the active window.

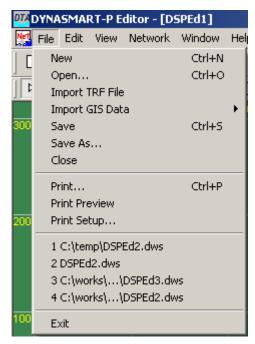
3.5 Menu Bar

The menu bar is a normal Windows menu bar. Each menu item is discussed in detail below.



3.5.1 File Menu

The following is the File menu. Refer to the Section 3.6 Tool Bar for alternate ways to invoke these commands.



File | New Ctrl+N

Selecting the File | New menu command or pressing CTRL+N will create a new, empty Traffic Network file.

File | Open... Ctrl+O

Selecting the File | Open menu command or pressing **CTRL+O** will bring up a standard File Open dialog to select the file to open. If a file is selected and the dialog dismissed with OK, the selected file will load into a new Traffic Network window.

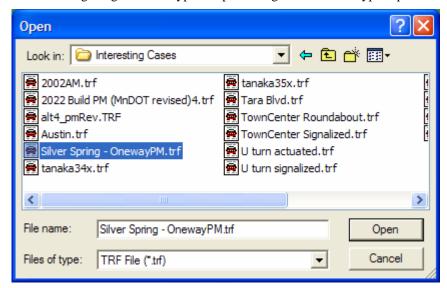
File | Import TRF File...

Selecting the File | Import TRF menu command will bring up a standard File Open dialog to select the file to import. If a file is selected and the dialog dismissed with OK, the selected file will load into a new Traffic Network window. Importing an existing network or data from another application can save time. Not all data will directly import to DSPEd. Some modifications to the network will be necessary after completion of the import.

Currently, CORSIM TRF files are the only types of files that can be imported into DSPEd. The link and node data are imported from the TRF file and populated in the network as DSPEd objects. The following CORSIM record types are imported:

- 10 Link Name
- 11 Arterial Street geometry
- 19 Freeway and ramp geometry (note: all ramps are assigned a type of On Ramp)
- 20 Freeway operations
- 25 Freeway turn movements
- 195 Node locations

The following image shows a typical Open dialog where the file type is pre-selected to TRF File (*.trf).



File | Import GIS Data...¹

Selecting the File | Import GIS Data menu command will bring up a sub-menu with the following items:

- o Import Network Table
- o Import Demand Table
- o Import Truck Demand Table
- Import HOV Demand Table

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¹ The GIS data format used in DSPEd is very similar to the format required by another DYANSMART-P network importer, namely DynaBuilder, developed by the DTA team at the University of Maryland. However, a number of format changes have been made to ensure a smoother conversion.

o Import Node/Link/Zone Geo Files

To import an existing GIS database (e.g., TransCAD), the user needs to have (1) an Excel file with node, link, zone and signal sheets in sequence; (2) a demand file in text format. If an Excel file is selected and the dialog dismissed with OK, the selected file will load into a new Traffic Network window. Note that, truck, HOV demand and Geo files are optional, and the node, link and zone geo files can be exported from GIS software.

Required fields in NODE sheet:

ID: node ID

Longitude: x coordinate

Latitude: y coordinate

TAZ: Traffic Analysis Zone of a node, used by DSPEd to generate destination nodes (and generation links)

CTRL_TYPE: Control type used in DYNASMART-P, where 1=no control; 2= yield sign; 3= 4-way stop sign; 4= pre-timed control; 5= actuated signal control; 6= 2-way stop sign

Required fields in LINK sheet:

ID: link ID

Length: link length in feet

From_ID: upstream node ID

To ID: downstream node ID

Dir: direction code, where 0= two-way links; 1= one-way link traffic direction and topology same directions;

-1= one-way link traffic direction and topology opposite directions

TYPE: link type used in DYNASMART-P, where 1= Freeway; 2= Freeway segment with detector (for ramp metering); 3= On ramp; 4=Off ramp; 5=Arterial; 6= HOT; 7= Highway; 8= HOV; 9= Freeway HOT; 10= Freeway HOV

LANES: number of lanes

TAZ: Traffic Analysis Zone of a link, used by DSPEd to construct generation links.

GRADE: grade of link, default=0

NAME: name of link, optional

LEFTTURNBAY: number of left-turn bays, default=0

RIGHTTURNBAY: number of left-turn bays, default=0

LIMIT: speed limit in mph, default= 70 for freeway, =60 for highway, =35 for on-ramp and off-ramp, 45 for arterial

ADJSPEED: posted speed limit adjustment margin in mph, default =0

SATUATION_FLOW_RATE: saturation flow rate in vphpl, default= 2200 for freeway, 2000 for ramp and highway, 1800 for arterial

MAX_SERVICE_RATE: Maximum service flow rate in vphpl, default = 2000

Remarks:

1) If Dir=0, the number of lanes are divided by two for each generated one-way links.

- If the upstream node of a link is a destination, then this link will be automatically added as a generation link.
- 3) The x and y coordinates of nodes can be specified in any coordinate system, as DSPEd automatically converts the original coordinate system to a new coordinate system that uses feet as the unit of length.
- 4) If a node is specified as an actuated signal in the node sheet, DSPEd automatically generates its default signal timing plan. Refer to Section 5.2.2 for more information on editing actuated signal controller properties.

Required fields in ZONE sheet:

ZONENO: Sequential zone number used in DYNASMART

TAZ: Traffic Analysis Zone number used in original GIS dataset

Required fields in SIGNAL sheet:

MaxGreen: default maximal green time for actuated signal control in seconds

MinGreen: default minimal green time for actuated signal control in seconds

Amber: default amber time for actuated signal control in seconds

Required fields in demand, truck demand and HOV demand files

Number of OD demand zones

Number of demand intervals

Length of demand interval in min

Demand loading ratio for each demand interval

Static demand cell in triplet format (origin TAZ, destination TAZ, value)

The following image shows a sample demand file.

```
//# of OD demand zones

16

//# of demand intervals

6

// length of demand interval

5

0.1 0.2 0.4 0.6 0.8 1

1,1,100

1,2,200

1,3,200
```

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File | Save Ctrl+S

Selecting the File | Save menu command or pressing **CTRL**+**S** will save the currently active document. If the file has not been saved before, a standard File Save dialog will appear to allow the user the set the file name.

File | Save As...

Selecting the File | Save As menu command will bring up a standard File Save dialog to select the file name. If a file name is selected and the dialog dismissed with OK, the active document will be saved with that name.

File | Close

Selecting the File | Close menu command will close the currently active document. If the document has unsaved changes, the user will be given the opportunity to save the file.

File | Print... Ctrl+P

Selecting the File | Print menu command or pressing **CTRL**+**P** will bring up a standard Print dialog to select the desired printer and printer properties. Selecting OK on that dialog will send an image of the entire network to the printer. Selecting the "Selection" radio button will send an image of the current view to the printer.

File | Print Preview

Selecting the File | Print Preview will show an image of what will be printed. Close this view to return to the network editor.

File | Print Setup...

Selecting the File | Print Setup menu command will bring up a standard Print Setup dialog to select the printer and print properties. You can select the printer that will be used to print and the type of paper and the orientation of the paper (landscape or portrait).

File | Recent Files

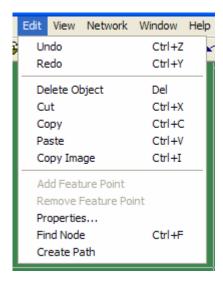
The area just above the Exit command is used to display the four most recently opened files. You can quickly open the file by simply clicking on it.

File | Exit

Selecting the File | Exit menu command will close all active documents and the application. If any documents have unsaved changes, the user will be given the opportunity to save them.

3.5.2 Edit Menu

The following is the Edit menu. Refer to Section 3.6 Tool Bar for alternate ways to invoke these commands.



Edit | Undo Ctrl+Z

Selecting the Edit | Undo menu command or pressing **CTRL**+**Z** will undo the last editing action. This can be done multiple times to undo multiple commands. The number of times the Undo command can be exercised is only limited by amount of memory on your computer. This functionality is currently accomplished by saving a copy of the network in memory. This functionality can be turned off using the Preferences dialog. With very large networks it may be desirable to turn off the undo capability to save time and resources.

Edit | Redo Ctrl+Y

Selecting the Edit | Redo menu command or pressing **CTRL+Y** will redo the last undone editing action. This can be done multiple times to redo multiple undone commands. The number of time the Redo command can be exercised is only limited by the number of Undo commands exercised. This functionality can be turned off using the Preferences dialog. With very large networks it may be desirable to turn off the undo capability to save time and resources.

Edit | Delete Object Del

Selecting the Edit | Delete Object menu command or pressing the Delete keyboard button will delete the current selection. This menu item will only be active when an object or objects are selected.

Edit | Cut Ctrl+X

Selecting the Edit | Cut menu command or pressing CTRL+X will copy the selected object(s) and their properties to the clipboard and delete them from the active Traffic Network document. This menu item will only be active when an object or objects are selected.

Edit | Copy Ctrl+C

Selecting the Edit | Copy menu command or pressing CTRL+C will copy the selected object(s) and their properties to the clipboard. This menu item will only be active when an object or objects are selected.

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Edit | Paste Ctrl+V

Selecting the Edit | Paste menu command or pressing **CTRL**+**V** will paste the clipboard's contents into the currently active document. This command will only be enabled if the clipboard contains DSPEd Traffic Network objects.

Edit | Copy Image Ctrl+I

Selecting the Edit | Copy Image menu command or pressing **CTRL+I** will copy the current view into the Windows clipboard. The image may then be pasted into other applications such as a word processor or graphics program. This feature copies only the image in the active network window to the clipboard. The **Print Screen** button on the keyboard will copy the whole desktop image to the clipboard. If **Alt** is held down in conjunction with the **Print Screen** button the whole active window (including the Title bar, menu bar, tool bar, etc.) will be copied to the clipboard.

Edit | Add Feature Point

A Feature Point helps to define the geometry of an object. For example, the curvature of a link may be shown using feature points instead of breaking the link into multiple links where the node placement would define the curvature. Selecting the Edit | Add Feature Point menu command creates a Feature Point between the end of the selected object and the existing Feature Point closest to that end. This menu item will only be active when a single object, such as a link or a zone, is selected. You may also add feature points by right clicking on an object and selecting "Add Feature Point" from the popup menu. Using this method feature points can be placed where the mouse click occurred. When the object is selected the Feature Points are shown as a small light blue circles. After the Feature Point has been added you may grab the Feature Point with the selection cursor and drag it to the desired location.

Edit | Remove Feature Point

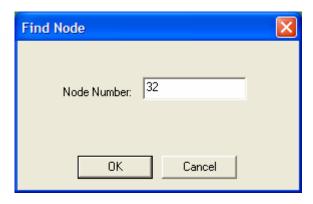
Selecting the Edit | Remove Feature Point menu command removes the Feature Point closest to the end of the selected object. This menu item will only be active when a single object, such as a link or a zone, is selected. When the object is selected the Feature Points are shown as small light blue circles. You may also remove Feature Points by right clicking on an object and selecting "Remove Feature Point" from the popup menu. Using this method specific Feature Points can be removed where the mouse click occurred.

Edit | Properties

Selecting the Edit | Properties menu command invokes the selected object(s) property dialog. This menu item will only be active when an object or many objects of the same type are selected. The property dialog for the type of object will allow you to edit that object's different properties. If more than one object is selected the edits that are made will apply to all selected objects. This is fast way to make many changes to the properties of many objects of the same type. Refer to Section 5 Working with DYNASMART-P Data for descriptions of these dialogs.

Edit | Find Node Ctrl F

Selecting the Edit | Find Node menu command invokes the Find Node dialog. The Find Node dialog allows you to enter a Node Number to select a node within the network. If the node number exists the node will be selected in the network. A selected node will appear highlighted with a magenta color that stands out from the rest of the network. If you cannot see the node you may have to change the view by zooming out or use the Show Entire Network tool. If the node does not exist within the network, a message box will notify you that the node cannot be found.

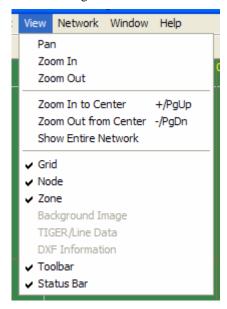


Edit | Create Path

Selecting the Edit | Create Path menu command invokes the Create Path dialog. This menu item will only be active when two or more links are selected. Refer to Section 4.12 Creating a Path for more information.

3.5.3 View Menu

The following is the View menu. Refer to Section 3.6 Tool Bar for alternate ways to invoke these commands.



Since a network may be too big to fit in the available space at a sufficient level of detail, the editor provides various commands for changing the view as described below. These commands do not modify the network itself; they only affect the visible area.

View | Pan

The cursor has now changed to the Pan cursor. It repositions the network's display without affecting the current zoom level. The position under the cursor will be centered in the window. Repeated "pans" can be done without accessing the menu option. To free the cursor from this "Pan" state, press the Select button, press the Pan toggle button again, right-click on an open area of the network, or press the ESC key.

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Note: The user can use the View | Pan menu command to view outside the current extent of the network. Holding down the **CTRL** key while rotating the mouse wheel centers the network on the location where the mouse wheel event occurred.

View | Zoom In

The cursor changes to the Zoom In cursor. From this point, there are two different methods for implementing the Zoom In command; each providing different results. One method is to place the cursor on a specific point in the network and press and release the left mouse button. This will cause that point to become the center of an updated view, zoomed to a higher magnification level. The other method uses a "rubber band" box to mark off the boundaries of a region, which will become the new view of the network. To perform this operation, place the cursor on a point you want to become the corner of a zoomed-in view. Press down and hold the left mouse button and drag the "rubber band" box to the point that forms the opposite corner of the new view. When you release the mouse button, the area within the "rubber band" will be expanded to fill the active window. Repeated zooms can be done without accessing the menu option. To free the cursor from this "Zoom In" state, press the Select button, press the Zoom In toggle button again, right-click on the open area of the network or press the ESC key. Zooming can also be accomplished with the Page Up / Page Down keys, the + / - keys or the mouse wheel.

View | Zoom Out

The cursor changes to the Zoom Out cursor. Place the cursor on a specific point in the network and press and release the left mouse button. This will cause that point to become the center of an updated view, zoomed to a lower magnification level. Repeat zooms can be done without accessing the menu option. To free the cursor from this "Zoom Out" state, press the Selection button, press the Zoom Out toggle button again, right-click on the open area of the network, or press the ESC key.

Note: The user can use the View | Zoom Out menu command to view outside the current extent of the network. Zooming can also be accomplished with the **Page Up** / **Page Down** keys, the + / - keys or the mouse wheel.

View | Zoom In to Center +/Page Up

This is a one-time version of the Zoom In mode. The network zooms in at a fixed level to the center point of the window. The + key or the **Page Up** key are short-cut keys for this command. The mouse wheel also changes the level of magnification.

View | Zoom Out from Center -/Page Down

This is a one-time version of the Zoom Out mode. The network zooms out at a fixed level keeping the center point of the window. The - key or the **Page Down** key are short-cut keys for this command. The mouse wheel also changes the level of magnification.

Note: The user can use View | Zoom Out of Center menu command to view outside the current extent of the network.

View | Show Entire Network

Displays the entire network. The view will be re-centered and zoomed in or out as necessary so that the network fills the window. If other options, such as a background image, are shown, the view will change to show the largest area.

View | Node

Hides or shows the nodes on the network in the display. The size of the node changes as you zoom in and out. It may desirable to hide the nodes when zoomed in. Even when the nodes are hidden they can be selected by clicking in the empty space between two links where the node should be located. When the node is selected it draws in it full size highlighted with a magenta color. Simply click away from any object to deselect the node.

View | Zone

Hides or shows the demand zones on the network in the display. The size of the zone changes as you zoom in and out. It may desirable to hide the zones when zoomed in.

View | Grid

Hides or shows the grid on the network in the display. The grid value can be changed with the Network | Preferences menu item.

View | Background Image

Hides or shows the background image on the network in the display. Refer to Section 4.13 Importing Images for more information on background images.

View | TIGER/Line Data

Hides or shows the TIGER/Line data on the network in the display. Refer to Section 4.14 TIGER/Line Data for more information.

View | DXF Information

Hides or shows the DXF Information on the network in the display. Refer to Section 4.15 DXF Information for more information.

View | Tool Bar

Hides or shows the Tool Bar.

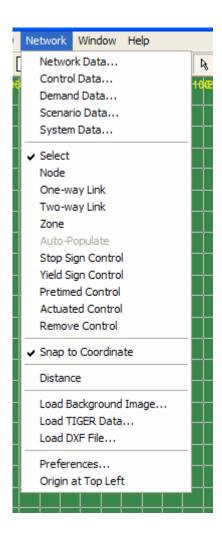
View | Status Bar

Hides or shows the Status Bar at the bottom of the application window.

3.5.4 Network Menu

The following is the Network menu. Refer to Section 3.6 Tool Bar for alternate ways to invoke these commands. These are the tools for building and editing a network.

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Network | Network Data

The Network Data menu item will open the Network Data dialog. The dialog allows you to input values for the network. Refer to Section 5.1 Network Data for more information.

Network | Control Data

The Control Data menu item will open the Control Data dialog. The dialog allows you to input values for the traffic control. Refer to Section 5.2 Control Data for more information.

Network | Demand Data

The Demand Data menu item will open the Demand Data dialog. The dialog allows you to input values for the origin-destination demand data. Refer to Section 5.3 Demand Data for more information.

Network | Scenario Data

The Scenario Data menu item will open the Scenario Data dialog. The dialog allows you to input values for the scenario. Refer to Section 5.4 Scenario Data for more information.

Network | System Data

The System Data menu item will open the System Data dialog. The dialog allows you to input values for the system data. Refer to Section 5.5 System Data for more information.

