MODULE FIVE: FIBER

Participant Guide
spatialNET Standard Users Workbook
November 1, 2011
Version 1.0
Brad Simpson

OVERVIEW:

This module provides an overview of how to successfully draft fiber network elements in spatialNET. This includes an introduction of the fiber architecture of spatialNET.

OBJECTIVES:

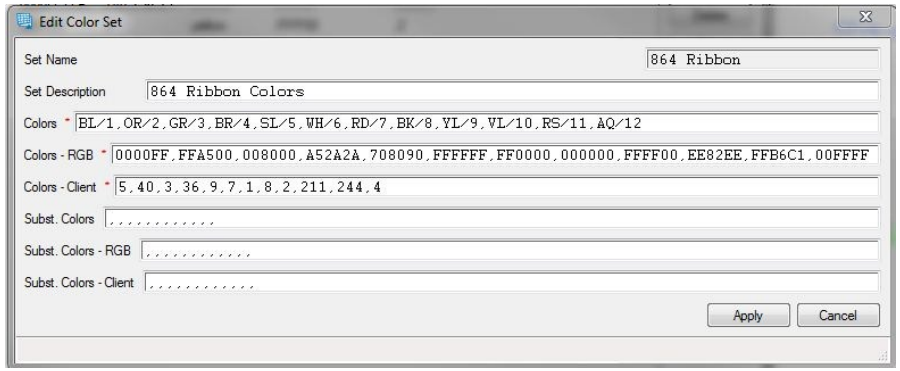
By completing this module, participants will be able to:

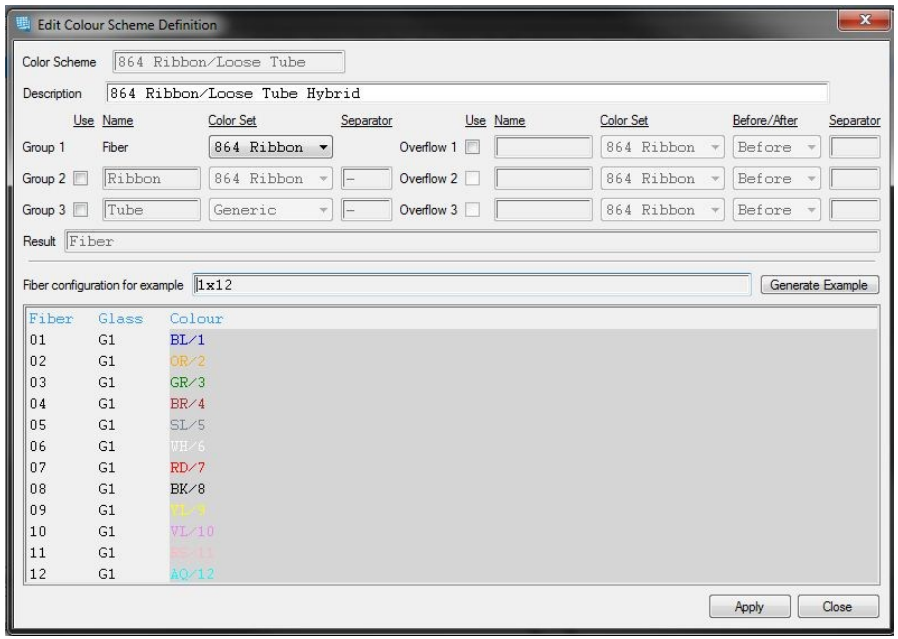
- Draft fiber cables and other fiber elements on the map.
- Modify fiber elements on the map including creating splice connection to connect multiple fibers together.
- Utilize different fiber reports and tools to modify the RF design.
- Modify usage and master circuit information.

NOTES

THE FIBER DICTIONARY

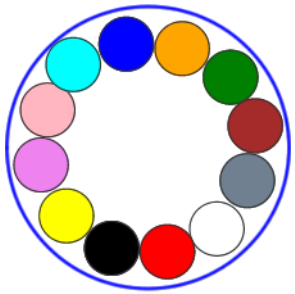
Just as in the real-world, fiber cable is defined by the color set and then by the count of the individual fibers contained in a sheath. Once the color set is defined, the scheme for the different cables can be created in the dictionary. The hierarchy of the cable scheme is based different groups of color sets.





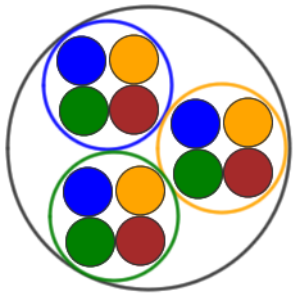
Depending on how the cables have been defined in the dictionary, the color scheme will have the following hierarchy:

Group 3 x Group 2 x Group 1



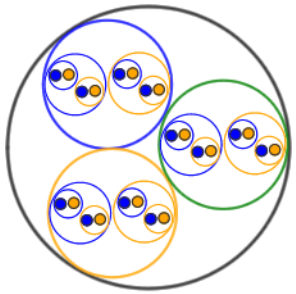
1X12

1 Group 2
12 Group 1



3X4

3 Group 2
4 Group 1



3X2X2

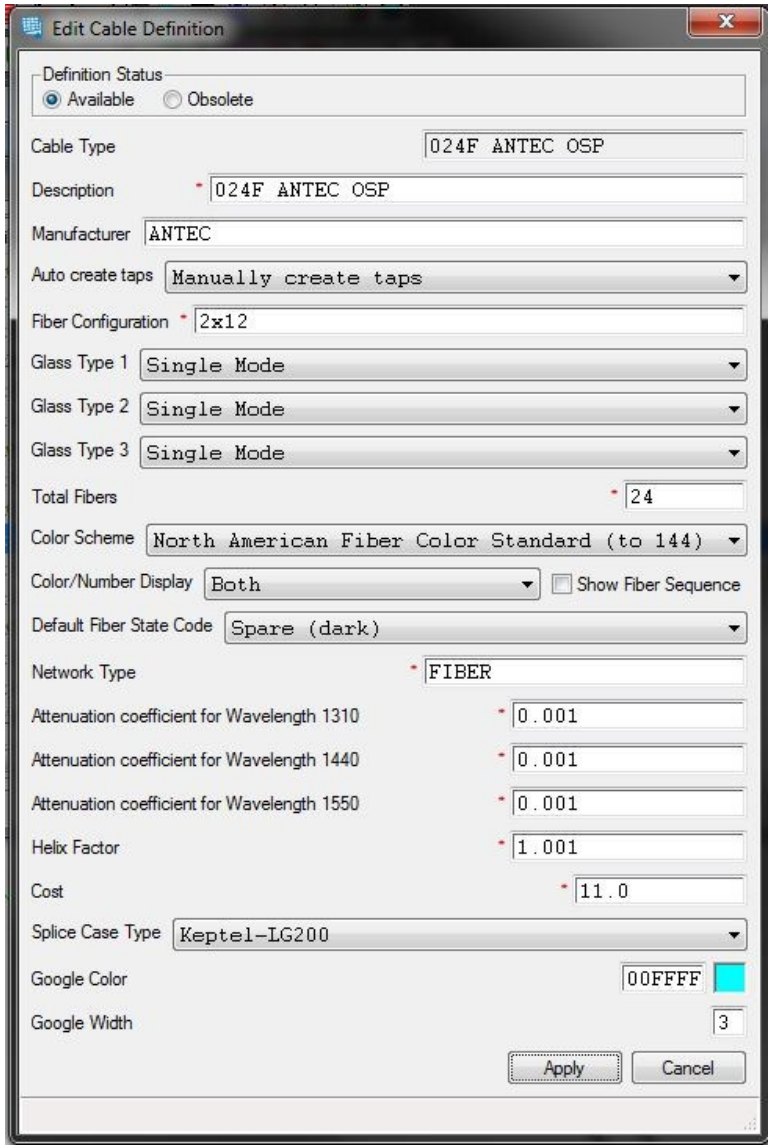
3 Group 3
2 Group 2
2 Group 1

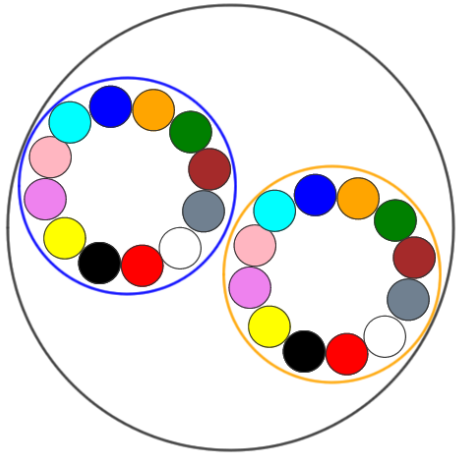
The configuration of Group 3 x Group 2 x Group 1 would have to defined differently in the dictionary.

