Network Templates
Concepts and Processes Guide

The
MetaSolv
Solution.™

5.1

MetaSolv Solution™ M/5.1.2

Network Templates

Concepts and Processes Guide
SECOND EDITION

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S O F T W A R E

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Introduction

This chapter describes the changes to the MetaSolv Solution user interface for network templates. The details of the features and functions introduced here are documented in the Concepts and Processes chapters.

ABOUT THIS GUIDE

Purpose

This guide can help you derive the benefits from using network templates right away. You are shown how to build rules that govern the design and management of both your internal network and the services offered to customers.

The information presented includes:

- An overview of network templates that positions it as the core of all template-based functionality throughout MetaSolv Solution
- A description of network templates and its components
- An introduction to the user interface changes in MetaSolv Solution that support network templates
- A suggested implementation sequence and step-by-step instructions on using network templates
- A set of scenarios that illustrate the role of network templates in building internal networks, external customer networks, and customer connections that can be provisioned over internal networks

Audience

If you are responsible for tailoring network templates to the requirements of your company or organization, this guide is written for you. This document may also interest others working with template-based processes including network designers, those who set up product specifications and product catalog items for customer networks and customer connections, those who use the Ordering Dialog for template-based products, and service provisioners.

Before you begin

Before you can use network templates, the MetaSolv Solution M/5.1 or above must be installed. See the *System Guide* for M/5.1 for information on database installation and upgrade. See online help for information on client and server installation.

In addition, you should have a thorough knowledge of your network, all its elements and connections, and the services your company offers.

Note: Templates setup must be complete before the PSR migration can be run. See the *Migration Guide* for M/5.1.

Organization

The following table describes the document organization with chapter references.

Table 1: Document organization

To learn about...	See chapter...
The purpose, organization, and target audience of this CAP guide and related references	"Introduction"
The look and feel of the major interface features—the panel lists and the graphical canvas	
The MetaSolv-defined data provided with each technology type and its structure—so you can determine what you can use right out of the box and what you need to add	
The technology modules, template-based functionality, network templates, network template components, and how network template rules are defined	"Concepts"
The windows accessible from the available menu options that support network template functionality	
How the customization of network templates is first in the end-to-end process that includes designing a representation of your internal networks, building template-based product specs and product catalog items, using the Ordering Dialog, and provisioning customer networks and services across your internal networks	
A sequential approach to setting up and maintaining templates	"Processes"
Steps required to tailor MetaSolv-defined template components and rules to your requirements and steps to create your own components and rules.	

Table 1: Document organization

To learn about...	See chapter...
Network template usage in the context of a business scenario, including adding elements and connections to a network template and incorporating them into prioritized paths for auto-provisioning	"Scenarios"

Related documentation

This section lists the documentation related to template-based functionality in MetaSolv Solution M/5.1. Concepts and Processes guides and white papers are available through the customer and partner portals on the MetaSolv Web site. Contact your MetaSolv Software representative for information on how to acquire a password for access to the secured areas of your partner portal. A technology module guide is available with the purchase of each technology module. Online Help can be accessed by clicking **Help** on the main toolbar of the MetaSolv Solution.

Concepts and Processes (CAP) guides

- *Template-based Network Design Concepts and Processes Guide*
- *Template-based Product Specifications Concepts and Processes Guide*
- *Template-based Ordering Concepts and Processes Guide*
- *Template-based Service Provisioning Concepts and Processes Guide*

Other documents

- Next Generation Networks White Paper
- *Migration Guide*
- *System Guide*
- *CA Technical Update*

Technology modules guides

- *ATM/Frame Relay Technology Module Guide*
- *Digital Loop Carrier Technology Module Guide*
- *Digital Subscriber Line Technology Module Guide*
- *Ethernet Technology Module Guide*
- *Internet Protocol Technology Module Guide*
- *Multiprotocol Label Switching Technology Module Guide*

Additional resource

- MetaSolv Solution Online Help

MetaSolv Education Services M/5.1 template-based courses

- Template-Based Technologies 5.1
- Template Customization 5.1

- Custom Attributes 5.1
- Template-Based Network Design 5.1
- Template-Based Ordering 5.1
- Template-Based Service Provisioning 5.1

FEATURES

Network templates are based on the idea that any network using any technology can be defined using a generic set of templates. The initial release of template-based functionality includes templates for designing internal networks using technologies such as ATM, Frame Relay, MPLS, and Ethernet. Besides the technology-specific templates, other templates have been defined to provide backward support to MetaSolv Solution users who have used the following software options: Broadband Design Module, Digital Loop Carrier, and VPN.

- MetaSolv's new DSL template takes the place of the Broadband Design Module with enhanced functionality.
- MetaSolv's new DLC template takes the place of the Digital Loop Carrier network design functionality and provides the means of moving DLC networks forward using templates.
- MetaSolv's new Basic VPN template takes the place of the functionality previously provided through the VPN software option and provides the means of moving existing customer VPNs forward using templates. In addition, the ATM/Frame Relay, MPLS, and IP technology modules each include a VPN template, which provides even better means of providing VPN support to your customers.

Features described in this section are listed on the following table.

Table 2: Features list

Feature	Description
Templates toolbar button	Used to access network templates
Panel lists	A set of panels that let you work with individual components that you can add to any template as well as a panel with details of a selected network template that is also displayed on the graphical canvas
Graphical canvas	Area for displaying and customizing template components through drag and drop functionality plus other toolbar options

See "How is network template functionality accessed?" on page 58 in the "Concepts" chapter for examples and descriptions of menu options and the windows they invoke.

Templates toolbar button

You access network templates through the following series of toolbar buttons: **Engineering > Net Systems > Templates.**
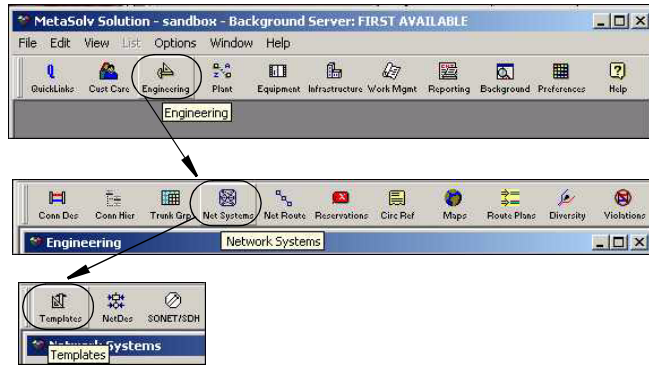
Figure 1: Accessing network templates

When you click **Templates**, the Network Template Maintenance window opens.

Network Template Maintenance window—layout

You maintain network templates from the Network Template Maintenance window. This window includes four panels and a graphical canvas with its own toolbar.
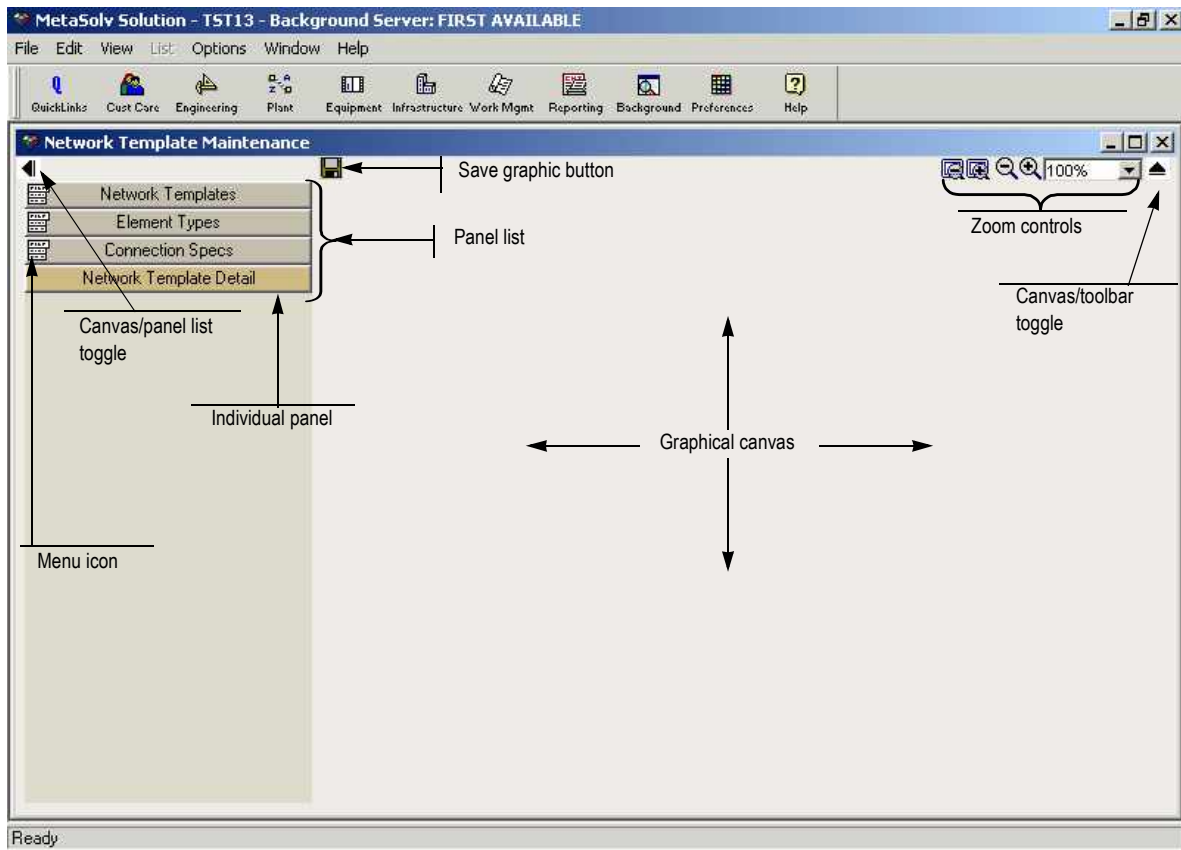
Figure 2: Network Template Maintenance window components

The following sections describe the features shown in this figure.

Panel lists with MetaSolv–defined data

The Network Templates panel list includes individual panels for *Network Templates, Element Types, Connection Specs,* and *Network Template Detail.* These panels initially display just MetaSolv-defined data that is included in the technology modules. After you compare this data with your requirements and make the needed modifications, it may look different from the examples shown in this section.

When you open a panel list for Network Templates, Element Types, or Connection Specs, that panel list displays MetaSolv-defined data for the corresponding template component. Each of these panels has its own menu. For each of these panel lists, this section describes the MetaSolv-defined data.

Network Templates panel

When the Network Template Maintenance window is initially displayed, no data is shown. Clicking on a panel heading opens that panel list. The top-level data on the Network Templates panel list is the template type. Although seven template types are shown on the following figure, the data displayed on your panel list represents only the template types your company requires. Template types such as ATM_FR, ETHERNET, IP, and MPLS represent technologies. The DLC template type represents network-related functionality that is being migrated from a previous release. UNCLASS is always present; it represents a PSTN network.
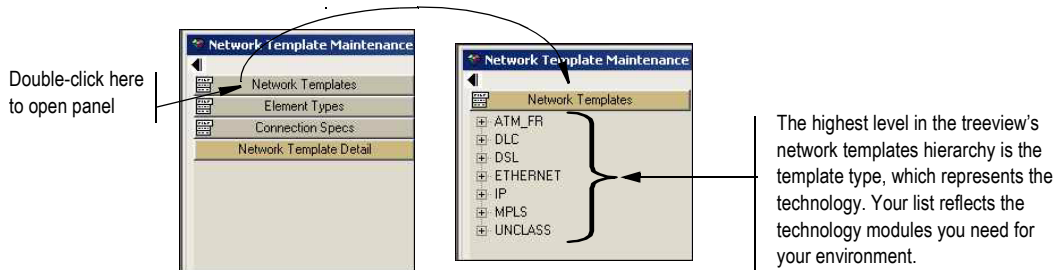
Figure 3: MetaSolv-defined template types

The Network Templates panel lists the MetaSolv-defined network templates within each template type being used. Your view may be similar to that shown in the following figure.
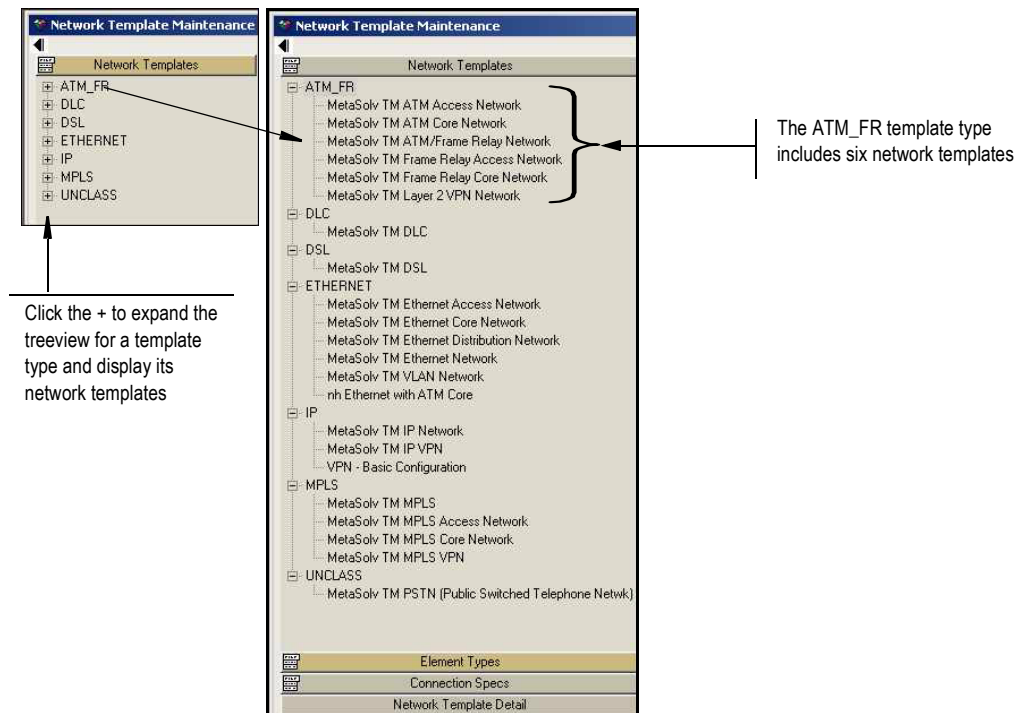
Figure 4: MetaSolv-defined network templates

One thing that is not obvious from the Network Templates panel is what each network template includes. These details are displayed on the Network Template Detail panel when you open a selected network template. See the "Network templates" section beginning on page 23 for details on the structure of each network template.

Element Types panel

The Element Types panel displayed with the Text option lists the element types that are used within the various network templates. Many of the element types are used in multiple network templates or in network templates that are embedded in other network templates.

MetaSolv-defined element types include all those element types that might be needed to support migrated network systems, such as DLC, and element types that could be part of migrated orders for services such as DSL. Because the former DSL functionality included specification of the broadband service categories of ATM and Frame Relay, the element types required for this service using these technology types are also predefined.

Several MetaSolv-defined element types support technologies such as Ethernet and MPLS. You can easily add any missing element types representing equipment you use.

Supports migrated Digital Loop Carrier (DLC) network systems

Supports migrated virtual private networks using the Basic VPN network template

Supports migrated DSL services including voice connections and Internet access and extends ability to define the internal ATM or frame relay networks over which such services are provisioned

Supports the design of embedded PSTN networks

Supports the design of new Ethernet networks

Supports the design of new MPLS networks

Supports the design of new VPNs, including IP VPNs, ATM VPNs, frame relay VPNs, and MPLS VPNs

Figure 5: MetaSolv-defined element types

The Element Types panel also can be displayed with images and text or used to search for an element type containing a specified search string. See page 67.

Connection Specs panel

The Connection Specs panel displays all connection type names with the connection specs within each category. MetaSolv-defined connection types include those needed to support migrated DLC and VPN network systems. Most MetaSolv-defined connection specs are used exclusively in the design of internal, provider networks.
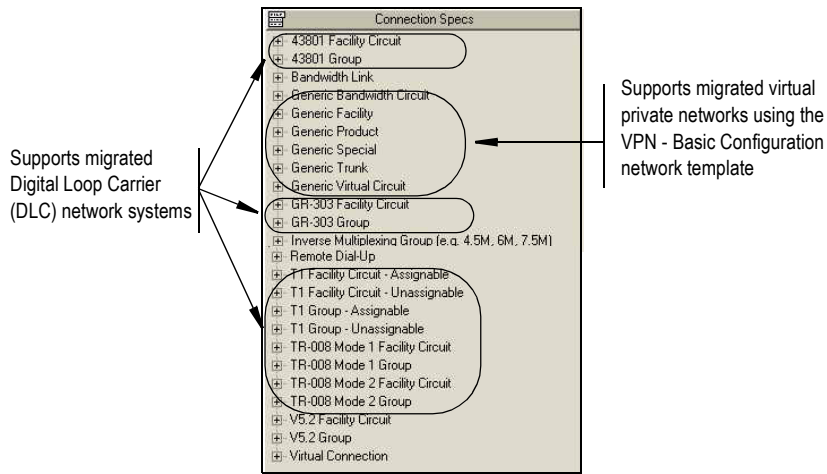
Figure 6: MetaSolv-defined connection type names

Connection specs used in the design of ordered external, customer networks or ordered customer extensions to the provider network are shown on the following figure.
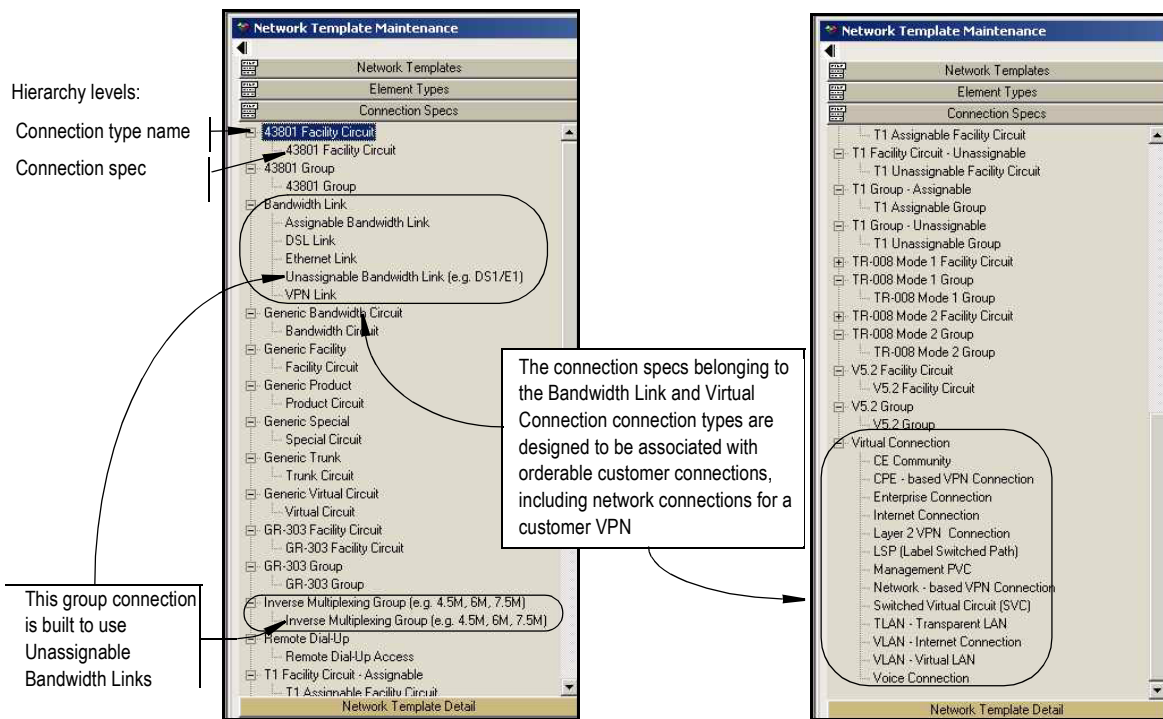
Figure 7: MetaSolv-defined connection specs

Network Template Detail panel

The Network Template Detail panel displays the hierarchy of network template components that is displayed graphically on the canvas. The first line of data listed on the Network Template Detail panel is the network template opened from the Network Template panel or "NewTemplate." When "NewTemplate" is displayed, the canvas is empty.

The Network Template Detail panel can be opened with "NewTemplate" by selecting the *Add Template* option from either the Network Templates panel menu or the template type menu. When the Network Template Detail panel is opened for a new template, the new template definition process begins with the selection of the *Properties* option for NewTemplate.
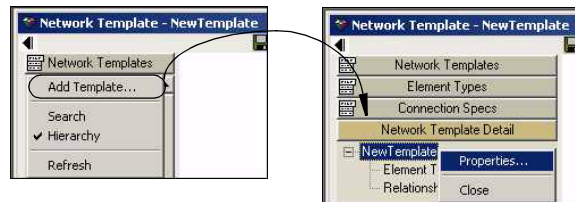
Figure 8: Network Templates Detail panel for a new network template

The Network Template Detail panel can be opened for a selected network template either by selecting *Open* from the menu or by double-clicking the network template name. The network template name is the top of a hierarchy containing Element Types and Relationships. For example, if you open MetaSolv TM ATM Core Network from the Network Templates panel, the Network Template Detail panel list displays the MetaSolv TM ATM Core Network at the top. (See the following figure.) You can expand Element Types to list all template element types that are part of the selected network template. In this example, there is just one template element type, the ATM Switch. You can expand Relationships to list all template relationships that are part of the selected network template. A template relationship is composed of two template element types that can be connected with the specification of whether those template element types are in the same network system (Intranetworking) or are in different network systems (Internetworking). In this example, there is just one template relationship, ATM Switch - Intranetworking - ATM Switch. A relationship item can be expanded to list the template connections that are valid for that relationship within this network template. In this example, there are

three template connections available for defining connections between any two ATM switches in the network design of an ATM core network.
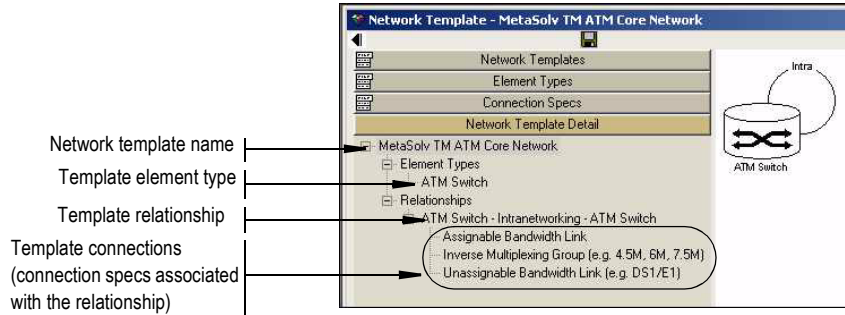
Figure 9: Network Template Detail panel for an existing network template

The graphical depiction of each MetaSolv-defined network template is included in "Becoming familiar with the network templates" on page 109. See also the pertinent Technology Module guides listed in "Related documentation" on page 3.

The menu icon on each panel displays the panel menu. See "How is network template functionality accessed?" on page 58 for details on the menu structure and menu content for each available menu, including a description of each option and selection results.

Graphical canvas

The graphical canvas is empty until you select a network template from the Network Templates list. This action displays the Network Template Detail panel. Network template components are presented textually on the panel and graphically on the graphical canvas. This section describes the features that enable you to manipulate the display.

Canvas and panel list size controls

The screen on the left in the following figure shows the default width of the panel lists. At times, you may want to widen a panel list to display the full text. The screen on the right illustrates the appearance of a panel list at its widest.
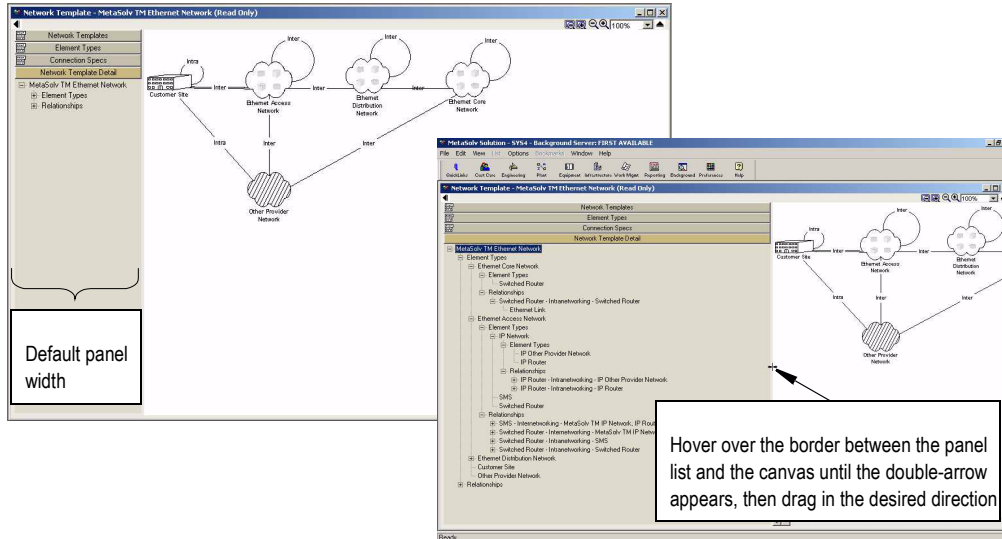
Figure 10: Panel list width variability

At other times, you may want to hide the panel list from view and use the entire screen width for the canvas. To do this quickly, just click the arrow in the upper left corner of the canvas. You can also gain a little height in the canvas display by hiding the tool icons. To do this, just click the arrow in the upper right corner of the canvas.
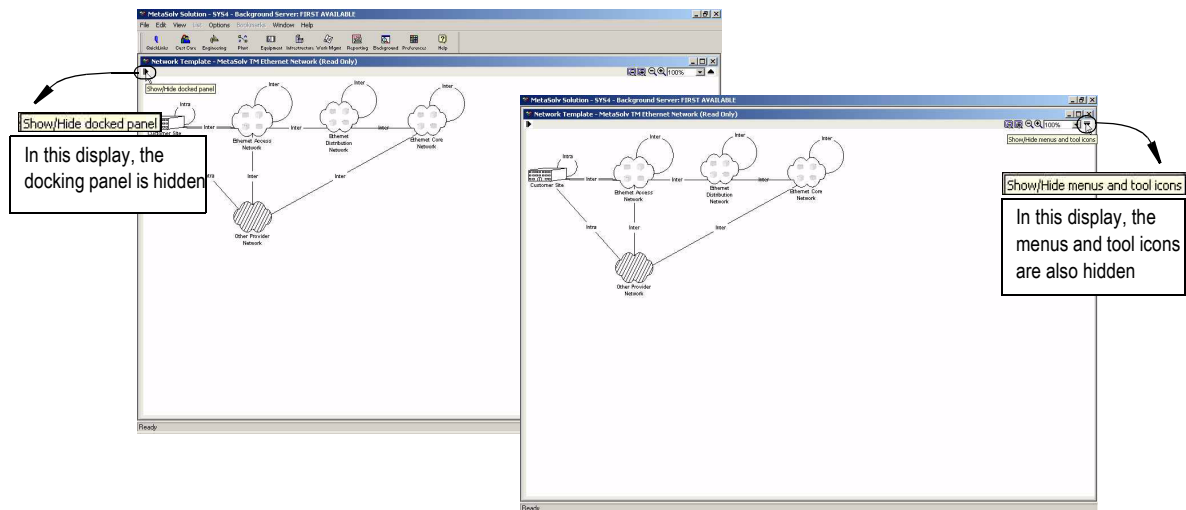
Figure 11: Canvas height and width variability

Graphic size and position controls

You can control what is displayed on the viewable portion of the canvas and its size. Clicking the *zoom in* makes the graphic components appear larger; *zoom out* makes the graphic components appear smaller. The *select and zoom in* feature allows you to filter out everything from view except the portion of the graphic you select. *Select and zoom out* operates like zoom out except the graphic location is moved to the upper left corner of the canvas.

Zoom in and zoom out percentages are based on the current setting.

Select and zoom enables you to rubber band the object of focus and select the zoom percentage.

Page enables you to zoom the drawing so the entire graphic fills the page.

Last displays the previous graphic view
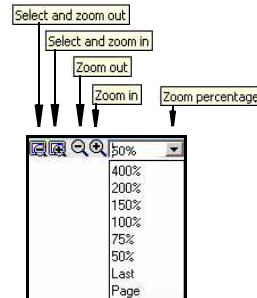
Figure 12: Zoom features controling display of graphic on canvas

The following graphic illustrates the results of zooming 50 percent, 100 percent, and full page.
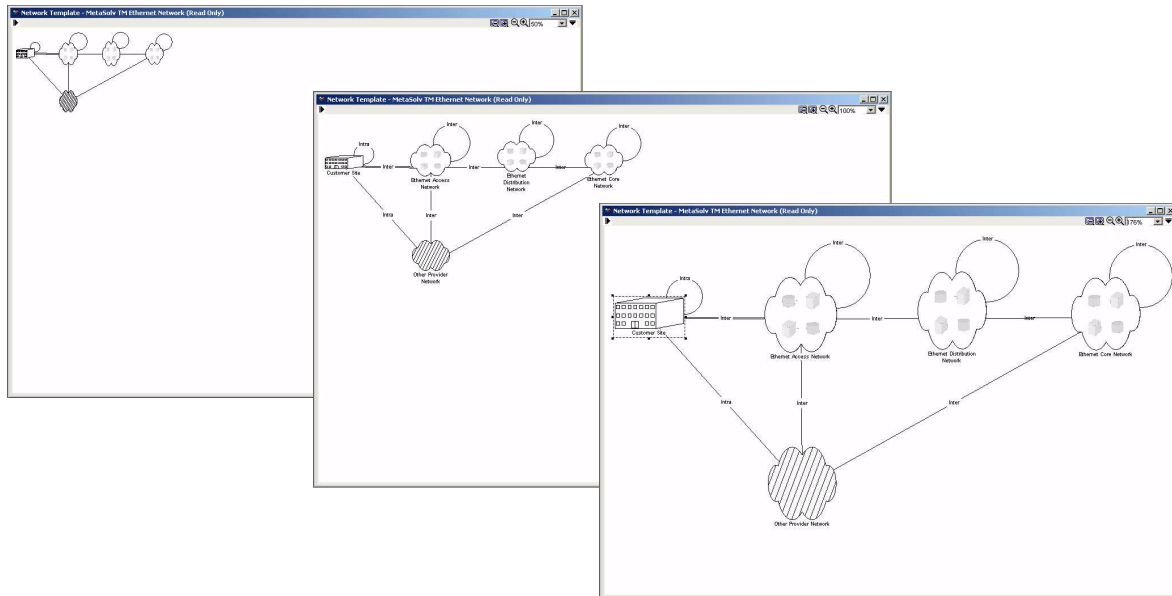
Figure 13: Example of graphic displayed at 50%, 100%, and full page

Graphical images and use of drag and drop

When you initially open a MetaSolv-defined network template from the Network Templates panel hierarchy, the Network Template Detail panel opens and the template

components are displayed on the graphical canvas. For example, when you initially open the ATM Access Network listed under the ATM_FR template type, the display resembles the following figure.
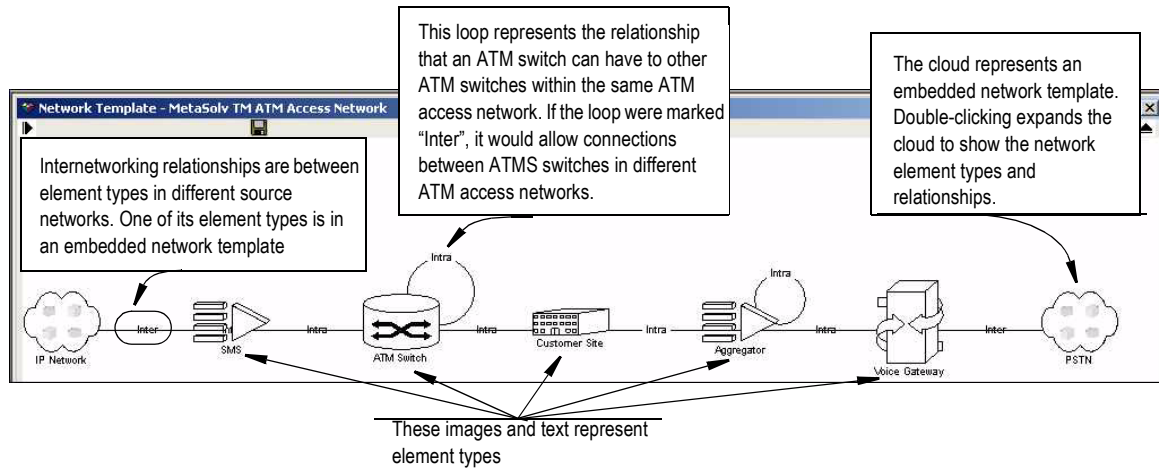
Figure 14: Components of a network template at initial display

You can click any element on the canvas and, while holding down the mouse button, drag it to a new position. If the element is a cloud, you can click it to expand, and then drag its elements to new positions. If you click the **Save** toolbar button, the new positioning of the element types is saved so the graphic looks the way you left it when you reopen it.

The *Delete and Rebuild Graphics* feature uses auto-position functionality to place template element types of the selected network template on the canvas. Therefore, if you select this option after you have moved the element types to new positions, your formatting is lost. Any embedded network templates you expanded are closed. This is illustrated by the following figure, where the top shows the modified view and the bottom shows the view after selecting and confirming the *Delete and Rebuild Graphics* option.
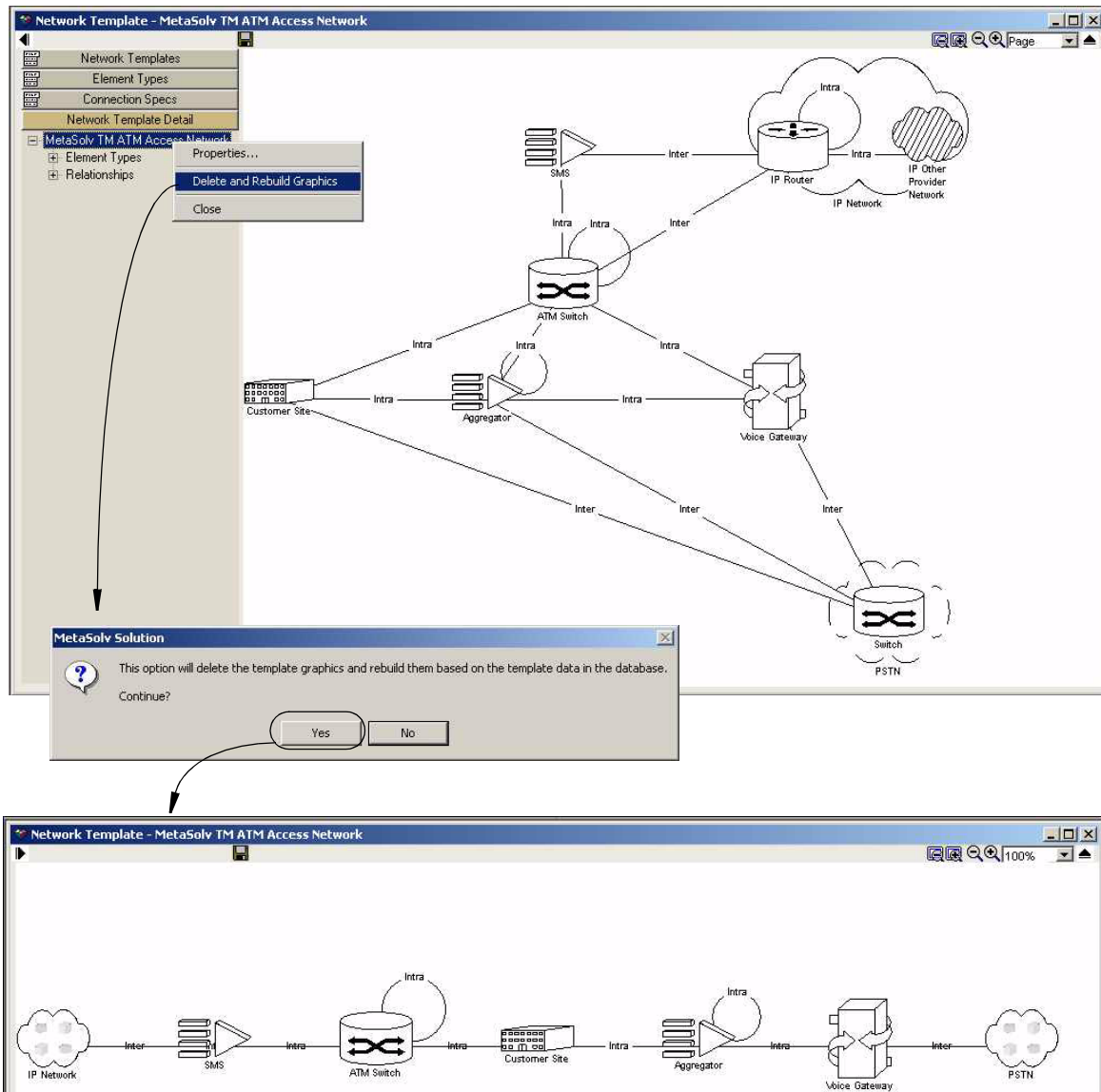
Figure 15: Example of Delete and Rebuild Graphics option

When a network template is displayed on the canvas, you can add element types to the network template through drag and drop of a selected element from the Element Type panel list. The following example is derived from a scenario. See "Scenario 2—Add new components to a network template" on page 187.
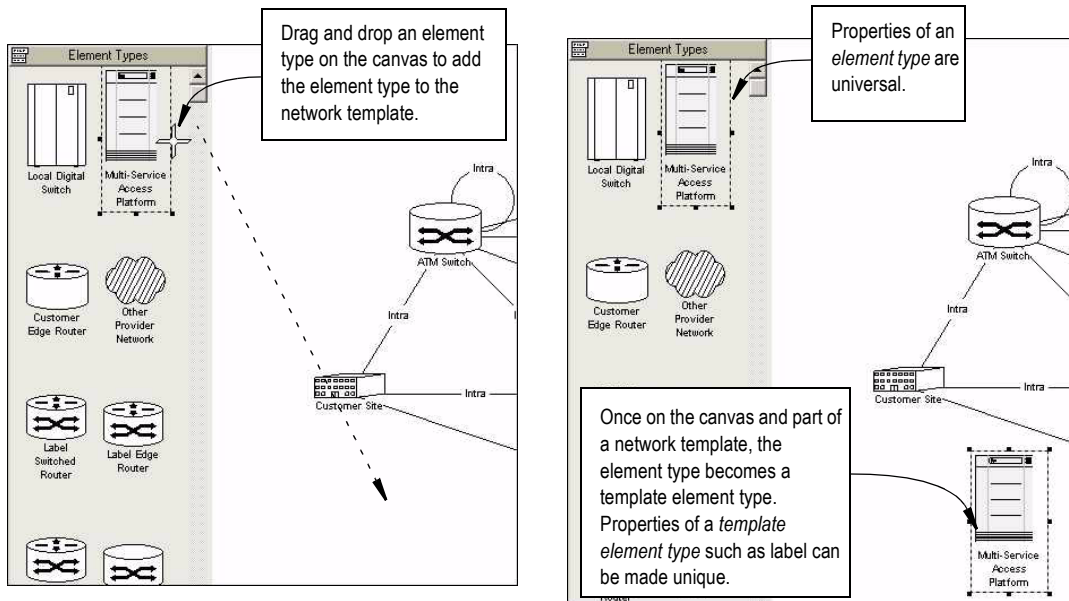
Figure 16: Drag and drop an element type on canvas displaying a network template

Once added, you can select it from the Network Templates detail and display properties. See Step 3 on page 190.

Similar functionality enables you to drag a template component from the Network Templates panel list and drop it on the network template currently displayed on the canvas. The result is an embedded template element type, which is really an embedded network template. This capability is demonstrated in "Scenario 1—Embed a network template" on page 183.

Concepts

This chapter presents the purpose, features, and benefits of network templates. Diagrams and descriptions explain the role network templates play in the MetaSolv Solution. This chapter also introduces key terms and concepts relevant to network templates and provides a preview of the available menus, windows, and MetaSolv-defined data.

WHAT ARE THE TECHNOLOGY MODULES?

Technology modules are software options. These software options enable you to simulate the design of your internal networks within MetaSolv Solution at a technology-specific level. They also enable you to capture how you provision services for your customers over those networks with the same specificity.
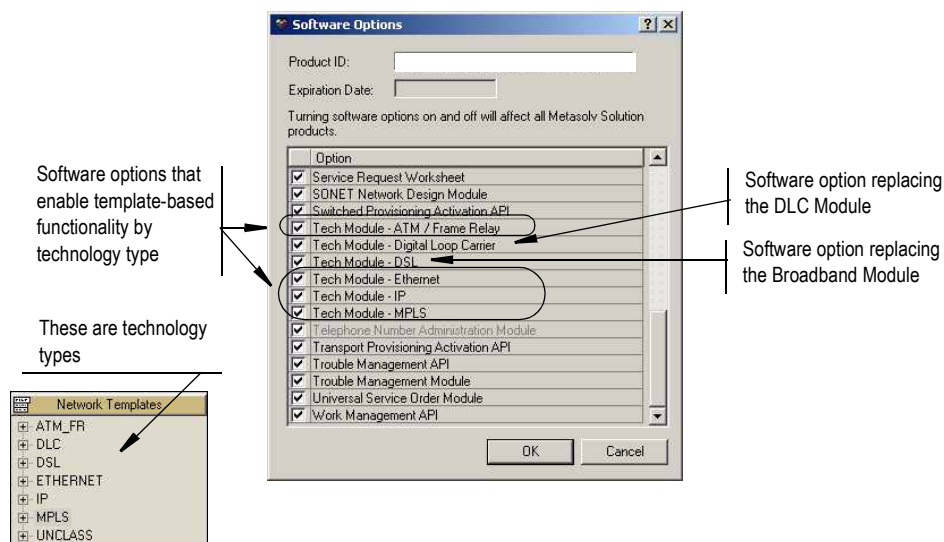
Figure 17: Technology module software options

Each technology module maps to a technology type that contains network templates and MetaSolv-defined data. Some network templates are designed for defining internal networks for the corresponding technology. Others are designed to support the ordering and provisioning of customer networks and services across your internal networks.

WHAT IS TEMPLATE–BASED FUNCTIONALITY?

Template-based functionality provides all users—regardless of size or business focus—the tools needed to easily replicate in software the design of the networks over which they provision services. MetaSolv's network design canvas supports drag-and-drop additions of network elements or nodes and right-click-and-drag capability for designing connections between the nodes. Once the network is designed, any customer service that uses virtual connections can be provisioned on the graphical layout record (GLR), which supports virtual connection assignments across the internal networks.

Network elements and network connections that make up a network system are defined with template components.

- The template component for defining network systems is called a *network template*.
- The template component for defining network elements is called an *element type*.
- The component for defining network connections is called a *connection spec*.

The MetaSolv technology modules for technology types such as ATM, Frame Relay, MPLS, Ethernet and IP include starter-kits composed of sample network templates, element types, and connection specs. A sampling of MetaSolv-defined template components for representative technology types are shown on the following figure.

MetaSolv-defined network templates

MetaSolv-defined element types

MetaSolv-defined connection specs

Template Name	Template Type
MetaSolv TM ATM Access Network	ATM_FR
MetaSolv TM ATM Core Network	ATM_FR
MetaSolv TM ATM/Frame Relay Network	ATM_FR
MetaSolv TM Frame Relay Access Network	ATM_FR
MetaSolv TM Frame Relay Core Network	ATM_FR
MetaSolv TM Layer 2 VPN Network	ATM_FR
MetaSolv TM DLC	DLC
MetaSolv TM DSL	DSL
MetaSolv TM Ethernet Access Network	ETHERNET
MetaSolv TM VLAN Network	ETHERNET
MetaSolv TM Ethernet Network	ETHERNET
MetaSolv TM Ethernet Distribution Network	ETHERNET
MetaSolv TM Ethernet Core Network	ETHERNET
MetaSolv TM IP VPN	IP
MetaSolv TM IP Network	IP
VPN - Basic Configuration	IP
MetaSolv TM MPLS VPN	MPLS
MetaSolv TM MPLS Core Network	MPLS
MetaSolv TM MPLS Access Network	MPLS
MetaSolv TM MPLS	MPLS
MetaSolv TM PSTN (Public Switched Teleph	UNCLASS

Element Name	Type
Aggregator	AGGREGATO
ATM Switch	ATM_SW
Back Bone	BB
Central Office Terminal	COT
Customer Edge Router	CE_RTR
Customer Site	CUST_SITE
Digital Cross-connect System	DCS
Digital Subscriber Line Access Multipl	DSLAM
End User Location	EUL
FR Switch	FR_SW
Label Edge Router	LER
Label Switched Router	LSR
Local Digital Switch	LDS
Other Provider Network	O_P_NET
Remote Digital Terminal	RDT
Remote User	RU
Router	ROUTER
Server	SERVER
Subscriber Management System	SMS
Switch	SWITCH
Switched Router	SW_RTR
Voice Gateway	VOICE_GW

Connection Spec	Connection Type
43801 Facility Circuit	43801 Facility Circuit
43801 Group	43801 Group
Assignable Bandwidth Link	Bandwidth Link
Assignable user-defined link	User-defined link
Bandwidth Circuit	Generic Bandwidth Circuit
CE Community	Virtual Connection
CPE - based VPN Connection	Virtual Connection
DSL Link	Bandwidth Link
Enterprise Connection	Virtual Connection
Ethernet Link	Bandwidth Link
Facility Circuit	Generic Facility
GR-303 Facility Circuit	GR-303 Facility Circuit
GR-303 Group	GR-303 Group
Internet Connection	Virtual Connection
Inverse Multiplexing Group (e.g. 4.5N	Inverse Multiplexing Group (e.g. 4
Layer 2 VPN Connection	Virtual Connection
LSP (Label Switched Path)	Virtual Connection
Management PVC	Virtual Connection
Network - based VPN Connection	Virtual Connection
Product Circuit	Generic Product
Remote Dial-Up Access	Remote Dial-Up
Special Circuit	Generic Special
Switched Virtual Circuit (SVC)	Virtual Connection
T1 Assignable Facility Circuit	T1 Facility Circuit - Assignable
T1 Assignable Group	T1 Group - Assignable
T1 Unassignable Facility Circuit	T1 Facility Circuit - Unassignable
T1 Unassignable Group	T1 Group - Unassignable
TLAN - Transparent LAN	Virtual Connection
TR-008 Mode 1 Digroup A	TR-008 Mode 1 Facility Circuit
TR-008 Mode 1 Digroup B	TR-008 Mode 1 Facility Circuit
TR-008 Mode 1 Digroup C	TR-008 Mode 1 Facility Circuit
TR-008 Mode 1 Digroup D	TR-008 Mode 1 Facility Circuit
TR-008 Mode 1 Digroup P	TR-008 Mode 1 Facility Circuit
TR-008 Mode 1 Group	TR-008 Mode 1 Group
TR-008 Mode 2 Digroup A/B	TR-008 Mode 2 Facility Circuit
TR-008 Mode 2 Digroup C/D	TR-008 Mode 2 Facility Circuit
TR-008 Mode 2 Digroup P	TR-008 Mode 2 Facility Circuit
TR-008 Mode 2 Group	TR-008 Mode 2 Group
Trunk Circuit	Generic Trunk
Unassignable Bandwidth Link (e.g.	Bandwidth Link
V5.2 Facility Circuit	V5.2 Facility Circuit
V5.2 Group	V5.2 Group
Virtual Circuit	Generic Virtual Circuit
VLAN - Internet Connection	Virtual Connection
VLAN - Virtual LAN	Virtual Connection
Voice Connection	Virtual Connection
VPN Link	Bandwidth Link

Figure 18: MetaSolv-defined template components

Template-based network design involves the use of these three types of template components to design internal networks, whereas *template-based service provisioning* involves the design of customer networks, such as virtual private networks (VPNs). Most of the MetaSolv-defined template components are used for building internal networks as opposed to provisioning customer networks and customer connections. Some of these template components can be used out-of-the-box to design internal networks. Others can be used to design customer networks and other customer connections that use internal networks. Regardless of use, you can tailor the sample MetaSolv-defined template components to reflect your business requirements.

Template-based product specs are product specifications for network systems, network elements, or network connections. When template-based product specifications are created for the new item types, network system, network element, and network connection, they are associated with one or more occurrences of their respective template component—network template, element type, and connection spec, respectively. For example, template-based customer connections, like an Internet connection, are defined

with the network connection item type and associated with one or more occurrences of the template component, connection spec type.

Template-based ordering begins with adding a template-based product offering to the order. Template-based products include any product bundle of customer connections or any customer network system that is defined in the product catalog with associated template components. From an ordering perspective, a network system refers to a customer network. The type of customer network that comes predefined with the ATM_FR (ATM/Frame Relay), MPLS, and IP technology types is the VPN. A customer's VPN is created by joining the customer's home office with each of its branch offices. These locations are joined together through connectivity offered by the provider's network. If you have a network that spans a large geographical area, you could support VPNs of customers who have offices in any location along your network routes.

In summary, each MetaSolv technology module (TM) is composed of technology-specific templates that support the design of internal networks and provide rules for processing and provisioning orders for services over these networks. Validation of orders for network systems or connections to an internal network are based on rules defined within the template components associated with the ordered network system or network connection.

WHAT ARE NETWORK TEMPLATES?

Network templates is the template-based functionality where rules are defined. The rules defined in network templates govern the design of internal and external networks, the specifications of template-based products and services that become available on the product catalog for customer orders, and the provisioning of those products and services. Rules are created through defining template component properties at two levels: the high level properties apply wherever the component is used; the low-level properties apply only within a given network template.

Each network template belongs to a template type and each connection spec belongs to a connection type. A network template is composed of template element types that are connected by template relationships, where each relationship is associated with one or more template connections. The generic version of each template element type is an element type. The generic version of each template connection is a connection spec. The difference between the generic version and the network template-specific version is that you can define additional properties for a component within a given network template. Some network templates embed other network templates; once embedded, such a component is called an embedded template element type.

Following is a brief summary of the terminology used for various components--where there is a mapping from its existence as an available component to its existence as an embedded component in a given network template.

Table 3: Template components

Components that can be added to any network template	Components that belong to a given network template
Network template	Embedded template element type
Element type	Template element type
	Template relationship
Connection spec	Template connection

Network templates are "create-once/use-repeatedly" collections of *template element types* and *template relationships* between template element types. Element types are representations of nodes that can exist in a network system of a given technology type, such as ATM, Frame Relay, or Ethernet. What network templates *do* is facilitate and expedite network system design, ordering, and service provisioning. Each network template includes one sample—one "stencil"—for each type of template element type and template relationship you would need to build a network system of a particular type.

Network templates provide functionality for:

- Defining new element types and customizing MetaSolv-defined element types
- Importing graphical depictions (.emf files) for new or existing element types
- Creating new connection types and connection specs and customizing MetaSolv-defined connection types and connection specs
- Adding template relationships between template element types and defining template connections associated with such relationships
- Defining prioritized paths over which virtual connections can be auto-provisioned
- Defining or customizing custom attributes

Network templates enable you to define the information once and then use it in designing all your network systems, and in ordering and provisioning all services across those network systems. For example, only if a relationship between element types exist in the network template can network elements created from those element types be connected during network design. The connection specs associated with a relationship in network templates determine the connection specs available for use with that relationship during the design of a network system.

Network template features include a graphical canvas on which template components, such as template element types, template relationships, and template connections can be manipulated. You define rules governing a network template and its components through

its properties and custom attributes. The concepts are developed in the sections that follow.

What do templates include?

Each technology module has one template type. Template types are the starting point for the rules that govern your templates, network system designs, template-based product catalog offerings, and provisioning. MetaSolv-defined template types include ATM_FR, DLC, DSL, ETHERNET, IP, MPLS. UNCLASS is part of the package, regardless of the technology modules used. Each template type contains one or more network templates.

The following figure depicts a typical Network Template Detail. Here, the element types are listed under Element Types and relationships are listed under Relationships. Element Types expands to list both element types that represent equipment at some location and element types that represent embedded network templates. Element types that represent embedded network templates can be expanded to list the element types it contains. A relationship is composed of two element types that terminate the connectivity represented by the relationship and the term internetworking or intranetworking, which describes whether both elements belong to the current network system (intranetworking) or not (internetworking). Internetworking relationships identify the source network template of the element type(s) not in the current network system.
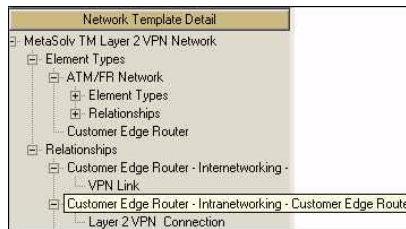
Figure 19: Network Template Detail view of the hierarchy of template components

This structure can be depicted in the form of a chart hierarchy as follows.
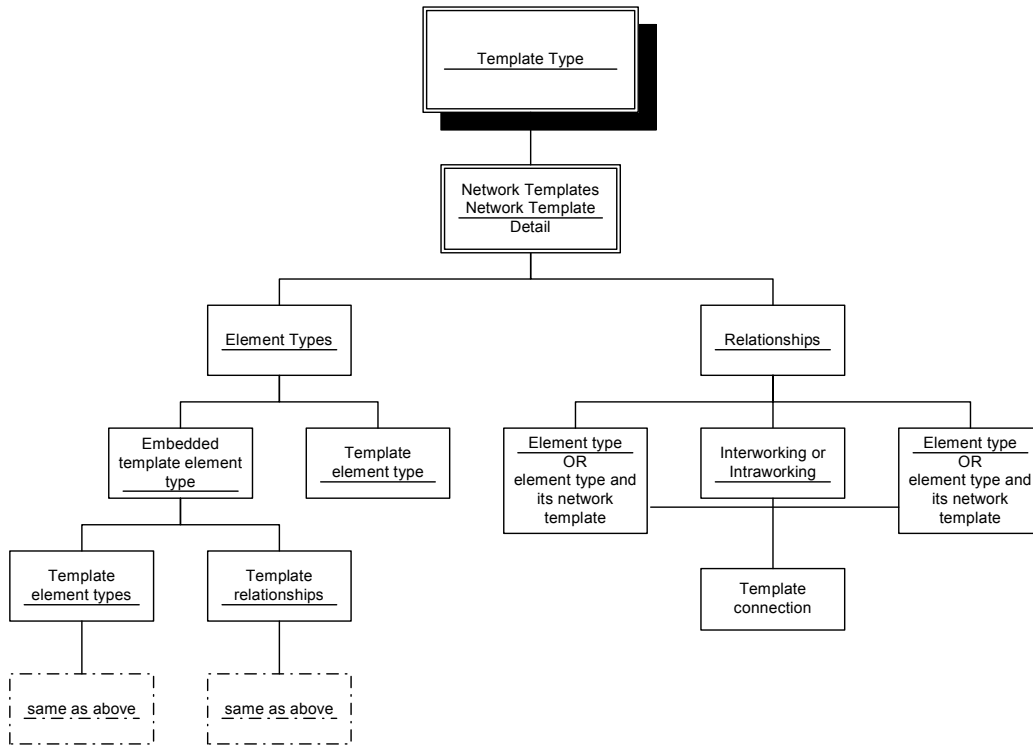
Figure 20: Network template detail structure

The following sections describe each of these template components: network templates, element types, relationships, and connection specs.

Network templates

When you open the Network Templates panel on the Network Template Maintenance window and expand each of the template types, you can view the names of the MetaSolv-defined network templates. The data displayed in your view may differ from that shown in Figure 4 on page 7 in that it includes only the network type(s) for the technology modules you need to design your network system and provision the customer networks and services you offer.

