

Template-based Network Design Concepts and Processes Guide

The
MetaSolv
Solution.™

5.1



MetaSolv Solution™ M/5.1

Templates-Based Network Design

Concepts and Processes Guide
FIRST EDITION



Copyright and Trademark Information

MetaSolv Software, the MetaSolv logo, MetaSolv Solution, Framework for Success, MetaSolv QuickStart, MetaSolv eService, MetaSolv Field Operations Portal, Rapid Results, and MetaSolv Network and Service Planning are trademarks of MetaSolv Software, Inc. MetaSolv is a trademark registered in the United States of America by MetaSolv Software, Inc.

COMMON LANGUAGE is a registered trademark, and Telcordia, CLCI, CLEI, CLFI, and CLLI are trademarks of Telcordia Technologies, Inc. (formerly Bellcore).

Cygent is a trademark of Cygent, Inc.

HipLink is a trademark of Cross Communications, Inc.

InfoMaker and PowerBuilder are registered trademarks of Sybase, Inc.

Microsoft, Windows, Windows 95, Windows 98, Windows 2000, and Windows NT are registered trademarks of Microsoft Corporation.

Oracle is a registered trademark of Oracle Corporation.

Saville CBP is a registered trademark of Saville Systems.

SilverStream, SilverJServer, SilverJRunner, JRunner, JBroker, SilverMonitor, and SilverJunction are trademarks of SilverStream Software, Inc.

Sun, Sun Microsystems, the Sun logo, Java, and all Java-based marks are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries.

All other marks are the property of their respective owners.

Copyright © 1994 - 2001 MetaSolv Software, Inc. All rights reserved.

Disclaimer

All references to future incorporation of new or enhanced product functionality, or to future release dates, are estimates only, and MetaSolv may change them at any time, without notice. Information in this document is subject to change without notice and does not represent a commitment on the part of MetaSolv Software, Inc. All references to new or enhanced product functionality, or to future release dates, are estimates only, and MetaSolv may change them at any time, without notice.

The software and/or databases described in this document are furnished under a written license agreement or nondisclosure agreement. No part of this document, the software and/or databases may be used, reproduced or transmitted in any form or by any means, electronic or mechanical, including copying, photocopying, recording, or information storage or retrieval systems, for any purpose without the written permission of MetaSolv Software, Inc., except as specifically allowed in the written license or nondisclosure agreement. It is against the law to copy the software on any medium except as specifically allowed in the license or nondisclosure agreement.

MetaSolv Software, Inc. assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual.

Use of any of this Software's functionality in a manner inconsistent with your license grant, whether or not protected by the Product ID, is a breach of the license agreement between your company and MetaSolv. A listing of the software options for which you possess a license may be viewed by navigating to Options>Software Options.

This Software contains sample network system templates ("Templates"). MetaSolv does not provide, and is not obligated to provide, Standard Maintenance and Support for the Templates or any modifications made thereto. The Templates are delivered as is and without warranty of any kind.

Printed in U.S.A.
MetaSolv Software, Inc.
5560 Tennyson Parkway
Plano, TX 75024 U.S.A

CONTINUOUS PUBLICATION

How It Works for You

This document is one of multiple published editions of this Concepts and Processes Guide. There are sections in this edition that are still in development. Those sections are identified by a descriptive heading and the following symbol and note:



Under Development

The next edition of the CAP guide will replace that note with the information described in the heading. You will know that the next edition has been published when you see it announced in the *ReadMe* accompanying a service pack, and when you read about it on the MetaSolv web site (www.metasolv.com). As soon as a subsequent edition is published, you can access it from the Download area of your customer or partner portal on the Web site.

We are pleased to be able to provide you with the most up-to-date and accurate documentation possible through this approach to publication. As always, we appreciate all of your suggestions and comments on ways we can improve our documentation. Please send comments to: documentation@metasolv.com

Contents

About this guide	ix
Concepts	1
What is template-based network system design?	1
Overview	2
Where does network system design fit in the end-to-end service provisioning process?	3
Features and functionality.....	4
What can a network system include?	5
Network Elements	5
Relationships	8
Embedded network systems	9
Integration of templates with other subsystems and modules	11
Customer Care	11
Engineering.....	11
Equipment.....	11
Infrastructure.....	11
Work management.....	12
Preferences	12
Processes	13
Using the Network System Design window	13
Features.....	14
Canvas work area	14
Navigation	16
Panel list	16
Menu icons	17
Save button	18
Print button	18
Zoom buttons	18
Tool tips	19
Search	19
Window Conventions	20
Opening an existing network system	21
Closing a network system	22
Unlocking a network system	22
Designing a network system	23
Defining the network system.....	24
Selecting a network template	24
Defining network system properties	25
Adding network elements to the design	26
Adding a network element	26
Defining properties for a network element	28
Associating equipment with a network element	29
Deleting a network element from a network system	31
Specifying a role for a network element	31
Locating a network element on the canvas	32

Adding connections	32
Adding a relationship	33
Defining the relationship between two elements	34
Associating an existing connection	34
Creating and associating a new connection	37
Deleting a connection's association with a relationship	37
Deleting a relationship	37
Placing a network system in service.....	37
Deleting a network system	38
Embedded network systems	38
Embedding an existing network system	39
Creating a placeholder for an embedded network system.....	39
Replacing a network system placeholder with a network system	40
Expanding an embedded network system	41
Updating information in embedded network systems	42
Deleting an embedded network.....	42
Working with ordered network systems	43
Sharing elements between networks	45
Viewing network neighbors	47
Displaying connections to other network systems	47
Managing customer extensions	50
Viewing a customer extension.....	50
Making changes to a customer extension	52
Removing a customer extension from the canvas.....	53
Exporting a network system design	53
Printing a graphic	53
Print Setup.....	54
Printing a network system design	55
Capacity management reporting	55
Service Activation Report	55
NAT Maintenance	56
Scenarios	57
Scenario 1 - Designing an ATM network system	57
Scenario 2 - Designing a virtual private network system	57
Scenario 3 - Designing a DSL network system	57
Setup	59
Enabling software options	59
Setting preferences	59
Configuration considerations	59
Conversion and migration considerations	60

Figures

Figure 1: How network systems fit in the end-to-end service provisioning process	3
Figure 2: Defining a network element	5
Figure 3: Network template requirements for connection specs	8
Figure 4: Connections in network system design	9
Figure 5: Embedded network system	9
Figure 6: Embedded network systems	10
Figure 7: Secondary Toolbar	14
Figure 8: Network Design Window	14
Figure 9: Hide/display buttons	15
Figure 10: Fully expanded canvas	15
Figure 11: Window menu	16
Figure 12: Panel menu icon	17
Figure 13: Tool tip	19
Figure 14: Selecting the Search function for a network template	19
Figure 15: Search panel	20
Figure 16: New window features	20
Figure 17: Choosing an existing network system	21
Figure 18: Network system displayed on the canvas	22
Figure 19: Message box for open network system	22
Figure 20: Network Template List panel showing a template selection	24
Figure 21: ATM Access network template in Network System Design	25
Figure 22: Managing a Network System window	26
Figure 23: Adding an element to a network system	27
Figure 24: Adding multiple elements to the canvas	27
Figure 25: Network Template Detail panel, showing network elements for a template	27
Figure 26: Network Template Detail panel, showing nested network element types	28
Figure 27: Managing an Element window, showing an ATM switch	29
Figure 28: Equipment icon	30
Figure 29: Equipment association	30
Figure 30: Equipment Install window	31
Figure 31: Connection between two elements	33
Figure 32: Connection specs associated with a relationship	34
Figure 33: Managing a Connection window	35
Figure 34: Connection Query window	35
Figure 35: Connection Query window showing the Results tab	36
Figure 36: Connection associated with a network system relationship	36
Figure 37: Embedded networks	38
Figure 38: Network template, showing embedded network templates	39
Figure 39: Embedded network properties	40
Figure 40: Network System Query window	40
Figure 41: Embedded network properties selected	41
Figure 42: Expanded network area	42
Figure 43: Network System Order Selection window	43
Figure 44: Unincorporated panel for customer-ordered systems	44
Figure 45: Unprovisioned panel for customer-ordered systems	44

Figure 46: Element Query window	45
Figure 47: Querying for a network element	46
Figure 48: Network Connections window, showing connected networks	47
Figure 49: Viewing Neighbors window	48
Figure 50: Network neighborhood	49
Figure 51: Expanded network neighborhood	49
Figure 52: List of customer extensions	51
Figure 53: Viewing Extensions window	51
Figure 54: Customer extensions displayed on the canvas	52
Figure 55: Export window	53
Figure 56: Print Setup window	54
Figure 57: DLC Capacity Management report	55

About this guide

Purpose

This guide provides detailed information that helps you design networks using network templates.

The information presented includes:

- An explanation of why network designs are based on network templates
- A description of the things—network templates, connections, network elements, custom attributes, and network systems—that can go into a network design
- An explanation of the configuration and setup that is required prior to working with network designs based on network templates
- An explanation of how a network design works in the context of the whole MetaSolv Solution, including step-by-step instructions and usage guidelines
- A set of scenarios that illustrate the role of network designs based on network templates in the overall process of order management and service fulfillment

Audience

If you are responsible for implementing M/5.1, converting and migrating an existing MetaSolv Solution database to M/5.1, and working with service provider (internal) and customer ordered (external) networks, this guide is written for you. The audience includes network designers, circuit engineers, service provisioners, system administrators, and anyone involved in implementing and supporting the M/5.1 MetaSolv Solution.

Before you begin

Before you can begin designing networks based on network templates, you must:

- Install MetaSolv Solution M/5.1. Earlier versions of the software do not employ the network templates on which you base new network designs.
- Have a thorough knowledge of your network, all its elements and connections, and the services your company offers.

Organization

This book is organized in the following manner:

To learn about...	See the following chapter...
Network System Design features, integration with other system modules, and technology modules	"Concepts"

To learn about...	See the following chapter...
How to build a template-based network system	"Processes"
Examples of network systems designed using this feature	"Scenarios"
Software options, preferences, and conversion issues	"Setup"

Related documentation

Concepts and processes documents

The following documents are available through the customer and partner portals on the MetaSolv Web site.

- *Network Templates Concepts and Processes Guide*
- *Templates-Based Network Designs Concepts and Processes Guide*
- *Templates-Based Product Specifications Concepts and Processes Guide*
- *Templates-Based Ordering Concepts and Processes Guide*
- *Templates-Based Service Provisioning Concepts and Processes Guide*

Technology modules documents

The following documents are available, with the purchase of the related technology module, through the customer and partner portals on the MetaSolv Web site.

- *ATM/Frame Relay Technology Module Guide*
- *DLC Technology Module Guide*
- *DSL Technology Module Guide*
- *Ethernet Technology Module Guide*
- *IP Technology Module Guide*
- *MPLS Technology Module Guide*

Additional resources

- **MetaSolv Solution Online Help**—Online Help is included with the MetaSolv Solution. To access it, click **Help** on the main toolbar.
- *Next Generation Networks White Paper*—Available from the MetaSolv web site, www.MetaSolv.com.

Concepts

This chapter presents the purpose, features, and benefits of designing network systems based on network templates. There are diagrams and descriptions in this chapter that explain the role network systems play in the MetaSolv Solution and in the overall process of order fulfillment and service provisioning.

You should read this chapter if you are:

- A network planner or consultant on the MetaSolv Solution implementation and support team, because you will be responsible for the setting up the software to support your network templates and network designs.
- A network engineer, because you will be basing new designs on network templates, and you will be converting existing network systems to work with network templates.
- A circuit designer or provisioner, because your designs and provisioning will be based on the rules, element types, and connection specs in the network templates that support your network system designs.
- An information technology specialist supporting the MetaSolv Solution, because many aspects of network design, such as network templates, custom attributes, and preferences, are critical to your understanding of the software.
- An individual who wants to know how network systems designed from network templates support ordering and provisioning in the MetaSolv Solution.

What is template-based network system design?

A network system is a collection of connections and network elements that allows provisioning of services to customers. Release 5.1 introduces many new features that you can use in network system design, but the two primary features that control how you design a network are the new graphical canvas and network templates. The following sections explain how a template-based network design works. Before you continue, read the "Concepts" chapter in *Network Templates Concepts and Processes Guide* to get a full understanding of network templates.

Overview

A network template can be considered a toolkit for building a network system. It contains all of the building materials you use to represent a network system in the MetaSolv Solution and rules that govern how you can use the building materials. When you select a network template to design a network system, you are, in effect, selecting a specific set of element types and a set of rules that govern how the element types can be connected to provide service to customers. Templates, which can be created for any operational or administrative purpose, provide guidelines that let you design and validate your design as you go. When you use a template, you reap the benefits of increased design speed and improved accuracy at network-design time, but you must pay special attention to template setup to ensure these benefits.

During network design, you select a network template to form the basis of your network system design. The network template you select controls the types of elements you can add to your network design canvas and the types of connections you can use between the types of elements. Only those defined by the network template are available to you. You cannot modify the network template from network design, and you must work within the rules set by the template you select for your network design.

You can select multiples of element types and arrange them in the order you please on the canvas; the network template determines how many you can add. No matter how many you select and place on the design canvas, the rules established in the template determine which network system elements you can connect to other elements and what kind of connections you can associate with the relationship between two elements.

As you create the new network system, the MetaSolv Solution constantly validates the elements and connections you place on the design canvas. Because a template contains the preset rules for building a network system, using one speeds up the design process and and cuts down on design errors. For example, suppose one of the parameters you defined for an network element type in the template (in this case, a router) indicated that a maximum of three could be included in any one network system. If during network design, you attempt to add a fourth router, the MetaSolv Solution software validates the design against the template and prevents the addition of the fourth element.

The template itself should be flexible enough to allow some latitude in network design, but rigid enough to enforce design standards as new networks are created.

Where does network system design fit in the end-to-end service provisioning process?

Network system design fits into the end-to-end service provisioning process at two separate points: during the design of the internal network systems over which customer service is provisioned and during the design of external, customer ordered systems such as VPNs. The following figure shows where network design occurs as part of the template-based service provisioning process flow.

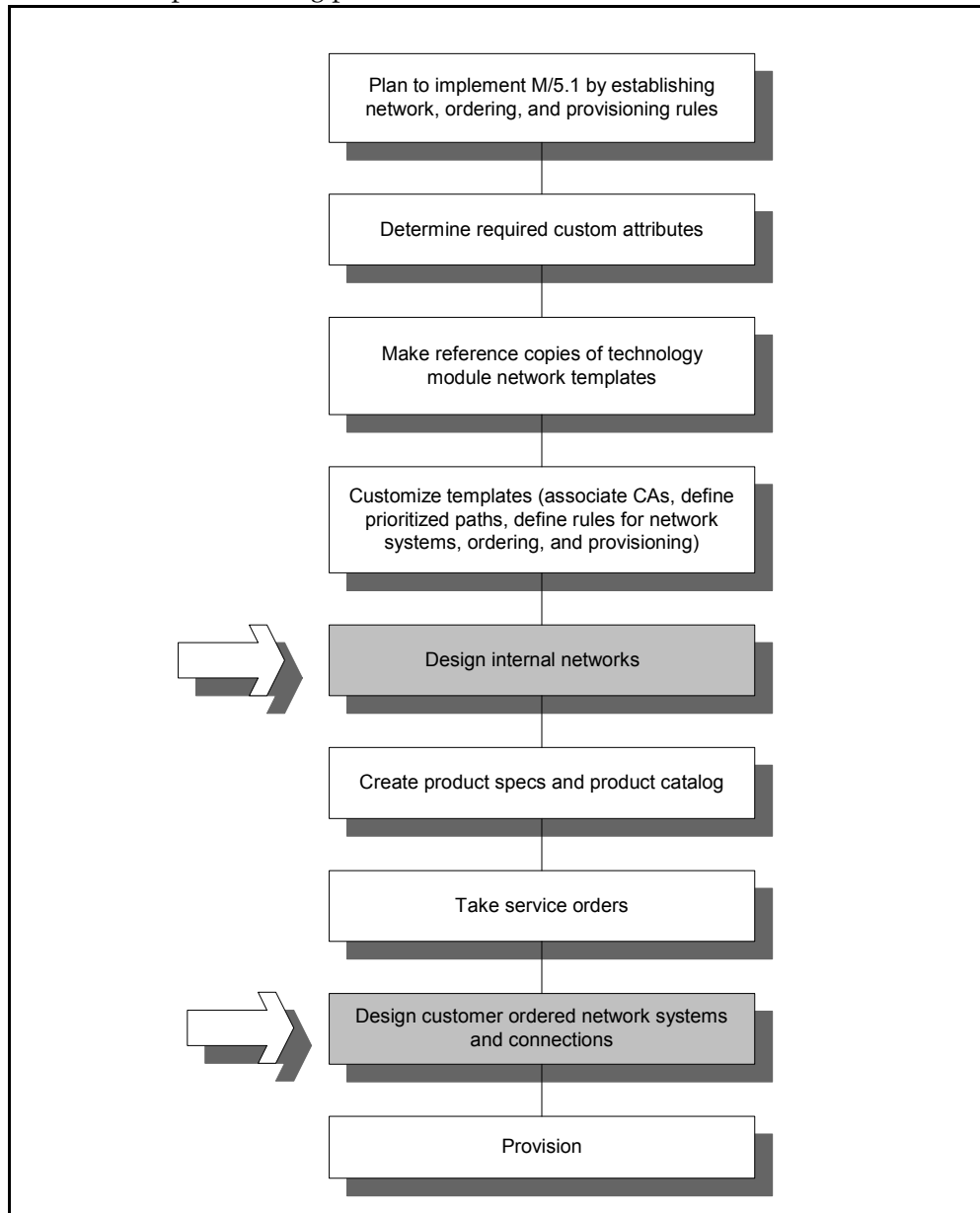


Figure 1: How network systems fit in the end-to-end service provisioning process

Features and functionality

Template-based network systems design includes features that give a new look and approach to the design process. The functionality supporting those features includes:

- **A graphical design canvas**

This canvas allows you to view and manipulate elements and connections in the network system you are creating. A panel list located in the same window with the canvas provides the information and tools you need to build out and define the network system.