NOTES

NOTES

Once color scheme has been set, the fiber cables can be defined. Based on the hierarchy of color scheme, the fiber configuration will be set like the following:





In this case, the cable that is defined here has a 2x12 configuration. Once the configuration is established, there are additional areas:

Areas of Discussion:

- Auto Tap Versus Manual
- Fiber Configuration
- Glass Type
- Default Fiber State
- Attenuation

FIBER AND NETWORK TOOLBARS

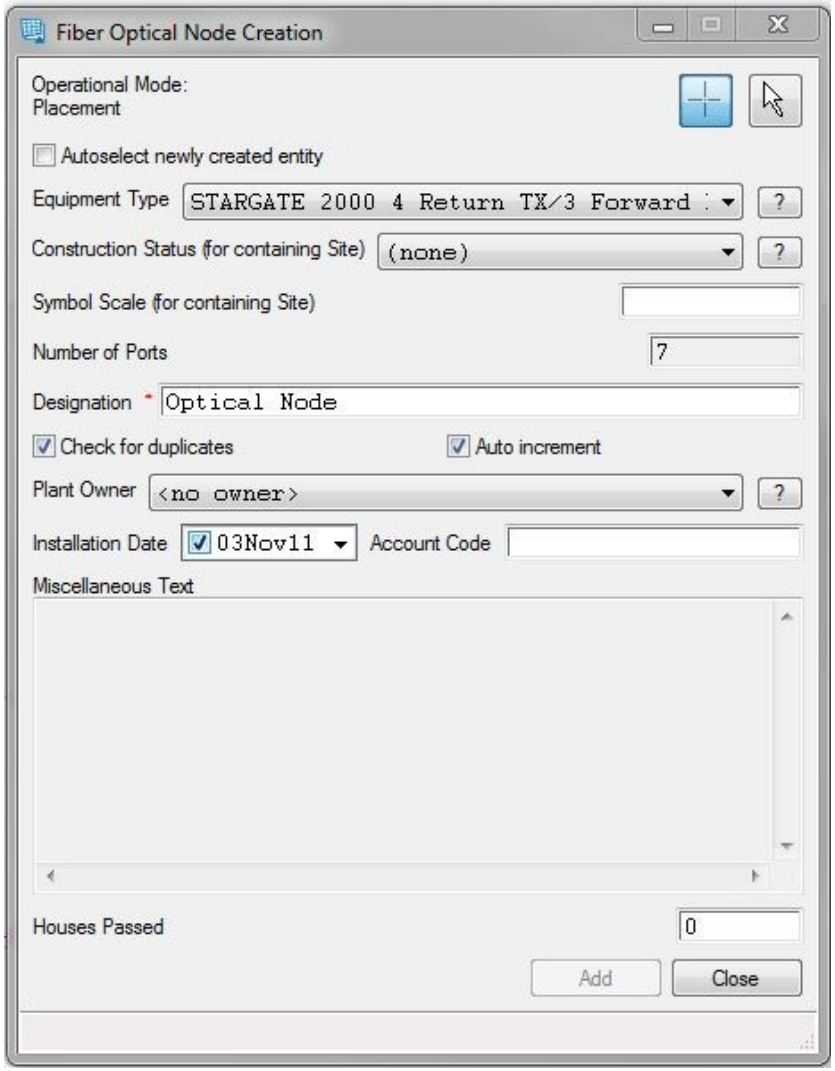
	Function	Use
	Add Fiber Cable	Draft fiber cable from selected entity or point.
	Add Term Panel	Places a term panel in the selected site.
	Add Splice Case	Adds a splice case in map view at the selected location.
	Add Optical Node	Places an optical node on the map or in the selected site.
	Add Fiber Tap Box	Creates a fiber (FTTx) tap box at the selected location.
	Add Site	Places a site at the selected location on the map view.
	Add Site with Term Panel	Creates an ISP site with rack, chassis and card.
	Physical Splice	Opens the splice panel tool to connect fibers.
	View Splice	Opens the splice view in a new window.
	Fiber Ports List	Displays all of the different fiber ports for the selected cable.
	Fiber/Pair Readings	Shows the circuit information for the selected entity.
	A to Z List	Allows users to change the directionality of the selected cable.
	Tail Off Cable	Opens the Cable Tail Off options to create a tap box for the fibers.
	Drop Tool	Creates association of the selected entity and addresses.

NOTES

PLACING AN OPTICAL NODE

NOTES

Depending on how the fiber optic node is situated, there could be several scenarios that can emerge from adding the node to the map especially as it relates to RF and cooper. It is important to keep in mind that a node is an OSP site.



When adding an optical node, it will include only the equipment for the fiber transmitters and receivers. Any other equipment will need to be added independently.

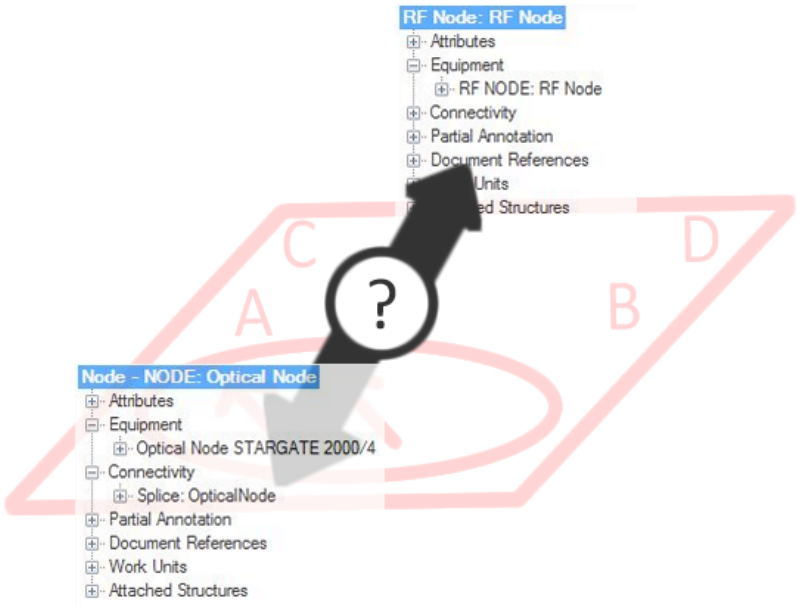
Areas of Discussion:

- Equipment Type
- Construction Status
- Symbol Scale
- Number of Ports

PORT MAPPING

NOTES

Fiber connection locations will be sites that allow for extra equipment to be placed and allow interconnections with other networks such as RF and copper. The fiber portion of the node and the RF or copper portion of the node are pieces of equipment sitting inside the site.



In order for connectivity to be modeled between these two types of networks, the port mapping between the optical node equipment and the RF/copper node needs to be completed. Depending on the dictionary, some of the port mapping may already be completed. However there might be opportunities in modeling your network where port mapping needs to be completed.

Areas of Discussion:

- Definitions of Optical Nodes
- Definitions of RF/Copper Nodes
- Equipment Category
- Connectivity Category

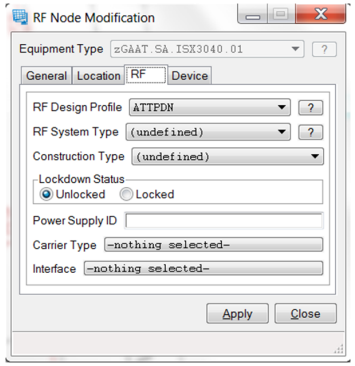
Notes

PORT MAPPING

NOTES

In order to complete the port mapping, both nodes needs to have the same interface location. There are several steps to process in order to finalize the port mapping.

Node Modification

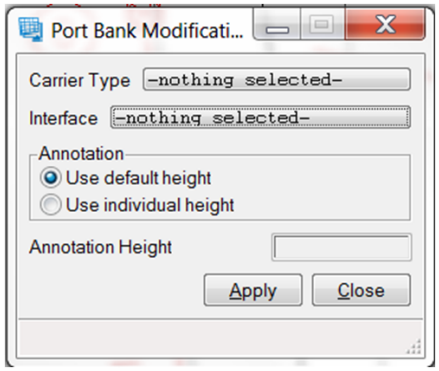


Areas of Discussion:

- Creating the Interface
- Instance Based Mapping

Notes:

Port Bank Modification

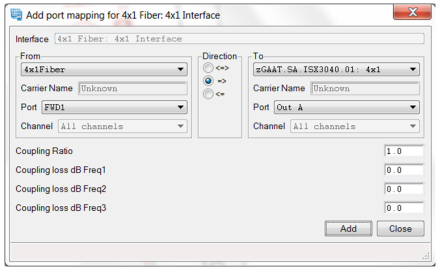


Areas of Discussion:

- Locating the Port Bank Modification Option
- Select from Site

Notes:

Port Mapping

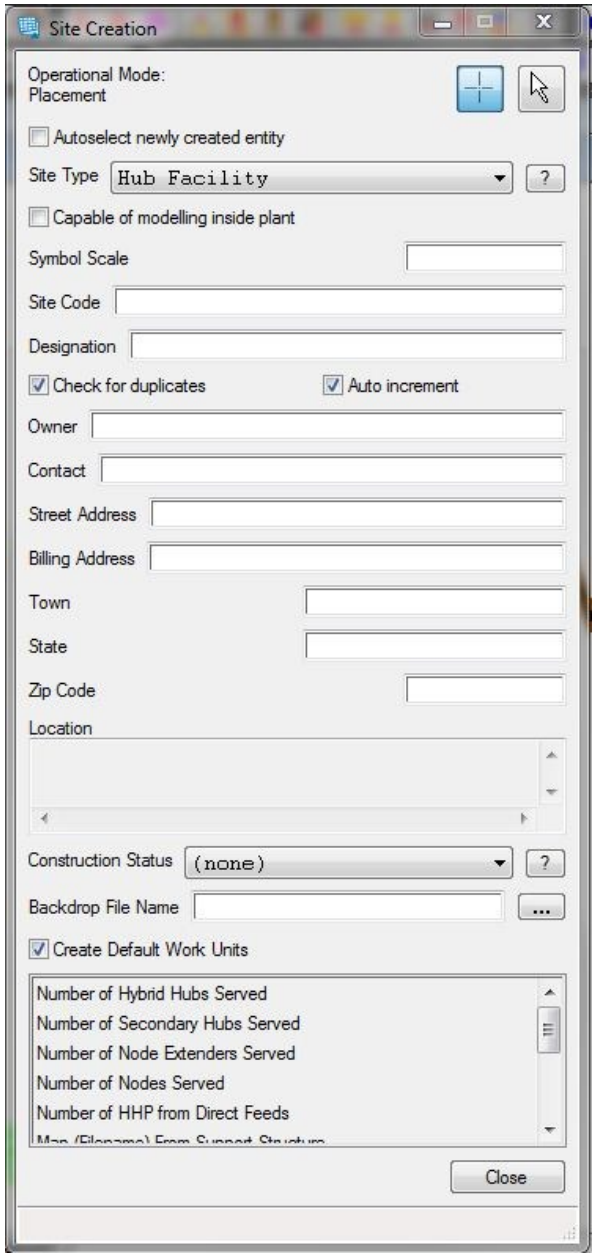


Areas of Discussion:

- Directionality
- Editing Port Mapping
- Applying Port Mapping

Notes:

OTHER FIBER OSP SITES



When modeling fiber networks in spatialNET, users will want to place more than just optical nodes on the map. Using the Site Creation window, users can place different sites on the map based on what is defined in the dictionary.

Areas of Discussion:

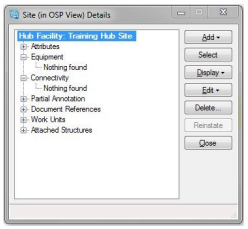
- Site Type
- Site Code/Designation
- Construction Status
- Custom Attributes

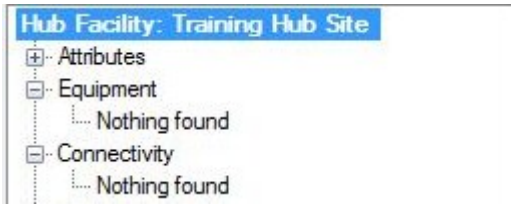
Notes

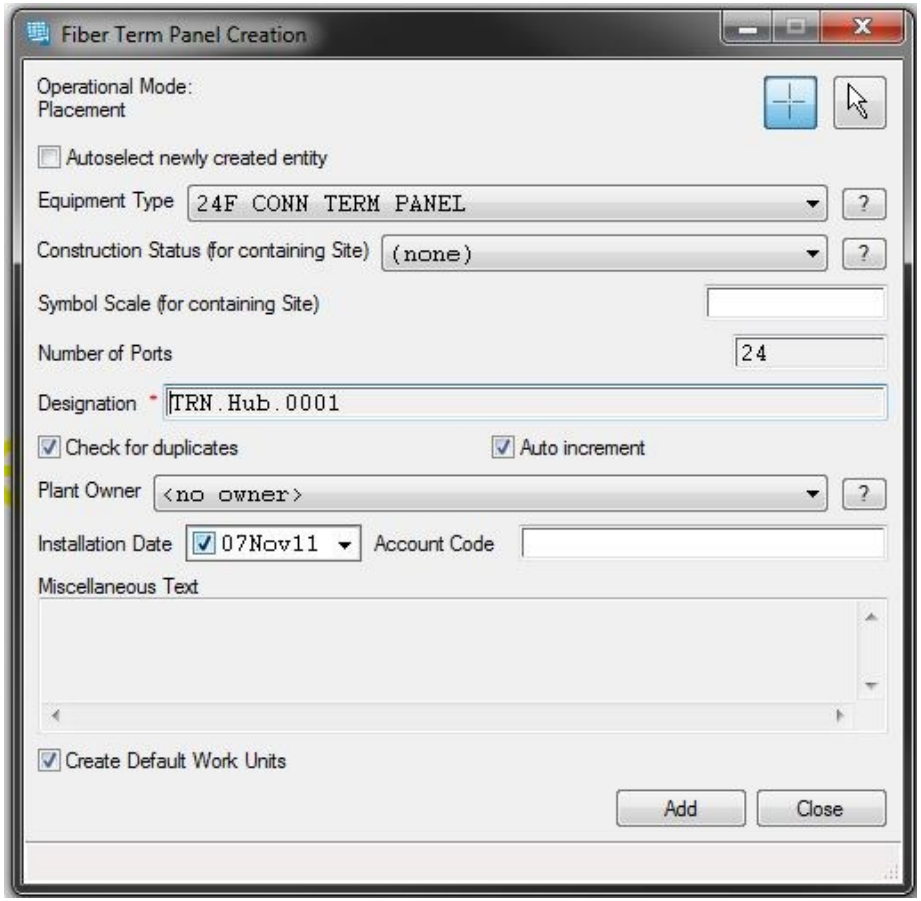
NOTES

TERMINATION PANEL

Once the site is created on the map, that location will not have termination panel added to the site. Users will have to place a termination panel at that site in order to show connectivity at the location (nothing found under equipment and connectivity.) Select the site and click the Add Term Panel icon.







Areas of Discussion:

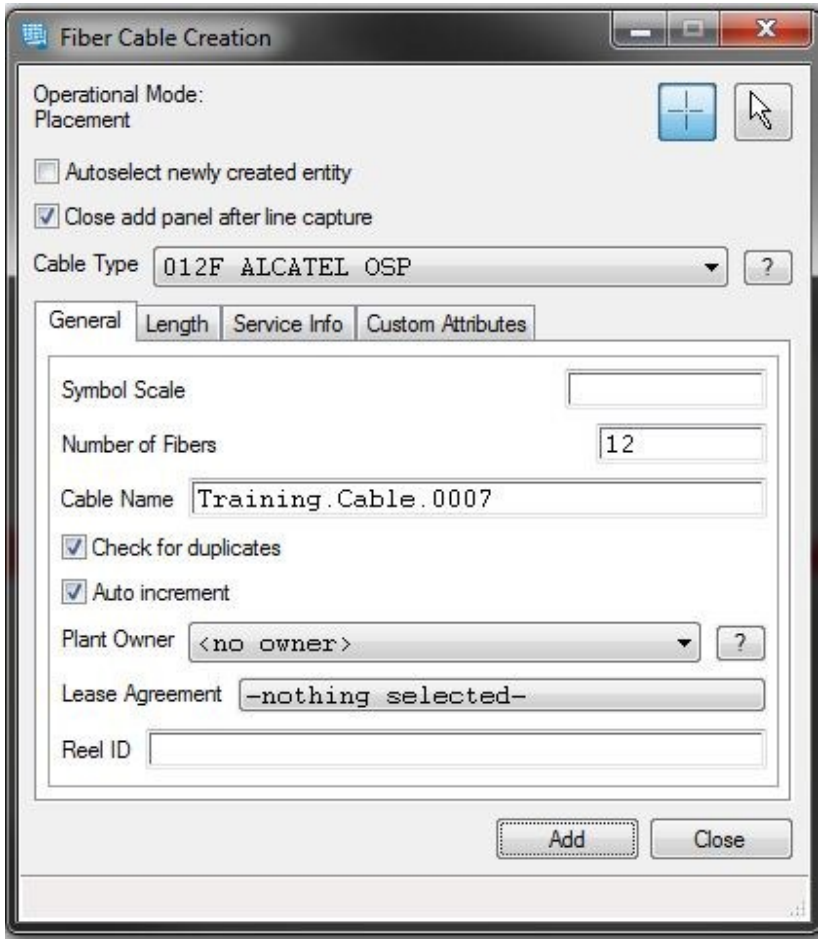
- Equipment Type
- Placement Mode
- Number of Ports
- Designation
- Add versus Close