This section depicts the network templates by template type in a form where you can see the hierarchical structure and relationships. The template type is identified at the top of the tree. The other leaves of the tree are network templates. The network templates embedded within a given network template are shown on the Network Template Details panel.

If you plan to add a network template to a template type, you must understand the current structure, which is composed of the following hierarchically related levels of network templates under template type.
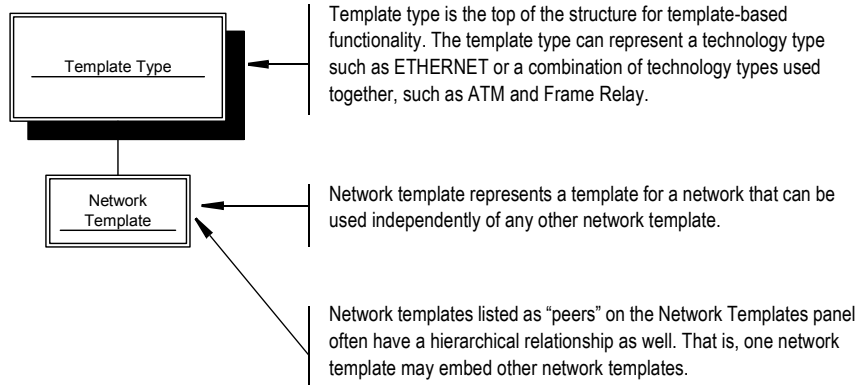
Figure 21: Template type and network template structure

The Network Templates panel of the Network Template Maintenance window displays the template type for each technology module you use. Each template type can be expanded to list its network templates. Selection of any network template displayed on the Network Templates panel displays the Network Template Detail for the selected template plus the graphical depiction of that network template on the canvas.

The following figure illustrates the "embedded" relationships among network templates within a template type. The ATM_FR template type has six network templates. The network template called ATM/Frame Relay Network embeds the Frame Relay access network template, the Frame Relay Core network template, the ATM access network template and the ATM core network template. The Layer 2 VPN network embeds the ATM/Frame Relay network template and the four network templates it embeds. When network templates are embedded in another network template, they are called embedded template element types. On the panel list, they are listed under the Element Types leaf along with simple template element types such as Customer Site.
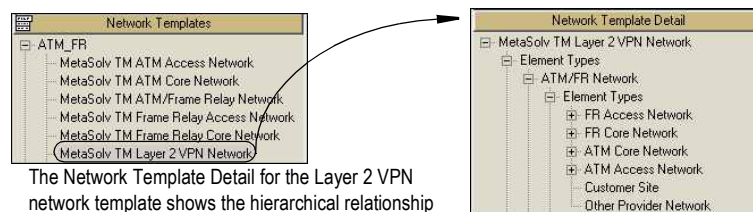
Figure 22: Embedded relationships among network templates

The following series of diagrams shows, by template type, the network templates that are embedded in other network templates. Such components are called embedded template element types.

ATM_FR template type

The hierarchical structure of network templates within the ATM_FR template type is shown on the following figure. The Layer 2 VPN network template embeds the ATM/ Frame Relay network template with all of its embedded network templates. The ATM/ Frame Relay network template embeds four network templates. Two of those embedded network templates embed other network templates.
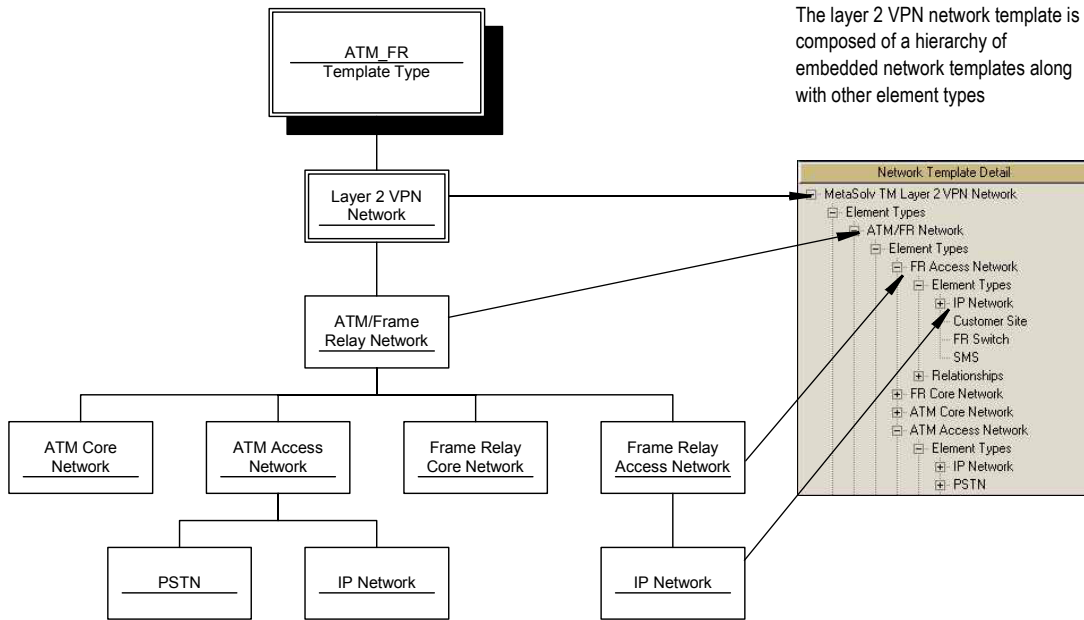
Figure 23: ATM_FR network template hierarchy

DLC template type

The single network template within the DLC (digital loop carrier) template type is shown on the following figure.
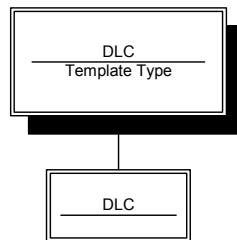
Figure 24: DLC network template

DSL template type

The hierarchical structure of network templates within the DSL template type is shown on the following figure. The DSL network template embeds the ATM/Frame Relay network template with all of its embedded network templates.

```
                        ┌─────────────────┐
                        │       DSL       │
                        │  Template Type  │
                        └─────────────────┘
                                 │
                        ┌─────────────────┐
                        │       DSL       │
                        └─────────────────┘
                                 │
                        ┌─────────────────┐
                        │    ATM/Frame    │
                        │  Relay Network  │
                        └─────────────────┘
            ┌──────────────┬──────┴───────┬──────────────┐
     ┌────────────┐ ┌────────────┐ ┌────────────┐ ┌────────────┐
     │ ATM Access │ │  ATM Core  │ │ Frame Relay│ │ Frame Relay│
     │  Network   │ │  Network   │ │Access Netwk│ │Core Network│
     └────────────┘ └────────────┘ └────────────┘ └────────────┘
       ┌─────┴─────┐                      │
  ┌─────────┐ ┌───────────┐        ┌───────────┐
  │  PSTN   │ │ IP Network│        │ IP Network│
  └─────────┘ └───────────┘        └───────────┘
```
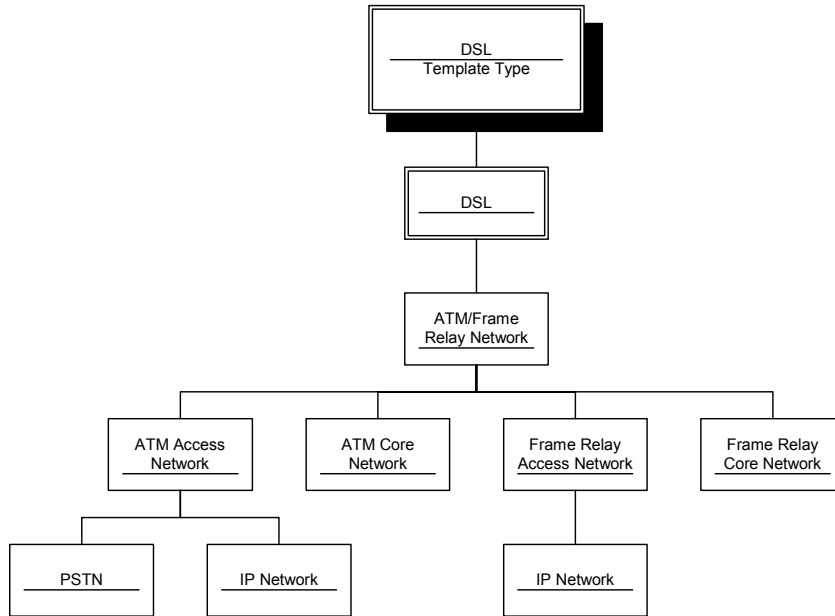
Figure 25: DSL network template hierarchy

ETHERNET template type

The hierarchical structure of network templates within the ETHERNET template type is shown on the following figure. The Ethernet access network template embeds the IP network template.
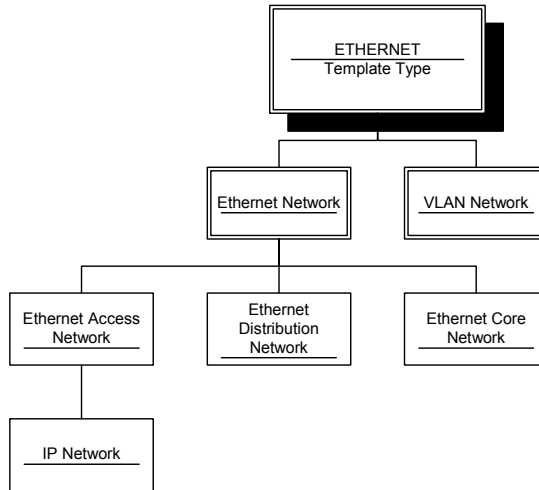
Figure 26: ETHERNET network template hierarchy

IP template type

The hierarchical structure of network templates within the IP template type is shown on the following figure. The IP VPN network template embeds only the IP network template.
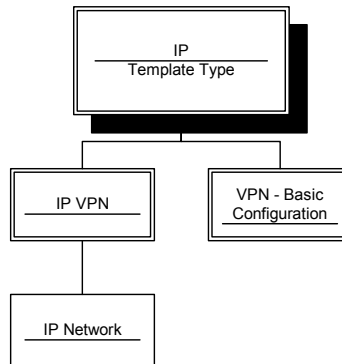
Figure 27: IP network template hierarchy

MPLS template type

The hierarchical structure of network templates within the MPLS template type is shown on the following figure. The MPLS VPN network template embeds the MPLS network

template with all of its embedded templates. The MPLS network template embeds the ATM/Frame Relay network template with all of its embedded network templates.

```
                    ┌─────────────────┐
                    │      MPLS       │
                    │  Template Type  │
                    └────────┬────────┘
                             │
                      ┌──────┴──────┐
                      │  MPLS VPN   │
                      └──────┬──────┘
                             │
                      ┌──────┴──────┐
                      │    MPLS     │
                      └──────┬──────┘
              ┌──────────────┼──────────────┐
        ┌─────┴─────┐  ┌─────┴─────┐  ┌─────┴─────┐
        │MPLS Access│  │ MPLS Core │  │ ATM/Frame │
        │  Network  │  │  Network  │  │Relay Net. │
        └───────────┘  └───────────┘  └─────┬─────┘
         ┌──────────────┬──────────────┼──────────────┐
    ┌────┴────┐   ┌─────┴────┐   ┌─────┴─────┐  ┌──────┴─────┐
    │   ATM   │   │ ATM Core │   │Frame Relay│  │Frame Relay │
    │ Access  │   │ Network  │   │Access Net.│  │Core Network│
    └────┬────┘   └──────────┘   └─────┬─────┘  └────────────┘
     ┌───┴───┐                         │
 ┌───┴──┐ ┌──┴───────┐          ┌──────┴───┐
 │ PSTN │ │IP Network│          │IP Network│
 └──────┘ └──────────┘          └──────────┘
```
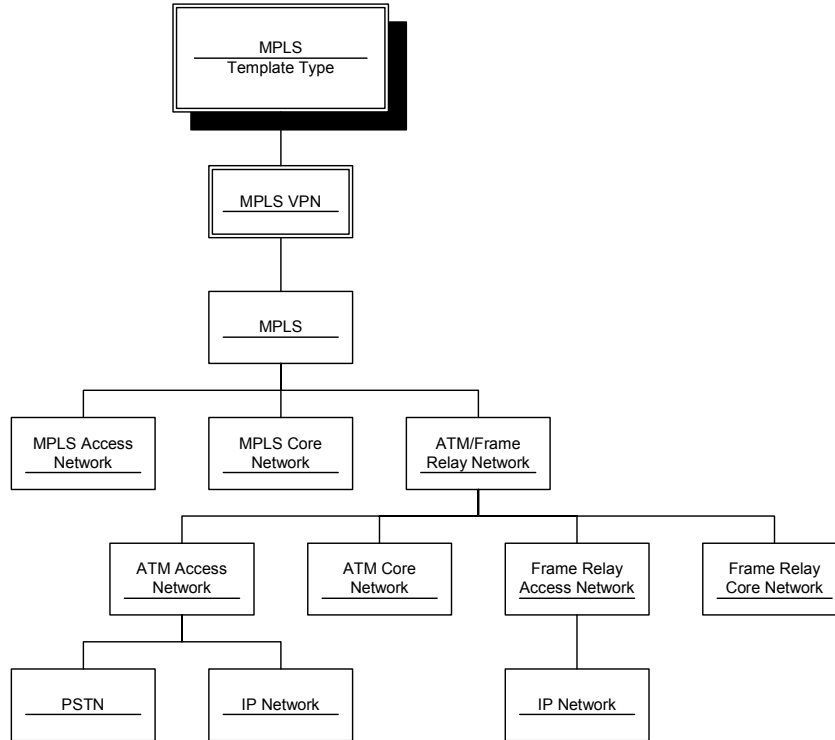
Figure 28: MPLS network template hierarchy

UNCLASS template type

The template type called UNCLASS is delivered with any purchased technology module. It contains just one network template, PSTN (public switched telephone network).

```
        ┌─────────────────┐
        │    UNCLASS      │
        │  Template Type  │
        └────────┬────────┘
                 │
          ┌──────┴──────┐
          │    PSTN     │
          └─────────────┘
```
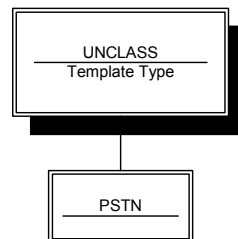
Figure 29: UNCLASS network template

Element types

Element types are logical representations of nodes that can exist in a network system of a given technology type. Element types have a definable identity and purpose for use in the design, ordering, and provisioning of services. The MetaSolv-defined element types that

can be displayed in the Elements Type panel of the Network Template Maintenance window can be displayed as graphical icons or as text. Your view may differ in that it includes only those element types used by the network templates for the technology modules you use.

In the MetaSolv Solution, an element type typically represents a logical collection of one or more pieces of equipment with a common identity and common purpose. It is used as a "stencil" for designing nodes within network systems. When you place an *element type* onto a network system design, it becomes a *network element*. A network element inherits the properties and rules you've defined for the element type, plus it takes on the specific values for that occurrence in the network system. For example, an *element type* does not have a value for location, but a *network element* usually does.

Relationships

Relationships define how pairs of element types can be connected within a network template. There are two ways that a given pair of element types can be connected:

- Internetworking
- Intranetworking

These relationship types are not mutually exclusive; a given pair of element types can have both intranetworking and internetworking relationships. Relationships that can be defined between element types belonging to the same network system are called Intranetworking. Relationships that can be defined between element types belonging to different network systems are called Internetworking. See Figure 14 on page 14 for an example of how relationships are displayed graphically on the canvas.

Note: *Intranetworking* refers to a connection between two elements in the same network system, not just two elements in the same template. *Internetworking* is between two elements in different network systems, even if both networks are built from the same template.

A relationship between two element types can be associated with one or multiple connection specs. The connection specs with which a relationship is associated in a MetaSolv-defined network system determines the connection specs that are available for association to this relationship when used in a network system design.

You must also determine, by associating connection specs to relationships, which relationships are eligible for consideration during *path analysis*. Path analysis is an automated means of provisioning an ordered service.

Connection specs

You can view the MetaSolv-defined connection specs on the Network Template Maintenance window when you expand the connection type names. Most of the connections use time division multiplexing and are defined with rate codes or transmission rates; only four represent bandwidth capacity and are defined with bit rates.

This setting is used in channel hierarchy, where the expanded connections shows circuit positions if set to TDM and allocations if set to Bandwidth.
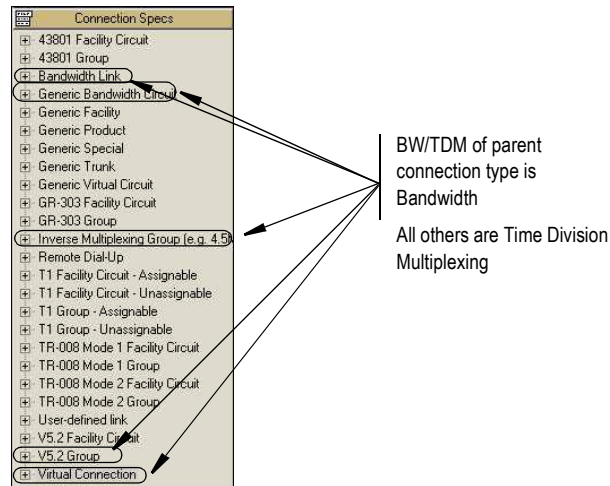
Figure 30: Bandwidth/Time Division Multiplexing setting for connection types

Most connection specs are designed to be associated with connections composing your internal network. Only those connection specs for virtual connections or bandwidth links are designed to be associated with customer connections designed during the provisioning of PSRs for VPNs or other services such as xDSL that involve customer connections. Connection specs used for customer connections are annotated in Figure 7 on page 9.

Connection specs, like element types, are included in technology module templates. They can also be created anew. Whether you use those included in the technology modules or create new ones, it is helpful to understand the hierarchy illustrated in Figure 31. Some functionality is valid for just certain connection types. For example, you can define capacity management rules for connection specs under the connection type called Group Connection. See Figure 93 on page 78.

Connection specs can be related to other connections specs. Three types of relationships between connection specs are supported: assignment, assembly, and aggregation. For an example, see Figure 88 on page 75. The assignment relationship type is governed by connection allocation building block type defined through custom attributes, as is illustrated on Figure 90 on page 76. Connection specs for TDM connections can be defined with transmission parameters. All types of connection specs can have CAs associated with them. When connection specs for virtual connections are related to a connection spec such as a bandwidth link, you can see the relationships through the Related Connection Specs view of the Managing a Connection Spec window.

If CAs have been associated with a connection spec, you can see them through the Custom Attributes view of the Managing a Connection Spec window. For an example, see Figure 92 on page 77.

When adding a new connection spec, you specify its connection type name and connection spec name. See Figure 79 on page 71. If you plan to add a connection type or a

connection spec, it is helpful to understand the current structure and be aware of the data that has already been defined.
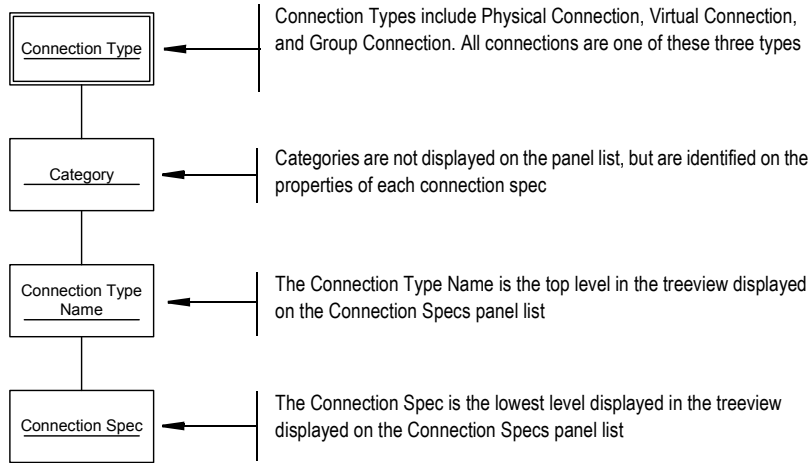
Figure 31: Hierarchical structure of template components for network connections

There are three predefined Connection Types: Physical, Virtual, and Group—they cannot be changed or deleted. These MetaSolv-defined connection types are the top nodes of three separate hierarchies.
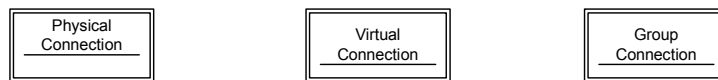
Figure 32: Connection Types: the top node of the connection hierarchies

Connection specs of the Physical connection type

The Physical Connection connection type, shown as the top node on the following figure, includes six Categories, shown on the second level of this chart view. You can get a feel for the scope of the physical connection hierarchy on the following overview diagram, although the details are not legible. Detailed views of each part of this diagram follow.
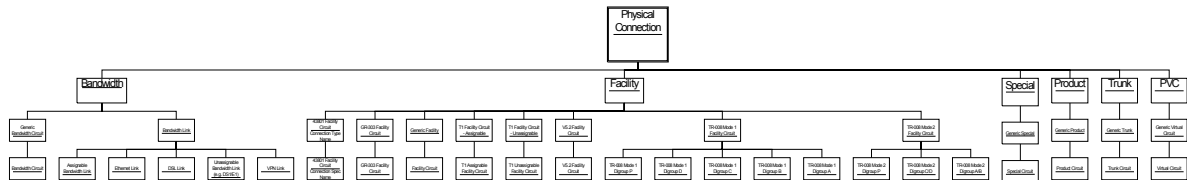
Figure 33: Physical connection type hierarchy (1 of 5)

Four of the six categories of the physical connection type are parents to simple tree structures of one connection type name and one connection spec. The tree structures of the Bandwidth category and the Facility category are more complex and are shown in figures following this one.
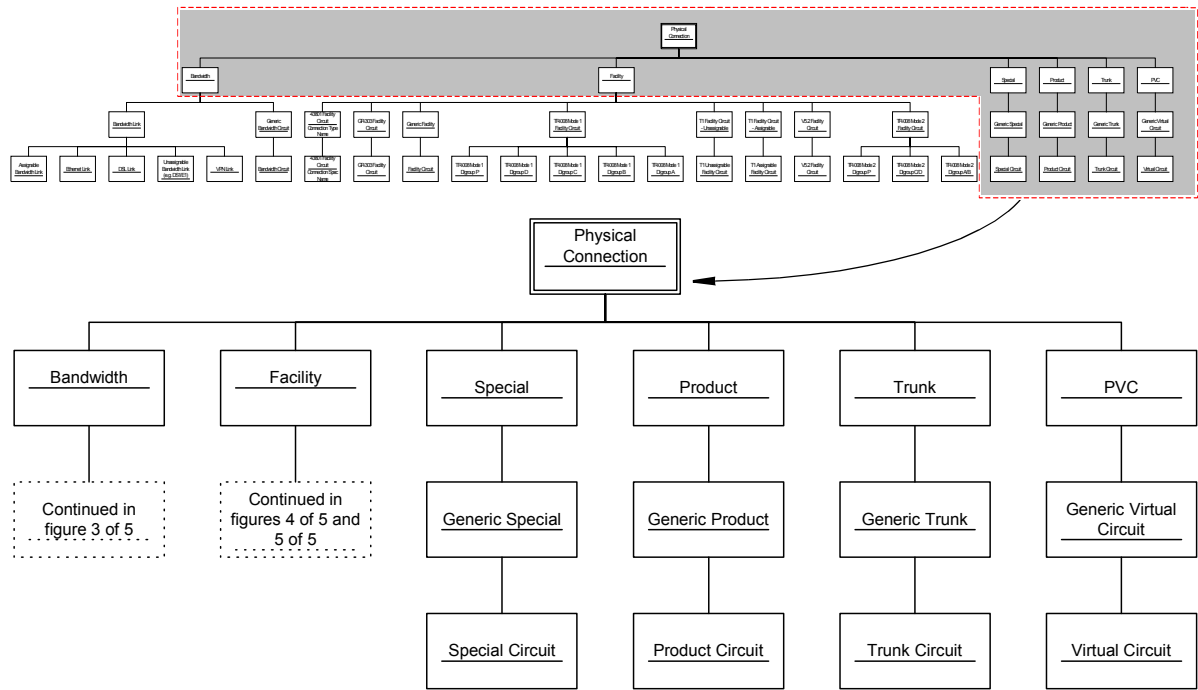
Figure 34: Physical connection type hierarchy (2 of 5)

The hierarchy of the Bandwidth category of the physical connection type follows.
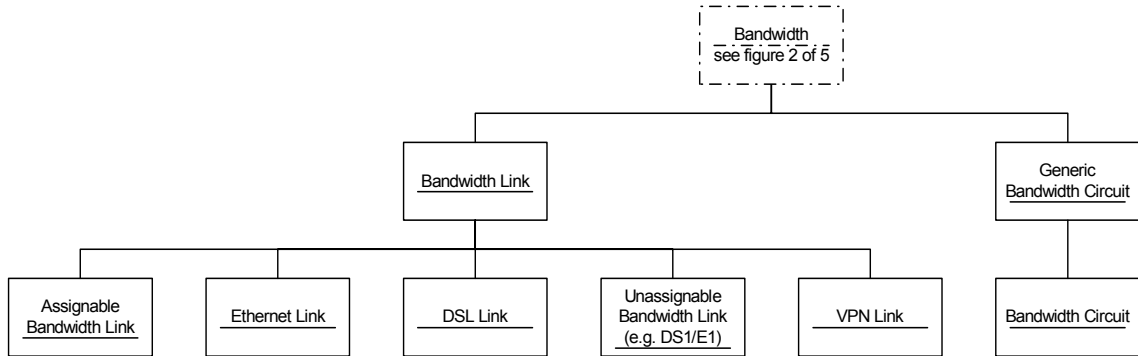
Figure 35: Physical connection type hierarchy (3 of 5)

The hierarchy of the Facility category of the Physical connection type is composed of eight connection spec names. The first six of these connection spec names is each associated

with one connection spec type. The last two connection spec names, which are used in the DLC technology type, are parents to a tree of connection spec types
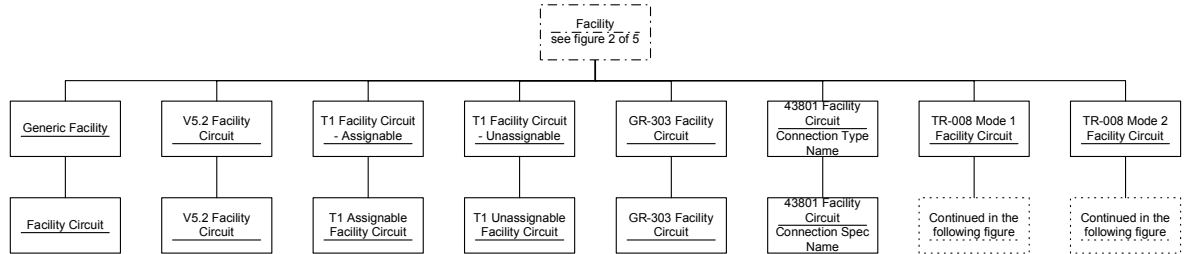
Figure 36: Physical connection type hierarchy (4 of 5)

The following connection specs are used in the DLC network templates.
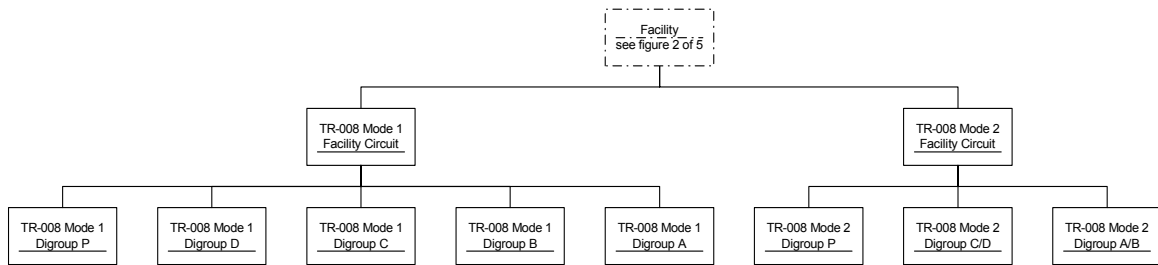
Figure 37: Physical connection type hierarchy (5 of 5)

Connection specs of the Virtual connection type

The Virtual Connection connection type has one category, PVC, which has two connection type names, Virtual Connection and Remote Dial-Up. The connection specs under each of these connection type names can be viewed on the Connection Specs panel with these connection type names expanded. The chart view contains the same details as the panel.
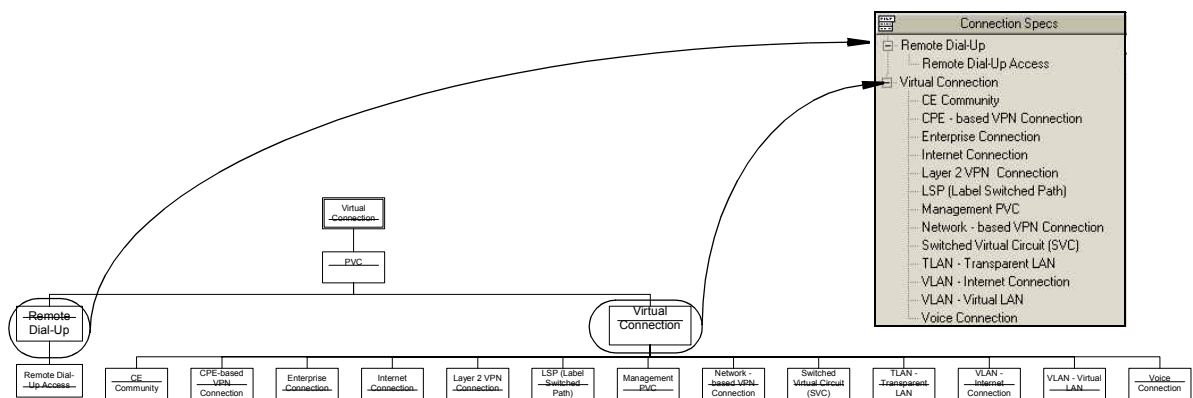
Figure 38: Virtual connection type hierarchy

Connection specs of the Group connection type

The connection type called group connection is composed of three categories. Two of these categories, Admin and Bandwidth, have a simple structure and are shown on the following figure. Bandwidth group connections are new for 5.1 and represent the ability to assign to a group of unassignable bandwidth links at the physical connection level.
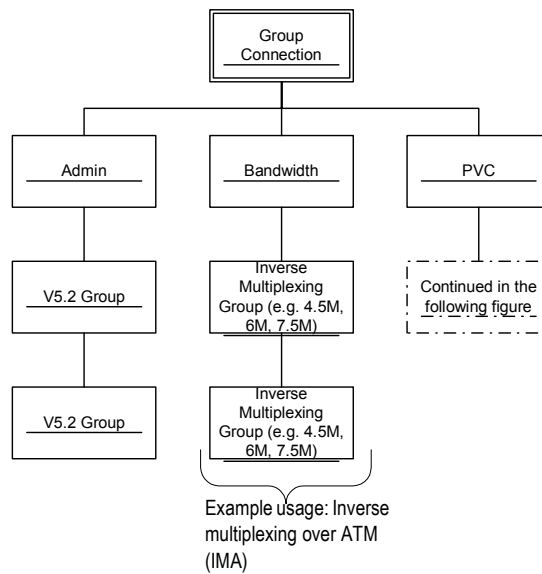
Figure 39: Group connection type hierarchy

Group connections listed under PVC support circuits designed prior to M/5.1.
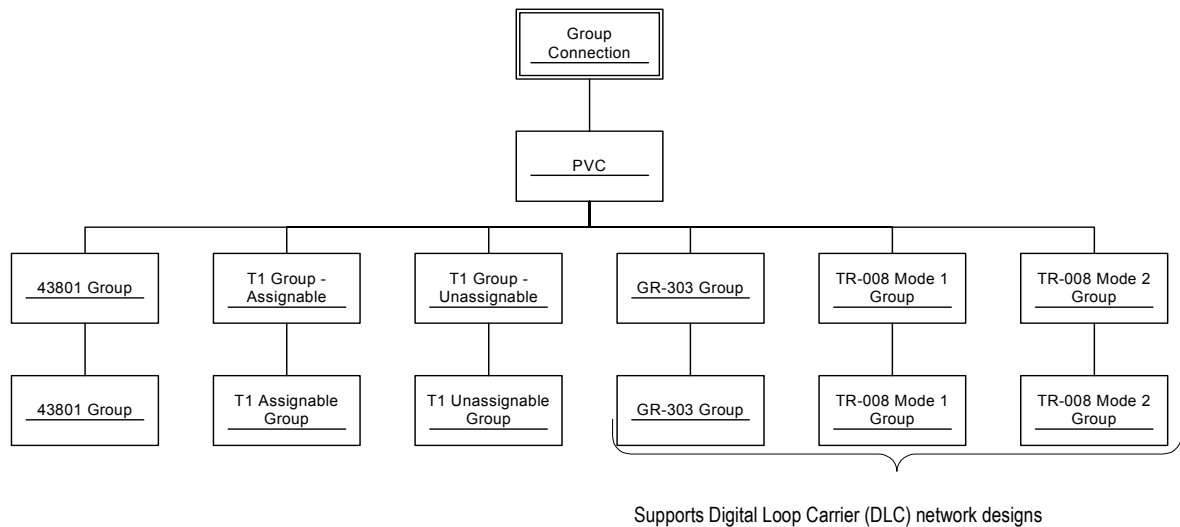
Figure 40: Group connection type hierarchy for PVC category

How are network templates used?

A network template is a collection of element types and relationships that is used in building network systems, and in governing ordering and provisioning. A template includes one of each type of element and relationship you would need to build a network system of a particular type.

MetaSolv has defined many network templates, element types, relationships and their associated connection spec types. These predefined components may be all you need to design your internal network, create product specifications/catalog items, and provision the customer connections and/or customer VPNs you offer. If needed, you can easily modify these template components, create new ones based on existing components, and create new components from scratch. Regardless of your approach, as soon as you determine your set of template components is sufficient to meet your needs, the payback is immediate with the first network system you design or the first product specification you create. Subsequent network system designs, orders, and provisioning increase that payback exponentially.

Network template usage in network design

Template element types, template embedded element types, and connection specs related to a template relationship carry far more into the network system than just an image; they carry properties and rules. In the MetaSolv Solution, a *network system* consists of network elements, network connections, other network systems. The rules defined in the network template on which the network system was built govern how everything fits together. This enables a service provider or enterprise to easily model, design, and manage simple and/or small to large and/or complex network configurations.

The process of representing an internal network using MetaSolv Solution's template-based network design functionality begins with selecting the type of network template on which to base the design. For example, to represent an internal ATM core network, the network designer would select the ATM core network template. Selecting Add Network Design for the MetaSolv TM Core Network displays the Network Detail panel with the selected network template element type(s) and relationship(s). In this example, there is one of each. One instance of the element type ATM switch is displayed as a network element on the canvas when the new network system is initially opened because this element type was defined as required in the source network template.

The value of 1 in the Min. Required Per System field of the element type definition in Network Templates is implemented in Network Design with the appearance of one network element on the canvas of the new network system based on this network template.
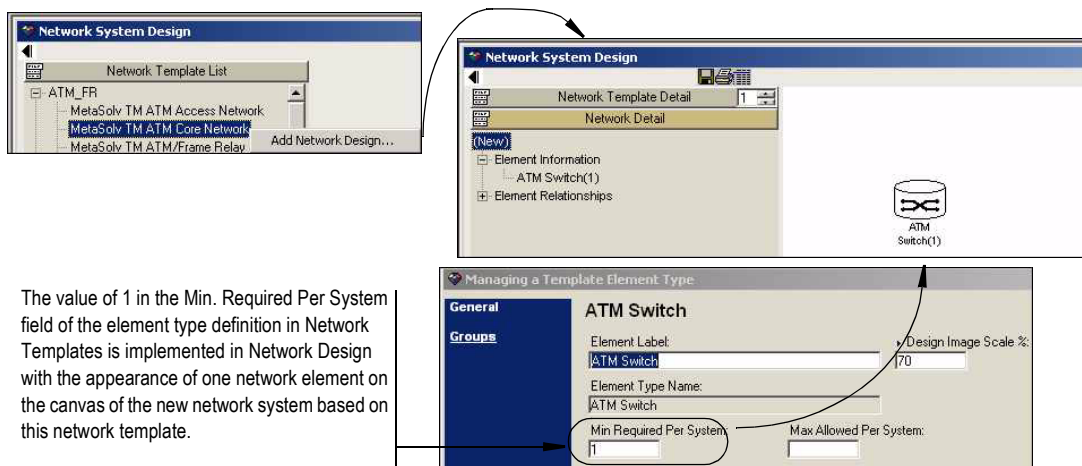
Figure 41: Network element existence based on source template element type properties

While the network template contains only one element type, the *network system* designed from it could contain many network elements for network management or network administration purposes. The new network system can be given an administrative identity, such as an autonomous system ID or it can be identified by its marketing role, such as Western Market Cable Broadband. Selecting Properties for (New) displays the Managing a Network System window where a name for the network system is assigned.

During the process of designing the internal network in the software, the network designer drags an element type from the Network Template Detail panel list and drops it on the canvas, where it becomes a network element in the network system being designed. The *network element* the network designer adds to a network system design is based on the properties you define for that *element type* in a network template, including how that element type is allowed to relate to other element types.
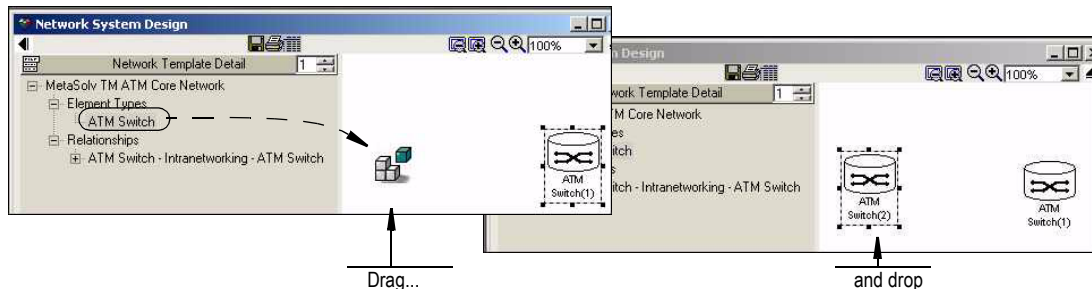
Figure 42: Network element addition to the network system based on template element type

The network designer is able to connect two network elements if and only if you have defined this relationship within network templates.

The ability to connect two ATM switches is made possible by the relationship defined in network templates
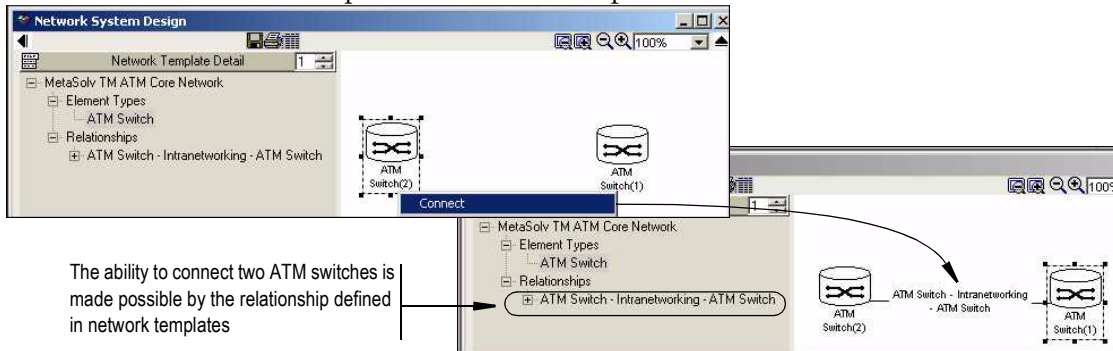
Figure 43: Relationship in network system based on source template relationship

Relationships between two network elements can further be defined by *connection specs*. The network designer can choose connection specs to associate with a relationship in a network system from those you associate with the corresponding relationship in network templates. Each connection spec belong to a connection type—physical, virtual, or group.

The connection specs available for association to a network relationship is limited to those associated with that relationship in network templates
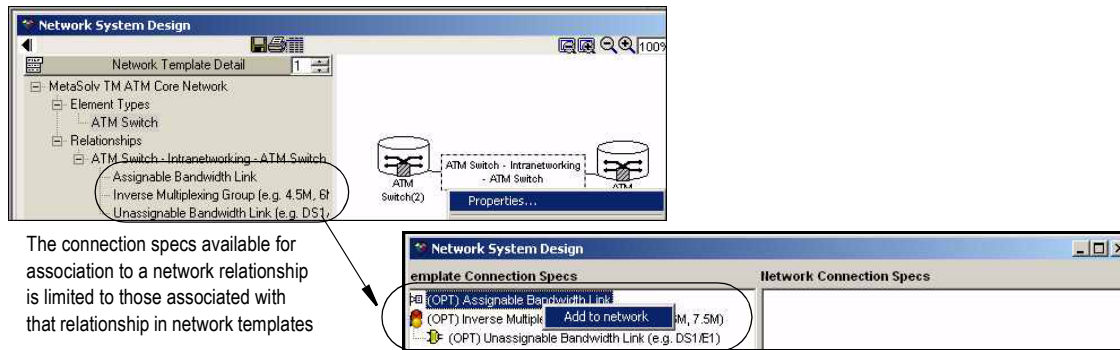
Figure 44: Connection spec availability in network system based on source template connection

As the network designer designs the network system, each network element and network connection added to that network system automatically inherits the properties for the *template element type, template relationship*, and *template connection.* Such inheritance expedites the network system design effort; there is no need to re-define properties each time a network element or network connection is added to a network system. Moreover, rules for how a network system should be designed cannot be overlooked.

Example 1

The MetaSolv TM ATM Core network template is composed of just one element type for an ATM core switch, and one relationship of ATM core switch to ATM core switch. See the following figure.
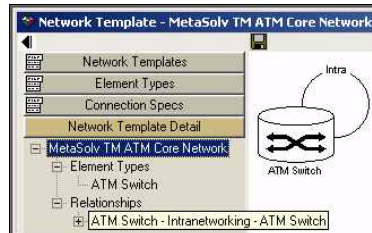
Figure 45: ATM core template

However, any network system built from the ATM core network template would contain many switches. In a fully meshed network, relationships would be defined from each switch to each of the other switches. In a network system, each ATM switch is a network element with unique properties, such as its location identifier.
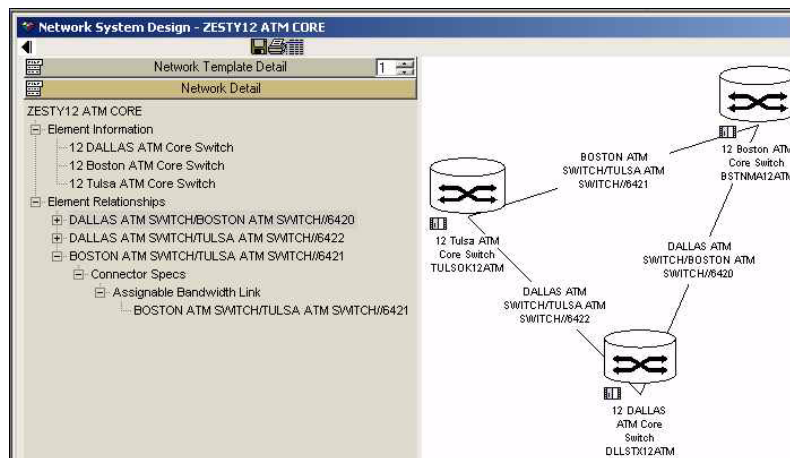
Figure 46: ATM core network system

Example 2

You can embed a network template in another network template as an embedded template element type. Embedded template element types retain the characteristics of the source network template. This facilitates the design and management of large network systems.

For example, the MetaSolv TM ATM/Frame Relay network template (shown in the following figure) includes element types and relationships as well as.several embedded template element types with interrelationships. Because a network template is a set of "stencils" from which a large variety of network systems could be built, any given network

system designed from a network template is likely to use only a subset of the available template element types and template relationships.
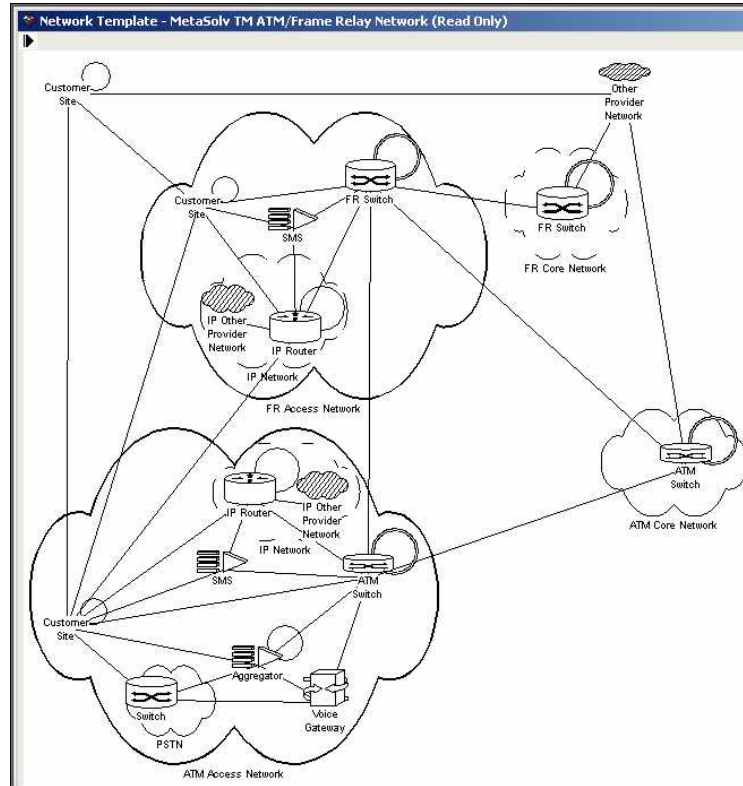
Figure 47: ATM/Frame Relay network template

The design of an ATM/Frame network system might be simple or complex, with several instances of each element. The advantage of having one template embedded within

another template is that it allows one to model simple to complex networks in a way that is easy to understand and manage.
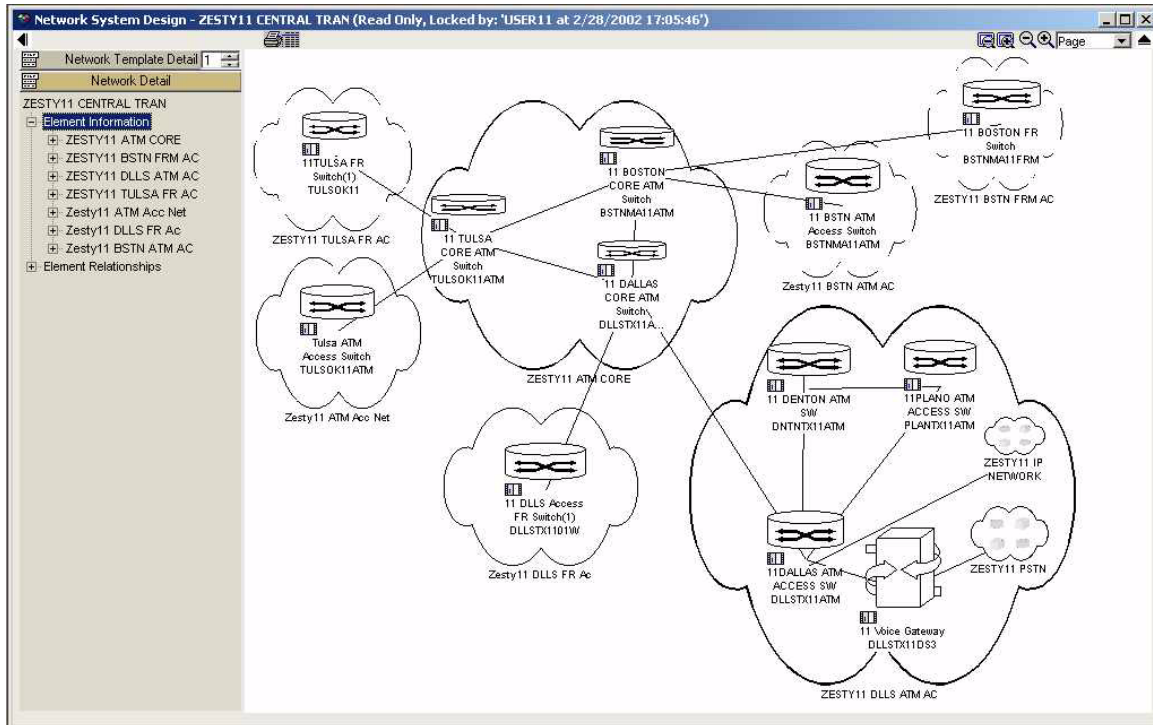
Figure 48: Network system based on ATM/Frame Relay network template

Network template usage in product specs, product catalog, and ordering

Network templates determine which network systems, network elements and network connections can be included in a Product Service Request (PSR) for services requiring those items. The MetaSolv-defined element types, Customer Edge Router and End User Location, are designated as orderable. The MetaSolv connection specs defined for the Virtual Connection and Bandwidth Link connection spec types are also designated as orderable. When you add a new element type or a relationship to a network template, you can designate it as orderable. Only element types designated as orderable can be associated with the network element item type in product specifications. Only connection specs designed as orderable can be associated with the network connection item type in product specifications. When a network system, network element, or network connection is associated with multiple template components, the individual processing the order selects the required template component at order time.

The technology modules contain network templates for providing orderable customer networks and for designing internal networks. The network templates for designing internal networks such as access networks can include extensions to the customer site. These extensions are designed during the service provisioning process. Such extensions are orderable connections. Two categories of network templates are of concern to the

designer of the product specifications for customer network systems and customer connections. The categories of concern are those that:

- Can be associated with the network system item type for the customer VPN networks
- Contain connection spec types that can be associated with network connection item types for bundles of customer connections

Template types with their corresponding network templates have been developed for customer virtual private networks, including VPN - Basic Configuration (migrated from previous releases), layer 2 VPNs, MPLS VPNs, and IP VPNs. The product specification for a network system (SYSTEM) can be associated with one or more of these network templates. (Product specifications for related network elements and connections must be associated with template components belonging to a network template associated with the network system.)

Product specifications for network connections (CONNECTORs) related to a product bundle (PRDBUNDLE) are normally associated with connection spec types belonging to a the same network template type, but this is not a requirement. Only when a virtual connection is ordered with the bandwidth link it is to be allocated to, must the network template types of the connection specs associated with these two connections be the same. The following diagram shows how the network template names displayed in Product Specifications tie back to Templates.
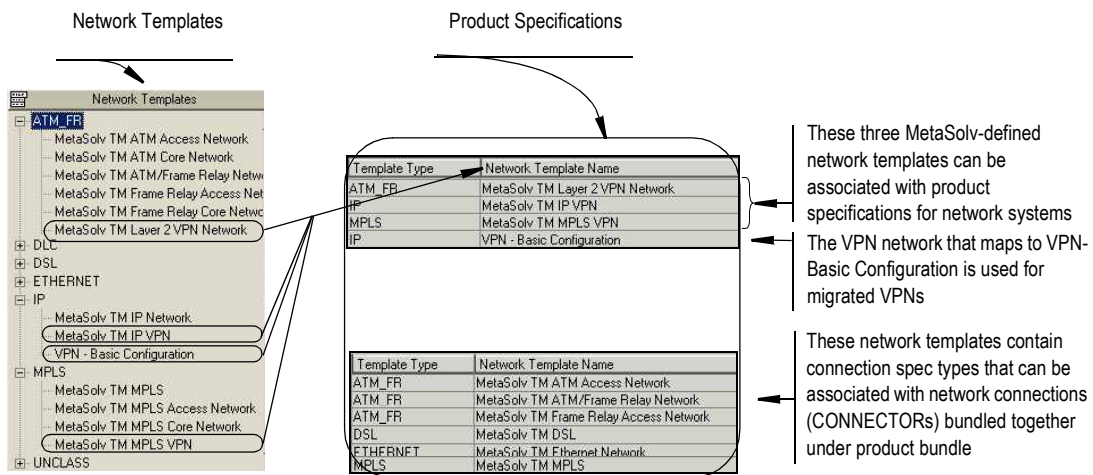
Figure 49: Network template—view from Templates and Product Specifications

A network template can contain one or more element types. The IP VPN, MPLS VPN, and Layer 2 VPN network templates each contain only one element type—the customer edge router (CE_RTR). The CE_RTR is the only MetaSolv-defined element type available for association with a network element. You can define other element types to associate with network elements.

A customer network element item type (XYZ's home office) can be associated only with an element type belonging to a network template associated with the related customer network system (XYZ Corp.). That is, if the element's network system item type is associated with only the MetaSolv TM MPLS VPN network template, then the related

network element must be associated with the CE_RTR belonging to the MetaSolv TM MPLS VPN; it cannot be associated with a CE_RTR belonging to a different network template.

A product specification for a network element (ELEMENT) must be associated with at least one element type. Element types can be displayed in one other place in Product Specs—that is as terminating elements (Element A and Element B) for a connection spec type. The following diagram shows how the element type displayed in Product Specifications ties back to Templates.
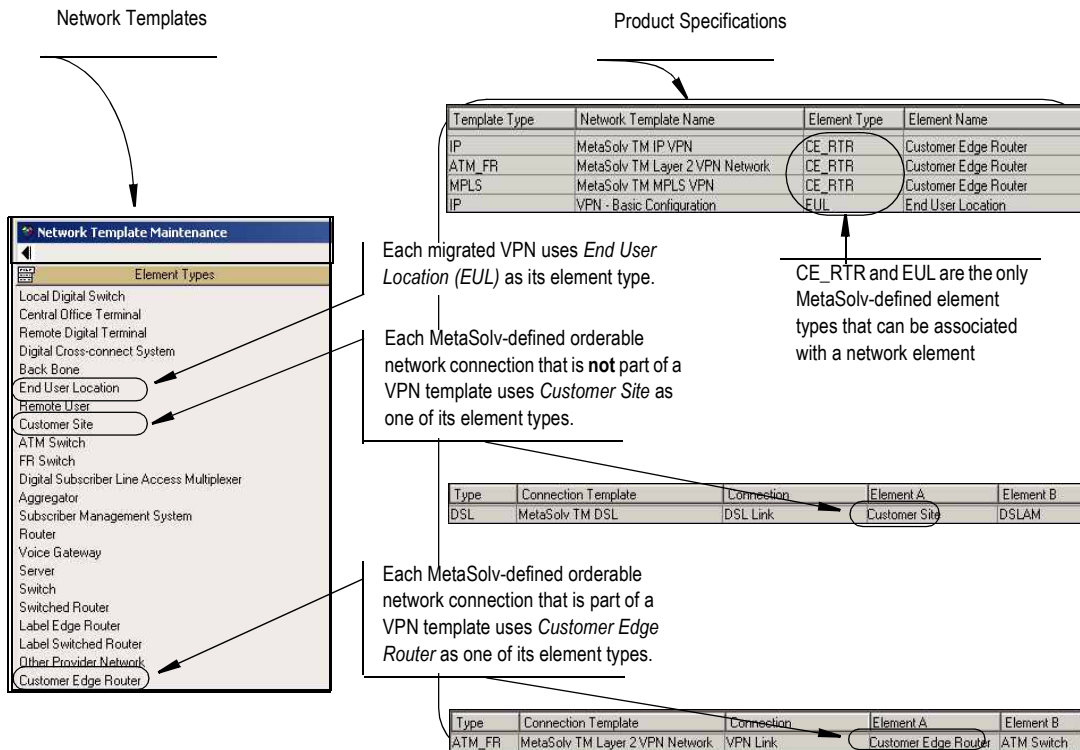
Figure 50: Element type—view from Templates and Product Specifications

Product specifications for network connections (CONNECTORs) must be associated with one or more connection spec types. The following diagram shows how the connection spec type displayed in a product specification for a product bundle ties back to templates. Notice that the list contains only bandwidth links and virtual connections. Group connections are not orderable. It is important to know whether a connection is a

bandwidth link or a virtual connection because a bandwidth link must be in place for a virtual connection to be provisioned.