Network | Select

The default Network Window mouse functionality is selection. To free the cursor from any other state, press the Select button, right-click in an open area of the network, or press the ESC key. The Select Cursor allows you to click on network objects to select them for future actions or move them or open the popup menu by right-clicking on the object. The popup menu provides different functionality based on the type of object. To select multiple objects at the same time hold the CTRL key while clicking on the objects. Refer to Section 4.6 Selecting Objects for more information.

Network | Node

The cursor has changed to the Node cursor. Point the cursor at the location where you want the node and click the left mouse button. To free the cursor from this state, press the Select button, press the Node toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.4 Creating Nodes for more information.

Network | One-way Link

The cursor changes to the One-way Link cursor. A single (one-way) link will be created when you click to create the starting location and then click again to create the ending location. To free the cursor from this state, press the Select button, press the One-way Link toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.3 Creating Links for more information.

Network | Two-way Link

The cursor changes to the Two-way Link cursor. A pair of links running in opposite directions will be created when you click to create the starting location and then click again to create the ending location. To free the cursor from this state, press the Select button, press the Two-way Link toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.3 Creating Links for more information.

Network | Zone

The cursor changes to the Zone cursor. The zone tool allows you to create Traffic Analysis Zones (TAZ) in the network. To free the cursor from this state, press the Select button, press the Zone toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.5 Creating Zones for more information.

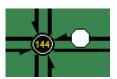
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Network | Autopopulate

The autopopulate tool allows the user to use TIGER/Line data or DXF Information displayed in the network window to quickly populate a network. This menu item is only available when TIGER Data or DXF Information is shown in the Network Window. Refer to Section 4.14.2 Using TIGER/Line Data to Populate a Network or Section 4.15.2 Using DXF Information to Populate a Network for more information.

Network | Stop Sign

Changes the active tool to the Stop Sign tool. The cursor will be displayed as a stop sign symbol when the cursor is over a link.



When the cursor is not over a link it shows up as a cursor. When you click on a link you assign that link as a minor approach to the node. A red octagon shaped icon will be drawn next to the link near the downstream end.

Network | Yield Sign

Changes the active tool to the Yield Sign tool. The cursor will be displayed as a yield sign symbol when the cursor is over a link.



When the cursor is not over a link it shows up as a cursor. When you click on a link you assign that link as a minor approach to the node. A yellow triangle shaped icon will be drawn next to the link near the downstream end.

Network | Pre-Timed Controller

Changes the active tool to the Pre-timed Controller tool. The cursor will be displayed as a pre-timed controller symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node you assign that node a pre-timed controller. A white square shaped icon will be drawn on the node to signify that is a pre-timed controlled intersection.

Network | Actuated Controller

Changes the active tool to the Actuated Controller tool. The cursor will be displayed as an actuated controller symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node you assign that node as an actuated controller. A white circular shaped icon will be drawn on the node to signify that is an actuated controlled intersection.

Network | Remove Control

The cursor changes to the Remove Control tool. The cursor will be displayed as a remove control symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node, you remove any type of control that is present at that node.

Network | Snap to Coordinate

If Snap is enabled via the toolbar or Network menu, nodes and feature points will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on the Miscellaneous Preference dialog. This only happens when a node or feature point is being created or dragged to a new location, otherwise nodes and feature points will remain in their location. Turn Snap on to do a rough layout of nodes in a network but turn Snap off to precisely place nodes and feature points.

Network | Distance

The cursor changes to the Distance Tool cursor. The Distance Tool allows the user to measure distances in the network. Click the distance tool cursor on the location where you want to begin measuring. As the cursor is moved away from that location the distance measured is displayed in the status bar. Click the cursor again to create a "way" point. Moving the cursor again will measure the cumulative distance from the starting point. This technique can be continued to measure the distance along a path in the network with many changes in direction. To start measuring again from a new starting point, double click the cursor. The cursor can then be moved to the new starting location where you will click the cursor to start again. To free the cursor from this "Distance Measuring" state, press the Select button, press the Distance Tool toggle button again, right-click in an open area of the network, or press the ESC key.

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Network | Load Background Image...

This item opens the Load Background Image dialog. You can load an image, such as an aerial photograph or a street map, which can be used as a background for the traffic network being modeled. An image can serve as a visual reference for laying out the network, as a visual reference for observers, or just as an attractive background. Laying out a network from an image is a very quick way to develop a traffic network of streets and intersections. Refer to Section 4.13 Importing Images for more information.

Network | Load TIGER Data...

This item opens the TIGER Data Registration dialog. You can load TIGER/Line data into the network and use it to populate the network objects. Refer to Section 4.14 TIGER/Line Data for more information.

Network | Load DXF File...

This item opens the DXF Registration dialog. You can load DXF file information into the network and use it to populate the network objects. Refer to Section 4.15 DXF Information for more information.

Network | Preferences...

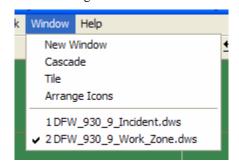
This item opens the User Preference dialog. You can customize the default data and look of the network with this dialog. Refer to Section 4.16 Network Preferences for more information.

Network | Origin at Top Left

Selecting the Network | Origin at Top Left menu command will change the orientation of the view so that the values of Y coordinates increase as they move down in the window. If this is not selected the orientation of the view will have the Y coordinates increasing as they move up in the window. This change will be reflected in the grid. This option is not enabled when TIGER files, DXF files, or background images are selected.

3.5.5 Window Menu

The following is the Window menu. The Window menu contains standard windowing commands.

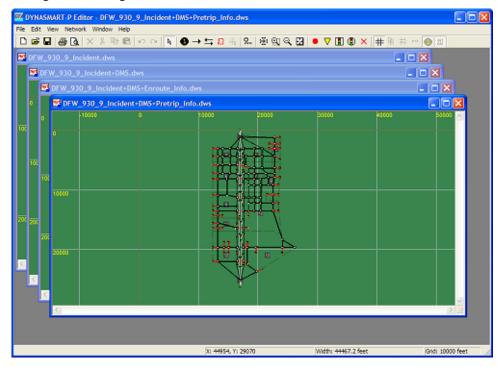


Window | New Window

Creates a new window displaying the currently active document. All windows displaying the same network will update as changes are made to the network from any window. This is useful if you want to zoom in on two separate areas of the network at the same time.

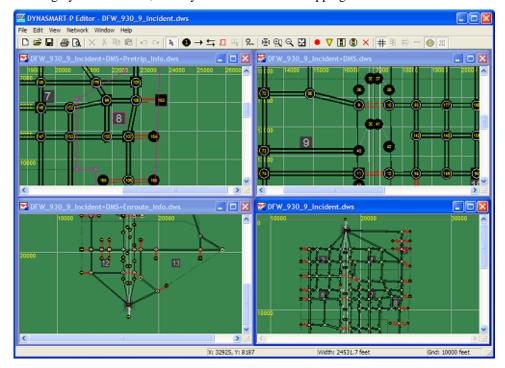
Window | Cascade

Arranges the existing windows such that all the title bars are visible.



Window | Tile

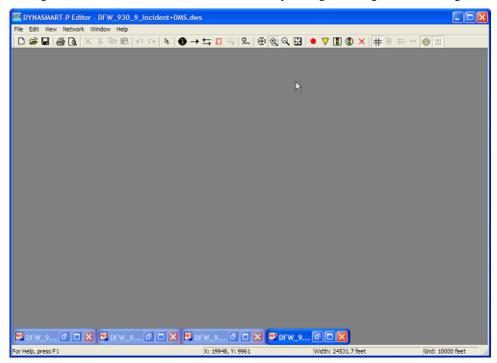
Arranges and resizes the document windows so they cover the available space within the application window, are roughly the same size, entirely visible and not overlapping.



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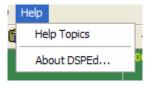
Window | Arrange Icons

Arranges the minimized document windows so they're aligned along the bottom edge of the window.



3.5.6 Help Menu

The following is the Help menu. It contains online help commands.

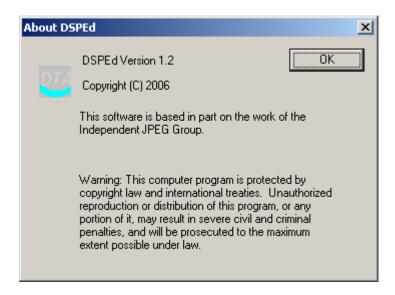


Help | Help Topics

Brings up the main application help window. The F1 key also opens the help window. Each dialog also has a help button that will open the help window with the current context shown.

Help | About DSPEd...

Brings up the About Box dialog containing DSPEd's version and copyright information.



3.6 Tool Bar

Most of the menu commands can also be accessed from the tool bar. See the associated menu item for a detailed description. The Tool Bar can be shown or hidden with the Tool Bar item on the View Menu. The tool bar is broken into four separate tool bars than can be moved independent of the other tool bars.



3.6.1 Common Tools

The first tool bar has common Windows controls.





Create a new file.



Open an existing file.



Save the currently active document.

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Print the currently active document.

Print Preview 🚨

Display the currently active document in a print preview window.

Delete X

Delete the selected object(s).

Cut 🖁

Remove the selected object(s) from the network and put them on the clipboard.

Сору

Copy the selected object(s) to the clipboard.

Paste 🕮

Paste the clipboard contents into the currently active document.

Undo 🖺

Undo the last change to the Network. This can be done multiple times to undo multiple commands. The number of times the Undo command can be exercised is only limited by amount of memory on your computer. This functionality is currently accomplished by saving a copy of the network in memory. This functionality can be turned off using the Preferences dialog. With very large networks it may be desirable to turn off the undo capability to save time and resources.

Redo 🖼

Redo the last action that was undone. This can be done multiple times to redo multiple undone commands. The number of time the Redo command can be exercised is only limited by the number of Undo commands exercised. This functionality can be turned off using the Preferences dialog. With very large networks it may be desirable to turn off the undo capability to save time and resources.

3.6.2 View Tools

The second tool bar has tools that change the view of the network.



Distance 🖳

The cursor changes to the Distance Tool cursor. The Distance Tool allows the user to measure distances in the network. Click the distance tool cursor on the location where you want to begin measuring. As the

cursor is moved away from that location the distance measured is displayed in the status bar. Click the cursor again to create a "way" point. Moving the cursor again will measure the cumulative distance from the starting point. This technique can be continued to measure the distance along a path in the network with many changes in direction. To start measuring again from a new starting point, double click the cursor. The cursor can then be moved to the new starting location where you will click the cursor to start again. To free the cursor from this "Distance Measuring" state, press the Select button, press the Distance Tool regularly toggle button again, right-click in an open area of the network, or press the ESC key.

Pan 🖗

The cursor changes to the Pan cursor. It repositions the network's display without affecting the current zoom level. The location under the cursor will be centered in the window. Repeated pans can be done without accessing the menu option. To free the cursor from this "Pan" state, press the Select button, press the Pan toggle button again, right-click in an open area of the network, or press the **ESC** key.

Note: The user can use the pan button to view outside the current extent of the network. Holding down the **CTRL** key while rotating the mouse wheel centers the network on the location where the mouse wheel event occurred.

Zoom In 🕄

The cursor changes to the Zoom In cursor. From this point, there are two different methods for implementing the Zoom In command; each providing different results. One method is to place the cursor on a specific point in the network and click the left mouse button. This will cause that point to become the center of an updated view, zoomed to a higher magnification level. The other method uses a "rubber band" to mark off the boundaries of a region, which will become the new view of the network. To perform this operation, place the cursor on a point you want to become the corner of a zoomed-in view. Press down on the left mouse button and drag the "rubber band" box to the point that forms the opposite corner of the new view. When you release the mouse button, the area within the "rubber band" will be expanded to fill the active window. Repeated zooms can be done without accessing the menu option. To free the cursor from this "Zoom In" state, press the Select button, press the Zoom In toggle button again, right-click on the open area of the network, or press the ESC key. Zooming can also be accomplished with the Page Up / Page Down keys, the +/- keys or the mouse wheel.

Zoom Out 🔍

The cursor changes to the Zoom Out cursor. Place the cursor on a specific point in the network and click the left mouse button. This will cause that point to become the center of an updated view, zoomed to a lower magnification level. Repeated zooms can be done without accessing the menu option. To free the cursor from this "Zoom Out" state, press the Select button, press the Zoom Out toggle button again, right-click on the open area of the network, or press the ESC key.

Note: The user can use the zoom out button to view outside the current extent of the network. Zooming can also be accomplished with the **Page Up / Page Down** keys, the + / - keys or the mouse wheel.

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Show Entire Network

Displays the entire network. The view will be re-centered and zoomed in or out as necessary so that the network fills the window. If other options, such as a background image, are shown, the view will change to show the largest area.

Grid

Hides or shows the grid on the network in the display.



If Snap is enabled via the toolbar or Network menu, nodes and feature points will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on the Miscellaneous Preference dialog. This only happens when a node or feature point is being created or dragged to a new location, otherwise nodes and feature points will remain in their location. Turn Snap on to do a rough layout of nodes in a network but turn Snap off to precisely place nodes and feature points.

Show/Hide Nodes



Hides or shows the nodes on the network in the display.

Show/Hide Zones 19



Hides or shows the zones on the network in the display.

Image 🦺

Hides or shows the image behind the network in the display. Refer to Section 4.13 Importing Images for more information on images.

TIGER Data 🗮

Hides or shows the TIGER/Line Data on the network in the display. Refer to Section 4.14 TIGER/Line Data for more information.

DXF Information ***

Hides or shows the DXF Information on the network in the display. Refer to Section 4.15 DXF Information for more information.

3.6.3 **Objects Tools**

The third tool bar has tools that create or change network objects.



Select 8

The Select or Arrow cursor is the default cursor. To free the cursor from any other state, press the Select button, right-click in an open area of the network, or press the ESC key. To select an object, click on it. When

an object has been selected it will be highlighted in magenta. If there were other objects selected prior to clicking on the new object, the other selected objects will no longer be selected. It is possible to select multiple objects by holding down the **CTRL** key when clicking on objects. By clicking and holding down the left mouse button and then dragging, everything that falls within the drag box will be selected.

Node •

The cursor changes to the Node cursor. Point the cursor at the location where you want the node and click the left mouse button. You can continue creating nodes by clicking the left mouse button until you select a

different functionality. To free the cursor from this state, press the Select button, press the Node toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.4 Creating Nodes for more information.

One-way Link →

The cursor changes to the One-way Link cursor. A single (one-way) link will be created when you click to create the starting location and then click again to create the ending location. To free the cursor from this state, press the Select button, press the One-way Link toggle button again, right-click in an open area of the network, or press the **ESC** key. Refer to Section 4.3 Creating Links for more information.

Two-way Link ≒

The cursor changes to the Two-way Link cursor. A pair of links running in opposite directions will be created when you click to create the starting location and then click again to create the ending location. To free the cursor from this state, press the Select button, press the Two-way Link toggle button again, right-click in an open area of the network, or press the ESC key. Refer to Section 4.3 Creating Links for more information.

Zone ¹

The cursor changes to the Zone cursor. The zone tool allows the user to create zones in the network.

To free the cursor from this state, press the Select button, press the Zone toggle button again, right-click in an open area of the network, or press the **ESC** key. Refer to Section 4.5 Creating Zones for more information.

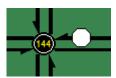
Autopopulate 4

The cursor changes to the Autopopulate cursor. This menu item is only available when TIGER Data or DXF Information is shown in the Network Window. This allows you to quickly create links from TIGER/Line or DXF file data. See Section 4.14.2 Using TIGER/Line Data to Populate a Network or Section 4.15.2 Using DXF Information to Populate a Network for more information. To free the cursor from this state, press the Select button, press the Autopopulate toggle button again, right-click in an open area of the network, or press the ESC key.

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Stop Sign •

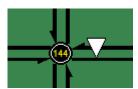
Changes the active tool to the Stop Sign tool. The cursor will be displayed as a stop sign symbol when the cursor is over a link.



When the cursor is not over a link it shows up as a cursor. When you click on a link you assign that link as a minor approach to the node. A red octagon shaped icon will be drawn next to the link near the downstream end.

Yield Sign 🔽

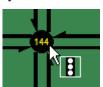
Changes the active tool to the Yield Sign tool. The cursor will be displayed as a yield sign symbol when the cursor is over a link.



When the cursor is not over a link it shows up as a cursor. When you click on a link you assign that link as a minor approach to the node. A yellow triangle shaped icon will be drawn next to the link near the downstream end.

Pre-Timed Controller

Changes the active tool to the Pre-timed Controller tool. The cursor will be displayed as a pre-timed controller symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node you assign that node a pre-timed controller. A white square shaped icon will be drawn on the node to signify that is a pre-timed controlled intersection.

Actuated Controller

Changes the active tool to the Actuated Controller tool. The cursor will be displayed as an actuated controller symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node you assign that node as an actuated controller. A white circular shaped icon will be drawn on the node to signify that is an actuated controlled intersection.

Remove Control



Changes the active tool to the Remove Control tool. The cursor will be displayed as a remove control symbol when the cursor is over a node.



When the cursor is not over a node it shows up as a cursor. When you click on a node you remove any type of control that is present at that node.

3.6.4 **Default Link Type**

The fourth tool bar has the default link type drop down selection list.



Default Link Type

Changes the default link type so that links created with the One-way Link Tool, the Two-way Link Tool, or by autopopulation of DXF file data will be of the type shown. Existing links will not be affected by this change. This value can also be set on the Link Properties page on User Preferences dialog. The default properties of the links that are created can be set on that page also. Refer to Section 4.16.2 Preferences: Link Properties Page for more information.

3.7 **Status Bar**



The status bar forms the bottom edge of the application window. When the cursor rests on a tool bar button or menu choice, the status bar displays a brief description of the command performed by the button or menu. When loading a network or performing other operations, the status bar displays a brief description of the operation being performed. If the user is creating a link, its length and angle from North are also displayed. It also displays the x-y grid coordinates of the cursor. The current width of the window in feet is also displayed. As you zoom in or out the width will change to reflect the distance across the window in network coordinates. The last item shown is the current separation of the grid lines in feet. The Status Bar can be shown or hidden with the Status Bar item on the View Menu.

