

# NETMGR: A Graphical Configurator for ROSE X.25 Packet Switch Networks

William Slack, NX2P  
Donald Rotolo, N2IRZ  
Radio Amateur Telecommunications Society  
PO Box 93, Park Ridge NJ 07656 USA

## Abstract

NETMGR is a windows-based graphical configuration utility for ROSE X.25 Packet Switch networks. This paper describes the features and usage of the software in detail.

## Introduction

NETMGR is a windows-based utility that provides an easy and intuitive method of building configuration files for ROSE X.25 Packet Switch networks. NETMGR allows the network manager to draw the network in a graphical fashion, enter the relevant data and then have NETMGR automatically build the initial configuration files for the switches. In many cases no manual editing of the configuration files will be needed.

The switchop simply draws the network using an interactive drag-and-drop system, and then enters the relevant data for each site and switch. In a single step, NETMGR builds the configuration files for the entire network as drawn. In most cases, no manual editing of the resulting configuration files is required.

## Starting NETMGR

Once NETMGR is installed, simply double-click on the icon. Click OK at the startup screen, and the main screen, shown on the next page, will appear. To view a previously drawn map, select 'File' 'Open' and select the desired map file, which will appear on the screen. To draw a new map, follow the steps below. It is recommended that a new user view the sample map file to get an idea of how things function before drawing a new map.

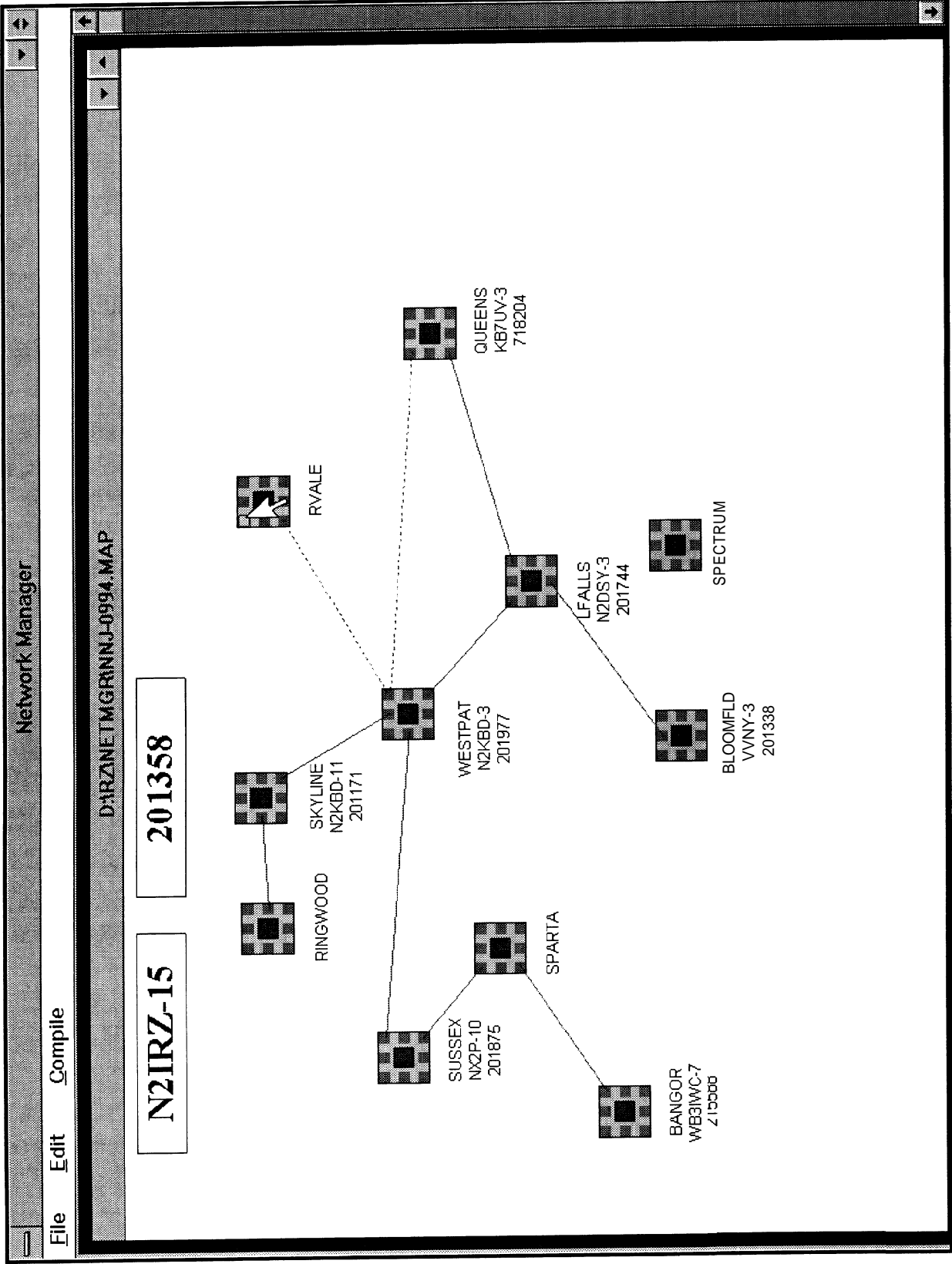
## Drawing the Map

There are four steps to drawing a map of your network:

1. Place the sites
2. Define the site global information
3. Define the switch-specific informaton
4. Draw the links

## Placing the Sites

To start drawing a map select the "Add Site" option under the File menu. This will cause a new site icon to appear in the upper left corner of the map window. The site icon looks like a tic-tat-toe board: eight small squares surrounding a central square of equal size. The eight outer squares represent individual switches, while the center square represents the site itself. This icon can be moved to any spot on the screen by by using a simple left mouse drag/drop operation. To do this press the left mouse button while the mouse pointer is over the center of the site icon. Then while the mouse button is still down drag the site to its new location and release the mouse button.



## Defining Site Information

Once the site has been placed next you will want to enter the default site information. To access this information, right click on the center of the site icon. This will bring up the default site info dialog that will look something like the following.

**Default Site Info**

Site Name: - 1

Site DNIC: 131ao

Site Location:  
1 Sparta, NJ

Site Password Filename:  
1 PASSWtIRD,RS

Default L3W: ( 2

Default Timeout [set]: 900

Default Max VC: 1 2 0

Default Info Text Filename:  
LINKTXT - 1

Do not build site \_CNF files 0

Save Delete Cancel

**Site Name** is a label up to 8 characters long that is used as a reference when building the configuration files. It is also used as the caption for the site icon. Do not place any spaces in this label or it will mess up the configuration files. Also used for the \$N token in the info text.

**Site DNIC** is the DNIC (Data Network Identification Code or country code) for all the switches at the site. Also used for the \$1 token in the info text.

**Site Location**, usually the city in which the site is located, is a text note that can be referenced by using the \$L token in a information text file. The \$L token will be replaced with the text entered in this box thereby allowing a generalized information text file to be customized for each switch when NETMGR builds the configuration files.

**Site Password Filename** is the filename that contains the password for all the switches at this site. This filename is the same filename that you would put in the configuration file of a switch if it is to have a password. Leaving this field empty causes NETMGR to build the configuration files without passwords.

**Default L3W** is just what it says. To simplify the job of the network manager a default L3W can be set for the entire site which than can be overridden by individual switches if neccessary. L3W is the "Level 3 Window" which specifies the maximum number of frames for a single virtual circuit that can be transmitted in a single burst. MAXFAME defines the total number of frames that can be in a burst. Therefore setting L3W below the MAXFRAME value insures that a slow link does not hold up data on another link.

**Default Max VC** is the default maximum number of virtual circuits. As indicated above for L3W, each switch can have a MaxVC that overrides the site default, however entering a site default relieves the network manager from having to enter the same value for each switch at a site.

**Default Info Text Filename** is the site default information text filename. The information text filename is a standard ascii text file that NETMGR references which contains the info text that will be used in the configuration file. The site default text acts in the same way as default L3W and MaxVC by relieving the network manager from having to specify a info text filename for each switch individually. The legnth of the info text file must be less than 2K bytes after all the tokens have been replaced. Tokens are allowed in this file so that it can be automatically be customized for each switch. The tokens supported by NETMGR are as follows:

\$A	Address	\$C	Callsign	\$D	Digi callsign	\$F	Frequency
\$I	DNIC	\$L	Location	\$N	Site name	ST	Time
\$U	Date						

The info text file must be in the local NETMGR directory. This file can be created and edited using Notepad or the DOS edit command.

The **Do not build site .CNF files** check box is used to tell NETMGR that no .CNF files are to be built for this site. This allows a site to be treated as a “reference” site which is used to provide routing information for other sites during the build process without being built itself.

After all the above information has been entered, you can press the **Save** button which will save the information and close the dialog. You can access this information again any time by right clicking on the center of the site icon. The **Cancel** button lets you exit the dialog without saving any changes. Pressing the **Delete** button causes the site to be removed from the map and all links connected to the site to be deleted.

### Defining Switch Information

Once the site information has been specified, you will want to enter the data for the switches at the site. Up to eight switches can be defined for each site/matrix. The switches are represented by the eight sections surrounding the center section of the site/matrix icon. To access a switch’s information right click on the section representing the switch of interest. In the case of entering the switch information for a switch that has not yet been specified, right click on one of the unused sections (best to select one on the side of the site/matrix icon that is the direction that links will be drawn). A switch dialog box something like the following will appear.