Notes

NOTES

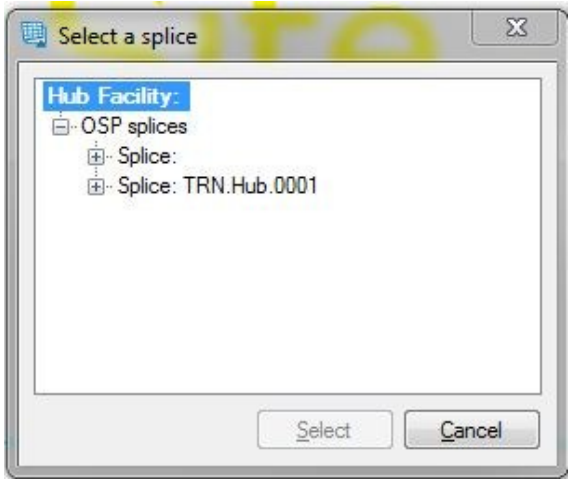
DRAFTING FIBER CABLE

NOTES



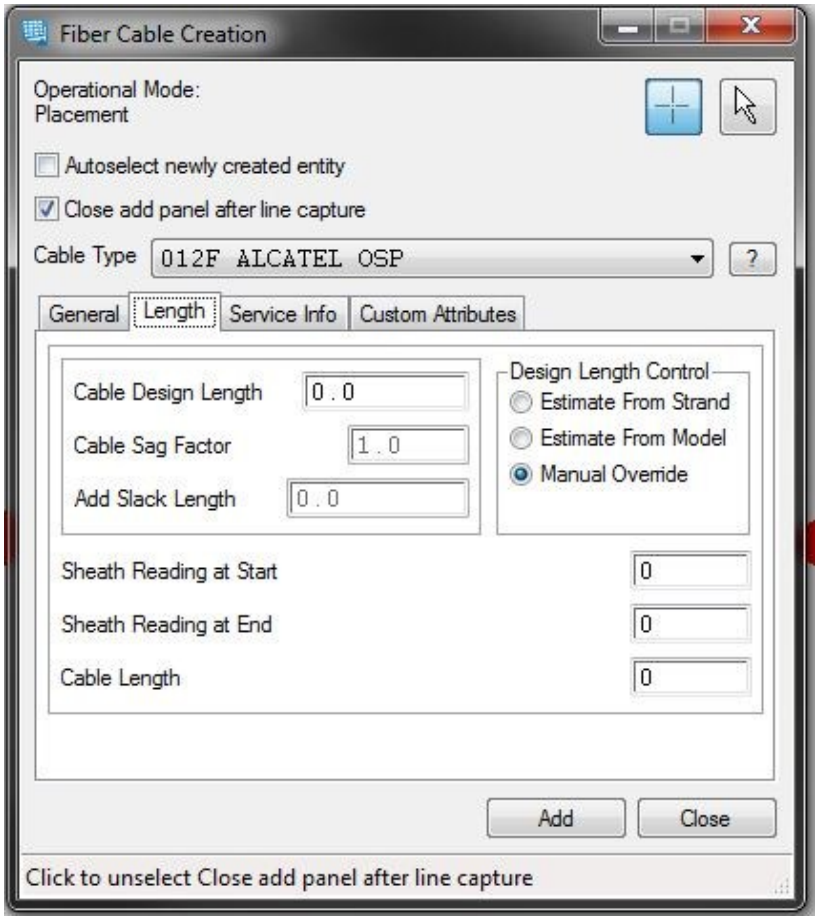
There are, in general, two methodologies that can be used to draft fiber network: design and as-built. Select the starting point for your cable before you begin. If spatialNET isn't sure where the fiber cable starts or ends, it will place extra splice cases.

If multiple splicing locations are present at the site that users have selected, spatialNET will prompt for the splicing location to use for starting or ending the connection.



Notes:

DRAFTING FIBER CABLE



There are different options for updating fiber cable length in spatialNET. In the Fiber Cable Creation window, users can update length information based on design length and adjust with sag and slack lengths. In addition, users can update the tick marks from the sheath readings.

Areas of Discussion:

- Manual versus Auto Tap
- Cable Name
- Number of Fibers
- Service Info
- Custom Attributes
- Line Capture Controls

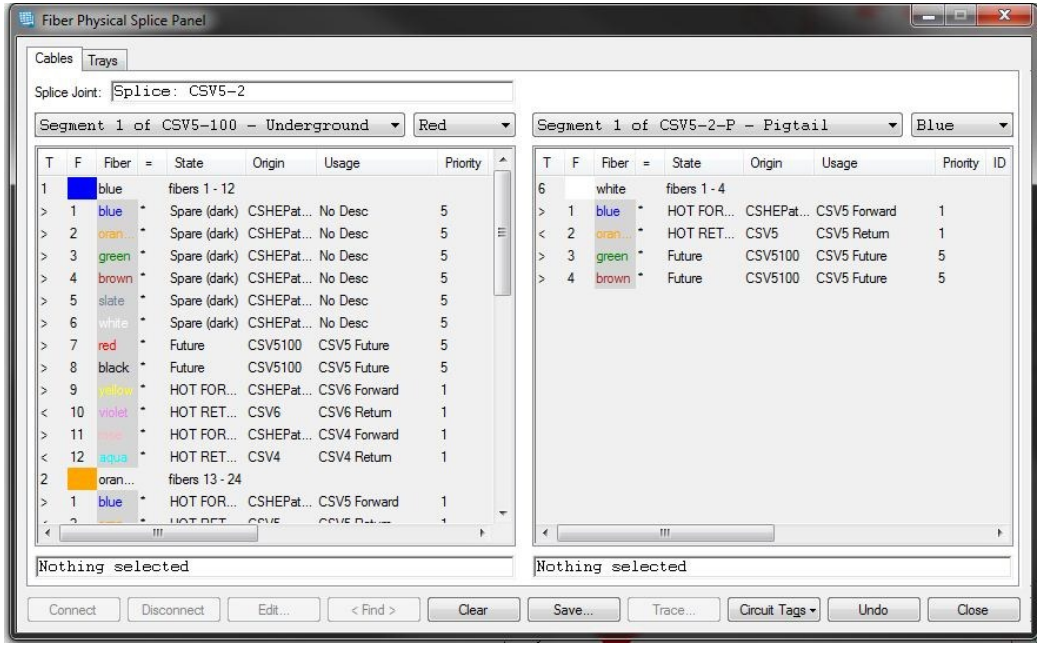
Notes:

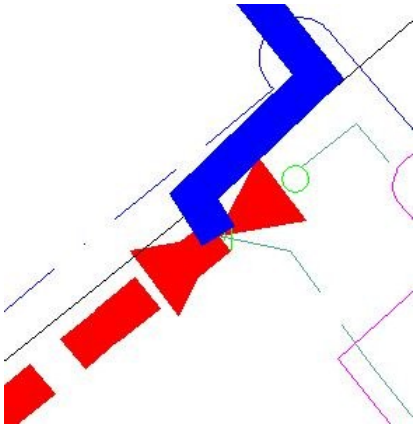
NOTES

SPLICING

NOTES

When connecting multiple fibers together, spatialNET allows for the glass layer to be spliced together. Users can control what cables or entities are being spliced based on the pull-down menus at the top of the window and spatialNET will display highlights to assist with splicing.





T Buffer tube notification for the user.

F The actual fiber that can be spliced.

Fiber Fiber color notification for the user based on the color schema the cable is using.

***** When * is present, the fiber is spliced.

State What is the state of the fiber. Typically controlled by the usage.

Origin Origin entity for the cable based on the directionality. This is subject usage and state code.

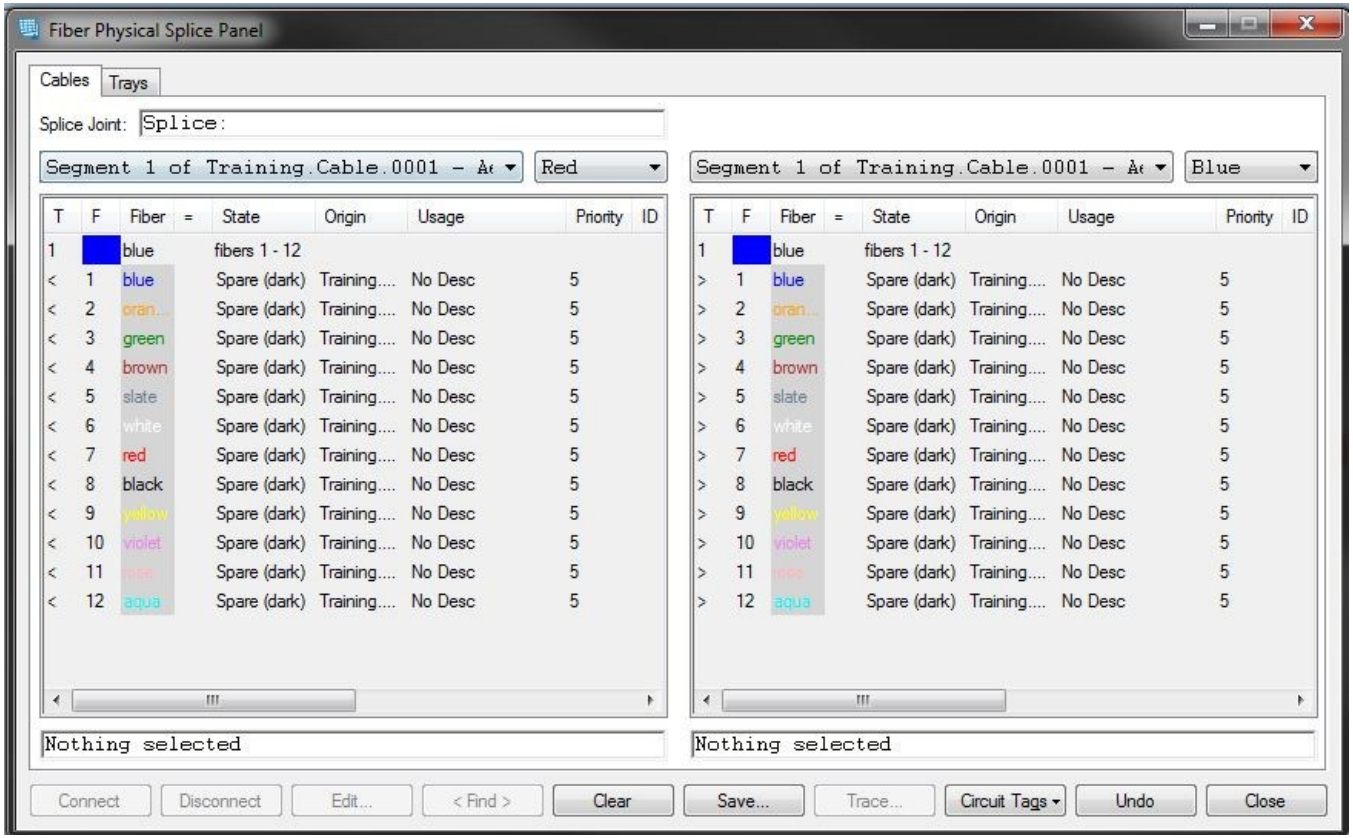
Usage Preset use code for the fiber. Depending on the dictionary, this code can override state and directionality of the fiber cable.