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4 Working with the Network Window

4.1 Overview

Pointing and clicking in the Network Window creates most types of traffic model objects. You select a menu command from the Network Menu, or press the equivalent tool bar button from the Tool Bar, to put the editor in a mode for creating objects of the chosen type. Then point to the desired location for the object in the Network Window and click the left mouse button to create an object. You can continue creating more objects of the chosen type until a different tool is chosen.

Each network traffic model object has properties that can be edited. For instance, links have properties such as the number of lanes or the free-flow speed, etc. Each type of network object has a dialog for editing the object's properties.

Viewing, creating, selecting, deleting, moving, and editing traffic objects are discussed in more detail in the following sections.

4.2 Changing the View of the Network

Since a network may be too large to fit in the available screen space at a sufficient level of detail, the editor provides various commands for changing the view. These commands do not modify the network itself; they only affect the visible display. The user can use menu commands, tool bar buttons, and scroll bars to change the view of the network in the Network Window. Refer to Section 3.5.3 View Menu for details on how to change the view of the network with menu commands. Refer to Section 3.6 Tool Bar for details on how to change the view of the network with buttons. Refer to the Window's User Guide for details on how to use scroll bars.

Note: The only way to view outside the current extent of the network is with the Zoom Out command, the Pan command or if the scrollbars are shown use the scroll buttons (arrows) to change the view. Zooming can also be accomplished with the **Page Up/Page Down** keys, the +/- keys or the mouse wheel.

4.3 Creating Links

A link represents a one-way, non-branching stretch of road where properties such as number of lanes, free-flow speed, etc. are constant. Links are always connected to exactly one node at the upstream end and exactly one node at the downstream end. Links are drawn as arrows, with the arrowhead at the downstream end of the link. The editor uses color to distinguish between links of different types. The colors can be customized using the Preferences dialog.

The default type of link and its default properties can be established by editing the default link properties on the Preferences dialog. By setting the defaults you can create many links with the correct properties that will not require extensive editing.

There are many ways to create new links. To create links, first set the default link properties in the Preferences dialog, and then decide whether you want a single (one-way) link or a pair of links running in opposite directions. For a single link, press the Link toggle button or the Network | Link menu command from the menu. For a pair of opposing links, press the Two-Way Link toggle button or the Network | Two-Way Link menu command from the menu.

After choosing single or double links, specify the start and end positions of the link(s). This can be done in two ways:

- Click on the location you want the link to start. This can be on an existing node or where no node currently exists. Move the cursor to the desired end of the link. Now click on the location you want the link to end. Again, this can be on a node or not. A link will be created between these two locations.
- Alternatively, you can press and hold the mouse button at the location you want the link to start. Keeping the button pressed, move the mouse to the location you want the link to end. Release the button and a link will be created between the two locations.

If either endpoint does not already have a node, one will be created. If nodes already exist at the endpoints, the link will be connected to them.

If Snap is enabled, the start or end nodes may move slightly to align with the nearest coordinates that are evenly divisible with the Snap Granularity set on the Miscellaneous Preferences page. This function can be turned on and off from the Network menu or the toolbar.

When drawing links, the drag line will highlight as the mouse pointer moves near a node. The location of the cursor, the distance drawn, and the direction from the start point will be displayed in the status bar.

The length of the link is a very important property. During layout of the network, the editor determines the length of the link based on the upstream node to downstream node distance. As feature points are added to the link the increased distance is accounted for automatically. This length can be changed to reflect the user specified distance. Links will be highlighted with red if the length is less than the minimum length acceptable to DYNASMART-P. Also refer to Section 5.1.2 Editing Links.

Feature Points can be used to define the curvature of the link. Feature Points can be added to a selected link from the Edit menu or by right clicking the link and selecting the Add Feature Point item from the popup menu. When the link is selected, Feature Points are displayed as small light blue circles. The following image shows a selected link with feature points.



The Feature Points can be clicked on and dragged to a new location to define the geometry of the link. If Snap is enabled via the toolbar or Network menu, the temporary feature point will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on the Miscellaneous Preference dialog. Feature Points do not have any properties other than location. They do not have a property page. The only adjustment to them is made by clicking and dragging them to a new location.

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4.4 Creating Nodes

Broadly speaking, a node is a point where something of interest occurs along a roadway. The characteristics of the links may change at the node. For example, a two-lane roadway may change to a three-lane roadway. Feature Points can be used to define the geometry of the links instead of using Nodes. Also refer to Section 5.1.1 Editing Nodes for more details.

To create nodes, press the Node toggle button or select the Network | Node menu command from the menu bar. Then point the cursor at the location where you want the node and click the left mouse button. You can continue creating nodes by clicking the left mouse button until you select a different tool bar button. You can accurately position a new node by holding down the left mouse button as you drag the mouse. An outline of the node will appear until you release the left mouse button. The outline of a selected node will be magenta. A selected node or set of nodes can also be moved using the arrow keys.

If Snap is enabled, the nodes may move slightly to align with the nearest coordinates that are evenly divisible with the Snap Granularity set on the Miscellaneous Preferences page. This function can be turned on and off from the Network menu or the toolbar.

Nodes can be inserted into existing links. If a newly created node intersects an existing link, the link is broken into two links. The new links are then automatically connected to the new node. The new links have the same properties as the existing link, except length, which is reset to default (node to node distance).

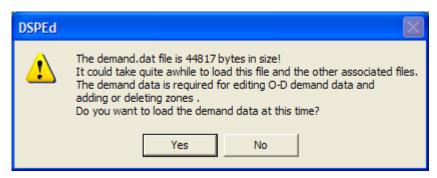
If a node is created within an existing zone, that zone will be updated to show the new node in its list of nodes in zone.

4.5 Creating Zones

To create zones, press the Zone toggle button or select the Network | Zone menu command from the menu bar. The zone tool allows the user to create zones in the network. Zones are defined geographically by their feature points. Adjacent zones can share feature points. Begin by clicking the mouse at a corner of the zone. A Feature Point will be created at that location. Move the mouse cursor to a new location and click again. A dashed line will be drawn to define the edge of the zone. If the point is on, or very close to an existing zone's feature point, the new line segment will use the existing point. (At a later time when that point is moved, both zones will be adjusted.) Repeat this process until the zone is complete. You can close the zone by double clicking the mouse anytime the zone will be defined by at least three points. Alternatively, you may move the mouse over the starting point and click to close the zone. When the zone is closed a zone number will appear centered in the zone. To free the cursor from this state, press the Select button, press the Zone toggle button again, right-click in an open area of the network, or press the ESC key.

The shape of the zone can be changed by right clicking on the zone and selecting "Add Feature Point" from the pop up menu. When a zone is selected, Feature Points are displayed as small light blue circles. Drag the Feature Point to the desired location to define the geometry of the zone. If Snap is enabled via the toolbar or Network menu, the temporary feature point will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on the Miscellaneous Preference dialog. Feature Points do not have any properties other than location. They do not have a property page. The only adjustment to them is made by clicking and dragging them to a new location.

Some projects have an enormous amount of demand data. Loading that data can be delayed or not done at all. One circumstance that requires demand data to be loaded is creation or deletion of zones. If loading of demand data was not done when the network loaded the following dialog will ask you if wish to load the demand data when you create a new zone.



Choosing Yes will load the demand data into memory. Once this has been accomplished it is not necessary to do it again during the course of this working session with this network. If No is chosen, you may continue to work with the network but you will not be able to perform the desired task. If you choose not to load the demand data you cannot create a new zone. If you choose to load the demand data the zone will be added to the network after the demand data has been loaded.

4.6 Selecting Objects

Selecting an object makes it the focus of subsequent commands such as editing properties, moving to another location, copying, and/or deleting the object. Once an object is selected, its appearance is highlighted magenta. Menu options that can operate on that selected object will become enabled.

4.6.1 Selecting a Single Object

The steps to select an object are:

- Press the Select button or choose the Network | Select menu command, if the cursor is not currently drawn as an arrow. Or, you can right-click the mouse in the background area on the Network Window and the arrow tool will then be changed to the cursor.
- Position the cursor over the object and click the left mouse button. The object will be drawn with a magenta border to indicate that it is selected. Selected objects may be moved to new locations by using the arrow keys or by dragging the object with the mouse.

4.6.2 Selecting Multiple Objects

Multiple objects can be selected at once. To add or remove an object from the current selection, hold down the CTRL key while clicking on the object with the selection cursor. You can select many items with the selection cursor by clicking the left mouse button and dragging a box around the items you want to select. All the items within the box will be selected. If all selected items are of the same type (e.g. Link objects) all of the items properties can be edited by right-clicking on one selected item and selecting the Properties item from the popup menu. Selecting multiple links can also be used to create a path through the network. When more than one link is selected the Create Path menu item on the Edit menu will be enabled. After creating a path, the bus route dialog or the VMS detour path dialog can use that path to complete its requirements. Refer to Section 4.12 Creating a Path for more information.

4.7 Moving Objects

Links are moved only by moving the nodes they are connected to. Nodes can be moved graphically, or by editing their X-Y locations in their Properties dialogs. To move nodes graphically, select the nodes to be moved. The left, right, up, down arrow keys may be used to move the selected nodes in the direction of the pressed key. Alternatively, the mouse may be used to drag the selected node or nodes to a new location. With

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the cursor positioned over one of the selected objects, press the left mouse button down and continue holding the button down while moving the cursor to a new location. If Snap is enabled via the toolbar or Network menu, the temporary node will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on the Miscellaneous Preference dialog. The status bar displays the location of the cursor as it moves. Also, the Network Window displays a coordinate grid which aids in positioning nodes. Release the mouse button when the cursor is at the desired new location. The nodes are now displayed at their new locations. If multiple nodes are selected, they maintain their relative positions during the movement. Any links connected to the nodes will be moved along with them, regardless of whether or not they are selected. Links that are selected will not actually be moved unless the node(s) they are connected to are moved. If only one node connected to the link is selected, the link will be stretched or compressed as the selected node is moved.

4.8 Deleting Objects

To delete an object or set of objects, select the object(s) to be deleted. Press the **Delete** key, select the Edit | Delete menu command, or press the Delete button on the tool bar. All selected objects will be deleted.

Note: Nodes that still have links attached cannot be deleted. They can be deleted simultaneously along with the links attached to them. If unselected links are still attached to any selected nodes, a message box will inform the user that some nodes could not be deleted. Those nodes will not be deleted, and will remain selected to identify them.

4.9 Cutting Objects

Cutting an object deletes it from its current location but puts the associated data on the Windows clipboard. To cut an object or set of objects, select the object(s) to be cut. Press **CTRL+X**, select the Edit | Cut menu command, or press the Cut button. The selected object(s) are removed from the network and copied to the clipboard. As with Delete, nodes that have uncut links still attached to them cannot be removed from the current network. However, copies of any such nodes are still placed on the clipboard. Cutting objects is useful when you want to move objects from one location to another or from one network to another. Using this method it is possible to cut objects from one window and place them in another network window.

4.10 Copying Objects

To copy an object or set of objects to the clipboard, select the object(s) to be copied. Press CTRL+C, select the Edit | Copy menu command, or press the Copy button. The selected object(s) are copied to the clipboard. Copying objects is useful when you want to reproduce a set of objects in another part of the same network or in a different network. For example, you can create a complex diamond interchange and copy it to different locations when needed.

4.11 Pasting Objects

To paste the clipboard contents into the currently active document, press CTRL+V, select the Edit | Paste menu command, or press the Paste button. These options are only available when the objects on the clipboard are DSPEd objects. The traffic network objects on the clipboard are copied into the currently active document at the location where they were cut or copied from. You may need to Show Entire Network to see the newly pasted objects. The pasted objects remain selected after they are pasted. If the pasted items need to be moved to a new location, they can be dragged as one object as long as they are all still selected. If pasted objects have properties that conflict with objects in the existing network they will be assigned new properties. For example, node numbers must be unique. If node number 100 is pasted in a network that already has a node number 100, the pasted node will be renumbered with the first available node number. Pasting is very useful when copying

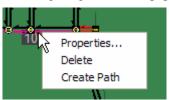
or cutting part of a network to be used in other networks. After pasting you will need to connect the pasted portion of the network to the existing network by dragging links from a pasted node to an existing node.

4.12 Creating a Path

Creating a bus route or a VMS detour path can be time consuming. By clicking on links on the network diagram using the multiple selection feature of the editor, (hold down the CTRL key when selecting links) the task is greatly simplified. When two or more links are selected, the Edit | Create Path menu will become active. The command invokes the Create Path dialog. The Create Path dialog displays the node sequence of the path that has been selected and asks if you want to create the path. When you click the Yes button, a path object is created and placed on the Windows Clipboard. Other dialogs within DSPEd, such as the VMS detour and the Bus Route dialogs, use the information on the clipboard to automatically populate their paths. Clicking the No button simply dismisses the dialog with no action taken.



An alternate way to create the path is to click the right mouse button while over one of the selected links to open the popup menu. Select Create Path from the popup menu to display the Create Path dialog. The following image shows the popup menu.



4.13 Importing Images

You can load an image, such as an aerial photograph or a street map, which can be used as a background for the traffic network being modeled. An image can serve as a visual reference for laying out the network, as a visual reference for observers, or just as an attractive background. Laying out a network from an image is a very quick way to develop a traffic network of streets and intersections. Currently, bitmap images (BMP file) and JPEG images (JPG file) are the only type of image that can be used as a background for a network. Other image formats may be supported in the future.

4.13.1 Selecting a Background Image

The accuracy of a traffic network developed with a background image relies on the accuracy of the image chosen and the scale that is set by you. The image must have the same resolution in the X (East West) direction as it does in the Y (North South) direction (some aerial photos may not adhere to this rule). This does not mean they must be square, it means they must not be stretched. The orientation of the map is not important to the editor. However, if the network is developed with a line drawn map, and then for presentation purposes, an aerial photo is associated with the network, the two images must have the same orientation. The editor does

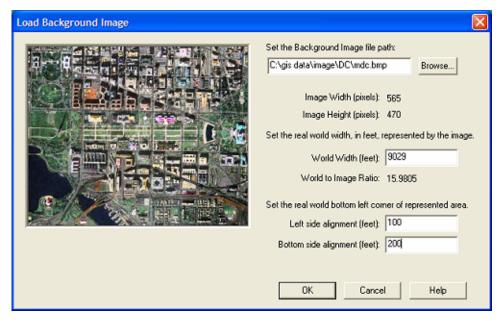
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not have any functionality built in to edit the image. If you wish to change the images orientation or drawing objects you must edit the image outside of the editor with a graphics program. You may wish to edit out unwanted lines or objects or add objects, such as buildings or text, to the image.

There are many types of images that may be used as a background for a traffic network. Aerial photographs may be used but may be hard to accurately select node locations if the world to image ratio is very high. Many computer-mapping programs allow exporting a desired view to an image format. These are very easy to use but may lack the accuracy you desire. Some CAD programs may allow you to export data to an image file. Scanning a paper map (such as a street map) and saving it as an image is also a viable option.

4.13.2 Loading a Background Image

To load an image select the Network | Load Background Image menu command. The Load Background Image dialog (below) will be presented. This dialog will assist you with the task of loading, positioning, and scaling the image. This process associates an image with a network and the association will remain until you remove the association.



Set the Background Image file path:

The first task is to input the file name and path to the image file. You may type in the path and file name directly to the edit box or browse to it via a standard File Selection dialog that pops up when the Browse button is pushed. Currently, bitmap images (BMP file) and JPEG images (JPG file) are the only type of image that can be used as a background for a network. When the file is selected, the image will be displayed in the left pane.

Image Width and Height

These values represent the image width and height in pixels. (A pixel is the smallest picture element of a digital image. Individual pixels are too small to notice, but together they make up the whole image.) The width and height values are obtained from the image file. They are provided for reference only. They do not represent the real world width or height. These types of raster images do not contain scaling information. The real world representation must be provided by the user in the next data fields.

Set the real world width, in feet, represented by the image.

In order for the image to provide an accurate background, the World Width must be set by you to reflect the actual number of feet represented by the width of the image.

World Width (feet):

This is the width of the image in real-world measurements. This value is critical to the accuracy of the traffic network. If the World Width is not set accurately, the length of links created by referencing the image may be off by many feet. The scale will be initially set to one foot per pixel when an image is loaded. For example, initially a 500 pixel wide image represents 500 feet in the real world. This will most likely not be correct and must be set correctly for the map to represent the real world. An image that is only 500 pixels across may represent 5,000 feet in the real world.

Example Process:

The World Width value can be determined by using known distances within the image or using the scale of the map that generated the image. One method for determining the scale is as follows:

- 1. Print out the full image.
- 2. Using a ruler, measure the distance in inches or millimeters between two points on the image that you know the corresponding real world straight-line distance. Two intersections on a map that you know the distance between or a football field (300 feet or 360 if you include the end zones) on an aerial photograph make good points of reference. For example, two intersections are known to be 1500 feet apart in the real world. On the image they are measured to be 50 millimeters apart.
- 3. Create a ratio of the real world distance in feet to inches or millimeters on the printout. For example, 1500 feet / 50 millimeters = 30 feet/millimeter.
- 4. Measure the full width of the image in inches or millimeters with the ruler. For example, the full image may measure 300 millimeters from left to right edge.
- 5. Multiply the ratio and the image width to get the number of feet represented by the width of the image. For example, 300 millimeters * 30 feet/ millimeter = 9000 feet.
- 6. Enter this value in the World Width field on the Load Background Image dialog.

You may need to adjust this value after you have created a few streets on the network. If the lengths of the links are not correct, enter a value that better represents the real world width of the image. You may have to adjust the positions of nodes after the World Width has been reset.

You may want to add this value as part of the file name so that this process does not have to be repeated. For example, "main street.bmp" may be changed to "main street width 9000 feet.bmp." If you change the name of the file, you will have to associate the network with the new file name.