- **Property and rule inheritance from network templates**

You select a network template to serve as the basis for your network design. Each addition to the network system is checked against the template for validation. Network templates control the design process to ensure that sound principles are used throughout the design.

- **Introduction of rules and values from custom attributes**

Custom attributes are properties that let you shape the network system to meet exact business needs. Custom attributes are created and associated with the network template in the MetaSolv Solution Utility. You can view the associated custom attribute values for a network system or a network element.

- **Export of a network system drawing**

You can export a network system drawing in a Windows Enhanced Metafile (*.EMF) or a Windows Bitmap (*.BMP) format

- **Capacity management reporting**

You can create and view a capacity management report for DLC network systems.

- **Activation report**

You can view the Activation report that contains the necessary information for field technicians to activate service.

- **Network neighborhood information**

You can view connections from the network currently displayed to other internal (service provider) networks or external (customer) networks. Viewing neighboring networks lets you understand how the network you have displayed interacts with other networks. The neighboring network you display is view only and is shaded in a different color to distinguish it from the network system you are working with. You can view a neighboring network as a cloud or as an expanded network showing its elements and connections, or you can choose to see only the element within the neighboring network that your network system is connected to.

- **Customer extension viewing**

You can view and modify customer extensions. A customer extension is that portion of the ordered service that goes from the customer site to the service provider network system. For example, the customer link to a DSLAM is a customer extension. Customer

extensions are not designed on the Network System Design canvas. These are not considered part of the internal network and don't qualify as a system. They are created at service provisioning time from the customer's order. Once the customer extension is created, you can select it from a list of customer extensions connected to the network, display it on the Network System Design canvas, make changes to it as needed, and remove it from display.

■ Printing a network system design

You can print the contents of the canvas. If your network is too large to be displayed on the canvas, you can still choose to print the entire network system. This option prints what can be seen on the canvas and any portions of the network that are not currently displayed on the canvas.

What can a network system include?

Network Elements

Network elements represent groups of equipment that have a common identity in the network system. A network element is an instance of a network element type defined in the network template. For example, in the following figure, a network element is displayed on the Network System Design canvas.

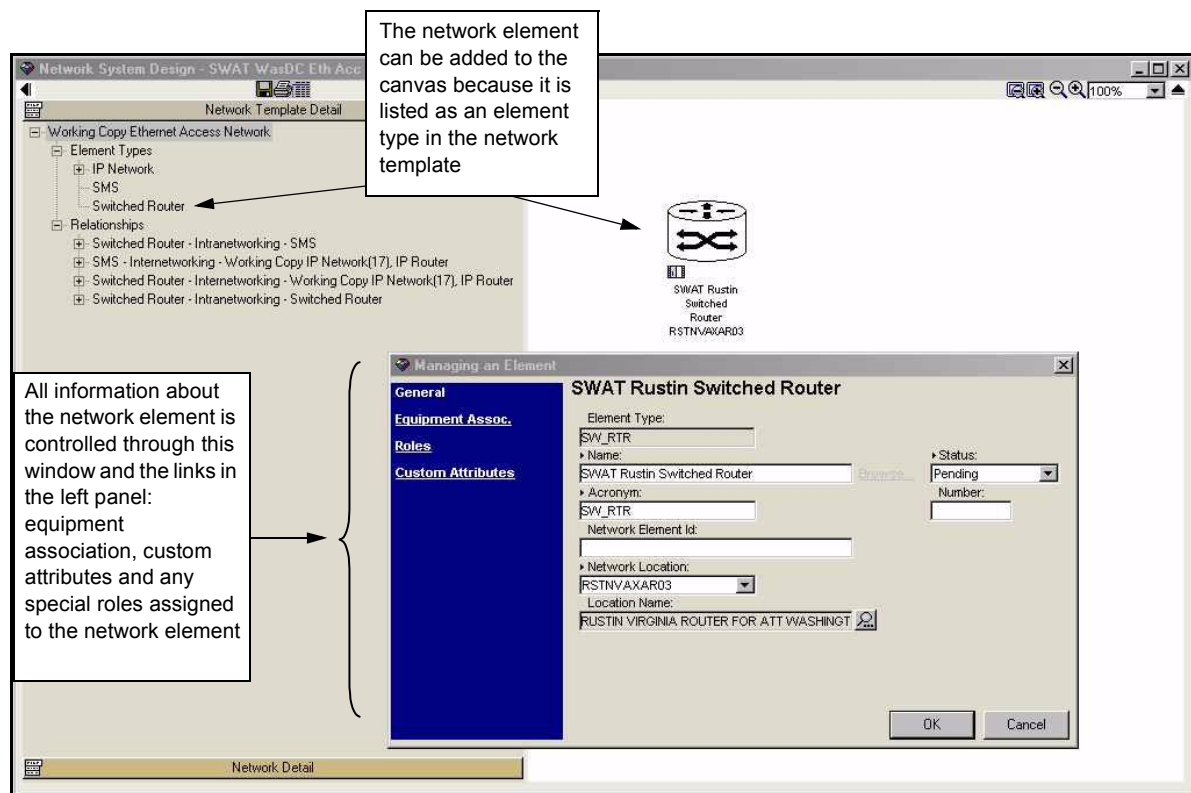


Figure 2: Defining a network element

The network element, which resides at a location (RSTNVAXAR03), has been fully defined and specific equipment has been associated. The complete definition of information for the element can be done from the Managing an Element window displayed on the canvas.

The template controls which types of elements can be added to the canvas, which elements on the canvas can be connected to other elements, and the kinds of connections that can be used to connect the elements.

The Network Template Detail panel on the canvas holds the detailed information on the element types and relationships that are available. In the preceding figure, the switched router element shown on the canvas is listed. The list of relationships in the panel shows that the switched router element type can be connected to another switched router element type within the same network system, an IP router element type located in a separate IP network system, and an SMS element type located within the same network system. This network element type can be connected to only those network element types indicated in the Relationship list. To find what kind of connections can connect the element types, you expand the relationship in the list and view the associated connection specs. Network element types that have been designated as inactive in the network template are not listed, nor are customer extensions to the provider network system.

You can associate equipment with a network element in the following ways:

- No equipment

In some cases, a network element represents a node in the network system satisfying a specific purpose, but no equipment needs to be associated with it. For example, consider cable modem broadband service delivered to a residence. This service may terminate at a network element (a network node) located at a customer's residence. If the customer provides the cable modem, the service provider probably does not want the customer's cable modem in their equipment inventory. In this instance, the network element representing the node is something generic such as "Customer Cable Node." No inventoried equipment would be associated with the network element, but the element would be associated with the customer's location.

- Simple Equipment

One or more pieces of equipment may be required to support the functions of a network element. An equipped network element represents a node in the network for which specific equipment details are known and maintained.

For example, assume a service provider supplies a cable modem to the customer. In this case, the network element, representing the network node at the customer's residence, would represent the cable modem (for example, a Cisco uBR905). Associated with the network element would be the specific cable modem represented in the equipment inventory. This modem would be of a specific vendor and part number, have its own serial number, perhaps a UPC identification, and an internally addressable MAC (Media Access Control) address. The element could also be associated with the customer's service location.

- **Complex Equipment**

An element may optionally represent a collection of equipment. A collection of equipment may consist of several individual pieces of equipment that together have a common identity and satisfy a common purpose.

An example of this is a Cisco 7000 router that consists of a physical equipment shelf and a number of adapter cards (that is, ATM interface cards, Ethernet interface cards, fast Ethernet interface cards, FDDI interface cards, and so forth). Individual vendor and part numbers classify the shelf and each of the adapter cards. Each of the items that are assembled together have unique serial numbers and UPC codes. The assembled unit would have a common purpose (that is, a router) and a common identity, such as a TID (terminal identifier) or IP address, that would enable it to be addressed or administered as a single functional unit or element.

- **No location**

The network template determines whether location is required for a network element at design time. In some cases, an element may not be associated with a specific location. For instance, at the time the logical network is designed, specific locations may not be known for all elements. Elements can be logically represented in the network and specific locations can be established for them as design proceeds. In another example, consider an element representing a portable wireless device. This type of device may not have a practical location with which it would be associated. In addition, consider an element that is discovered from the network. While the element is known, its specific location may not be initially known.

Relationships

The template determines that two element types can be connected by indicating a relationship between them. The relationship is defined in the network template, and connection specs associated with the relationship in the network template indicate how the two element types can be specifically defined during network system design. When you select a network template for a network system design, a panel displays on the canvas with the network template details outlined. The following figure shows how the network template information on a relationship is displayed on the Network System Design canvas.

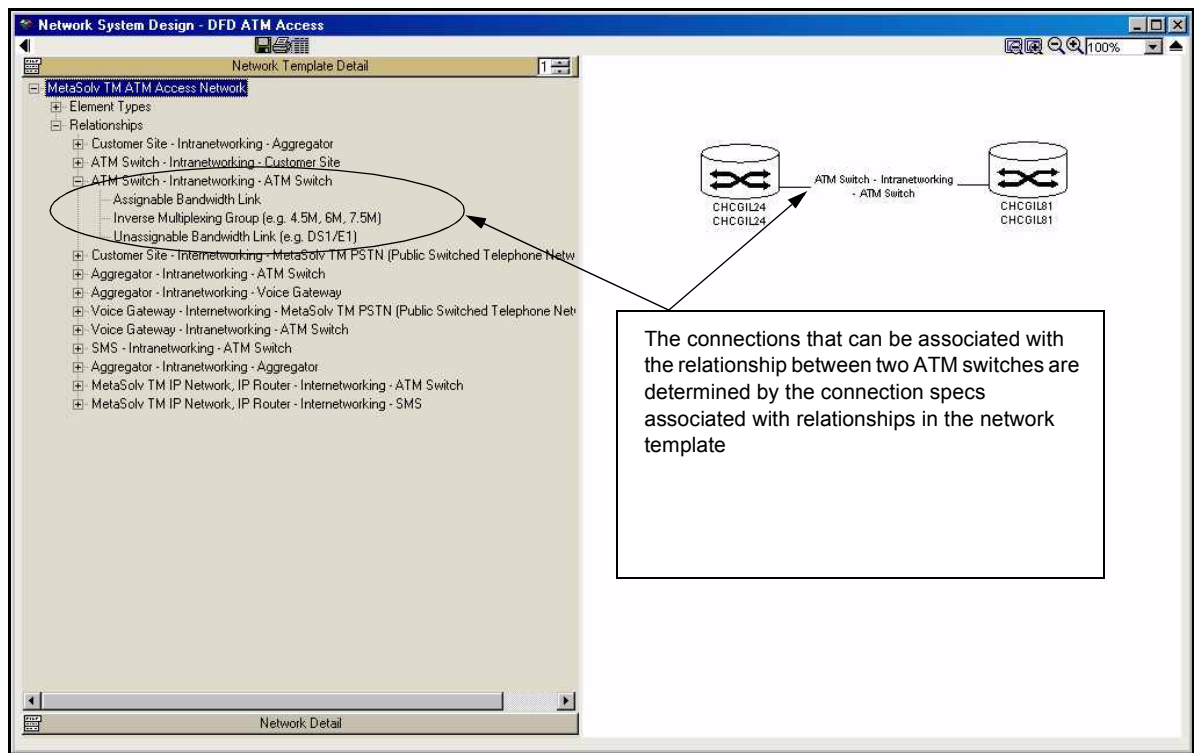


Figure 3: Network template requirements for connection specs

Connection specs associated with a relationship in the network template become available to the network designer in the Network System Design window. Actual connections of the type indicated by the connection specs can be created or selected from existing connections and associated with the relationship in the network system design. Only connection specs associated with a relationship in the template are available during network system design. The following figure shows the Managing a Connection window. This window allows you to associate connections with the relationship between two

elements. Notice that the only connections that appear on the window match the connection specs listed in Network Template Detail panel.

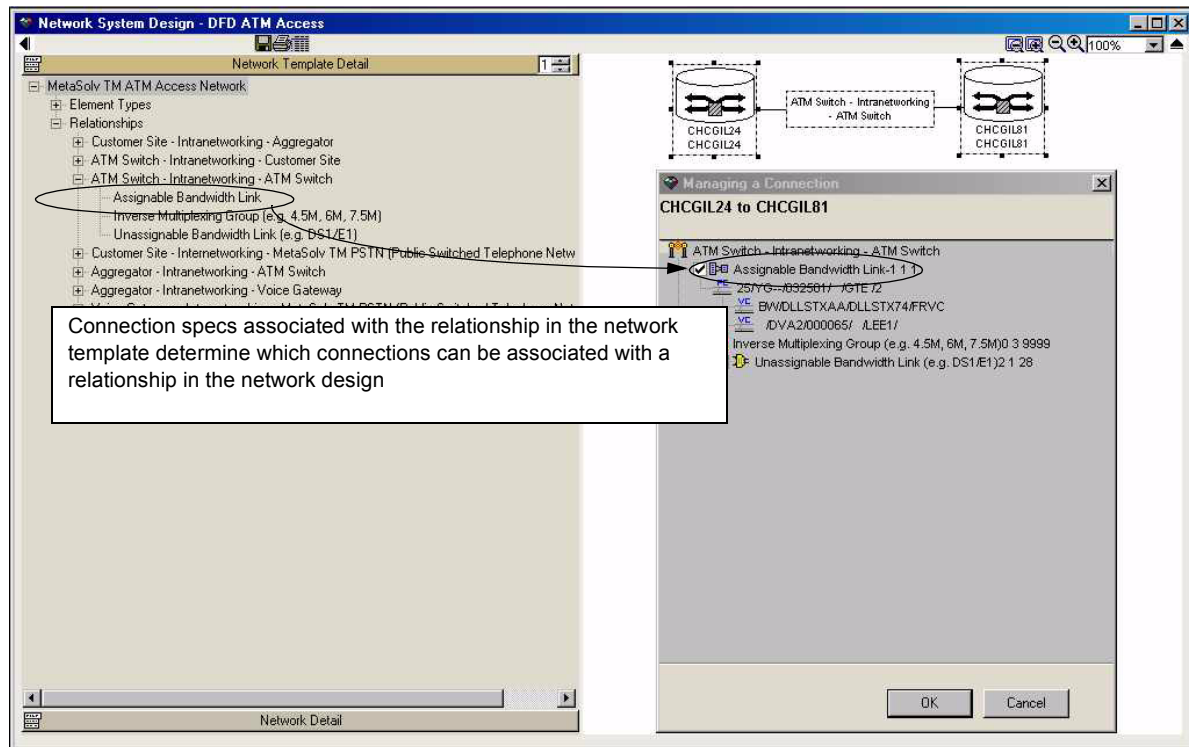


Figure 4: Connections in network system design

Embedded network systems

A network system can be made up of other network systems. For example, a DSL network system can contain an IP network system along with a DSLAM and other elements. For the IP network system to be embedded within the DSL network system, the network template used must specifically contain the IP network template as an "embedded" template.

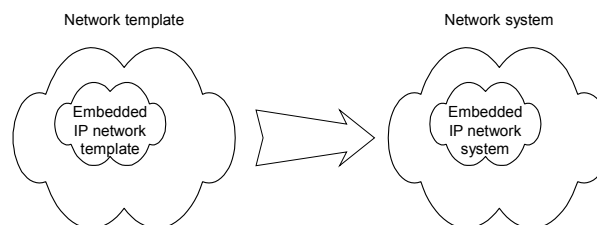


Figure 5: Embedded network system

This grouping of network functionality allows you to work with large network systems in an organized way. The network templates included in the MetaSolv Solution technology modules contain embedded network templates. The ATM/Frame Relay technology module includes a network template with the following embedded network templates:

- Frame relay access
- Frame relay core
- ATM access
- ATM core

The ATM and frame relay network templates are shown in the Network Template Detail panel in the following figure. The network design shown on the canvas shows several unexpanded clouds and one expanded cloud representing embedded networks.