Refer to the Template view to determine the connection spec designation of Bandwidth Link and Virtual Connection for the corresponding connection spec type in Product Specs

Connection specs within Templates are called connection spec types within Product Specs.

Network Template Maintenance

Connection Specs
- Bandwidth Link
  - Assignable Bandwidth Link
  - DSL Link
  - Ethernet Link
  - Unassignable Bandwidth Link (e.g. DS1/E1)
  - VPN Link
- Virtual Connection
  - CE Community
  - CPE - based VPN Connection
  - Enterprise Connection
  - Internet Connection
  - Joe's virtual connection spec
  - Layer 2 VPN Connection
  - LSP (Label Switched Path)
  - Management PVC
  - Network - based VPN Connection
  - Switched Virtual Circuit (SVC)
  - TLAN - Transparent LAN
  - VLAN - Internet Connection
  - VLAN - Virtual LAN
  - Voice Connection

Template Type	Network Template Name	Connection Spec Type	Element Type A	Element Type B
MPLS	MetaSolv TM MPLS	Assignable Bandwidth Link	CUST_SITE	O_P_NET
MPLS	MetaSolv TM MPLS	Internet Connection	CUST_SITE	SMS
MPLS	MetaSolv TM MPLS	Enterprise Connection	CUST_SITE	CUST_SITE
MPLS	MetaSolv TM MPLS	Internet Connection	CUST_SITE	ROUTER
MPLS	MetaSolv TM MPLS	Assignable Bandwidth Link	CUST_SITE	LER
MPLS	MetaSolv TM MPLS	Enterprise Connection	CUST_SITE	CUST_SITE
MPLS	MetaSolv TM MPLS	Enterprise Connection	CUST_SITE	CUST_SITE
MPLS	MetaSolv TM MPLS VPN	VPN Link	CE_RTR	LER
MPLS	MetaSolv TM MPLS VPN	VPN Link	CE_RTR	CE_RTR
MPLS	MetaSolv TM MPLS VPN	Internet Connection	CE_RTR	SMS
MPLS	MetaSolv TM MPLS VPN	Internet Connection	CE_RTR	SMS
MPLS	MetaSolv TM MPLS VPN	Internet Connection	CE_RTR	ROUTER
MPLS	MetaSolv TM MPLS VPN	CE Community	CE_RTR	CE_RTR
MPLS	MetaSolv TM MPLS VPN	Internet Connection	CE_RTR	SMS
MPLS	MetaSolv TM MPLS VPN	VPN Link	CE_RTR	O_P_NET

Figure 51: Connection spec type—view from Templates and Product Specifications

When you enter an order for a network system, you generally identify the following things:

- The network template to use for the ordered network system
- The customer locations to use as terminating points for ordered network connections
- The network element(s) to use at each location and its element type
- The equipment ordered with each network element
- The pairs of locations to be connected, for example, two customer locations or a customer location and the provider network
- The network template to associate with each connection between each pair of locations you selected for connectivity
- The name of the network system, each network element, and each piece of equipment

Network template usage during service provisioning

Network templates affect service provisioning of template-based products. The rules, properties and custom attributes included in the network template from which a network system is designed govern what can be provisioned across that system. Likewise, the rules, properties and custom attributes of an ordered network system, network element, or network connection that is associated with a template component through the product catalog govern how that item can be provisioned. During provisioning, the paths available for path analysis are governed by the connection spec definitions within the template and by the specification of prioritized paths. This topic is discussed in the next section.

When the design engineer for an ordered VPN works the provisioning plan tasks from the work queue, the design work is completed on a graphical layout record (GLR). During the

VPN design, assignments are driven by the equipment associated with the ordered network elements and the connection specs associated with the ordered network connections.

What are template "rules"?

The design of network systems, the ordering of template-based products, and the provisioning of services are all governed by the rules expressed in the network templates. Template rules that apply to any network template are found in the *properties* defined for element types, connection type names, and connection specs. Additional rules that apply to a given network template are found in the properties defined for that network template as well as properties defined for its template element types, embedded template element types, template relationships, and template connections.

Properties include:

- General properties (all template components)
- Custom attributes (network template, element type, connection spec)
- Related connection specs (connection spec)
- Transmission parameters (connection spec)
- Capacity management rules (connection spec)
- Groups (template element type)
- Associated connections specs (template relationship)
- Assignable connection specs (template connection)
- Prioritized paths (template connection)

The following four subsections concern template rules—rules defined through properties, rules governing path analysis, rules governing auto-provisioning, and rules defined through custom attributes.

Rules defined through properties

Properties can be defined for nine template components. This section begins with a listing of those template components with a figure cross-reference to the corresponding window. As you examine these windows, you can deduce the rules. This section ends with examples of both narrow and broad rules that are defined through properties.

The properties defined at a high-level are inherited by their counterpart when used in a network template. For an example of the difference, see Figure 105 on page 86. The following table provides cross-references to windows where properties are defined for components available for any network template.

Table 4: Cross-reference for high-level properties of template components

For details on properties for...	See...
Template type	Figure 67 on page 64

Table 4: Cross-reference for high-level properties of template components

For details on properties for...	See...
Element type	Figure 75 on page 69
Connection type name	Figure 84 on page 73
Connection spec	Figure 87 on page 75 (existing) for general properties
	Figure 88 on page 75 for related connection spec properties
	Figure 91 on page 77 for transmission parameters properties
	Figure 92 on page 77 for custom attributes that have been defined
	Figure 93 on page 78 for capacity management rules

The following table provides cross-references to windows where properties are defined for components of a particular network template.

Table 5: Cross-reference of template-specific properties of template components

Network template	Figure 96 on page 80 (new)
	Figure 97 on page 80 for general properties
	Figure 98 on page 81 for CAs
Template element type	Figure 103 on page 84 for general properties
	Figure 104 on page 85 for properties of groups
Embedded template element type	Figure 109 on page 89
Template relationship	Figure 113 on page 91 for general properties
	Figure 115 on page 92 for the connection specs associated with the relationship

Table 5: Cross-reference of template-specific properties of template components

Template connection	Figure 117 on page 94 for general properties of a physical connection
	Figure 118 on page 94 for general properties of a virtual connection
	Figure 119 on page 95 for assignable connection specs
	Figure 120 on page 96 for prioritized paths

Certain properties of element types and connections specs serve as rules. For example, one of the properties you define for a connection spec is *Auto ID.* If you want a connection to be eligible for automatic assignment of a connection ID during provisioning, then you must enable the Auto ID property for the connection spec in the template used to build the network system over which the connection is provisioned. Setting the Auto ID property to *yes* or *no* creates a rule about how connections can be identified during provisioning. To use the MetaSolv-defined connection ID mask, you must enable the Use Default Connection ID preference (Service Request > Circuits). This mask is loc a / loc z / connection label / circuit design id. The "connection label" is the Connection Spec Name. If the auto generated ID is greater than 53 characters, the sections are truncated to 15 / 15 / 14 / 9.

The active indicator is a property that create rules that apply to both connection specs and element types. These are the rules:

- For an element type or connection spec to be eligible for use in a network system, the Active checkbox must be checked for that component in the template in which it exists.
- For an element type or connection spec to be incorporated in the catalog for an ordered service, the Active checkbox must be checked. An element type has an additional requirement: the network system to which it belongs must be built from a network template defined as "External Configuration of a System." See Figure 96 on page 80.
- If the Active indicator is set to no, this element type or connection cannot be ordered or used in a network system.

Template relationships between template element types within a network template create rules. If one template element type is related to another template element type, then the corresponding network elements can be connected where the specification of Intranetworking or Internetworking is honored. On the other hand, two network elements that are built from unrelated template element types cannot be related in any network system.

Connection specs associated with a template relationship create rules. When a valid relationship is defined between network elements in a network system, the connection specs which can be associated with it are limited to those associated to the corresponding relationship in network templates.

Rules governing path analysis

Prioritized paths are defined in network templates to support scenarios where a virtual connection could be provisioned over alternative paths through the provider network. Each potential path is identified with a priority number that specifies your preference for its usage. The path you assign as priority path 1 is the path that will be used unless its capacity is exhausted, in which case the path you assign as priority path 2 will be used. Path definitions and their priority settings you define in Network Templates apply to all network systems defined with the template containing the definitions.

Path analysis is a software process used when provisioning a customer-ordered service. The path analysis process determines the path to take from the customer site to the element that provides the ordered service. Consider, for example, a customer who needs DSL service for connectivity to the Internet. You provide this service by ordering an Internet connection from the customer site to an IP router. You also order a single physical connection from the customer site to your DSLAM, an element in your network. This physical connection must be a bandwidth link or an inverse multiplexing group, since these are the types of physical connections that allow a virtual connection to be assigned to it. (For DSL service, the link is called a DSL Link.) The Internet connection is a virtual connection that is provisioned over a path though your internal network to the IP router; the first segment in this path is the physical DSL link. The network element terminating this physical link from the customer site (in this example, the DSLAM) is always the first intermediate element in every prioritized path.

The following figure demonstrates multiple physical paths over which you might provision the virtual connection from the customer site to the IP router. The virtual connection is shown as a dashed line between the terminating elements, customer site and IP router. The prioritized path is shown as a series of segments involving intermediate elements between the customer site and IP router.

The first segment of all paths from a customer site to the provider network typically refers to the same connection. In most cases, a given customer will be physically linked to the provider network with no more than one link. From the terminating element of this link, diverse paths can be traversed to the network element that terminates the virtual path.

Virtual connection

Customer Site

IP router

DSLAM

ATM switch
ATM access

ATM switch
ATM core

ATM switch
ATM access

Aggregator

Managing a Prioritized Path

Prioritized Path Name:

DSL CustSite to Router in ATM Internet Prio1

Intermediate Element Types

Customer Site
DSLAM
MetaSolv TM ATM Access Network, ATM Switch
MetaSolv TM IP Network, IP Router

Priority Path1
Priority Path2
Priority Path3

Figure 52: Priority path for Internet connection terminating at IP router

If you support Internet connections that terminate at both an IP router and at an SMS, create separate sets of priority paths. All segments of the two sets of priority paths may be identical, with the exception of the last segment. Compare the previous figure with the one that follows.
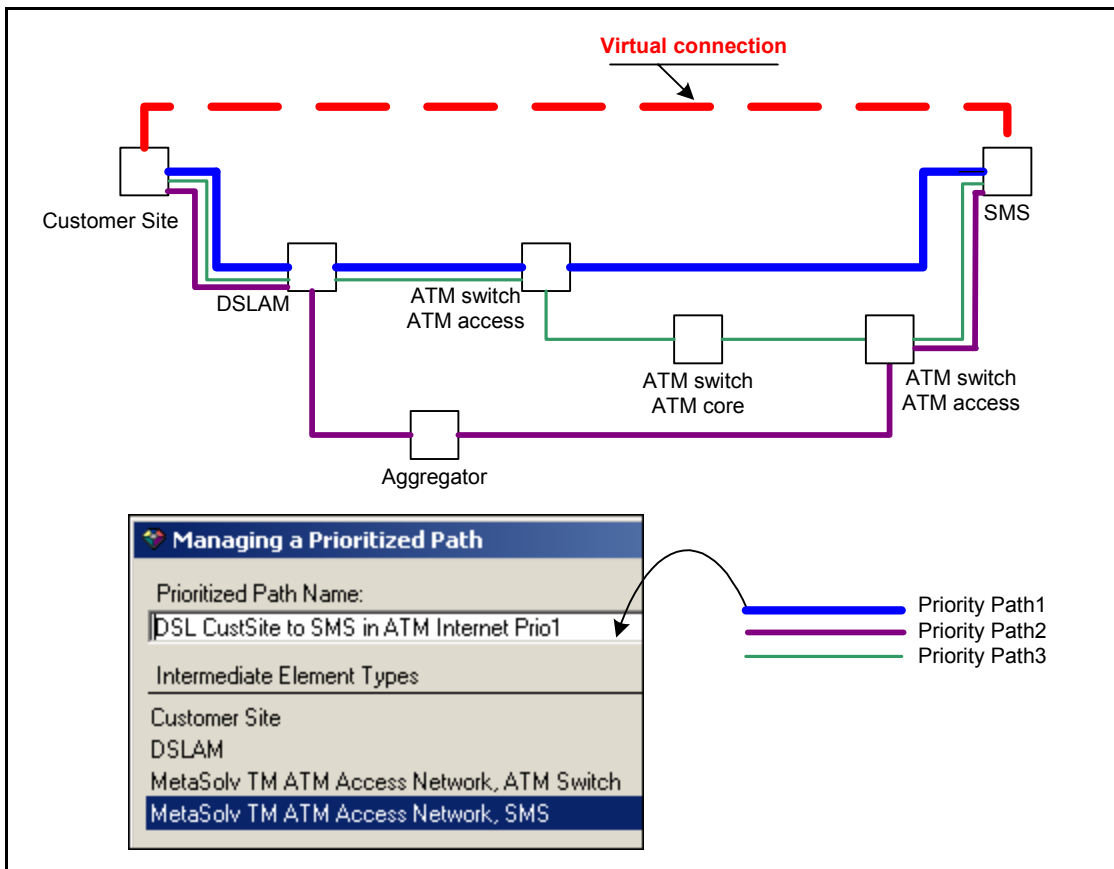
Figure 53: Priority path for Internet connection terminating at SMS

When a customer-ordered service requires connectivity from the customer site to the provider network, the order generally includes one *physical connection* to the provider network and one or more *virtual connections*. Each virtual connection identifies a different service, such as voice connection, Internet connection, or Enterprise connection. Each of these types of virtual connections is defined in templates with its terminating element types. For example, a voice connection provides connectivity from the customer site to a PSTN switch; an Internet connection from the customer site to either an IP router or an SMS; an Enterprise connection connects two customer sites—one belonging to the customer placing the order and the other belonging to an enterprise in a different location. The full list of MetaSolv-defined virtual connections is shown on Figure 7 on page 9.

Defining a template connection for a virtual connection as eligible for path analysis requires that assignable connection specs are associated with it. Assignable connection specs are defined for the connections to which the virtual connection can be assigned. These physical connections are for links along a path from the originating to the terminating element type for the virtual connection. The connection specs under parent building block on Figure 90 on page 76 indicate the valid assignable connection specs for each type of virtual connection.

Sometimes a single prioritized path can represent more than one route through a network system. Consider the following figure.
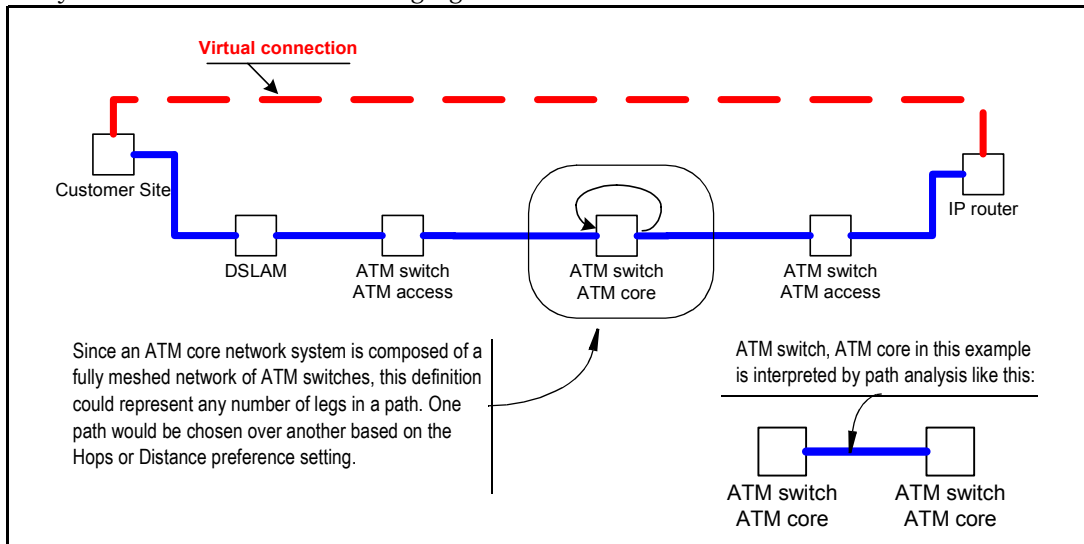
Figure 54: Multiple routes are represented by a path that includes a recursive relationship

During provisioning of a virtual connection such as one used for Internet connectivity, path analysis checks for paths of the highest priority first. If the highest priority path includes a network element that is related to network elements of the same type, the Design Mode preference is evaluated. The Design Mode preference setting determines whether that path is designed on the basis of *shortest distance*, or *least number of hops*. If shortest distance is the basis, the latitude and longitude for the network locations in which the terminating elements of the network system reside must be established so that distance can be computed. The assumption here is that Design Mode is not set to Manual; Manual design bypasses path analysis, since the selection of paths is performed manually, segment by segment.
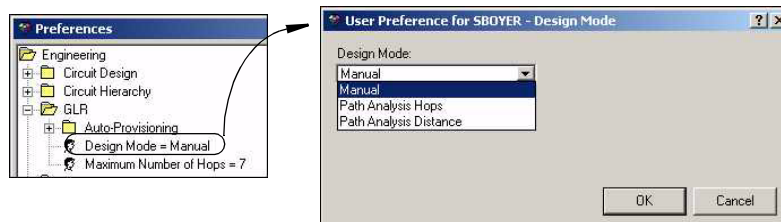
Figure 55: Path analysis is bypassed when design mode preference is set to manual

Rules governing auto-provisioning

Two preferences apply to auto-provisioning.

- Maximum number of prioritized paths

- Maximum number of terminating elements
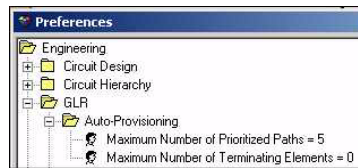
Figure 56: Preferences for auto-provisioning

There could be more than one terminating element that could potentially be used for provisioning a service. For example, an Internet connection could terminate at an IP router or it could terminate at an SMS. In the GLR, valid terminating element names appear in a list on the 'Select Terminating Element' step, at which time the provisioner selects the one to use. When the user clicks Next, the paths are generated. Alternatively, auto-provisioning involves no user interaction. In this case, the terminating element is selected through software analysis. MetaSolv Solution finds all paths using all applicable terminating elements and then picks the best path. The user can set two preferences to help speed up the analysis process. The setting for maximum number of terminating elements limits the number terminating elements evaluated by our software logic. Likewise, the setting for maximum number of prioritized paths limits the number of prioritized paths evaluated. For example, if set to five, the software would consider only those paths defined with priorities 1 through 5.

All MetaSolv-defined priority paths begin at the customer site or customer edge router template element type. You can alter the relative priority of the MetaSolv-defined paths by simply dragging a path name up or down the list. You can also define your own prioritized paths. Your paths do not necessarily have to include a segment to a customer network, but such paths would not be used to provision a customer service. For an example of defining additional prioritized paths for an existing virtual connection, where the new path segments include connections to a new network element, see "Scenario 2—Add new components to a network template" on page 187.

Rules defined through custom attributes

You can view custom attributes defined for a network template, element type, or connection specs on the customer attributes view of their respective properties window. You can define your own custom attributes for a network template, element type or connection spec through a separate utility. See the *CA Technical Update* document.

Custom attributes (CAs) can be defined to collect and compute data at specific processing points. That data can then be used to govern the collection and computation of other data. Any data collected or computed by a CA can be used at specified processing points. For example, you can use CAs to define a rule that requires users to supply certain codes during ordering, where valid values are the codes needed by your billing API. Or, you can define a rule that requires users to identify port speed on specific elements during network design. In these examples, ordering and network design are the processing points.

Options for custom attributes are shown in the following figure.
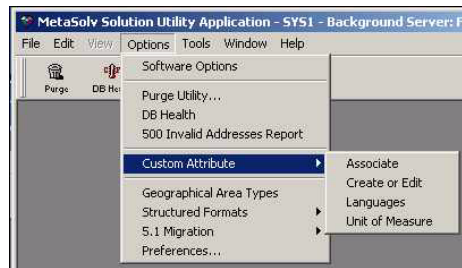
Figure 57: Custom attribute options

Following is a list of high points about custom attributes.

- Many technology-specific CAs have been defined by MetaSolv and are included with technology modules.

- You can modify the MetaSolv-defined CAs.

- You can create additional CAs.

- CAs are associated with *building blocks*. Once associated, their *usage* is defined. Their usage determines the point they appear during processing and how they are formatted.

- What goes into a CA is determined by its rules. A CA can be simple user-entered data, user-selected data that derives from valid values you define, computed values, or computed values that are dependent on other CA values.

- CAs can be created in multiple languages.

- CAs can use different units of measure, per your definitions. Those units of measure can apply to the CA or to its valid values, but not both.

- The CA cache refresh interval established in your gateway.ini parameters governs how quickly CAs appear after they are created and associated. The interval can be set to hourly, daily, or weekly by your database administrator.

You are encouraged to invite the MetaSolv Professional Services organization to assist you with CA development and maintenance.

Where do network templates fit in the end-to-end process?

Network templates affect each part of the business process supported by the technology modules of M/5.1. The following sections provide four views of how network templates fit in the end-to-end process:

- The CAP guide view
- The service fulfillment view
- The work flow view
- The subsystem/module level view

CAP guide view

Following is the CAP guide structure, where CAP guides are listed as they are used in the end-to-end process. This guide, the *Network Templates CAP Guide* is highlighted.
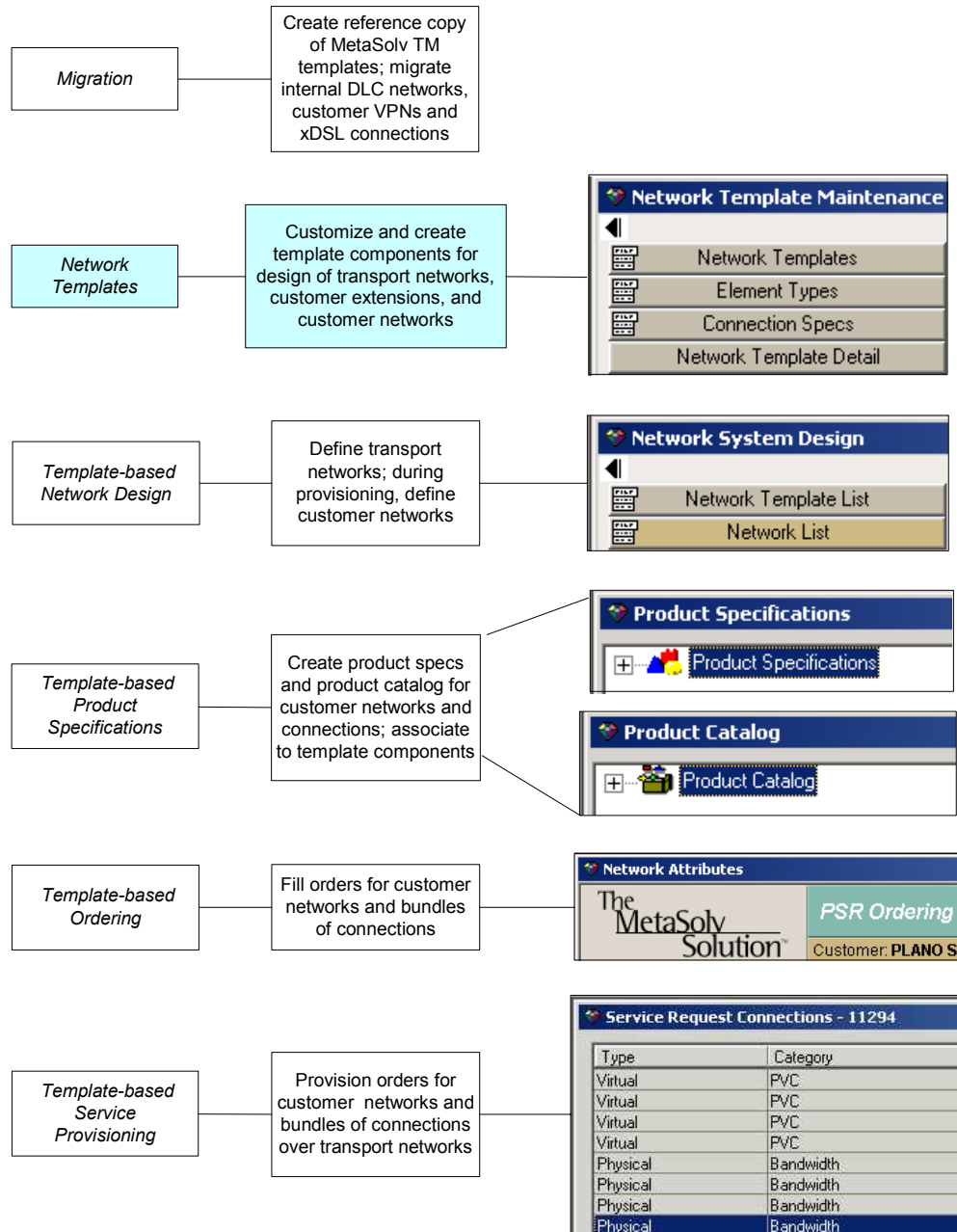
Figure 58: Template-based features and processes within the MetaSolv Solution

Service fulfillment view

The end-to-end business process for service fulfillment includes six steps. To map how network templates fit into that business process, refer to the following figure.
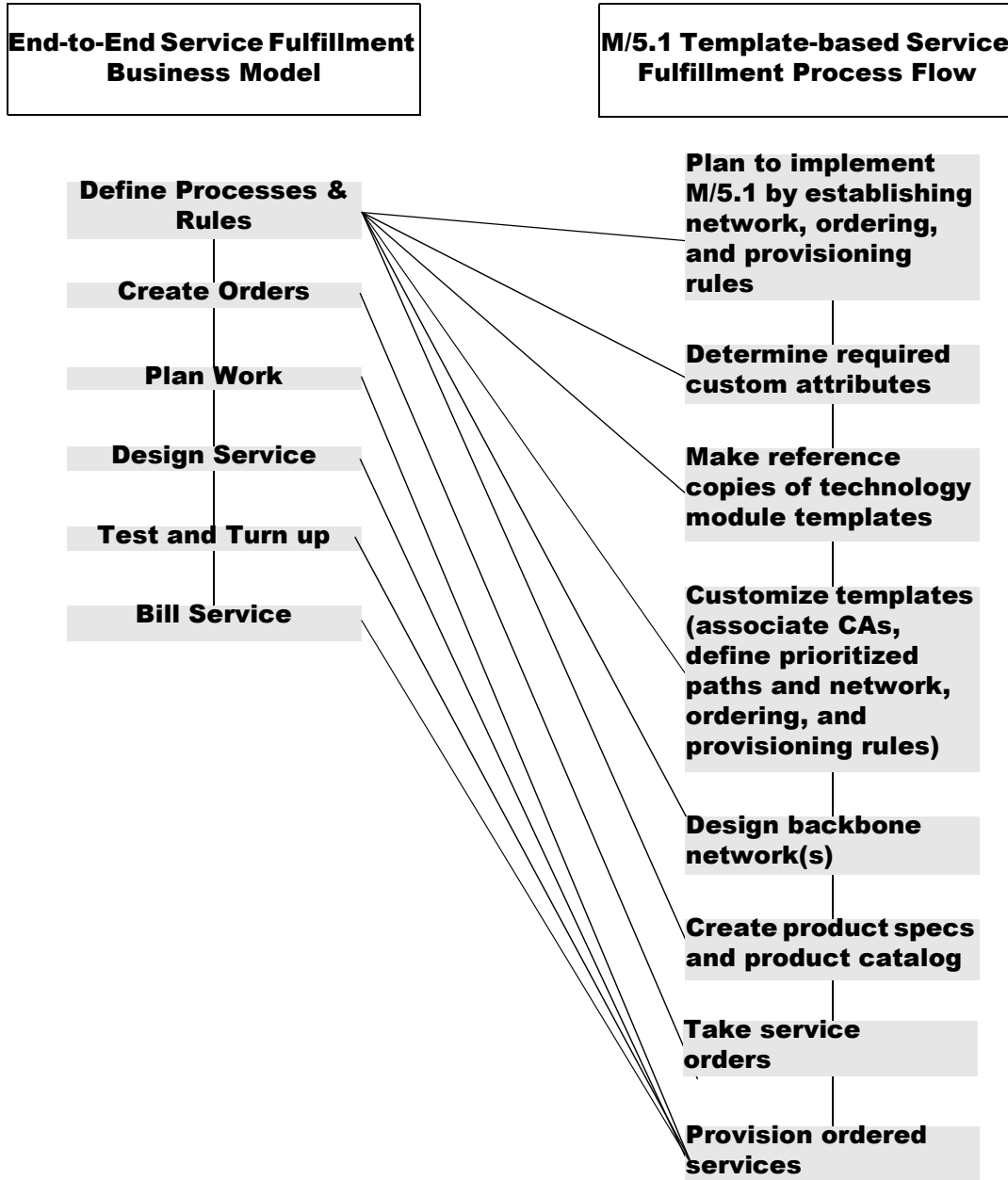
Figure 59: Service fulfillment business model to process flow mapping

Work flow view

Following is a detailed workflow. The process in the workflow that is addressed in this CAP guide is highlighted in the following diagram.

Figure 60: Work flow for template-based functionality

Subsystem and module-level view

Tool/Utilities

- Migration utilities include a PSR migration. This migration process is required if you use the current Digital Subscriber Line (DSL) functionality with the Broadband Design module. When you upgrade to release 5.1.x, the Digital Loop Carrier (DLC) and Basic VPN is upgraded. See the *MetaSolv Migration Guide* for details.

- MetaSolv Solution Utility Application, a separate executable from the MetaSolv Solution, is the application through which you create and maintain custom attributes. The purpose of custom attributes and brief descriptions of the processes involved in creating and maintaining them are documented in the *CA Technical Update*.

Engineering

- Templates based on MetaSolv Technology Modules are available as software options for technologies such as ATM/Frame Relay, MPLS, Ethernet, and IP for services such as Virtual Private Networks (VPNs) and Digital Subscriber Line (xDSL), and for existing networks such as Digital Loop Carrier (DLC). See Figure 17 on page 17 for details.

- Internal network systems based on templates can be designed on the new graphical canvas with the enhanced Network Systems functionality. See the *Template-based Network Design Concepts and Processes* for details.

Infrastructure

- Customer and non-customer 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 *Template-based Ordering Concepts and Processes* 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 *Template-based Product Specifications Concepts and Processes* for details.

- 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. 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 with the network area can then be further associated at the network system level and/or the network element level. See online help for network areas for details.

- Number inventory includes the inventory of IP addresses. IP addresses are assigned to ports during the provisioning of Internet connections. See the *Template-based Service Provisioning Concepts and Processes* guide for details. IP addresses may also be assigned during the design of the internal network. See online help for IP address management and the *Template-based Network Design Concepts and Processes* guide for details. IP address allocation to customers has not changed.

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 *Template-based Product Specifications Concepts and Processes* for details.
- The Ordering Dialog permits selection from equipment specifications associated to an ordered network element. See the *Template-based Ordering Concepts and Processes* for details.
- Equipment specifications can be associated with network elements selected from the templates when building internal networks. See the *Template-based Network Design Concepts and Processes* for details.
- Connection assignments to equipment, specifically, port addresses is part of service provisioning. Service provisioning of any product offering processed through the Ordering Dialog is provisioned with the Provisioning Dialog. See the *Template-based Service Provisioning Concepts and Processes* for details.

Preferences

- Engineering preferences include a new Design Mode preference that 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 Connection ID task. When set, the default format used is Location 1/Location 2/ label/name/sequence number.

Customer Care

- 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 *Template-based Ordering Concepts and Processes* for details.

Work management

- Task types include a new task type called NET DSGN for provisioning a VPN network system. See the *Template-based Service Provisioning Concepts and Processes* guide for details.
- The provisioning of an ordered connection can include the automation of the former CKTID task. This is enabled with a setting of the Auto ID property for the connection spec in the template. See the *Template-based Service Provisioning Concepts and Processes* guide for details.

HOW IS NETWORK TEMPLATE FUNCTIONALITY ACCESSED?

Most network template functionality is performed on popup windows accessed through either the selection of a menu option or through double-clicking. This section addresses:

- Double-click functionality
- Menu functions
- Menu structure
- Menu options, including a description of each option and the result of selecting it

Double–click functionality

Some windows are accessible through a double-click action on a selected object rather than through a right-click menu option. The results of double-clicking depends on the selected object. You can double-click any of the following:

- Icon on a window
- Data on a window
- Data on a panel list
- Object on the canvas

Many frequently used windows contain icons that you double-click to display a selection window. Normally, double-clicking data on a window that was populated by double-clicking an icon brings up the source window that populated that item. You can double-click data displayed on any panel list. If it is the top level of a hierarchy, it expands or collapses the hierarchy view. If it is a data item in the hierarchy, it displays the properties window or, in the case of a network template, the canvas.Double-clicking a template element type or a template relationship on the canvas is an alternative to right-clicking and selecting Properties.

Menus

Menu functions

Much of the functionality of network templates is accessed through menu options. These functions fall into the following broad categories:

- Functions affecting the generic template data (accessed from item menus on Network Templates, Element Types, and Connection Specs panels)
- Functions affecting the data in one network template (accessed from Network Template Details panel and canvas)
- Functions affecting the display
- Export and print graphics functions

Functions that can affect multiple network templates

Additions of new template components provide more options for network templates created after the additions. A deletion of a template components removes the deleted

template component from being selected for inclusion in any network template created after the deletion. A change in a template component is carried into the network templates that incorporate that template component after the change. Functions that affect the generic template data are usually accessed from a menu for a selected item on the Network Templates, Element Types, or Connection Specs panel. Such functions include:

- Create reference copy of all MetaSolv-defined data
- Duplicate a selected network template
- Add a template component
  - ⇒ Add a network template
  - ⇒ Add an element type
  - ⇒ Add a connection type name
  - ⇒ Add a connection spec
- Delete a template component
- Manage a template component
  - ⇒ Display or modify name of a template type
  - ⇒ Display or modify general properties of an element type
  - ⇒ Display custom attributes of an element type
  - ⇒ Display or modify name of a connection type
  - ⇒ Display or modify general properties of a connection spec
  - ⇒ Display or modify list of related specs of a connection spec
  - ⇒ Display or modify list of transmission parameters for a connection spec
  - ⇒ Display custom attributes for a connection spec
  - ⇒ Display or modify capacity management rules for a connection spec of group connection type, such as T1 assignable group.

Functions that affect one network template

Functions affecting the data in one network template are usually accessed from the canvas or the Network Template Details panel. Such functions include:

- Add a component to the displayed network template
  - ⇒ Add a template element type to the displayed network template
  - ⇒ Add a template embedded element type to the displayed network template
  - ⇒ Add a relationship to the displayed network template
- Delete a component from the displayed network template
  - ⇒ Delete an template element type from the displayed network template
  - ⇒ Delete an template embedded element type from the displayed network template
  - ⇒ Delete a relationship from the displayed network template
- Manage a component in the displayed network template
  - ⇒ Manage a template element type
  - ⇒ Manage an embedded template element type
  - ⇒ Manage a template relationship

■ Save changes to the displayed network template

Functions that affect the display

Functions affecting the display include:

■ Text panel view for element types; hierarchy panel view for network templates connection specs
■ Refresh hierarchy
■ Image panel view for element types
■ Search panel view
■ Open a selected network template
■ Alter size of panel v. canvas in window
■ Alter size and position of graphics on canvas
■ Reposition element types on the canvas
■ Reset position of element types on the canvas
■ Close network template panel and remove graphics from canvas

Miscellaneous functions

Export and print graphics functions include the ability to export or print the entire network template or just the displayed portion

Menu structure

There are three types of menus:

■ Menus on the panel list menu icon drop-down
  ⇒ Network Template panel menu
  ⇒ Element Types panel menu
  ⇒ Connection Specs panel menu
■ Menus for each level of data in the template hierarchy
  ⇒ Template type item menu
  ⇒ Network template item menu
  ⇒ Element type item menu
  ⇒ Connection type name item menu
  ⇒ Connection spec item menu
■ Menus for components of a single network template
  ⇒ Detail—network template item menu
  ⇒ Detail—element type item menu
  ⇒ Detail—embedded element type item menu
  ⇒ Detail—relationship item menu

The following are examples of a panel list menu, item menus, and detail item menus.

Network Templates panel list menu

Template type item menu

Network template item menu

Detail—Relationship item menu for a relationship within a network template. This example shows the same item selected on the detail panel list and the canvas; the menus have one overlapping option.
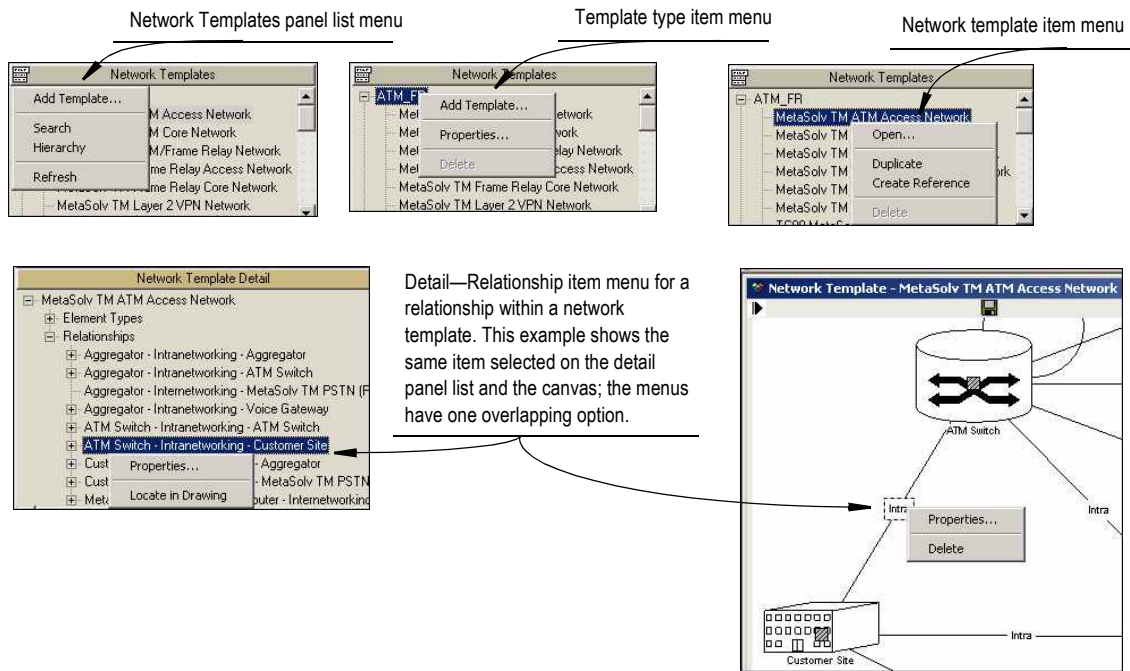
Figure 61: Example source of menus

The Network Template Detail panel has no panel menu, but does include menu options for the network template item, the template element type item, and the template relationship item.

Menus exist for panel list scrollbars.

Right-click menus are also accessible from the canvas—in a blank area, with a template element type selected, with an embedded template element type selected, and with a template relationship selected.

Network Templates panel menu

A left-click popup menu can be displayed from the menu icon on the Network Templates panel. The Network Templates panel menu has four options:

- Add template
- Search and Hierarchy toggle options
- Refresh
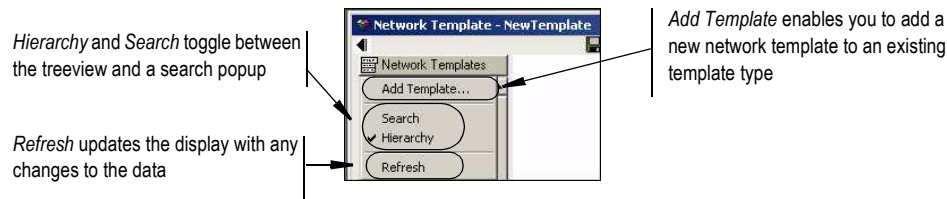
Figure 62: Network Templates panel menu options

Selecting the *Add template* option from the Network Templates panel menu opens the Network Template Detail panel with "empty" template component types. This option enables you to add a new network template to one of your template types. See "Network Template Detail—network template item menu" on page 78 for a continued description of the usage of the Add Template option.
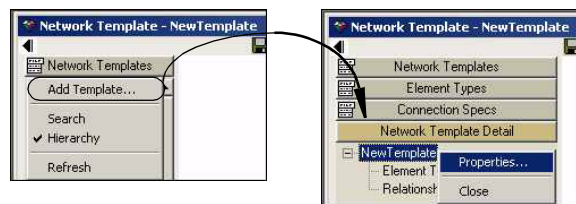
Figure 63: New Template on Network Template Detail

Note: A specialized use of the Add Template function is performed during the process of creating a backup of all MetaSolv-defined template components. In this case, the new network template is deleted after it is used. For details, see "Creating reference copies of TM templates" on page 105.

The *Search* option allows you to search for any network template that can be displayed on an expanded view of the Network Templates panel. For example, if you search on "Access Network", you retrieve the names of all the network templates that include that phrase. Any search string is valid.
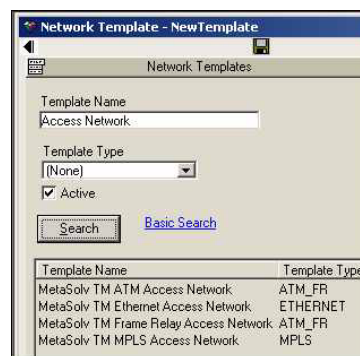
Figure 64: Network Templates—advanced search example

If you search on a network template name only, you retrieve the occurrence of that network template that can be displayed on an expanded view of the Network Templates

panel. The occurrences of that network template that are embedded in other networks and displayed on the Network Templates Detail panel are not retrieved through this search.
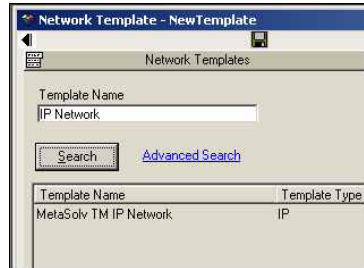
Figure 65: Network Templates—basic search example

To re-display the treeview after a search, select the *Hierarchy* option from the Network Templates left-click menu. For an example of the hierarchy view, see Figure 4 on page 7.

The *Refresh* option closes any expanded leaves of the treeview and updates the treeview with any changes made by other users.

Template type item menu

The right-click menu for a highlighted template type data contains three options:

- Add Template
- Properties
- Delete
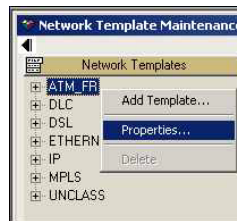
Figure 66: Template Type item menu options

The *Add Template* option operates like the option of the same name accessible from the Network Templates panel list menu. See Figure 63 on page 62.

The *Properties* option allows you to view the properties of the template type, change the template type name, reactivate an inactive template or inactivate an active template type. When a template type is deactivated, all the network templates defined under that

template type are also deactivated. Components of deactivated template types cannot be used to design networks or to associate with product specifications.
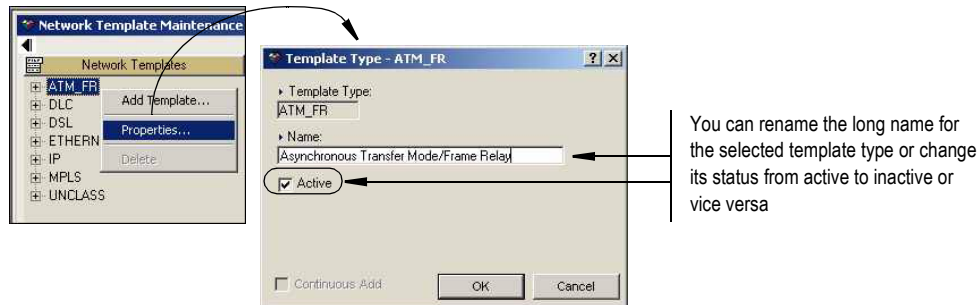
Figure 67: Template type properties example

The *Delete* option appears on this menu for consistency with options on other menus. However, this option is disabled on the Network Templates panel menu since MetaSolv-defined template types cannot be deleted and new template types cannot be user-defined.

Network template item menu

The right-click menu for a selected network template contains three or four enabled options, depending on whether the network template is MetaSolv-defined. These options include:

- Open
- Duplicate
- Create Reference
- Delete
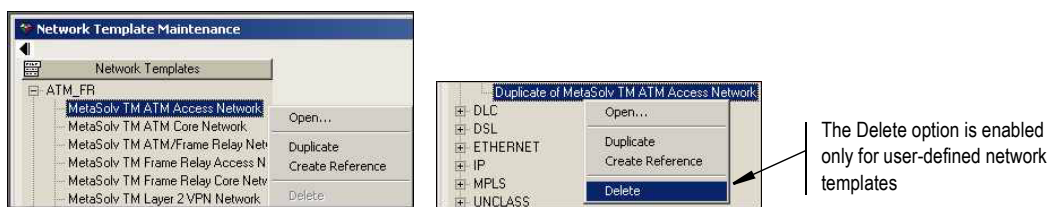
Figure 68: Network template item menu options

The *Open* option opens the Network Template Detail panel and displays the selected network template on the canvas. Double-clicking a network template name has the same result as selecting the Open option.
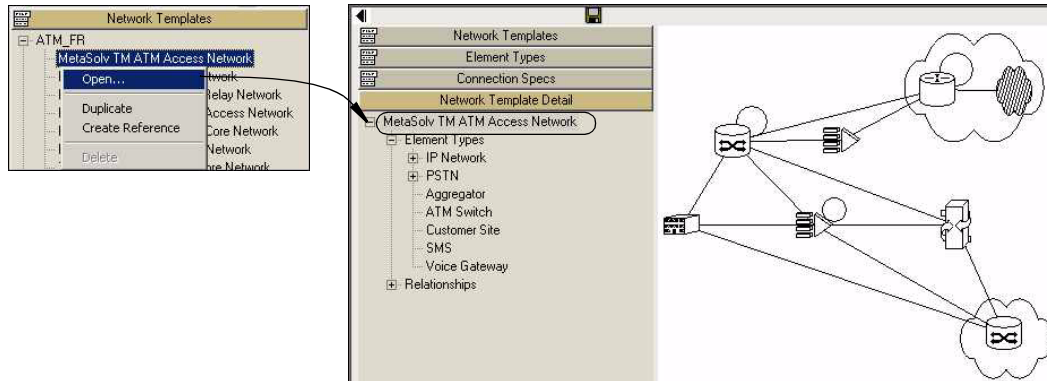
Figure 69: Open network template

The *Duplicate* option duplicates the selected network template. Use this option to create a network template that you can modify. Do not use this option to create a back-up of a network template you plan to modify. When you select the Duplicate option, a confirmation message appears. The duplicated network template is added to the network templates panel with the name "Duplicate of <duplicated network template name>." You can modify this name as needed.

The *Create Reference* option is used only during the one-time process of setting up the MetaSolv-defined templates for use.

> **Note:** Perform the process using the Create Reference option before you take any other action with the templates. See "Creating reference copies of TM templates" on page 105.

The *Delete* option, which is not enabled for MetaSolv-defined templates, can be used to delete any user-defined network template. Deleted network templates are permanently removed. Selecting this option displays a message for confirming the delete action.

Element Types panel menu

The Element Types panel menu, like the Network Templates panel menu, includes options for adding a new template component, performing a text search, and refreshing the view. The *Search* option toggles with the element type list, which can be displayed textually or graphically. The Element Types panel menu options include:

- Add Element Type
- Text Only, Images and Text, and Search toggle options
- Refresh
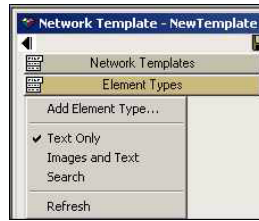
Figure 70: Element Types panel menu options

The *Add Element Type* option enables you to create a new element type for use within any of the template types you are using. MetaSolv-defined data includes over twenty element types. If your internal network or any customer's (external) network includes an element type not represented by those included in the starter kit, you can create a new element type and its associated graphic representation. For details, see "Add a new element type" on page 138.
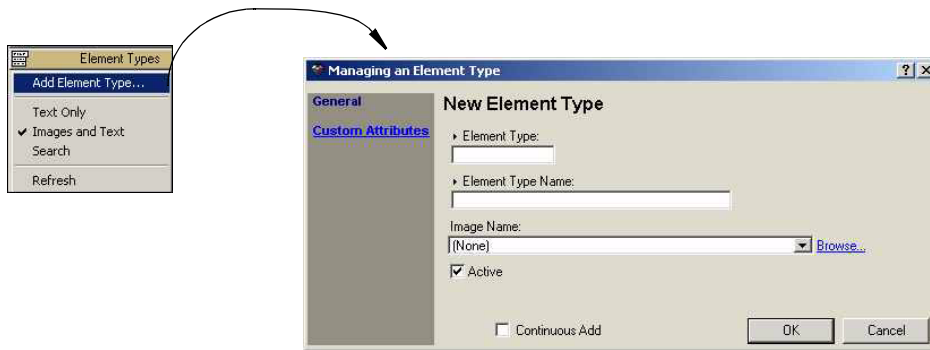
Figure 71: Add Element Type option enables definition of element type properties

The *Text Only* and *Images and Text* options are toggle options; the checked option on the menu is used on the displayed panel list. The following figure shows both views. All MetaSolv-defined element types are available for adding to any template type.
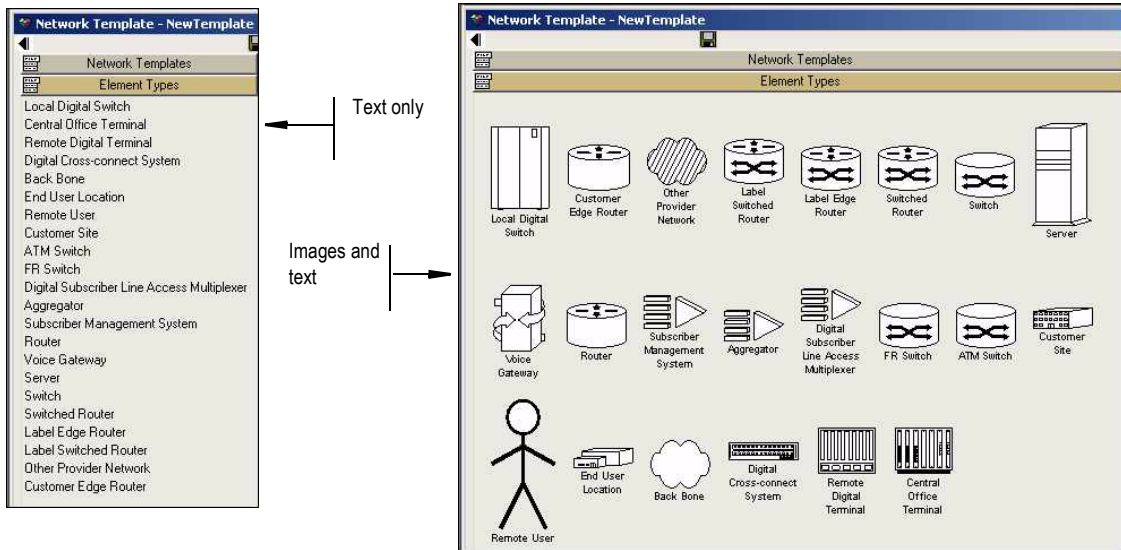
Figure 72: Element Types panel display options—images or text

Selecting the *Search* option for Element Types replaces the element type list (images or text) with a search panel. When you enter a word or phrase in the Element Name field and click Select, all element names containing the text you entered are displayed as a list at the bottom of the panel.
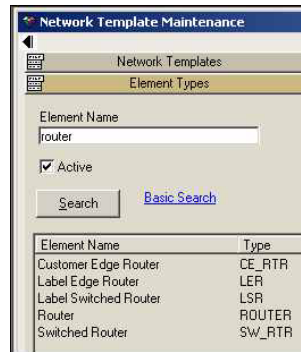
Figure 73: Element Types—advanced search example

The *Refresh* option updates the list of element types. For example, if two people are viewing the Elements Type panel and one adds, deletes, or modifies an element type, only the person making the modification sees the update immediately. The other person must select Refresh to view the changed version.