World to Image Ratio:

This value is the ratio or scale of the real world to the image. It is calculated as the World Width (feet) divided by the Image Width (pixels). It is provided only as a reference.

Set the real world bottom left corner of represented area.

Setting the position of the image is critical to aligning an existing network with a new image. The default values for a new image are set to the zero left value and a zero bottom value. This places the bottom left corner at the crossing point of the major axes. This is a good place to start a new network. For existing networks, you may have to move the image behind the network by adjusting the left and bottom alignment points. These values are in network (real world) coordinates (feet).

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Left side alignment

This is where the left side of the image will be positioned.

Bottom side alignment

This is where the bottom side of the image will be positioned.

4.13.3 Adjusting the Background Image

An image may need to be adjusted because the scale or the position was not input correctly. The background image may be adjusted after it has been associated with a network by using the Load Background Image dialog. The Network | Load Background Image menu item will display the Load Background Image dialog with the existing image, file name and path, scale, and position information shown. You may select a different image if desired. You may choose a different scale by adjusting the World Width value. You may also adjust the position of the image by setting the Left and Bottom alignment values.

4.13.4 Hiding the Background Image

The image may be hidden using the View | Background Image menu item or tool bar button. The association of the image to the network will remain but the background image will not draw behind the network until you click the menu item again or you reload the network. You may delete the association between the network and the image by following the instructions for deleting the background image.

4.13.5 Deleting the Background Image

You may end the association between the image and the network by removing the path and file name from the Load Background Image dialog. The Network | Load Background Image menu item will display the Load Background Image dialog with the existing image, file name and path, scale, and position information shown. Simply highlight the path and file name of the existing image and delete it from the edit box. Select OK and the image will no longer be associated with the network. The image itself will not actually be deleted, just the association.

4.14 TIGER/Line Data

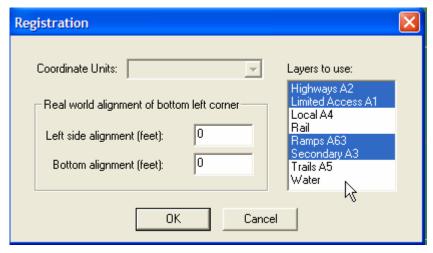
TIGER/Line files are street and roadway data (and much more) files created and distributed by the U.S. Bureau of the Census. You can load TIGER/Line data into the document window to facilitate rapid creation of links and nodes. More information and TIGER/Line data may be obtained at the U.S. Bureau of the Census website (http://www.census.gov/geo/www/tiger/index.html).

The Federal Information Processing Standards (FIPS) codes cross-reference a state and county to their numeric designation. For example, if you wanted TIGER/Line data for Colorado Springs, Colorado, which is in El Paso County, you would look up the FIPS code for El Paso County Colorado. Colorado's state FIPS code is 08 and El Paso County's FIPS code is 041. You could then download the TIGER/Line data designated 08 041 and lay out roadways for El Paso County, Colorado based on that data.

4.14.1 Loading TIGER/Line Data

Select the Network | Load TIGER Data menu command. A standard File Open dialog appears for selecting the TIGER/Line file. TIGER/Line data is organized by county. Only the type 1 and type 2 card files are needed by the editor. Any other card files will be ignored.

A Registration dialog will be displayed. The dialog allows you to select what information (layers) to display and where to display the bottom left corner of the TIGER/Line data. By default it will be at location 0, 0 in Network coordinates. The Water features and the Rail features will be ignored by DSPEd. They are included as reference points. Local features include all local streets. There can be a large number of Local features. If you intend to autopopulate a large area network you may want to not load the Local features. By simply loading the Highways, Limited Access, Ramps, and Secondary features you can use the autopopulate feature to create a large network in a matter of minutes. The identifier next to the layer is the TIGER/Line data designation for the layer.



Multiple TIGER/Line files can be read in. Simply load in additional files exactly as the first. This allows multiple counties to be shown at once. Their data will be added to the network. The first file loaded will set the origin and the information (layers) to display. The rest of the files will be automatically adjusted to the correct positions relative to the first.

4.14.2 Using TIGER/Line Data to Populate a Network

Using the data to populate a network is simple. The Preferences dialog allows you to set the default link parameters for all types of links. If this link data has been defaulted when links are populated from the TIGER data they will be assigned the default parameter values based on the type of line data in the TIGER file. Also use the Preferences dialog to set whether one link or two opposing links will be created during autopopulation. To enter autopopulate mode, press the Autopopulate button or select the Network | Autopopulate menu command. There are two ways to populate the network:

- Click on a road line. A link (or link pair) will be created to match this line. If there are nodes at the endpoints, the link will be connected to them. If there are no nodes at the endpoints, nodes will be created.
- Press and hold the left mouse button, and drag out a box. All road lines within the box will have links created to match them. As above, existing nodes will be used where possible. New nodes will be created as necessary.

The different types of TIGER/Line data will create different types of DSPEd links. The following information details what types of Line data will create what types of DSPEd links.

- Limited Access (A1) Freeway
- Highways (A2) Highway
- Secondary (A3) Arterial
- Local (A4, A61, A62, A64) Arterial
- \blacksquare Ramp (A63) On Ramp

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Due to the structure of TIGER/Line data, nodes exist everywhere two road lines cross, even where the roads do not actually intersect. When this occurs, it is better to manually draw these links using the TIGER/Line data as a reference (like a map), rather than relying on automatic population.

The TIGER/Line data is not perfect. The link connections, direction of travel, and type should be verified after a network had been created with this data.

4.14.3 Hiding TIGER/Line Data

The TIGER/Line Data may be hidden using the View | TIGER/Line Data menu item or tool bar button. It will still be available, but will not draw until you click the menu item again. While the data is not visible, the Autopopulate function will not operate.

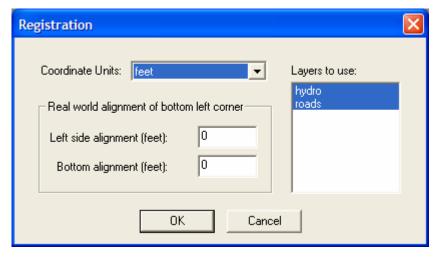
4.15 DXF Information

DXF/Line files are street and roadway data (and much more) files created by Computer Aided Design programs. You can load DXF/Line data into the document window to facilitate rapid creation of links and nodes.

4.15.1 Loading DXF Information

Select the Network | Load DXF File menu command. A standard File Open dialog appears for selecting the DXF Information file. Only one DXF file can be read in at a time. Opening an additional DXF file will overwrite the first file display.

A Registration dialog will be displayed. The dialog allows you to select what units the data was stored and what information (layers) to display and where to display the bottom left corner of the DXF Information. By default it will be at location 0, 0 in Network coordinates.



4.15.2 Using DXF Information to Populate a Network

Using the data to populate a network is simple. Use the Preferences dialog to establish the default link type and default link parameters. Also use the Preferences dialog to set whether one link or two opposing links will be created during autopopulation. To enter autopopulate mode, press the Autopopulate button or select the Network | Autopopulate menu command. There are two ways to populate the network:

- Click on a road line. A link (or link pair) will be created to match this line. If there are nodes at the endpoints, the link will be connected to them. If there are no nodes at the endpoints, nodes will be created.
- Press and hold the left mouse button, and drag out a box. All road lines within the box will have links created to match them. As above, existing nodes will be used where possible. New nodes will be created as necessary.

In some cases it is better to manually draw some links using the DXF data like a map, rather than relying on automatic population.

4.15.3 Hiding DXF Information

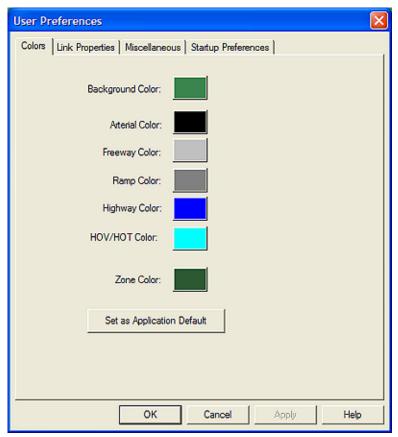
The DXF data may be hidden using the View | DXF Information menu item. It will still be available, but will not draw until you click the menu item again. While the data is not visible, the Autopopulate function will not operate.

4.16 Network Preferences

To get to the User Preferences dialog select the Network | Preferences menu command. A tabbed dialog will open from which the editor preference parameters can be specified. These values are either used for the current session only or saved in the registry for the current user and used as default for all new cases or new traffic objects.

4.16.1 Preferences: Colors Page

To display the Colors tabbed page, open the User Preferences dialog and then click on Colors page.



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Colors Page: Background Color

This is the color the background will be drawn. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: Arterial Color

This is the color for all Arterial links. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: Freeway Color

This is the color for all Freeway links. This applies to Freeway with Detector links also. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: Ramp Color

This is the color for all Ramp links. This applies to both On and Off Ramps. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: Highway Color

This is the color for all Highway links. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: HOV/HOT Color

This is the color for all HOV and HOT links. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

Colors Page: Zone Color

This is the color for all Zones. To pick a new color, click on the colored button. A standard Color Dialog will appear for choosing the color. If the color dialog is dismissed with OK, the new color will appear on the button. When the Preferences dialog is dismissed the color will change for the current working session.

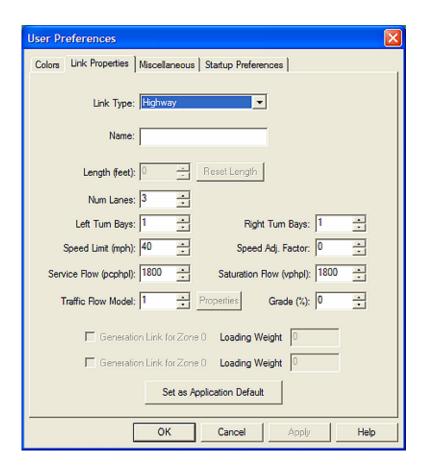
Colors Page: Set as Application Default

If the User Preferences dialog is dismissed with OK, the new settings will be in affect for the current working session. Using the Set as Application Default button will save the settings for the current user for all future working sessions.

4.16.2 Preferences: Link Properties Page

To display the default Link Properties tabbed page, open the User Preferences dialog and then click on Link Properties page. The Link Properties preference page is the same as the normal link properties page except some parameters only apply to a specific link. The individual properties are discussed in detail on the Link Properties page. Please refer to Section 5.1.2 Editing Links for more information. Only the parameters that are changed because they are on the preferences page are discussed below.

The properties set as defaults are used during the creation of new links within the network. The page stores a set of properties for each type of link. Each type of link can be edited and then those values will be used during the creation of new links for this session if the Ok button is clicked and/or for all future sessions if the Set as Application Defaults button is clicked. The link type that is currently selected when the dialog is dismissed with the Ok button will be the default link type. The default link type will be used when you create new links with the single link or two-way link tool or when populating the links from a DXF file. Each link created will have the default values for the parameters. When populating the links from a TIGER file, different types of links will be created from different types of TIGER line data. If the default data has been set for all types of links, the new links from the TIGER file will have the default values for the parameters. Using this capability you could create a very large network within a few minutes.



Link Type

This drop down list specifies the default link type. The preferences store a copy of default parameters for each type of link. Simply change the link type and set the parameters that should be used as default values for that link type.

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Length

This entry specifies the length of the link. The link length cannot be set as a default value. The length of individual links is determined by it node coordinates.

Reset Length

This button resets the link length to the default length of the link. This button is not available for the preference dialog for the same reasons stated above for the link length.

Traffic Flow Model Properties

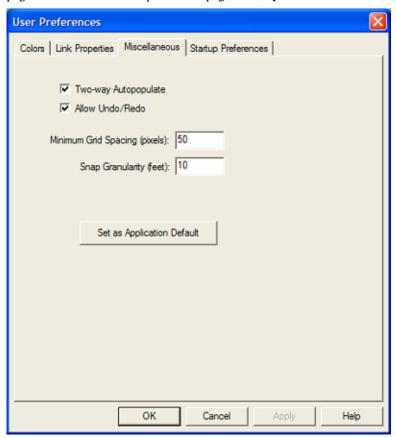
The Properties button is disabled in the preferences dialog. Refer to Section 5.1.3 Editing Traffic Flow Model Properties for more information.

Link Properties Page: Set as Application Default

Using the Set as Application Default button will save the settings for the current user for all future working sessions. If the User Preferences dialog is dismissed with OK, the new settings will be in affect for the current working session.

4.16.3 Preferences: Miscellaneous Page

To display the Miscellaneous tabbed page, open the User Preferences dialog and then click on Miscellaneous page. The Miscellaneous preference page allows you to set some miscellaneous preferences.



Miscellaneous Page: Two-way Autopopulate

This is a flag used during the autopopulation of links from DXF files or TIGER files. If this is checked two mated links will be generated for a line segment. If this is not checked only one link will be generated for a line segment.

Miscellaneous Page: Allow Undo/Redo

This controls whether the editor saves the network before each change of the network. If a change is not desired it can be "undone." If the change that was undone was truly a desired change then it can be "redone." If this is checked the network will make a full copy of the network and store it in memory each time a change is made to the network. For very large networks it takes time to perform the save. You may want to uncheck this feature for very large networks.

Miscellaneous Page: Minimum Grid Spacing

This is the minimum distance between grid lines, measured in screen pixels. The lower the value, the closer together the grid lines will be drawn.

Miscellaneous Page: Snap Granularity

If Snap is enabled via the toolbar or Network menu, nodes and feature points will jump to the nearest coordinate location that is evenly divisible by the Snap Granularity value set on this page. A value of 10 feet will cause the node or feature point to jump to locations of 10, 20, 30, etc in the X and Y directions. A value of 100 feet will cause the node or feature point to jump to locations of 100, 200, 300, etc. Larger values make setting up the rough layout of a network easier but reduce the precision of node placement.

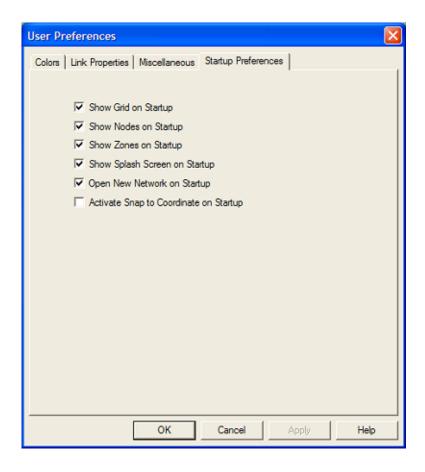
Miscellaneous Page: Set as Application Default

If the User Preferences dialog is dismissed with OK, the new settings will be in affect for the current working session. Using the Set as Application Default button will save the settings for the current user for all future working sessions.

4.16.4 Preferences: Startup Preferences Page

To display the Startup Preferences tabbed page, open the Preferences dialog and then click on Startup Preferences page. The Startup Preferences page allows you to control different operations that are performed at startup.

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Startup Preferences Page: Show Grid on Startup

This option controls whether the grid is shown when new networks are loaded. The grid can be turned on and off for the current session from the View Menu. If this is not checked the grid will not be displayed until you turn it on via the View Menu or Toolbar.

Startup Preferences Page: Show Node on Startup

This option controls whether nodes are shown when new networks are loaded. The nodes can be turned on and off for the current session from the View Menu. If this is not checked nodes will not be displayed until you turn them on via the View Menu or Toolbar.

Startup Preferences Page: Show Zone on Startup

This option controls whether zones are shown when new networks are loaded. The zones can be turned on and off for the current session from the View Menu. If this is not checked the zones will not be displayed until you turn them on via the View Menu or Toolbar.

Startup Preferences Page: Show Splash Screen on Startup

This option controls whether the splash screen is shown when the application is started. The splash screen shows the application name and version for a few seconds when the application starts up. If this is not checked the splash screen will not be displayed when the application begins.

Startup Preferences Page: Open New Network on Startup

This option controls whether a new network is created when the application is started. The new network can be used to start building a new network as soon as the application starts up. If this is not checked the new network will not be displayed when the application begins. If you normally open existing networks you may want to not create new networks on startup.

Startup Preferences Page: Activate Snap to Coordinate on Startup

This option controls whether Snap is enabled when new networks are loaded. Snap can be turned on and off for the current session from the Network Menu or the Toolbar. If this is not checked Snap will not be enabled until you turn it on via the Network Menu or Toolbar.

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5 Working with DYNASMART-P Data

5.1 Network Data

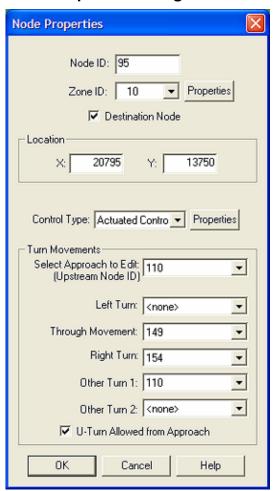
A DYNASMART-P network is made up of many objects, such as Nodes, Links, Zones, etc., and traffic flow properties. Much of the Network Data consists of objects found in the Network Window and can be edited by clicking on the object. There are some data, such as traffic flow model data and grade length Passenger Car Equivalents data, which apply to the whole network and can only be edited from the Network Data Dialog. The following sections describe how to edit the properties associated with Network Data objects and dialogs.

5.1.1 Editing Nodes

To bring up a Node's Properties dialog select the node and then choose the Edit | Properties menu command, or double-click on the node in select mode, or right-click on the node and choose the Properties menu command from the pop-up menu.

The Node Properties dialog is described in more detail in the following section.

Node Properties Dialog



Node ID

This is the node identifier. Other objects in DSPEd that refer this node keep track of the association by the node's internal object number and not it's Node ID. The Node ID is simply a label. Therefore, this Node ID can be changed without concern about the surrounding links or controller data associated with this node. They will still be associated with this node no matter what the new Node ID is.

Zone ID

This is the identifier of the zone this node is assigned to. The zone is initially set automatically by the location of the node on the network display. If a node that has not previously been assigned a zone is placed or moved inside a zone or a zone is drawn or moved to encompass the node, the node is assigned to that zone. Once the node's zone is assigned it will not automatically change, you must change the zone with this edit control box.