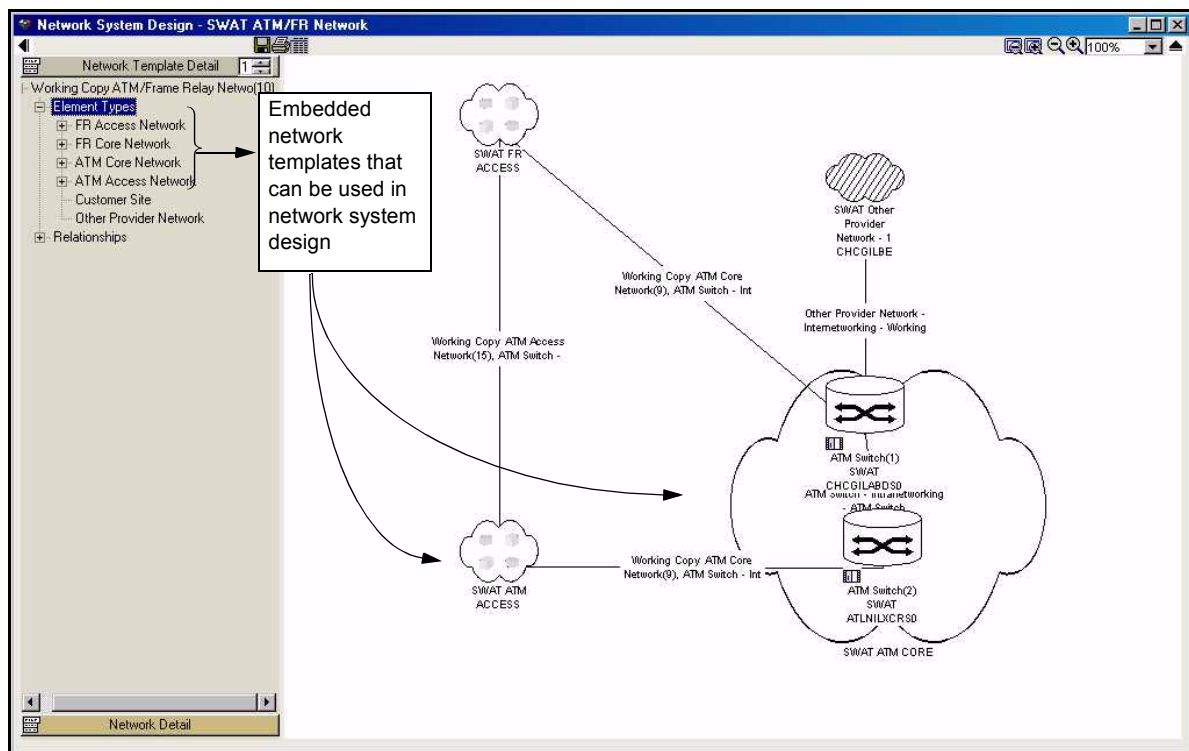


Figure 6: Embedded network systems

If the network template does not define an embedded network system, you cannot create this functionality at network design time. All of the functionality for the embedded network system is defined in the network template, including:

- Network elements and relationships allowed inside the embedded network
- Relationships allowed with network elements in other network systems

Integration of templates with other subsystems and modules

Customer Care

- Product service requests (PSRs) for product catalog offerings defined with item types of Network System (SYSTEM) and Product Bundle (PRDBUNDLE) will be fulfilled using the new ordering dialog. Virtual Private Networks, xDSL services, and Internet connectivity are examples of product offerings that can be ordered via the new ordering dialog. See the *Templates-Based Ordering Concepts and Processes Guide* for details.

Engineering

- Templates based on MetaSolv technology modules are available as software options for technologies such as ATM/Frame Relay, MPLS, and Ethernet, for services such as Digital Subscriber Line (xDSL), and for existing networks such as Digital Loop Carrier (DLC). See the *Network Templates Concepts and Processes Guide* for details.
- Internal network systems based on templates can be designed with the new Network Systems functionality. See the *Templates-Based Network Design Concepts and Processes Guide* for details.

Equipment

- Product specifications for equipment can be related to product specifications for network elements, and product specifications for equipment can be associated with equipment specs. The ability to associate an equipment spec for a customer router to equipment related to VPN locations is supported. See the *Templates-Based Product Specifications Concepts and Processes Guide* for details.
- The ordering dialog includes a page on What kind of equipment do you want to order? This page permits retrieval of an existing equipment specification. See the *Templates-Based Ordering Concepts and Processes Guide* for details.
- Equipment specifications can be associated with network elements selected from the templates when building internal networks. See the *Templates-Based Network Design Concepts and Processes Guide* for details.
- Connection assignments to equipment, specifically, port addresses is part of service provisioning. Service provisioning of any product offering fulfilled through the ordering dialog is provisioned with the Provisioning Dialog. See the *Templates-Based Service Provisioning Concepts and Processes Guide* for details.

Infrastructure

- Locations can be defined or queried for in the ordering dialog. The definition of locations containing customer edge routers is critical to defining ordered VPN systems. Completing the connectivity matrix for ordered standalone network connections requires the definition of locations. See the *Templates-Based Ordering Concepts and Processes Guide* for details.

- Product catalog is used to develop product offerings for Network Systems and bundled Network Connections that are based on new item types. See the *Templates-Based Product Specifications Concepts and Processes Guide* for details.
- Customer management information for customer accounts is accessed when creating any change order in PSR. New customer account information can be collected through the new Customer Profile functionality. See online help on customer profile for details.
- Product service request information is collected on the new ordering dialog when a network system or product bundle of connections is selected from the product catalog. See the *Templates-Based Ordering Concepts and Processes Guide* for details.
- Network areas are used by the new network items, but product availability by network area is not part of the current release. Network items that may be associated with network areas have been extended to include a network system a network element within a network system, and a network element, where network system is not associated with network area. IP addresses associated to the network area can then be further associated at the network system level and/or the network element level. When querying for IP addresses to assign to connections, the query criteria can be set to retrieve only those IP addresses previously associated to the related network element or network system. See online help for network areas for details.
- Number inventory includes the inventory of IP addresses. IP addresses are assigned during the provisioning of Internet circuits. See the *Templates-Based Service Provisioning Concepts and Processes Guide* or details. IP addresses may also be assigned during the design of the internal network. See online help for IP address management and the *Templates-Based Network Design Concepts and Processes Guide* for details.

Work management

- Task types include a new task type for provisioning a VPN network system. See the *Templates-Based Service Provisioning Concepts and Processes Guide* for details.

Preferences

- Engineering preferences include a new Design Mode preference that replaces the former Use Path Analysis preference. It is used to indicate whether virtual connections are to be designed with path analysis based on the number of hops, with path analysis based on distance, or manually configured.
- System preferences include a new Use Default Connection ID format which was added for the CKTID task. When set, the default format used is Location 1/Location 2/label/circuit design ID.

Processes

This chapter describes key concepts and processes for creating and maintaining network systems. Read this chapter if you are responsible for implementing the MetaSolv Solution or working with network design, the product catalog, or service provisioning.

This chapter includes overviews, usage guidelines, and some step-by-step instructions for the following topics:

- Using the Network System Design window
- Starting a network system design
- Adding and maintaining network elements
- Adding and maintaining connections
- Embedding networks
- Associating custom attributes
- Sharing elements with other networks
- Viewing connections
- Using network extensions
- Exporting graphics
- Printing graphics
- Viewing capacity management report information for a DLC network
- Maintaining NAT information for IP networks

Using the Network System Design window

The Network System Design window is the main work area for network system design. From this window you perform all of the functions necessary for network system design.

To display the window

1. Click **Engineering** on the main toolbar.
2. Click **Net Systems** on the secondary toolbar that appears.

The secondary toolbar changes to show the following selections.



Figure 7: Secondary Toolbar

3. Click **NetDes** to display the Network System Design window.

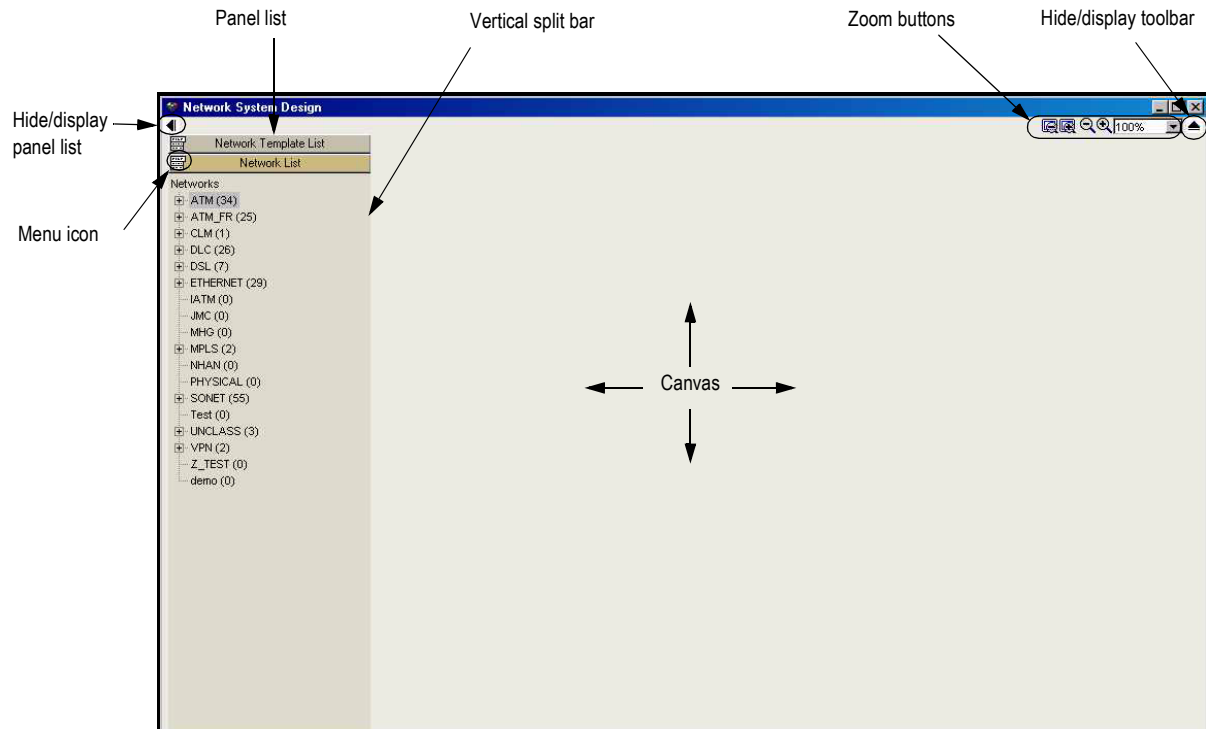


Figure 8: Network Design Window

Features

The Network Design window contains two panes. The left pane, which you can drag to expand, contains panels you can use to select templates, or elements, or network systems. The right pane contains the canvas where the network system design displays.

Canvas work area

The canvas is where you view and work with the graphical representation of your network system. You control what appears on the canvas by making selections in the panel list on the left pane of the window. You can hide the main tool bar and the panel list to enlarge

the canvas work area. To expand the canvas work area, click the hide/display buttons shown in the following figure.

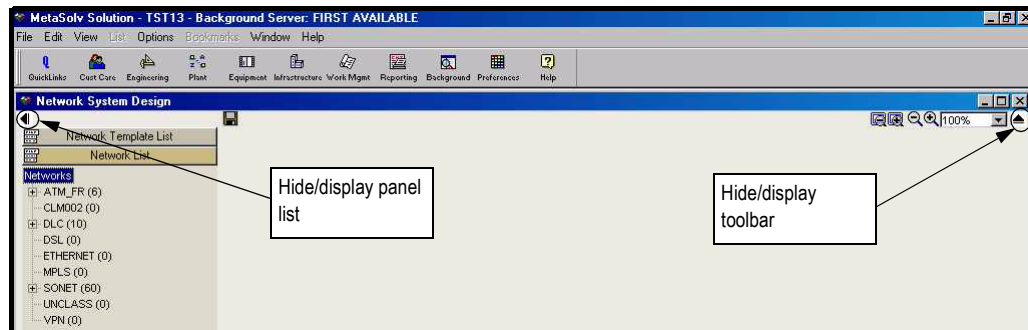


Figure 9: Hide/display buttons

The canvas expands to fill the entire screen. To redisplay the panel list or the toolbar, click the buttons again.



Figure 10: Fully expanded canvas

Navigation

Use the Window menu to move between the Network System Design window and the other open windows.



Figure 11: Window menu

Panel list

The panel list contains panels that can be opened to display information needed to create or maintain a network system on the canvas. To open a panel and display its contents, click the name on the panel. This causes the panel to slide open.

When you open the Network System Design window, the following *list* panels display.

- *Network Template List*—Contains a complete list of the templates available for selection as the basis for a network design. Use this list to open a template if you are creating a new network system.
- *Network List*—Contains a complete list of all current network systems. The networks are sorted and presented by network system type. Use this list to open and display an existing network system that you want to view or modify.

When you select a template or a network system to begin work, the panels change to show the detail you need. When you are actively working on a network system on the canvas, the following *detail* panels display:

- *Network Template Detail*—This panel provides details on the template used for the current network system. The detail includes each element included in the template and the relationships defined for each element.

You can drag elements to the canvas from the list. If you prefer images to text, you can switch the view on this panel to show images, which can also be dragged to the canvas. Relationships do not show in this view, only elements. To toggle between the views, click the menu icon located in the panel's label and select **Text Only** or **Images and Text**.

- *Network Detail*—This panel provides details on the elements and relationships that appear in the network system displayed on the canvas. As you add or delete elements and relationships, the list in the panel is updated. To see the full network list, click the menu icon located in the panel's label and select **Network List**.

Menu icons

Each panel has a menu icon to the left of the panel name. Click this icon to display a drop-down menu.

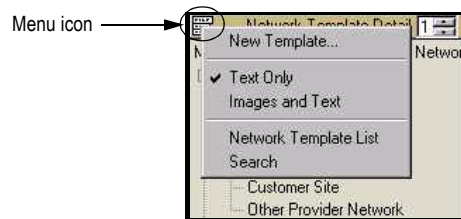


Figure 12: Panel menu icon

The menus vary according to the panel they serve. Many options are tied to these menus, for example, the Search feature, or the Images and Text feature that shows the graphical representation of the elements in a panel rather than a text list.

The following menus are available from the panels that display during network system design:

Network Template List menu options

- New Template—This option opens the Network Template Maintenance window where you can create a new template. The Network Design window does not close, and you can navigate to it using the Windows menu on the main menu bar.
- Search—Displays the search feature for network templates.

Network List menu options

- Search—Displays the search feature for existing network systems.

Network Template Detail menu options

- New Template—Opens the Network Template Maintenance window where you can create a new template. The Network Design window does not close, and you can navigate to it using the Windows menu on the main menu bar.
- Text Only—Displays the detail for the current network template in a text only list format.
- Images and Text—Displays the detail for the current network template in a graphical format.
- Network Template List—Displays all network templates.
- Search—Displays the search feature for network templates.

Network Detail menu options

- Network List—Displays the list of existing network systems
- Search—Displays the search feature for existing network systems.

Save button

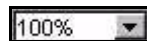
The **Save** button appears on the toolbar on the canvas once you open a network system. Click this button to save your network design. The button displays even if you have the panel list and main toolbar hidden so that you can save your work without redisplaying the menu bar.

Print button

The **Print** button appears on the canvas toolbar when you open a network system. The button displays even if the panel list and toolbar are hidden.

Zoom buttons

These buttons allow you to size the images you see on the screen. The following list indicates how to use each zoom button feature.



You can set the size of the images by selecting a percentage from the drop-down. The default value is 100 percent.



Click the minus or plus button to increase or decrease the size of the images on the canvas in preset increments.



Click the minus or plus button and highlight the area you want to zoom by dragging the cursor across the canvas to create a stretch box. If you select the plus button, the area you select inside the box expands to fill the canvas. If you select the minus button, the entire canvas is reduced to the size of the box you create.

Tool tips

Tool tips provide a brief description of an element when the cursor floats over it on the canvas. They can be toggled on or off using the pop-up menu.

To show tool tips, right-click on the canvas and select **Show Tool Tips**. Or, to turn tool tips off, select **Hide Tool Tips**.

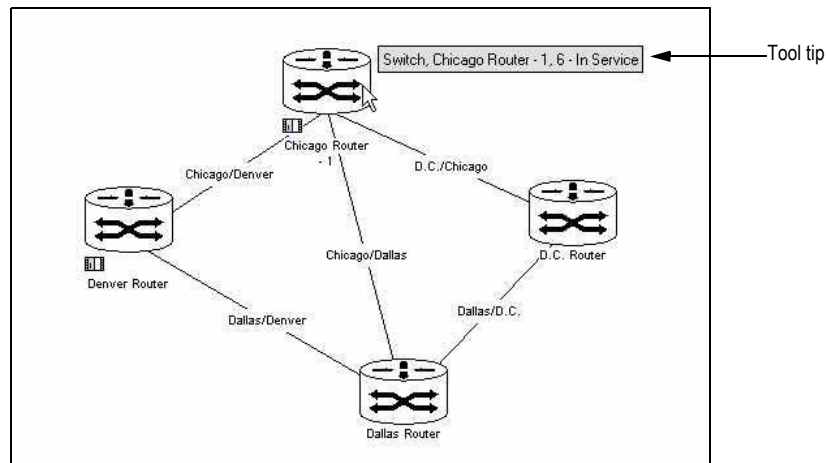


Figure 13: Tool tip

Search

You can search for a network system or a network template rather than manually scrolling and searching the lists on the panels. You can reach the Search function from either panel, and the search dialog that appears is specific to the panel you are using.

To search for a network template or network system

1. Click the menu icon on the appropriate panel list and select **Search**.

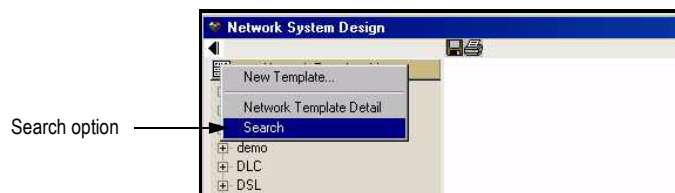


Figure 14: Selecting the Search function for a network template

The Search panel appears.

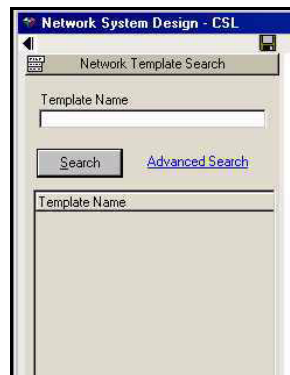


Figure 15: Search panel

2. Enter the appropriate information and click **Search**.

For a more specific search with additional criteria, click **Advanced Search**. When the search is complete, you can drag an item in the list of returned items to the canvas.