Priority Allows users to set repair or usage priority over the specific fiber. When splicing, if a fiber is spliced to another fiber, the one with a higher priority can reset the usage information.

MULTIPLE SPLICING LOCATIONS

NOTES

When the entities and/or cables are in a different splicing location, the Fiber Physical Splice Panel will not display as expected. Based on this example, the user would be trying to splice upon the same cable.

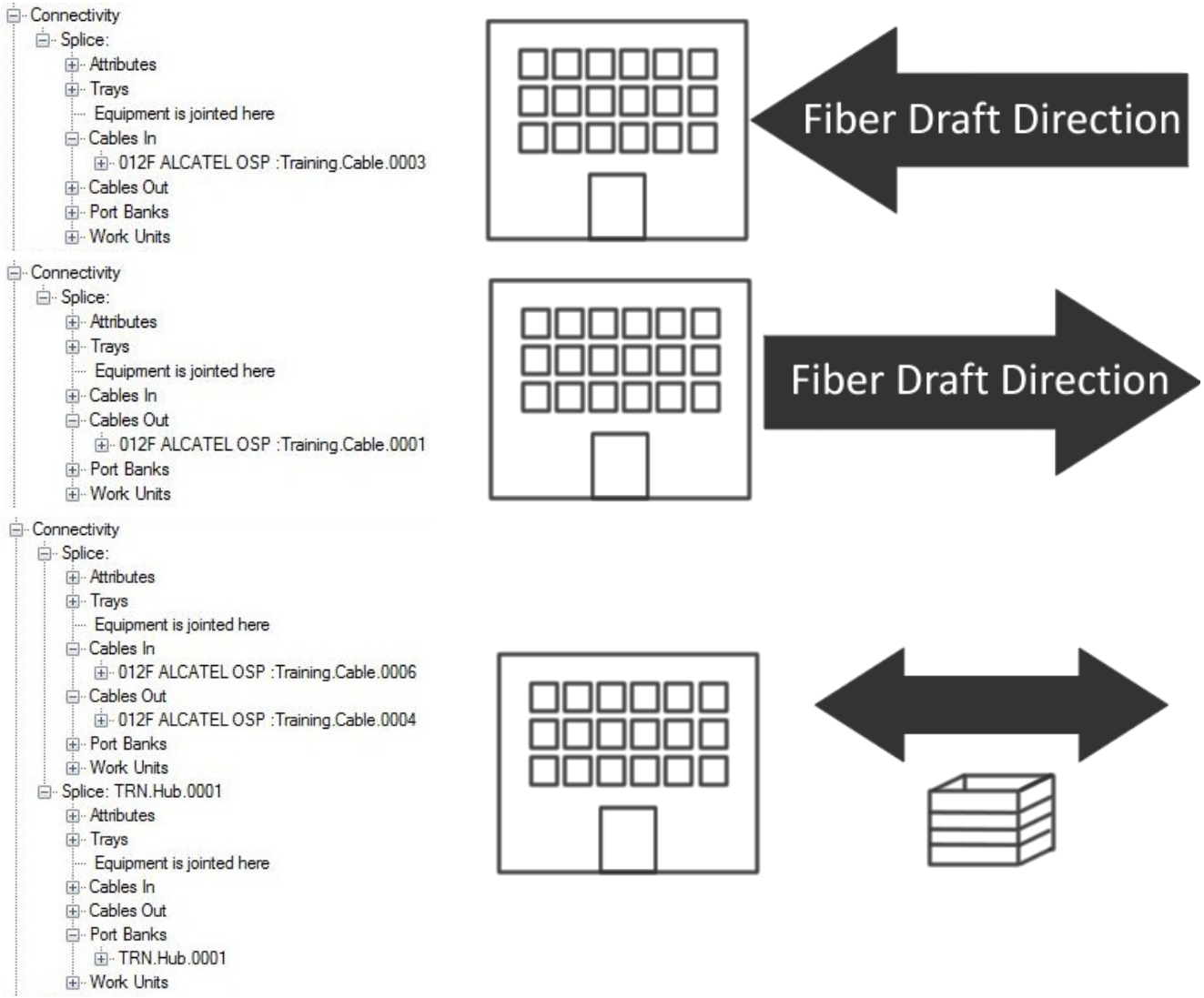


Notes:

MULTIPLE SPLICING LOCATIONS

NOTES

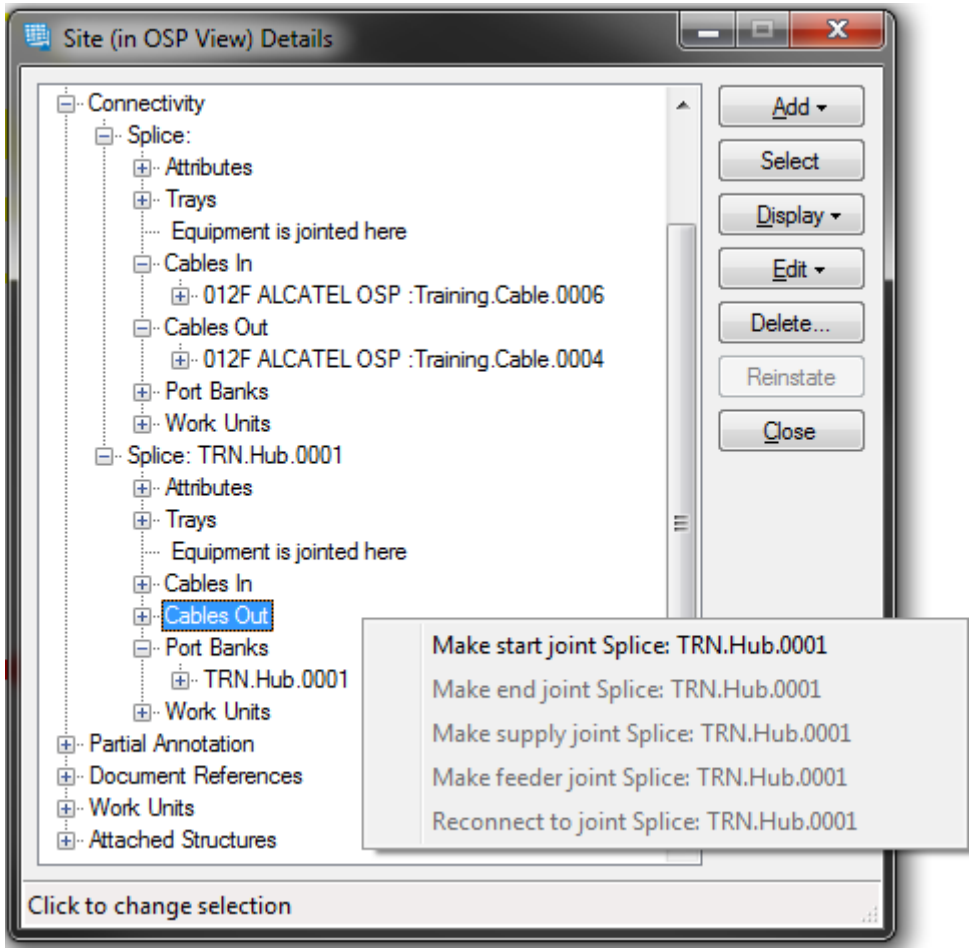
Depending on the drafting situation, fiber connections at site will automatically make a splicing location if no termination panels are present. The specific splicing location that spatialNET will add the connection to will be determined based on the drafting direction.



MULTIPLE SPLICING LOCATIONS

NOTES

With multiple splicing locations present, entities located at different splicing locations cannot be spliced together. Users will have to reconcile which location and entities to splice. The process to resolve these types of situations is fairly straightforward can be used to control entities that users would like to have them separated.