Element type item menu

Options available for a selected element type displayed on the Element Types panel depend on whether the display is text or image and whether the item is MetaSolv-defined or user-defined. Additionally, an option is available when no item is selected. Options include:

- Add Element Type
- Properties
- Delete
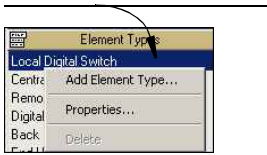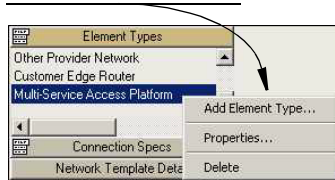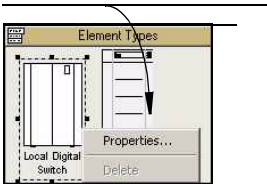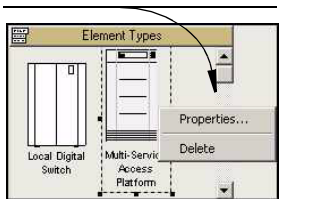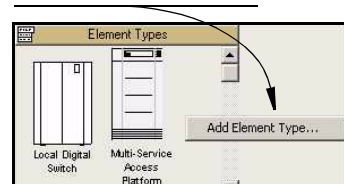
Figure 74: Element type item menu options

The *Properties* option enables you to examine or edit generic properties of a selected element type. These are element types that can be used in any network template.
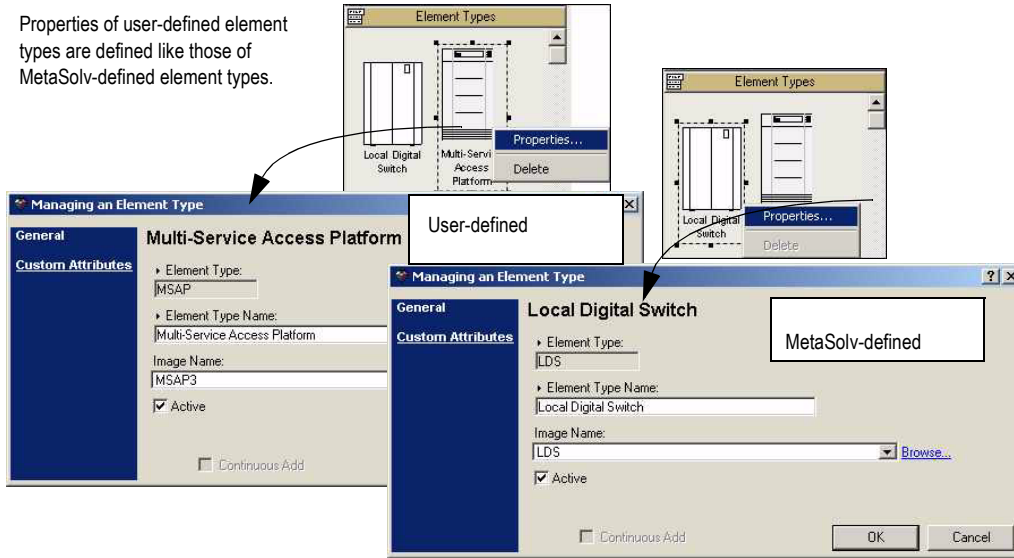
Figure 75: Element type properties option

If the selected element type is user-defined, an option exists for deleting it. The *Delete* option invokes a confirmation message. Once an element type is deleted, it cannot be restored.
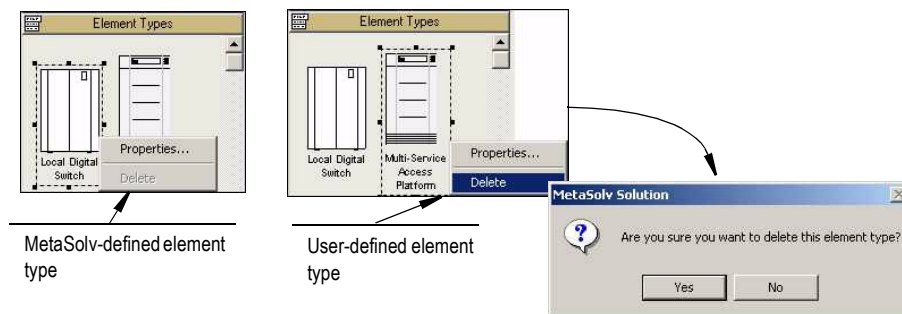
Figure 76: Delete option for user-defined element types

Connection Specs panel menu

The Connection Specs panel includes a menu with the following options:

- Add Connection Type
- Add Connection Spec
- Search/Hierarchy toggle options
- Refresh
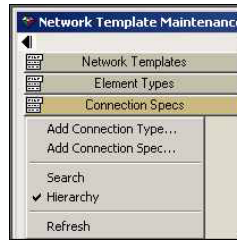
Figure 77: Connection Specs panel menu options

MetaSolv-defined data includes three connection types: group connections, physical connections, and virtual connections. The *Add Connection Type* option on the Connection Specs panel menu does not allow you to add to these connection types. Rather, it allows you to define a connection type name, under which you can define connection specs. That is, the *Add Connection Type* option allows you to create a new connection type name within one of the MetaSolv-defined connection types. Selecting this option displays the Connection Type - New window, which allows you to add a new connection type name. Upon selection, that name appears in the physical hierarchy. The BW/TDM code must be set to BW on a physical connection if you want to make an allocation of a virtual connection to the physical connection.
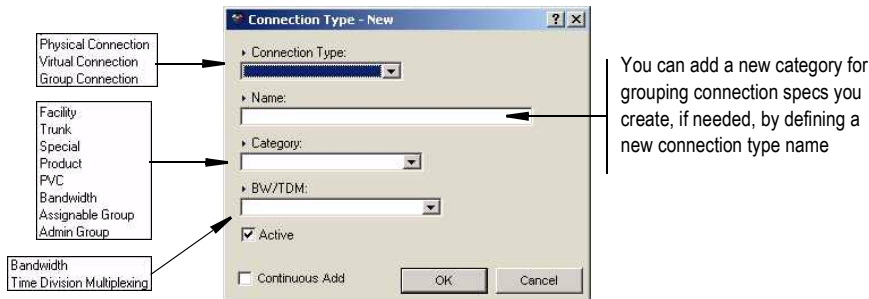
Figure 78: Connection Type—New window

The *Add Connection Spec* option on the Connection Specs panel menu enables you to add a new connection spec. Once added, the user-defined connection spec is available for associating with any relationship within any network template. MetaSolv-defined data includes quite a number of connection specs. (See "Connection specs" on page 29.) If your internal network or any customer's (external) network includes a connection spec not represented by one of those included in the starter kit, you can create a new connection spec for use within any of the template types you are using. For details, see "Add a new connection spec" on page 142. The following figure shows the Managing a Connection

Spec window for a new connection spec where values are shown for the drop-down menus.
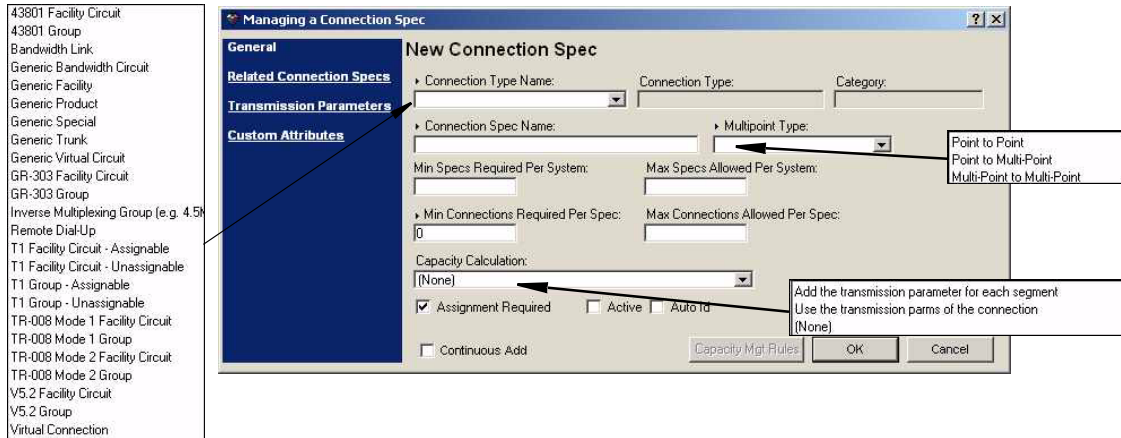
Figure 79: Managing a Connection Spec window for a new connection spec

Selecting the *Search* option when the treeview is displayed changes the view to a search query for connections. There are two suboptions—Basic search and Advanced search. The Basic search option allows retrieval of connection specs with names containing the text you enter in the **Connection Spec** field.
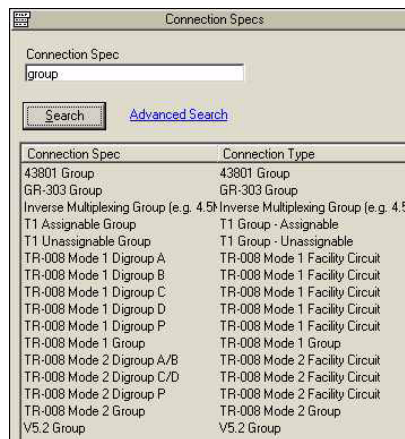
Figure 80: Connection specs—basic search example

The Advanced Search option allows retrieval of connection specs based on the connection type name. When used with other criteria, the connection type criteria further limits the retrieval to connection specs that are part of the hierarchy for that connection type name. The following figure illustrates that selecting a connection type as the sole criteria simply displays the same list of connection specs that you would see if expanding that connection

type name in the hierarchy view. Unchecking the Active checkbox as the sole criteria enables retrieval of all connection specs that are inactive.
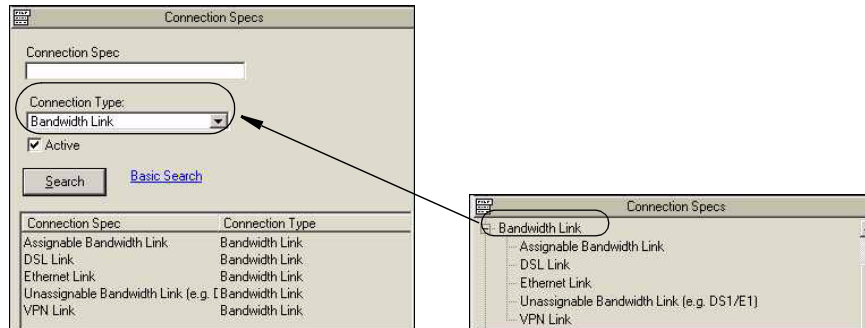
Figure 81: Connection Specs—advanced search example

Selecting the *Hierarchy* option replaces the Search view with the view shown on Figure 7 on page 9.

The *Refresh* option is available only when the Hierarchy view is active. This option is disabled when the Search view is displayed. The Refresh option redisplays the Hierarchy view with all connection type names collapsed. All changes made to any connection specs since your login or most recent refresh are applied to your display.

Connection type name item menu

When the Connection Specs panel is open in the Hierarchy view, you can select any connection type name and display a menu, where the number of enabled options depends on whether the selected connection type name is user-defined. Options include:

- Add Connection Spec
- Properties
- Delete

The *Delete* option is disabled for MetaSolv-defined connection type names

The *Delete* option is enabled for user-defined connection type names
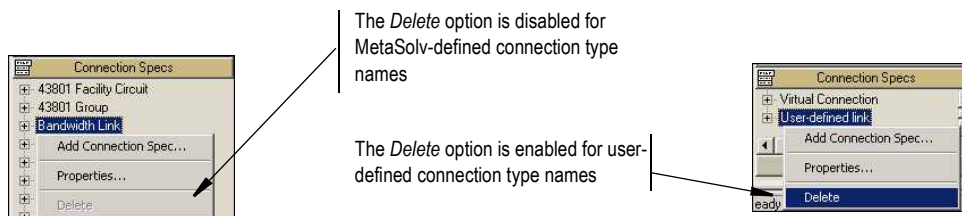
Figure 82: Connection type name item menu options

The *Add Connection Spec* option functions like the option of the same name on the Connection Specs panel menu, except the Connection Type Name field is populated with the selected connection type name.
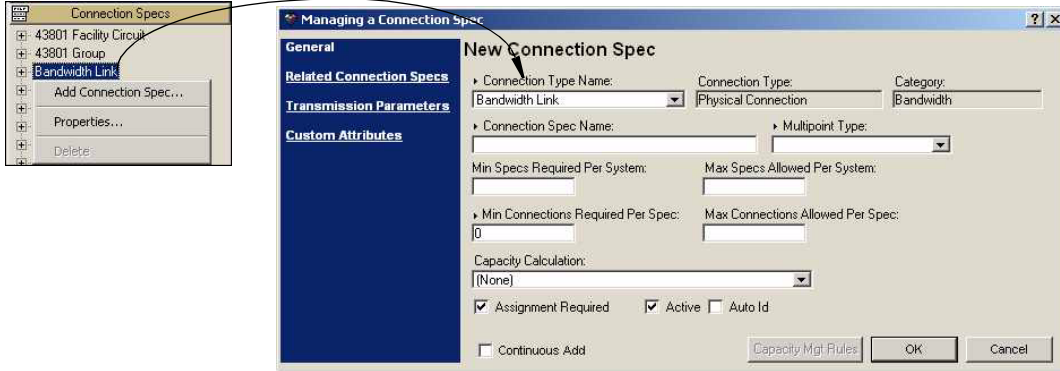
Figure 83: Add Connection Spec for a selected connection type name

The *Properties* option displays the definition of the selected connection type name. You can modify the text in the Name field and you can change the setting for whether the connection type is active by clicking the Active checkbox.
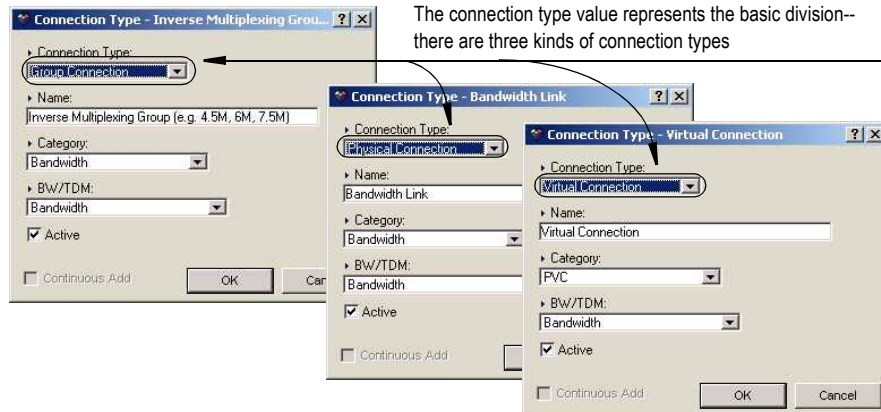
Figure 84: Connection Type window for a selected connection type name

The *Delete* option is enabled only if the selected connection type name is user-defined. MetaSolv-defined connection type names can be inactivated through the Properties option. The selected connection type name can be deleted only if it has no related connection specs. If connection specs have been related, they must be deleted first. A

deleted connection type name cannot be restored. The following example shows a connection type name that cannot be deleted because it has a related connection spec.

Notice the selected connection type name has a related connection spec (Assignable user-defined link)

Figure 85: Delete option for connection type names

Connection spec item menu

The enabled options on connection spec item menu for a selected connection spec depend on whether the selected connection spec item is MetaSolv-defined or user-defined, and whether the item is of a group type for TDM. Possible options include:

- Properties
- Delete
- Capacity Management Rules

The *Delete* option is disabled for MetaSolv-defined connection specs

The *Delete* option is enabled for user-defined connection specs

The *Capacity Management Rules* option is available only for connection specs for TDM group connections

Figure 86: Connection spec item menu options

The *Properties* option displays the properties of the selected connection spec on the Managing a Connection Spec window, which has up to four views. See online help for field-level descriptions. The General view is displayed first.
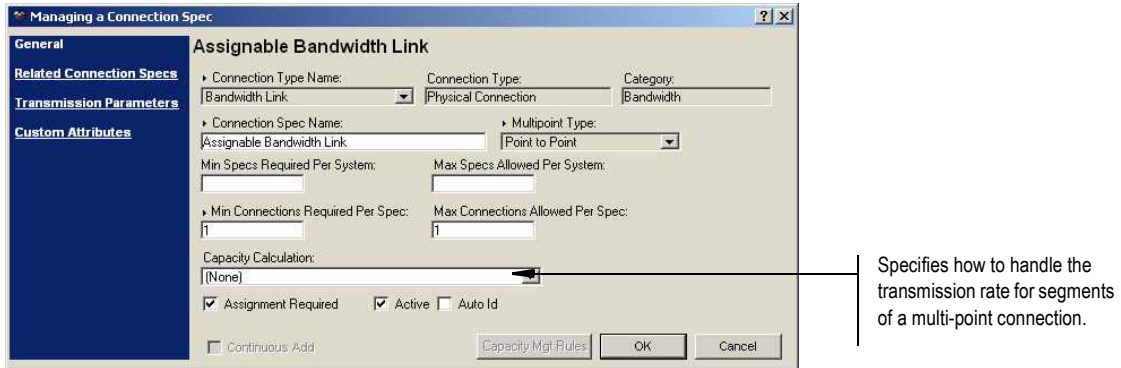
Figure 87: Managing a Connection Spec window—General

Following is the Related Connection Specs view of the window. There are three relationship types that can be represented: Assembly, Aggregation, and Assignment.
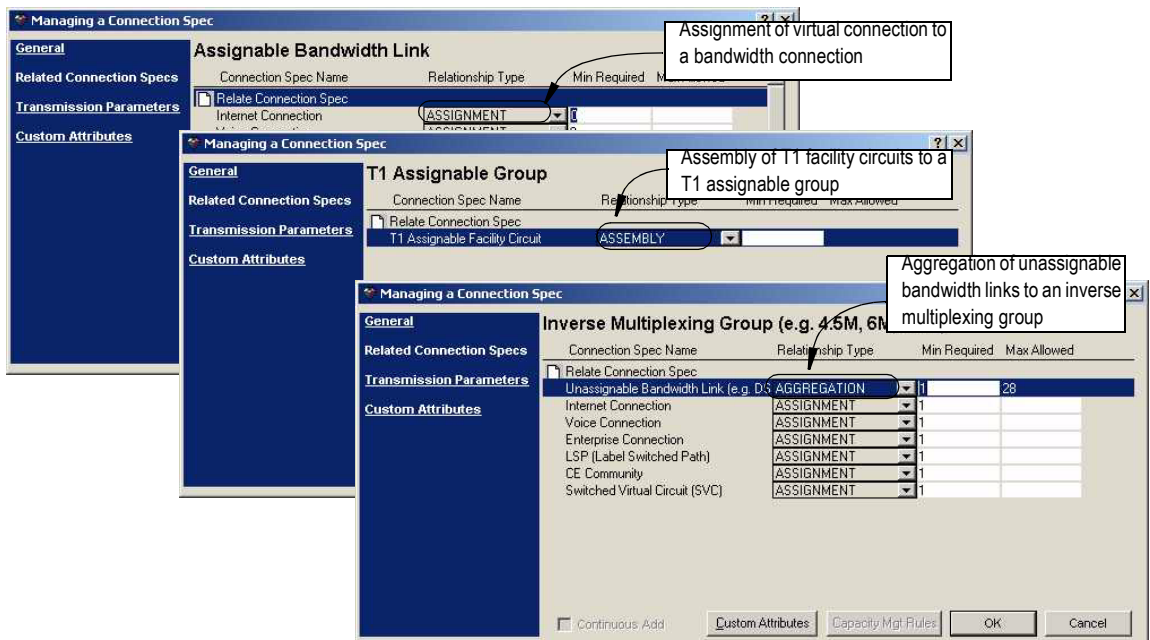
Figure 88: Managing a Connection Spec window—Related Connection Specs

Double-clicking the Relate Connection Spec icon brings up the Select Connection Spec window, regardless of the relationship type.
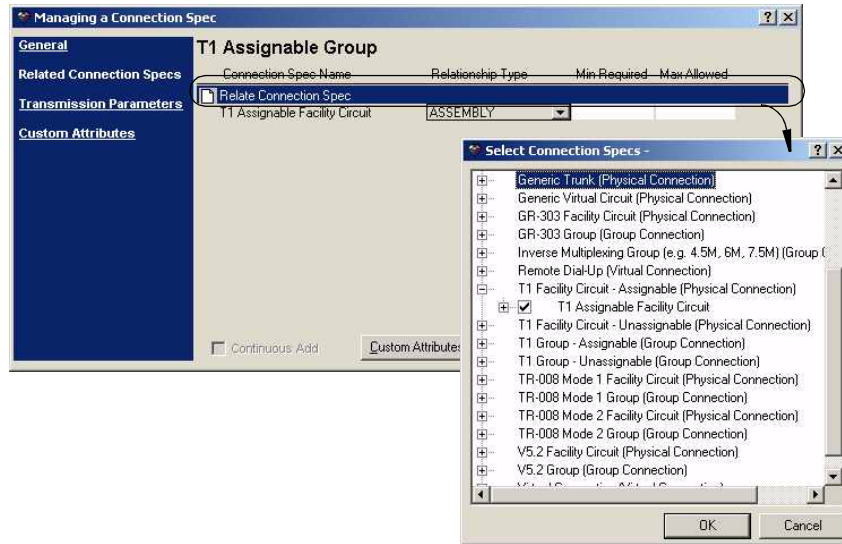
Figure 89: Adding related connection specs

Note: Assignment capability is established through custom attributes. For MetaSolv-defined data, see the following figure for these relationship.

Figure 90: Connection allocation for the assignment relation type

Transmission Parameters are an important property for time division multiplexing (TDM) connections.
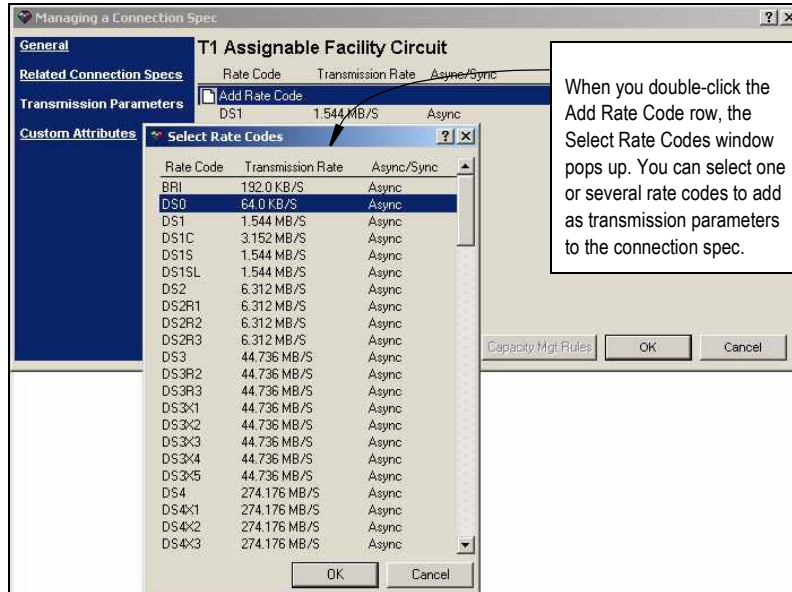
Figure 91: Managing a Connection Spec window—Transmission Parameters

Custom attributes are displayed by clicking the Custom Attribute link on the panel. Custom attributes are added through the MetaSolv Solution Utility application.
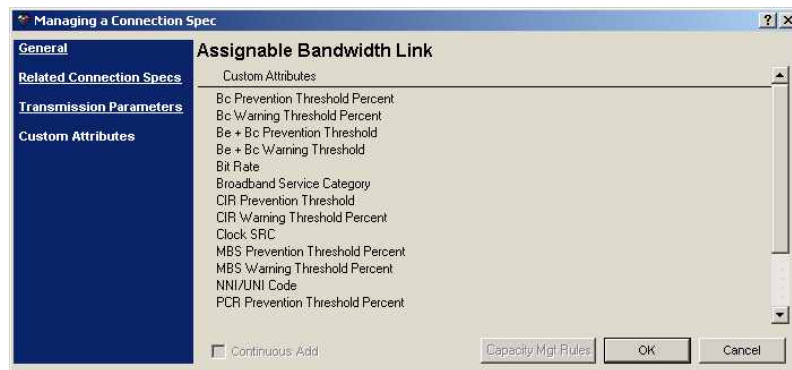
Figure 92: Managing a Connection Spec window—Custom Attributes

The *Delete* option is enabled only if the connection spec has been user-defined as opposed to MetaSolv-defined. This enables you to delete any connection spec you define. Selecting the Delete option deletes the user-defined spec, if unused, without a confirmation.

The *Capacity Management Rules* option displays the Capacity Management Rules window for the selected group connection spec. This window allows you to associate equipment

specs to each related connection spec. The relationship type for group connections is assembly.
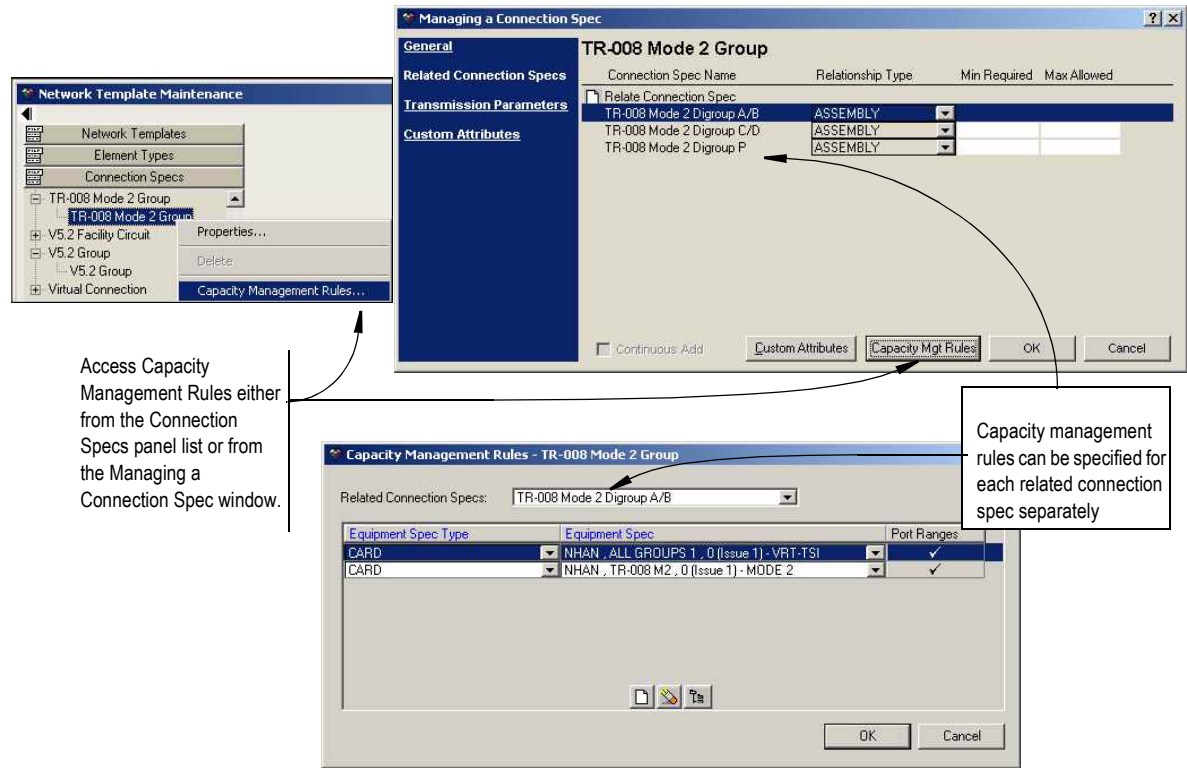
Figure 93: Capacity Management Rules window

Network Template Detail—network template item menu

When you display the Network Template Detail panel, you have access to two menus at the network template level—the network template item menu and the menu that pops up on the canvas if you right-click in a blank area. These menus have two options in common—the Properties option for the network template and the option to close the Network Template Detail panel and graphical display on the canvas. Both menus are discussed in this section.

The menu options for a selected network template item on the Network Template Detail panel varies, depending on whether the panel is displayed for a new network template or an existing network template. The right-click menu for an existing network template contains three options:

- Properties
- Delete and Rebuild Graphics
- Close

The second option is not applicable for a new network template because nothing has been built to display graphically. Once a new network template is defined and saved, the graphics can be rebuilt. For user-defined network templates, the rebuild uses an auto-position routine to reset the display.
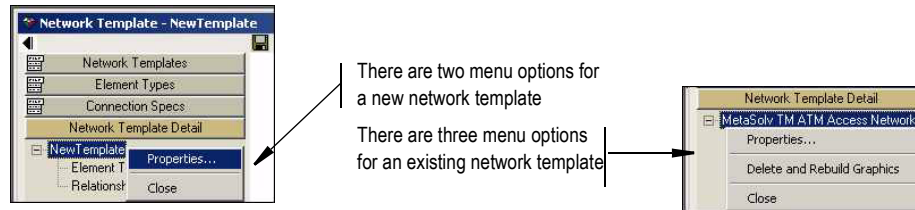
Figure 94: Detail for network template item menu options

Right-clicking on the canvas when nothing is selected displays the same canvas popup menu for a new template as for an existing network template. This menu lists the things you can do with the displayed graphic, including display the properties of the displayed network template, print it, export it, or close it. The menu options include:

- Properties
- Print Graphics
- Print Graphics Setup
- Export Visible Graphics
- Export All Graphics
- Close Template
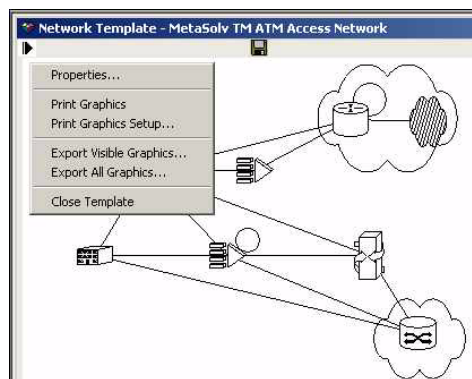
Figure 95: Canvas menu with nothing selected

Selecting *Properties* for the new network template displays the Managing a Template window with no data. You can add a network template to any of the template types you are using. For example, consider a scenario where the provider's internal network is composed of an ATM core network, ATM distribution networks, and ATM access networks. The ATM_FR template type includes an ATM core network template and an ATM access network template, but not an ATM distribution network template. If a separate network template to represent an ATM distribution network were desired, the

functionality is available to add such a network template to this template type. The Properties option for a new network template displays a window similar to the following.
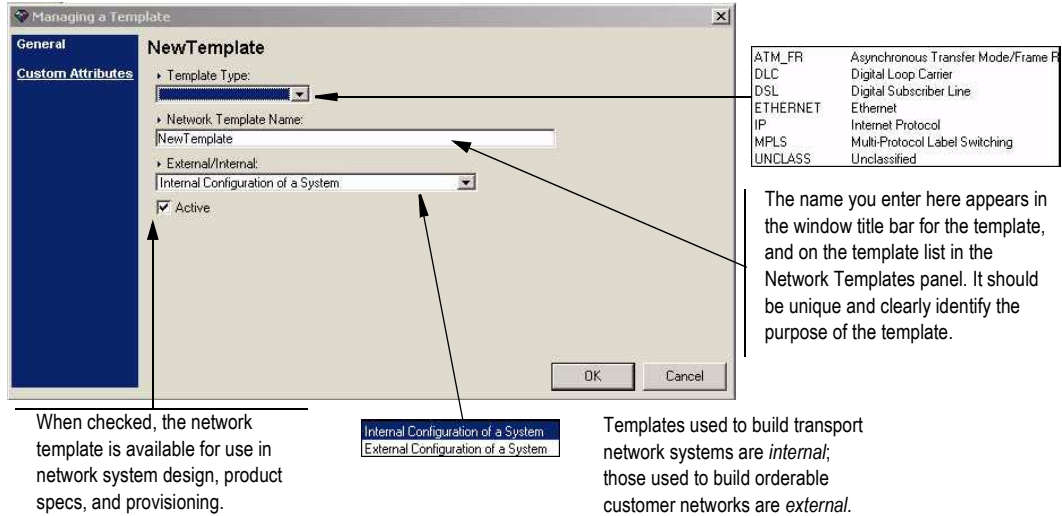
Figure 96: Managing a Template—General view for new network template

The *Properties* option for an existing network template displays the Managing a Template window for that network template. This window allows you to customize the selected network template by changing its name or image. Or, you can inactivate a template if it represents a network type you do not need. Inactivating a network template does not have any affect on networks that were previously designed from it.
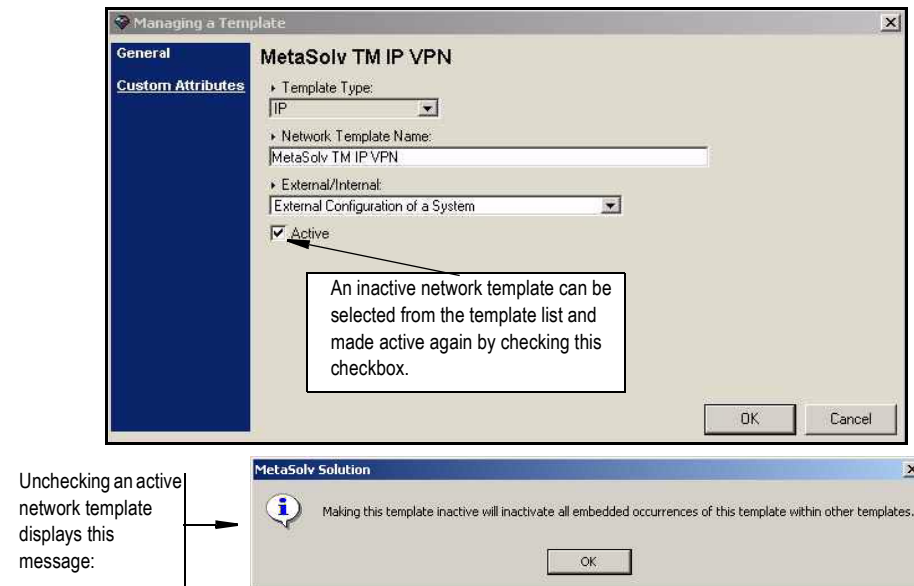
Figure 97: Managing a Template—General view for an existing network template

The Custom Attributes link in the Managing a Template window's navigation panel displays the Custom Attributes view.
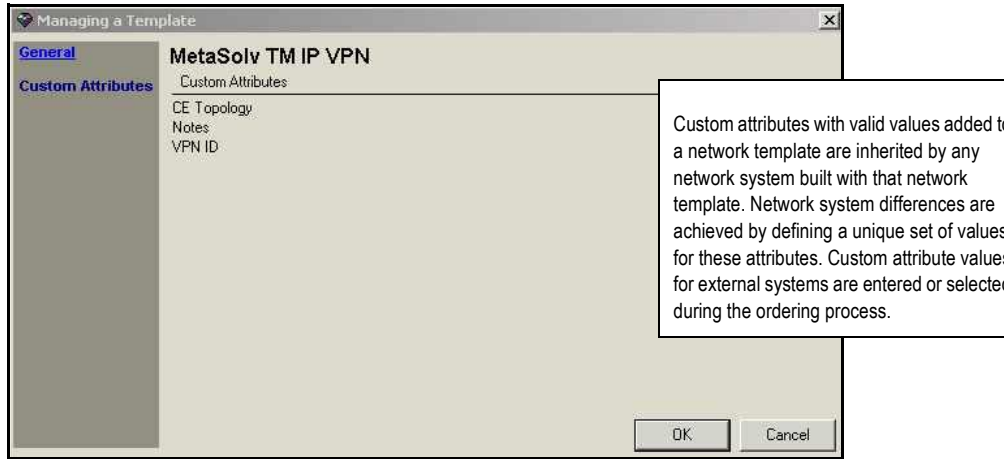
Figure 98: Managing a Template—Custom Attributes view

The examples that follow show the difference between network templates used for designing internal (provider) networks and network templates used for designing external (customer) networks. MetaSolv-defined properties include indicators of whether the network system is external or internal and whether active or inactive. All network systems are marked as active by default. Network systems that are external include VPN networks such as the MetaSolv TM Layer 2 VPN network, the MetaSolv TM IP VPN network, and the MetaSolv TM MPLS VPN network. Networks such as core and access networks are defined as internal.
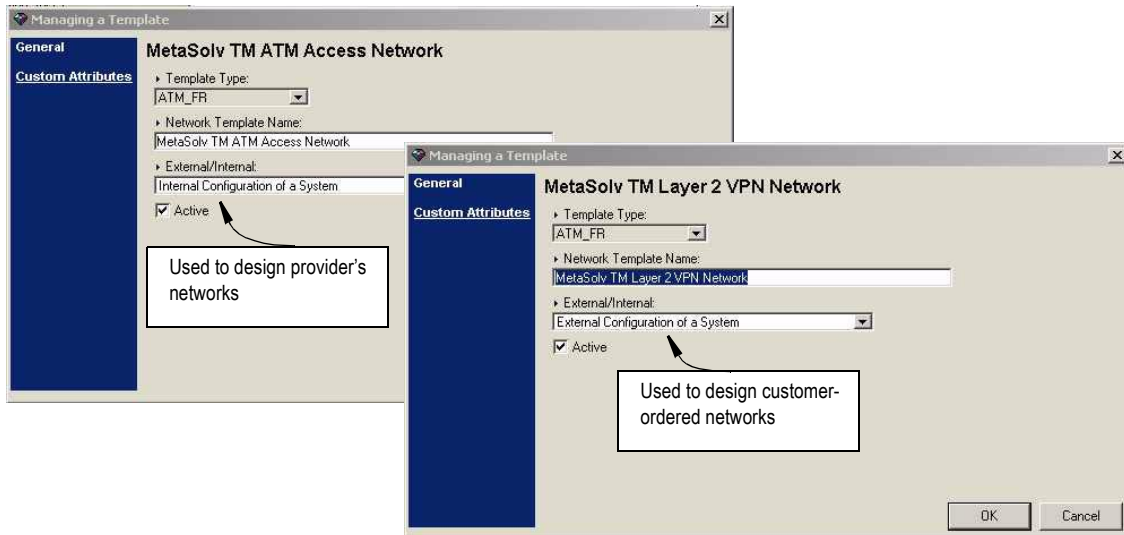
Figure 99: Designation of network template for internal or external networks

The *Delete and Rebuild Graphics* option deletes the current display of the network template from the canvas and replaces it with a graphic formatted by auto-positioning the template element types. See Figure 15 on page 15.

The *Print Graphics Setup* option displays a window with a preview of how the printed graphic will appear. You can preview different options, such as the landscape view or the portrait view.
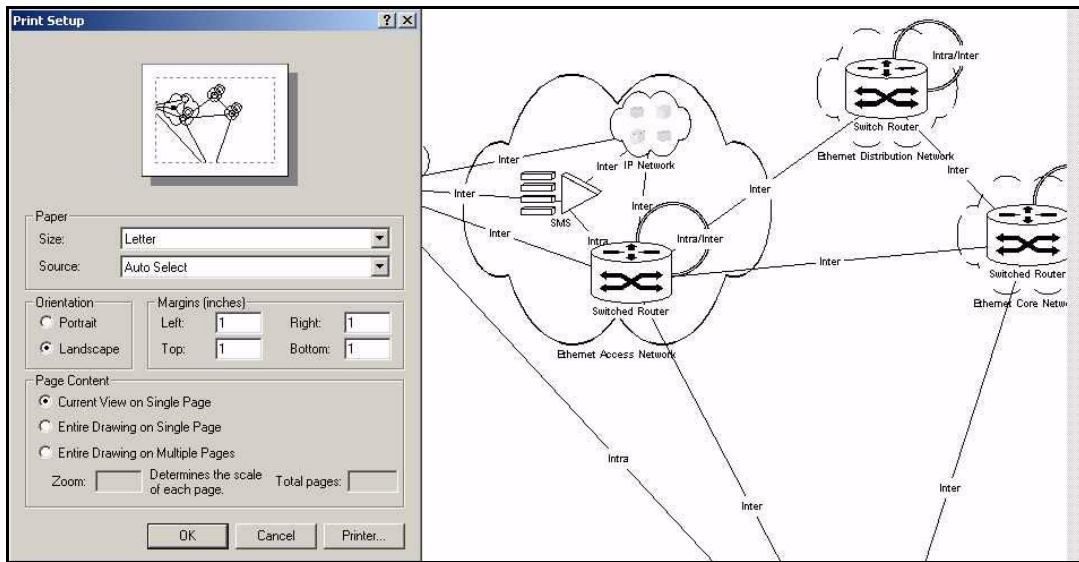
Figure 100: Print Setup window for printing graphics

After making any needed adjustments and selecting the preferred view, you can print the graphic by selecting the *Print Graphic* option from the canvas popup menu. The printed version includes the network template components previewed on the Print Setup window.

There are two options for exporting graphics. The *Export Visible Graphics* option is used to export only the portion of the network template that is visible on the canvas. The *Export All Graphics* option is used to export the entire network template, including the portions that are not displayed, given the current settings. The graphic is exported as an .emf file. You name the file and specify the location as a path on the Export Canvas window.
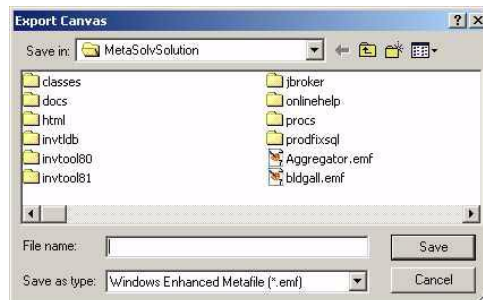
Figure 101: Export Canvas window

The *Close* option on the network template item menu and the *Close Template* option on the canvas both close the network template detail panel and the graphics. Both options display the same confirmation message that allows you to specify whether or not to save any changes you made.

Network Template Detail—template element type item menu

When you display the Network Template Detail panel, you have access to two menus at the template element type level—the element type item menu on the panel and the menu that pops up on the canvas if you right-click an element type. These menus have the *Properties* option in common.

The right-click menu for the selected element type item on the Network Template Detail panel contains two options:

■ Properties
■ Locate in Drawing

When you right-click a template element type on the graphical canvas, the options on the displayed menu include:

■ Connect
■ Properties
■ Delete
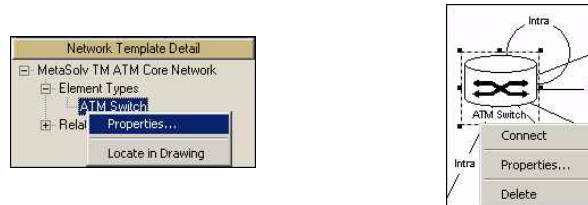
Figure 102: Detail for template element type item menu options

The *Properties* option displays the properties of the selected element type. The element type can be a simple element type, an element type representing an embedded network, a

new element type or an element type within an embedded network. The links and the fields displayed on the resulting properties window depends on the component selected.

If you add a template element type to a new or existing network template, you can add an element label for display on the canvas and Network Template Detail panel list or use the default, the Element Type Name.
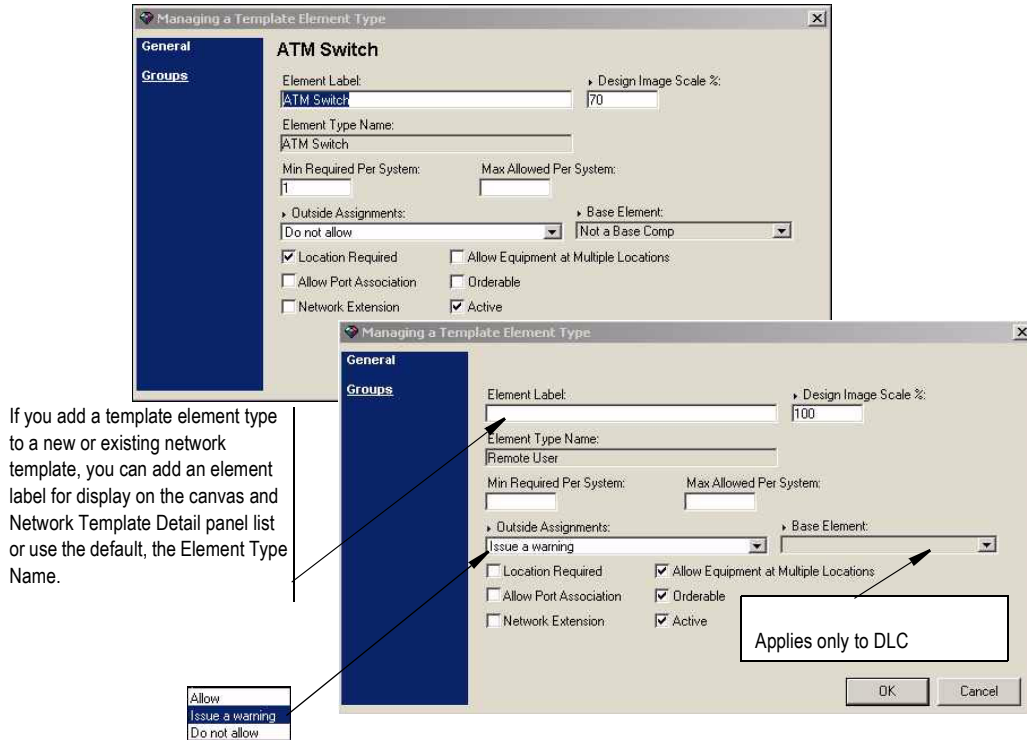
Figure 103: Properties of a network template's element type

The Groups link displays the following tab, which is useful in defining element types for the Digital Loop Carrier network template. In DLC there is sometimes a limit placed on the number of connections of a certain rate code associated to a "group" of interface types that

can terminate at a certain type of element. For example, a maximum of 28 GR303 and TR008 Mode 1 and Mode 2 T1 connections can terminate at a LDS in a DLC network.
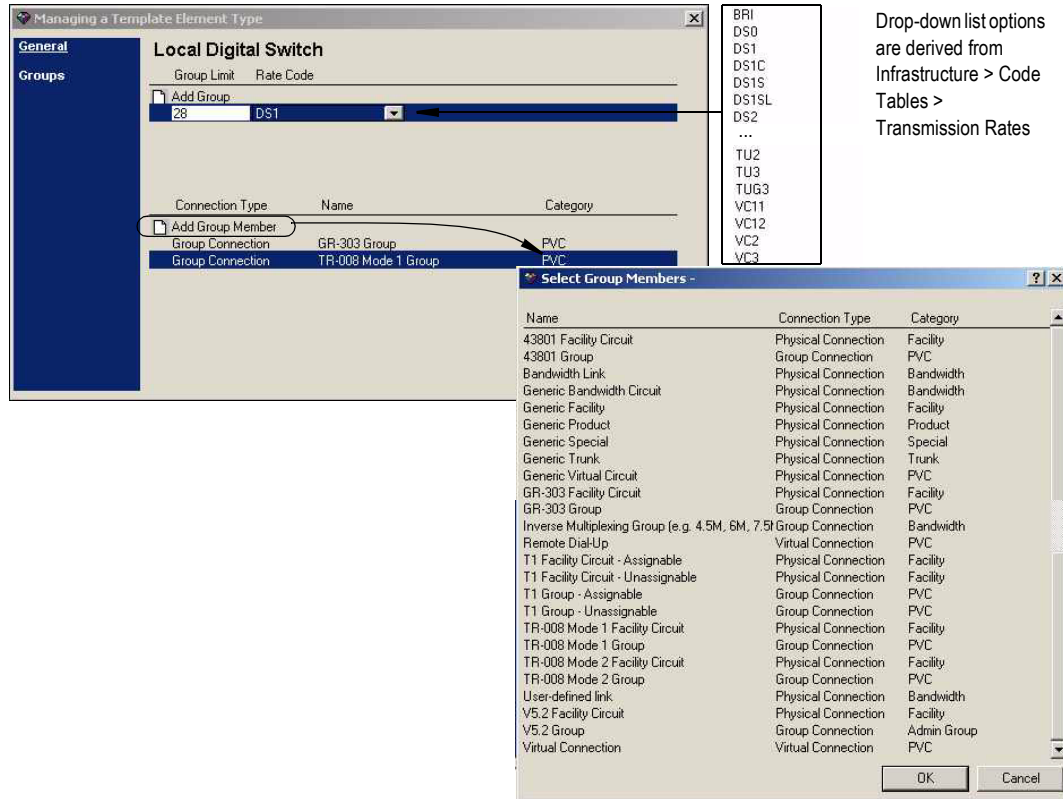
Figure 104: Properties of a template element type's group limit, rate code, and connection type

Notice that element type properties that are available for inclusion in any network template are different from the properties of template element types that have actually been included in a network template.

Generic properties of an element type that can be used in any network template can be displayed from the Element Types panel.

Properties of a template element type can be displayed from the Network Template Detail panel of the network template to which it belongs. The element type name defined for the element type is inherited by any template element type that uses it.
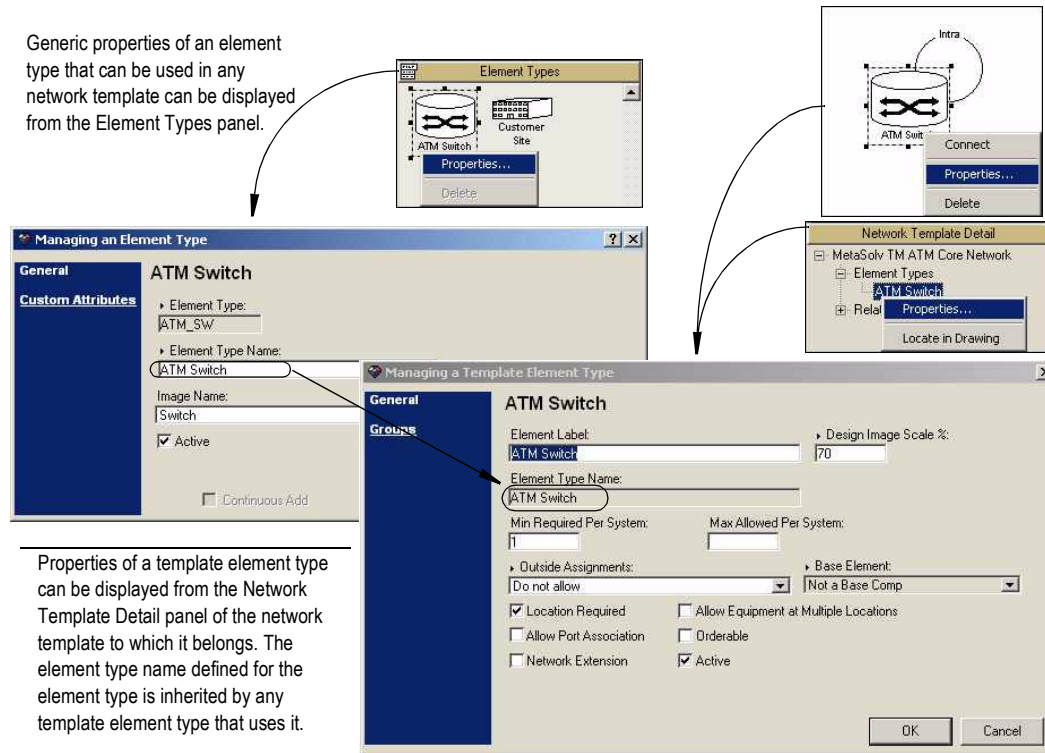
Figure 105: Element type properties—generic and specific to a given use

A template element type can be defined with a new element label, which changes its name in that network template. For example, if an ATM switch element type is dragged onto a user-defined network template called ATM Distribution Network, it can be labeled ATM Distribution Switch. That is, changing the Element Label changes the text below the image on the network canvas. This does not affect the label of the source element type called ATM switch nor does it create a new element type. The impact is simply on the label within this network template.

If you select an element type within an embedded network, the resulting window is displayed in Read-only mode.

If you select an element type of an embedded network template, the properties cannot be modified.
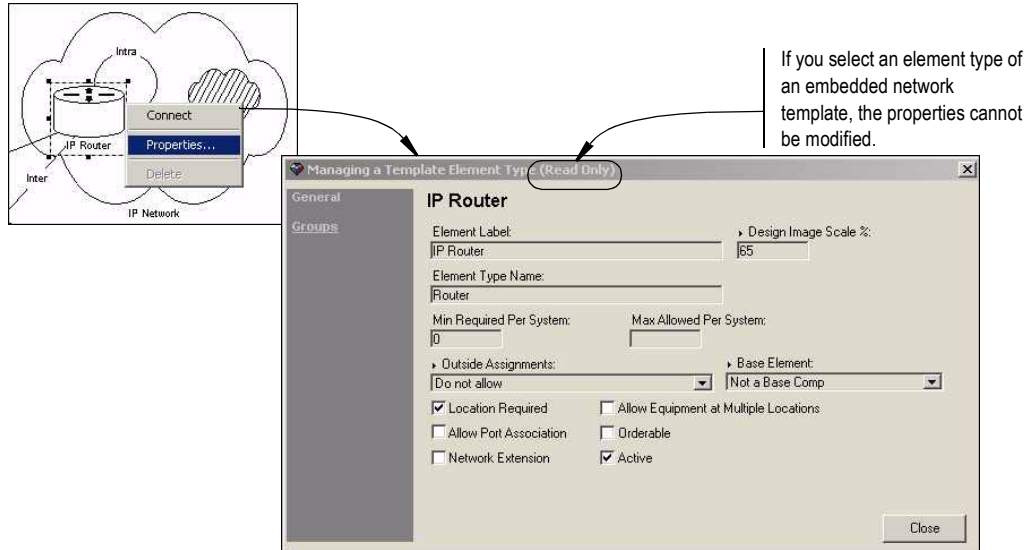
Figure 106: Properties of a network template's embedded element type and its element type

The *Locate in Drawing* option causes the selected template element type to blink on and off.
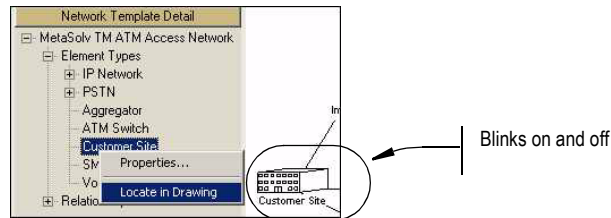
Now let us consider the *Connect* option that appears when you right-click an element type on the canvas. One way you can modify a network template is to add an existing element type to it and create a relationship from that added element type to another element type that is already a component of the network template. Creating a new relationship can be

initiated on the canvas by right-clicking one element type, selecting the *Connect* option, and dragging the "relationship" line to the terminating element type.
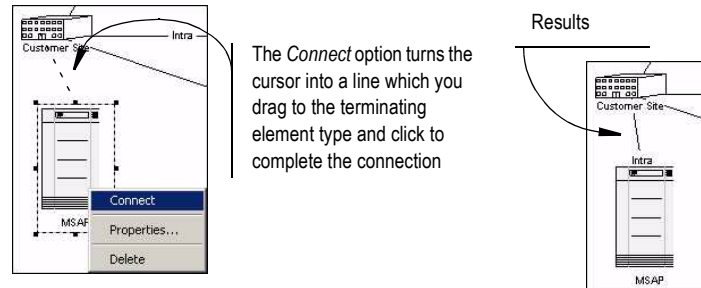
Figure 107: Connect option for adding a template relationship between template element types

The *Delete* option on the canvas applies to user-defined element types. A template element type can be deleted only if it is not associated with any network element in Product Specifications.

Network Template Detail—embedded template element type item menu

When you display the Network Template Detail panel, you have access to two menus at the template embedded element type levels. When you right-click the name of an embedded element type on the panel, the options on the displayed menu include:

- Properties
- Locate in drawing

When you right-click an embedded template element type on the graphical canvas, the options on the displayed menu include:

- Properties
- Delete
- Refresh

These menus have the *Properties* option in common.

Figure 108: Embedded template element type item menus on panel and canvas

The Properties option displays properties for an embedded template element type, such as the IP Network that is embedded in the ATM Access Network. Notice the difference between the properties displayed for a network template on its native canvas and that

displayed for the same network template when it is an embedded element type in another network template.
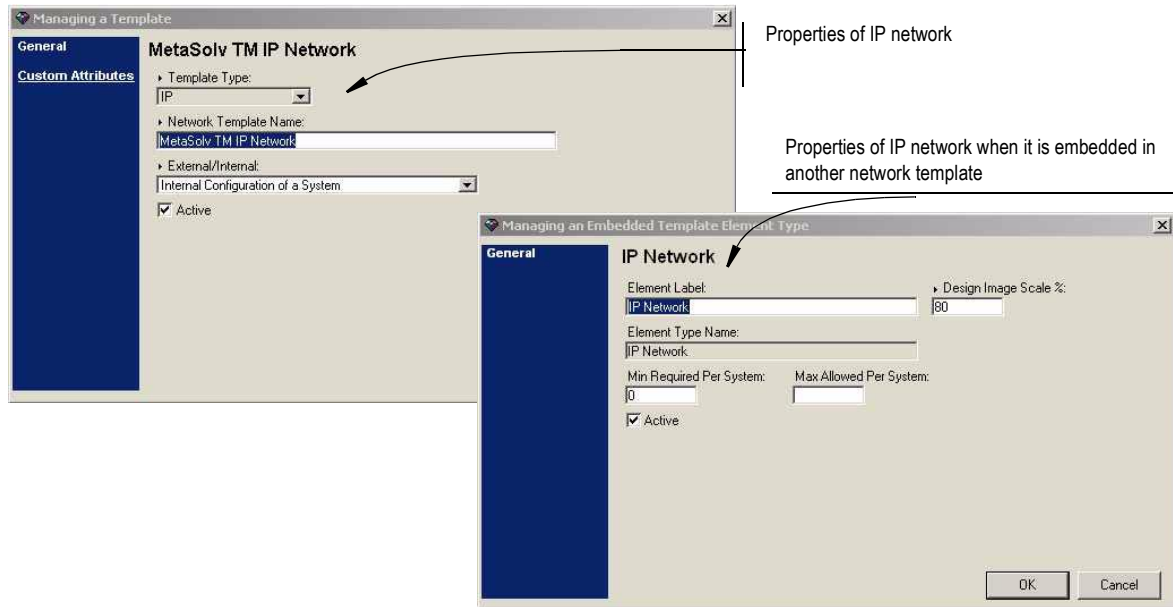
Figure 109: Properties of an embedded network template compared with its native properties

The *Locate in Drawing* option causes the selected template element type to blink on and off.
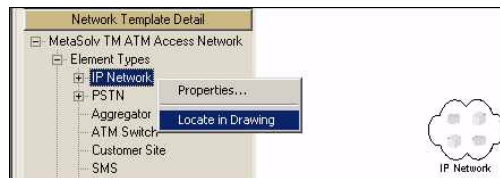
When the *Delete* option is selected, the following message may appear:

Refresh updates the embedded network template, called an embedded element type, if any changes have been made to the source network template.