Window Conventions

Some windows that appear in the MetaSolv Solution 5.1 are different in appearance from previous releases. The following figure shows two new features.

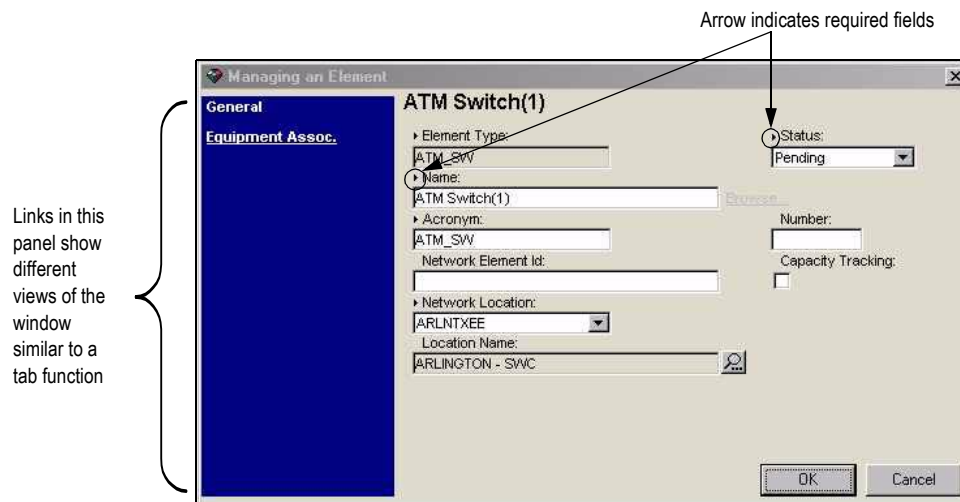


Figure 16: New window features

Opening an existing network system

To open an existing network

1. On the Network List panel, expand the appropriate network system type (for example, ATM_FR) to display the networks that have been created under this system type.

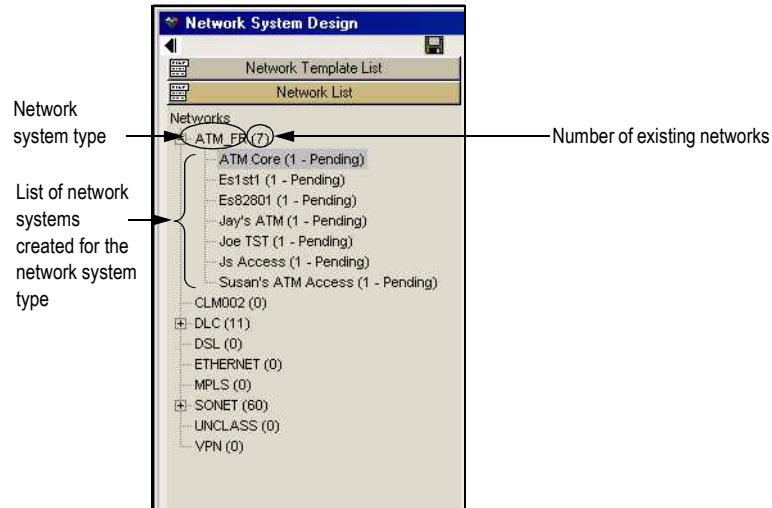


Figure 17: Choosing an existing network system

2. Highlight the network you want and complete one of the following actions:
 - ✎ Right-click on the network system and select **Open**.
 - ✎ Double-click on the name in the list.

The following figure shows a network open on the canvas. When the network opens and displays, the panels on the left change to provide information you need to work on the network system.

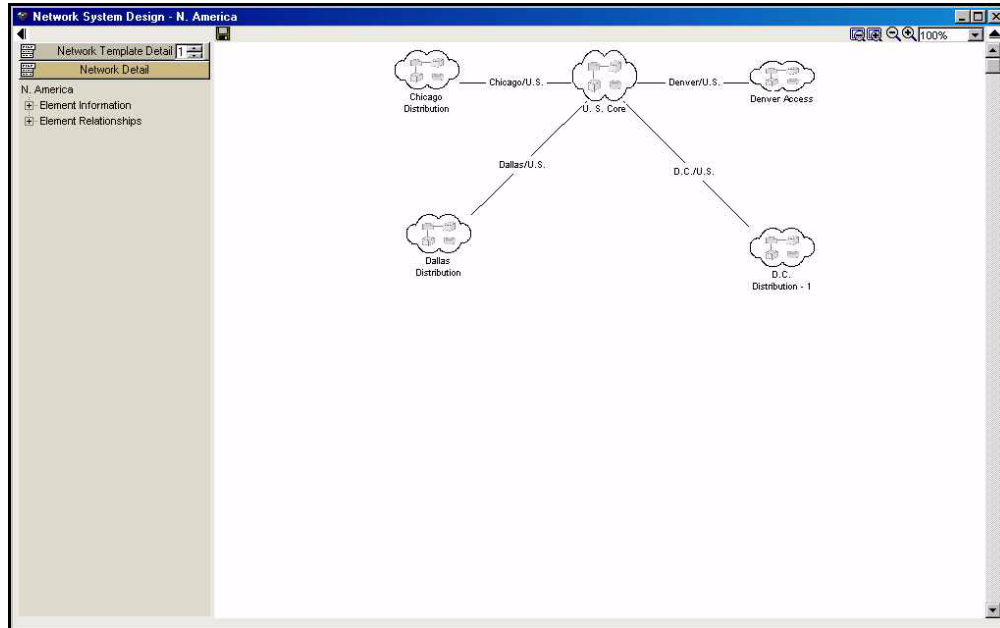


Figure 18: Network system displayed on the canvas

Closing a network system

To close a network system, right-click on a blank area on the canvas (or on the network system in the list) and select **Close Network System** from the pop-up menu. This closes the network system without closing the Network Design System window.

Unlocking a network system

A network system can only be open and active for one user at a time. When a network system is displayed on the canvas for use, it is locked to other users. The following figure shows the message that appears when a network system is in use on the canvas. It indicates who has the network system open.

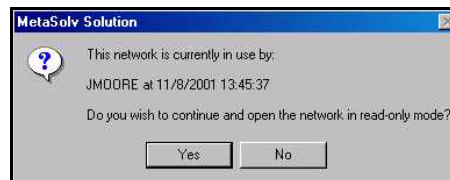


Figure 19: Message box for open network system

When a network system is being used, you can still open and view a read only copy.

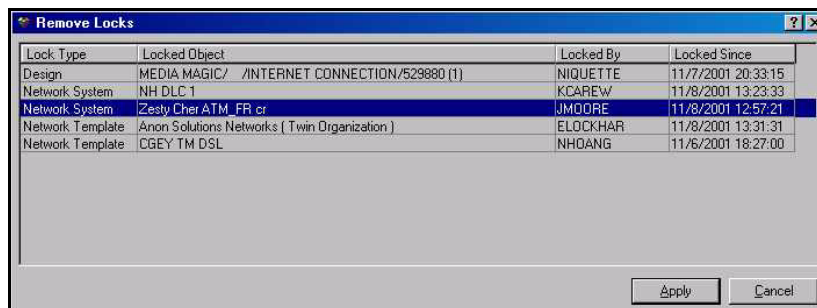
If a network system is locked for some reason and you need to make changes to it, you can remove the lock and open the network system. Access to the Remove Lock function is controlled by the System Administrator who can secure this window from the Security module. See your system administrator about permission to remove locks from a network system.

Note: Use the Remove Lock feature with caution. Make sure you do not unlock a system that is being worked on by another user. You can overwrite the changes another user has made after you unlock.

To unlock a network system

1. From the Windows menu, select Network Systems to display the Network Systems window.
2. From the Options menu, select **Remove Locks**.

The following window appears listing all networks systems and network templates that are currently locked.



Lock Type	Locked Object	Locked By	Locked Since
Design	MEDIA MAGIC/ /INTERNET CONNECTION/529880 (1)	NIQUETTE	11/7/2001 20:33:15
Network System	NH DLC 1	KCAREW	11/8/2001 13:23:33
Network System	Zesty Cher ATM_FRI cr	JMOORE	11/8/2001 12:57:21
Network Template	Anon Solutions Networks (Twin Organization)	ELOCKHAR	11/8/2001 13:31:31
Network Template	CGEY TM DSL	NHOANG	11/6/2001 18:27:00

3. Select the network system you want to unlock, right-click, and select **Remove Lock**.
4. Click **Apply**.
5. Return to the Network System Design window and open the network system.

Designing a network system

Designing a network system is a complex process because networks can vary according to size, purpose, and technology. But no matter how complex a network is, the process for creating it in the MetaSolv Solution can be broken into a sequential set of tasks that can be described in a straightforward manner.

The high-level tasks for creating a network design include:

1. Defining the network system by selecting a network template and defining system-level properties.
2. Adding elements and associating equipment or port addresses with the elements.

3. Adding relationships between the elements and associating connections with the relationships.
4. Setting the status of the new network system to "In Service".

Although the high-level steps are simple, each step can be broken into smaller procedures. This section describes the basic steps for creating a network system.

More complex processes such as embedding network systems within other network systems are covered in later sections of this guide.

Defining the network system

To define a network system design, you must:

- Select a template
- Define basic properties about the network system

Selecting a network template

To select a network template

1. On the Network Template List panel, expand the appropriate network system type (for example, ATM_FR) to display the existing templates for the system type.

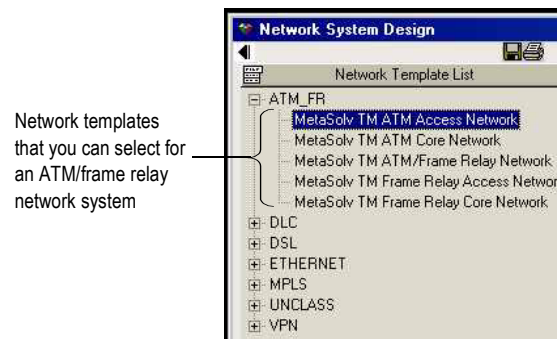


Figure 20: Network Template List panel showing a template selection

2. Highlight the network template you want, then right-click and select **Add Network Design**.

When you open a template in the Network Template Maintenance window, you see all of the elements and relationships in the template displayed on the canvas. When you open the same template in the Network System Design window to serve as the basis for a network design, you see a very different canvas. The only template items that display are elements that have a minimum requirement in the template. This means you may see a blank canvas or you may see one or two elements, depending on the template you select. For example, the ATM Access network template requires an ATM switch. If you select this template as the basis for a new network system design, a single ATM switch displays on

the canvas for the new network system when you open the template. This is the point at which your design begins.

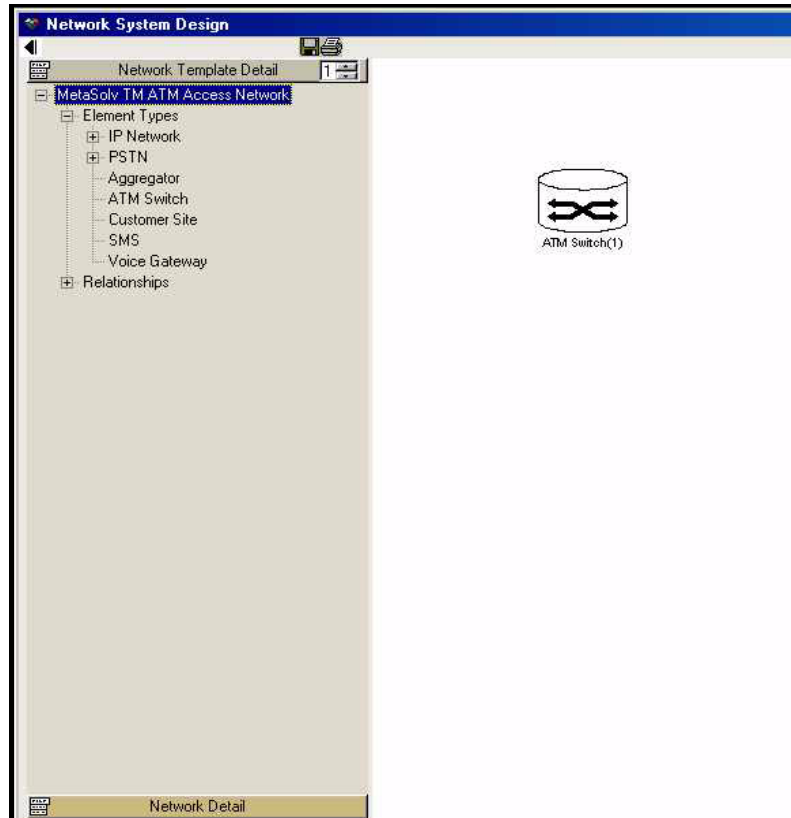


Figure 21: ATM Access network template in Network System Design

The panels change to show Network Template Detail and Network Detail. The Network Template Detail panel contains a list of network elements that you can add to the canvas according to network template rules. It also contains a list of relationships that indicate which elements can be connected to other elements in the template.

The Network Detail panel contains information on the elements and relationships for the network system you are building. The detail in this panel grows as you make additions to the network system on the canvas.

Defining network system properties

You must select a template for the network system before you can define system properties.

To define network system properties

1. Right-click a blank area on the canvas and select **Properties**.

The Managing a Network System window appears.

Managing a Network System

ETHERNET - N. America

Network Spec Type: ETHERNET

Network Spec Name:

Old Ethernet:

Short Name: N. America

Long Name: North America Core

Description: North America Ethernet Core Network

Customer System Id: 345

Date Created: 3/21/2001 11:13:59

Date In Service: 3/21/2001 11:14:11

Status: In Service

Hard Soft Assign Cdt: 1 - Hard

Required fields

OK Cancel

Figure 22: Managing a Network System window

2. Enter a name in the **Short Name** field and indicate a status for the network system.

The name you enter in the **Short Name** field is used to identify the network system in the panel lists.

The default status for a new network system is "Pending". When you complete the network system design and are ready to provision against this network, you must reopen this window and set the status to "In Service".

The **Customer System ID** and **Provider System ID** fields are not required but are provided for user-defined identification codes.

3. Click **OK**.

Adding network elements to the design

The network template determines which network elements can be added to a network system design. For example, before you can add a network element like an ATM switch to a design, the template you are using must have a network element type for an ATM switch defined.

Adding a network element

Before you can add an element to a network system design, the network system must be open and displayed on the canvas. Or, if you are starting a new network system design, you must open a template. For more information, see "Starting a network system design" on page 24.

To add an element to a network system

In the Network Template Detail panel, highlight the element you want to add and complete one of the following tasks:

- ✎ Drag the element to the canvas from the panel
- ✎ Right click on the panel and select **Add Network Design** from the pop-up menu.

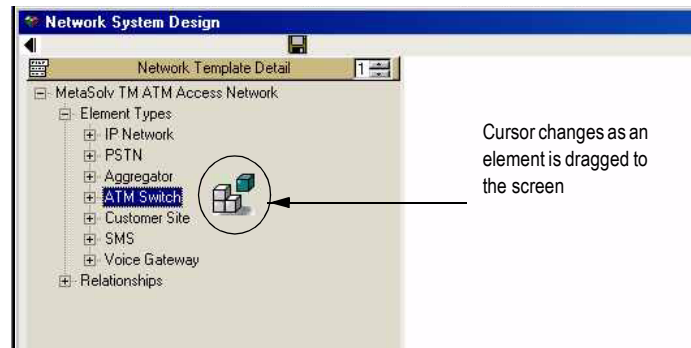


Figure 23: Adding an element to a network system

To add multiples of the same element at once, indicate the number of copies you want to add using the spin button, then drag the element to the canvas. A maximum of 20 elements can be added at one time.

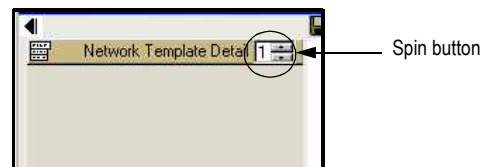


Figure 24: Adding multiple elements to the canvas

Not all elements that are listed on the Network Template Detail panel can be added directly. Any element that appears in the highest level of the hierarchy can be added to the canvas directly by dragging or right-clicking and selecting the **Add Network Design** option.

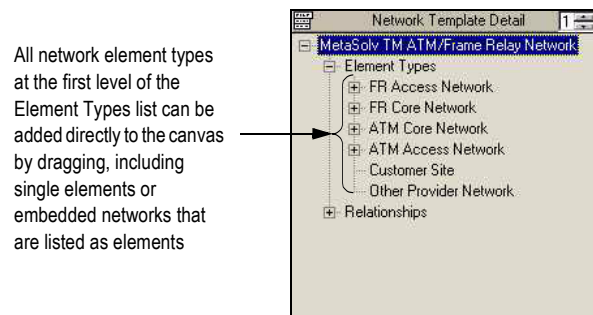


Figure 25: Network Template Detail panel, showing network elements for a template

In the nested levels of the list, you can select and add elements representing embedded networks, but you cannot select single elements that represent a specific piece of equipment or functionality. The following figure illustrates what can be added from the nested levels of the list.