Areas of Discussion:

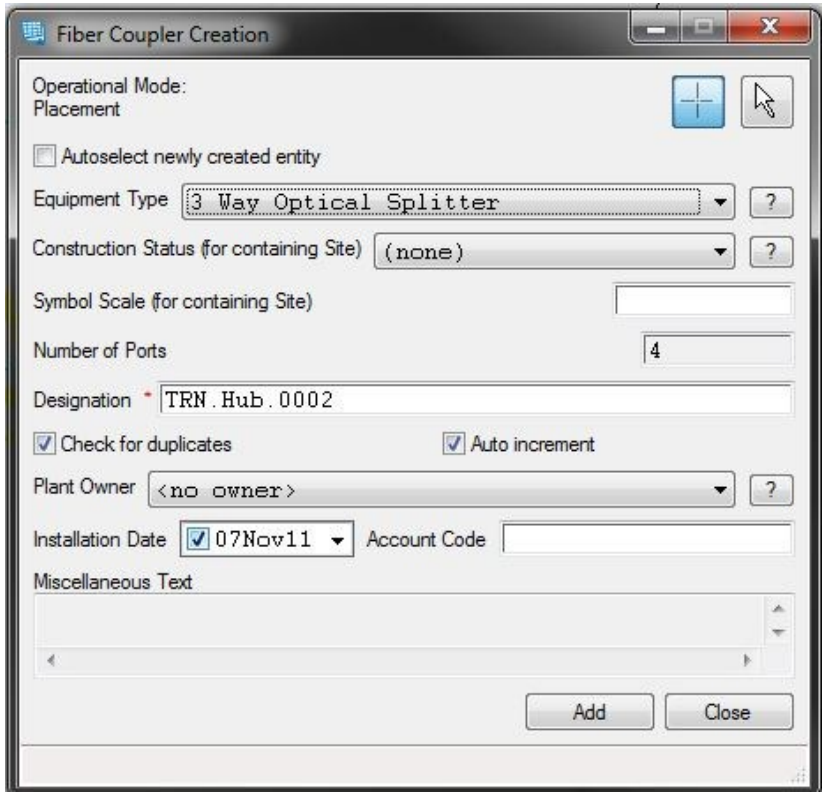
- Process
- Different Joint Splice Locations

Notes

FIBER COUPLERS

NOTES

Fiber couplers act as fiber splitters allowing users to model different connection points across the fiber network. Accessing fiber couplers are from the spatialNET Fiber menu as there is not a default icon to add fiber couplers on the map. Just as with other entities in spatialNET, couplers will have pre-defined ports to use within the model. In the case of the 3-Way Optical Splitter displayed on this page, the splitter has one in port and three out ports allowing for the connection to be split into three. This can be controlled based on attenuation and for types of carrier/channels.



Areas of Discussion:

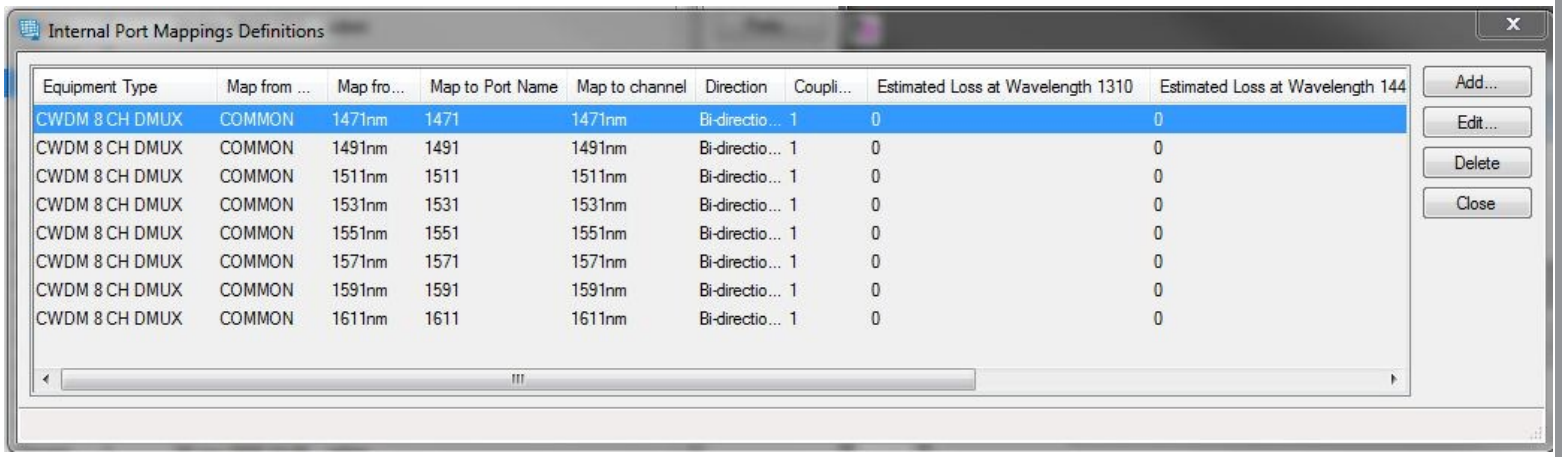
- Equipment Type
- Ports

Notes:

WAVELENGHT DIVISION MULTIPLEXING

NOTES

Couplers can be defined to act as multiplexers and de-multiplexers to support Wavelength Division Multiplexing (WDM). The Port Mapping for the coupler can control the different carriers and channels that can be associated to a specific port. Directionality of that signal can also be controlled from these definitions. Depending on the situation, broad, course and dense WDM can be modeled in spatialNET. The number of ports and wavelengths can be controlled for the ports.



Areas of Discussion:

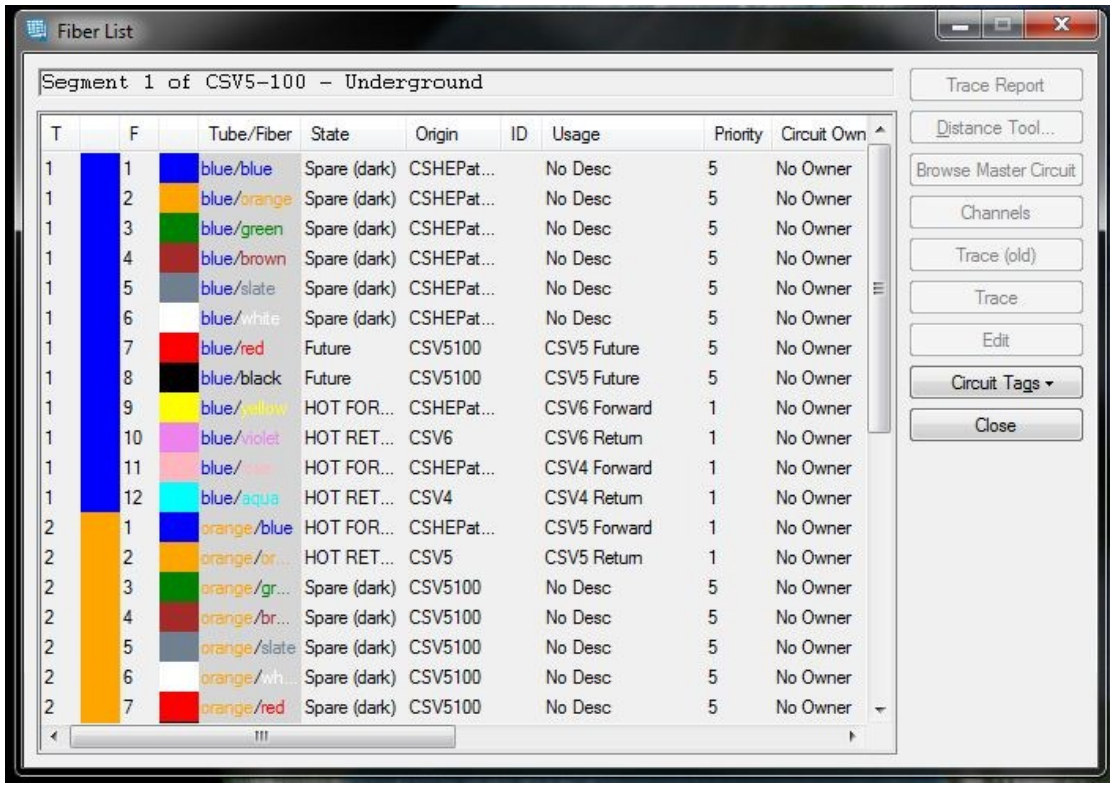
- Wavelength channels and carriers

Notes:

FIBER LIST

NOTES

Once the fiber drafted, users can see fibers that are contained in the fiber sheath. There is a set of tools users will have access to different tools. These tools are helpful to spatialNET users and provide greater insight to the overall design. The list itself contains the same basic information from the Physical Splicing Tool.