Network Template Detail—template relationship item menu

When you display the Network Template Detail panel, you have access to two menus at the template relationship level with one common option. The right-click menu for the selected relationship item on the Network Template Detail panel contains two options:

- Properties
- Locate in Drawing
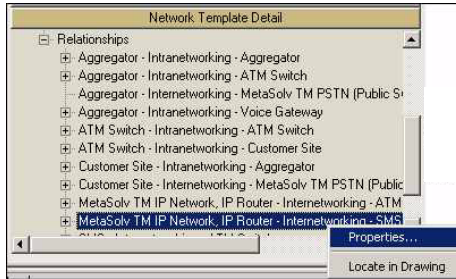
Figure 110: Detail for template relationship item menu options

When you right-click a relationship on the canvas, the menu options include:

- Properties
- Delete

These options are discussed in this order: *Locate in Drawing*, *Delete*, and then *Properties*.

The *Locate in Drawing* option causes the selected template relationship to blink on and off.
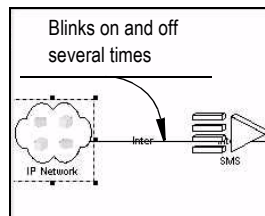
Figure 111: Locate relationship in drawing

The results of selecting the *Delete* option for a relationship depends on whether the relationship is in an embedded network template. If it is, a message is displayed that explains that you can delete this relationship only from the originating network template. That is, to delete the relationship in the IP network that is embedded in the MetaSolv TM Frame Relay Access Network, you would need to open the MetaSolv TM IP Network and

delete the relationship there. Selecting the Delete option for a relationship that is native to the network template displays a confirmation message for the deletion.

Relationship is part of the displayed network template

Relationship is part of an embedded network template

A relationship can be deleted only in its originating network template; not from a network template in which the originating template is embedded.
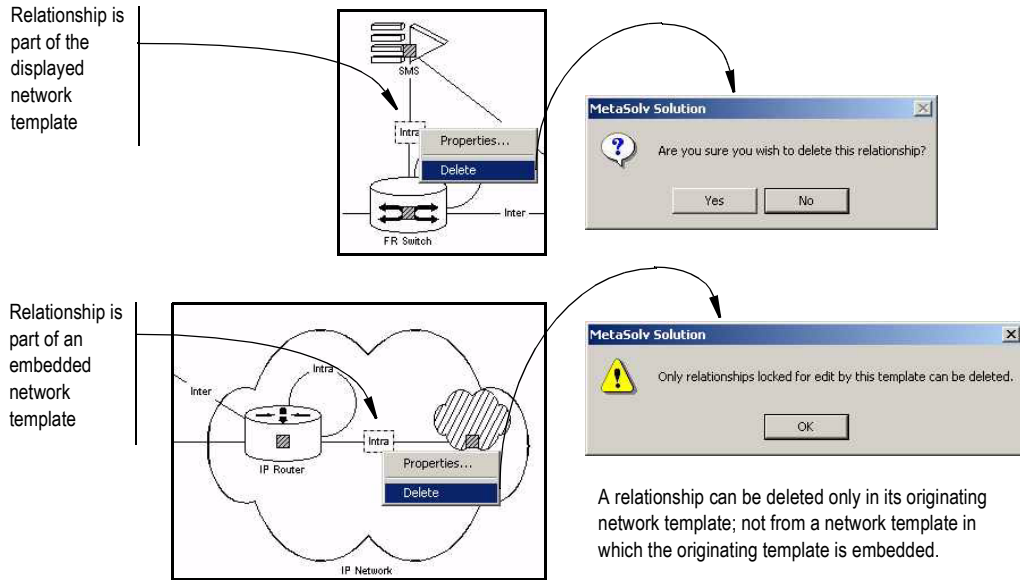
Figure 112: Condition for successful relationship deletion

Selecting *Properties* for a selected relationship displays a window for defining the roles played by the two element types involved in the relationship. The following figure demonstrates how the elements in the selected relationship are connected graphically on the canvas and are displayed with roles on the properties window.

The minimum and maximum number of secondary elements you can connect to each primary element.

Example: In an LDS/COT connection of a DLC, both would be marked as 1 since one and only one COT must connect to a single LDS.

Select LSR only if element type is an ATM switch enhanced for MPLS-support. Select Authentication only if element type is a server with this role in a management network. Otherwise, select (None).

Figure 113: Properties of a template relationship

If you select Properties for a double-line on the canvas, where a double-line indicates multiple relationships, the Select Relationship window opens.

This window appears only when you double-click or right-click and select Properties for a double-line, which indicates there are multiple relationships
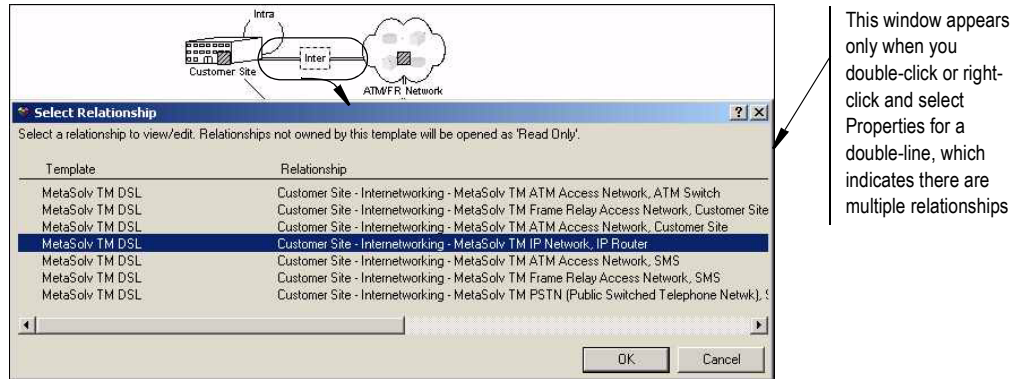
Figure 114: Select Relationship window

The Connection Specs link on this window displays the Managing a Template Relationship connection specs tab that lists the connection spec types associated with the selected relationship. Double-clicking the Associate Connection Spec icon displays the Select Connection Specs window.

Double-click Associate Connection Specs to select to select a connection spec to associate with this template relationship; selected connection specs are then defined as template connections. See Figure 117.

If the relationship represents a physical or group connection over which a virtual connection will be provisioned, select a spec under Bandwidth Link or Inverse Multiplexing Group.

Figure 115: Select connection specs to associate with physical template relationship

The views available from the Managing a Template Connection window depend on the connection type of the selected connection.
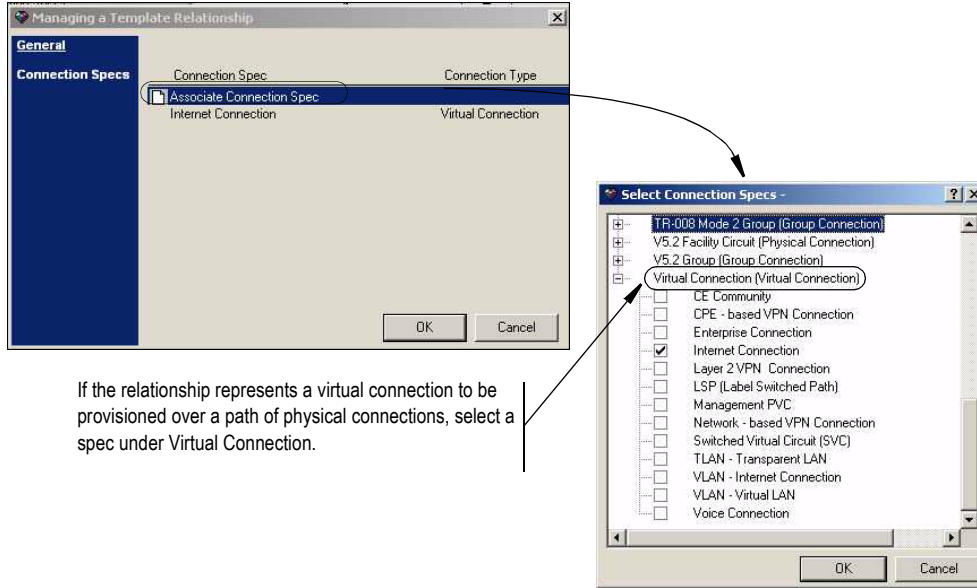
Figure 116: Select connection specs to associate with virtual template relationship

Network Template Detail—template connection access

When you display the Network Template Detail panel, you can expand any relationship to display its associated connection specs, but unlike other displayed panel list items, template connections do not have an item menu with a properties option. The Managing a Template Connection window can be accessed only though the Managing a Template Relationship window for the relationship to which the connection spec is associated.

Properties of any connection spec can be tailored to reflect the usage within the current network template.

Double-clicking an associated connection spec that represents a physical connection displays General properties only
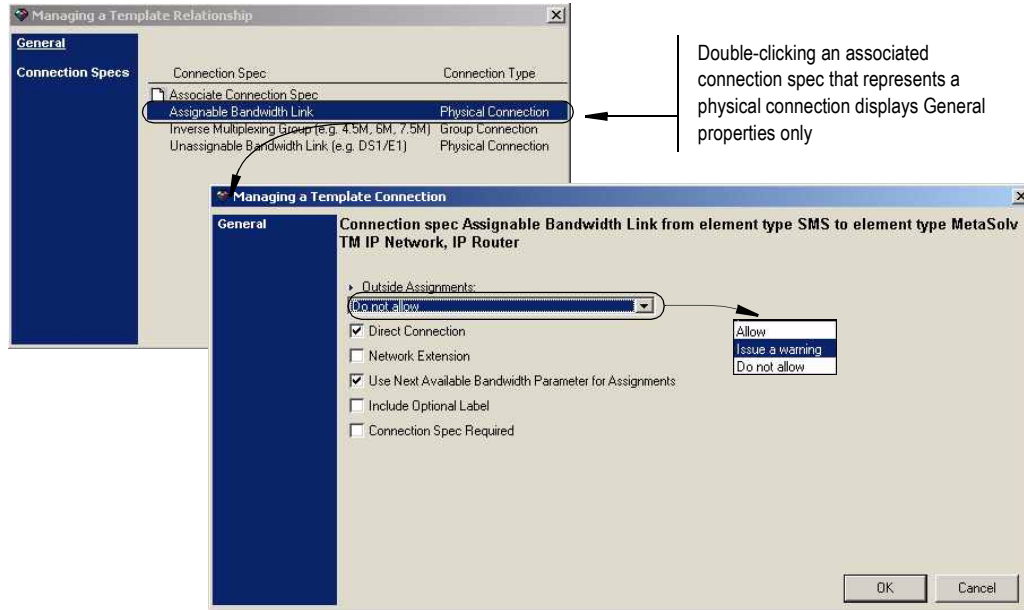
Figure 117: General properties of a physical template connection

Physical connections have only one view; virtual connections have three.

Double-clicking an associated connection spec that represents a virtual connection displays three views--General properties, Assignable connection specs, and prioritized paths
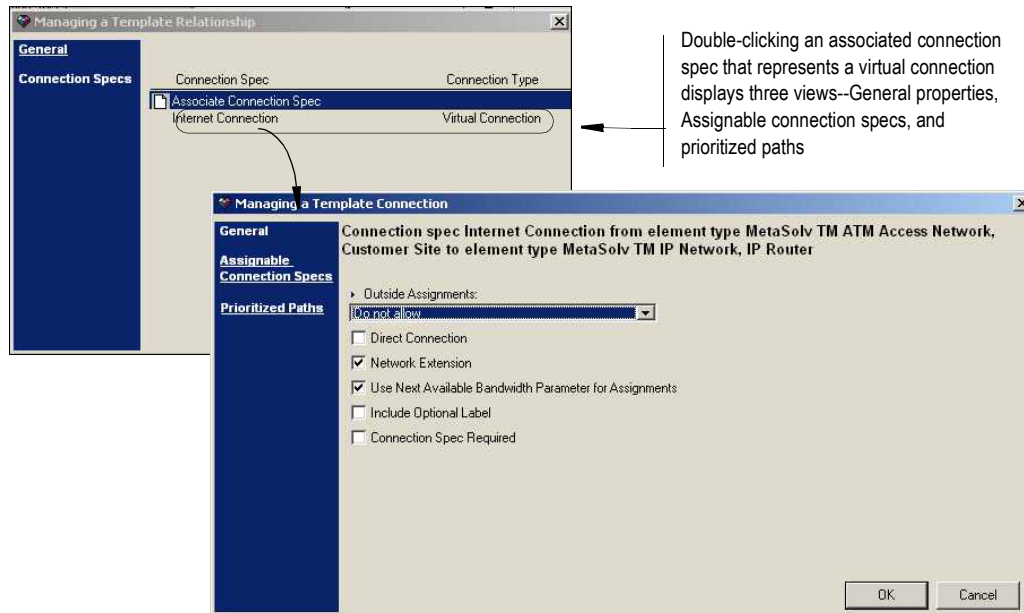
Figure 118: General properties of a virtual template connection

The Managing a Template Connection window with the Assignable Connection Specs view displayed is a scrollable window. This view allows you to set up the pool of possible links available for provisioning this virtual connection over prioritized paths. You can delete any displayed assignable connection spec to remove it from the pool. To indicate a given link must be used in every path, check the Assignment Required checkbox. It is then up to you to ensure that each prioritized path you define includes the link you specified as required.
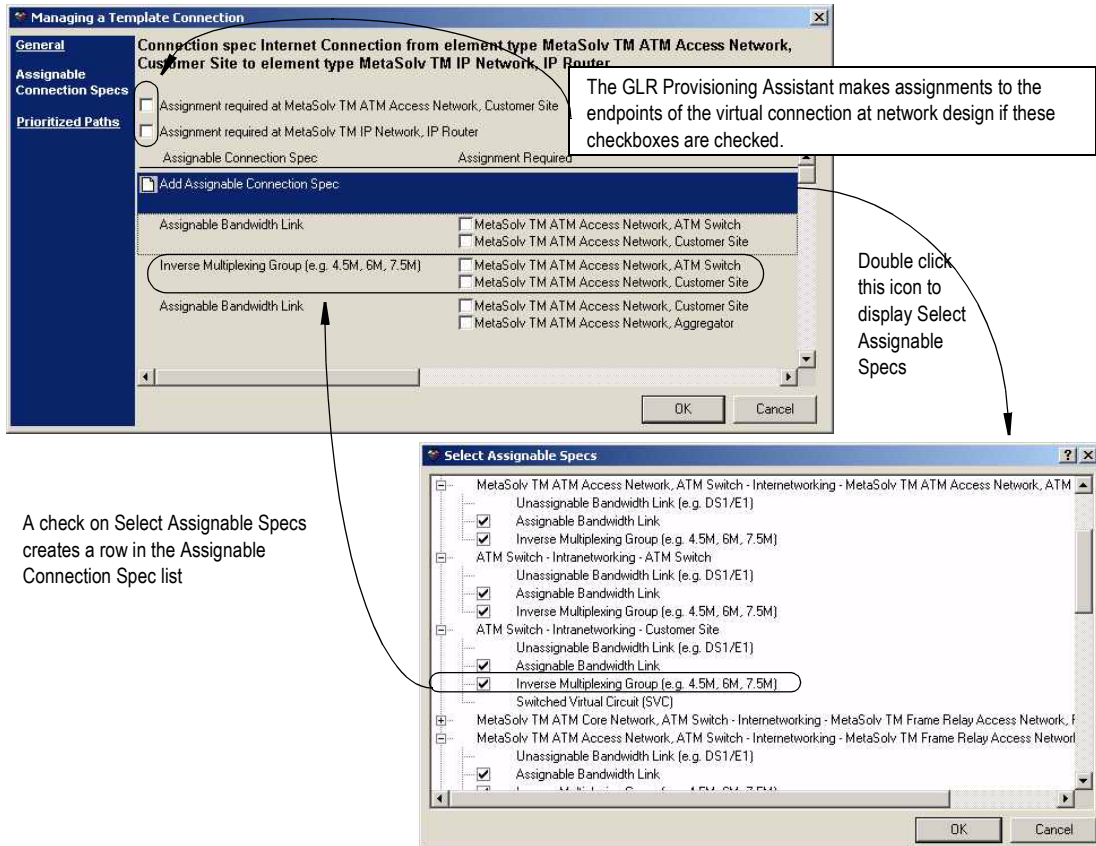
Figure 119: Select assignable connection specs for a virtual template connection

Consider Customer Site and ATM Switch in the following network drawing. Notice that there are two paths between these network elements—one direct:

■ From Customer Site to ATM Switch

■ From Customer Site to Aggregator to ATM Switch
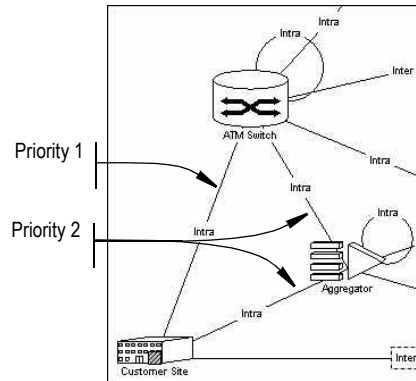
These two paths can be prioritized based on which is the better. The better path is
assigned priority 1. In this example, the path assigned with priority 1 is the direct route,
which is the shortest.

Figure 120: Select sequence of relationships for a prioritized path for a virtual connection

Scrollbar menus

A final set of menus on the panel lists are the horizontal scrollbar menu and the vertical
scrollbar menu. Scrollbars are used to pan the display in the direction of the scrollbar. You

can drag the horizontal and vertical scrollbar to the desired location, click on a location to move the center of the scrollbar to that location, or use the right click menu from a scrollbar location and select an option to move the scrollbar.
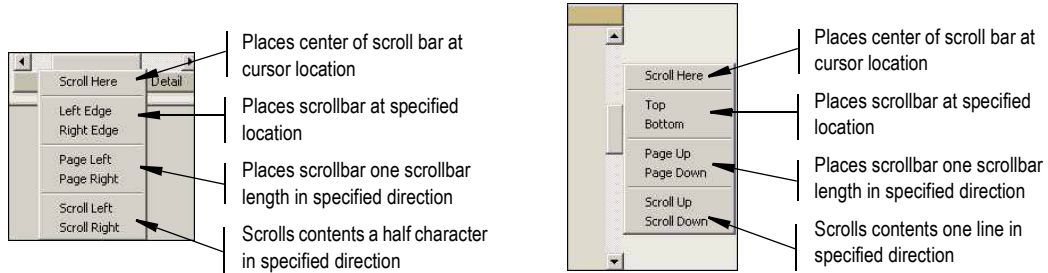
Figure 121: Panel list scrollbar menu options

Processes

This chapter includes:

- An implementation sequence that provides the tasks required to prepare network templates for use
- A list of processes addressed in this chapter
- A series of step-by-step instructions for completing each of the listed processes

IMPLEMENTATION SEQUENCE

The following implementation sequence suggests an approach for individuals who set up and maintain network templates. While many of the steps focus on processes that involve working with the network template software, this sequence also includes gap analysis that is performed outside of the MetaSolv Solution and running PSR migration, which is not addressed in this chapter. It even suggests when in the implementation to read which sections of this book. It is assumed that MetaSolv Solution release 5.1 or above is installed.

Process sequence

1. Obtain a high-level understanding of the benefits of template-based functionality.

   - See "What are the technology modules?" on page 17
   - See "What is template-based functionality?" on page 18

2. Create a reference copy of the TM templates. (See page 105.)

3. Become familiar with MetaSolv-defined template components that can be used in any network template. (See page 127.)

   - Survey element types in each network template.
   - Survey connection types and connection specs.

4. Become familiar with the MetaSolv-defined network templates for the technology types corresponding to your technology modules. (See page 109.)

   - Survey template element types and template relationships in each network template, repositioning element types on the canvas if needed.
   - Refer to the appropriate technology module guide document for an easy way to discriminate between virtual and physical connections.

5. Identify high-level gaps between MetaSolv-defined template components and your requirements. An approach follows:

- Prepare a list of requirements for representing your networks, using the MetaSolv naming conventions where applicable. This list can include:

  ⇒ Types of elements composing the nodes in your internal networks

  ⇒ Element types between which you support connectivity (relationships)

  ⇒ Types of physical and group connections employed

  ⇒ Types of virtual connections used for services you offer to customers

- Identify element types you need that are not represented by the MetaSolv-defined element types.

- Identify connection specs you need that are not represented by the MetaSolv-defined connection specs.

- For each type of network system you use, identify any relationships not included in the corresponding MetaSolv-defined network template.

- For each customer service that involves provisioning virtual connections from a customer site to your network, identify any relationships not included in the corresponding network template.

6. Become familiar with the structure of template components. See "What are network templates?" on page 20.

7. Become familiar with the template-based features in MetaSolv Solution by reading the "Features" section beginning on page 4.

8. Add any missing template components identified during initial gap analysis. For step-by-step instructions, see "Customizing a particular network template" on page 150.

   - Embed missing template element types representing other network templates that are needed, but missing from a given network template.

   - Add element types to list of available Element Types and define their properties. (See the *CA Technical Update* for details on defining properties called custom attributes.)

   - Add connection specs to list of available Connection Specs and define their properties. (See the *CA Technical Update* for details on defining properties called custom attributes.)

   - Add template element types to network template details and define their properties.

   - Add template relationships to network template details and associate connection specs.

9. Customize MetaSolv-defined components for use in any network template. This involves tailoring properties that are similar to your needs, but do not precisely reflect your requirements. For step-by-step instructions, see "Customizing components for any network template" on page 134. Tasks include:

   - Revise properties of an element type (in Element Types).

   - Revise properties of a connection spec (in Connection Specs), where properties can include:

     ⇒ General properties of any connection spec

> ⇒ Capacity management rules for specs for TDM group connection
>
> ⇒ Transmission parameters (rate codes) for a TDM connection
>
> ⇒ Capacity calculation method for connection specs to be used in a multipoint connection
>
> ⇒ Specifications for related connection specs (assignment, assembly, or aggregation)

10. (Optional) Within a given network template, remove MetaSolv-defined template components that you do not need. For example:

    - Delete relationships between element types that do not exist in your network and that you do not provision for customer networks or customer connections.

    - Inactivate element types representing network elements that do not exist in your environment.

11. Customize MetaSolv-defined template components at the network template detail level. For step-by-step instructions, see "Customizing a particular network template" on page 150. Modifications (including additions and deletions) can include those for any of the following:

    - Groups for a template element type
    - Connection specs associated with a template relationship
    - Connection specs specified as assignable for a virtual template connection
    - Prioritized paths for a virtual template connection

12. Run PSR migration. See the *Migration Guide* for M/5.1.

    Note: Before you run PSR migration, you must ensure that all your network templates accurately reflect your internal and external network design requirements. When the migration runs, it designs the connections based on the network templates you have created.

13. Maintain template components as needed.

    - Delete any user-defined template components.
    - Reactivate any MetaSolv-defined template components.
    - Use any customization process described in Step 8, Step 9, or Step 11.

PROCEDURES LIST

The processes addressed in this chapter are listed in the following table.

Table 6: Process list reference

Steps	Cross-reference
Completing the prerequisite to using technology module templates	See "Creating reference copies of TM templates" on page 105
Becoming familiar with the network templates	See "Examining network templates and embedded template element types" on page 109
	See "Examining template element types and template relationships" on page 112
	See "Examining element types" on page 127
	See "Examining connection types and connection specs" on page 128
Becoming familiar with common processes	See "Opening network templates" on page 130
	See "Closing network templates" on page 130
	See " Saving or canceling changes" on page 130
	See " Exporting a network template" on page 131
	See " Printing a network template graphic" on page 132
	See " Unlocking a network template" on page 133

Table 6: Process list reference

Steps	Cross-reference
Customizing template components for use in any network template	*Managing a template type or network template*
	See "Modify properties of a template type" on page 135
	See "Add a new network template and define its properties" on page 136
	See "Modify properties of a network template" on page 137
	Managing an element type
	See "Add a new element type" on page 138
	See "Modify properties of an element type" on page 138
	See "Delete a user-defined element type" on page 140
	Managing a connection type
	See "Add a new connection type" on page 140
	See "Modify properties of a connection type" on page 141
	See "Delete a user-defined connection type" on page 142
	Managing a connection spec
	See "Add a new connection spec" on page 142
	See "Modify general properties of a connection spec" on page 143
	See "Add, modify, or delete related connection specs" on page 144
	See "Add or delete specifications for transmission parameters" on page 146
	See "Add, modify, or delete capacity management rules" on page 148
	See "Delete a user-defined connection spec" on page 150

Table 6: Process list reference

Steps	Cross-reference
Customizing template components within a particular network template	*Managing a network template (end-to-end)*
	See "Define a new network template (end-to-end)" on page 151
	See "Delete a user-defined network template (end-to-end)" on page 152
	Managing an embedded template element type
	See "Add an embedded template element type" on page 153
	See "Modify properties an embedded template element type" on page 154
	See "Inactivate an embedded template element type" on page 155
	Managing a template element type
	See "Add a template element type" on page 157
	See "Add, modify, or delete group properties of a template element type" on page 160
	See "Add, modify, or delete group properties of a template element type" on page 160
	See "Delete a template element type" on page 162
	Managing a template relationship
	See "Add a template relationship" on page 165
	See "Add or modify general properties of a template relationship" on page 166
	See "Associate a connection spec with a template relationship" on page 168
	See "Disassociate a connection spec from a template relationship" on page 170
	See "Delete a template relationship" on page 170

Table 6: Process list reference

Steps	Cross-reference
Customizing template components within a particular network template (continued)	*Managing a template connection* See "Add or modify general properties of a template connection" on page 172 See "Add assignable connection specs for a template connection" on page 174 See "Modify or delete assignable connection specs of a template connection" on page 175 See "Add a prioritized path for a virtual template connection" on page 177 See "Modify priorities of the prioritized paths for a template connection" on page 180 See "Delete a prioritized path for a template connection" on page 181

CREATING REFERENCE COPIES OF TM TEMPLATES

For each technology license purchased, you receive a technology module (TM) that includes MetaSolv-defined template types, network templates, element types, and connection specs. Some element types and connection specs are defined with custom attributes. Each network template is composed of template element types, template relationships, and template connections, and in some cases, embedded template element types. Template relationships have associated connection specs. Some template relationships representing virtual connections are defined with prioritized paths.

To preserve a reference for the complex definitions of the MetaSolv-defined network templates associated with your technology modules, it is highly recommended that you create reference copies (backups). This provides a set of original templates to refer to after customizing the TM templates.

⚡ **Warning:** It is important that one person perform this one-time-only process at the very beginning of the M/5.1 implementation. Duplicating templates prior to the creation of reference copies can introduce irreversible complications involving template relationships.

To create reference copies of your TM templates in one pass, you must first create a temporary holding template and embed specific templates from each of the technology modules you have enabled. The reason you embed certain templates from a technology module and not others has to do with pre-existing embedded relationships. By embedding specified templates into your holding template, you can make one backup/reference copy

of each unique template comprised by each technology module with one command. The **Create Reference** command names the backups as *reference* copies and, for your protection, inactivates them so they cannot be used inadvertently.

Use the following process to back up all network templates and thereby create a set of inactive reference templates.

Steps

1. Display the Network Templates panel list on the Network Template Maintenance window.

   a. From the main toolbar in MetaSolv Solution, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel to open it.

   c. If the Search window appears instead of the treeview, click the *Menu icon* and select **Hierarchy** to switch to the treeview.

2. Right-click the UNCLASS template type and select **Add Template**.
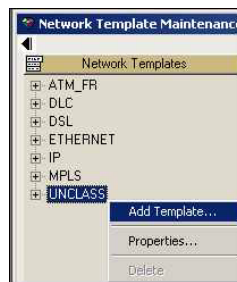
Figure 122: Add a temporary network template under UNCLASS

3. Right-click *New Template* on the Network Templates Detail panel list (or right-click anywhere on the canvas) and select **Properties**.

4. Enter *Holding* in the **Network Template Name** field.

Name the template a unique name that will be easy for you to identify
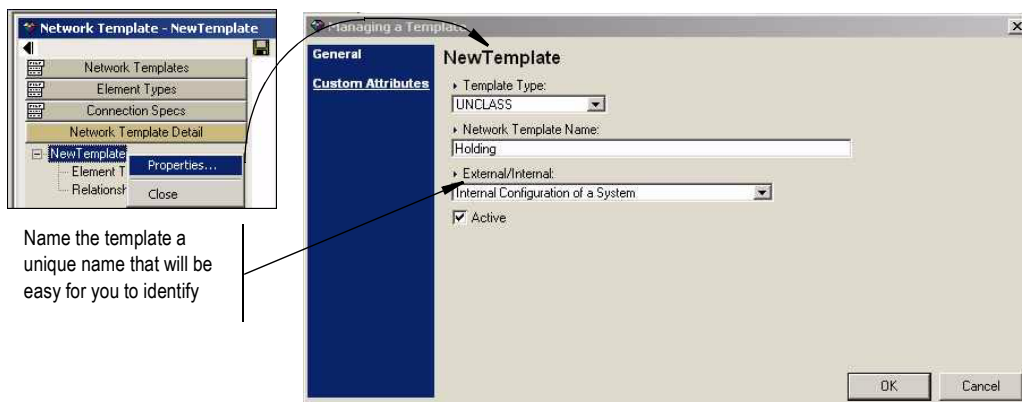
Figure 123: Open the Managing a Template window and rename the template

5. Click **OK** to close the Managing a Template window and display a blank canvas for the Holding network template detail.

6. Open the Network Templates panel list and expand the template types. Refer to the following table to identify the network templates to embed in the Holding network template you created.

Table 7: MetaSolv-defined network templates for reference copy

If you licensed this technology...	Drag these templates into the backup template
ATM/Frame Relay	MetaSolv TM Layer 2 VPN Network
DLC	MetaSolv TM DLC
DSL	MetaSolv TM DSL
Ethernet	MetaSolv TM Ethernet Network, and MetaSolv TM VLAN Network
IP	MetaSolv TM IP VPN
MPLS	MetaSolv TM MPLS VPN

This subset of network templates is sufficient to back up all network templates included in your technology modules, since these few embed all the other network templates. (The exception is the VPN—Basic Configuration, which is applicable only to migrated VPNs and will not be used on a go-forward basis. If you want to back up this network template, add it to your list)

7. For each network template you identified, click it to select it and drag it to the canvas containing the Holding network template you created.

If you licensed all the technology modules and dragged each of the templates listed in Table 7 on page 107 into the Holding network template, the canvas would resemble the following.
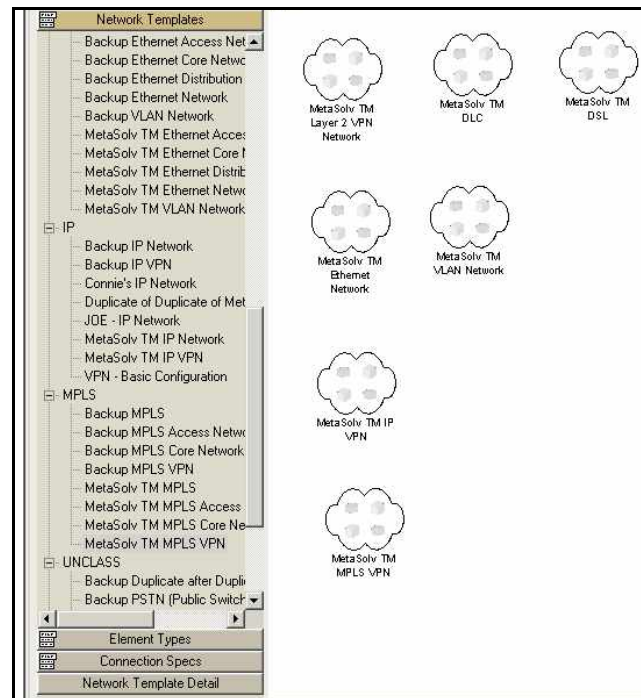
Figure 124: Holding network template with embedded network templates

8. Close the holding template by right-clicking on an open area of the canvas and selecting **Close Template**. Click **Yes** to the message prompting you to save the template.
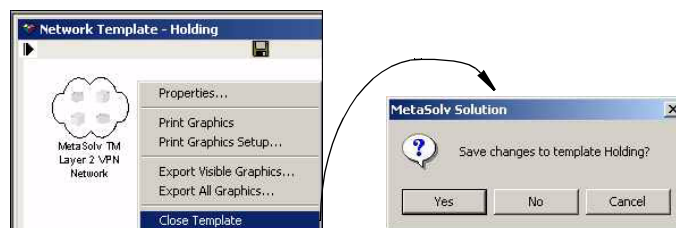
9. Open the **Network Templates** panel, expand the UNCLASS template type, right-click the Holding network template, and select **Create Reference**.
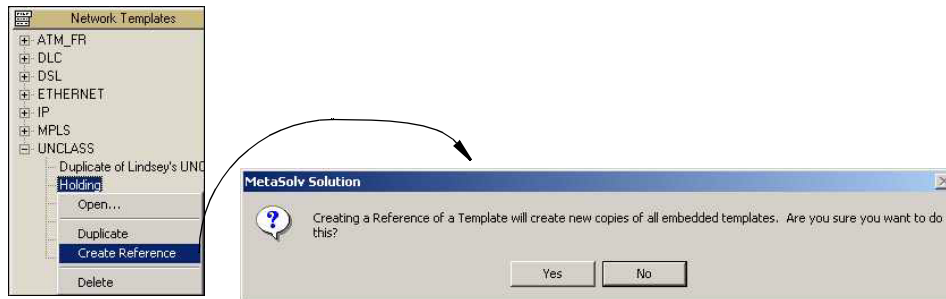
10. Once the Reference templates have been created, right-click the Holding network template again, and select **Delete**.

11. Click **Save** to save your changes.

12. Continue with other network templates tasks or return to the main menu. See "Opening network templates" on page 130.

BECOMING FAMILIAR WITH THE NETWORK TEMPLATES

Before making any changes to an element type or connection spec used in one or more network templates or to a network template embedded in other network templates, it is important to understand the downstream effects. When you inactivate a template element type, delete a template relationship, or change the properties of any component within a network template, those changes, inactivations, or deletions are propagated to all network templates that embed the network template you have modified. When you delete, inactivate, or change an element type or a connection spec, the impact will extend to all network templates in which that element type or connection spec is used. This propagation saves you from having to redo tasks over and over. Whether a given change to a component of a particular network template will have downstream effects depends on whether the network template itself is embedded in other network templates.

You can analyze the contents of a network template either by reviewing the template element types and template relationships listed on the Network Templates Detail panel or by viewing the template element types and template relationships on the canvas. To most efficiently analyze the contents of a network template on the canvas view, it is helpful to reposition the elements to ensure you can detect all existing relationships.

Examining network templates and embedded template element types

Before you begin the process of customizing your network templates, you should become familiar with how they are embedded in other network templates. When one network template contains an embedded network template, that embedded network template is called an *embedded template element type*. The process of analyzing how MetaSolv-defined network templates are embedded will help you understand the impact of any modification you consider.

Use the following process to become familiar with network templates and their embedded template element types.

Steps

1. Display the Network Template Maintenance window. From the main toolbar, click **Engineering > Net Systems > Templates**. Notice the panel lists are closed.
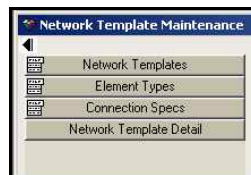
2. Display the embedded networks for a selected network.

    a. Click *Network Templates* to open this panel.

    b. Select a template type to display the network templates. For example, open the MPLS template type to display the four network templates that comprise it.

    c. Double-click one of the network templates, for example MetaSolv TM MPLS. This opens the Network Template Detail panel for the select network template.

    d. To view embedded networks, if any, expand the Element Types list. Notice that there are three embedded networks in the following example of the MPLS network: ATM/FR Network, MPLS Core Network, and MPLS Access Network.
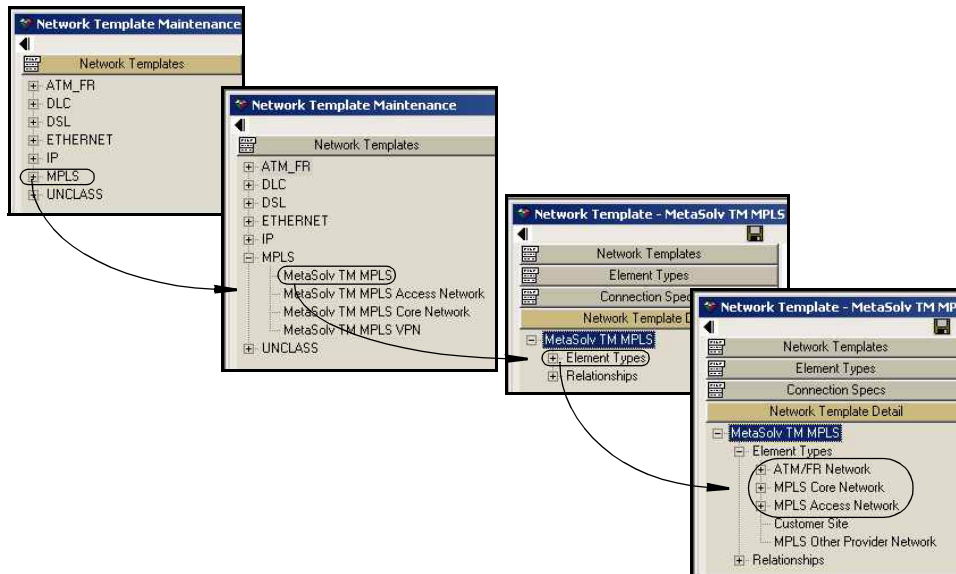
3. Using the preceding steps, preview the element types in each network template and notice the element types that are embedded networks. Embedded networks can be

identified by the preceding + sign, indicating they can be expanded to show their own elements and relationships. Following are some examples:
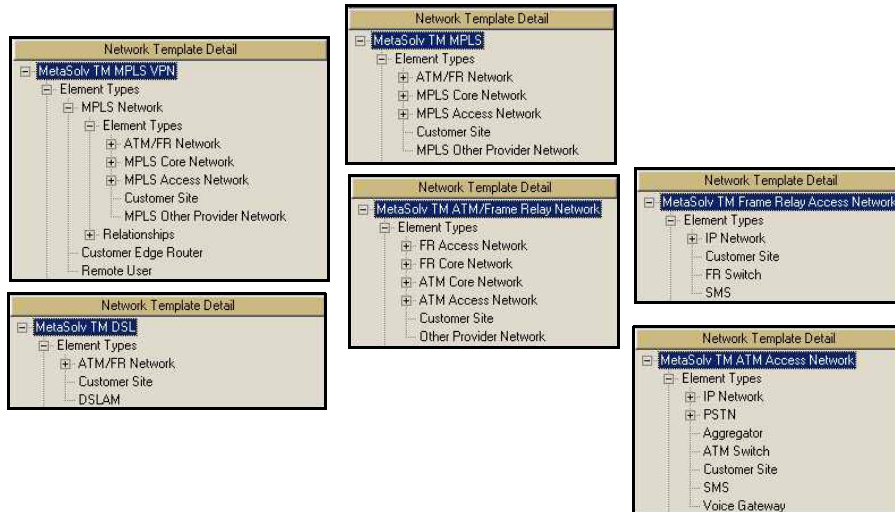
4. Understand the impact of inactivating a network template. Assume you are displaying the ATM/Frame Relay network when you inactivate the embedded MetaSolv TM Frame Relay Core Network. The Frame Relay Core Network will be inactive in the following networks, which includes the network displayed when inactivated plus any networks that embed the displayed network. This includes the following:

- ATM/Frame Relay Network
- Layer 2 VPN Network
- MPLS Network
- DSL network

For this and other relationships among network templates, see the following table.

Table 8: Embedded network templates

This MetaSolv TM network template	Is embedded in this MetaSolv TM network template:
ATM Access Network	ATM/Frame Relay Network
ATM Core Network	ATM/Frame Relay Network
ATM/Frame Relay Network	Layer 2 VPN Network MPLS Network DSL
Frame Relay Access Network	ATM/Frame Relay Network
Frame Relay Core Network	ATM/Frame Relay Network
Ethernet Access Network	Ethernet Network
Ethernet Core Network	Ethernet Network
Ethernet Distribution Network	Ethernet Network
IP Network	ATM Access Network Frame Relay Access Network Ethernet Access Network IP VPN
MPLS Network	MPLS VPN
MPLS Access Network	MPLS Network
MPLS Core Network	MPLS Network
PSTN	ATM Access Network

5. Continue with other network templates tasks or return to the main menu. See "Opening network templates" on page 130.

Examining template element types and template relationships

Some network templates are so complex that when you initially display them, some of their relationships may not be apparent on the drawing. When this is the case, you should reposition the elements to display all the relationships. After such repositioning, you will have the view you need to determine which components you require.

Use the following process to become familiar with template element types and template relationships.

Steps

1. Display the network template details for a selected network.

   a. Display the Network Template Maintenance window. From the main toolbar, click **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel.

   c. Expand a template type.

   d. Double-click a network template within the expanded template type to display the Network Template Detail panel list with the selected network template on the canvas.

2. Position the elements logically such that all relationships are visible. See the following example.

Initial display of MPLS network

Display of MPLS network template after repositioning the element types representing embedded network templates.
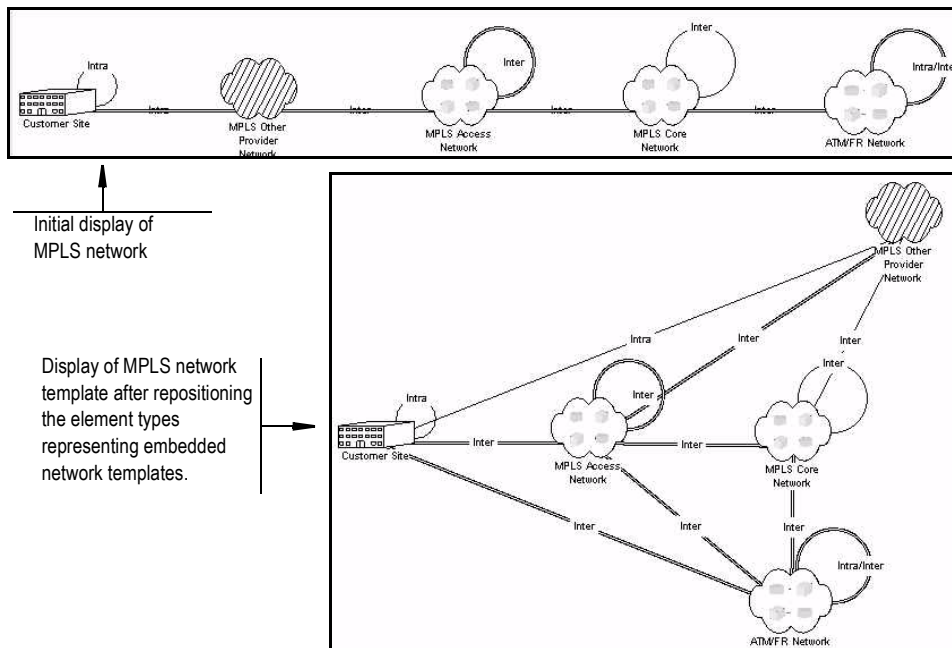
3. After repositioning the displayed network elements, save the drawing.

Click to save reformatted drawing.

4. While the repositioned network drawing is displayed, survey the properties of the network template.

5. Consider inactivating the network elements that are not required and deleting the relationships that your network designers will never need. See "Delete a template element type" on page 162. See "Delete a template relationship" on page 170.

6. Repeat for each template type.

Components of ATM_FR network templates

If you are using the ATM_FR template type, reposition the elements in the following MetaSolv TM network templates to view all existing relationships: ATM/Frame Relay, ATM Access, and Frame Relay Access. Note that ATM Core, Frame Relay Core, and Layer 2 VPN drawings contain no hidden relationships.

The relationships shown in the ATM access network template from the customer site to the various other element types represent network connections that are used when provisioning a service request for customer connections within a product bundle. The presence of the Customer Site element type in this access network supports connections that are defined as network extensions.

To identify which of these connections represent a virtual connection or both a physical and virtual connection, either examine the connection specs associated with the relationship under relationship properties Network Templates, or refer to the diagrams in the *ATM/Frame Relay Technology Module Guide.* For example, the relationship between the Customer Site and the PSTN switch is a voice connection, which is a virtual connection. In the technology module guides, virtual connections are easy to identify since they are shown as red dashed lines.

If you compare the relationships in the following figure with those in Figure 130 on page 117, you will notice that the embedded ATM access network includes two additional virtual connections that are not defined in the ATM access network itself—those are the Internet connections (virtual) between the customer site and the IP router, and between the customer site and the SMS.
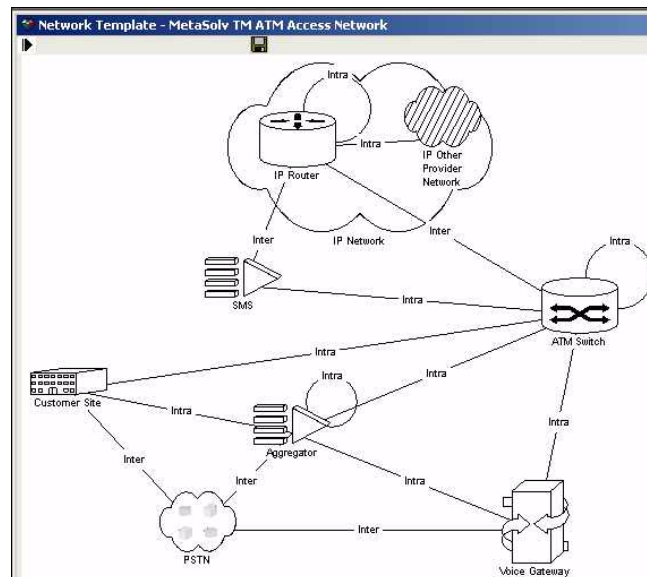
Figure 125: MetaSolv TM ATM Access Network Template

The relationship shown within the ATM core network template enables an internal core network system to be designed, using the ATM technology, composed exclusively of interconnected ATM switches.
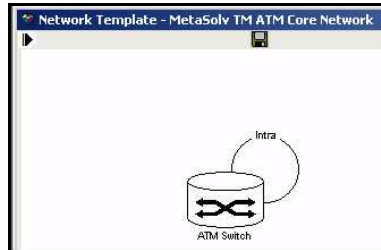
Figure 126: MetaSolv TM ATM Core Network Template

The relationship between the customer site and the frame relay switch enables the provisioning of a customer-ordered connection that is an extension of the frame relay access network rather than a connection that is part of a customer-ordered network. The presence of the Customer Site element type in this access network provides the flexibility to build networks using just the Frame Relay Access network template alone (without the ATM/Frame Relay network template).
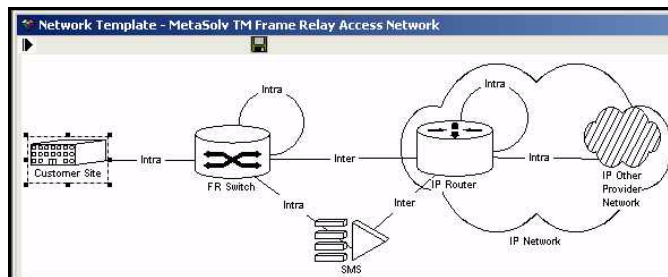
Figure 127: MetaSolv TM Frame Relay Access Network

The relationship shown within the frame relay core network template enables an internal core network system to be designed, using the frame relay technology, composed exclusively of interconnected frame relay switches.
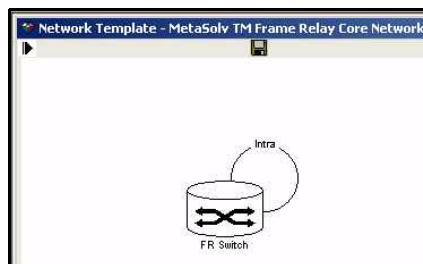
Figure 128: MetaSolv TM Frame Relay Core Network

When you initially display the ATM/Frame relay network template, you can reposition the element types representing network systems such that you can view the relationships among the network systems. This provides just a high-level view.
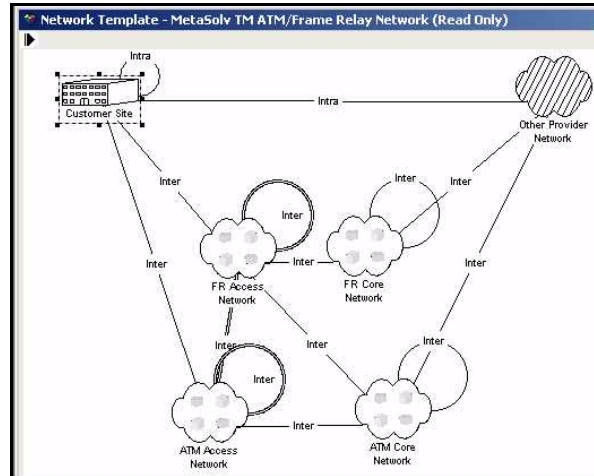
Figure 129: MetaSolv TM ATM/Frame Relay network template (embedded networks collapsed)

If you expand all the embedded networks, which are represented with a cloud, you can view relationships at the detail of element types representing nodes rather than element types representing embedded networks.

If you compare the relationships in the following figure with those in Figure 125 on page 114, you will notice that the embedded ATM access network includes two additional virtual connections that are not defined in the ATM access network itself—those are the Internet connections (virtual) between the customer site and the IP router, and between the customer site and the SMS. The customer site displayed in the upper left hand corner (not in an embedded network) represents an off-net location. It has an Intranetwork relationship with the other provider network template element type. This element type is designed to be used as the destination of an enterprise connection that is offnet. This

template element type would be used by a carrier's carrier that makes arrangements for connections outside their own network.
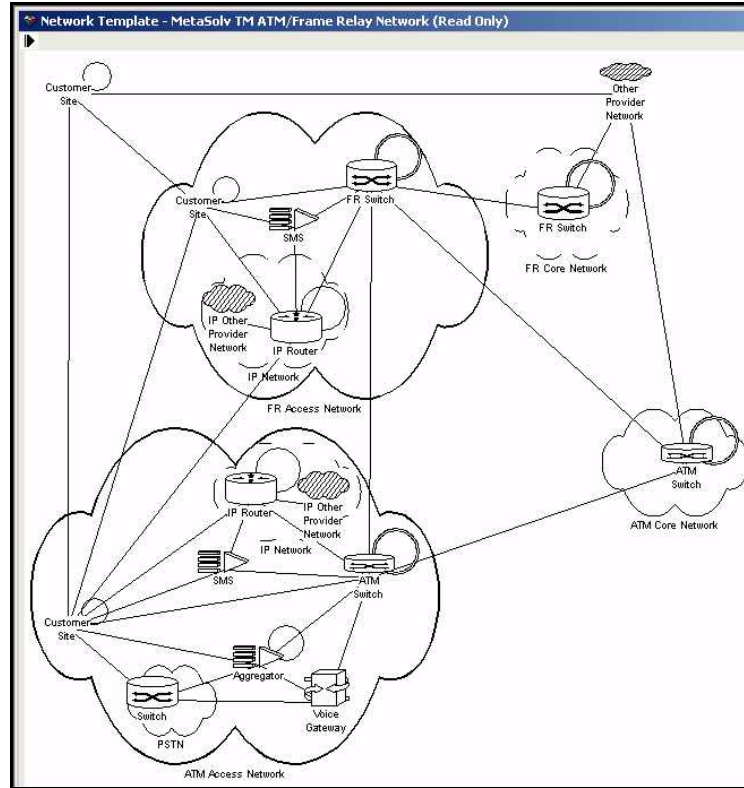
Figure 130: MetaSolv TM ATM/Frame Relay network template (embedded networks expanded)

The MetaSolv TM Layer 2 VPN network template is the network template in the ATM_FR template type that comprises all of the other network templates in this template type. The element type unique to this VPN network template is the Customer Edge Router. This element type is used to represent nodes of an ordered network system, specifically, a customer VPN. Connection specs have been defined between the customer edge router and many other element types. For example, VPN links provide the possibility of designing a bandwidth connection between a customer edge router and any of the following element types: an ATM switch in the ATM access network, a frame switch in the frame access network or another provider network. Connections between nodes of a VPN are provided with an intranetworking relationship between customer edge routers called Layer 2 VPN connection. Internet connections are supported by relationship from the customer edge router to the IP router in either the IP network embedded in the

ATM access network or the IP network embedded in the frame relay access
network.
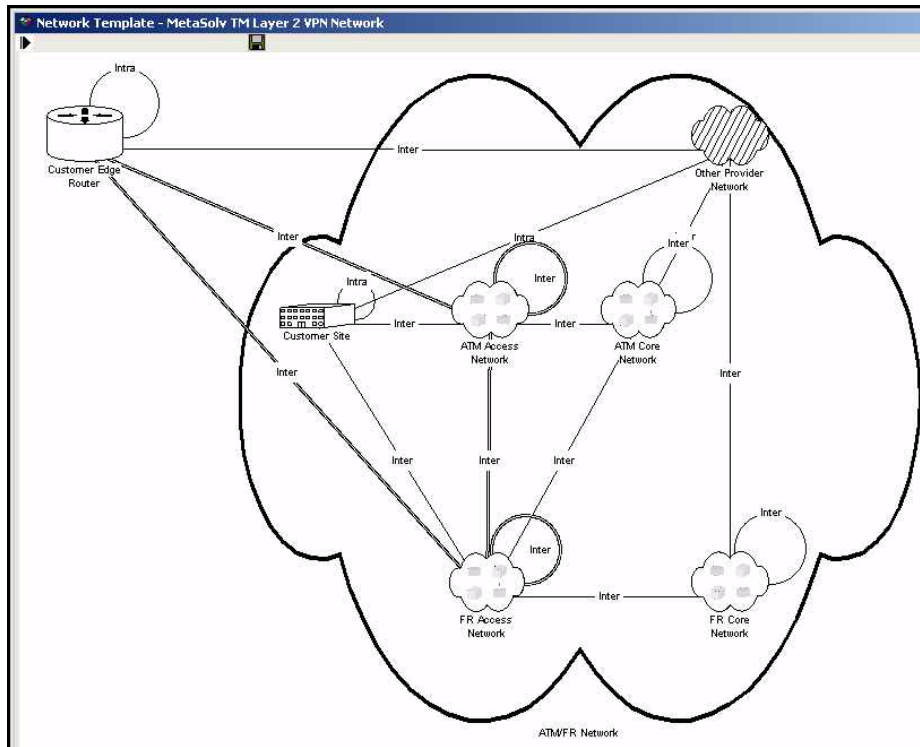
Figure 131: MetaSolv TM Layer 2 VPN Network Template

Components of the DLC network template

If you are using the DLC template type, the elements are already positioned to display all relationships.