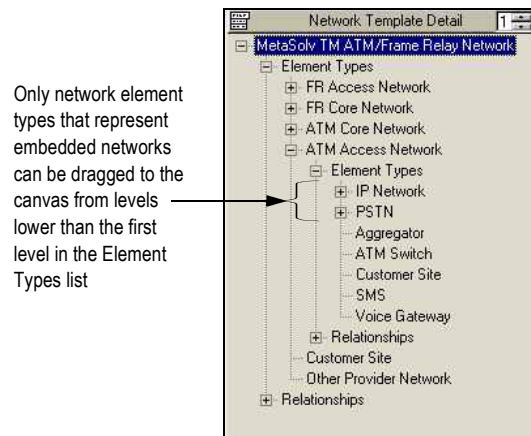


Figure 26: Network Template Detail panel, showing nested network element types

Defining properties for a network element

After you add a network element to the network system design, you must define properties for the network element that let the system properly identify it. The information that you are required to provide is determined by the rules set in the template. The rules defined can be different for each type of element and depend on the purpose of the element and how it relates to the network system.

To define properties

1. Right-click on the element and select **Properties** from the popup menu.

The Managing an Element window appears.

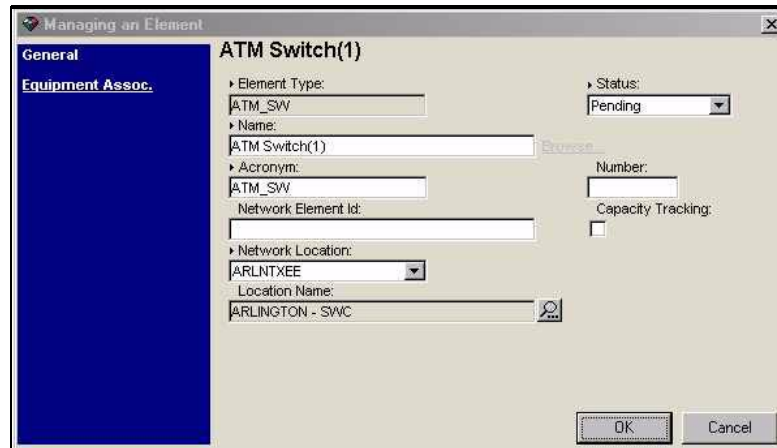


Figure 27: Managing an Element window, showing an ATM switch

2. Complete the required fields (marked by an arrow[▶]):

Name—Type a name for the network element. This name appears in the label on the canvas.

Acronym—Type an acronym or short name for the network element (for example, DSLAM or LSR).

Network Location—Select the location that identifies the element. Type the initial letters for the location, then click the down arrow to display the list.

Status—Identify the element as "Pending" or "In Service." The element cannot be used in service provisioning until it has an "In Service" status.

3. Click **OK**.

Associating equipment with a network element

The following rules apply to associating equipment:

- You can associate a piece of equipment with only one element. For example, you can associate a specific ATM switch with only one network element.
- You can associate multiple pieces of equipment with a single network element. Complex equipment setups may require this type of association. For example, a single router may consist of a physical equipment shelf and a number of individual interface adapter cards. Each piece of equipment can be associated with the same element, but they may not be associated with any other element.
- An element's association with equipment is network independent. This means that once an element is associated with equipment, you can use the element in more than

one network. For more information on using network elements in multiple networks, see "Sharing elements between networks" on page 45.

- You can associate either equipment or a port address on a piece of equipment with a network element, but not both. If you associate the equipment, you cannot associate specific port addresses on the equipment. The network template determines whether port addresses can be associated.

When you associate a piece of equipment with a network element, an equipment icon appears next to the element on the canvas as a visual cue. The following figure shows how an element with associated equipment appears on the canvas.

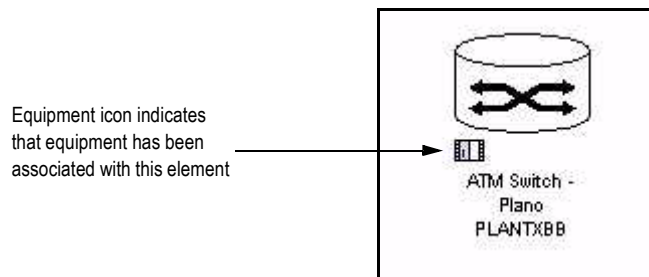


Figure 28: Equipment icon

To associate equipment with a network element

1. Right-click the element on the canvas and select **Properties**.

The Managing an Element window appears.

2. In the left panel, click **Equipment Assoc.**

The following view of the Managing an Element window appears. If equipment is already associated with the element, the equipment appears in a list below the equipment icon.

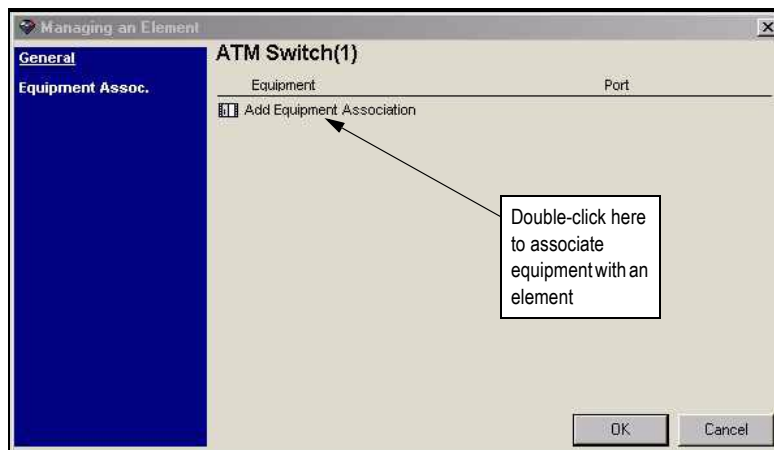


Figure 29: Equipment association

3. Double-click **Add Equipment Association** to display the Equipment Install window. The equipment available at the location indicated for the network element displays in the window.

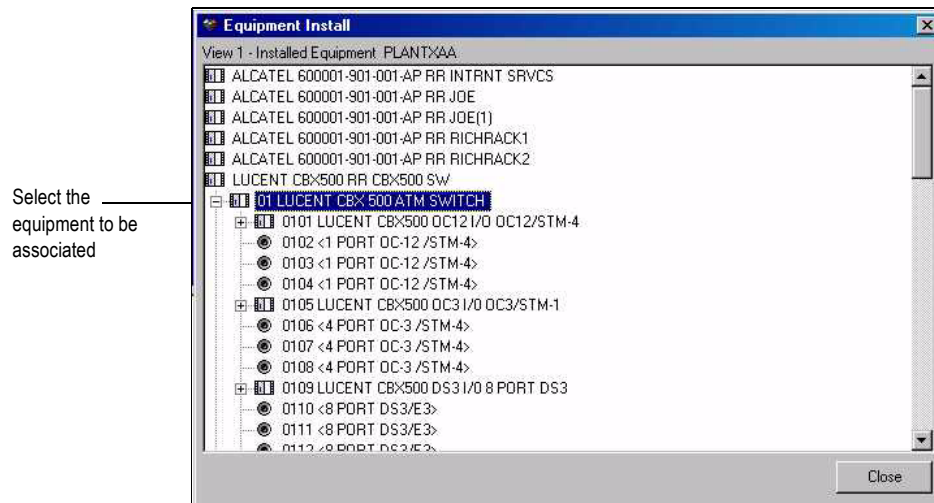


Figure 30: Equipment Install window

4. Locate the equipment to be associated, then right-click and select **Associate to Element** from the pop-up menu. You can associate to the equipment or to a port on the equipment.

Deleting a network element from a network system

To delete a network element, right-click on the network element on the canvas and select **Delete** from the pop-up menu.

If the network element is not included in any other network systems, it is deleted from the network system and the database. If the network element is included in other network systems, it is deleted from the current network system only.

Elements that represent embedded network systems can also be deleted from individual network systems. However, a network system is not removed from the database if it is not embedded in any other network system. The deletion of a network system must be done at the system level. See "Deleting a network system" on page 38.

Specifying a role for a network element

You can specify a role for an element that defines how it functions in the network system. One role is currently defined for the network templates that are part of the M/5.1 release. It is the LSR (label switch router) role. In MPLS network systems, you must have routers capable of handling label switch paths. Some ATM switches have the ability through software upgrades to become label switch routers. Any ATM switch involved in label

switch path communication must have this capability and be identified in the MetaSolv Solution as having the role of a label switch router.

You can create additional roles using the Code Tables function in the Infrastructure module.

To assign a role to an element

1. Right-click on the element on the canvas and select **Properties**.
2. Click **Roles** in the left pane of the window.
3. In the window that displays, select the role you want for the network element and click **OK**.

Locating a network element on the canvas

If your network system is complex and covers the canvas or extends beyond the viewing area, you can locate an element on the canvas.

To locate a network element on the canvas

1. Locate the network element name in the Network Detail List panel.
2. Right-click the network element and select **Locate in Drawing** in the pop-up menu.

The network element flashes on the canvas. If the network element is located in part of the network system that is not showing on the canvas, the canvas scrolls automatically so that the network element displays. You may have to repeat this action because the network element flashes only for a few seconds.

Adding connections

The network template controls two important rules for network design:

- Which network element types can be connected
If you want a relationship between an aggregator and an ATM switch in your network system, the template you are using must also have a relationship that allows the connection between these two network element types. If the template does not show a relationship between two element types, you get an error message when you try to connect them in network system design.
- What the relationship between elements can be
If you want the relationship to be an assignable bandwidth connection, you must create a connection spec for assignable bandwidth in Network Templates and associate it with the relationship in the template. You can create and associate multiple connection specs with a network template relationship.

Adding a relationship

To add a relationship between two elements

1. Right click on the first network element and select **Connect** from the pop-up menu.

A line appears between the first network element and the cursor. You can stretch the line by dragging the cursor.

2. Move the cursor to the second network element and click to complete the relationship.

The following figure shows a completed relationship between two network elements. Note that the relationship shows under Relationships in the Network Template Details panel. This template is simple; it includes only one element type, an ATM switch. The template allows you to add multiple ATM switches to a design and create relationships between them together. Relationships define how the ATM switches can be connected

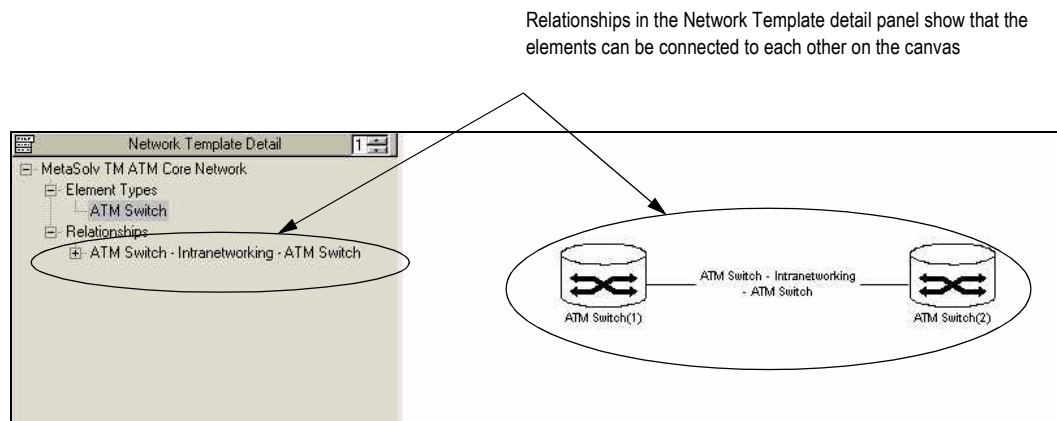


Figure 31: Connection between two elements

The information displayed on the canvas only indicates that the elements can be connected, it does not indicate specifics about the connection. The kinds of connections that you can use in a network system design depend on the connection specs associated with the relationship in the network template. Connection specs determine what can connect elements in a design and therefore what can be used during service provisioning to provide service to the customer. The following procedure shows how to define the relationship between two elements based on the connection specs in the network template.

Defining the relationship between two elements

To see the connection specs associated with a relationship between two network template element types, expand the Relationship branch in the list in the Network Template Detail panel. The following figure shows the expanded relationship from the preceding figure.

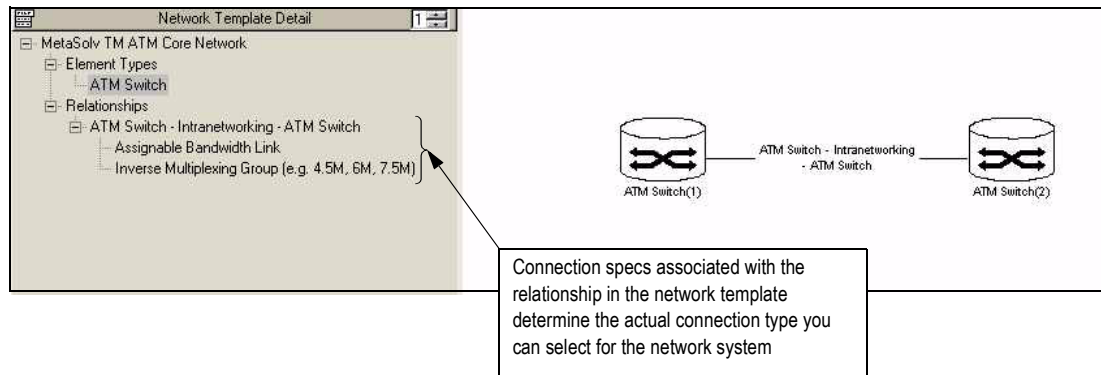


Figure 32: Connection specs associated with a relationship

The connection specs listed for a relationship in the template determine what you can associate with the relationship in the network system. For example, in the preceding figure, the connection specs associated indicate that an assignable bandwidth link can be used. You can query for and select the appropriate bandwidth connection to associate with the relationship.

Associating an existing connection

To associate an existing connection

1. Right-click the relationship on the canvas and select **Properties**.

The Managing a Connection window appears.

2. Check the checkbox beside the connection types you want to associate with the relationship.

In the following figure, Assignable Bandwidth Link is selected so that bandwidth connections can be searched for and associated.

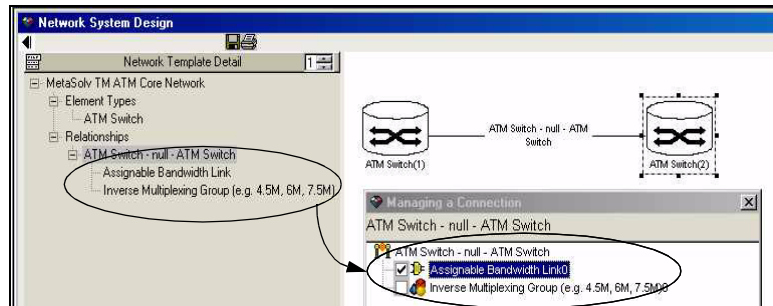


Figure 33: Managing a Connection window

3. Right-click and select **Associate Circuits**.

The Connection Query window appears. The connection types selected on the Managing a Connection window identify the connection types you can query for using this window.

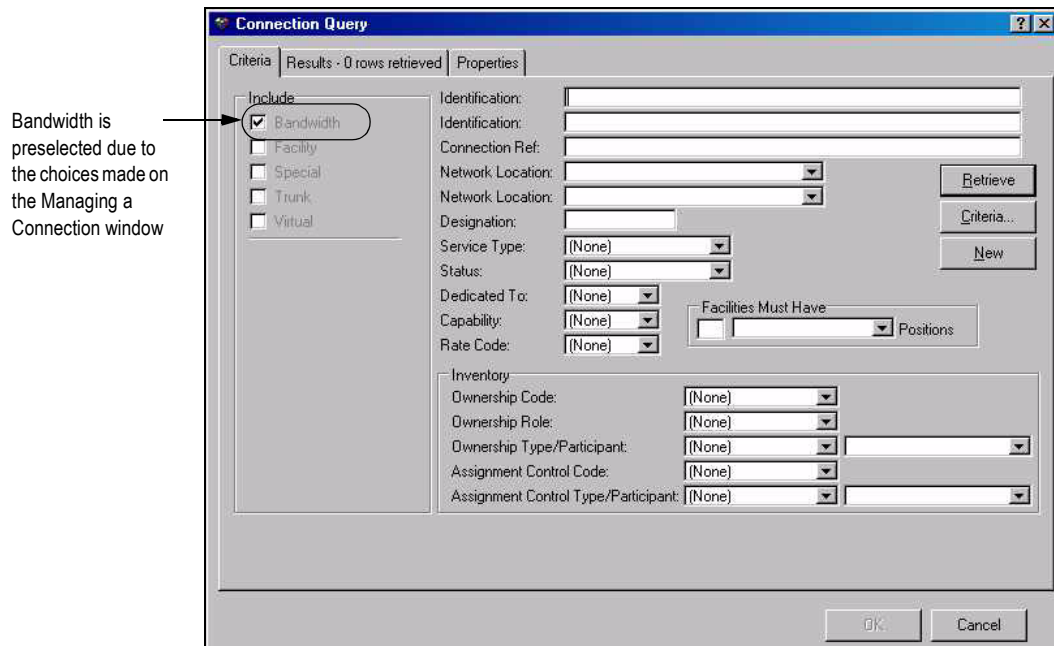


Figure 34: Connection Query window

4. Add additional criteria such as locations to narrow the search, and click **Retrieve**.

The Results tab displays with a list of available circuits.