Properties

The Zone Properties button will open the property dialog for the zone that this node is assigned to. Refer to Section 5.3.1 Editing Zones for more information.

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Destination Node

This checkbox indicates if this node is a destination node within its zone. This can also be set on the Zone property page. Allowing you to set the flag here is for ease of navigation on the network. In the Zone property page you only have a list of nodes to choose from. Selecting the node as a destination node makes it clear which node is being set. When a node has been designated as a destination node it is displayed as a square



object for ease of identification.

Location



This is the lateral position of the node, in feet, located relative to the origin of the network.



This is the vertical position of the node, in feet, located relative to the origin of the network.

Control Type

This is the type of control at this node. Available options are Actuated Control, Pre-timed Control, Four-way Stop, Two-way Stop Sign, Yield, or None. If a type other than none is selected, the Properties button will be active. The stop sign and yield properties are the designation of major and minor approaches to the intersection. Other properties for stop and yield signs are network wide, not node specific, so they will be edited from the Network | Control Data menu item.

The type of control at a node can be seen on the Network window by the shape within the node.



Actuated Control is shown as a circle:



Pre-timed Control is shown as a square:



Four-way Stop is shown as an octagon:

Two-way Stop sign (red octagon) and Yield sign (yellow triangle) control will appear on the minor approach or

approaches links to the node:

Properties

The Properties button will be active if a type other than none is selected in the Control Type drop down selection. This button will open the appropriate property dialog box for the selected type of control. An alternate method of viewing the control propertied dialog is to right click on the node and select Control Properties on the popup menu. See Section 5.2 Control Data for more information on editing traffic control parameters.

Turn Movements

The turn movements are initially determined by the geographic relationship of the approach and departure links at this node. The editor automatically assigns the "Left Turn", "Through Movement", and "Right Turn" directions when departure links are added to the node. This assignment is based on the direction the node connects to the link's first feature point or the downstream node if no feature points exist. The editor does not automatically assign "Other Turn 1" or "Other Turn 2" destinations nor does it automatically set the "U-Turn Allowed" flag. They can be modified in this dialog.

Approach to Edit

This is the upstream node of the approach link to assign turn movements.

Left Turn

This is the downstream node of the link that the left turn movement leads to.

Through Movement

This is the downstream node of the link that the through movement leads to.

Right Turn

This is the downstream node of the link that the right turn movement leads to.

Other Turn 1

This is the downstream node of the link that a turn movement other than left, through, or right leads to.

Other Turn 2

This is the downstream node of the link that a turn movement other than left, through, or right or Other Turn 1 leads to.

U-Turn Allowed from Approach

This checkbox allows U-Turns to be made from the selected approach when checked.

5.1.2 Editing Links

To bring up a link's Properties dialog select the link and then choose the Edit | Properties menu command, or double-click on the link in select mode, or right-click on the link and choose the Properties menu command from the pop-up menu.

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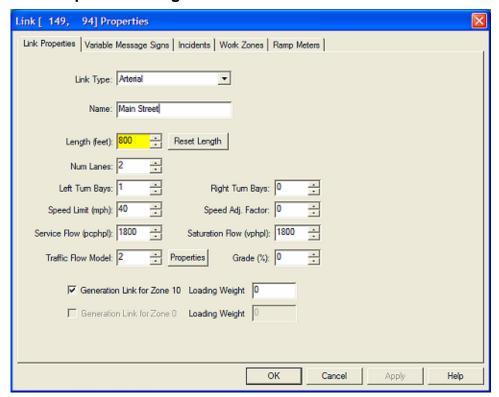
In the properties dialog for a link, you can specify data such as the number of lanes, link type, and speed limit. The default values for each new link created can be set on the Link preferences page accessed from the Network | Preference menu command. The Link Properties dialog also contains pages to edit Variable Message Signs, Incidents, Work Zones, and Ramp Meters for this link.

A link highlighted in red indicates it has failed validation. In most cases this indicates the link length is not long enough to satisfy the length check based on its speed.

The shape of the link can be changed by selecting the link and selecting "Add Feature Point" from the Edit Menu or by right clicking on the link and selecting "Add Feature Point" from the pop up menu. Drag the new feature point to the desired location. When the link is selected, Feature Points are displayed as small light blue circles. The Feature Points can be clicked on and dragged to a new location to define the geometry of the link. Feature Points do not have any properties other than location. They do not have a property page. The only adjustment to them is made by clicking and dragging them to a new location.

The Link Properties dialog is described in more detail in the following section.

Link Properties Dialog



Link Type

This drop down list specifies the link type. Links are defined as:

- 1: Freeway (Fully-controlled access highways, where entrance and exit is only allowed at interchanges and all crossroads are grade-separated using overpasses or underpasses not directly intersecting the highway.)
- 2: Freeway segment with detector (for ramp metering)
- 3: On ramp (links that provide entry locations to freeways)
- 4: Off ramp (links that provide exit locations from freeways)

- 5: Arterial (links with fully signalized/controlled intersections)
- 6: HOT (links specifically designed to model HOT links)
- 7: Highway (Partially-controlled access highway which is usually divided by a median or other non-crossable barrier, and has access at interchanges or at-grade road intersections.)
- 8: HOV (DYNASMART-P treats HOV links exclusively. The user needs to code the link twice if a HOV link is concurrent with other network links.)
- 9: Freeway HOT
- 10: Freeway HOV

Note: In coding HOV links, the user typically needs to create duplicate links, one for regular lanes and the other for HOV lanes as DYNASMART-P does not model lane movement explicitly.

Name

This entry specifies the name of the link.

Length

This entry specifies the length of the link. The default length of the link is the distance from upstream node to downstream node including the distance along any feature points that exist on the link.

Note: If the user has not changed the length from the default length, graphically dragging a node on either end or a feature point will reset the link length based on the new distance. If the length shown in this field does not match the default length, dragging a node will **not** reset the link length automatically. The length may not match because a user has manually edited this dialog box entry or because the link length does not exactly match the default length when opening a network file.

If this entry box has a white background it indicates the length shown matches the default link length. If this entry box is highlighted yellow it indicates the length varies from the default link length. If this entry box is highlighted red it indicates the length is less than the minimum required by DYNASMART-P.

DYNASMART-P will internally reset the length of short links to the minimum. An excessive number of short links may distort the actual network representation.

Reset Length

This button resets the link length to the default length of the link. The default length of the link is the node to node distance. If feature points are present on the link, the length of the link from upstream node through all of the feature point to the downstream node is calculated.

Num Lanes

This entry specifies the number of lanes on the link.

Left Turn Bays

This entry specifies the number of left turn bays. Up to four bays may be specified.

Right Turn Bays

This entry specifies the number of right turn bays. Up to four bays may be specified.

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Speed Limit (MPH)

This entry specifies the posted speed.

Speed Adjustment Factor

This entry specifies the posted speed limit adjustment margin (mph). It is used to reflect the actual observed free-flow mean speed as opposed to posted speed limit. A positive/negative margin indicates that actual speed is higher/lower than posted speed limit. That is, if a highway section has a posted speed limit of 65 mph, but speed measurements indicate that the actual free flow speeds is around 69 mph, then a +4 must be entered for that parameter. It can also be used to represent aggressive/defensive driver behavior.

Service Flow (pcphpl)

This entry specifies the maximum capacity of moving vehicles along a given lane and provides an upper bound on the flow rate through a section under any condition. For freeways, these flow rates need to be expressed as passenger cars per hour per lane (pcphpl). For all other link types, the unit of flow is vehicles per hour per lane (vphpl).

Saturation Flow (vphpl)

The saturation flow rate applies to downstream vehicles discharging from a queue (vehicles per hour per lane).

Traffic Flow Model

This entry specifies the Traffic Flow Model number which corresponds to those specified in Traffic Flow Model page on the Network Data dialog.

Properties

The Properties button will open the Traffic Flow Model properties dialog and allow you to edit the properties for the assigned Traffic Flow Model. These properties are network wide and are not specific to this link. For example, if you edit the properties for Traffic Flow Model 2 by accessing it from this link, all links that are assigned Traffic Flow Model 2 will have the same changed behavior. Refer to Section 5.1.3 Editing Traffic Flow Model Properties for more information.

Grade

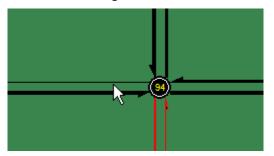
This field allows the user to enter the grade of the link in percent.

Generation Link for Zone

This checkbox indicates whether this link is a generation link for the specified zone. If this link is a generation link, its loading weight for the zone can be set in the Loading Weight entry box. A link's upstream node could be in a different zone than its downstream node. A second Generation Link checkbox and Loading Weight are available if it is also in a second zone. This information may be edited on the Zone property page also. Allowing you to select a specific link and set the data eliminates any confusion that may arise from the list of links in the zone property page.

Note: The use of freeway links as generation links is not recommended except for those at the boundary of the network study area, to account for traffic generated outside the study area.

Generation links will be drawn slightly wider than non-generation links on the network window. The image below shows some generation links and some non-generation links.



5.1.2.1 Editing Multiple Links

Multiple links can be edited simultaneously. To edit multiple links at once, select all the links to be edited by holding the **CTRL** key while clicking on the links. Bring up the Link Properties dialog by choosing the Edit | Properties menu item, or right-click on one of the selected links and choose the Properties command from the pop-up menu. Properties with values that are common to all the selected links will show those values in the dialog. Properties with values that are not common to all the links will remain blank. Any properties set in the dialog will be set for all the selected links when the dialog is exited. Properties not set (i.e., the dialog fields are still blank) will remain at their current values for the individual links. For example, if you wanted to change a number of links to all have three lanes, the Link Properties dialog would show a 2 in the Num Lanes edit field if all of the selected links currently have two lanes. If the selected links have various number of lanes (e.g. some have 2 lanes, some have 4 lanes) the field will be blank. Entering a 3 in the field will change them all to three lanes. Leaving a blank field blank will leave the links with two lanes and the links with four lanes unchanged.

5.1.2.2 Link Variable Message Sign Page

This page is identical to the page on the Scenario dialog.

5.1.2.3 Link Incidents Page

This page is identical to the page on the Scenario dialog. Refer to Section 5.4.6 Editing Incidents Properties for more information.

5.1.2.4 Link Work Zones Page

This page is identical to the page on the Scenario dialog. Refer to Section 5.4.7 Editing Work Zones Properties for more information.

5.1.2.5 Link Ramp Meters Page

This page is identical to the page on the Scenario dialog. Refer to Section 5.4.5 Editing Ramp Meter Properties for more information.

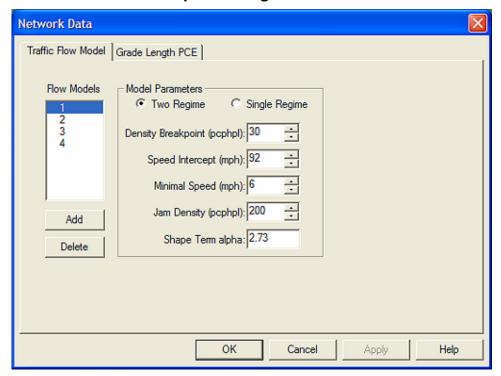
5.1.3 Editing Traffic Flow Model Properties

To bring up the Traffic Flow Model Properties page select the Network Data item from the Network menu. The Network Data dialog will open. Select the Traffic Flow Model tab. The Traffic Flow Model page is described in more detail in the following section.

Dual regime models are generally applicable to freeways, whereas single regime models apply to arterials. Refer to the DYNASMART-P User's Guide for a detailed discussion of Traffic Flow Models.

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Traffic Flow Model Properties Page



Flow Models

This is a list of the existing models. Select the model number identifier to edit.

Add

The Add button creates a new Traffic Flow Model that can be edited.

Delete

The Delete button deletes the selected Traffic Flow Model.

Model Parameters

These are the parameters that define the traffic flow model that is being edited. The first radio button selection determines if a two-regime or single-regime model will be used.

Density Breakpoint (pcpmpl)

This is the density breakpoint between regimes used in the two-regime model. (Passenger cars per mile per lane.) This is disabled for a single regime model.

Speed Intercept (mph)

This is the speed intercept used in the two-regime model. (Miles per hour) This is disabled for the single regime model.

Minimal Speed (mph)

This is the minimal speed for the second regime. (Miles per hour)

Jam Density (pcpmpl)

This is the jam density in vehicles per hour per lane. (Passenger cars per mile per lane.)

Shape Term Alpha

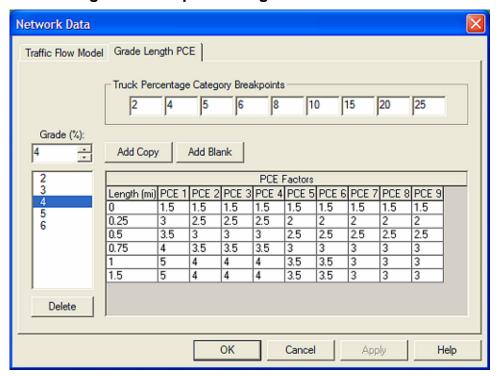
This is the shape term alpha. The larger alpha is, the quicker the speed drop is with increasing density.

5.1.4 Editing Grade Length PCE Properties

To bring up the Grade Length Passenger Car Equivalents (PCE) Properties page select the Network Data item from the Network menu. The Network Data dialog will open. Select the Grade Length PCE tab. The Grade Length PCE page is described in more detail in the following section.

PCE values are used for adjusting the physical capacity of links (arterials and freeways), and the maximum service flow rate on freeways.

Grade Length PCE Properties Page



Truck Percentage Category Breakpoints

These are the breakpoints for truck percentage categories.

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Grade (%)

This is the grade in percent. When a grade is selected from the grade list, the grade percent will change to that grade. If the grade percentage is changed in the edit box the grade value selected in the list below will change. If the Add Copy or Add Blank buttons are pushed, the value in the Grade % edit box will be used as the value of the new grade.

Grade List

This is a list of the existing grades. Select the grade to edit. The PCE Factors grid will change to reflect the values for the selected grade.

Add Copy

The Add Copy button will create a copy of the PCE factors for the grade selected in the list of grades and use the grade set in the Grade % edit box as the new grade. If the Grade % value already exists in the list of grades, the user will be prompted for a new value for the grade.

Add Blank

The Add Blank button will create a set of PCE factors with all values set to zero and use the grade set in the Grade % edit box as the new grade. If the Grade % value already exists in the list of grades, the user will be prompted for a new value for the grade.

Delete

The Delete button will delete the PCE factors for the grade selected in the list of grades and remove the grade from the list.

PCE Factors

This is the table of PCE factors for each length.

Length (mi)

This is the link length breakpoint category.

PCE 1...

These are the passenger car equivalents for the associated truck percentage, grade, and link length.

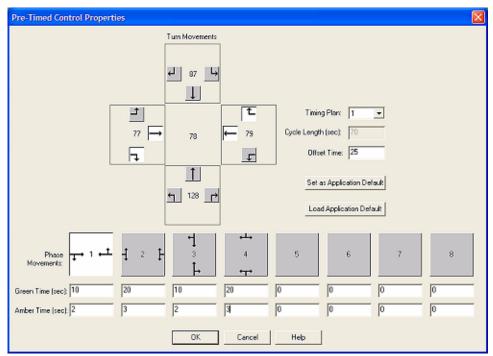
5.2 Control Data

Traffic control in DYNASMART-P consists of Pre-timed Signal Controllers, Actuated Signal Controllers, and sign control. The signal timing plans and assignment of signs to approach links are specific to certain location within the network. These data can be edited directly from the associated node or link. Other data such as left-turn capacity is network wide and can be edited from the Control Data dialog. The next sections describe how to edit these properties.

5.2.1 Editing Pre-Timed Signal Controller Properties

To bring up the Signal Controller Properties dialog use the Control Type Property button on the Node's Property dialog. Right click the node to select Properties from the popup menu. Or, right click the node to select the Control Properties from the popup menu. The Pre-Timed Signal Controller dialog is described in more detail in the following section.

Pre-Timed Signal Controller Properties Dialog



Turn Movements

These are the available turn movements. They can be assigned to the phase by first selecting a phase and then clicking the arrow buttons. The selected movements will be displayed in the Phase Movements diagram. The turn movement buttons are toggle buttons that can be turned off by clicking on the movement again. The direction the approach connects with the node (from upstream node of from the closest feature point) controls the direction the turn movements are drawn.

Timing Plan

This is the plan identifier to edit. The Timing Plans can be edited on the Control Data dialog.

Cycle Length (seconds)

This is the cycle length. The editor calculates this value by adding the green times and the amber times when focus leaves the edit box of one of the phase times (i.e. tab to, or click in, another edit box).

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Offset Time (seconds)

This is the offset for pre-timed control for phase one. The offset edit box will only be active when editing the first phase.

Phase Movements

This is the display of the selected movements that will have green time during this phase. Click to select the phase to edit. Then choose the desired movements from the Turn Movements area above by clicking on the turn movement buttons. Remove the turn movement from the phase by clicking on the turn movement in the Turn Movements area again.

Green Time (seconds)

This is the green time for pre-timed controller for this phase.

Amber Time (seconds)

This is the amber time for this phase.

Set as Application Default

This button saves the current signal timing data as default settings for the current user. It does not save the phase movements because they are unique to an intersection. These default signal timings will be applied when new Pre-timed Controllers are added to the network.

Load Application Default

This button loads the default signal timings from the current user's registry settings. The default settings will not change the phase turn movements. The phase turn movements are unique to an intersection and must be set by the user.

5.2.2 Editing Actuated Signal Controller Properties

To bring up the Signal Controller Properties dialog use the Control Type Property button on the Node's Property dialog. Right click the node to select Properties from the popup menu. Or, right click the node to select the Control Properties from the popup menu. The Actuated Signal Controller Properties dialog is described in more detail in the following section.