Figure 132: MetaSolv TM DLC Network Template

Components of the DSL network template

If you are using the DSL template type, the DSL network template elements are already positioned to show all existing relationships among the customer site element type, the DSLAM element type and the ATM/FR network template.
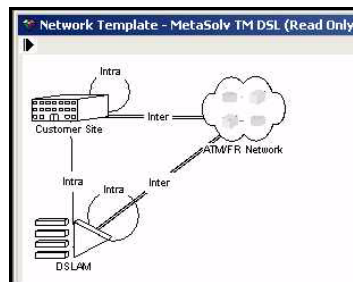
Figure 133: MetaSolv TM DSL Network Template

Expand the ATM/FR network cloud to display the relationships to the individual embedded network templates. To identify which of these connections represent a virtual connection (or both a physical and virtual connection), either examine the connection

specs associated with the relationship under relationship properties Network Templates, or refer to the diagrams in the *Digital Subscriber Line Technology Module Guide.*

Represent all virtual connections for services the provider provides to the customer

Represents the physical connection from a customer site to the provider network
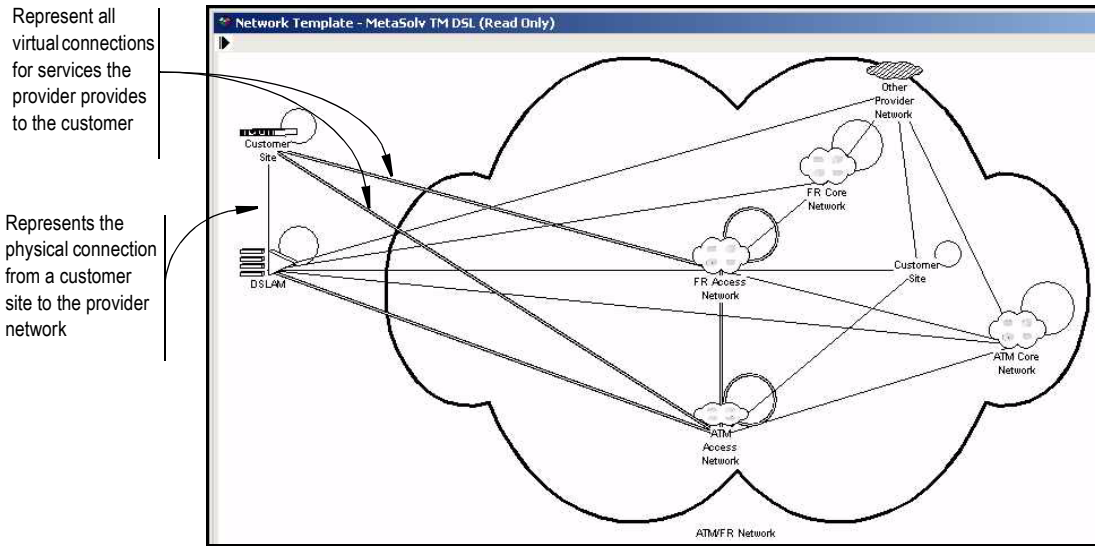
Figure 134: MetaSolv TM DSL Network Template (partially expanded)

Sometimes the relationships on a full expansion is not easy to decipher from the canvas. In such a case, review the textual description of relationships on the panel list.
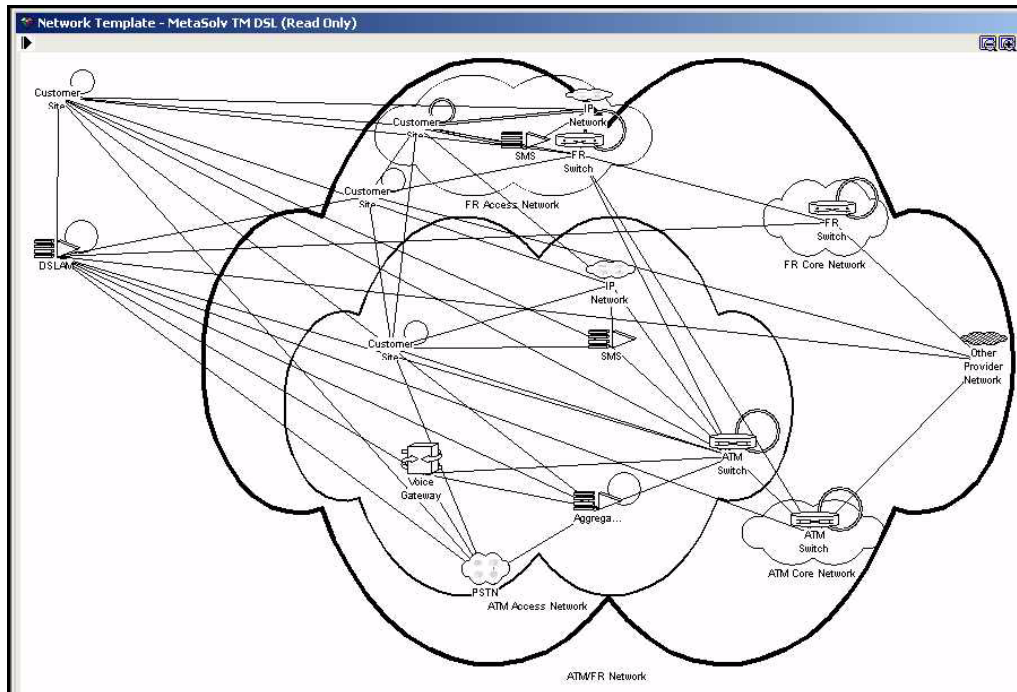
Figure 135: MetaSolv TM DSL network template (fully expanded)

Components of Ethernet network templates

The Ethernet access network template is similar to the frame relay access template except that no customer site is included. The assumption is that you will not be building your internal networks based only on the Ethernet access template—that if you are using Ethernet, you will be building your internal networks on the Ethernet network template that includes the access, distribution, and core networks. For more details, refer to the diagrams in the *Ethernet Technology Module Guide.*

Figure 136: MetaSolv TM Ethernet Access Network Template

The relationship shown within the Ethernet core network template enables an internal core network system to be designed, using the Ethernet technology, composed exclusively of interconnected switched routers.

Figure 137: MetaSolv TM Ethernet Core Network Template

From a template standpoint, the MetaSolv TM Ethernet distribution network template looks exactly like the Ethernet core template.
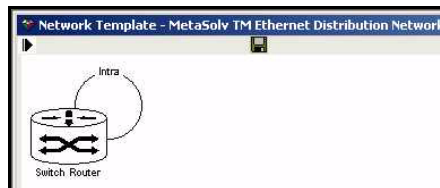
Figure 138: MetaSolv TM Ethernet Distribution Network Template

Notice that the Ethernet distribution network template is an optional network component. That is, the template allows for direct connectivity between the Ethernet access network and the Ethernet core network
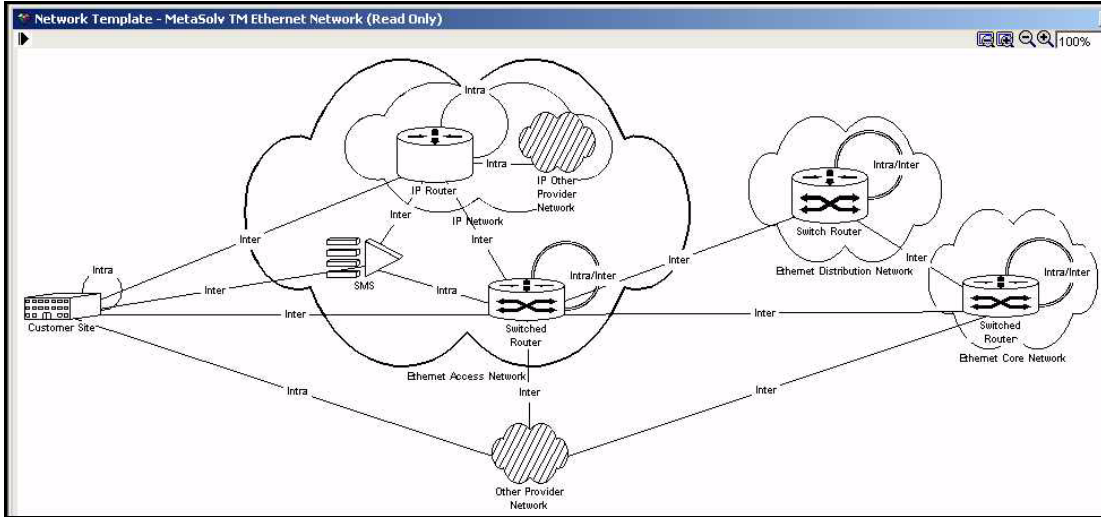
Figure 139: MetaSolv TM Ethernet Network Template

The MetaSolv TM VLAN network template allows you to emulate any Virtual LAN. Notice that there are no relationships defined for this network template. This is because VLANs are based on logical instead of physical connections. VLANs are created by configuring a group of devices on different LANs, using management software, so that they can communicate as if they were on the same LAN.

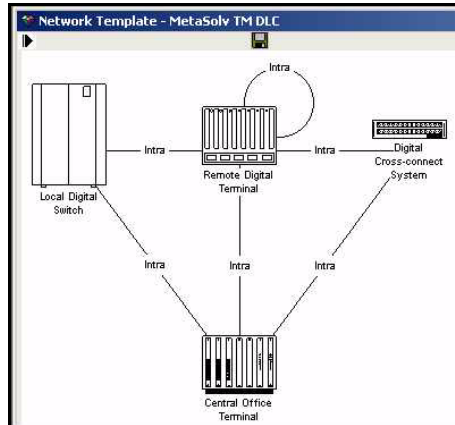**Figure 140: MetaSolv TM VLAN Network Template**

Components of IP network templates

If you are using the IP template type, both the IP network template and the IP VPN network template display all existing relationships and require no repositioning of element types. The assumption here is that IP networks are composed of interconnected routers and routers connected to other provider networks. If your IP network includes equipment such as load balancers or servers, such as a mail server or a web hosting server, you can add

element types representing these network nodes to your IP network template. For more details, refer to the diagrams in the *Internet Protocol Technology Module Guide.*
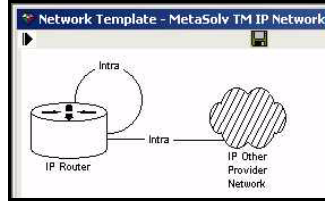
Figure 141: MetaSolv TM IP Network Template

In the IP VPN network template, the customer edge router can be used to represent each node of a VPN. It is not restricted to use in an intranet VPN. That is, you could also use this element type to represent partner nodes in an extranet VPN. No distinction is made at the network template level. The remote user element type provides you with a place to store custom attributes for the remote user occurrences in network design, such as Userid/password.
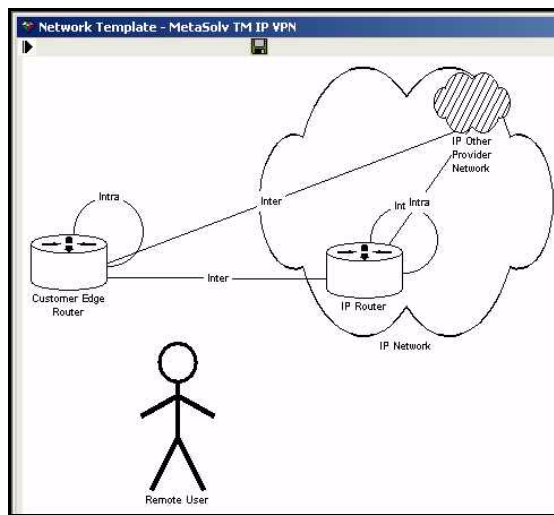
Figure 142: MetaSolv TM IP VPN Network Template

The VPN - Basic configuration is designed to accommodate VPNs ordered and provisioned with MetaSolv Solution prior to the 5.1 release. In the design of a network using this template, the connection to the remote user is not controlled by the provider.
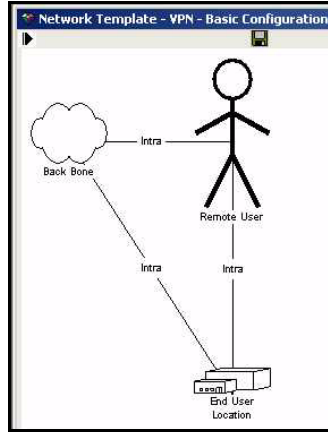
Figure 143: VPN - Basic Configuration Network Template

Components of MPLS network templates

If you are using the MPLS template type, reposition the elements in the MPLS and MPLS Access network templates to display all defined relationships.
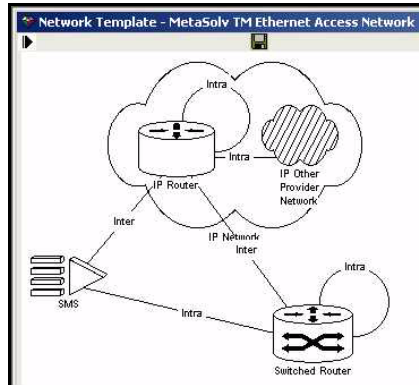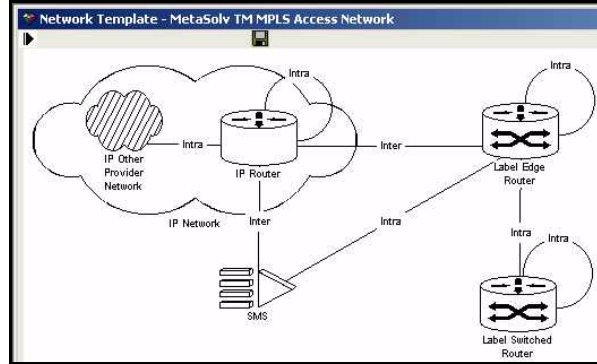

Figure 144: MetaSolv TM MPLS Access Network Template

The relationship shown within the MPLS core network template enables an internal core network system to be designed, using the MPLS technology, composed exclusively of interconnected label switched routers.
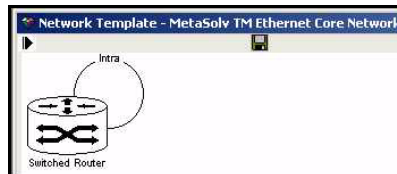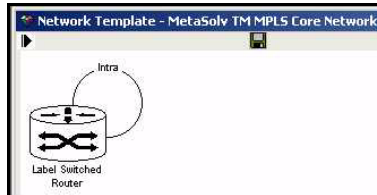

Figure 145: MetaSolv TM MPLS Core Network Template

The MPLS network template contains three embedded networks. The following figure shows the relationships at the embedded network template level.
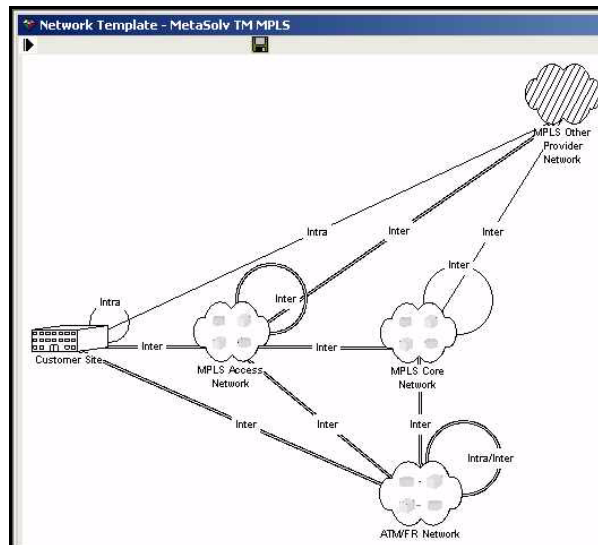
Figure 146: MetaSolv TM MPLS Network Template (with embedded networks)

Expanding the MPLS access and MPLS core network templates, you can see the relationships among the elements that compose them. To view the relationships to element types within the ATM/Frame Relay network, see the Relationship section on the

panel list. For details on virtual connections, refer to the diagrams in the *Multiprotocol Label Switching Technology Module Guide.*
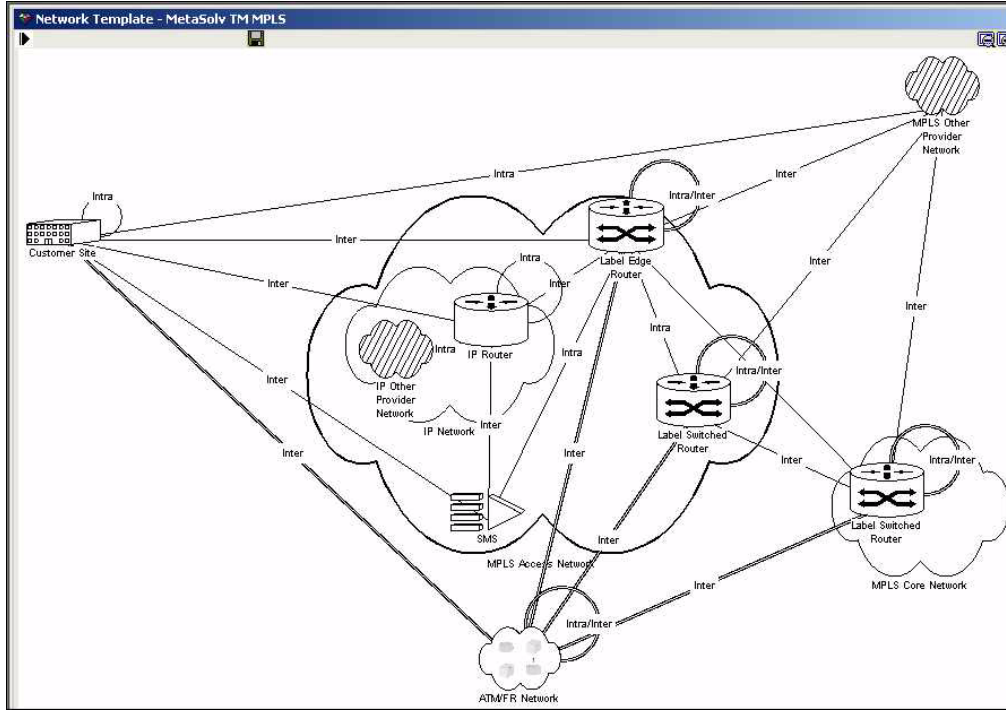
Figure 147: MetaSolv TM MPLS Network Template (with access and core expanded)

If you look at the relationships between element types within the ATM/Frame Relay network on the panel list, you will notice the notation "LSR." This notation refers to the case when an ATM switch is Label Switched Router enabled.

The MPLS VPN network template adds a customer edge router and a remote user element type to the MPLS network template. The customer edge router connectivity to itself allows connectivity between the home office and branch office of an ordered customer VPN. The

relationship between the customer edge router and the MPLS access network supports the design of a VPN bandwidth link.
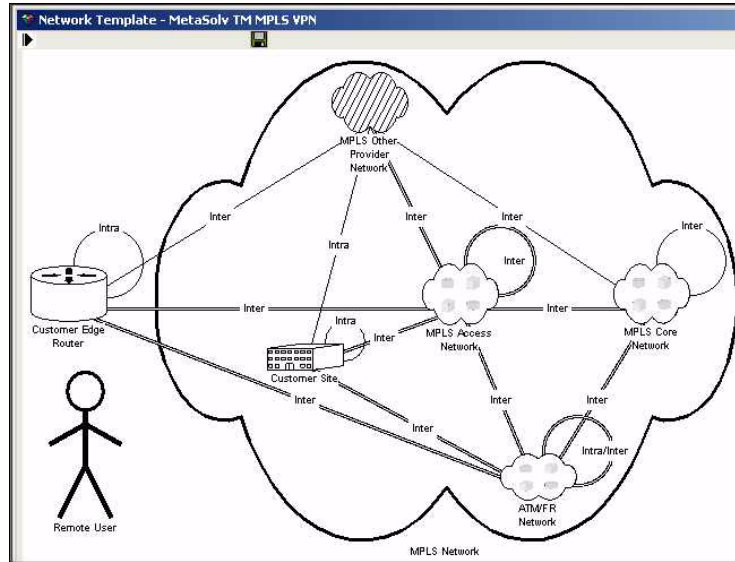
Figure 148: MetaSolv TM MPLS VPN Network Template

Examining element types

You are familiar with the types of network elements composing your internal and external networks. You may want to list those and compare your list with the MetaSolv-defined element types. This comparison will enable you to identify any element types you need to add as well as those that represent types of elements you will never use. Later, you can create the new element types and inactivate the unneeded ones based on your review and analysis.

Use the following steps to preview all element types.

Steps

1. Open the Element Types panel list on the Network Template Maintenance window.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Element Types* panel list.

   c. If a search window is displayed, select **Text** or **Images and Text** from the panel menu.

2. Review the list with Figure 5 on page 8, which contains annotations on a purpose served by each MetaSolv-defined element type.

3. Evaluate each element type for potential use by comparing it to your list of element types used by your business or organization. For details on a given element type, right-click the element type and select **Properties**.

4. For each MetaSolv-defined element type that maps to elements used in your network system, examine its custom attributes and identify any that need to be added, modified, or deleted. Keep a list.

5. For each MetaSolv-defined element type that does not map to elements used in your network system, make note for possible deactivation.

6. Make note of any element type you use in your network systems that does not appear on the Element Types panel list.

Examining connection types and connection specs

You are familiar with the types of network connections composing your internal networks and the types of customer connections that you provision over your internal networks. You may want to list those and compare your list with the MetaSolv-defined connection types and connection specs. This comparison will enable you to identify any connection types and connection specs you need to add as well as those that represent types of connections you will never use. Later, you can create the new connection specs and connection types and inactivate the unneeded ones based on your review and analysis.

Use the following steps to become familiar with connection types and connection specs.

Steps

1. Open the Connection Specs panel list on the Network Template Maintenance window.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Connection Specs* panel list.

   c. If a search window is displayed, select **Hierarchy** from the panel menu.

2. Review the list of connection types with Figure 30 on page 30.

3. Evaluate physical connections for potential use by comparing each to your list of connection types/connection specs used by your business or organization. See Connection specs of the Physical connection type beginning on page 31. Considerations include evaluating where a connection type or connection spec is currently use. An example follows.

   a. If you have provided VPN services using MetaSolv prior to 5.1, you may need the circuits used within the VPN - Basic Configuration network template.
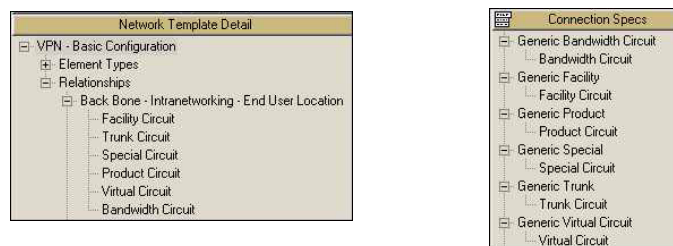
   b. If you have not provided VPN services using MetaSolv prior to 5.1, you may want to consider inactivating the circuits used exclusively within the VPN - Basic

Configuration network template. If so, create a list of connection types and connection specs to deactivate and add these to your list. Before a connection type or connection spec can be made inactive on the Connection Specs panel, it must first be deactivated in each Network Template Detail where it is used.

Note: A connection spec cannot be changed to inactive if it is associated with a network connection item in a product spec.

4. Evaluate virtual connections for potential use by comparing each to the list of connection specs used by your business or organization for virtual connections. See annotations on Figure 7 on page 9. Also see "Connection specs of the Virtual connection type" on page 33.

5. Evaluate group connections for potential use by comparing each to the list of group connection specs used by your business or organization. See "Connection specs of the Group connection type" on page 34.

6. As you evaluate each connection spec for potential use by comparing it to the list of connections used by your business or organization, consider the details for the connection spec. Right-click the connection type name or connection spec and select **Properties**.

7. For each MetaSolv-defined connection spec that maps to connections you need, examine its custom attributes and identify any that need to be added, modified, or deleted. Keep a list.

8. For each MetaSolv-defined connection spec that does not map to elements used in your network system, make note for possible deactivation.

9. Make note of any connection spec you use in your network systems that does not appear on the Connection Specs panel list. You will want to add these.

BECOMING FAMILIAR WITH COMMON PROCESSES

You will need many of the following processes for any template customization. It is helpful to become familiar with these before you begin working with network templates.

- Opening and closing network templates
  ⇒ Display the Network Template Maintenance window from the MetaSolv Solution main toolbar
  ⇒ Redisplay the MetaSolv Solution main toolbar from the Network Template Maintenance window
- Saving or canceling changes
  ⇒ Save changes made to a component of a particular network, where the component could be a template element type, an embedded template element type, a template relationship, or a template connection.
  ⇒ Cancel changes made to a component of a particular network, where the component could be a template element type, an embedded template element type, a template relationship, or a template connection.

- Exporting a network template
  - ⇒ Export graphics that you are viewing on the canvas
  - ⇒ Export all graphics, including those portions not currently displayed
- Printing a network template graphic
  - ⇒ Set up print options
  - ⇒ Print displayed or all graphics as they are formatted on the canvas
- Unlocking a network template
  - ⇒ Remove locks from a template that is locked in your name due to an unexpected termination (such as a server going down)
  - ⇒ Remove locks from a template someone else has locked if you are working on a team and have notified the person who has it locked

Opening network templates

Use the following process to open network templates from the main toolbar.

Steps

1. Click the **Engineering** button.

2. Click the **Net Systems** button.

3. Click the **Templates** button.

Closing network templates

Use the following process to close network templates and redisplay the main toolbar.

Steps

1. Click the **Close** button to close the Network Template Maintenance window.

2. Click the **Close** button to close the Network Systems window.

3. Click the **Close** button to close the Engineering window.

Saving or canceling changes

You can change the properties of an element type from the Element Types panel. You can change the properties of a connection type or connection spec from the Connection Specs panel. When you make any such change and click **OK**, those changes are permanent and cannot be automatically backed out. To undo a change to a component that is available to any network, you need to manually reinstate the specifications you changed.

You can change the properties of a template element type, a template relationship, or a template connection from the canvas displaying a selected network template detail. When you make any such changes and click **OK**, those changes can be backed out when you close the template as long as you have not explicitly clicked the **Save** button. When you are involved in a long process, you may want to click **Save** periodically to save incremental changes. However, it is a good practice to review your changes and ensure your new specifications are correct before saving.

Use the following processes to save or back out pending changes to a particular network template (or defer the decision).

Steps

1. Right-click anywhere on the canvas and select **Close Template**.

2. When the confirmation message for saving changes appears, proceed in one of the following ways:

   ■ Click **Yes** to save pending changes and close the network template detail.

   ■ Click **No** to back out the pending changes and close the network template detail.

   ■ Click **Cancel** to close the message box with the network template detail displayed.

Exporting a network template

Use the following process to export a network template drawing in a Windows Enhanced Metafile (*.EMF) or a Bitmap (*.BMP) format.

Steps

1. Display Network Template Details and graphical display for the network template containing the graphic to be exported.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template

   d. Double-click the network template name.

2. Right-click a blank area of the canvas and proceed in one of the following ways:

   ✥ Select **Export Visible Graphics** to export only the portion of the network template visible on the canvas.

   ✥ Select **Export All Graphics** to export the entire network template.

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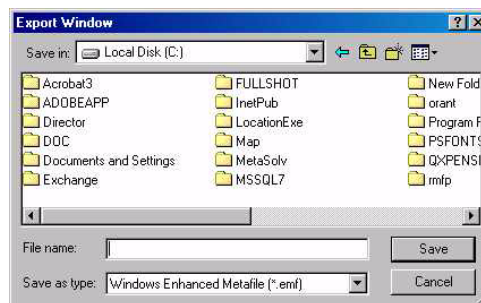
4. Click **Save**.

Printing a network template graphic

You can choose to print your network template in two ways. You can print only what displays on the canvas or you can print the entire network template.

Set up printing options

Use the following process to set up options for printing.

Steps

1. Display Network Template Details and graphical display for the network template containing the graphic to be printed.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template.

   d. Double-click the network template name.

2. Right-click a blank area of the canvas and select **Print Graphics Setup**.
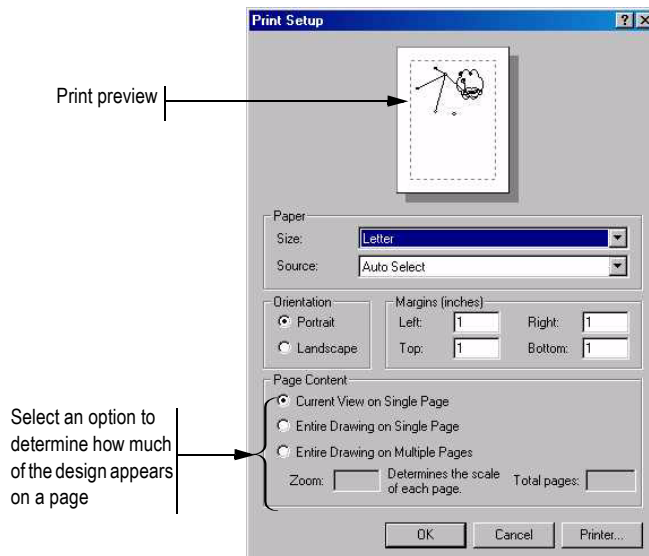
3. Select the appropriate settings for paper, orientation, and margins.

4. Select the appropriate scale from the following options, based on your preference of the print preview appearance.

   ✥ Select **Current View on Single Page** to print only what is visible on the canvas on a single page.

   ✥ Select **Entire Drawing on Single Page** to print the entire network system on a single page.

     ↳ Select **Entire Drawing on Multiple Pages** to print the entire network system using the number of pages required by the zoom percentage you select.

5. Click **OK**.

Print the network template

Use the following process to print a network template.

Steps

1. Display Network Template Details and graphical display for the network template containing the graphic to be printed.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template.

   d. Double-click the network template name.

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

3. Select desired options on the Print window and click **OK**.

Unlocking a network template

A network template can be active for only one user at a time. When a network template is displayed on the canvas for use, it is locked to other users. If you attempt to open such a network template, a message appears with the user's name and a time stamp indicating when the template was locked. The message provides an option for opening the network template in read-only mode. If you attempt to open a network template that you were customizing when the system terminated unexpectedly, a message appears with your name on it. In this case, you must unlock the network template to continue your work. If you need to make changes to a network template locked by another user, it is possible to remove the lock and open the network template.

Access to the Remove Lock function should be controlled by the System Administrator who can secure this window from the Security module. If this window is secured, see your system administrator about permission to remove locks from a network template.

    Warning: Use the Remove Lock feature with caution. Make sure you do not unlock a network template that is being customized by another user. You can overwrite the changes another user has made after you remove the lock.

Steps

Use the following process to remove locks from a locked network template.

1. Display the Remove Locks window.

   a. From the main toolbar, select **Engineering > Net Systems**.

b. From the Options menu, select **Remove Locks** to display the list of network systems and network templates that are currently locked.

2. Examine the window. An example follows:
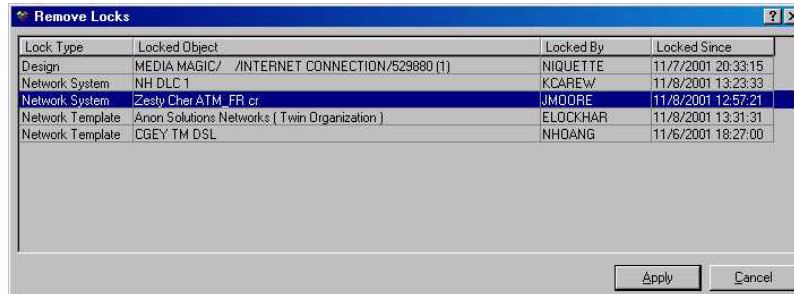
3. Right-click the network template you want to unlock, select **Remove Lock**, then click **Apply**.

4. To work with the network template you unlocked, display the Network Template Details and graphical canvas.

a. Select **Templates**.

b. Open the Network Templates panel list.

c. Expand the template type containing the network template.

d. Double-click the network template name.

CUSTOMIZING COMPONENTS FOR ANY NETWORK TEMPLATE

You can customize an element type and a connection spec and add the customized version to one or more existing network templates. You can customize a network template and then embed it into one or more existing network templates. Any customization performed on such a component has global impact; that is, the customized version is applied wherever that component is used.

You can also customize template element types and template connection specs that belong to a particular network template. Customization performed to a component within the context of a particular network template has limited impact; that is, the changes apply only to the occurrence of the component on which you make the change.

This section deals with customization that will affect every network template in which the component is used. Managing a network template is included in this section because a network template can be embedded in another network template as an embedded template element type. Topics include:

- Managing a network template
- Managing an element type
- Managing a connection spec

⊖ **Note:** Custom attributes can be added, modified, and deleted for any network template, element type, or connection spec through the MetaSolv Solution Utility application. These processes are not documented in this section; they are discussed in the *CA Technical Update*.

Managing a template type or network template

Each MetaSolv technology module supports a technology type. Each technology type is represented by a template type that is composed of one or more network templates. You cannot create a new template type in MetaSolv Solution.

You can manage a network template or its template type in the following ways:

- Modify properties of a template type
- Add a new network template shell and define its properties (For information on adding details, see "Define a new network template (end-to-end)" on page 151.)
- Modify properties of a network template

Modify properties of a template type

The only template type property you can modify is the long name and whether it is active. Normally, there is no need to modify properties of a template type.

Use the following process to modify properties of a template type.

Steps

1. Display the Template Type window as follows:

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel to open it.

   c. Right-click a template type and select **Properties**.

2. Examine the window. An example follows.
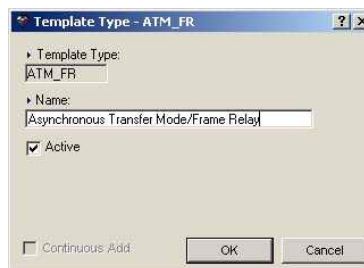
3. Make one or more of the following changes:

   - Enter a new name in the **Name** field.
   - Ensure the **Active** checkbox remains checked, since unchecking it will shut down all activity for any network template belonging to this template type.

4. Click **OK** to close the Template Type window and save the changes.

Add a new network template and define its properties

Use the following process to add a new network template and define its properties.

Steps

1. Display the Managing a Template window as follows:

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel menu and select **Add Template**.

   c. When the Network Template Detail window opens, either right-click anywhere on the canvas and select **Properties**, or right-click *NewTemplate* on the *Network Template Detail* panel and select **Properties**.

2. Examine the window. An example follows. For more details, Figure 96 on page 80.
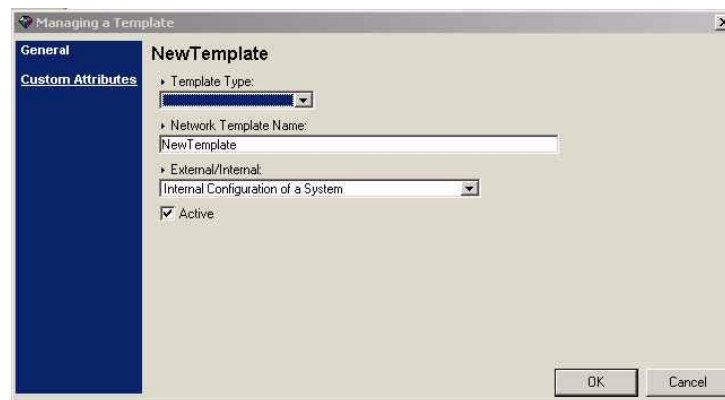
3. Define the properties of the new network template:

   ■ Select the parent template type from the **Template Type** dropdown.

   ■ Enter a name in the **Network Template Name** field.

   ■ Select a value from the **External/Internal** dropdown, based on whether this network template is to be used to design an internal (provider) network or a external (customer) network.

   ■ Leave the **Active** checkbox checked unless you want to prevent the network template from being designed.

4. Click **OK** to save your changes and close the Managing a Template window.

5. Save your changes and close the network template detail in one of the following ways:

   ■ Click **Save** to save your specifications for the network template, then right-click anywhere on the canvas and select **Close Template**.

   ■ Right-click anywhere on the canvas and select **Close Template** and click **Yes** to the message to save changes.

Modify properties of a network template

Use the following process to customize general properties of a network template.

Steps

1. Display the Managing a Template window as follows:

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel, expand the template type for the network template, right-click the network template name and select **Open**.

   c. Right-click in an open area of the canvas and select **Properties** to view the general properties of the template from the Managing a Template window.

2. Examine the window. An example follows. For more details, see Figure 97 on page 80.
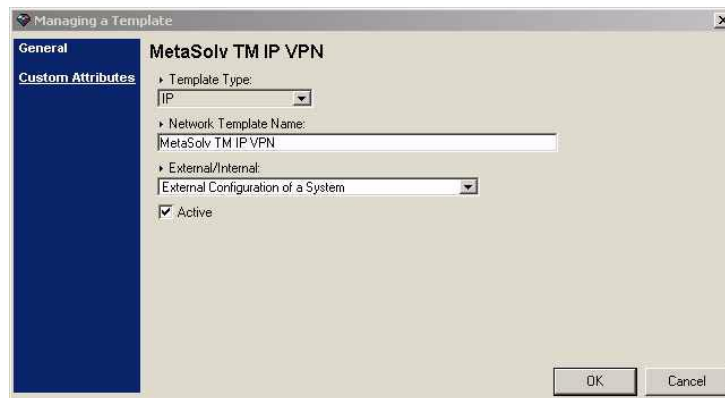
3. Make one or more of the following additions or changes:

   ▪ Enter a new name in the **Network Template Name** field.

   ▪ Change the configuration setting by selecting the other option from the dropdown.

   ▪ Click the **Active** checkbox to inactivate or reactivate the network template.

4. If you unchecked the **Active** checkbox, evaluate your action with the results explained in the message, "Making this template inactive will inactivate all embedded occurrences of this template within other templates" and click **OK**.

5. Click **OK** to save your changes and close the Managing a Template window.

Managing an element type

You can manage an element type in the following ways:

▪ Add a new element type
▪ Modify properties of an element type
▪ Delete a user-defined element type

Add a new element type

If you need to add an element type to a template, but none of the existing element types are appropriate, you can create a new element type. For an example, see "Scenario 2—Add new components to a network template" on page 187.

Use the following process to add a new element type.

Steps

1. Display the Managing an Element Type window as follows:

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the Element Types panel menu and select **Add Element Type.**

2. Examine the window. An example follows.
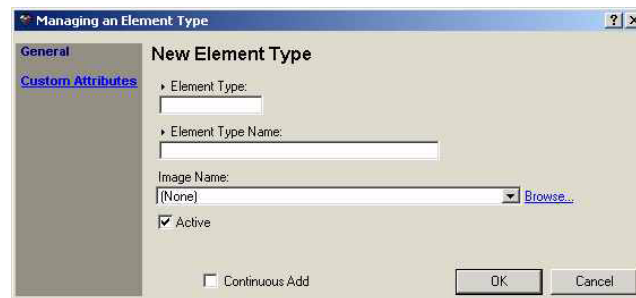
3. If you'll be adding more than one element type this session, check the **Continuous Add** checkbox to keep the window open with cleared entries when you click **OK**. (Uncheck it before adding the final element type.)

4. Define the properties for the new element type.

   - Identify the element type.
   - Give it a name.
   - Choose an image for it.

     To add bitmaps for use as images, create them as .emf files and save them in an appropriately named folder. Then, browse to that folder (by clicking the Browse link to the right of the Image Name field) and select the bitmap you created.

   - Leave it checked as **Active**.

5. Click **OK** to save and close the new element type.

   The new element type now appears in the *Element Types* panel.

Modify properties of an element type

You can change the name, image, or status of an element type. If you want to modify the image for an element type, you must first create an .emf file of the image you want to use and move it to the directory containing the other MetaSolv-defined images.

Use the following process to modify an element type.

Steps

1. Display the Managing an Element Type window as follows:

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Element Types* panel list.

   c. On the Element Types panel, right click the element type to be changed and select **Properties.**

2. Examine the window. An example follows.
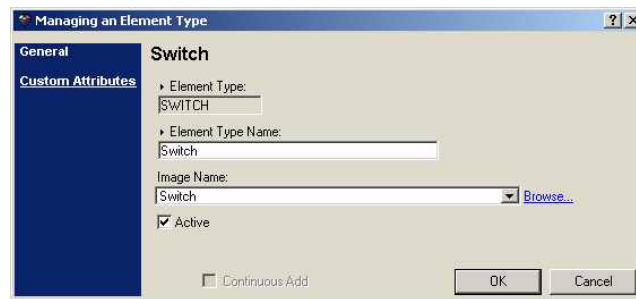
3. Determine the modification to make. You can do any of the following:

   ▪ Change the element type name
   ▪ Change the image for the element type
   ▪ Change the status—deactivate or reactivate the element type

4. To change the name, enter a new name in the Element Type Name field.

5. To change the image:

   a. Click the **Browse** link.

   b. Highlight the name of the file you created and click **OK**.
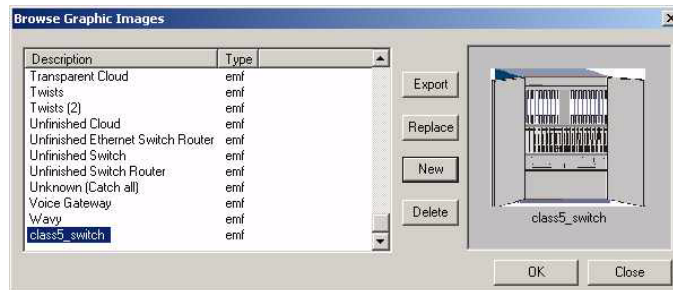
   c. Verify the image name and click **OK**.

d. Select **Refresh** to display the new image in the Element Types panel list.
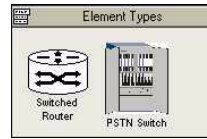
6. To reactivate a deactivated element type, click to check the **Active** checkbox.

7. To deactivate an active element type, proceed as follows:

   a. Verify that it is not referenced by product specifications or product catalog, and if it is remove the reference.

   b. Click the **Active** checkbox to remove the check.

   c. When the confirmation message appears, click **OK**.

   🛈 **Note:** Making an element type inactive will inactivate all occurrences of this element type within each template.

Delete a user–defined element type

Use the following process to delete a user-defined element type.

Steps

1. Display the Element Types panel on the Network Template Maintenance window.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Element Types panel.

   c. If the Search view is displayed, change it to **Text** or **Images and Text**.

2. Right-click the image or name of the element type to be deleted and select **Delete**. For an example, see Figure 76 on page 69.

3. When the confirmation message appears, click **Yes**.

Managing a connection type

You can manage a connection type in the following ways:

- Add a new connection type
- Modify properties of a connection type
- Delete a user-defined connection type

Add a new connection type

Use the following process to add a connection type.

Steps

1. Display the Connection Type - New window.

    a. From the main toolbar, select **Engineering > Net Systems > Templates**.

    b. Click the Connection Specs menu and select **Add Connection Type**.
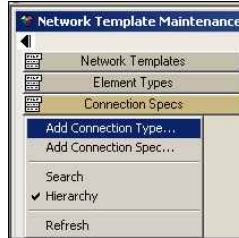
2. Examine the window. An example follows. For details, see Figure 78 on page 70.
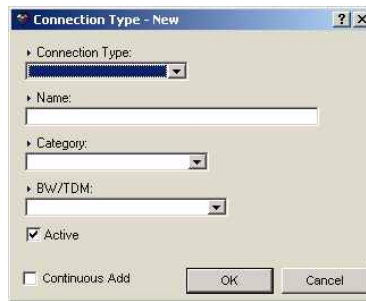
3. Complete the required fields:

- Select the connection type from the **Connection Type** dropdown.
- Enter a name in the **Name** field.
- Select the category from the **Category** dropdown.
- Select either Bandwidth or Time Division Multiplexing from the **BW/TDM** dropdown.

4. Click **OK** to save the definition of the new connection type.

Modify properties of a connection type

Use the following process to modify properties of a connection type.

Steps

1. Display the Connection Type window for a selected connection type.

    a. From the main toolbar, select **Engineering > Net Systems > Templates**.

    b. Open the Connection Specs panel.

    c. Right-click the selected connection type and select **Properties**.

2. Examine the properties. For an example, see Figure 84 on page 73.

3. Change one or more properties as follows:

- Select a different connection type from the **Connection Type** dropdown.

- Enter another name in the **Name** field.
- Select a different category from the **Category** dropdown.
- Change the Bandwidth or Time Division Multiplexing setting by selecting the other option from the **BW/TDM** dropdown.
- Click the **Active** checkbox. If removing a check to change the setting to inactive, click **Yes** when the confirmation message appears.

> **Note:** Making a connection type inactive will inactivate all connection specs of this type.

4. Click **OK** to save the definition of the modified connection type.

Delete a user-defined connection type

Use the following process to delete a user-defined connection type.

Steps

1. Display the Network Templates Maintenance window. From the main toolbar, select **Engineering > Net Systems > Templates**.

2. If the connection type is referenced by a connection spec, delete the connection spec as described on page 150.

3. Open the Connection Specs panel list in hierarchy view.

4. Right-click the connection type to be deleted and select **Delete**. For an example, see Figure 85 on page 74.

Managing a connection spec

You can manage a connection spec in the following ways:

- Add a new connection spec
- Modify general properties of a connection spec
- Add, modify, or delete related connection specs
- Add or delete specifications for transmission parameters
- Add, modify, or delete capacity management rules
- Delete a user-defined connection spec

Add a new connection spec

Before adding a new connection spec, determine where it fits in the structure of existing connection specs. The structure of connection specs is described in Connection specs section beginning on page 29.

Use the following process to add a new connection spec.

Steps

1. Access the Managing a Connection Spec window for a new connection spec.

a. From the main toolbar, select **Engineering > Net Systems > Templates**.

b. Open the Connection Specs panel.

c. Right-click a connection type and select **Add Connection Spec**.

2. Examine the window. The data in the first three fields reflect your selection of connection type. An example follows:

3. Complete the fields on the Connection Spec - New window to add a connection spec.

   ▪ Enter the connection spec name in the **Connection Spec Name** field.

   ▪ Select Point to Point, Point to Multi-Point, or Multi-Point to Multi-Point from the **Multipoint Type** dropdown to reflect the connection configuration.

   ▪ Specify the minimum and maximum specs required per system.

   ▪ Specify the minimum and maximum connections required per spec.

   ▪ If the connection includes a multi-point, specify whether to use as the method for capacity calculation the transmission parameter of the connection or the sum of the transmission parameters of the segments composing the connection.

   ▪ Specify whether an assignment is required.

   ▪ Leave the **Active** checkbox checked to make this spec available for use or uncheck it to make it unavailable for use.

   ▪ Specify whether the connection ID is to be auto-generated. All connections must be auto ID-able for the auto ID process to work.

4. If appropriate, continue with the connection spec definition in one or more of the following ways:

   ▪ Add related connection specs as described on page 144.

   ▪ Add transmission parameters as described on page 146.

   ▪ Add capacity management rules as described on page 148.

Modify general properties of a connection spec

Before modifying an existing connection specification, become familiar with its current definition. You cannot modify the structure, that is, its parent connection type, category, or connection type name, but you can modify any of its other properties. Any changes you

make to a connection spec will be used each time that connection spec is used in a template connection.

Use the following process to modify the properties of a connection spec.

Steps

1. Display the Managing a Connection Spec window—General view.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Connection Specs* panel list.

   c. Expand a selected connection type name.

   d. Right-click a connection spec and select **Properties**.

2. Examine the window. An example follows.
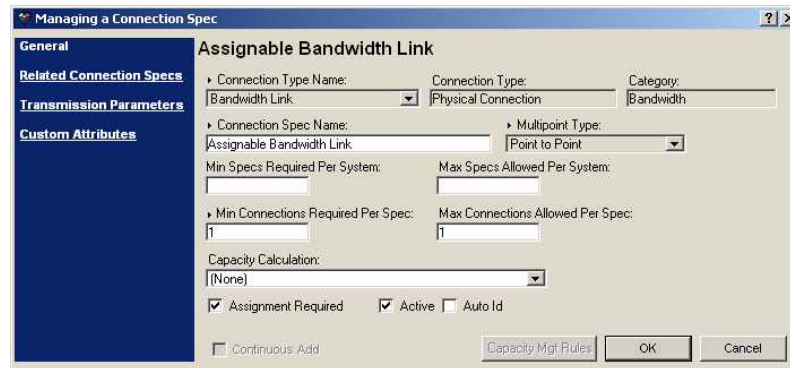
3. Make any of the following modifications:

   ▪ Change the connection spec name.

   ▪ Specify the minimum and maximum specs required per system.

   ▪ Specify the minimum and maximum connections required per spec.

   ▪ If it includes a multipoint connection, specify a method for capacity calculation.

   ▪ Specify whether an assignment is required.

   ▪ Change its status from active to inactive or vice versa. For a connection spec to be reactivated, its connection type must be active.

   ▪ Specify whether the connection ID is to be auto-generated. All connections must be auto ID-able for the auto ID process to work.

4. Click **OK** to close the window and save the changes.

Add, modify, or delete related connection specs

Managing related connection specs applies only to a connection spec to which other connection specs can be assigned, aggregated, or assembled. See Figure 88 on page 75 for examples of the three relationship types: assignment, assembly, and aggregation.

An assignable bandwidth link is a type of physical connection to which virtual connections can be assigned. If you display the related connection spec properties for assignable bandwidth link, you will notice that MetaSolv has defined several connection specs of the connection type called virtual connection as related connection specs, where the relationship type is *Assignment*. You can define the connection specs that can be assigned to the selected connection specs using this example as a model. Assignment capability is controlled through custom attributes; see Figure 90 on page 76.

A T1 assignable group connection can have T1 assignable facility circuits as part of its assembly. This type of relationship can be defined with the *Assembly* relationship type. MetaSolv has defined the T1 assignable group connection spec with the T1 assignable facility circuit as a related connection spec, with the relationship type of assembly. You can defined connection specs with an assembly type of relationship using this example as a model.

An inverse multiplexing group is a connection composed of multiple unassignable bandwidth links. This relationship is defined with related connection specs. That is, the inverse multiplexing group connection spec is defined with unassignable bandwidth link as a related connection spec with the relationship type of *Aggregation*.

When applicable, use the following process to add, modify, or delete connection specs that are related to the selected connection spec.

Steps

1. Display the Managing a Connection Spec window—Related Connection Specs.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Connection Specs* panel list.

   c. Expand a selected connection type name.

   d. Right-click a connection spec and select **Properties** to display the General view of the Managing a Connection Specs window.

   e. Click the *Related Connection Specs* link.

2. Examine the window. An example follows. For additional details, see Figure 88 on page 75.
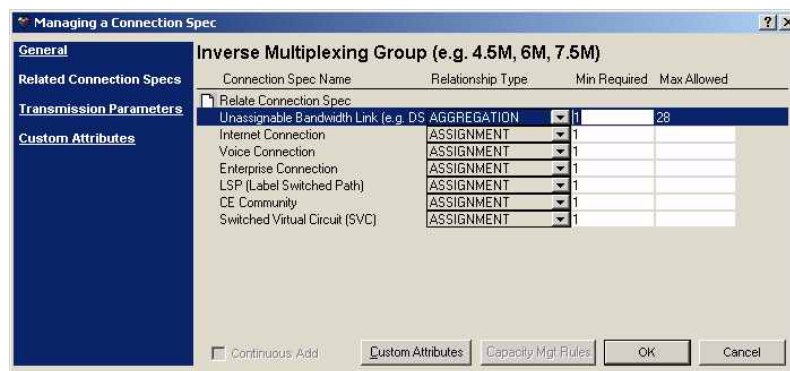
3. Proceed in one of the following ways:

- To add a related connection spec, go to Step 4.
- To modify a related connection spec, go to Step 5.
- To delete a related connection spec, go to Step 6.

4. Add a related connection spec as follows:

a. Click **Relate Connection Spec**.

b. From the Select Connection Specs window, expand the connection type name to which the connection spec to be related belongs. An example follows:
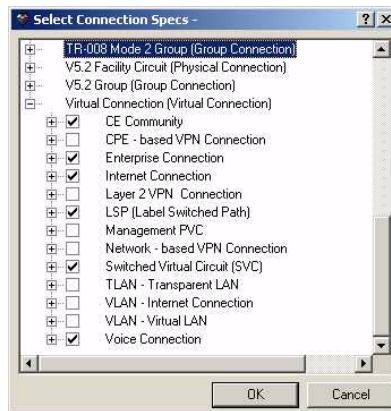
c. Check the box next to that connection spec and click **OK**.

d. Specify how this spec is related by selecting the appropriate option from the **Relationship Type** dropdown.

e. Optionally, specify values for the minimum required and the maximum allowed.

5. If the connection spec with a related connection spec has an incomplete definition, change it by specifying a minimum required value for a related connection spec.

6. If the connection spec has a related connection spec that is not required, delete a related connection spec by right-clicking the name and selecting **Delete**.

Add or delete specifications for transmission parameters

If the connection spec represents an assignable connection that uses time division multiplexing (TDM), you can add, modify, or delete transmission parameters valid for that connection spec.

Use the following process to add or delete specifications for transmission parameters valid for a connection built with the selected connection spec.

Steps

1. Display the Managing a Connection Spec window—Transmission Parameters.

a. From the main toolbar, select **Engineering > Net Systems > Templates**.

b. Click the *Connection Specs* panel list.

c. Expand a selected connection type name.

d. Right-click a connection spec and select **Properties** to display the General view of the Managing a Connection Specs window.

e. Click the Transmission Parameters link.

2. Examine the window. An example follows.

3. Proceed in one of the following ways:

- To add transmission parameters, go to Step 4.
- To delete a specified transmission parameter, go to Step 5.

4. Add transmission parameters as follows:

a. Double-click **Add Rate Code** to display the Select Rate Codes window. An example follows:
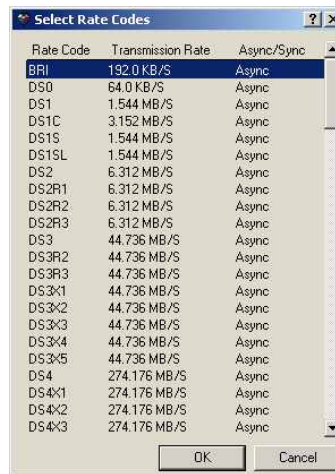
b. Highlight the rate codes to add and click **OK** to add the selected rate codes to the Managing a Connection Spec window.

c. Click **OK** to return to the Network Template Maintenance window and save the change.

5. Delete a specified transmission parameter by right-clicking the row, selecting **Delete**, and clicking **OK**.

Add, modify, or delete capacity management rules

If a connection spec represents a group connection with related connection specs, you can associate equipment specs to each related connection spec, modify the specifications, or delete them. MetaSolv-defined group connections include: 43801 Group, GR-303 Group, T1 Assignable Group, T1 Unassignable Group, TR-0008 Mode 1 Group, TR-008 Mode 2 Group, and V5.2 Group. To define capacity management rules, the connection specs related to the selected spec must have a relationship type of assembly.

Use the following process to manage the capacity management rules for a connection spec.

Steps

1. Display the Capacity Management Rules window.

    a. From the main toolbar, select **Engineering > Net Systems > Templates**.

    b. Click the *Connection Specs* panel list.

    c. Expand a selected connection type name that is a Group.

    d. Right-click a connection spec and select **Capacity Management Rules**.

2. Examine the window. An example follows.
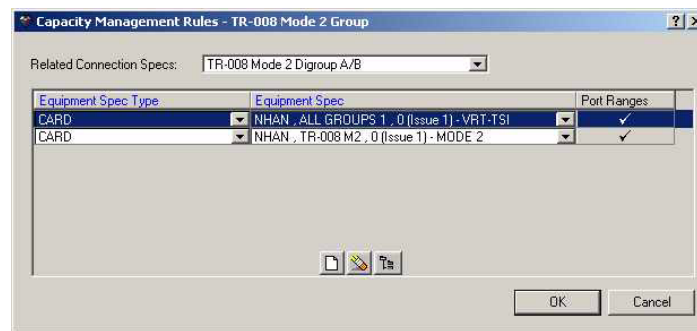
3. Proceed in one of the following ways:

    ■ To add an associated equipment spec to a related connection spec, go to Step 4.

    ■ To change specifications for an equipment spec associated with a related connection spec, go to Step 5.

    ■ To delete an associated equipment spec to a related connection spec, go to Step 6.