5. On the Results tab, select the connection you want to associate and click **OK**.

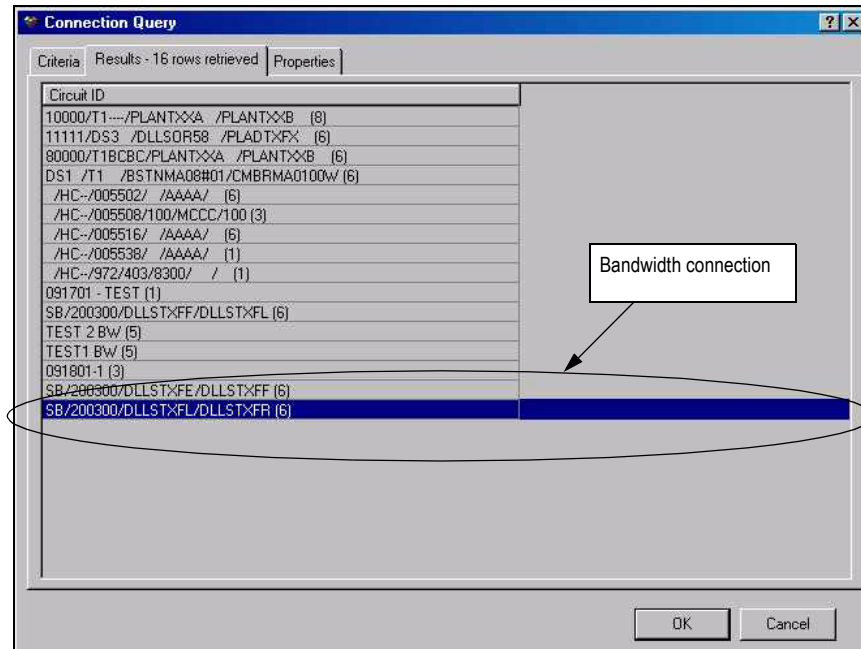


Figure 35: Connection Query window showing the Results tab

The connection ID appears in the Managing a Connection window listed under the appropriate connection spec. The following figure shows how a bandwidth connection that has been associated with a relationship appears in the Managing a Connection window.

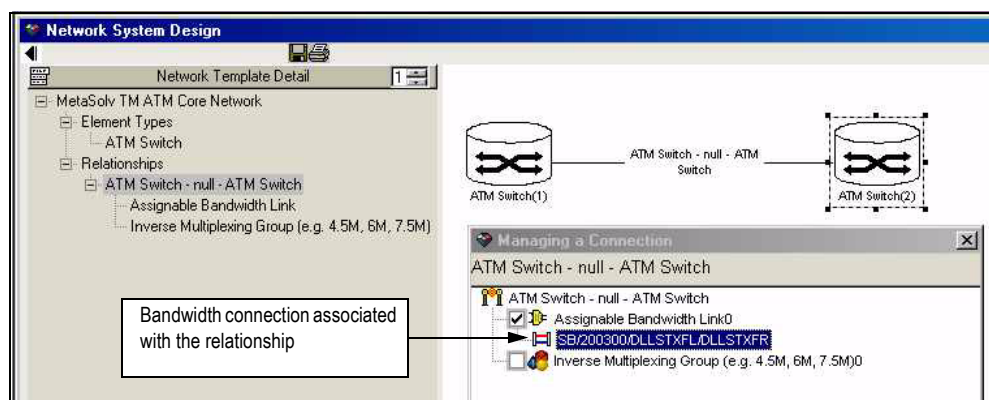


Figure 36: Connection associated with a network system relationship

6. Click **OK**.

Creating and associating a new connection

In previous releases, you had to enter an internal service request (ISR) to create a new connection, but you can now create a new connection from the Network System Design canvas.



Under Development

Deleting a connection's association with a relationship

To delete an association

1. Right-click on the relationship on the canvas and select **Properties**.
The Managing a Connection window appears.
2. Right-click on the connection you want to delete, and select **Unassociate Circuit**.
3. Click **OK**.

Deleting a relationship

To delete a relationship between two elements, right-click on the relationship on the canvas and select **Delete**. The relationship is deleted from the network design.

Placing a network system in service

You must set the status for a network system to "In Service" for the network to be available for service provisioning.

To set the network system status

1. In the Network List panel, select the network system and drag it to the canvas to open it.
2. Right-click a blank area on the canvas and select **Properties** to display the Managing a Network System window.
3. In the **Status** field, select *In Service* from the drop-down menu.
4. Click **OK**.

Deleting a network system

Before you delete a network, make sure that the network system is **not**:

- Embedded as an element within another network system

You must remove it from any system in which it is embedded before you can delete a network system.

- Associated with any connections

If you have associated connections with any relationships in the network system, you must remove the associations before you can delete the network system.

- Open

You cannot delete a network system that is open, either on your canvas or on another user's canvas.

To delete a network system

1. Close the network system and display the Network List panel.

❗ **Note:** If the Network Detail panel is showing, click the menu icon in this panel and select **Network List**.

2. Select the network system you want to delete from the list of networks, then right-click and select **Delete**.

Embedded network systems

Embedded networks allow you to break the functionality for a large network into smaller more manageable units. Rather than creating one large network that includes all of the network elements and connections that your company owns and operates, you can break the larger network into functional or administrative areas. You can represent each functional or administrative area with a network system that contains the equipment and connections that are appropriate. The following figure shows a network system that contains a number of embedded network systems.

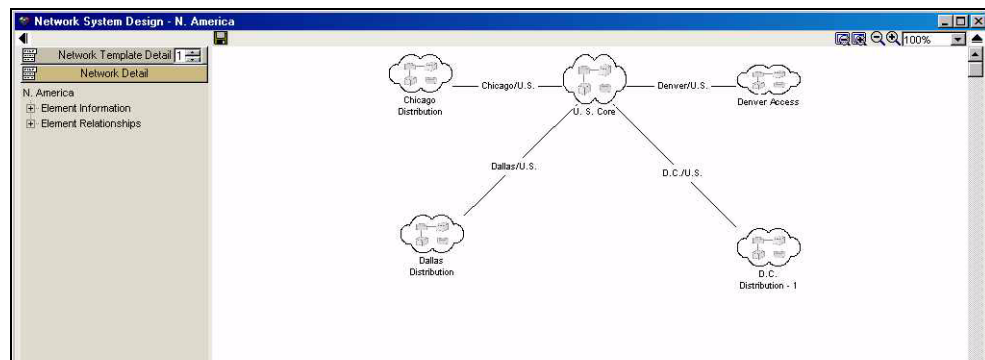


Figure 37: Embedded networks

For a network system to contain an embedded network, the network template selected must explicitly allow the embedded network and define the elements and connections it contains. The network system in the preceding figure was designed using the network template shown below. Note that the core and distribution networks indicated in the template appear in the network design.

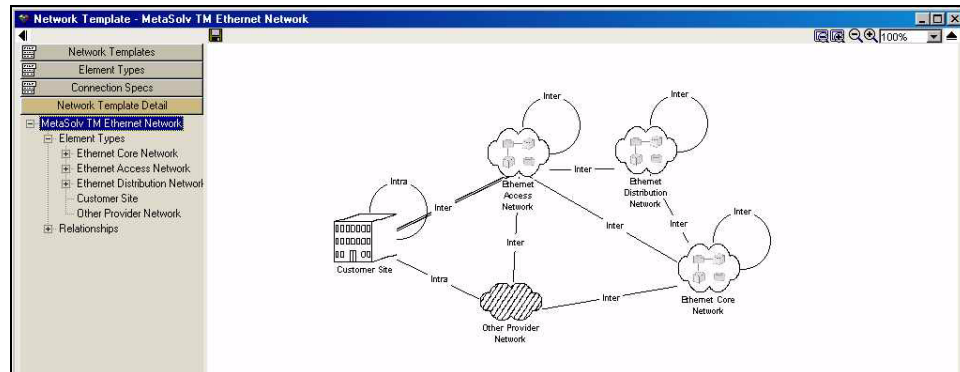


Figure 38: Network template, showing embedded network templates

You can embed a network system in one of two ways:

- You can build the embedded network system first then drag it to the canvas. This method automatically associates the embedded network system with the network system in which it will reside.
- You can create a placeholder element for the embedded network system and associate it later, when the network to be embedded is built out.

Embedding an existing network system

To embed an existing network system

1. Open the parent network system (the system in which you want to embed another system).
2. Expand the Network List panel.

If the Network System Detail panel is showing, click the menu icon and select **Network List**.

3. Select the network you want to embed and drag it to the canvas.

Creating a placeholder for an embedded network system

A placeholder is an element that represents a network that has not been defined on the canvas. The default graphic is a cloud that cannot be expanded.

To create a placeholder

1. Display the parent network system on the canvas.

If you are creating a new network system as the parent, select a network template and define the properties. See "Defining the network system" on page 24 for more information.

2. In the Network Template Detail panel, locate the element that represents the network system you want to embed and drag it to the canvas.

Replacing a network system placeholder with a network system

To replace a placeholder

1. Right-click on the placeholder and select **Properties**.
2. Click **Embedded Network Properties**.

The following window appears. This window allows you to search for the appropriate network. You cannot enter information into the fields on this window.

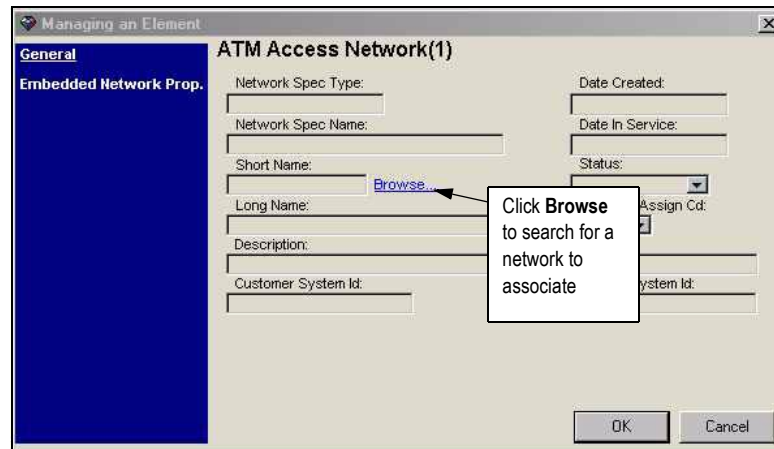


Figure 39: Embedded network properties

3. Click **Browse**.

The Network System Query window appears.

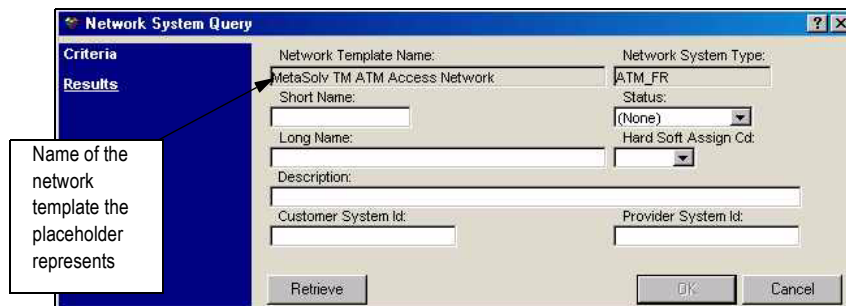


Figure 40: Network System Query window

4. Enter selection criteria and click **Retrieve**.

A list of available networks display on the Results view of the window.

5. Select the network you want to replace the placeholder and select **OK**.
6. Click **OK** in the message box that appears. The message indicates the default information on the network system placeholder will be replaced by the information on the network system you selected.

The information on the network system displays in the Embedded Network Properties view of the window.

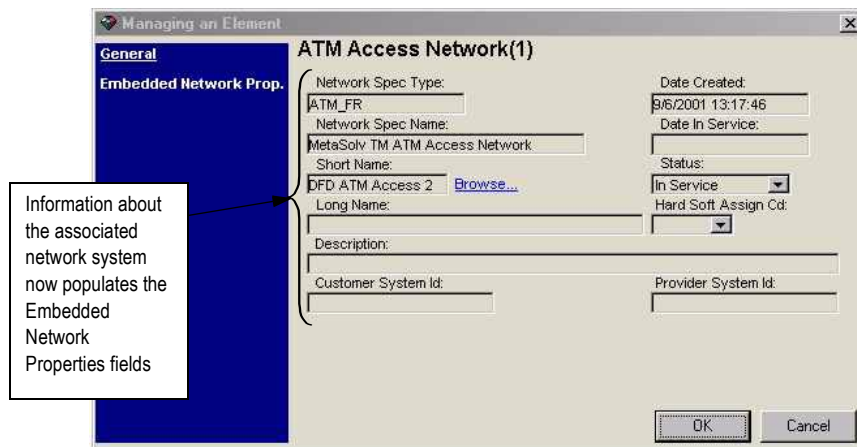


Figure 41: Embedded network properties selected

7. Click **OK**.

The label for the element on the canvas changes to show the name of the new network system associated with it.

Expanding an embedded network system

You can expand an embedded network system to display its network elements and connections on the canvas. The contents of the embedded network system display on the portion of the canvas that the cloud occupies.

To expand an embedded network system, double-click the image on the canvas.

If the embedded network is large, you may want to isolate it by dragging it to a part of the canvas that is blank before you expand it.

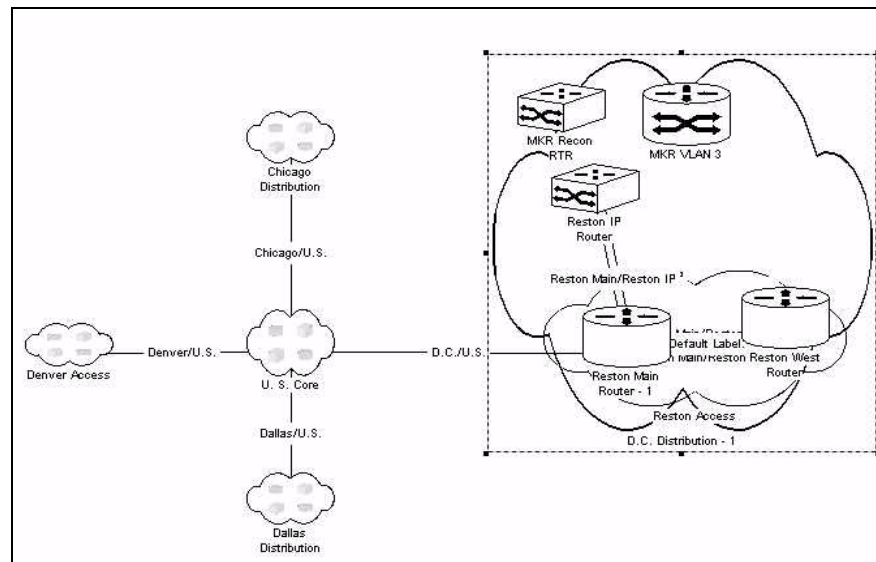


Figure 42: Expanded network area

Updating information in embedded network systems

If changes are made to a network system that you have embedded, the changes do not show automatically if you have the embedded network system open and displayed on the canvas.

To update an embedded network system, right-click the cloud that represents the embedded network and select **Refresh** from the pop-up menu.

Deleting an embedded network

You cannot delete an embedded network if it has connections associated with any of the relationships it contains. Make sure the associations for all relationships are deleted before you delete the embedded network.

To delete an embedded network, right-click on the network on the canvas and select **Delete** from the pop-up menu.

Working with ordered network systems

Customer ordered network systems (VPNs) have a network design task associated with them. Even though a VPN designed for a customer runs over an existing service provider network, the physical connections from a customer's edge router to the service provider network must be designed in Network System Design. Once the physical connections have been designed on the canvas, the remaining virtual connections that complete the VPN are provisioned in Service Provisioning.

During the original network system design you get to the canvas from the Network Design task in the work queue as the order is being fulfilled. Once the customer-ordered network system is designed, it appears in the Network List panel and can be opened directly from the Network System Design window.

If you open a customer-ordered system that has pending orders from the Network System Design window, the window shown in the following figure appears displaying the open order numbers. You can open the appropriate order and complete the work without going through the work queue. The following figure shows the Network System Order Selection window.

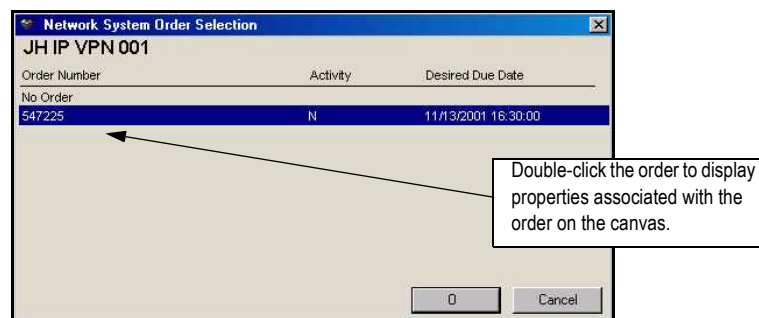


Figure 43: Network System Order Selection window

When you open the network system, the following panels appear in the panel list:

- Unincorporated panel—This panel contains the equipment on the order that must be added to the network system design.
- Unprovisioned panel—This panel contains connections on the order that must be added to the network system design.

The following figures show the Unincorporated and Unprovisioned panels.