Areas of Discussion:

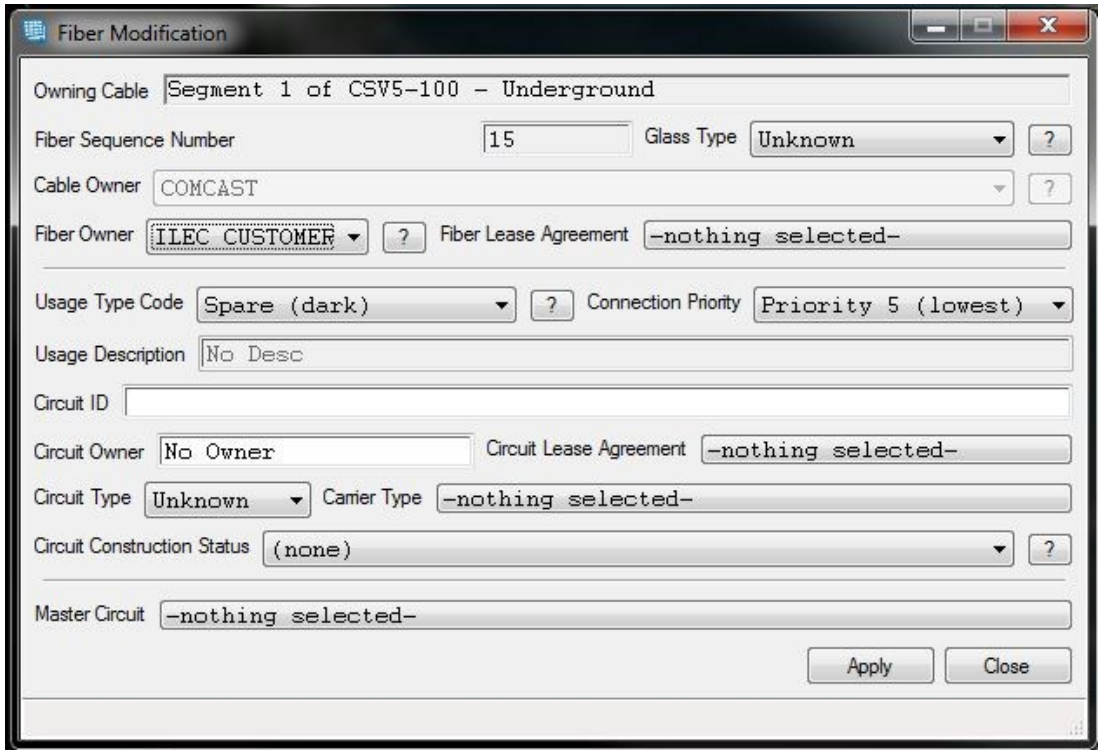
- Distance Tool
- Channels
- Trace
- Circuit Tags

Notes:

EDIT FIBER

NOTES

When drafting the fiber network, users will want to document the usage of specific fiber strands that are in use. Users can modify the usage information through the Edit option location in several windows in the Network toolbar. Once open, the Fiber Modification window provides users different options to update the fiber.

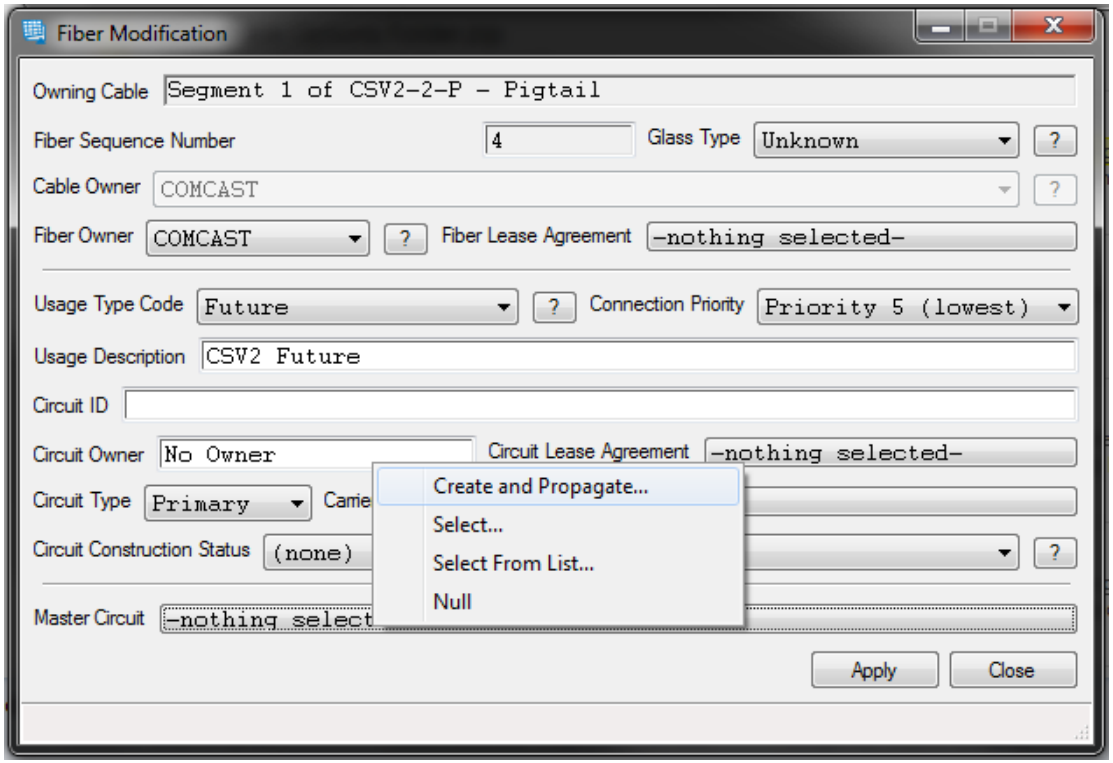


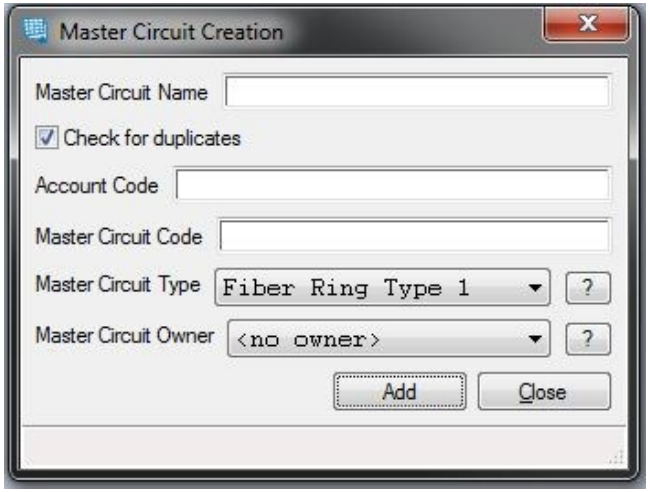
Areas of Discussion:

- Glass Type
- Fiber Owner
- Usage Type Code
- Connection Priority
- Circuit ID
- Circuit Type
- Carrier Type
- Circuit Construction Status

Notes:

MASTER CIRCUITS





Master circuits provide a way to track multiple splice points for a specific fiber strand or collection of strands. This is very useful using WDM transmissions. Master circuits can also be very helpful when a specific fiber needs to be found and traced.

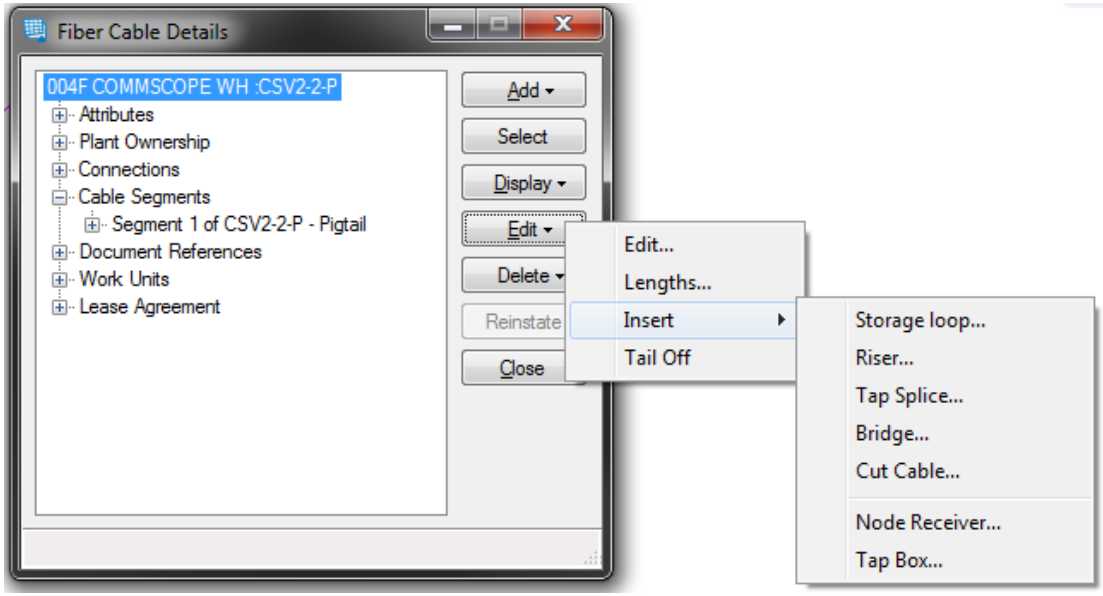
When creating a master circuit, select Create and Propagate… so other fibers can be associated to the master circuit.

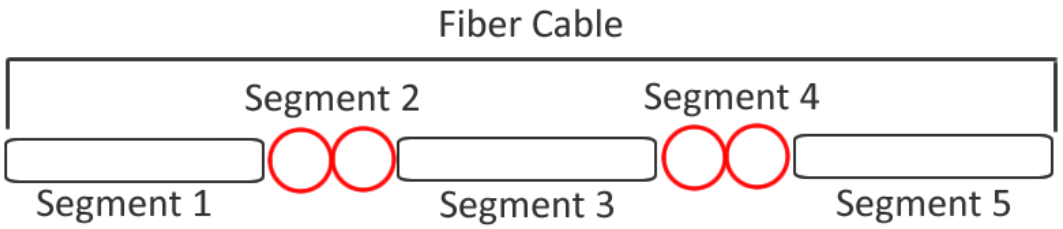
Areas of Discussion:

- Master Circuit Name
- Master Circuit Code
- Master Circuit Type
- Master Circuit Owner
- Line Capture Controls

NOTES

CUTTING FIBER





Cutting fiber occurs in the real-world constantly with different network changes. When these occur, spatialNET supports these changes. Through the Details of the selected fiber segment, users can add different fiber network elements to the segment. These inserts are part of the same fiber cable, but will have different segments. The number of segments will depend on the number of elements that are inserted into the cable. These segments have different lengths associated to them.