Actuated Control Properties Turn Movements 166 1 1 Timing Plan: 1 107 → 108 J ₽ 1 Set as Application Defaul ← 165 p→ Load Application Default 25 25 Max Green (sec): 25 25 10 10 10 0 0 0 0 5 5 Ō 0 0 OK Cancel Help

Actuated Signal Controller Properties Dialog

Timing Plan

This is the plan identifier to edit. The Timing Plans can be edited on the Control Data dialog.

Cycle Length (seconds)

This is the cycle length. The editor calculates this value by adding the maximum green times and the amber times when focus leaves the edit box of one of the phase times (i.e. tab to, or click in, another edit box).

Turn Movements

These are the available turn movements. They can be assigned to the phase by first selecting a phase and then clicking the arrow buttons. The selected movements will be displayed in the Phase Movements diagram. The turn movement buttons are toggle buttons that can be turned off by clicking on the movement again. The direction the approach connects with the node (from upstream node of from the closest feature point) controls the direction the turn movements are drawn.

Phase Movements

This is the display of the selected movements that will have green time during this phase. Click to select the phase to edit. Then choose the desired movements from the Turn Movements area above.

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Max Green (seconds)

This is the maximum green time for actuated control for this phase. DYNASMART-P emulates the behavior or actuated signals. The green time is extended, as long as vehicles are detected, until Max Green is reached with no max-out policy.

Min Green (seconds)

This is the minimum green time for actuated control for this phase.

Amber Time (seconds)

This is the amber time for this phase.

Set as Application Default

This button saves the current signal timing data as default settings for the current user. It does not save the phase movements because they are unique to an intersection. These default signal timings will be applied when new Actuated Controllers are added to the network.

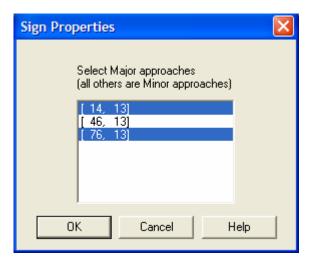
Load Application Default

This button loads the default signal timings from the current user's registry settings. The default settings will not change the phase movements. The phase movements are unique to an intersection and must be set by the user.

5.2.3 Editing Major and Minor Approaches to Stop and Yield Controlled Intersections

A two-way stop sign or yield sign controlled intersection can be designated in two ways. The simplest way is to use the Stop Sign or Yield Sign tool from the Network menu or from the toolbar. Select the desired tool and click on the link that has the sign at its downstream end. DSPEd automatically designates this approach as a minor approach to the intersection. All other approaches are considered major approaches. Refer to Section 3.5.4 Network Menu or Section 3.6 Tool Bar for more information on these tools.

The second method is to assign the Control Type on the Node Properties dialog as a Stop Sign or Yield Sign. Clicking the Properties button will display the Sign Properties dialog. The Sign Properties dialog is shown in the following figure.



All approaches to the intersection are listed. Select the major approaches to the intersection. All minor approaches will be controlled by the sign control type selected on the Node Properties dialog. The Sign Properties dialog can also be invoked by right clicking on a two-way sign or yield sign controlled intersection and selecting Control Properties from the popup menu.

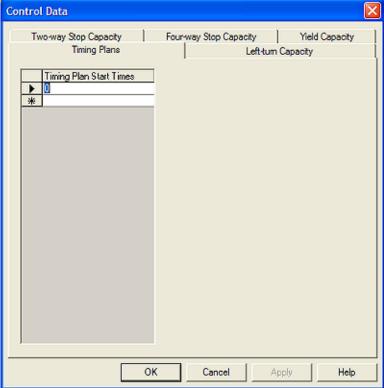
To remove a two-way stop sign or yield sign change the Control Type to none on the Node Properties dialog or select the Remove Control tool from the Network menu or toolbar.

5.2.4 Editing Signal Timing Plan Properties

To bring up the Signal Timing Plan Properties page select the Control Data item from the Network menu. When the Control Data dialog opens select the Timing Plans tab page. The start time for the first timing plan is 0.0 seconds. It is used as a reference time to specify the start time of each timing plan.

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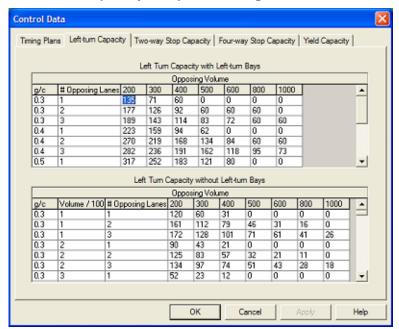
Timing Plan Start Times

This is the start time in minutes of each timing plan.

5.2.5 Editing Left-turn Capacity Properties

To bring up the Left-turn Capacity Properties page select the Control Data item from the Network menu. When the Control Data dialog opens select the Left-turn Capacity tab page.

Left-turn Capacity Properties Page



Left-Turn Capacity with Left-turn bays

g/c Indicator

The ratio of green time to the cycle length.

Opposing Lanes

This is the number of lanes on the opposing link.

Opposing Volume (vph)

This refers to the volume on opposing links (vehicles per hr). Seven categories of opposing volumes ranging from 200 to 1000 vph are used to estimate the left turn capacity with Left-turn bays.

Left-turn Capacity

This is a set of left-turn capacities at varying total volumes on the opposing link (vehicles per hour).

Left-Turn Capacity without Left-turn bays

g/c Indicator

The ratio of green time to the cycle length.

Volume / 100

This is the volume on the current link in hundreds (vehicles per hour).

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Opposing Lanes

This is the number of lanes on the opposing link.

Opposing Volume (vph)

This refers to the volume on opposing links (vehicles per hour). Seven categories of opposing volumes ranging from 200 to 1000 vph are used to estimate the left turn capacity without Left-turn bays.

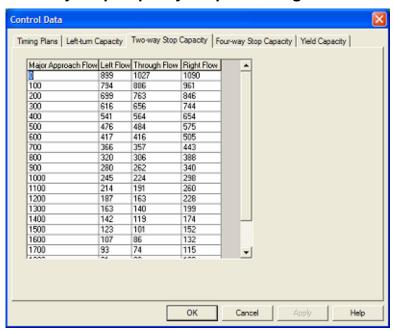
Left-turn Capacity

This is a set of left-turn capacities at varying total volumes on the opposing link (vehicles per hour).

5.2.6 Editing Two-way Stop Capacity Properties

To bring up the Two-way Stop Capacity Properties page select the Control Data item from the Network menu. When the Control Data dialog opens select the Two-way Stop Capacity tab page.

Two-way Stop Capacity Properties Page



Major Approach Flow

This is the average flow on the major approach (vehphpl).

Left-turning Flow Rate

This is the saturation flow rate for left-turning vehicles (vehphpl).

Through Flow Rate

This is the saturation flow rate for through vehicles (vehphpl).

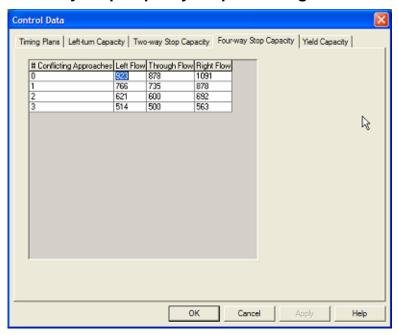
Right-turning Flow Rate

This is the saturation flow rate for right-turning vehicles (vehphpl).

5.2.7 Editing Four-way Stop Capacity Properties

To bring up the Four-way Stop Capacity Properties page select the Control Data item from the Network menu. The Control Data dialog will open. Select the Four-way Stop Capacity tab. The Four-way Stop Capacity is described in more detail in the following section.

Four-way Stop Capacity Properties Page



Conflicting Approaches

This is the number of active conflicting approaches where vehicles are present at the stop line.

Left Flow (vphpl)

This is the discharge rate for left turns.

Through Flow (vphpl)

This is the discharge rate for through movements.

Right Flow (vphpl)

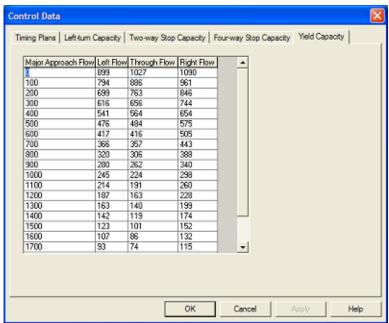
This is the discharge rate for right turns.

5.2.8 Editing Yield Capacity Properties

To bring up the Yield Capacity Properties page select the Control Data item from the Network menu. When the Control Data dialog opens select the Yield Capacity tab page.

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Yield Capacity Properties Page



Major Approach Flow

This is the average flow on the major approach (vphpl).

Left Flow

This is the saturation flow rate for left-turning vehicles (vphpl).

Through Flow

This is the saturation flow rate for through vehicles (vphpl).

Right Flow

This is the saturation flow rate for right-turning vehicles (vphpl).

5.3 Demand Data

The demand data in DYNASMART-P is separated into multiple dialogs. Zone data, including generation links and loading weights, are specific to a zone and are accessed directly from the zone's property page. Other data, such as SuperZones and Time Dependent OD data are network wide and are accessed from the Demand Data dialog. The next sections describe how to edit these properties.

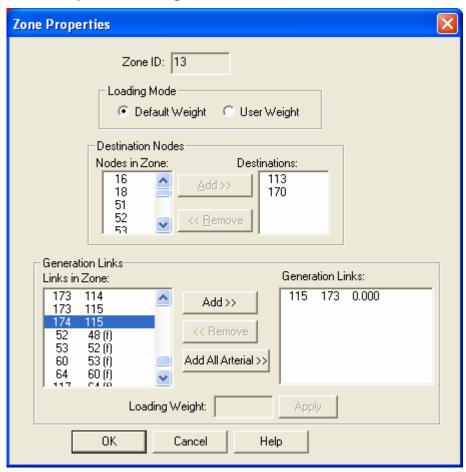
Note: DYNASMART-P also generates vehicles from vehicle and path specific input data. DSPEd does not edit that data. However, that data can be generated automatically by DYNASMART-P.

5.3.1 Editing Zones

Zone locations are specified graphically on the Network Window. Refer to Section 4.5 Creating Zones for more information. To bring up a Zone's Properties dialog select the zone and choose the Edit | Properties menu command, or double-click on the zone in select mode, or right-click on the zone and choose the Properties menu command from the pop-up menu.

The shape of the zone can be changed by selecting the zone and selecting "Add Feature Point" from the Edit Menu or by right clicking on the zone and selecting "Add Feature Point" from the pop up menu. Click and drag the new feature point to the desired location. When the zone is selected, Feature Points are displayed as small light blue circles. The Feature Points can be clicked on and dragged to a new location to define the geometry of the zone. Feature Points do not have any properties other than location. They do not have a property page. The only adjustment to them is made by clicking and dragging them to a new location.

Zone Properties Dialog



Zone ID

This is the zone's identifier.

Loading Mode

Loading weights are fractions of the total number of to-be generated vehicles in each simulation interval on each generation link.

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Default Weight

Default link loading weights are proportional to the relative link capacities within a zone. Capacity of a link is calculated as length of link multiplied by the number of lanes.

User Weight

DYNASMART-P will use the loading weights as specified in the Generation Links section on this dialog.

Destination Nodes

Nodes in Zone

This is a list of all the nodes that are within the zone. Nodes are initially assigned to the zone that geographically contains the node. The Node Property dialog allows the user to change the assigned zone. Select a node and click the add button to move the node to the Destination list. Double clicking the node will automatically move the node to the Destination list.

Destinations

This is a list of all destination nodes within this zone. To remove the node from the Destination list, select the node and click the remove button. Double clicking the node will automatically move the node to the list of all nodes in the zone. Nodes can also be specified as destinations on their Node Property dialog.

Generation Links

A distinctive feature of DYNASMART-P is that vehicles are generated on links. DYNASMART-P allows you to specify generation links for each traffic analysis zone (TAZ), on which demand will be loaded. Note that the number of vehicles generated on each link is proportional to its length and capacity. Alternatively, you may specify the share of demand that each generation link within a TAZ will generate. Also note that freeway links should not be modeled as generation links. Links can also be specified as generation links on their Link Property dialog.

Note: The use of freeway links as generation links is not recommended except for those at the boundary of the network study area, to account for traffic generated outside the study area. Freeway links in the Links in Zone List are marked with" (f)".

Links in Zone

This is a list of all links in the zone. Select a link and click the add button to move the link to the list of Generation Links. Double clicking the link also moves the link to the list of Generation Links.

Generation Links

This is the list of all Generation Links in the zone. You can set the loading weight of the link by selecting the link and entering the loading weight in the edit box. Click the Apply button to set the weight for the link. Select the link and click the remove button to remove the link from the list of Generation Links and place it on the list of links in the zone. Double clicking the link also moves the link from the Generation Links to the list of links.

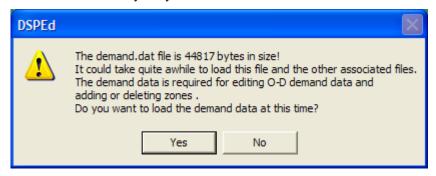
Loading Weight

The vehicle loadings on the link will be according to the fraction that you specify in this field. The "User Weight" loading mode must be set for the loading weight to have effect. The sum of link weights for a given zone must be 1.000. The loading weights will have absolutely no effect if vehicles are to be loaded onto the network via the vehicle.dat and path.dat files.

5.3.2 Demand Data Dialog

To open the Demand Data Dialog choose the Network | Demand Data menu command. The Demand Data dialog will be displayed.

Some projects have an enormous amount of demand data. Loading that data can be delayed or not done at all if it is not needed. One circumstance that requires demand data to be loaded is editing demand data. If loading of demand data was not done when the network was loaded, the following dialog will ask you if wish to load the demand data when you try to edit the demand data.



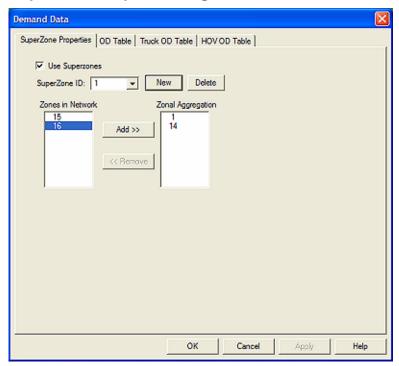
Choosing Yes will load the demand data into memory. Once this has been accomplished it is not necessary to do it again during the course of this working session with this network. If No is chosen, you may continue to work with the network but you will not be able to perform the desired task. If you choose not to load the demand data you cannot edit the demand data. If you choose to load the demand data the Demand Data dialog will open after the demand data has been loaded.

5.3.2.1 Editing the SuperZone Properties

SuperZones allow aggregating several Traffic Analysis Zones (TAZ) into a single zone. Such a capability provides the flexibility for users to reduce the required computational resources without compromising the details of the traffic representation. To open the SuperZone Properties page choose the Network | Demand Data menu command. When the Demand Data dialog opens select the SuperZone Properties tab page.

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SuperZone Properties Page



Use SuperZones

This checkbox controls whether SuperZones are used during analysis. If checked SuperZones will be used and if unchecked SuperZones will not be used.

SuperZone ID

Select a SuperZone to edit. After one or more zones are added to the SuperZone, another SuperZone will be created and available to edit.

New

Click the New button to add a SuperZone. Then proceed to add zones with the other controls.

Delete

Click the Delete button to remove the SuperZone shown in the SuperZone ID drop down box.

Zones in Network

This is a list of zones that are available to be aggregated into a SuperZone. Select a zone and click the Add button to add it to the SuperZone and remove it from this list. This can be also done by double clicking the zone. Note that this list may be empty if all zones have been aggregated into superzones.

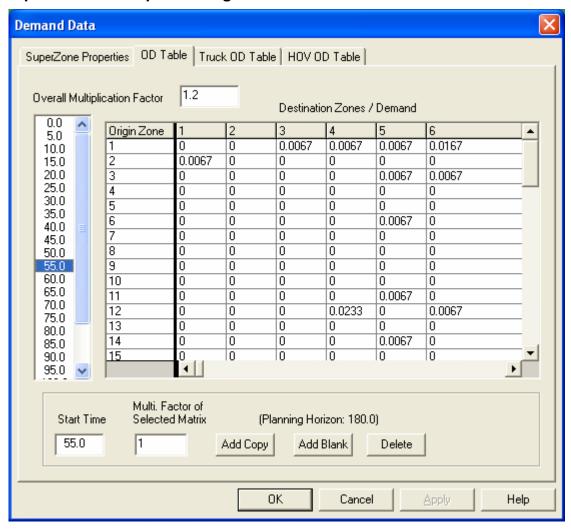
Zonal Aggregation

This is a list of zones that have previously been aggregated into the SuperZone. To remove a zone from the SuperZone, select the zone and click the Remove button to remove it from the list and add it back to the list of zones in the network. This can be also done by double clicking the zone.

5.3.2.2 Editing Time-Dependent OD Properties

To bring up the Time-Dependent OD Properties page select the Demand Data item from the Network menu. When the Demand Data dialog opens, select the desired tab page. The passenger car, truck and HOV Origin-Destination tables are all the same in structure. The data on the different pages will be stored separately for the DYNASMART-P program to use.

Time-Dependent OD Properties Page



Overall Multiplication Factor

This is the overall multiplication factor with respect to the planning horizon. This factor could control the uniform increase or decrease of the overall network loading level based on the OD matrix.

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Start Time

This is the starting time for the selected OD matrix (min). Selecting a start time in the list below allows you to edit the OD table for this time, or change the start time, or set the time of the copy you wish to insert into the matrix. To change the start time of the selected matrix, edit this field. When you leave the edit box the time will be updated in the Start Time List below. See the description of the Add Copy or Add Blank buttons for more information on creating new start time milestones.

Multiplication Factor of Selected Matrix

This is the multiplication factor used in copying the selected matrix to the new matrix. A default multiplication factor of 1 means that an identical copy will be created. This factor can be used to generate a time-dependent OD demand table. The user can select the matrix at the first interval as the base matrix and sequentially generate new time-dependent matrices for the other intervals by applying a series of factors (e.g. 1, 2, 3 ...).