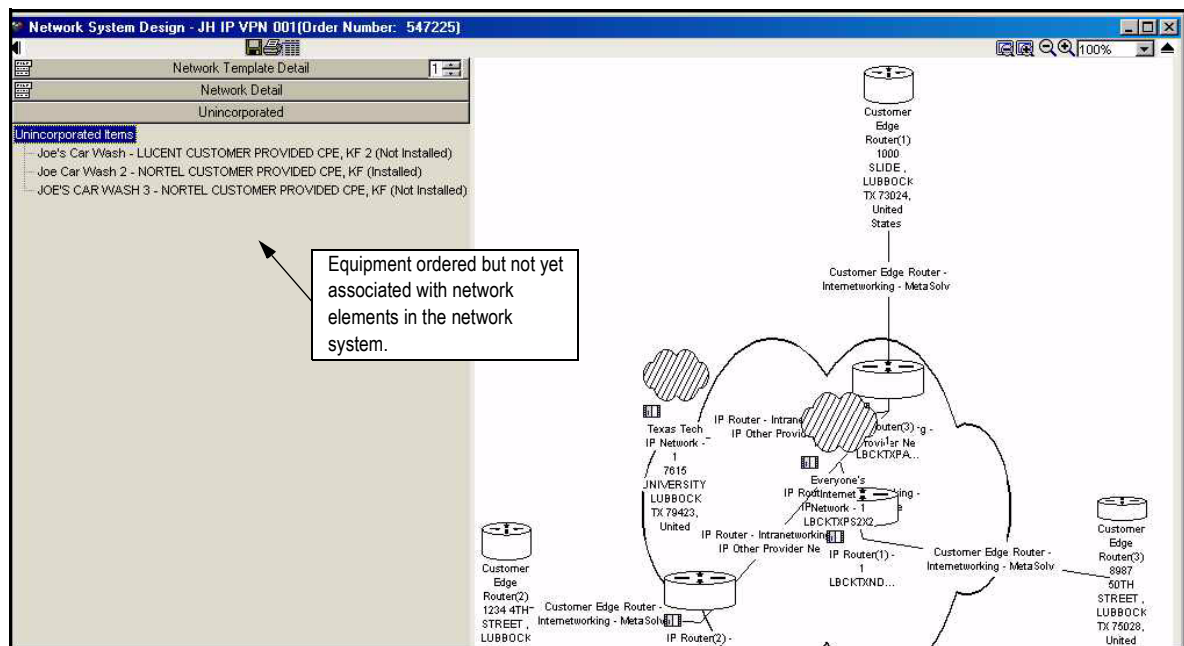


Figure 44: Unincorporated panel for customer-ordered systems

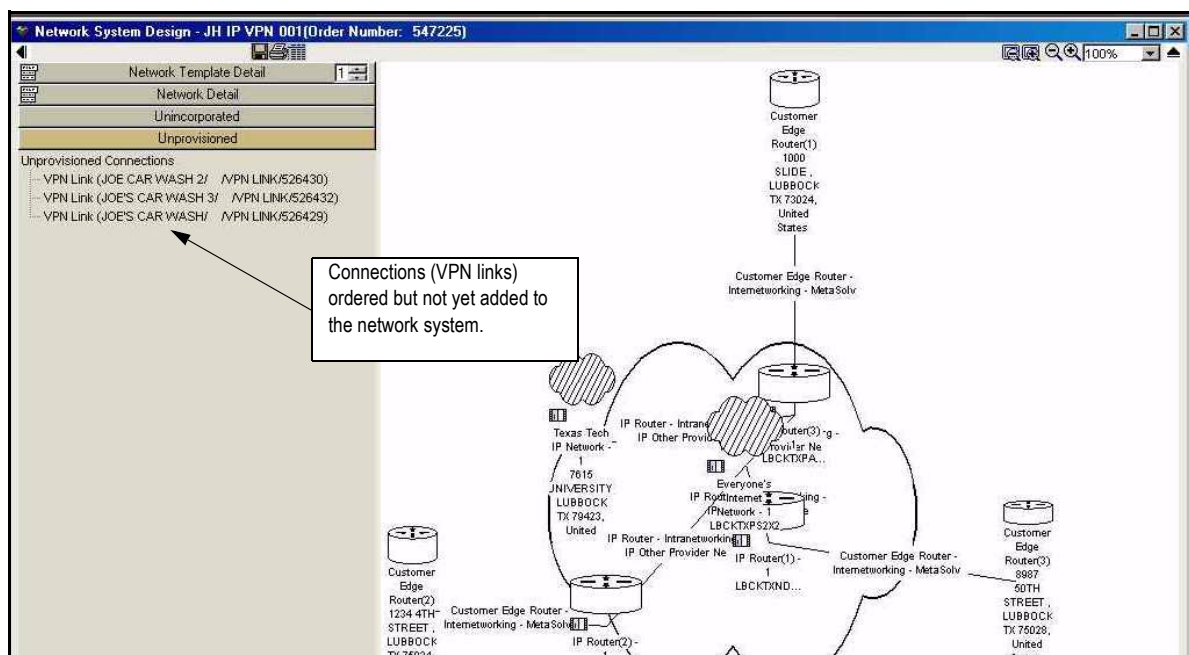


Figure 45: Unprovisioned panel for customer-ordered systems

The panels provide a list of ordered items that have not been included in the network system. As ordered items are included in the network design, they are removed from the panels. For example, when you associate a piece of equipment listed in the Unincorporated panel with a network element, it no longer appears in the list panel as "unincorporated".

Sharing elements between networks

A network element can be used in more than one network. The following procedure assumes that you have a network element placed on the canvas and are ready to define its properties.

To share an element

1. Right-click the network element and select **Properties**.

The Managing an Element window appears.

2. Click **Browse**.

The Element Query window appears. This window lets you search for network elements. By definition, every network element is included in a network system. When a network element is no longer associated with any network system, it is removed from the system.

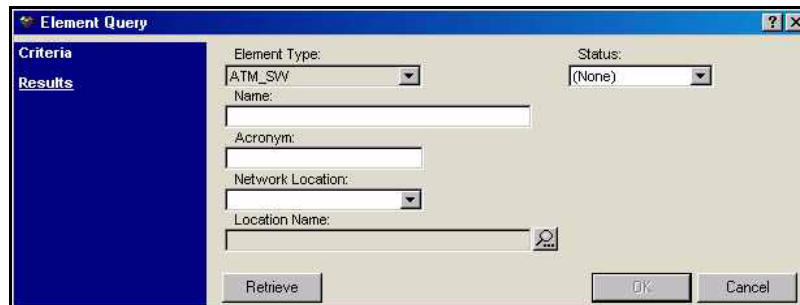


Figure 46: Element Query window

3. Enter selection criteria and click **Retrieve**.

4. From the Results view, select the network element that you want to share and click **OK**.

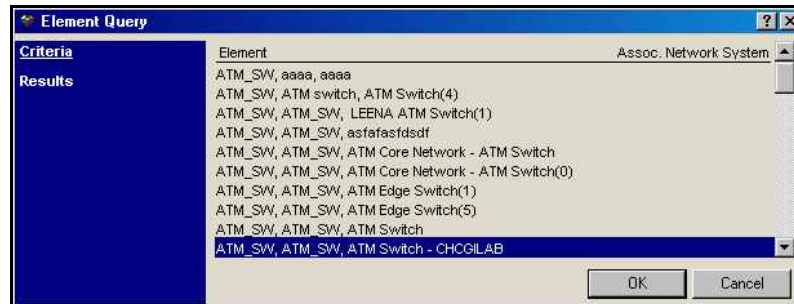


Figure 47: Querying for a network element

The network element property information replaces the default information on the Managing an Element window.

5. On the Managing an Element window, click **OK**.

The network element label on the canvas changes to display the name of the associated network element.

Viewing network neighbors

You can view a listing of connections from a network displayed on the canvas to other networks, both your own networks and customer networks. This feature lets you see how a network system fits into your overall network scheme and what other systems it touches.

Displaying connections to other network systems

To display connections to another network

1. Open the network whose connections to other networks you want to see.
2. Right-click a blank area on the canvas and select one of the following:
 - ✎ **Network Connections** - This option shows connections to other internal (service provider) networks outside of the scope of the network being viewed.
 - ✎ **Customer Network Connections** - This option shows connections to other external (customer) networks outside of the scope of the network being viewed.

The following figure shows the window that displays when you select **Network Connections**. The list window contains the names of other networks that are connected to the network displayed on the canvas.

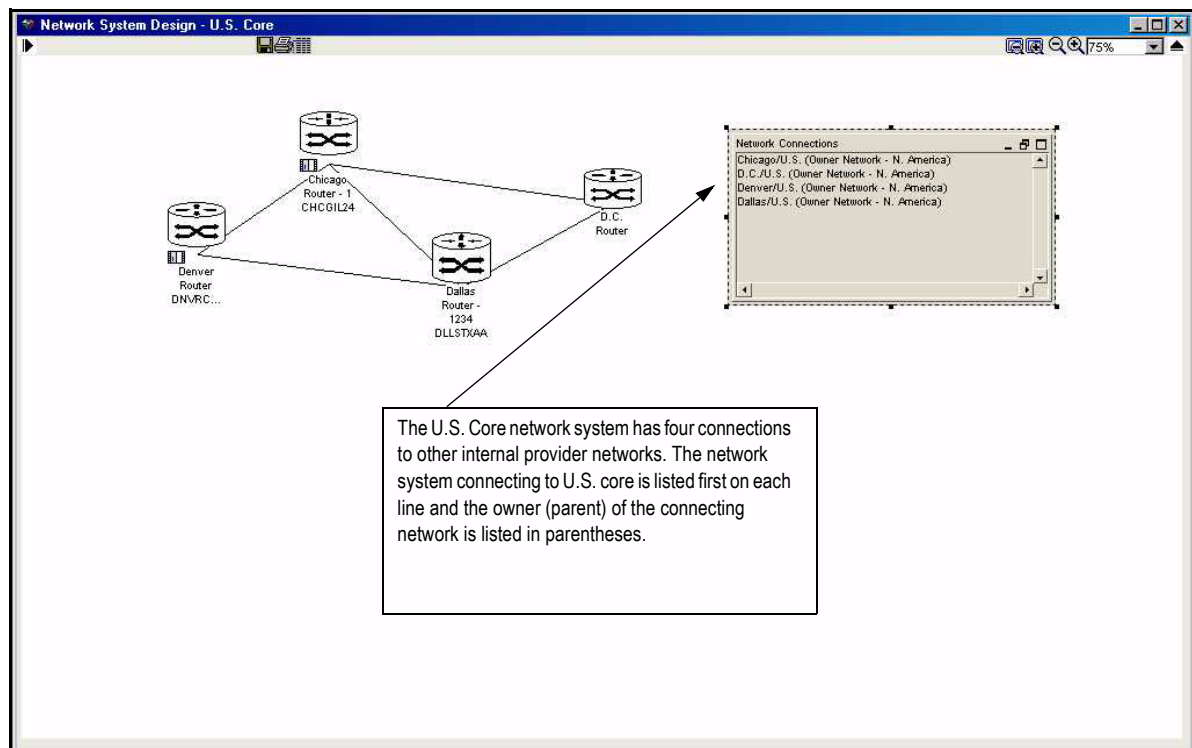


Figure 48: Network Connections window, showing connected networks

The preceding figure shows the U.S. Core network system with the Network Connections window showing four connections to other networks. The window contains the name of the network system connecting to the open network system and lists a parent network system if one exists.

3. Right-click in the list window and select **Properties** from the pop-up menu.

The Viewing Neighbors window appears. The list in this window matches the Network Connections list window, but you can select and display connected networks from this window. Note that this window also provides the name of the parent (owner) network. You cannot display a network if it is the parent of the network open on the canvas.

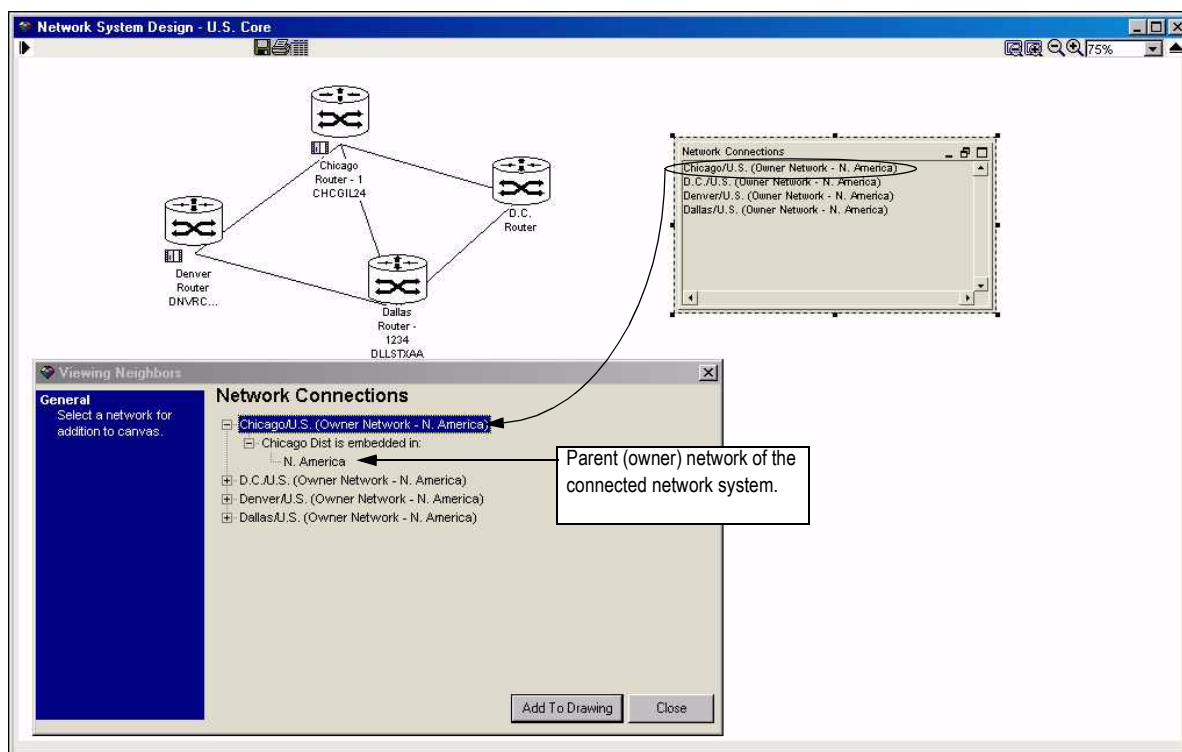


Figure 49: Viewing Neighbors window

4. Select the connected network you want to display and click **Add to Drawing**.

The network system cloud is added to the canvas. The connected network system is shown with a shaded background to distinguish it from the network system you currently have open.

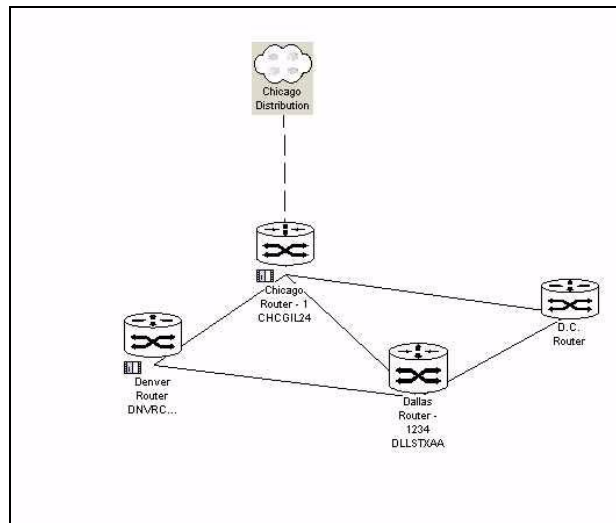


Figure 50: Network neighborhood

You can expand the connected network system by double-clicking it. The following figure shows an how the network looks expanded.

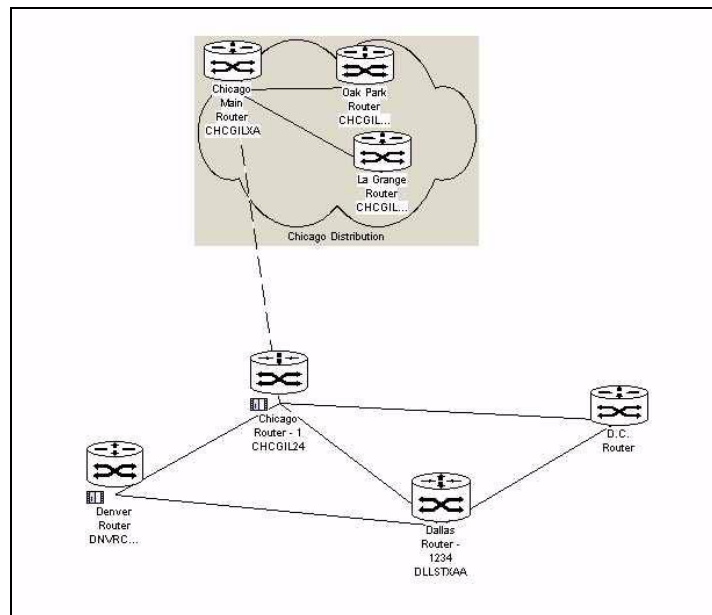


Figure 51: Expanded network neighborhood

Managing customer extensions

A customer extension is the connection and the network element that goes from the customer site to your provider network. For example, in a DSL network, the customer extension is the modem and the bandwidth connection that connects the customer to the DSLAM. The DSLAM is where the provider network begins.

Because customer extensions are not part of the service provider network, you cannot create them in Network System Design. The customer extension is ordered as a product bundle (PRDBUNDLE) and is created during service provisioning.

Viewing a customer extension

Once a customer extension is created in the Service Provisioning GLR, you can view it on the Network System Design canvas and make changes its properties and associations.

To view customer extensions for a network system

1. Open the network so that it is displayed on the canvas.
2. Right-click on a blank spot on the canvas and select **Customer Connections**.

The following window appears listing customer extensions to the network. The figure shows a DSL network with a DSLAM going to an unexpanded ATM/frame relay

network. The list of customer extensions that connect customer sites to the DSLAM shows in the list box that displays on the canvas.