4. Add an associated equipment spec to a related connection spec as follows:

    a. Select a related connection spec from the corresponding dropdown with which the equipment specs are to be associated.

b. Click the **New** button to add a row.

c. Select a value from the Equipment Spec Type dropdown that identifies the equipment type of the spec to be selected.

d. Select the name of the equipment spec to associate from the Equipment Spec dropdown.

e. If the equipment spec is for a card with ports, click the **Hierarchy** button to display the equipment spec hierarchy. An example follows. To specify a port range, right-click the port that represents the beginning of the range and select **Range From**, then right-click the port that represents the end of the range and select **Range To**. Click **OK** to return to the Capacity Management window, where Port Ranges are displayed with a check.:
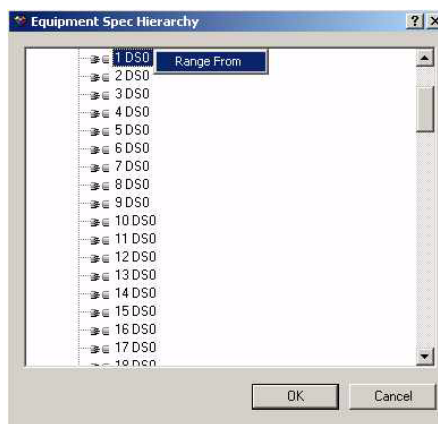
f. If there are multiple related specs, repeat this process for each related spec, then click **OK** to display the window from which you invoked the Capacity Management Rules window. If needed, click **OK** again to redisplay the Network Maintenance window.

5. Change specifications for an equipment spec associated with a related connection spec as follows:

   a. Do any of the following:

      ⇒ Add or change port ranges for the selected equipment spec.

      ⇒ Select a different equipment spec for the specified equipment spec type and update the port range if needed.

      ⇒ Select a different equipment spec type, equipment spec, and port range.

   b. Click **OK** to save your changes.

   c. Click **OK** again to redisplay the Network Maintenance window.

6. Delete an associated equipment spec to a related connection spec as follows:

   a. Highlight the row to be deleted.

   b. Click the **Delete** button.

      c. Click **OK** to save your changes.

      d. Click **OK** again to redisplay the Network Maintenance window.

Delete a user-defined connection spec

Use the following process to delete a user-defined a connection spec.

Steps

1. Display the Connection Specs panel hierarchy view.

      a. From the main toolbar, select **Engineering > Net Systems > Templates**.

      b. Click the *Connection Specs* panel list.

2. Expand a selected connection type name.

3. Right-click a connection spec and select **Delete**.

CUSTOMIZING A PARTICULAR NETWORK TEMPLATE

The MetaSolv-defined templates that come with your technology modules were designed to accommodate needs of companies with diverse requirements. Therefore, you can expect to find many template components that you may not need. For example, if you have created a reference copy of the MetaSolv TM ATM/Frame Relay templates, you will find when evaluating the delivered components that templates for both an ATM core network and a Frame Relay core network exist. It is likely that the core network of a given company that purchases this technology module is either an ATM core network or a frame relay core network. During the evaluation process, it is a good business practice to inactivate any template components that are not needed to reflect your current or planned internal network or any customer networks you may manage.

When you customize a technology module template, you are working with a predefined set of element types. Most MetaSolv-defined element types can be used out-of-the-box, but others may need to be modified or deactivated. It's possible, too, that you may need to create an entirely new element type and add it to a template.

You can deactivate network elements that are not required. When a network element is deactivated, no automatic change is made to the status of any relationships that involve that element as a terminating point. This is so you can easily reactivate an element type and retain all of the predefined connection specs that can be associated with its relationships. Deactivating an element type applies on a "go-forward" basis. That is, any networks that have been built using that element type are left intact; however, any new networks would not be able to use that element type. You can also delete relationships that are not required, when the relationship teminates at two required network elements. Once the reference templates are made, you can begin customizing the TM templates for your network designers to use in building network systems, for your product catalog designers to use in creating product specs, and for circuit designers and provisioners to use in provisioning services.

Customizing a template is a matter of modifying the templates of a technology module until they meet your specific business needs. The modifications you are likely to make include:

- Deactivating element types you do not use; deleting relationships you do not use
- Modifying the properties of, and adding template elements types
- Adding, defining, and changing the relationships between element types

Examples of how to make those kinds of modifications are explained in the processes included under the following sections:

- Managing an embedded template element type
- Managing a template element type
- Managing a template relationship
- Managing a template connection

The section begins with the end-to-end processes involved in creating a network template with all of its components and deleting a network template with all of its components. This section provides the context for all the component-related sections that follow.

Managing a network template (end-to-end)

This section presents the end-to-end process of defining a network template, which includes adding template element types, template relationships, associating connection specs, and so forth. References are provided for each step. The end-to-end process of deleting a network template is also addressed, since the deletion process requires the undoing of each thing added in the reverse order.

You can manage a network template in the following ways:

- Define a new network template
- Delete a user-defined network template

Define a new network template (end-to-end)

Use the following process to define a new network template using existing element types and connection specs.

Steps

1. Add a network template and define its properties. See "Add a new network template and define its properties" on page 136.

2. Add and define each template element type required by your new network template.

   - See "Add a template element type" on page 157.
   - See "Add or modify general properties of a template element type" on page 158.
   - If any template element type is for a group, specify group properties. See "Add, modify, or delete group properties of a template element type" on page 160.

3. Add and define each embedded template element types required by your network template, if any.

- See "Add an embedded template element type" on page 153.
- See "Modify properties an embedded template element type" on page 154.

4. Add and define each template relationship representing a *physical connection* for your new network template and associate one or more connection specs with each template relationship. For each connection spec you associate, define the properties of that template connection.

  - See "Add a template relationship" on page 165.
  - See "Add or modify general properties of a template relationship" on page 166.
  - See "Associate a connection spec with a template relationship" on page 168.
  - See "Add or modify general properties of a template connection" on page 172.

5. Add and define each template relationships representing a *virtual connection* from a element type, such as a customer site, to an element type in your network template and associate a connection specs for a virtual connection with each such template relationship. For each connection spec you associate, define the properties of that template connection, including general properties, assignable connection specs, and prioritized paths.

  - See "Add a template relationship" on page 165.
  - See "Add or modify general properties of a template relationship" on page 166.
  - See "Associate a connection spec with a template relationship" on page 168.
  - See "Add or modify general properties of a template connection" on page 172.
  - See "Add assignable connection specs for a template connection" on page 174.
  - See "Add a prioritized path for a virtual template connection" on page 177.

Delete a user-defined network template (end-to-end)

Before you can delete a network template, you must delete all its connection references, all its template connections, all its template relationships, and all its template element types and embedded template element types.

Use the following process to delete a user-defined network template.

Steps

1. Display the Network Template Detail for the network template to be deleted.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type containing the network template to be deleted.

   d. Right-click the network template to be deleted and select **Open**.

2. From the canvas, delete template components in the reverse order from the way they were added. Use the following sequence as a guideline.

   a. Delete any prioritized path for a template connection. See page 181.

   b. Delete any assignable connections specs of a template connection. See page 175.

   c. Disassociate any connection spec from a template relationship. See page 170.

   d. Delete any template relationship. See page 170.

   e. Delete any template element type. See page 162.

3. When all template element types have been removed from the canvas, click **Save**.

4. Right-click on the canvas and select **Close Template** to close the network template detail.

5. From the Network Templates panel, right-click the network template and select **Delete**.

6. When the confirmation message appears, click **Yes**.

Managing an embedded template element type

You can manage an embedded template element type in the following ways:

- Add an embedded template element type and define its properties
- Modify properties an embedded template element type
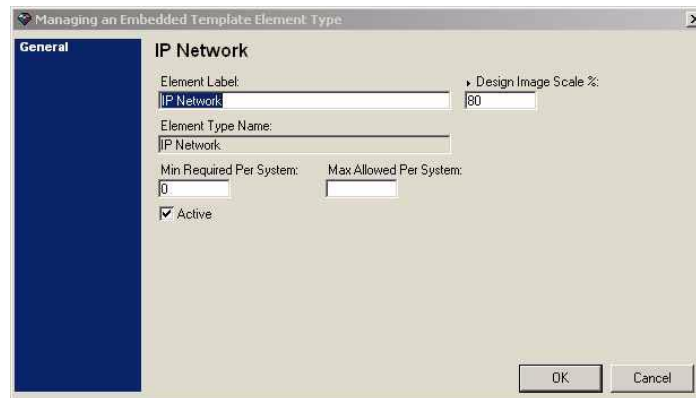- Inactivate an embedded template element type

Add an embedded template element type

Use the following process to add a network template to another network template, thereby creating an embedded template element type. For an example, see "Scenario 1—Embed a network template" on page 183.

Steps

1. Display the Network Template Detail panel and canvas for the network template into which you want to embed a template element type.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template.

   d. Double-click the network template name.

2. Open the Network Templates panel and expand the template type containing the network template to embed.

3. Right-click the network template to embed, drag it to the canvas and click to drop it.

4. Right-click the image of the embedded template element type on the canvas and select **Properties**.

5. Examine the window. The properties displayed are those set for the corresponding network template. An example follows.

6. Modify any of the following properties. These properties will apply to every occurrence of this embedded template element type in any network system built from this network template.

- Provide a different name for the embedded template element type in the **Element Label** field.

- Change the **Design Image Scale %** to alter the size of this image on the network design canvas.

- To place requirements on the number of occurrences of this embedded template element type, enter values in the **Min Required Per System** and **Max Required Per System** fields.

- Leave the **Active** checkbox checked to enable this embedded template element type to be used in any network system using this template.

7. Click **OK** to close the window and save your specifications.

> **Note:** To see how this process fits into a work flow, see "Define a new network template (end-to-end)" on page 151. Specifying properties for a template element type is included in Step 3.

Modify properties an embedded template element type

Use the following process to modify properties of an embedded template element type.

Steps

1. Display the Managing an Embedded Template Element Type window.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type of the network template containing the embedded template element type.

      d. Right-click the network template and select **Open**.

      e. Either right-click the embedded template element type name on the Network Template Details panel list and select **Properties** or right-click the image of the embedded template element type on the canvas and select **Properties**.

2. Examine the window. An example follows.
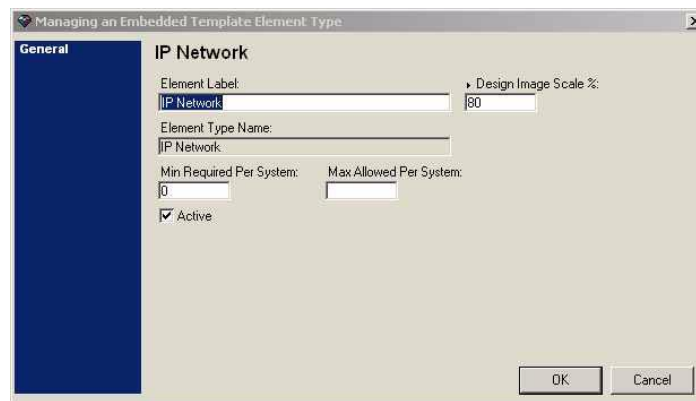
3. Modify the properties by changing the specifications for one or more of the following:

- Change the name that identifies this element on the canvas and in the Network Detail panel list in the **Element Label** field.

- Change the size of the image depicting this embedded element type in the current network template by altering the percentage specified in the **Design Image Scale %** field.

- Change the range of occurrences of this embedded element type that are permitted in this network template by altering values in the **Min Required Per System** and **Max Required Per System** fields. Or, enter *1* in the **Min Required Per System** to make this embedded template element type mandatory.

4. If considering removing the check from the Active checkbox, see the next process.

5. Click **OK** to close the window and save your specifications.

Inactivate an embedded template element type

Use the following process to inactivate an embedded template element type in a specific network template. To inactivate a given network template in every network template where it is embedded, perform the deactivation on the Network Template panel.

Steps

1. Display the Network Template Detail panel and canvas for the network template containing the embedded template element type.

      a. From the main toolbar, select **Engineering > Net Systems > Templates**.

      b. Open the Network Templates panel list.

c. Expand the template type containing the network template.

d. Double-click the network template name.

2. If you are performing this process as part of your initial survey, compare the displayed embedded template element types with your requirements. If you identify any that you do not need, inactivate them. The step-by-step procedure follows.

a. Expand the elements list in the panel.
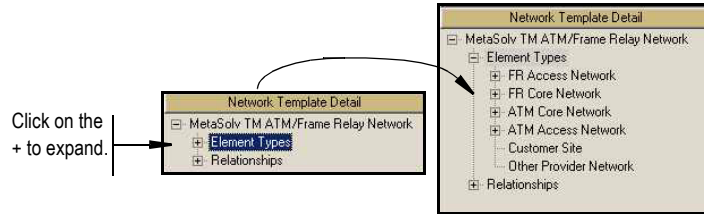
b. If you identify any unneeded element, select that element from the element list and select the **Locate in Drawing** option. Notice which element flashes on and off. The following example demonstrates selection of the element type representing the Frame Relay core network.
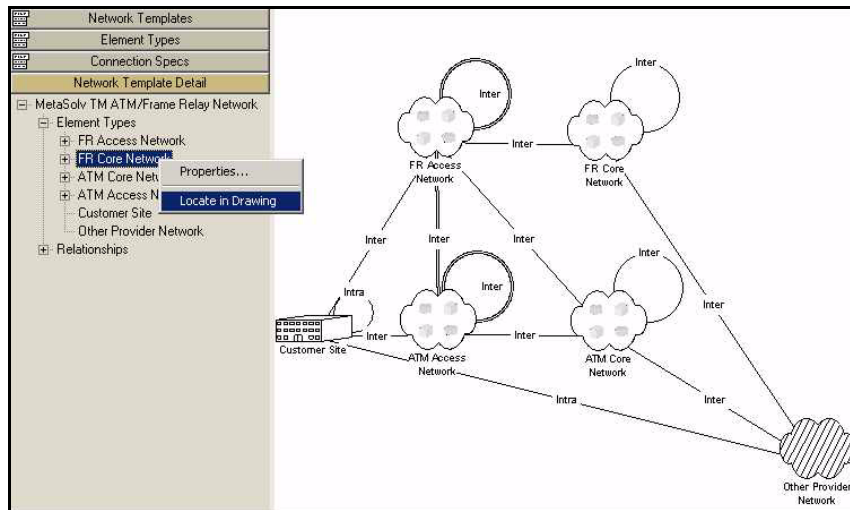
c. Select the element type that flashes on and off. Select **Properties** from the right-click menu to display the properties of the selected network element.

d. Click the **Active** checkbox to inactivate the selected network element, then click **Close**.

Click the **Activate** checkbox to remove the check and inactivate the element
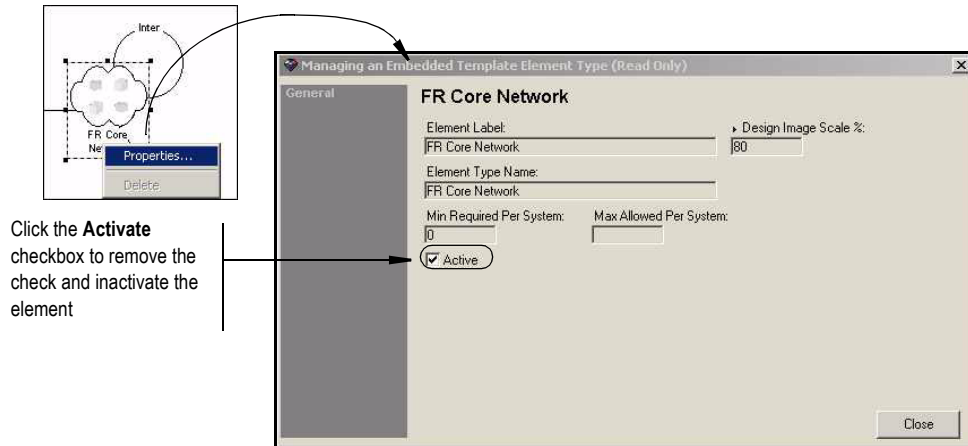
Managing a template element type

An element type (displayed on the Element Types panel list) can be added to any number of network templates. A template element type (displayed on the Network Template Detail panel list) is a component of the network template displayed on the canvas.

You can manage a template element type in the following ways:

- Add a template element type to a network template
- Add or modify general properties a template element type
- Add, modify, or delete group properties of a template element type
- Delete a template element type
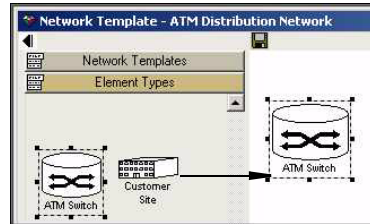
Add a template element type

This section describes the process of adding an existing element type to a network template. For details on creating a new element type, see "Add a new element type" on page 138.

Use the following process to add a template element type.

Steps

1. Display Network Template Details for the network template to which you are adding a template element type.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type containing the network template

   d. Right-click the network template and select **Open**.

2. Click the *Element Type* panel to open it, click the element type and drag it over to the canvas, and release the mouse button to drop it.

Drag and drop

3. Click **Save** to save the network template with the template element type you added.

> **Note:** To see how this process fits into a work flow, see "Define a new network template (end-to-end)" on page 151. Adding a template element type is Step 2.

Add or modify general properties of a template element type

Use the following process to add or modify general properties of a template element type.

Steps

1. Display the Managing a Template Element Type window.

    a. From the main toolbar, select **Engineering > Net Systems > Templates**.

    b. Click the *Network Templates* panel.

    c. Expand the template type of the network template containing the template element type to be defined or modified.

    d. Right-click the network template and select **Open**.

    e. Either right-click the template element type name on the Network Template Details panel list and select **Properties** or right-click the image of the template element type on the canvas and select **Properties**.

2. Examine the window. An example follows. For more details, see Figure 103 on page 84.
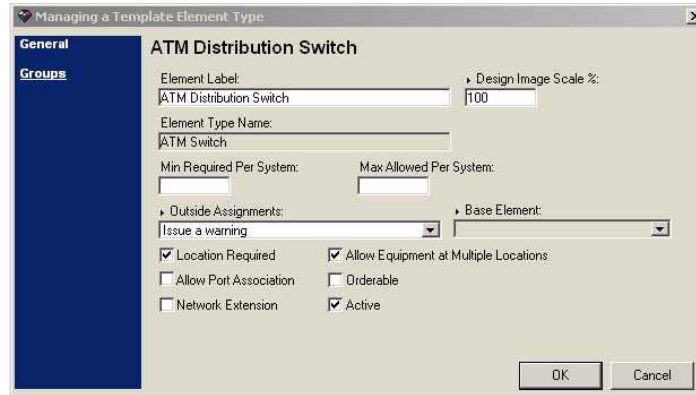
3. Use the following descriptions as a guide to completing the fields on the Managing a Template Element Type window.

⇒ **Element Label** is a property unique to the template element type and appears under its image on the canvas. The Element Label is used by product specifications and product catalog. If you don't provide an Element Label, no name will appear for this template element type on the Network Templates Type tab in product specifications or product catalog; however the Element Type Name will be used to identify the template element type on the canvas.

⇒ The **Design Image Scale%** affects the size of the image used to create an element in the design of network systems based on this network template.

⇒ The **Min** and **Max** prescribe how many of this element type you *must* (Min) and how many you *can* (Max) include in a network system design based on this template. If you set a **Min** of 1, then as soon as you design a network system based on this template, one instance of this element type automatically appears on the network design canvas; if the Min is 5, five instances will appear.

⇒ The **Outside Assignments** field defines whether this element type can have connections assigned to it from a foreign origin. When set to allow outside assignments, the reduction of available capacity due to such outside assignments cannot be computed. All MetaSolv-defined elements are set to not allow outside assignments or, in the case of elements used in the DLC and VPN network templates, to issue a warning.

⇒ Designating an element type as a **Base Element** is only relevant to DLC systems, and you can designate whether this element type is primary or secondary to the DLC system through the **Base Element** field.

4. Use the following descriptions as a guide for marking the checkboxes at the bottom of the Managing a Template Element Type window.

⇒ Uncheck **Location Required** for other provider networks; otherwise check this checkbox.

⇒ Check **Allow Port Association** to enable users to associate individual ports with a network element during network design. Uncheck this checkbox to limit the association with a network element to the shelf or card level.

⇒ Check **Network Extension** to indicate that any network element based on this template element type is an extension from the network being designed. The only MetaSolv-defined template element type set as an extension is customer site, which is the terminating element type for connections that are extensions from the provider network. (Customer edge router of a VPN is not a network extension.)

⇒ Check **Allow Equipment at Multiple Locations** to enable users to associate multiple pieces of equipment installed in different locations with the same network element. Uncheck this checkbox to ensure that equipment associated with a network element based on this template element type is installed at a single location.

⇒ Check **Orderable** to enable the association in Product Specs and Product Catalog of an orderable network element to the corresponding element type. Orderable is meaningful only if the network template in which this template element type resides is defined as "an external configuration of a system." The network element so defined is orderable on a PSR.

⇒ Check **Active** to allow element types based on this template element type to be available for use in a network system design, on an order, or during provisioning. Deactivation applies on a go-forward basis and does not affect in service networks.

5. Click **OK** to close the Managing a Template Element Type window and save your specifications for general properties.

Add, modify, or delete group properties of a template element type

Use the following process to add, modify, or delete group properties for a template element type.

Steps

1. Display the Managing a Template Element Type window—Groups view.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type of the network template containing the template element type to be defined or modified.

   d. Right-click the network template and select **Open**.

   e. Right-click the template element type name on the Network Template Details panel list and select **Properties** to display the Managing a Template Element Type window—General view.

   f. Click the Groups link.

2. Examine the window. An example follows. For more details, see Figure 104 on page 85.
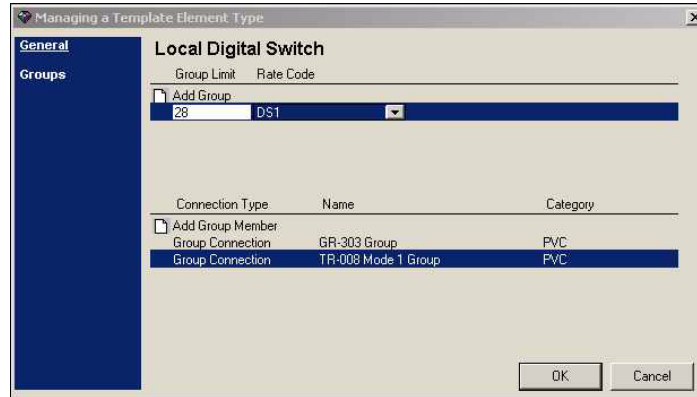
3. Proceed in one of the following ways:

   ■ To make additions or modifications, continue with Step 4 and skip Step 7.

   ■ To delete a spec from group membership, go to Step 7.

4. For each group to be added, complete the following steps:

   a. Click the **Add Group** icon to display a row of enterable fields.

   b. Enter a value for the **Group Limit**.

   c. Select a value from the **Rate Code** dropdown.

5. To add connection group members, do the following:

   a. Double click **Add Group Member** to display the Select Group Members window. An example follows.
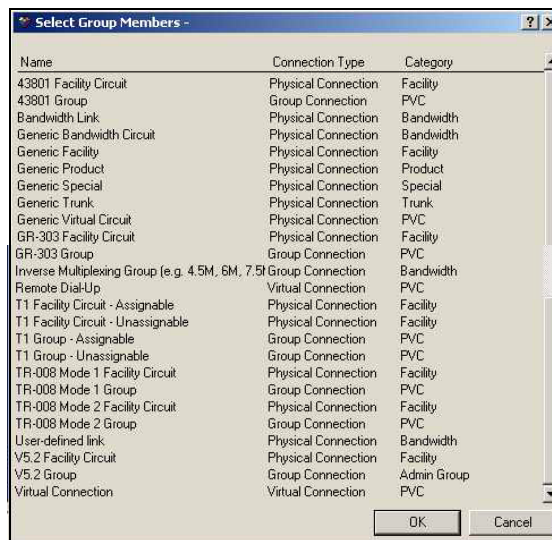
    b.   Select one or more connection spec names, then click **OK**.

6.   To change values for a given group, do either or both of the following:

- Enter a different **Group Limit** value.
- Select a different **Rate Code** value.

7.   For each connection spec to be deleted from group membership, right-click the connection spec and select **Delete**.

8.   Verify entries on the Managing a Template Element Type window, then click **OK**.

9.   Click **Save**.

Delete a template element type

The following rules dictate the steps required for this procedure:

- a template element type cannot be deleted until any associations with the network element item type in product specifications and product catalog are removed.
- A template element type cannot be deleted until all *relationships* that terminate at it are removed.
- A relationship cannot be deleted until all its *associated connection specs* are removed.
- A connection spec for a physical connection designated as assignable cannot be deleted until it is removed from the list of *assignable connection specs* for any virtual connection it supports.
- A connection spec for a virtual connection cannot be deleted until all of its *prioritized paths* are deleted.

Deletions must be performed in this order: Prioritized paths, assignable connection specs, associated connection specs, template relationships, template element type.

Use the following process to delete a template element type. This process demonstrates how to undo additions such as those made in scenario 2.

Steps

1.   If the template element type to be deleted is an intermediate element in one or more prioritized paths, display the Managing a Template Connection—Prioritized Paths view and delete the affected prioritized paths as follows:

    a.   Right-click the template relationship for the virtual connection for which the prioritized path containing the element to be deleted was created, and select **Properties**.

    b.   Click the Connection Specs link of the Managing a Template Relationship window.

    c.   Double-click the virtual connection to display the Managing a Template Connection window.

    d.   Click the Prioritized Paths link.

    e.   Evaluate each path to determine whether it includes the template element type to be deleted. Click the path to display the Managing a Prioritized Path window.
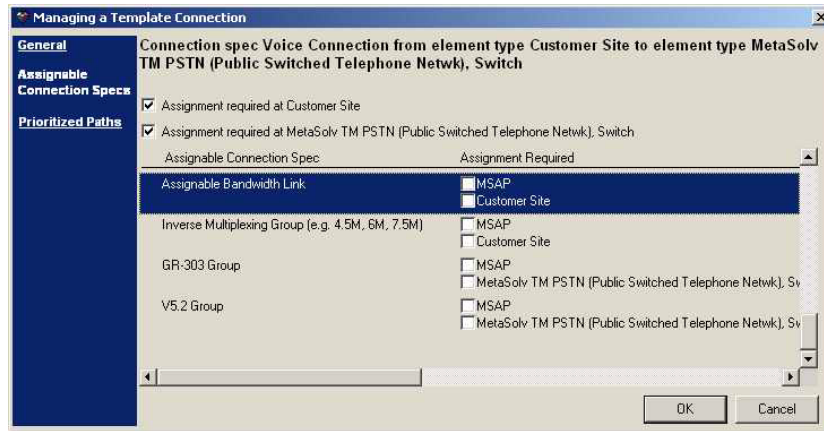
Determine whether the template element type to be deleted is listed as an Intermediate Element Type. If so, click **Cancel** to redisplay the Managing a Template Connection window with that path selected.

f.   Select the path that includes the element type to be removed, select **Delete**, respond **Yes** to the prompt, and click **OK**.
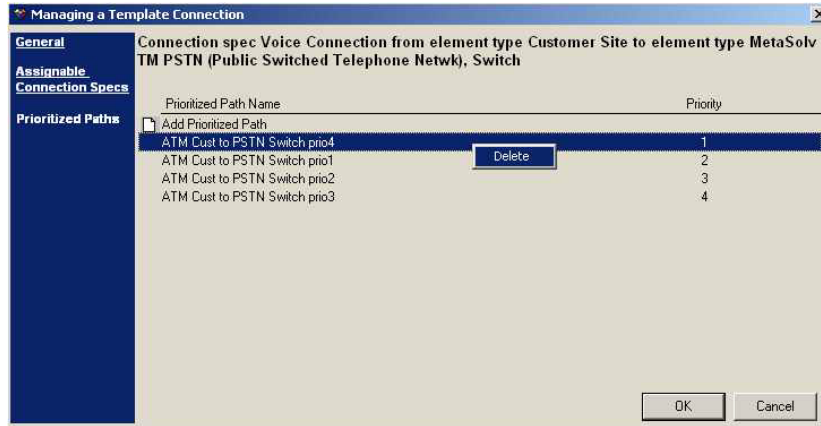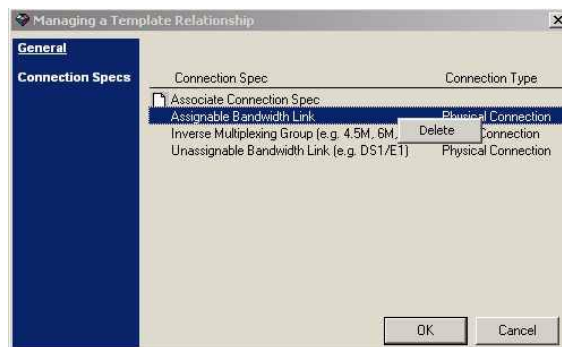

2.   If the template element type to be deleted is listed in the Assignment Required column for one or more assignable connection specs, delete the affected connection specs as follows:

a.   Display the Managing a Template Connection window for each virtual connection that could be provisioned over a path that included a segment that terminates on the template element type to be deleted.

b.   Select Assignable Connection Specs.

c.   Identify connection specs to be removed. Scroll through the list and evaluate each assignable connection spec to determine whether it terminates at the template element type to be deleted.

d.   For each connection spec to be removed, click to select it, then right-click and select **Delete**. Respond **Yes** to the confirmation message.

e. When all needed deletions of assignable connection specs are complete, click **OK** to close the Managing a Template Connection window and return to the Managing a Template Relationship window.


3. For each physical relationship that terminates at the template element type to be deleted, delete the associated connection specs as follows:

a. Display the Managing a Template Relationship window.

b. Click Connection Specs.

c. Right-click each connection spec and select **Delete**.

d. Click **OK**.

4. Remove each relationship that terminates at the template element type to be removed as follows:

a. For each relationship to be removed, right-click that relationship on the canvas and select **Delete**.

b. Respond **Yes** to the confirmation message.
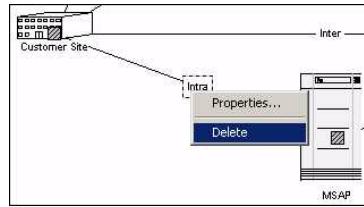
5. Remove each template element type that participated in a deleted relationship as follows:

a. Right-click the template element type on the canvas and select **Delete**.

b. Respond **Yes** to the confirmation message.
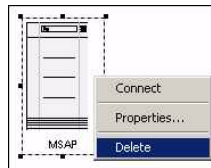
6. Click the **Save** button to save the changes.

Managing a template relationship

A template relationship is a connection between two template element types within a network template.

One of the most important rules a template defines is how pairs of element types can be related to one another or how an element type can be related to another occurrence of itself. Once element types are related, connection specs can be associated with those relationships. The connection specs associated with a relationship define how the element types can be connected as network elements during network design or service provisioning.

You can manage a template relationship in the following ways:

- Add a template relationship
- Add or modify general properties of a template relationship
- Associate a connection spec with a template relationship
- Disassociate a connection spec from a template relationship
- Delete a template relationship

Add a template relationship

Adding a template relationship defines the rule that a network connection can be created between two network elements built from the connected template element types.

Use the following process to add a template relationship.

Steps

1. Display the Network Template Detail for the network template with the pair of template element types that are to be connected or the single template element type that is to be related to itself.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type containing the network template.

   d. Right-click the network template and select **Open**.

2. Add a template relationship between a source template element type and a target template element type, where the source and target can be different images or the same image. See Figure 107 on page 88. A recursive relationship, shown as a "loop," is annotated in Figure 14 on page 14.

   a. Click the source template element type to select it.

   b. Right-click and select **Connect.**

   c. Move the cursor to hover over the target template element type and click to complete the connection.

3. Right-click the template relationship and select the **Properties** option to display the Manage a Template Relationship window. See Figure 113 on page 91.

4. Continue with Step 2 in the following procedure, "Add or modify general properties of a template relationship".

Add or modify general properties of a template relationship

Use the following process to modify general properties of a template relationship.

Steps

1. Display the Managing a Template Relationship window for a selected template relationship.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Click the *Network Templates* panel.

   c. Expand the template type containing the network template containing the template relationship to modify.

   d. Right-click the network template and select **Open**.

   e. Right-click the template relationship to modify and select **Properties**.

2. Examine the window. An example follows. For details, see Figure 113 on page 91.
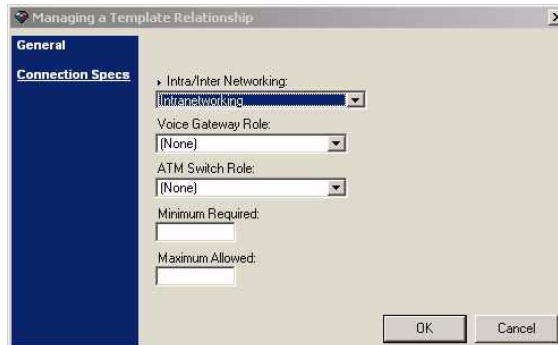
3. Modify properties of the template relationship as needed.

   ■ Specify whether the template relationship is Intranetworking (connecting two element types in the same network) or Internetworking (connecting two template element types in different networks). If both are possible, define two separate relationships, one for each.
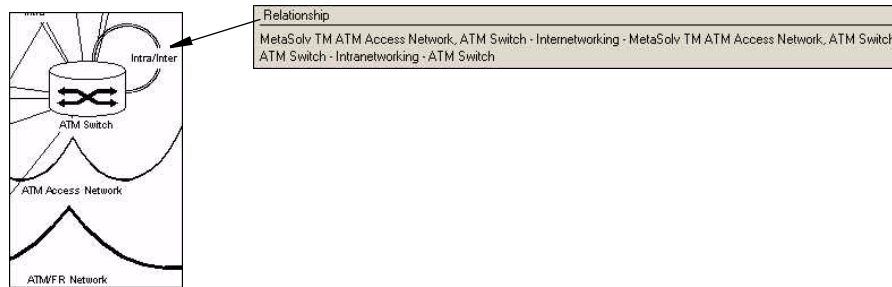
   ■ If one of the element types is an ATM switch that is now being enhanced for MPLS-support, select *LSR* as the role.

   ■ If one of the element types is a server that is to be used for authentication in, for example, a DSL network, select *Authentication* as the role.

   ■ If the relationship is mandatory, select *1* as the minimum allowed; if optional, leave *blank*.

   ■ If no more than one relationship of this type is to be permitted in a network system built from this network template, enter 1 as the maximum allowed. If an unspecified number are allowed, leave blank. If there is an upper limit to the number of occurrences in a network, specify that number as the maximum allowed.

4. Click **OK** to close the Managing a Template Relationship window.

5. Click **Save** to save the changes.

Associate a connection spec with a template relationship

Every template relationship needs to have at least one connection spec associated with it. If the relationship connects element types within your internal network, the connections specs associated with it represent physical or group connections. There are two types of relationships between a customer site and an element type in your internal network. One relationship represents the physical link that is the first segment of every path used to provision services enabled by virtual connections from that customer site. Each other template relationship from the customer site is associated with a connection spec for a virtual connection.

Use the following process to associate a connection spec with a template relationship.

Steps

1. Display the Network Template Detail panel and canvas for the network template containing the template relationship.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template

   d. Double-click the network template name.

2. On the canvas, right-click the template relationship to which the connection spec is to be associated and select **Properties**.
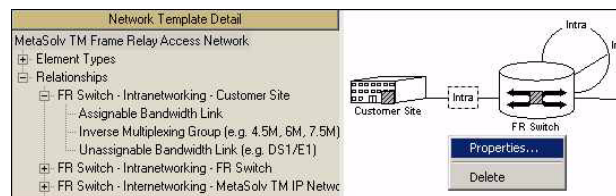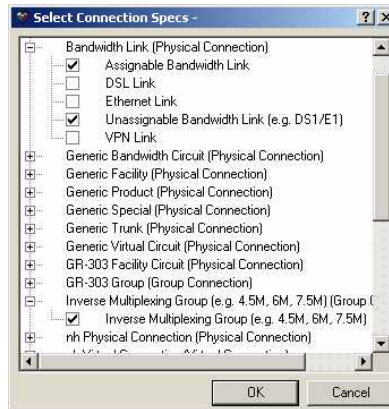

3. If the selected template relationship is displayed as a double line, select the template relationship from the list displayed on the Select Relationship window by double-clicking the desired row.

4. From the Managing a Template Relationship window, click the Connection Specs link to display the connection specs view. An example follows.
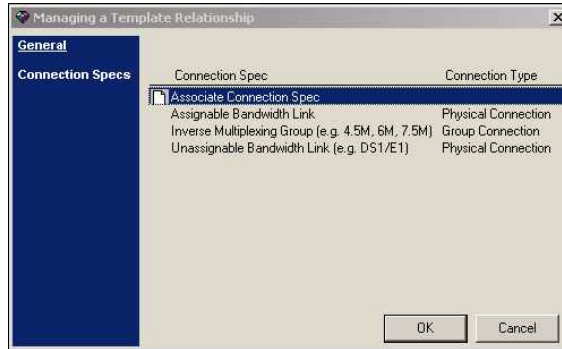
5. Double-click **Associate Connection Spec** to display the Select Connection Specs window. An example follows.

6. From the Select Connection Specs window, use the following guidelines to select connection specs to associate with the selected template relationship, then click **OK**.

   If the relationship represents a physical connection or group connection, expand connection types such as Bandwidth Link and Inverse Multiplexing Group and check the appropriate connection spec(s) within the expanded connection types. See the previous figure.

   If the relationship represents a virtual connection, expand the connection type called Virtual Connection and check the appropriate connection spec. For an example, see Figure 116 on page 93.

7. Verify the new connection spec appears under the selected template relationship on the Network Template Detail panel, then click **OK**.

8. Click **Save** to save the changes.

Disassociate a connection spec from a template relationship

Use the following process to disassociate a connection spec from a template relationship.

Steps

1. Display Network Template Details and graphical display for the network template containing the template relationship with the connection spec(s) to be disassociated.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template

   d. Double-click the network template name.

2. Disassociate the connection spec as follows:

   a. Right-click the template relationship and select **Properties** to display the Managing a Template Relationship—General view.

   b. Click the Connection Specs link to display connection specs associated with this template relationship.

   c. For each connection spec to be disassociated, click the connection spec name to select it, then right-click and select **Delete**. An example follows:
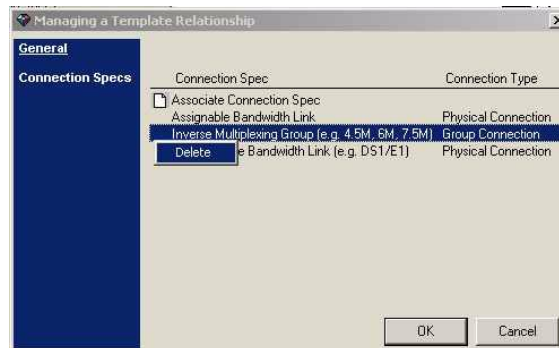
   d. Click **OK**.

3. Click **Save** to save the changes.

Delete a template relationship

A relationship cannot be deleted until all its associated connection specs are removed.

Use the following process to delete a template relationship.

Steps

1. Display Network Template Details and graphical display for the network system containing the template relationship to be deleted.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

      b. Open the Network Templates panel list.

      c. Expand the template type containing the network template

      d. Double-click the network template name.

2. Evaluate the relationships and identify any that you do not need.

Either survey the existing relationships directly on the drawing or survey their textual descriptions on the expanded relationship list. The following example demonstrates the deletion of the relationship between the Customer Site and the Other Provider Network.

3. Locate the identified relationship on the drawing by right-clicking the relationship name on the Network Template Detail panel and selecting **Locate in Drawing**.
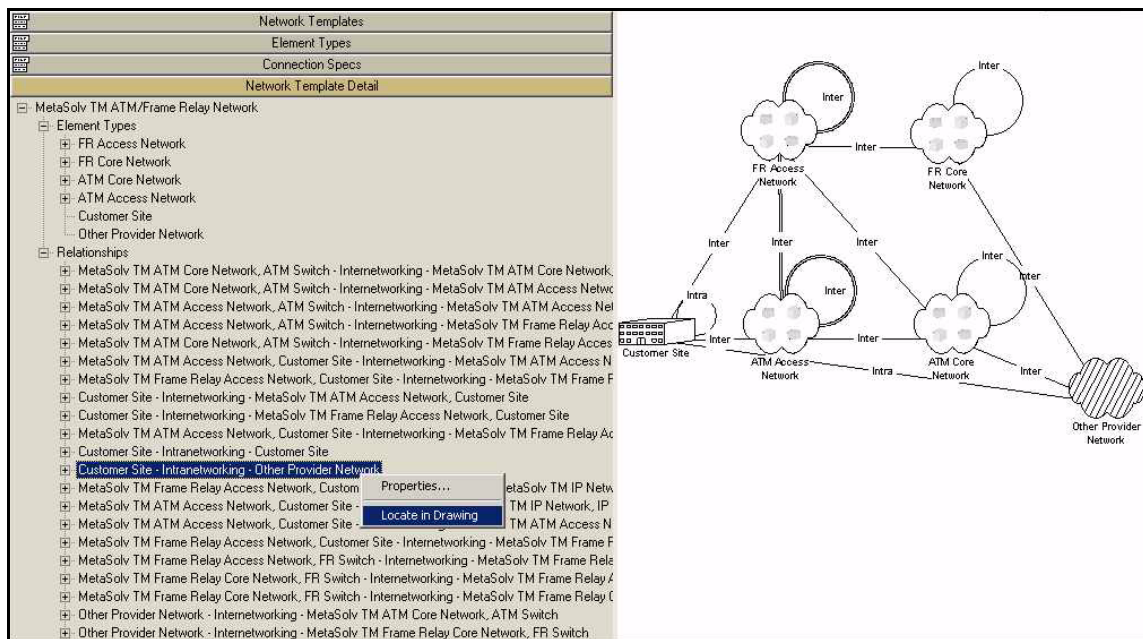
4. Disassociate any associated connection specs.

      a. Right-click the template relationship and select **Properties**.

      b. Click the Connection Specs tab to determine whether any connection specs are associated with this template relationship.

      c. If a connection spec is associated, click the connection spec to select it, then right-click and select **Delete**. Repeat for each associated connection spec.

      d. Click **OK**.

5. Delete the unneeded relationship by right-clicking the relationship on the canvas and selecting **Delete**.
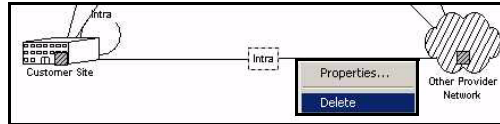
The line representing the deleted relationship is removed from the drawing.

6. Click **Save** to save the changes.

Managing a template connection

There are two types of template connections—those for a connection spec of a physical connection and those for a connection spec of a virtual connection. The Managing a Template Connection window's tabs differ depending on the connection spec type. Assignable connection specs and prioritized paths apply only to virtual template connections.

You can manage a template connection in the following ways:

- Add or modify general properties of a template connection
- Add assignable connection specs for a template connection
- Modify or delete assignable connection specs of a template connection
- Add a prioritized path for a virtual template connection
- Modify priorities of the prioritized paths for a template connection
- Delete a prioritized path for a template connection

Add or modify general properties of a template connection

A template connection needs to be defined for each connection spec associated with a template relationship. It is a good practice to define template connections as soon as you make the associations.

Use the following process to add general properties of a new template connection or modify general properties of an existing template connection.

Steps

1. Display the Managing a Template Connection window for the template connection to modify. See Figure 117 on page 94 and Figure 118 on page 94.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

   d. Double-click the network template name.

   e. Expand Relationships on the treeview.

  f. Right-click the template relationship and select **Properties**.

  g. Click the Connection Specs link.

  h. Double-click the associated connection spec for which properties are to be defined or modified. Double-clicking displays the Managing a Template Connection window for the selected connection spec.

2. Examine the window. An example follows.
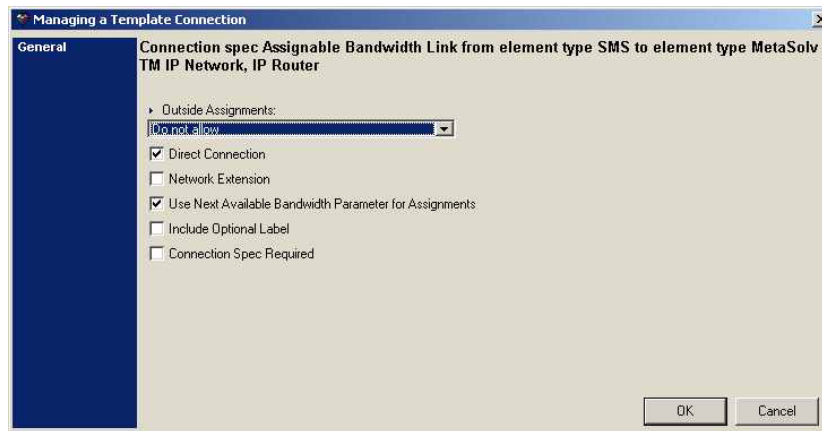
3. Use the following guidelines to define or modify properties.

  ■ If outside assignments can use this connection, thus affecting capacity management, select *allow* or *issue a warning* from the **Outside Assignments** dropdown. Otherwise, select *do not allow*.

  ■ If the connection is a physical connection, check the **Direct Connection** checkbox. If the connection is a virtual connection, uncheck this checkbox.

  ■ If the connection is a physical connection from the customer site to your network, check **Network Extension**. If the connection is a virtual connection or a physical connection between element types composing your internal network, uncheck this checkbox.

  ■ If the template connection is a virtual connection and you want to automate the assignment of parameter values such as DLCIs or VPI/VCIs, check the **Use Next Available Bandwidth Parameter for Assignments** checkbox. If the template connection is a physical connection or you want bandwidth parameters to be manually assigned during provisioning, uncheck this checkbox.

  ■ Check the **Connection Spec Required** checkbox to specify that the connection spec is to be automatically associated with a relationship when the network elements are connected during network design.

4. Click **OK** twice to redisplay the Network Template Maintenance window.

5. Click **Save** to save the changes.

Add assignable connection specs for a template connection

The Assignable Connection Specs view is where you identify the bandwidth or inverse multiplexing connection specs the virtual connection can be assigned to on segments of the path between the terminating points of the virtual connection.

Use the following process to add assignable connection specs for a virtual template connection.

Steps

1. Display the Select Assignable Specs window. Figure 119 on page 95.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

   d. Double-click the network template name.

   e. Right-click the template relationship to which the connection spec is associated and select **Properties**. (You can select the relationship either on the Network Template Details panel or on the canvas)

   f. Click the Connection Specs link to display Managing a Template Relationship—Connection Specs.

   g. Double-click the connection spec to modify to display the Managing a Template Connection window—General view.

   h. Click Assignable Connection Specs link. An example of Managing a Template Connection—Assignable Connection Spec follows.
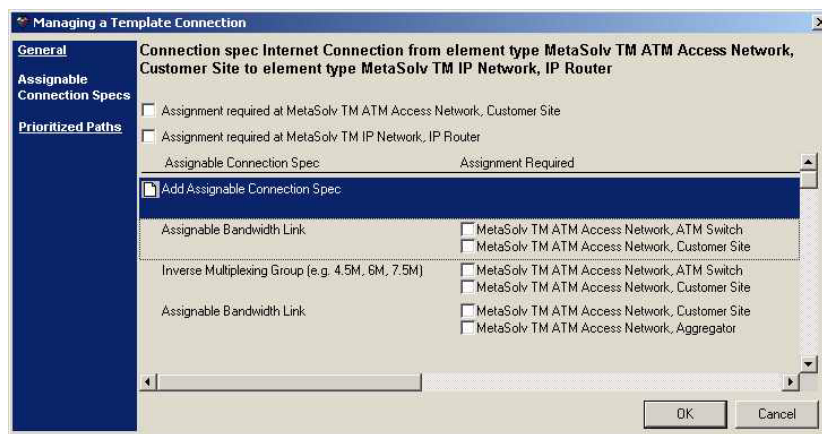
   i. Double-click **Add Assignable Connection Spec** to display the Select Assignable Specs window.

2. Examine the window. An example follows.

3. Expand a relationship where the associated connection spec is assignable and click the checkbox preceding the connection spec name to mark it as assignable. Repeat for each assignable connection spec, then click **OK** to close the Select Assignable Specs window.

4. Verify the additions you made on the Managing a Template Connection window — Assignable Connection Specs and check the Assignment Required checkboxes if needed. For example, if the first segment of the selected virtual connection is always the same as is the case in a DSL scenario where the segment Customer Site to DSLAM is always required, you can check the checkboxes for that segment.

5. Click **OK** to close the Managing a Template Connection window —Assignable Connection Specs window.

6. Click **OK** to close the Managing a Template Relationship window.

7. Click **Save** to save the changes.

Modify or delete assignable connection specs of a template connection

Use the following process to modify or delete assignable connection specs for a virtual template connection.

Steps

1. Display the Managing a Template Connection window—Assignable Connection Specs. For an example, see Figure 119 on page 95.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

   d. Double-click the network template name.

e. Right-click the template relationship to which the connection spec is associated and select **Properties**.

f. Click the Connection Specs link to display Managing a Template Relationship—Connection Specs.

g. Double-click the virtual connection spec to display the Managing a Template Connection window.

h. Click Assignable Connection Specs.

2. For each assignable connection spec to be deleted, right click the corresponding row and select **Delete**. An example follows.
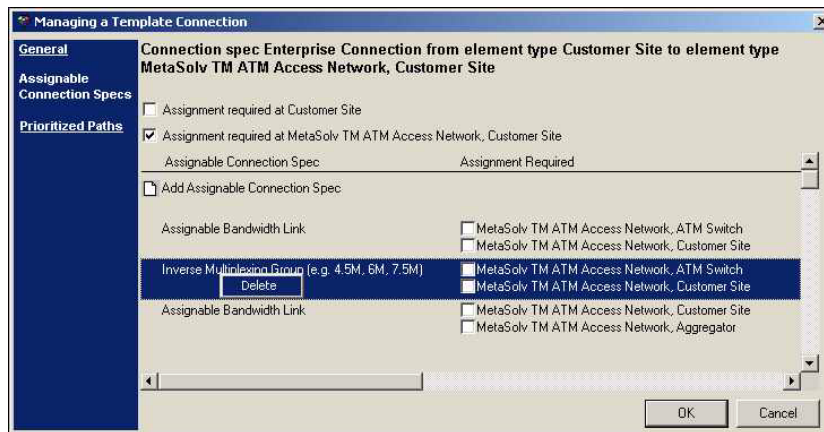
3. For modifications, use the following guidelines.

- To modify an assignable connection spec in terms of its assignment required setting, click the corresponding **Assignment Required** checkbox.

- To modify the assignment required setting for the virtual connection, click the corresponding **Assignment Required** checkbox at the top of the window.

4. When all modifications and/or deletions are complete, click **OK** to close the window.

5. Click **OK** again to close the Managing a Template Relationship window and return to the canvas.

6. Click **Save** to save the changes.

Add a prioritized path for a virtual template connection

To define a prioritized path, the template connection must represent a virtual connection. Prioritized paths define the paths that a virtual connection can take through a network system when path analysis is invoked in the GLR Provisioning Dialog.
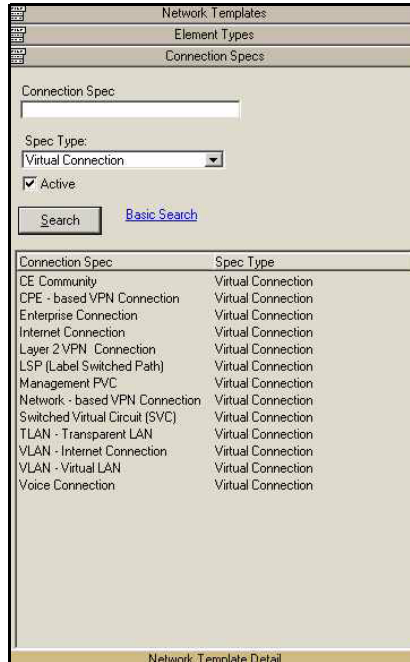
Figure 149: Virtual connection specs

Use the following process to define a prioritized path.

Steps

1. Display the Managing a Template Connection window—Prioritized Paths for the specified template connection.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

   d. Double-click the network template name.

   e. Right-click the template relationship to which the connection spec is associated and select **Properties** to display the Managing a Template Relationship window.

   f. Click the Connection Specs link to display Managing a Template Relationship— Connection Specs.

   g. Double-click the selected virtual connection spec to display the Managing a Template Connection window.

h. Click the Prioritized Paths link to display Managing a Template Connection—Prioritized Paths. An example follows. For details, see Figure 120 on page 96.
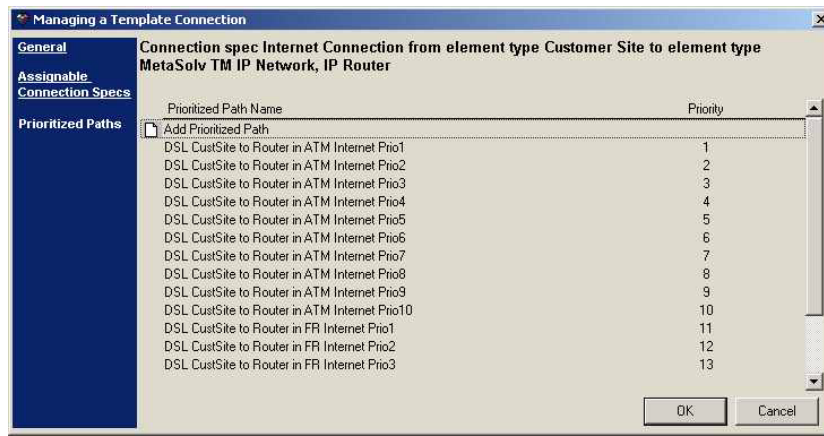
2. Double-click **Add Prioritized Path** to open the Managing a Prioritized Path window. An example follows.
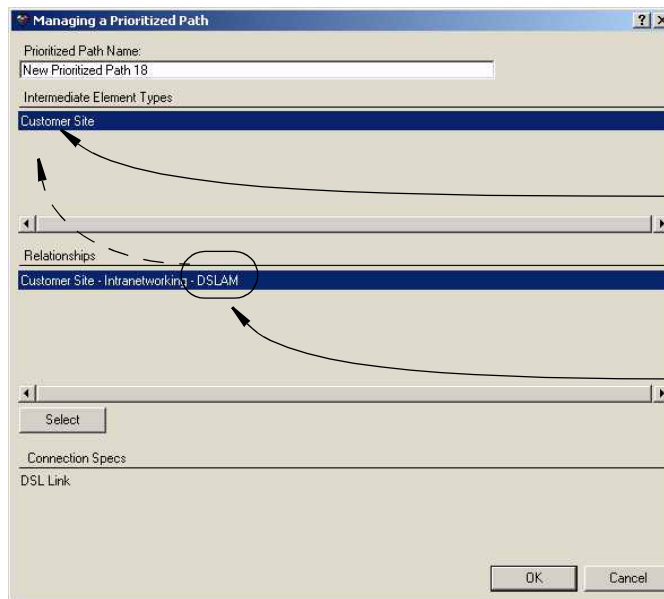
Customer Site is the starting point of this virtual connection. Each element added to the path *after* the starting point is an intermediate element in the path.

When you click **Select**, the next template element type in the row highlighted in the **Relationships** section is added to the **Intermediate Element Types** section as the current intermediate element in the path.

Figure 150: Managing a Prioritized Path window

3. Examine the data on the Managing a Prioritized Path window.

⇒ The *Intermediate Element Types* section lists the element type that is the starting point of the virtual connection, for example, the Customer Site element.

⇒ The *Relationships* section lists all the relationships from Customer Site with an *assignable* connection spec for the virtual connection. In this example, there is just one, which is typical of the first leg.