Planning Horizon

This is the Planning Horizon for the network. It is also the ending time for the OD matrix. The Planning Horizon can be edited on the System Data dialog. It is shown on the OD Table page as a reminder of the length of the simulation. The Start Times are checked to ensure they are less than the Planning Horizon. When the OD matrices are saved, the Planning Horizon is used as the end of the final loading interval.

Start Time List

This is the starting time for the selected OD matrix (min). Note that time milestones are needed to define starting and ending time of OD matrices. The start time of a loading interval is the end of the preceding interval. Select the start time of the desired matrix from the Start Time List to load the demand data.

Add Copy

The Add Copy button will make a copy of the OD matrix as selected in the Start Time List and insert it with the start time designated in the Start Time edit box. If the designated start time already exists, the user will be prompted for a new start time.

Add Blank

The Add Blank button will insert a matrix with all demand equal to zero with the start time designated in the Start Time edit box. If the designated start time already exists, the user will be prompted for a new start time.

Delete

The Delete button will remove the matrix that is selected in the Start Time List.

Origin Destination Demand Table

This is the origin-destination demand table to be edited. There is a row for each origin and a column for each destination in each OD matrix. The value for the origin row and destination column is the demand value. There is a separate matrix for each time milestone. Select the time to be viewed or edited from the Start Time List at the left.

Note: The user can input either the number of trips for entries of the O-D matrix, or other entries that reflect certain scaling. If the user specifies the number of trips for each entry, then the multiplication factor should be specified as one.

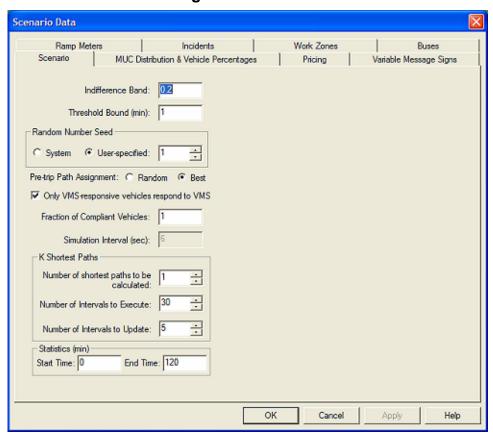
5.4 Scenario Data

The Scenario properties define the data used to simulate an individual set of network and control properties. The next sections describe how to edit these properties.

5.4.1 Editing the Scenario Parameters

To bring up the Scenario Parameter dialog select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the Scenario tab page.

Scenario Parameters Page



Indifference Band

This is the relative indifference band for switching paths (percent improvement above which user will change paths). This parameter only applies to user class 4 (en-route info).

Threshold Bound

This is the threshold bound for switching decisions (minutes). Trip makers will not change paths unless travel time-savings are greater than the bound. This parameter only applies to user class 4 (en-route info).

Random Number Seed

This controls the vehicle generation random number seed.

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System

If this radio button is selected then the system will reset the seed for each run.

User Specified

If this radio button is selected then the user may specify the random number that will be used. Positive integers will serve as the seed. Using the same seed will generate the save results.

Pre-trip Path Assignment

Random

If this radio button is selected then trip-makers will be randomly assigned to one of the k-shortest paths. Such a scenario is intended to model the event where trip makers are not that familiar with network traffic conditions.

Best

If this radio button is selected then trip-makers will be assigned to the best path at their time of departure. Such a scenario is intended to model pre-trip information.

Only VMS-responsive vehicles respond to VMS

This is the checkbox to indicate which user classes will respond to VMS. By default, it is set checked, which means only user class 5 (VMS responsive) will respond to VMS. If this parameter is set unchecked, then user classes 2 to 5 will respond to VMS. This is also referred to in the DYNASMART-P User's Guide as VMS Preemption Mode.

Fraction of Compliant Vehicles

This is the fraction of compliant vehicles (will respond to real time en-route information). This parameter only applies to user class 4 (en-route info).

Simulation Interval

This is the simulation interval (seconds) at which the positions of the vehicles in the network are updated (i.e. the system states evolve every simulation interval). The current version of DYNASMART-P fixes the simulation interval at 6 seconds.

K Shortest Paths

Number of shortest paths to be calculated

Enter the number of shortest paths to be calculated for each OD pair. The number of shortest paths to be specified depends on the planning application. For pure UE or SO runs, a value of 1 (one path) is recommended for this entry. For en-route information planning applications, a value of 3 (three paths) is recommended (to provide alternate paths). For a general planning application with ATIS strategies, a value of 2 (two paths) is recommended.

Number of Intervals to Execute

This is the number of simulation intervals (6 seconds each) for calculating the K-shortest paths. It refers to "how often" the KSP routine is executed. For example, if 30 simulation intervals were specified, this means, the KSP routine will be executed every (30 intervals x 6 seconds/interval =) 3 minutes. That is DYNASMART-P will actually solve for the K shortest paths tree every 3 minutes. Note that this is different than the number of simulation intervals for updating the shortest path, a process that does not solve for a new shortest paths tree, instead, the current shortest paths tree travel times will be updated based on prevailing link travel times.

Number of Intervals to Update

This is the number of simulation intervals in which the K shortest paths are updated. The previously identified k-paths (from the shortest path solution algorithm) will have their travel time updated based on the current state of the system. These paths will also be re-ranked once the travel time is updated. If a value of 10 is entered the paths will be updated every 60 seconds. If a value of 50 is entered the paths will be updated every (50 intervals x 6 seconds/interval =) five minutes.

Statistics

This is the time that statistics will be collected.

Start Time

This is the Start-up time to collect statistics.

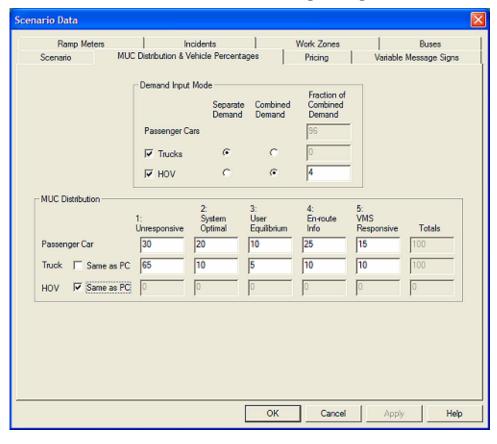
End Time

This is the End time to collect statistics

5.4.2 Editing MUC Distribution and Vehicle Percentages

To bring up the MUC Distribution and Vehicle Percentages page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the MUC Distribution and Vehicle Percentages tab page. The page is discussed in the following section.

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MUC Distribution and Vehicle Percentages Page

Demand Input Mode

These are the vehicle type proportions. DYNASMART-P recognizes four vehicle types (passenger cars (PC), trucks, high-occupancy vehicles (HOV), and buses) for their effect on traffic conditions. PCs, trucks, and HOVs are specified as fractions of the overall vehicle fleet or specified with separate O-D matrices. Buses are entered individually. For more information on buses refer to Section 5.4.8, Editing Buses Properties.

Passenger Cars

Passenger Cars cannot be unselected. All networks use passenger cars. Their fraction of combined demand is 100 percent minus the truck and HOV fraction of combined demand. This value cannot be edited by the user.

Truck

The check box gives the user the option to use or not use trucks in the network. If trucks are selected the user may choose to use a separate demand file or use a fraction of the combined demand file. If Combined Demand is selected, enter a fraction of 100 percent in the Fraction of Combined Demand column.

HOV

The check box gives the user the option to use or not use HOV in the network. If HOV are selected the user may choose to use a separate demand file or use a fraction of the combined demand file. If Combined Demand is selected, enter a fraction of 100 percent in the Fraction of Combined Demand column.

MUC Distribution

These are the multiple user class (MUC) distribution of vehicles. DYNASMART-P recognizes five different user classes (not to be confused with vehicle types) in terms of the availability of Advanced Traffic Information Systems (ATIS) equipment, driver's knowledge of the network, and driver response to supplied routing information. The MUC percentages have absolutely no effect if vehicle loading was done via the vehicle + path files. The MUC percentages may be specified for each of the three vehicle types or the truck and HOV distribution may be designated to be the same as the passenger car distribution. Each vehicle type distribution must sum to 100 percent.

Unresponsive

This class of users is not responsive to any type of information and is used to model pre-trip information. These users are assigned their paths at the beginning of the simulation, and they stick to them through out the whole simulation. They will not respond to any en-route information or guidance devices. This class only responds to detours (VMS type 2).

System Optimal

This class of users follows the system optimal (SO) assignment rule, in which the travel times are minimized from the system's perspective. The general idea of this assignment rule is to force a small fraction of users to follow sub-optimal routes from their perspective (not user equilibrium) for the benefit of the majority. Such a class is only available if the iterative consistent assignment is chosen. Similar to the user equilibrium class, this user class is only responsive to VMS types 2 (mandatory detour) and 4 (optional detour) unless the "Only VMS responsive vehicles respond to VMS" box is unchecked, whereby this user class will also respond to VMS information as well. The total network-wide travel time resulting from this assignment is smaller or equal to that generated from the user equilibrium assignment rule.

User Equilibrium

This class of users follows the user equilibrium (UE) assignment rule, in which the travel times are minimized from the user's (traveler's) perspective. Such a class is only available if the iterative consistent assignment is chosen, and is used to model users who are familiar with the network. This user class is only responsive to VMS types 2 (mandatory detour) and 4 (optional detour) unless the "Only VMS responsive vehicles respond to VMS" box is unchecked, whereby this user class will also respond to VMS information as well. Note that this assignment rule provides an upper bound for the network-wide travel time as compared with the system optimal assignment rule.

En-route Info

This class of users updates its paths at each intersection based on the prevailing shortest path tree. It is designed to replicate the en-route information and is based on the boundedly rational behavior. Two criteria are used for the route choice, namely the indifference band and the threshold bound for switching decisions. The indifference band reflects the fraction of travel time improvement below which the user will not switch routes. The threshold bound reflects the time improvement (in minutes) below which the user will not switch routes. Should any of these two criteria be exceeded, the user will switch routes at the next intersection. This class of users is only responsive to detours (VMS type 2) and generally does not respond to VMS information unless the "Only VMS responsive vehicles respond to VMS" box is unchecked, whereby this user class will also respond to VMS information as well.

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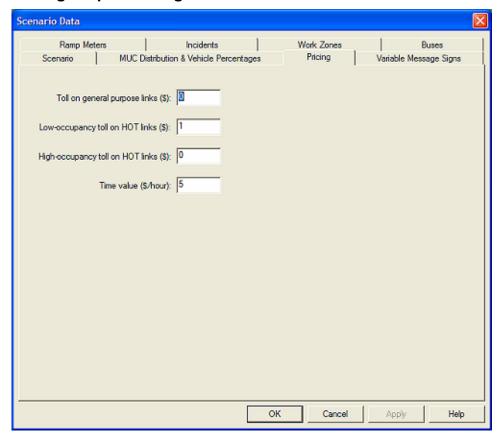
VMS Responsive

This class of users responds to VMS information. There are four types of VMS information, namely congestion warning, optional and mandatory detours, and speed advisory. VMS responsive users get assigned their paths at the beginning of the simulation, which they keep unless they encounter a VMS and possibly change their paths consequently.

5.4.3 Editing Pricing Properties

To bring up the Pricing Properties page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the Pricing tab page. The purpose of this dialog is to specify the toll values for the low and high occupancy vehicles (LOV and HOV) on high occupancy toll (HOT) and generic network links. If no link is specified as an HOV or HOT link then pricing will not be used.

Pricing Properties Page



Toll on General Purpose Links

This is the toll value on every link in the general-purpose network.

Low-occupancy toll on HOT Links

This is the toll value (dollars) for the low occupancy vehicles on the HOT lanes (links). If LOV vehicles are to be denied access to HOT-dedicated links, then a very high price tag is recommended for the cost.

High-occupancy toll on HOT Links

This is the toll value (dollars) for the high occupancy vehicles on the HOT lanes (links).

Time value (\$/hour)

This is the money value of time (dollar/hour).

5.4.4 Editing Variable Message Signs Properties²

To bring up the Variable Message Sign Properties dialog select the Scenarios Data item from the Network menu. When the Scenario Data dialog opens select the Variable Message Sign tab page. The Scenario Data | Variable Message Sign page shows all VMSs in the network. Alternately, open a specific link's property page and add or delete a variable message sign for that link. The variable message sign property page on the link property dialog is the same as the property page on the Scenario Data dialog.

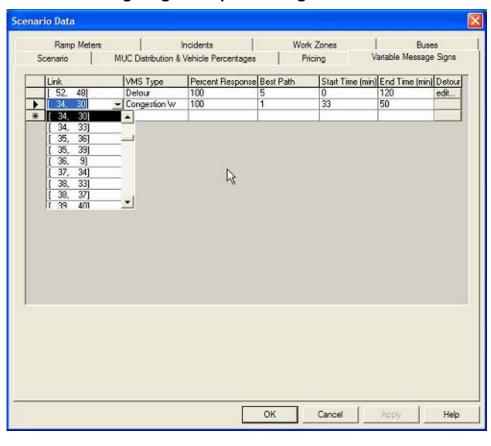
There are four types of VMS or dynamic message signs supported by DYNASMART-P. Type 1 VMS is the speed advisory type of VMS that allows users to increase/decrease the link speed by a certain percentage when it is below/above certain threshold. Type 2 VMS is the mandatory detour type of VMS that advises drivers with lane closure information and mandates all vehicles to follow some user-specified subpath in the vicinity. Type 3 VMS is the congestion warning type of VMS, which allows users to specify a percentage of vehicles that responds to the VMS and take diversion actions at the diversion points. Type 4 VMS is the optional detour VMS, which advises drivers with lane closure information, but allows the drivers the option between following the detour path and keeping their original paths based on the boundedly rational decision rule.

These VMS can be specified at any location in the network. In the current version of DYNASMART-P, the diversion behavior is modeled through the response rate, a user-specified parameter that indicates the percentage of VMS traversing drivers who may potentially switch routes due to a VMS. Note that only user class 5 (VMS responsive) will respond to VMS types 1 and 3; whereas all vehicles will respond to type 2 and 4 VMS.

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² The Variable Message Sign Properties dialog has been temporally disabled in DSPEd version 1.2.



Variable Message Signs Properties Page

Link

This is the link where the VMS will be located. A drop down list of links in the network can be used to select the link. When editing this page from a link's property page, this field is set to that link and cannot be edited.

VMS Type

This is the type of VMS according to the following description.

- 1: Speed advisory
- 2: Detour
- 3: Congestion warning.
- 4: Optional detour

Speed Threshold / Percent Detour / Percent Respond

This field label varies depending on the type of variable message sign. The column headings will be updated after the VMS Type is selected. It is the Speed Threshold for VMS Type 1: specify the speed threshold (+ or -) (mph). If positive (+), the link speed will be increased (if the link speed is less than the threshold) because VMS-responsive vehicles will attempt to increase their speed. If negative (-), the link speed will be decreased (if actual link speed is higher than the threshold). It is the Percent Detour for VMS Type 2 or 4: the percent of vehicles that detour is fixed at 100 percent and cannot be edited. It is Percent Respond for VMS Type 3: specify the percentage of user class 5 who will actually respond to the re-routing advice. If the "Only VMS

responsive vehicles respond to VMS" box is unchecked, user classes 2 through 5 will also respond to VMS information as well. If a better path exists they will divert, otherwise they will keep their original paths.

Percent Change / Nodes in Subpath / Path Preference

This field label varies depending on the type of variable message sign. The column headings will be updated after the VMS Type is selected. This is the Percent Change for VMS Type 1: specify the percentage reduction or increase in the speed of the link on which the VMS is located. It is Nodes in Subpath for VMS Type 2 or 4: number of nodes in the subpath. This number is updated by DSPEd after editing the detour path. It cannot be edited directly. It is Path Preference for VMS Type 3: specify path preference flag (0 or 1) for diversion. 0 means a random path among K-paths will be used. 1 means the current best path will be used. The path preference flag specified has two major modeling implications. (1) If a value of "one" is specified, the corresponding best path will be assigned to diverted vehicles, which implies that tripmakers who actually divert have a priori knowledge or reasonable familiarity with the network and corresponding traffic dynamics. And, (2) if a "zero" is specified, diverted vehicles will be assigned paths at random, which implies tripmakers may not necessarily have perfect network and traffic information, and hence might take inferior paths. This situation is used to model general situations where tripmakers are regular commuters or moderately familiar with the traffic network.

Start Time

This is the start time for VMS (minutes).

End Time

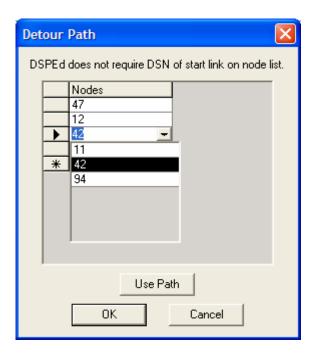
This is the end time for VMS (minutes).

Detour Path

This allows you to set the sequence of nodes for the subpath required by type 2 or 4 VMS. If the VMS Type is Detour, the word "edit..." will appear in the column. This is a button that may be clicked on to display the Detour Path dialog.

When you click the Detour Path button the Detour Path dialog opens. The dialog is shown below. Note that the downstream node of the VMS link, as specified in the link column, is not required by DSPEd to be on the detour path. The process of specifying a path is significantly easier if you select the links in the path on the network window and create a path with the Create Path dialog. Refer to Section 4.12 Creating a Path for more information. If the Use Path button is enabled there is path data on the Windows clipboard that can be loaded into the list. Click the button to automatically load the path. You may enter node numbers in the list or select node numbers from the drop down list to designate the path. The list of available nodes in the drop down list is generated based on the previous node in the node list. Only nodes that can be reached from the previous node will be listed. If you change the path in the middle of an existing path you most likely will have to reset all the nodes from the point of change.