**Switch Callsign** is the callsign (including SSID) for the switch that will be represented by this section. Also used for the \$C token in the info text.

**Switch Digi Call** is the digi callsign (including SSID) for the switch that will be represented by this section. Also used for the \$D token in the info text.

**Switch Address** is the address for the switch that will be represented by this section. Not specifying a address or removing the address has the same effect as pressing delete. Also used for the \$A token in the info text.

**L3W** overrides the default L3W that is entered for the site. If this field is left blank, NETMGR will use the site default.

**Timeout** overrides the default Timeout that is entered for the site. If this field is left blank, NETMGR will use the site default.

**Max VC** overrides the default Max VC that is entered for the site. If this field is left blank, NETMGR will use the site default.

**Info Text Filename** overrides the site default info text filename. See the site default section earlier in this document. If this field is left blank, the site default text will be used. In this case USER.TXT has been specified which is a general user port text file containing tokens that make it look like it was generated specifically for this switch.

**Switch frequency** is a text note for frequency. It is only used when building the info text by substituting whatever you enter in this field for any \$F tokens used in the info text file.

**Primary userport at site** check box is used to tell NETMGR that this switch call and address should be displayed under the map and printed out with the map. This check box has no other effect.

**Switch Version** is currently unused for anything other than a place you can place this information to keep track of it. In the future, I plan on using the information to automatically call CONFIGUR.EXE of the correct version to go direct from NETMGR to .TBL files thereby avoiding a manual step. In order to maintain compatibility with the RZ series of programs (RZLOAD, RZCONFIG and RZSYSOP) I recommend you maintain this data using the 6 digit version date stamp.

**Coverage** can be used to enter coverage addresses for a switch. A single line up to 72 characters can be entered which has any number coverage addresses separated by spaces. NETMGR currently does not support “virtual” switches therefore the same coverage address must not be entered in more than one switch or else the address will appear more than once in each routing table. This WILL cause switches to lock up. If a virtual switch is being used, only put the coverage address in one of the switches and then manually edit the configuration files of the other switches by adding the coverage and deleting the covered address from the routing section of the configuration file.

Note - A virtual switch would be used in a case where two or more switches on the same frequency have some amount of common coverage. The common coverage area can be assigned a address and this address be put in the coverage of both switches. This allows any connects into this area covered by the virtual switch to route to the nearest switch thereby providing maximum efficiency.

**Do not build switch .CNF file** check box is used to tell NETMGR that a .CNF file is not to be built for this switch. This allows a switch to be treated as a “reference” switch which is used to provide routing information for other switches during the build process without being built itself.

After all the above information has been entered, you can press the Save button which will save the information and close the dialog. You can access this information again any time by right clicking on the center of the switch section of the site icon. The **Cancel** button lets you exit the dialog without saving any changes. Pressing the **Delete** button causes the all the switch information to be removed. Links connected to the switch to be deleted.

Once the switch information has been specified you will note that whenever you move the mouse cursor over a section, the switches call and address appears in the ID windows. This provides a way of knowing what switches have been defined and a way of identifying the switches when you are adding the link information to the map.

### Drawing Links

The next step in building the map, once you have at least two sites with at least one switch at each site defined, is to draw the RF links. To do this simply left click over a section on a site/matrix icon for which you have defined switch parameters. At this point a line will appear between that section and the mouse pointer. As you move the mouse pointer the line moves with it. Now move the mouse pointer over to the switch at the other end of the link. Left click on the section of the site representing the destination switch (note that links cannot be drawn within a site). To terminate the link draw process without creating a link, left click on the same site you started to draw the link from. As you draw links, you will note that some links will be green lines while others will become dotted red lines. When NETMGR sees that more than one RF link has been drawn from a particular switch, it changes from green to dotted red so that dedicated links (green lines) stand out as being virtually “collision free” (assuming there are no stations on the channel that are not shown on the map).

Each link has an associated Q factor, arbitrarily defined by the sysop. The lower the Q factor, the better the path. To set the Q factor for a link, right click on the line representing the link. This will cause a dialog to appear that lets you enter the Q factor. The Q factor is used in determining what the best and/or shortest path to a destination address and for alternative routing. The default Q factor is set to 1 whenever a link is added. Whenever there is a mix of backbone and 2m paths, it is a very good idea to set the 2m Q factors to a relatively high value such as 15. This means that for the routing to take a 2m path, there would have to be more than fifteen Q factor 1 backbone hops over the same path. Q factors can be any value from 0.01 to 1,000 per link. Fractional Q factors are allowed and are a good idea for high speed links. The way NETMGR builds the routing table is to look at all possible paths to a destination site and add the Q factors of all the links. The lowest total Q factor path is used as the primary path and the next to lowest total Q factor is used as the alternative route (note that second alternative routes have found to be generally ineffective. In practice this results in connects that seem to hang as the number of combinations get large. Thus, NETMGR only records a primary and first alternate path).