4. The *Connection Specs* section lists the connection spec associated with the highlighted relationship. To set up prioritized paths, proceed as follows:

a. Click **Select** to select the relationship that represents the first segment of the path. There is generally only one relationship available for the first leg of the path since there is generally no more than one physical connection between the customer site and the provider network.

When you click **Select**, the terminating element type in the highlighted relationship moves up to the **Intermediate Element Types** section. This element type, here the *DSLAM*, becomes highlighted. The **Relationships** section is populated with all connections that originate at the highlighted *DSLAM*. One of these relationships is highlighted by default and its assignable connection specs are displayed in the bottom section.

b. Evaluate the set of relationships that originate at the highlighted intermediate element type and highlight the one representing the next leg in this priority path. Then click **Select**.

c. Evaluate whether the highlighted Intermediate Element Type is the terminating element type for the virtual connection. If so, click **OK** to indicate this priority path is complete. If not, return to the preceding step.
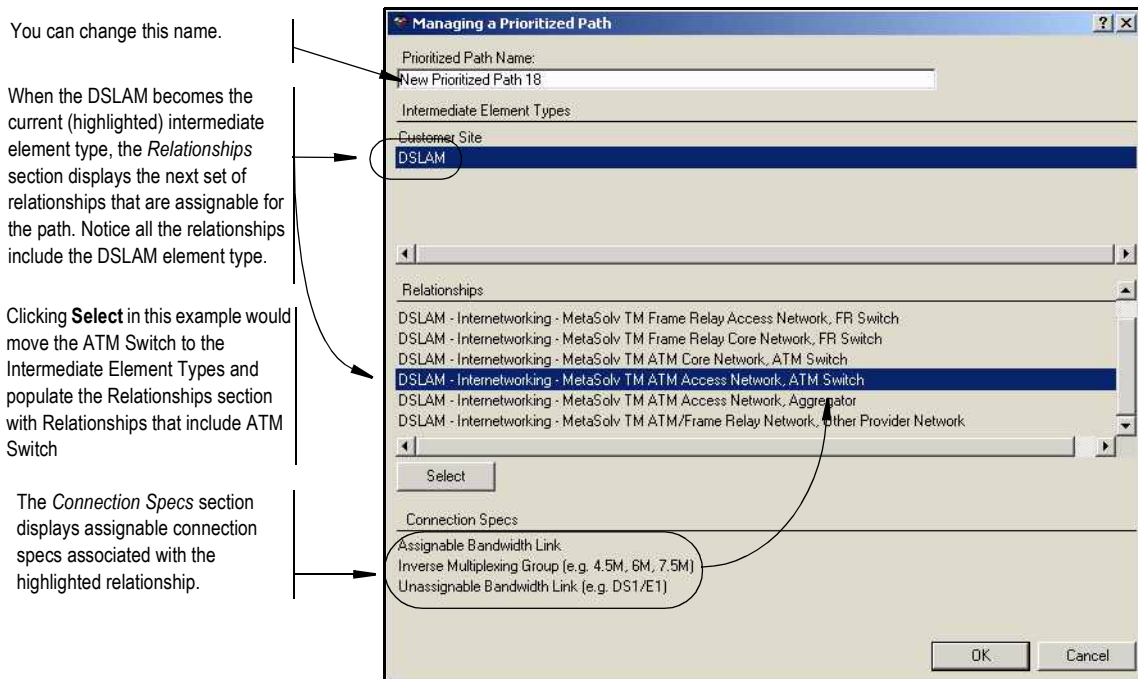
Figure 151: Using the Managing a Prioritized Path window

5. Determine whether the priority listed for the path you added is the desired priority setting. If not, drag and drop the paths up and down until you've achieved the optimal priority order.
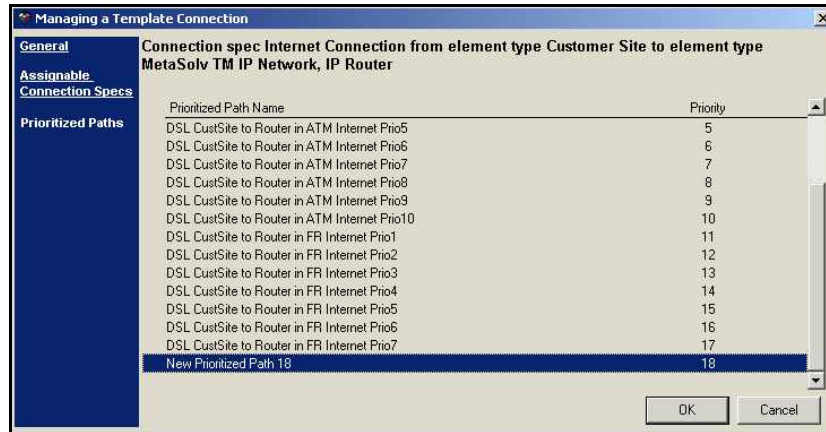
Figure 152: New priority path

6. Redisplay the Network Template Maintenance window.

   a. Click **OK** to close the Managing a Template Connection window.

   b. Click **OK** to close the Managing a Template Relationship window.

7. Click **Save** to save the changes.

Modify priorities of the prioritized paths for a template connection

The main modification you are likely to make (other than adding or deleting paths) is the reordering of priorities for an existing path. Use the following process to modify a prioritized path for a template connection.

Steps

1. Display the Managing a Template Connection window—Prioritized Paths for the specified template connection. For an example, see Figure 120 on page 96.

   a. From the main toolbar, select **Engineering > Net Systems > Templates**.

   b. Open the Network Templates panel list.

   c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

   d. Double-click the network template name.

   e. Right-click the template relationship to which the connection spec is associated and select **Properties**. (You can select the relationship either on the Network Template Details panel or on the canvas)

f. Click the Connection Specs link to display Managing a Template Relationship—Connection Specs.

g. Double-click the virtual connection spec to display the Managing a Template Connection—General window.

h. Click the Prioritized Paths link to display the Managing a Template Connection—Prioritized Paths window.

2. For each path that requires a priority change, click that path name, holding down the mouse button so the arrow is displayed. Then drag the path to the new position in the list that corresponds to the desired priority setting and release the mouse button.
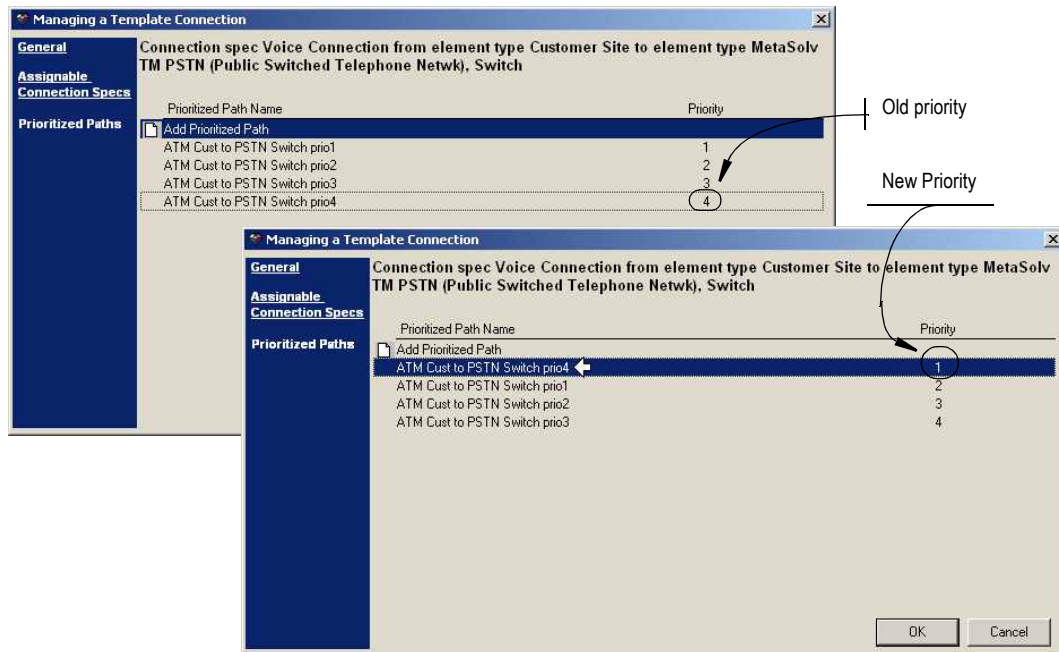
3. Verify that the revised list of paths are in the desired priority order.

4. Redisplay the Network Template Maintenance window.

a. Click **OK** to close the Managing a Template Connection window.

b. Click **OK** to close the Managing a Template Relationship window.

5. Click **Save** to save the changes.

Delete a prioritized path for a template connection

Use the following process to delete a prioritized path for a template connection.

Steps

1. Display the Managing a Template Connection window—Prioritized Paths for the specified template connection. For an example, see Figure 120 on page 96.

    a. From the main toolbar, select **Engineering > Net Systems > Templates**.

    b. Open the *Network Templates* panel list.

    c. Expand the template type containing the network template containing the template relationship to which the specified template connection is associated.

    d. Double-click the network template name.

    e. Right-click the template relationship to which the connection spec is associated and select **Properties**. (You can select the relationship either on the Network Template Details panel or on the canvas)

    f. Click the Connection Specs link to display Managing a Template Relationship—Connection Specs.

    g. Double-click the virtual connection spec to display the Managing a Template Connection window.

    h. Click Prioritized Paths.

2. Right-click the prioritized path to delete and select **Delete**.
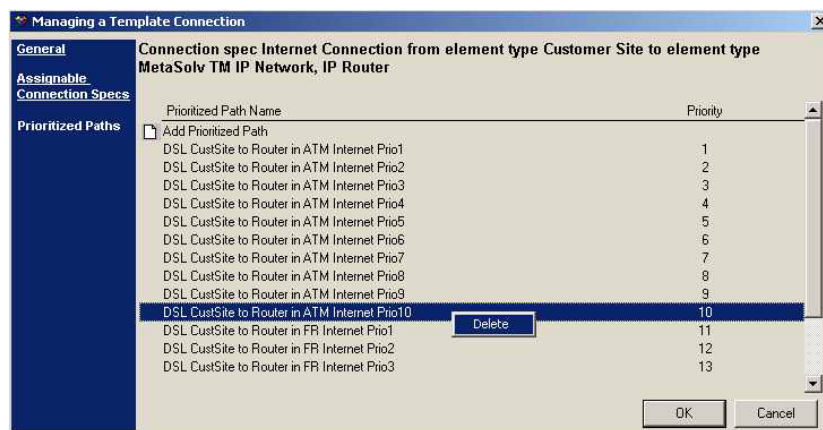
3. Redisplay the Network Template Maintenance window.

    a. When the confirmation message for the deletion appears, click **Yes**.

    b. Click **OK** to close the Managing a Template Connection window.

    c. Click **OK** to close the Managing a Template Relationship window.

4. Click **Save** to save the changes.

Scenarios

This chapter presents end-to-end scenarios for creating and using network templates. 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 theories, windows, and buttons into realistic use. Our objective with this chapter is to show you examples of how the MetaSolv Solution is used in specific 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 exactly, bridging the knowledge you gain from reading through these scenarios should give you a firm foundation for going forward.

Creating a network template involves tasks such as:

- Adding a network template to a template type
- Creating a new element type and defining its properties
- Adding one or more element types to the network template
- Embedding a network template as an embedded template element type into the network template
- Adding one or more relationships to the network template and defining their properties
- Creating a new connection spec and defining its properties
- Associating connection specs to a template relationship

Customizing a network template can involve the same tasks as creating a network template plus tasks such as:

- Inactivating template element types
- Deleting template relationships
- Modifying properties of an template element type
- Modifying properties of a template relationship

SCENARIO 1—EMBED A NETWORK TEMPLATE

In this scenario, the ATM core network template is embedded into the MetaSolv TM Ethernet Network template type.

Use the following steps to embed an existing network template as an embedded template element type into an existing network template.

Steps

1. Display the Ethernet network template. Click the Network Templates tab, open ATM_FR and select the ATM core network.
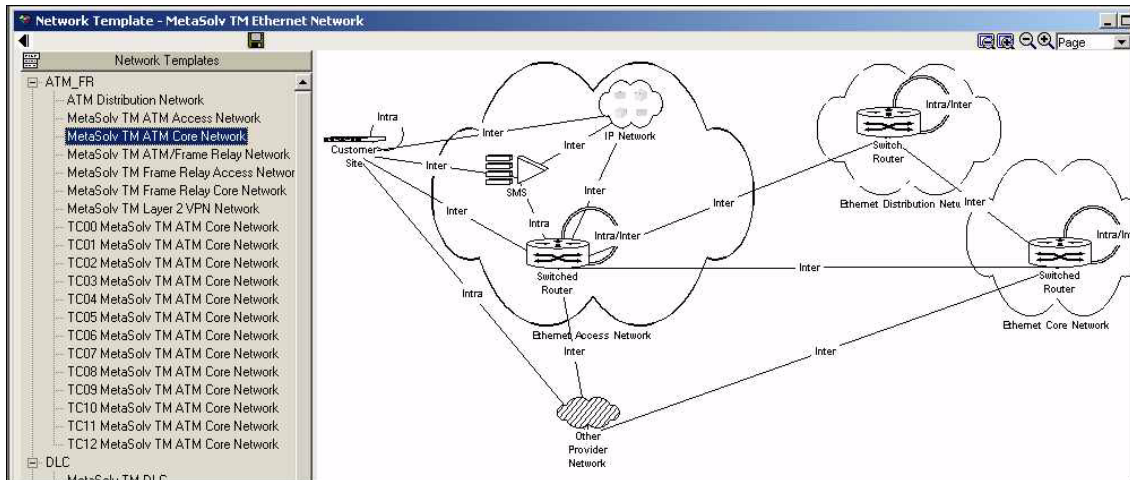
2. Right click and drag the ATM core network to the canvas. When the cursor changes to the following symbol, release the mouse button.

3. Optionally, define an element label. Right-click on the embedded template element type and select **Properties**. Enter a name in the **Element Label** field.
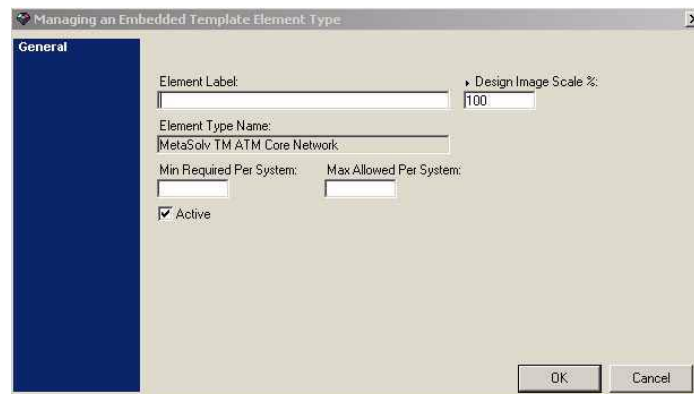
4. Open the ATM core cloud to display the ATM switch. Right-click the switch and select **Connect**.
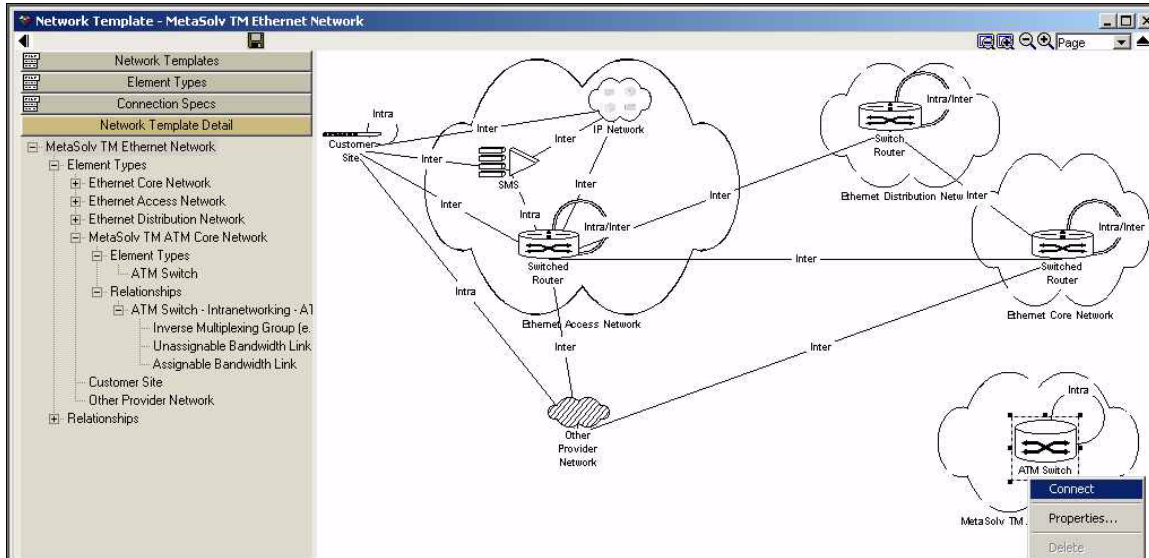
5. Drag the "line" to the switched router in the Ethernet access network to create the relationship. Right-click the "line" and select **Properties**.
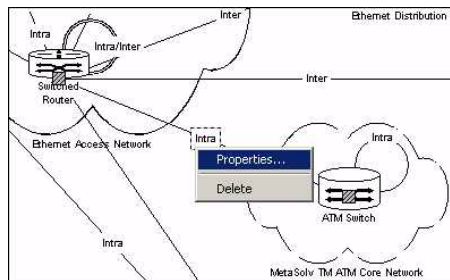
6. Define the properties for the connection. On the General tab, change the Intra/Inter Networking to *Internetworking*. Click the Connection Specs link. Double-click Associate Connection Spec and select the connection specs normally associated with the ATM switch from the Select Connection Specs window. Click **OK.**
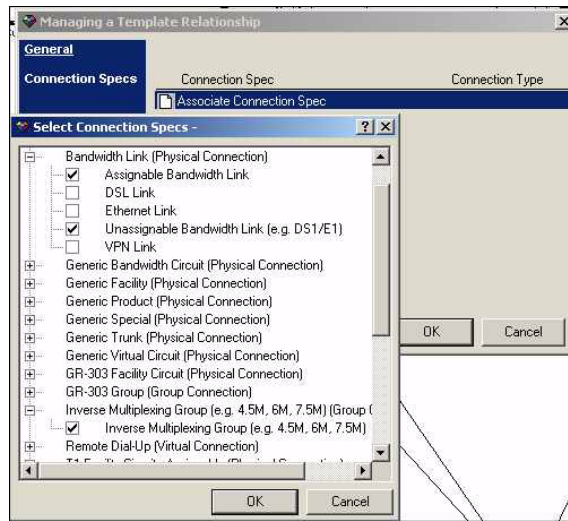
7. Repeat the last two steps to connect the ATM switch to the switch router in the Ethernet Distribution network. Repeat again to connect the ATM switch to the Other Provider network.

8. Notice the three relationships are shown on the canvas and the connection specs are displayed under the added relationships in the panel list.
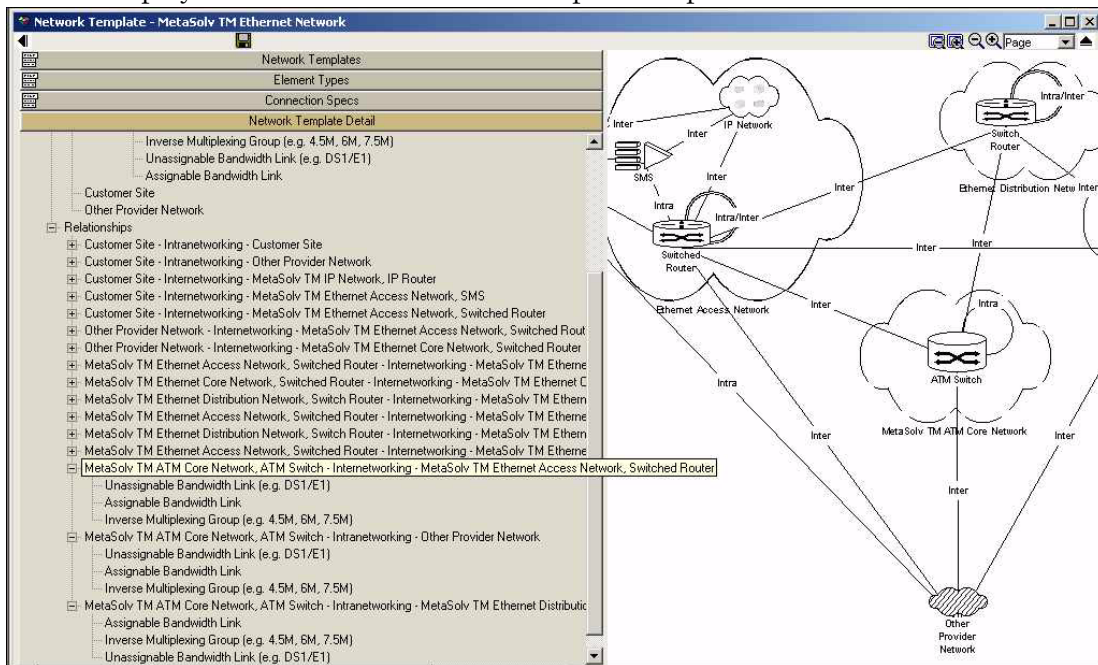
9. Click **Save** to save the template.

SCENARIO 2—ADD NEW COMPONENTS TO A NETWORK TEMPLATE

The MetaSolv-defined ATM access network template supports voice connections through the path that includes the aggregator and voice gateway. Scenario 2 involves the requirement to be able to design ATM access network systems that include a Multi-Service Access Platform (MSAP) as a network element. In this environment, MSAP enables an alternate route for voice connections from a customer site to the PSTN switch. The change needs to be made in Network Templates, since this element type is used in many of the company's ATM access networks. The new route is the preferred route.

For this scenario, assume you determined to achieve this objective by completing the following tasks.

- Create an element type called MSAP and add it to the MetaSolv TM ATM Access Network template.
- Add two new physical connections from MSAP—one to the customer site, the other to the switch in the embedded PSTN network.
  - ⇒ To the relationship between the customer site and the MSAP, associate as a connection spec, the Assignable Bandwidth Link and Inverse Multiplexing Group.
  - ⇒ To the relationship between the MSAP and the PSTN switch, associate as connection specs, GR-303 Group and V5.2 Group.

  ⓘ **Note:** Voice connections can be assigned to all four of these types physical connections. See Figure 90 on page 76. Only assignable bandwidth link and inverse multiplexing group are used on extensions to the customer site.

- Given that a virtual connection already exists between the Customer Site and the PSTN switch, create a new prioritized path for this virtual connection that includes the route through the MSAP network element. Set this new path as Priority 1.
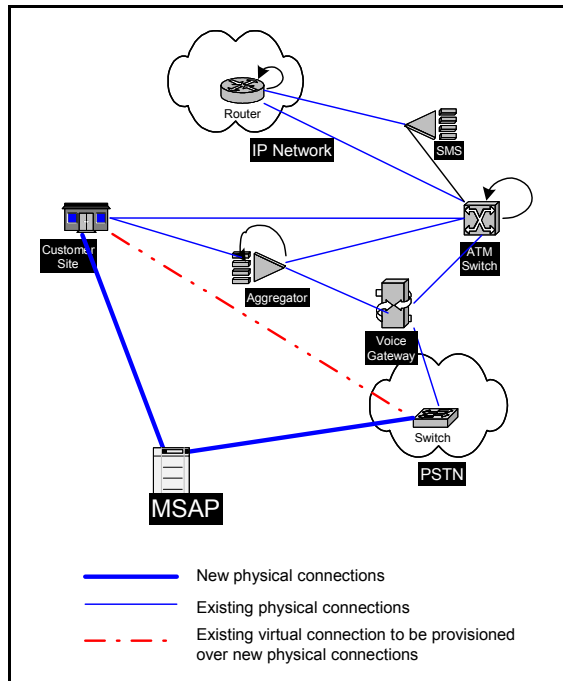
Figure 153: Addition of MSAP element type to ATM access network template

> **Note:** If the requirement had included adding physical connections from the MSAP to the IP router and to the SMS, and then creating virtual connections, you would either have to add new virtual connections to the ATM access network template or use the ATM/Frame Relay network template, which includes these two virtual connections in the embedded ATM access network.

Use the following steps to create an element type, add it to an existing network, create physical connections to it, and create new prioritized paths that include segments terminating at the new element type.

Steps

1. Display the ATM access network on the canvas

    a. Select **Engineering > Net Systems > Templates**.

    b. Open the Network Templates panel list.

    c. Expand the ATM_FR template type.

d. Double-click the ATM access network to display details of this network template both textually on the Network Template Detail panel and graphically on the canvas.
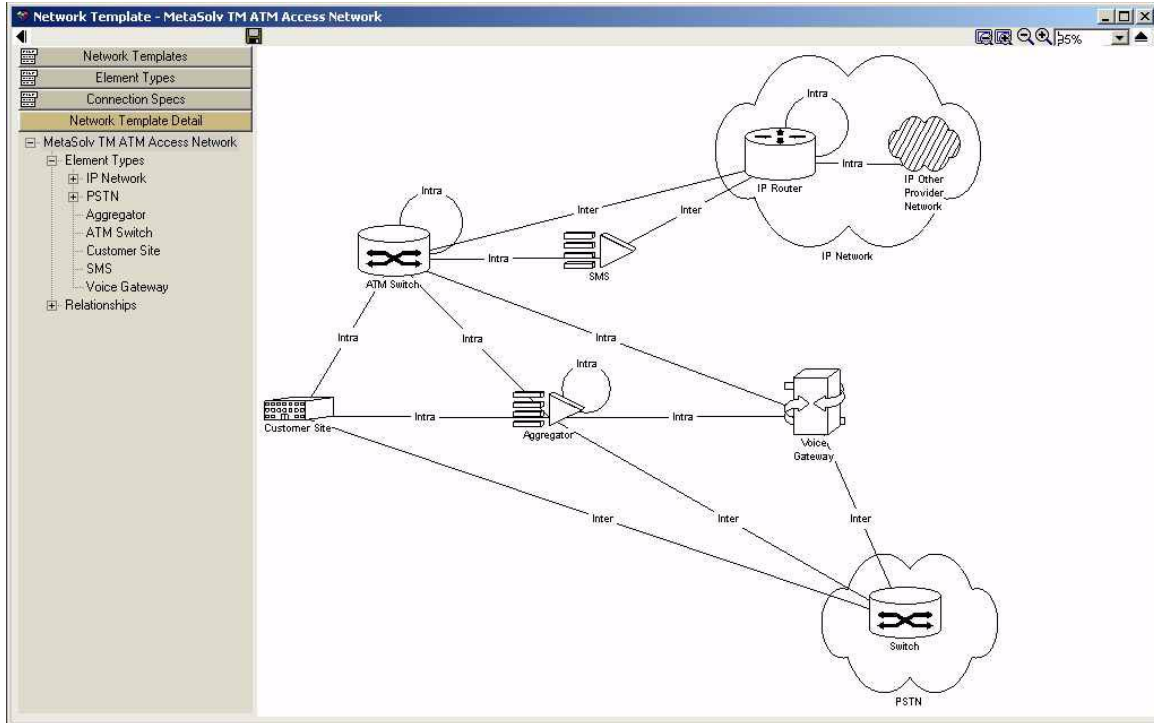
2. Add a new element type called MSAP.

a. Select **Add Element Type** from the Element Types panel list left-click menu.
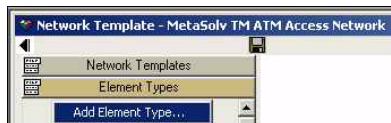
b. Enter MSAP for the **Element Name** and Multi-Service Access Platform for the **Element Type Name**. Click **Browse**.
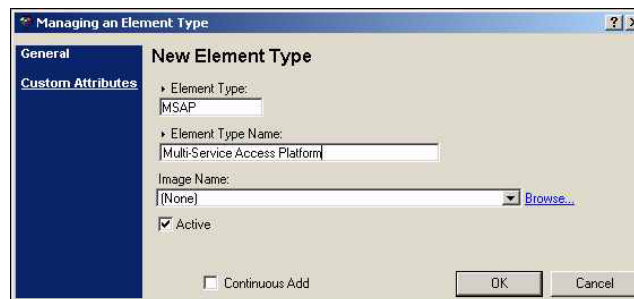
c. Highlight the name of the graphic image for MSAP (MSAP3). Click **New**. Click **OK**.
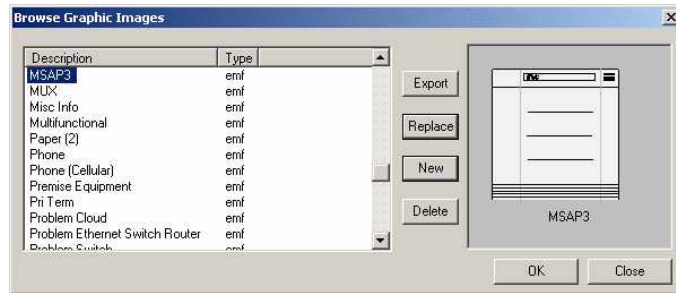
d. Click **OK.**

3. Add the MSAP element type to the ATM access network as a template element type and define its properties.

a. Drag the MSAP image from the Element Types panel to the canvas.

b. Select **Properties** from the right-click menu.
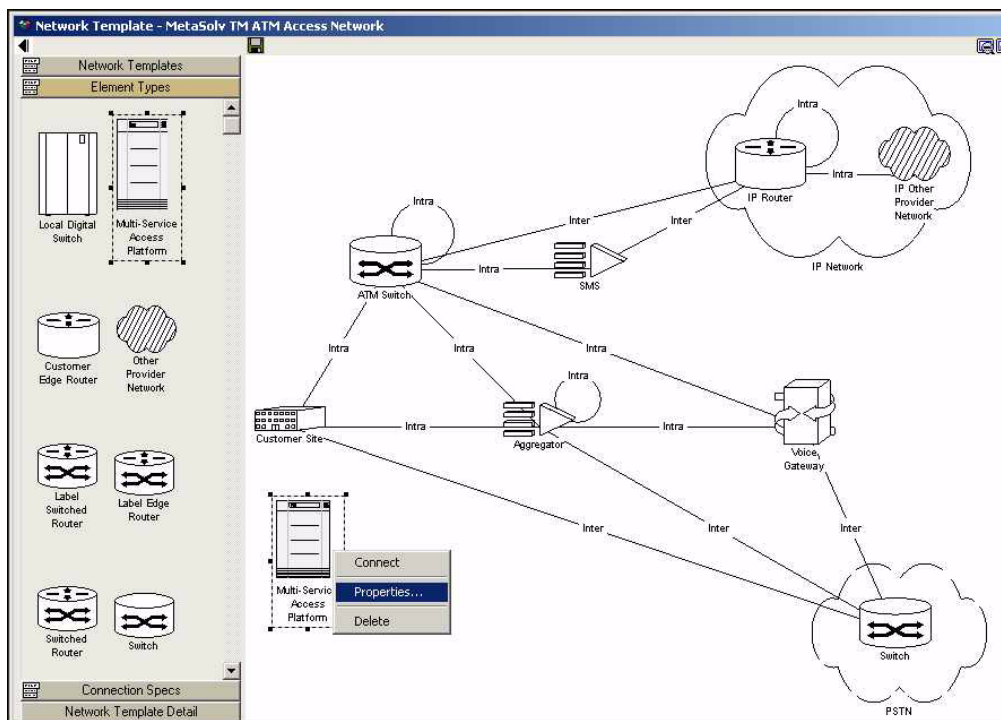
c. Complete the Managing a Template Element Type window. (Although Orderable is checked by default, this element type will not be orderable since it has been added

to a network template that is defined as Internal Configuration of a System.) Click **OK**.
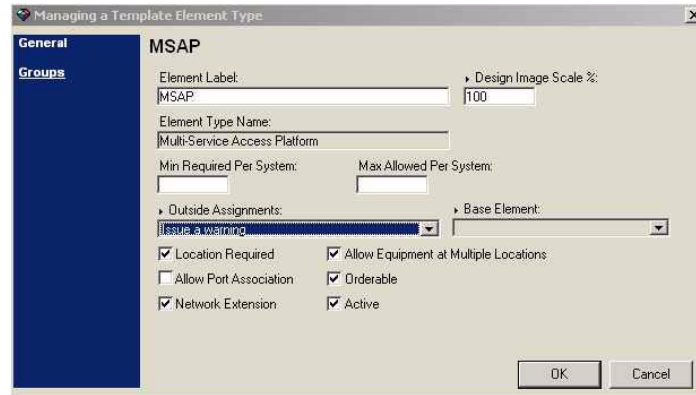
4. Create a template relationship between the Customer Site and the MSAP template element types and define its properties.

   a. Right click the MSAP icon and select *Connect.*

   b. Drag the dotted line to the MSAP image and click to complete the connection.

Drag the dotted line from the MSAP image to the Customer Site image and click to complete the connection

Results
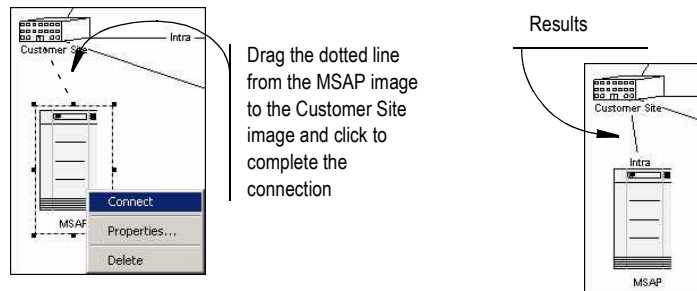
   c. Click the relationship between MSAP and Customer Site and select **Properties.**
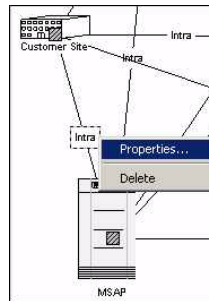
   d. Evaluate the setting for Intranetworking/Internetworking and change if needed. Since the Customer Site is considered an extension of the provider network, ATM Access Network, the Networking default setting is correct.

e. Click the Connection Specs link in the panel.
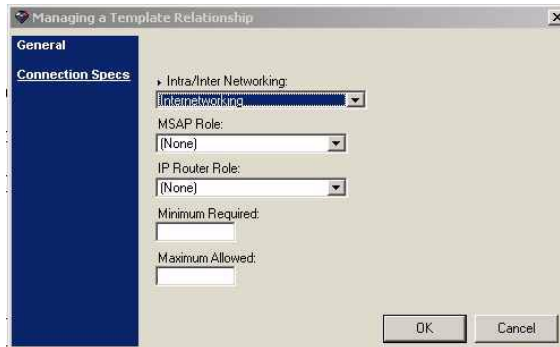
f. Double-click on a connection spec.
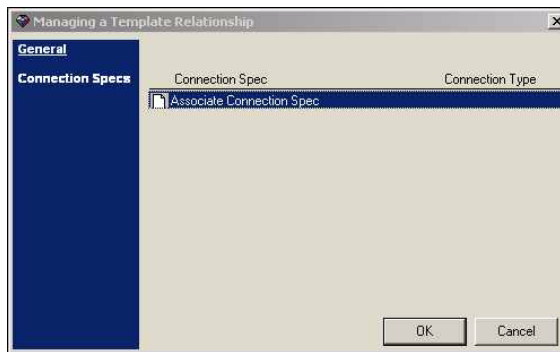
g. Associate the relationship between the customer site and the MSAP with an Assignable Bandwidth Link, an Unassignable Bandwidth Link, and the Inverse Multiplexing group. Then click **OK**.
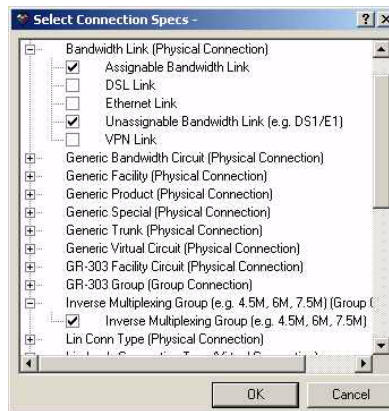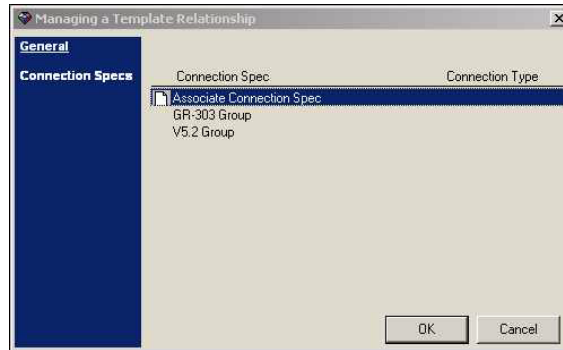
h. Verify the assignment and do not click **OK**.
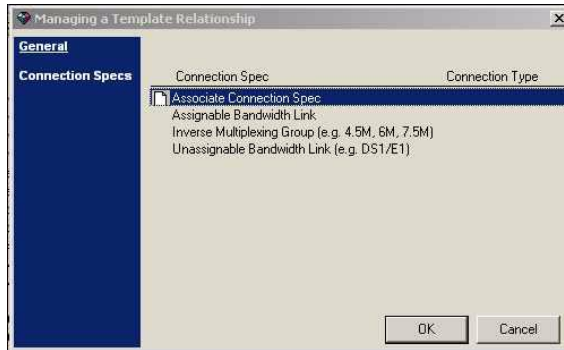
5. Define the template connection for each of the connection specs associated with the relationship between the customer site and MSAP.

a. Double-click a connection spec.

b. Check the required checkboxes and click **OK**.
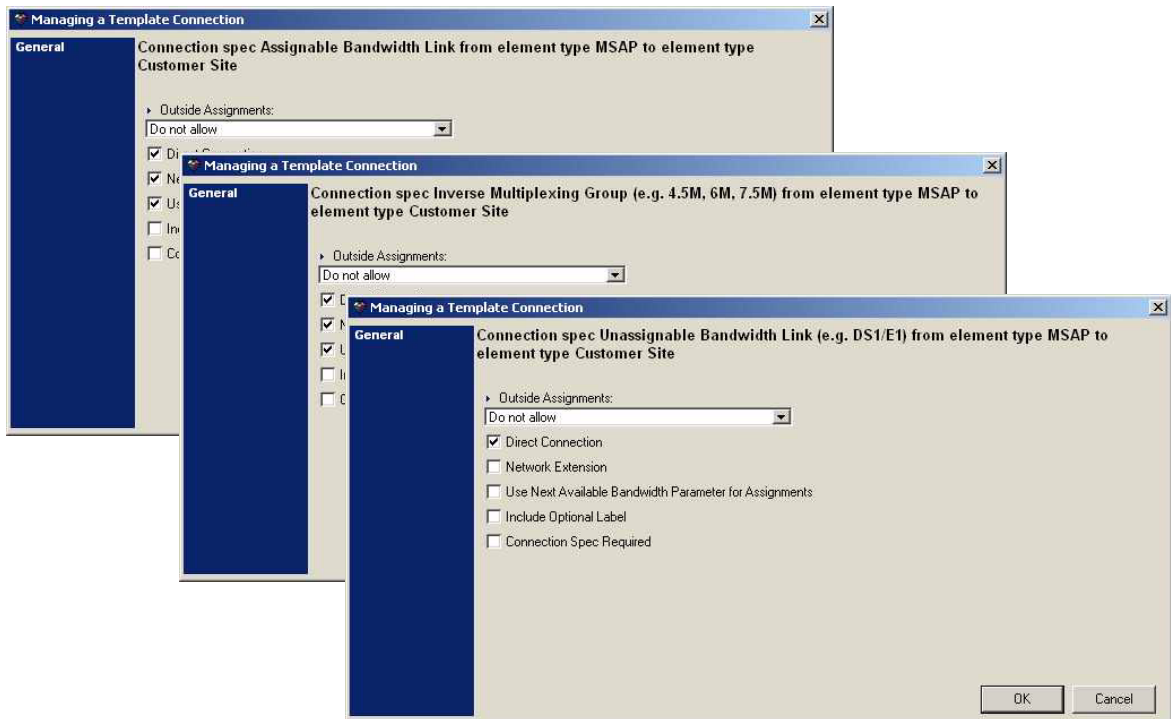
6. Using Step 4 on page 191 as a model, create a template relationship between the MSAP template element type and the switch that is part of the PSTN template embedded element type and define its properties.


7. Using Step 5 as a model, define the template connection for each of the connection specs associated with the relationship between MSAP and the PSTN switch.
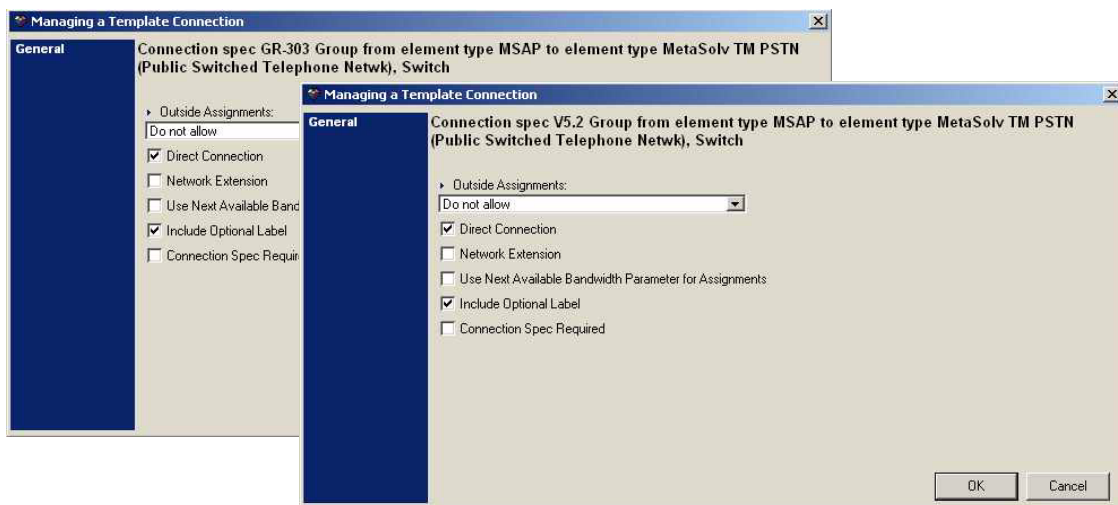
8. Assign the virtual voice connection to the path, between the customer site and the PSTN switch, that goes through MSAP.

a. Right-click the template relationship between the customer site and the PSTN switch and select **Properties**.

b. Click the Connection Specs link on the Managing a Template Relationship window.

c. Double-click the associated Voice connection.
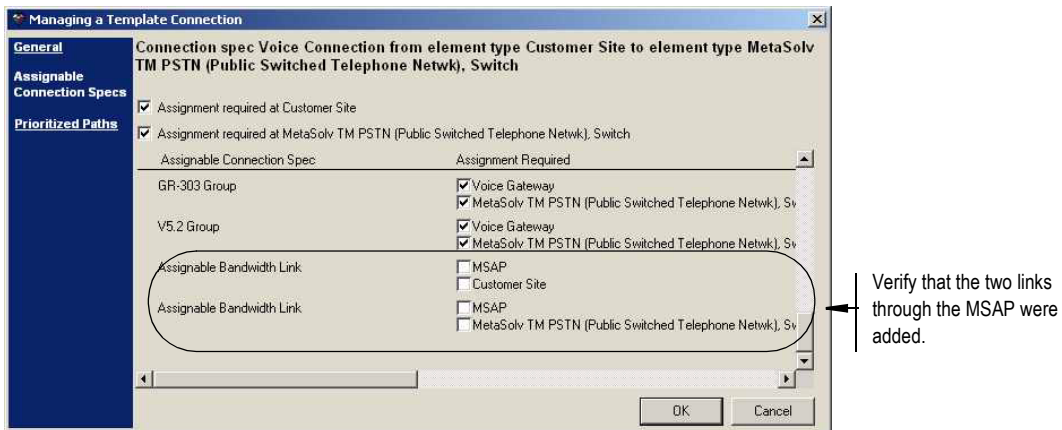
d. Open the Assignable Connection Specs view.
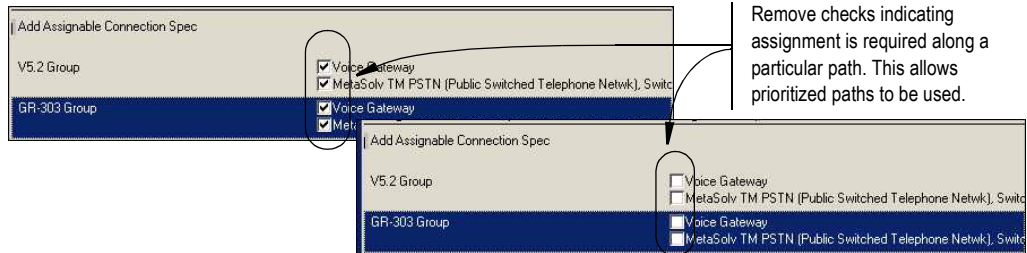
e. Click the Add Assignable Connection Specs icon.
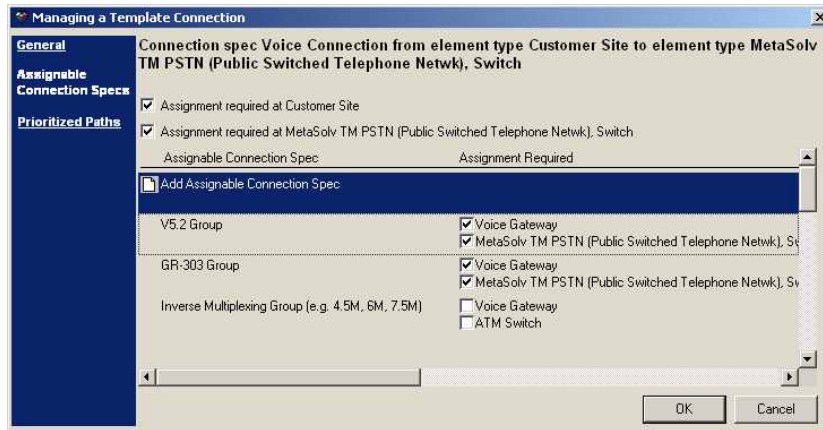
f. Specify the two links for voice through MSAP, then click **OK**.

g. Scroll to verify the new path has been defined.

h. Scroll to verify the connections appear.

Verify that the two links through the MSAP were added.

    i.   Uncheck any checkboxes that are checked for required assignments.

Remove checks indicating assignment is required along a particular path. This allows prioritized paths to be used.

9.   Assign an additional prioritized path to the voice connection between the customer site and the element in the embedded PSTN network, where this path includes the MSAP element type. Make this path first in the priority list.

    a.   Click Prioritized Paths on the Managing a Template Connection window to open the Managing a Prioritized Path.

    b.   Click Add Prioritized Path
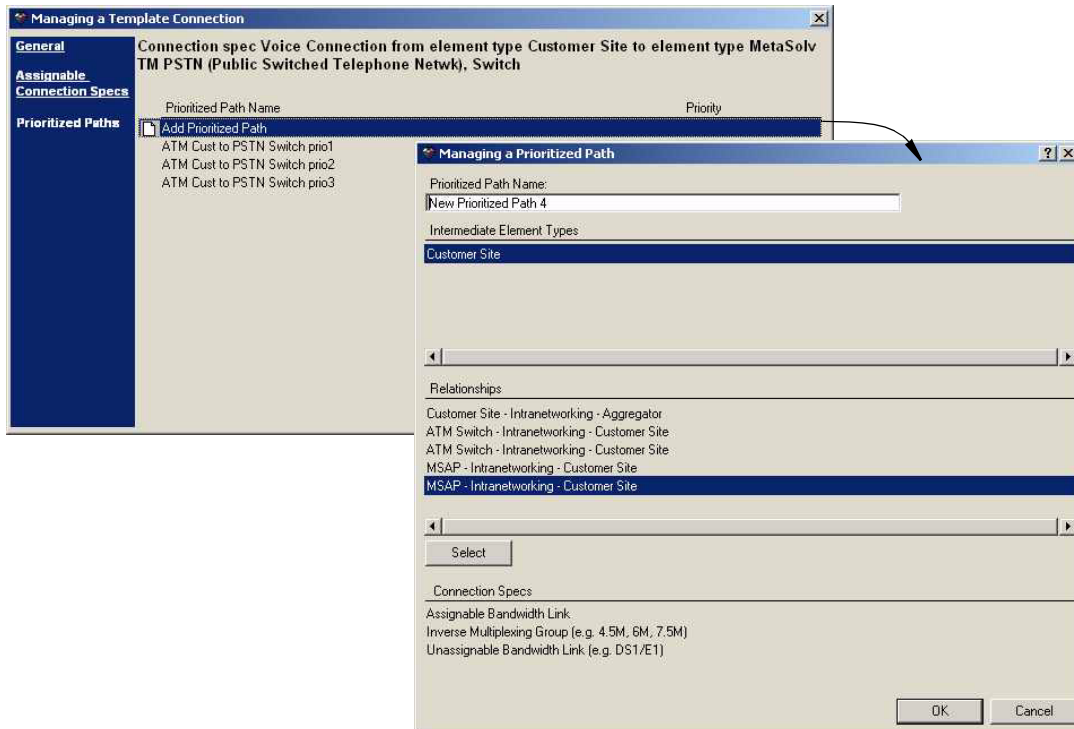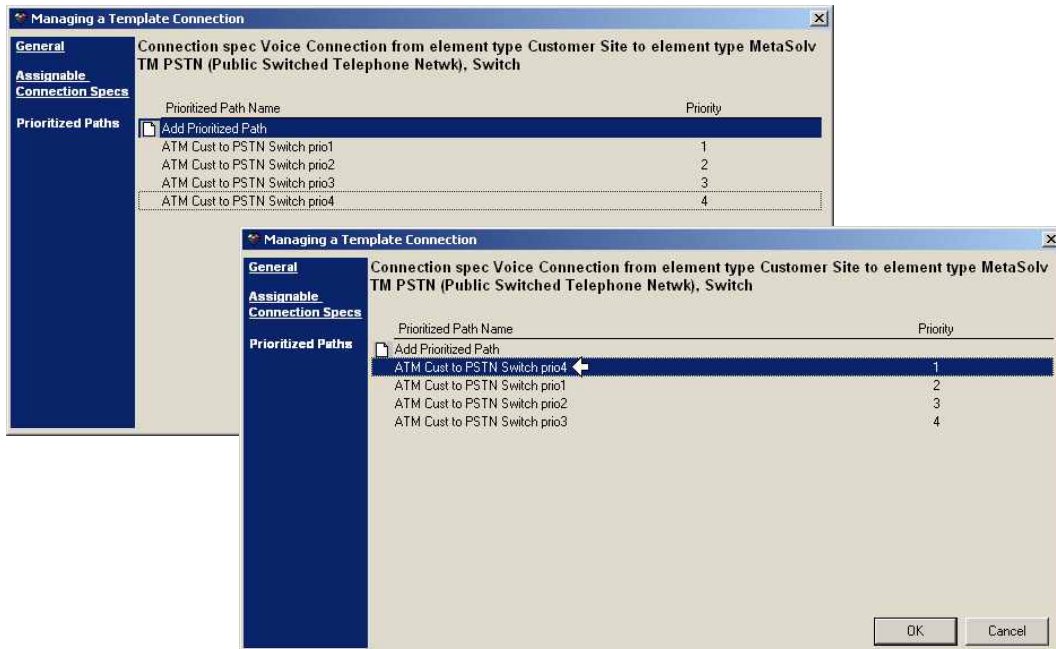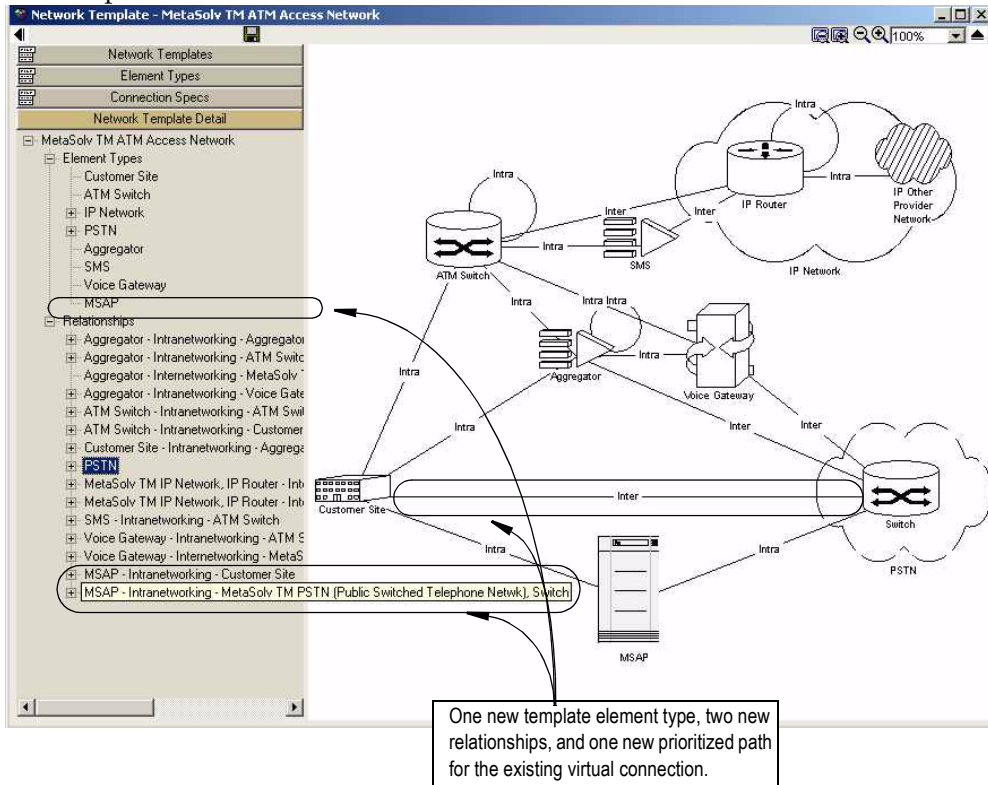

    c.   Add the name: ATM Cust to PSTN Switch prio4

d. Click **Select** twice to move MSAP and PSTN to the Intermediate Element Types section, then click **OK**.
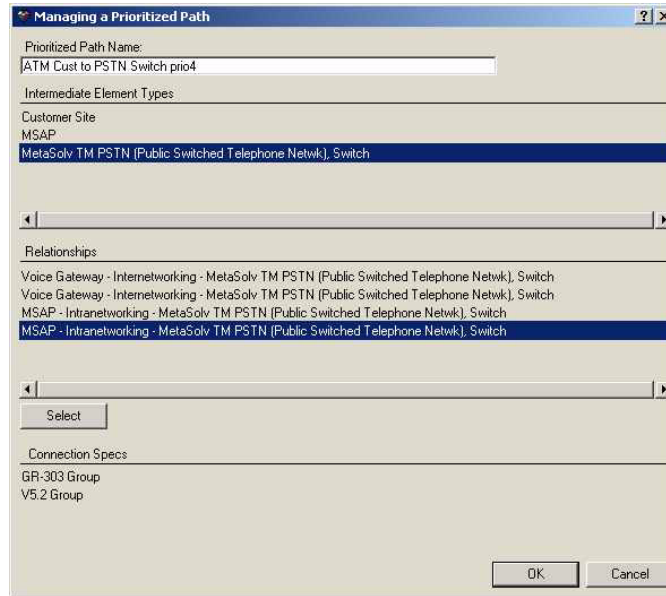
e. Verify the new path was added, then drag the new path to the Priority 1 position and click **OK**.

10. Click **Save**. Review the data on the Network Template Detail panel list to verify completeness.

One new template element type, two new relationships, and one new prioritized path for the existing virtual connection.

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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.