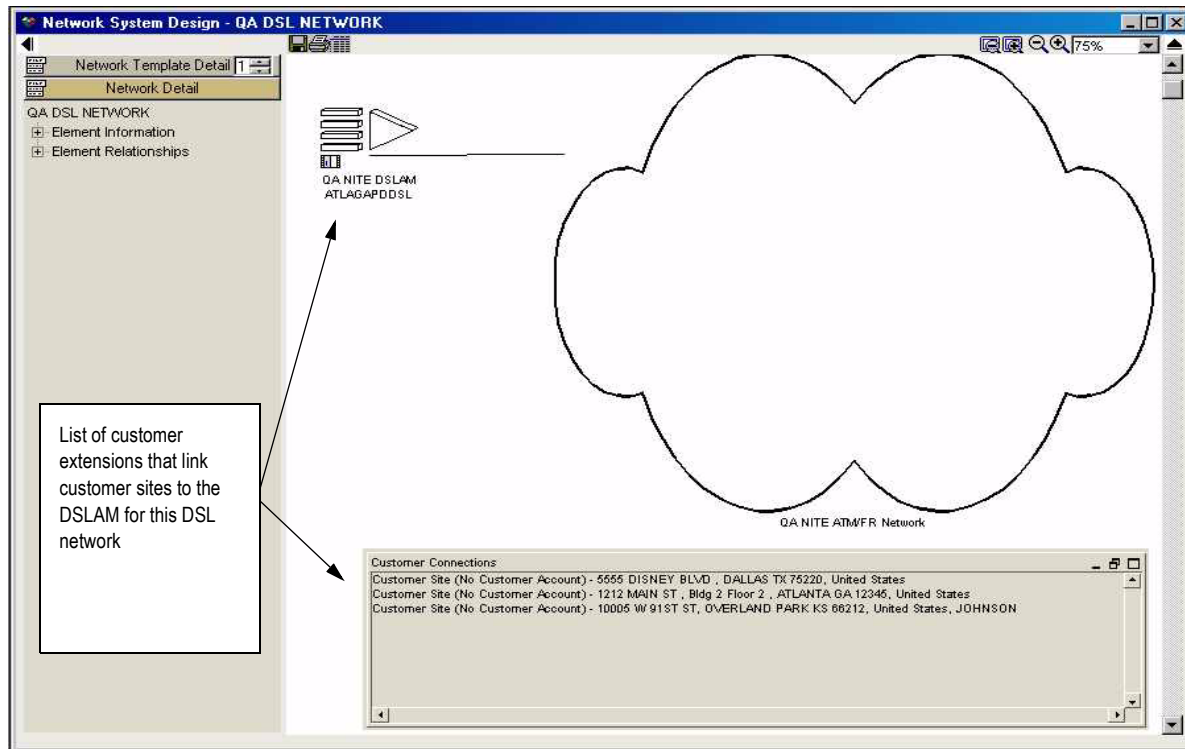


Figure 52: List of customer extensions

- Double-click anywhere in the Customer Connections list box.

The following window appears.

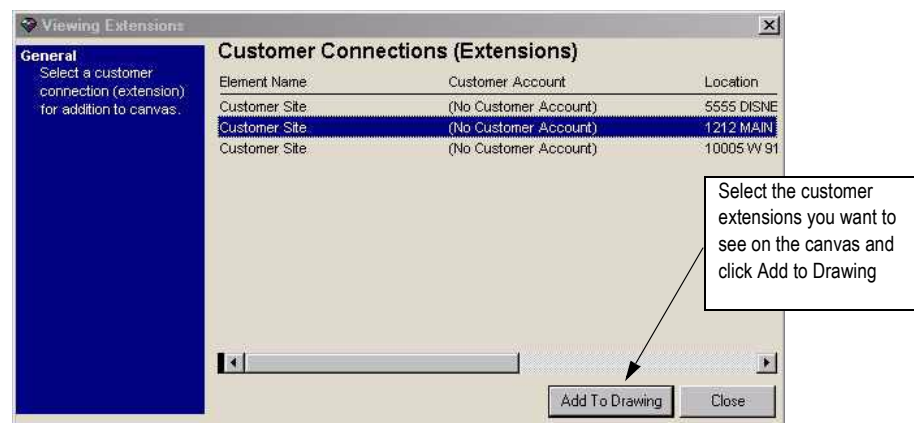


Figure 53: Viewing Extensions window

4. Select the customer extension you want to see on the canvas and select **Add to Drawing**. The window stays open until so you can select and add as many customer extensions as you want, one at time.
5. Click **Close** when you are done.

The following figure shows a network system with the customer extensions displayed.

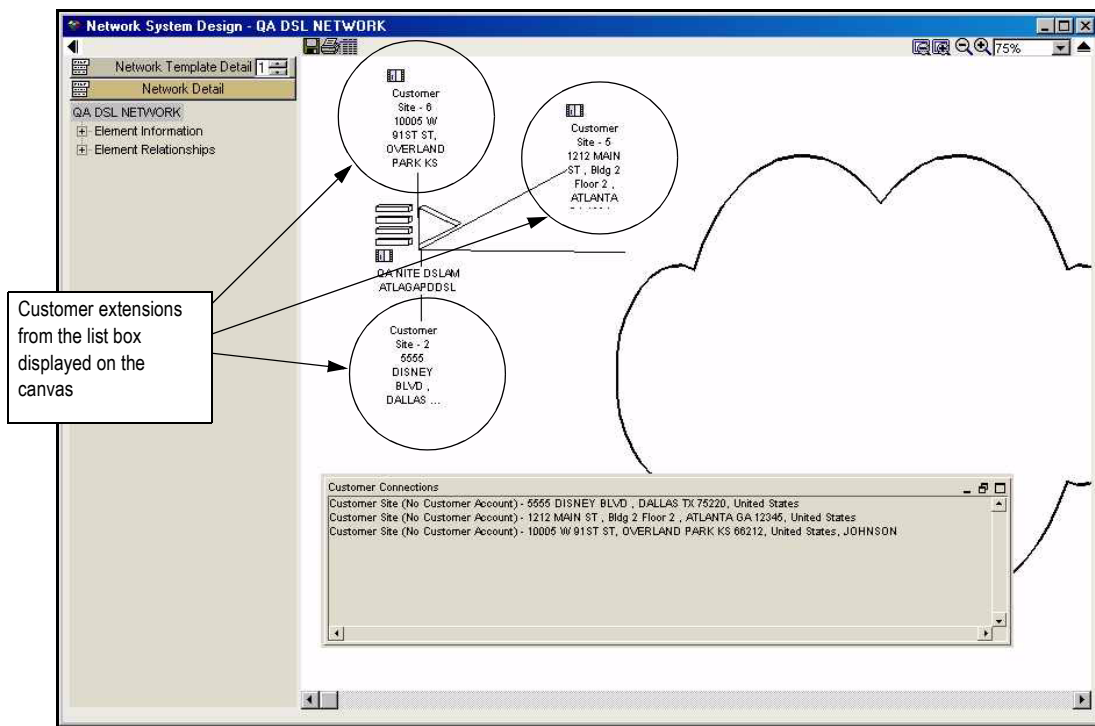


Figure 54: Customer extensions displayed on the canvas

Making changes to a customer extension

Once a customer extension is displayed on the Network System Design canvas, you can make changes to its elements and connections.

To make changes to a customer extension

1. Display the customer extension on the Network System Design canvas. See the preceding procedure for information on this task.
2. Right-click on the Customer Site element or the connection and select **Properties**.
3. Make the changes you want for the element or connection and click **OK**.

Removing a customer extension from the canvas

Right-click on the customer extension and select **Delete**. The Delete option does not remove the customer extension from service. In this case, it removes it from displaying on the network system canvas.

Exporting a network system design

You can export a network system drawing in a Windows Enhanced Metafile (*.EMF) or a Windows or OS/2 Bitmap (*.BMP) format.

To export a network system design

1. Open the network system.
2. Right-click a blank area of the canvas and select one of the following menu options:
 - ✦ **Export Visible Graphics**—Select this option to export only the portion of the network visible on the canvas.
 - ✦ **Export All Graphics**—Select this option to export the entire network design.

The Export window appears.

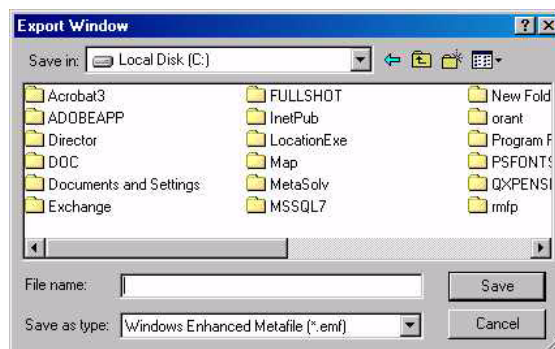


Figure 55: Export window

3. Select the appropriate directory, enter a file name, and select the file format in the **Save as Type** field.
4. Click **Save**.

Printing a graphic

You can choose to print your network system design in a number of ways. You can print only what displays on the canvas or you can choose to print the entire network. The following procedures explain how to set up for printing and how to print.

Print Setup

To complete print setup

1. Open the network system.
2. Right-click a blank area of the canvas and select **Print Graphics Setup**.

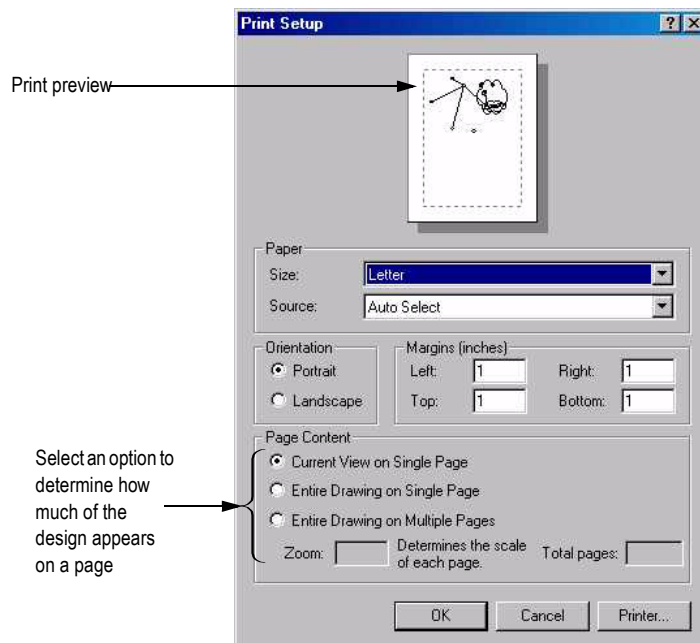


Figure 56: Print Setup window

3. Select the appropriate settings for paper, orientation, and margins.
4. In the Page Content group box, select the appropriate scale. As you make selections, the print preview at the top of the window changes to give an idea of what appears on the printed page.
 - ✎ **Current View on Single Page**—Prints only what is visible on the canvas on a single page.
 - ✎ **Entire Drawing on Single Page**—Prints the entire network system on a single page.
 - ✎ **Entire Drawing on Multiple Pages**—Prints the entire network system using the number of pages required by the zoom percentage you select.
5. Click **OK**.

Printing a network system design

To print a network system design

1. Open the network system.
2. Right-click a blank spot on the canvas and select **Print Graphics**.

The Print window appears.

3. Select any desired options and select **Print**.

Capacity management reporting

You can view the capacity management report only for DLC systems. For the report to be available in Network System Design, you must set up the correct information in Network Templates. For more information on DLC capacity management setup, see *Network Templates Concepts and Processes*.

To view the Capacity Management report for a DLC system

1. Open the DLC network system.
2. Right-click on a blank spot on the canvas and select **Capacity Management Report**.

A report similar to the one shown in the following figure appears. To learn about the individual fields on the report, press F1 while the report is displayed to see the online Help.

Components	Label	Total Available	Outside Assignments	Remaining	Assigned	Ratio (%)
Local Digital Switch-XC	Central Office TerminalXC					
	TR-008 Mode 1 Digroup A	24	0	24	0	.00
	TR-008 Mode 1 Digroup B	24	0	24	0	.00
	TR-008 Mode 1 Digroup C	24	0	24	0	.00
	TR-008 Mode 1 Group	72	0	72	0	.00

Page 1 of 1 Report Date: November 5, 2001

Print Close

Figure 57: DLC Capacity Management report

Service Activation Report

To view the Service Activation Report for a network system

1. Open the network system and display it on the canvas.
2. Right-click on a blank spot on the canvas and select Service Activation Report.

A report similar to the one shown in the following figure appears. To learn about the individual fields on the report, press F1 while the report is displayed to see the online Help.

NAT Maintenance

Network Address Translation (NAT) is the translation of an IP address used by one network to a different IP address used by another network. This process is used in VPNs, where the VPN is designated as the inside, or private, network and the other is the outside, or public, network. NAT mappings are typically specified during the ordering process, but you can add a NAT mapping to a VPN being designed in Network System Design. See the section entitled "Ordering IP addresses" in *Templates-Based Ordering Concepts and Processes* for more information on the process of specifying NAT addresses.

Scenarios

This chapter presents end-to-end scenarios for creating and using network systems. These scenarios are intended to overlay the features and functions you've read about in the preceding chapters with realistic examples of those features and functions being put to use in a business environment—moving you from concepts, windows, and buttons into realistic use. Our objective with this chapter is to show you examples of how the MetaSolv solution is used in business scenarios so that you can apply that usage to your specific business needs. While no scenario is going to mirror your business needs and processes perfectly, bridging the knowledge you gain from reading through these scenarios should give you a strong foundation for going forward.

Scenario 1 – Designing an ATM network system



Under Development

Scenario 2 – Designing a virtual private network system



Under Development

Scenario 3 – Designing a DSL network system



Under Development

Setup

This chapter provides instructions on how to configure MetaSolv Solution for network system design. Before you can create a network system design you must:

- Enable M/5.1 software options
- Set related preferences
- Understand configuration considerations and make any indicated accommodations
- Understand conversion considerations and make any indicated accommodations

You should read this chapter if you are responsible for setup and/or system administration tasks supporting MetaSolv Solution.

Enabling software options

Technology modules are software options that contain predefined network template samples for the following technologies:

- ATM/Frame Relay
- DLC
- DSL
- Ethernet
- IP
- MPLS

The base data for the technology module and its network templates is delivered with the MetaSolv Solution, and you activate it at installation with an appropriately coded product ID.

Setting preferences

The Enable Network Areas preference must be enabled (set to a value of Y).

Configuration considerations



Under Development

Conversion and migration considerations

Conversion and migration issues apply only to existing MetaSolv Solution users who are upgrading to the MetaSolv Solution M/5.1. If your company's first installation of the MetaSolv Solution is M/5.1, these issues do not affect you. You can make full use of all of the new features included in M/5.1 without restriction.

However, if you created network designs in the software prior to M/5.1, some additional steps are necessary before you can make full use of the new features.

If you designed DLC or VPN network systems in the MetaSolv Solution prior to M/5.1, the data for these systems is automatically converted to the new network design format during the M/5.1 upgrade. That means you can view DLC or VPN network systems and make changes to them on the new graphical canvas immediately.

For M/5.1, using the new canvas for network design is optional. You can still use the windows that existed previously. However, releases that follow will require the migration of existing network design data to the new graphical format.

US Locations

MetaSolv Software, Inc.

Headquarters

Plano, Texas

5560 Tennyson Parkway
Plano, TX 75024
972.403.8300 (Voice)
972.403.8333 (Fax)
800.747.0791 (Toll Free)

Atlanta, Georgia

1117 Perimeter Center West
Suite 500E
Atlanta, GA 30338
770.392.3365 (Voice)
770.392.9469 (Fax)

Chicago, Illinois

303 West Madison Street
Suite 925
Chicago, IL 60606
312.827.2500 (Voice)
312.827.2525 (Fax)

Englewood, Colorado

6300 South Syracuse Way
Suite 365
Englewood, CO 80111
303.224.8700 (Voice)
303.224.8759 (Fax)

McLean, Virginia

7601 Lewinsville Road
Suite 400
McLean, VA 22102
703.917.1300 (Voice)
703.917.1332 (Fax)

International Locations

MetaSolv Software, Limited

10 Stratton Street
Mayfair, London W1X 5FD
United Kingdom
+44 207 546 8537 (Voice)
+44 207 546 8570 (Fax)

MetaSolv Software Canada Inc.

4446, boul. St-Laurent
Suite 300
Montreal, Quebec
Canada H2W 1Z5
514.844.4545 (Voice)
514.844.6545 (Fax)

MetaSolv Software do Brasil Ltda

Rio de Janeiro Mourisco
Praia de Botafogo, 501
Bloco B – 2o.andar
Rio de Janeiro, 22250-040
Brasil
+55 21 546 9975 (Voice)

MetaSolv Software S.A.S.

Air France Building
455, Promenade des Anglais
06200 Nice
France
+33.4.92.29.28.20 (Voice)
+33.4.92.29.29.00 (Fax)

World Wide Web

www.metasolv.com



System Requirements

The MetaSolv Solution employs an n-tiered architecture consisting of an Oracle database, UNIX or Windows NT servers (for application and database servers), and Windows or browser-based clients. For more information specific to your application or version of the MetaSolv Solution, please contact your MetaSolv representative.

©2001 MetaSolv Software, Inc. All rights reserved. MetaSolv Software, the MetaSolv logo, MetaSolv Solution, Framework for Success, MetaSolv QuickStart, MetaSolv eService, MetaSolv Field Operations Portal, Rapid Results, and MetaSolv Network and Service Planning are trademarks of MetaSolv Software, Inc. The MetaSolv Network and Service Planning subsystem is based on STAR INFORMATIC S.A.'s GIS technology. MetaSolv is a trademark registered in the United States of America by MetaSolv Software, Inc. All other trademarks are property of their respective owners. Any rights not expressly granted herein are reserved. Information contained herein is subject to change without notice.