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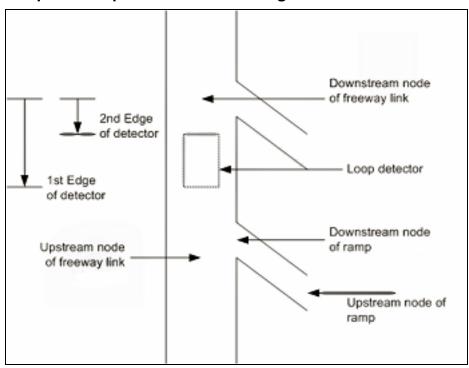


5.4.5 Editing Ramp Meter Properties

To bring up the Ramp Meters Properties page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the Ramp Meters tab page. Alternately, open a specific link's property page and add or delete a ramp meter for that link. The ramp meter property page on the link property dialog is the same as the property page on the Scenario Data dialog.

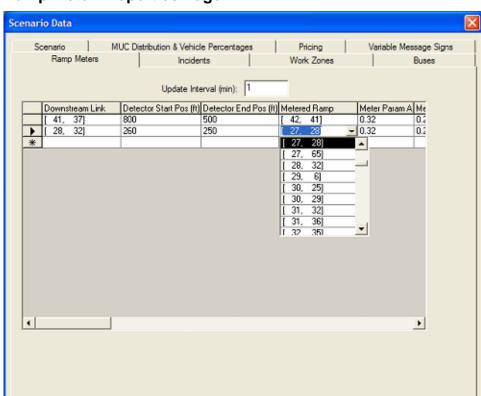
Ramp metering in DYNASMART-P is modeled by adjusting the on-ramp flow rates based on the flow and downstream capacity on mainline freeway lanes. The logic implemented is similar to Papageorgiou's ALINEA, which is a relatively simple feedback-control mechanism. The procedure measures the flow on freeway mainline lanes downstream of the ramp and determines the remaining freeway capacity available based on occupancy values. Then the on ramp flow rate is adjusted to meet the available capacity.

Ramp Meter Input Reference Drawing



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Ramp Meter Properties Page

Update Interval

This is the ramp metering updating interval (minutes). This variable applies to all ramp meters. It cannot be changed on individual Link Properties dialogs. It can only be edited on the Scenario Data dialog.

Cancel

Help

ОК

Downstream Link

This is the downstream link of the metered ramp.

Detector Position

Start Pos

This is the position of the first detector edge on the downstream link (in feet) measured from the downstream node of that link.

End Pos

This is the position of the second detector edge on the downstream link (in feet) measured from the downstream node of that link.

Metered Ramp

This is the link of the metered ramp. When editing a ramp meter from a specific link's property dialog, this field is set to that link and cannot be changed.

Metering Parameters

Α

This is the constant (alpha) used in calculating the metering rate of the ramp (default=0.32). This term may be regarded as a control factor, which controls the number of vehicles to enter the freeway via the on-ramp. Therefore, the higher it is, the more vehicles get to enter the freeway.

B

This is the second constant (beta) used in calculating the metering rate of the ramp (default=0.2). It is the maximum freeway downstream occupancy. The higher it is the more available capacity for entering vehicles.

Saturation flow rate on ramp (veh/s/ln)

This is the Saturation flow rate on the ramp in vehicles per second per lane (default=0.5 veh/sec/ln or 1800 veh/hr/ln).

Start Time

This is the starting time for metering at the ramp (min).

End Time

This is the ending time for metering at the ramp (min).

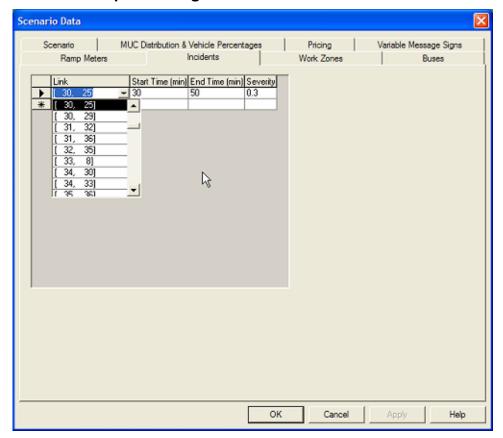
5.4.6 Editing Incidents Properties

To bring up the Incidents Properties page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the Incidents tab page. The purpose of this dialog is to specify the number of incidents to be simulated, their starting time, location, and severity. Alternately, open a specific link's property page and add or delete an incident for that link. The incident property page on the link property dialog is the same as the property page on the Scenario Data dialog.

Multiple incidents may be specified on a link. DYNASMART-P will pick the highest severity of all these active incidents to reduce the physical capacity and the maximum flow rate on the incident link.

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Incidents Properties Page



Link

This is the link where the incident occurs. When editing an incident from a specific link's property dialog, this field is set to that link and cannot be changed.

Start Time

This is the start time of the incident (minutes).

End Time

This is the end time of the incident (minutes).

Severity

This is the severity of the incident, which represents the fraction of link capacity lost due to the incident (i.e., the remaining capacity becomes one minus the severity).

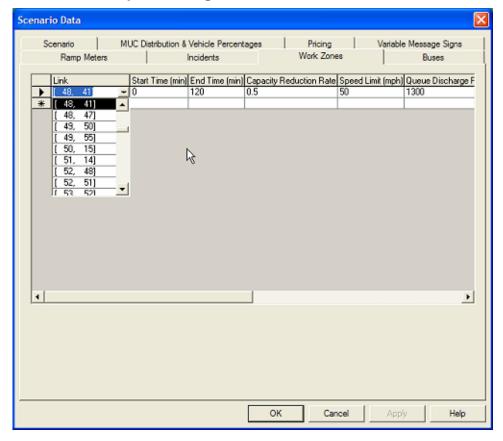
5.4.7 Editing Work Zones Properties

To bring up the Work Zones Properties page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select, the Work Zones tab page. Alternately, open a specific link's property page

and add or delete a work zone for that link. The work zone property page on the link property dialog is the same as the property page on the Scenario Data dialog.

Note: There can be only one work zone active on a link at any one time.

Work Zone Properties Page



Link

This is the link where the work zone occurs. When editing a work zone from a specific link's property dialog, this field is set to that link and cannot be changed.

Start Time

This is the start time of the work zone (minutes).

End Time

This is the end time of the work zone (minutes).

Capacity Reduction Rate

This is the capacity reduction rate of the lane closure or the work zone, which represents the fraction of physical link capacity (lane closure) lost due to the work zone.

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Speed Limit

This is the posted speed limit in the work zone area.

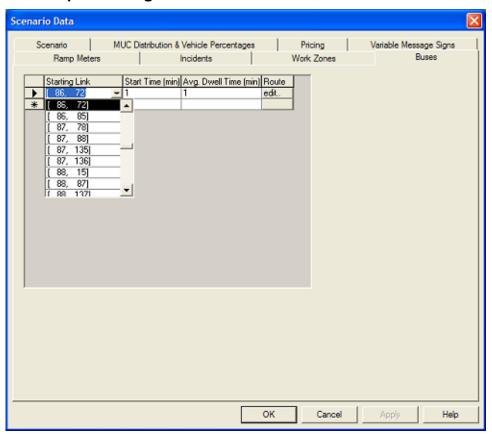
Queue Discharge Rate

This is the queue discharge rate for work zone area (vehicles per hour per lane).

5.4.8 Editing Buses Properties

To bring up the Bus Properties page select the Scenario Data item from the Network menu. When the Scenario Data dialog opens select the Buses tab page. The purpose of this dialog is to specify the bus operational characteristics. Specify each bus in the network in the following dialog.

Bus Properties Page



Starting Link

This is the starting link of the bus operations.

Start Time

This is the starting time of the bus (in minutes).

Avg. Dwell Time

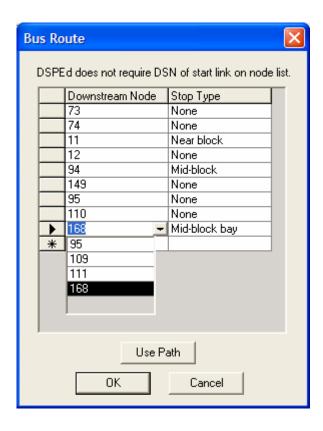
This is the average dwell time (in minutes).

Route

This button brings up the route selection dialog. This is the sequence of nodes used for the bus route. The word "edit..." will appear in the column. This is a button that may be clicked on to display the Bus Route dialog.

When you click the Route "edit..." button the Bus Route dialog opens. The dialog is shown below. This process is significantly easier if you select the links in the path on the network window and create a path with the Create Path dialog prior to opening the Buses dialog page. Refer to Section 4.12 Creating a Path for more information. If the Use Path button is enabled there is path data on the Windows clipboard that can be loaded into the list. Click the button to automatically load the path. You may enter node numbers in the list or select node numbers from the drop down list to designate the route. The list of available nodes in the drop down list is generated based on the previous node in the node list. Only nodes that can be reached from the previous node will be listed. If you change the route in the middle of an existing route you most likely will have to reset all the nodes from the point of change.

Note: DSPEd does not require the first node to be the downstream node of the starting link. Because no stop is allowed on the starting link DSPEd does not show that node. If you enter the downstream node of the starting link as the first node in the route DSPEd will save the data correctly and not allow a stop on that link.



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Stop Type

By default no link has a bus stop. Select the Stop Type from the drop down menu to designate this link's bus stop. Note that the nodes are the downstream nodes. Select the Stop Type for link 2 to 1 at the downstream node 1 Stop Type. The last node in the route must be a valid destination node.

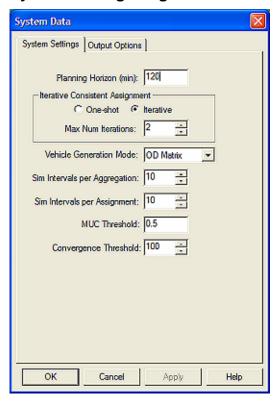
5.5 System Data

The System properties control the execution of DYNASMART-P and the data generated by DYNASMART-P. The next sections describe how to edit these properties.

5.5.1 Editing System Settings

To bring up the System Settings dialog select System Data the item from the Network menu. When the System Data dialog opens select the System Settings tab page.

System Settings Page



Planning Horizon

This is the length of the simulation in minutes.

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Iterative Consistent Assignment

One-shot

This is a one-shot simulation. Only one iteration is performed. When this radio button is selected the number of assignments is set to zero indicating to DYNASMART-P that a one-shot assignment simulation is desired.

Iterative

This indicates an iterative consistent procedure is to be used. When this radio button is selected the Max Num Iterations edit box is enabled. In specifying Iterative Assignment, it is implicitly known that an SO or UE assignment is desired.

Max Num Iterations

This is the maximum number of iterations to be used in the iterative consistent procedure. This edit box is enabled when the Iterative process is selected above.

Vehicle Generation Mode

This is the vehicle generation mode. There are two ways of loading vehicles in DYNASMART-P. The first method is to specify time-dependent O-D matrices for Traffic Analysis Zones (TAZs). The second method is to specify the trip information of all vehicles and their corresponding paths. Select either "Vehicles" (from the vehicle file), "OD Matrix" (from OD demand matrix), or "Vehs and Paths" (from vehicle and path files).

When time-dependent O-D matrices are used for network loading, all vehicles are individually generated from the OD demand matrix files. DYNASMART-P assigns each vehicle a path based on the path assignment setting that the user specified. Vehicles are loaded only on generation links. Within a given zone, the loading intensity of a given generation link is either proportional to the link's lane-miles, or according to the loading weight specified in the generation link data.

There are many instances where a user may need to load vehicles through vehicle files with or without the path files. This type of loading scheme is needed particularly when a user intends to evaluate different traffic management strategies that require specific network loading patterns and/or vehicle paths to be fixed across experiment scenarios. When vehicles are loaded through the vehicle file, with or without a path file, no O-D matrix will be used. The vehicle input file specifies the total number of vehicles to be loaded along with associated detailed vehicle attributes (origin, destination, vehicle type, class, etc.) of these vehicles; and DYNASMART-P assigns their paths. If the user chooses to use path files in conjunction with vehicle files, then the vehicles will be assigned with the itineraries specified in the path files.

Sim Intervals per aggregation

This is the number of simulation intervals (6 seconds each) per aggregation interval. The aggregation interval pertains to the time interval over which the MOEs are averaged. These traffic measures are used by the time-dependent shortest path algorithm to calculate the shortest path tree. The lower the number of simulation intervals per aggregation interval is, the more accurate the link travel times are and the better the traffic assignment is. If a value of 1 is entered, the MOEs are averaged every 6 seconds. If a value of 50 is entered, the MOEs are averaged every (50 intervals x 6 seconds/interval =) five minutes.

Sim Intervals per assignment

This is the number of simulation intervals (6 seconds each) per assignment interval. The assignment interval pertains to the time interval for which the MUC procedure solves the shortest path tree problem and assigns

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vehicles generated within that interval to a path from this shortest path tree. If a value of 1 is entered, the assignment interval will be 6 seconds. If a value of 50 is entered, the assignment interval will be (50 intervals x 6 seconds/interval =) five minutes. For example, if an assignment interval of 5 minutes is specified, then the MUC (making use of the already stored K shortest paths) will solve the shortest path tree for time intervals [0-5], [6-10], and so on. Then each vehicle that is generated in the interval [0-5] will be assigned a path from the shortest path tree generated for the time interval [0-5] and so on. Hence, the smaller the number of intervals, the finer the representation and the larger the memory requirements. Note that this parameter is only applicable for iterative consistent assignment procedure (UE or/and SO).

MUC threshold

This is the Multiple User Classes (MUC) threshold. The minimal difference (in vehicles) of assignment levels between two consecutive iterations for all OD for all departure time intervals. If the difference is greater than the MUC threshold, then a violation is counted. The lower this value is the better traffic assignment results are.

Convergence threshold

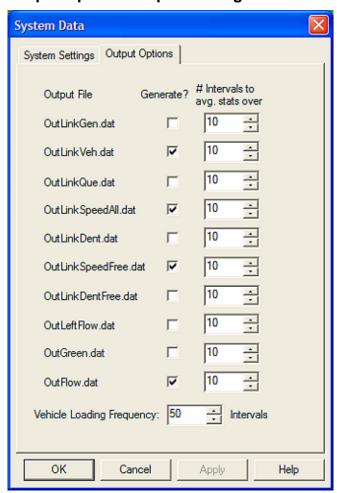
This is the Convergence threshold. The total number of MUC threshold violations accumulated over all OD for all departure time intervals. The lower this value is the better traffic assignment results are.

5.5.2 Editing Output Options

To bring up the Output Options page select the System Data item from the Network menu. When the System Data dialog opens select the Output Options tab page. This dialog allows users to indicate whether or not certain output files should be created. Users can also specify the time interval in which the statistics are averaged over. In addition, users can specify the time interval in which vehicle loading information is displayed on the console window at runtime.

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Output Options Properties Page



Output File

This is the list of files that can be generated.

OutLinkGen.dat	This file contains the number of vehicles generated on each generation link during each simulation interval.
OutLinkVeh.dat	This file contains the number of vehicles (volume) on each link.
OutLinkQue.dat	This file contains the number of vehicles in the queue on each link.
Out Link Speed All. dat	This file contains the average speed (mile/hr) on each link.
OutLinkDent.dat	This file contains the average density (pc/mile-lane) on each link.
OutLinkSpeedFree.dat	This file contains the average speed (mile/hr) for the moving vehicles on each link. This file is similar to OutLinkSpeed.dat, but it excludes stopped vehicles or those that have stopped.
OutLinkDentFree.dat	This file contains the average density (pc/mile-lane) for the moving vehicles on free-moving section of each link.
OutLeftFlow.dat	This file contains the number of left turning vehicles that are discharged from links.

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OutGreen.dat This file contains the green time (seconds) for each approach.

OutFlow.dat This file contains the number of vehicles that have been discharged by the link

including left turning vehicles.

Generate?

This is a check box to turn on or off the generation of each listed file.

Intervals to avg. stats over

This is the number of simulation intervals over which the metrics will be averaged. If a value of 10 is entered the metric will be averaged every (10 intervals x 6 seconds/interval =) 60 seconds.

Vehicle Loading Frequency (Intervals)

This is the number of simulation intervals (set at 6 seconds) in which the GUI updates vehicles position and loading information on the network. If a value of 1 is entered the GUI will update every 6 seconds. If a value of 50 is entered the GUI will update every (50 intervals x 6 seconds/interval =) five minutes.

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6 Glossary of Terms

active window

When several windows are open, clicking the left mouse button anywhere in a window makes that the active window. The active window is indicated by a highlighted title bar. Also, the filename of the active window is displayed in the title bar of the main window.

ATIS

Advanced Traffic Information System

ATMS

Advanced Traffic Management Systems

DOT

Department of Transportation

DYNASMART-P

DYNASMART-P is the dynamic network analysis and evaluation program developed by University of Maryland.

FHWA

Federal Highway Administration. Sponsor for the development of the DYNASMART-P dynamic network analysis and evaluation program.

FIFO

First-In First-Out

graphical user interface

An interface between a user and a software tool, consisting of graphical elements and controls, e.g., windows, dialogs, buttons.

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GUI

Graphical User Interface

HTML

Hypertext Markup Language is a system of marking up or tagging a document so that it can be published on the World Wide Web. It is used to display on-line help.

HCM

Highway Capacity Manual

HOT

High Occupancy Toll

HOV

High Occupancy Vehicles

LOV

Low Occupancy Vehicles

MOE

Measures of Effectiveness

MUC

Multiple User Classes

OD

Origin Destination

PC

Passenger Car

SO

System Optimal

TAZ

Traffic Analysis Zone

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TIGER

Topologically Integrated Geographic Encoding and Referencing. These are files containing geographic data of the United States compiled and distributed by the US Census Bureau.

tool tip

A small rectangular pop-up window that displays a brief description of a command bar (tool bar) button's purpose.

UE

User Equilibrium

VMS

Variable Message Sign

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