To delete a link, left click on the line representing the link. The line will change color to blue. Then under the edit menu select the delete link option. This will delete the link. If you decide you do not what to delete the link, just left click someplace on the background of the map. This will cause the line to return to its normal color.

### Building Configuration Files

Once you have entered all the site, switch and link information you are ready to build the configuration files. This is the easiest step in the process. Just select 'Compile' 'Build', which causes all the configuration files (.CNF) to be built. The status of the build process will be shown in a window. Any errors or warning will appear in the status window and, once the build process is complete, you can browse through them and make any fixes necessary. To close the status window, double click on the control box in the upper left corner.

The configuration files are saved in either the NETMGR directory or the directory from which you have loaded the map file from or previously saved the map file to.

### Build Options

Several optional parameters are available to control generation of alternate routes. These are designed as a mechanism to prevent alternate routes from being created using paths which cannot support the traffic or alternates so lengthy they should never be tried. These parameters are saved with the MAP file. These options can be set by selecting 'Compile' 'Options'. The following dialog appears:

Build Options	
<input type="text" value="0"/>	Maximum difference in Q factor from the primary link allowed for alternate routes.
<input type="text" value="0"/>	Maximum Q factor allowed for alternate links. Enter 0 for no limit.
<input type="text" value="0"/>	Maximum percentage change in Q factor between the primary and secondary routes
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

**Maximum difference in Q factor from the primary link** is used to prevent alternative routes from being generated which are more than this threshold higher in Q factor than this limit. This is useful in cases where there is a very long loop of switches. In this case NETMGR will see this and create the alternative routes (both ways around the

loop). At first, this appears wonderful, but the many hops required to get to the adjacent site 'the long way' will overload all the other switches. Using this control can prevent this while still allowing a alternative route to be created for the distant switches on the loop where the primary and secondary routes are nearly the same length. This control can be disabled by setting it to zero.

**Maximum Q factor allowed for alternate links** prevents alternative links from being generated when the Q factor of the alternative route exceeds this value. This is useful for preventing secondary routes from being created using paths which should never be used as a alternate (i.e. they can not support additional traffic). This can be done by setting this limit arbitrarily high (i.e. 9000), then you can set the Q factor for any links which are not be used to 10000. Caution should be used with this control. Setting it too low can result in no alternative routing being generated at all for long paths (i.e. paths where the primary link has a Q factor above this limit). This control can be disabled by setting it to zero.

**Maximum percentage change in Q factor between primary and secondary routes** prevents alternative links from being generated when the Q factor is greater than the specified percentage larger than the primary route. For example a primary route with a Q factor of 4 and this control set to 50%, the Q factor of the alternative can have a value up to 6. Extreme caution should be used with this parameter since this can prevent alternative routes from being created for very short paths. For example, when set to 40% and a primary route over a single hop path with a Q factor of 1 will require a alternative path with a Q factor 1.4 or less. If you have no paths with Q factors less than 1, no alternatives will be generated. This control can be disabled by setting it to zero.

## Exiting

To exit NETMGR select 'File' 'Exit' or double-click on the control box in the upper left corner. Note that there is no checking of whether the map has been saved or not, so make sure you save your files before exiting.

## Notes

1. NETMGR uses standard file NEW, OPEN, SAVE and SAVE AS . . . commands for loading and saving the maps. (Note that there is no warning when you overwrite an existing file).
2. There is a trace option available for the build process. Selecting the trace option will result in a much longer build process. With this option selected you will see the links change color as NETMGR examines them. It makes a pretty good show.

## Hints

1. To handle routing out of your management area, simply add a site to the map representing the first switch outside your area. Enter the proper callsign and address of this switch. Then in the coverage section enter all the address that need to be routed out through that link. If there is more than one link into the adjacent area, place one site for each of the links. You then enter the appropriate information in the coverage for the particular link. Do NOT duplicate information in the coverages as this will cause the problems by having duplicate listings in the routing table. If the links provide backup for each other place a link between them, this will cause the alternate routing to be built into the routing tables.
2. Avoid drawing very poor paths that might be used as alternate routes. In practice a poor quality alternate route usually will fail once loaded with the primary route's traffic. Therefore it really does not provide a backup path in practice. Each alternate path increases the amount of paths that must be examined by NETMGR, eliminating what would be useless links both avoids routing on useless paths and speeds up the NETMGR build process.

## Conclusion

NETMGR is a powerful yet easy-to-use utility for configuring ROSE networks. The simple drag-and-drop construction lends itself to easy mapmaking, with the added benefit of clear and compact network documentation. The NETMGR software is shareware, and can be downloaded from CompuServe's HAMNET forum, or obtained by sending a SASE with a formatted 1.44 Mb floppy to the authors at the address above. As of this writing (July 1995) version 1.5 is current.