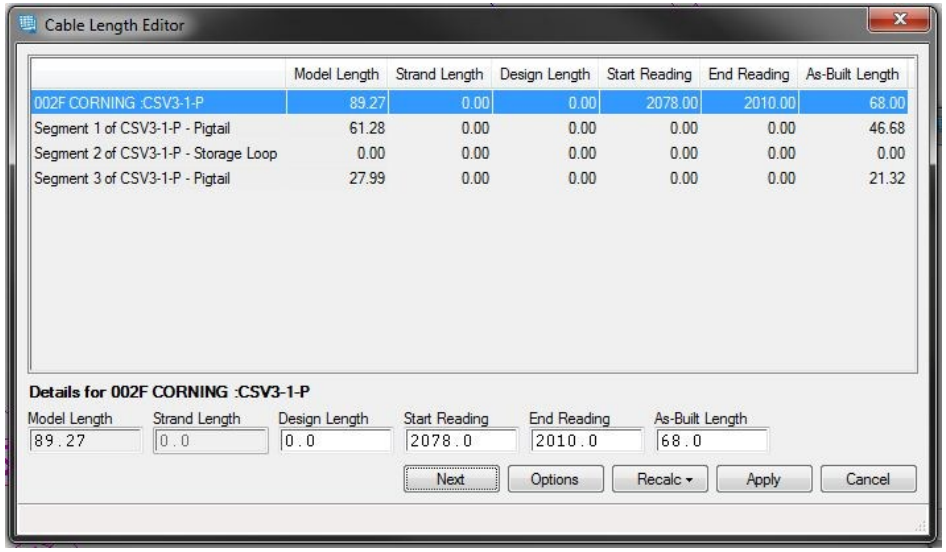
NOTES

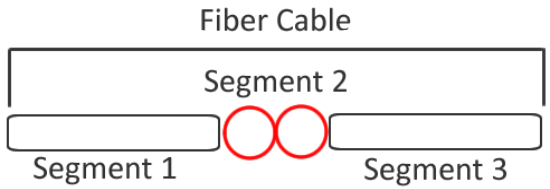
Notes:

CUTTING FIBER

NOTES

Once the different elements have been added to the cable, users can change the lengths of the segments. The Cable Lengths Editor can accommodate users who want to change the length of the whole cable or different segments. In the case of this cable, there are three segments associated to CSV3-1-P.





When updating the length of one segment, spatialNET can change the length of the whole cable based on as-built readings. It is important for users to confirm the lengths when editing the segments and the cable.

Areas of Discussion:

- Model, Strand, Design, As-Built Lengths
- Length Options
- Calculation of the Cable Length

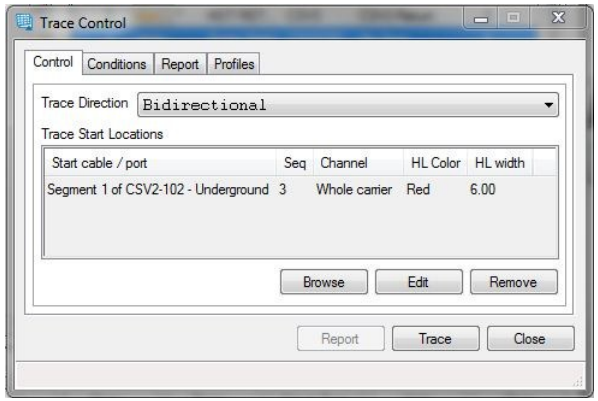
Notes:

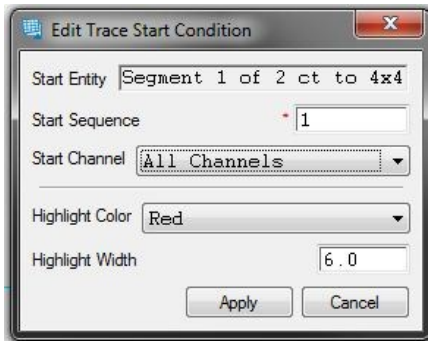
NOTES

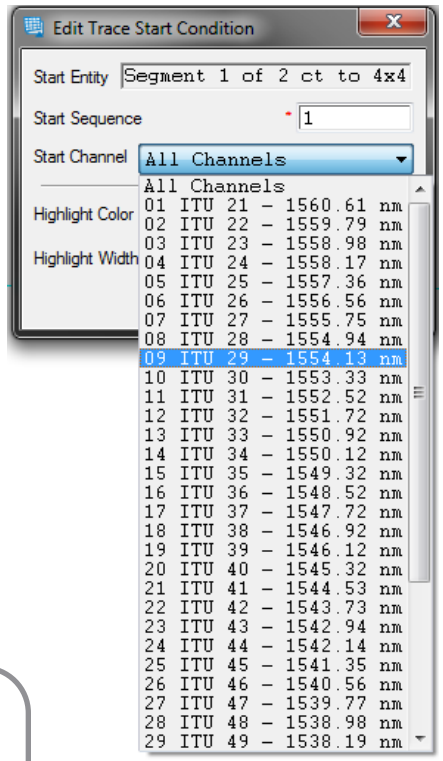
As with the different fiber tools, the different fiber reports are helpful in gaining insight to the overall design of the fiber network. There are several reports and others that users can individually customize for their needs. The different reports (based on the version of spatialNET being used) are:

Tracing

The tracing tool provides users the ability to locate, display and report on the connective paths through the fiber network. The trace tool can display connections for both physical and logical network.







When there are WDM scenarios, users can edit the tracing to trace specific wavelengths to show connectivity versus connectivity for the all of the channels that are used for the multiplexer/de-multiplexer fiber couplers. The reporting from the trace and also be altered based on the needs of the spatialNET user.

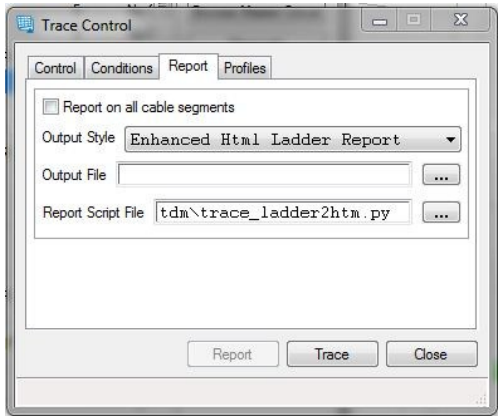
Areas of Discussion:

- Highlight Map View Only
- Splice View
- Google Earth Export
- Summary Report
- Ports Traced
- Loss Report
- OSP View from Trace
- Custom Reports

NOTES

Ladder Report

Ladder Reports (especially enhanced ladder reports) provide users each connection point for the fiber with specific channel, as-built length and distance and design length and distance. In addition, address information and other information about the entities that the fiber connects through is listed.



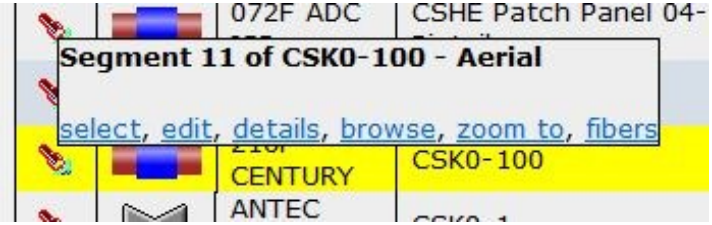
Once the report generates, the selected fiber will be highlighted. The report will also show connected ISP entities.

A End / Z End Splice Details

Attribute	A end	Z end
Name	CSJ6-2 Storage Loop	CSU6-2 Storage Loop
Enclosure Type		
Address		
City		
CBU		
Card Type		
Port Type		

Trace Details

View	Symbol	Type	Name	Address	Location	Section F	Tray	Ribbon	Seq	Channel	Fiber Owner	ASB Len	ASB Running	Design Len	Design Running
		⊞ Port Up ⊞ Port Up	Branch -20 Branch -2												
			IN1	N Union Blvd					1	Whole carrier			6930.0		652.0
			OUT1B	N Union Blvd					102	Whole carrier			6930.0		652.0
		NUP01	R05.03 TX18 Slot 11B	N Union Blvd		01.05.03.84.11B									
		100073: CABLE / ISP JUMPER CABLE YELLOW	BGNC1-R	N Union Blvd		01.05.03.84.11B.OUT1B -> 01.01.01.H5.01.IN4			1	Whole carrier		5.0	6935.0	5.0	657.0
		NUP01	R01.01 Patch Panel 04	N Union Blvd		01.01.01.H5.01									
			IN4	N Union Blvd					4	Whole carrier			6935.0		657.0
		NUP01	R01.01 Patch Panel 04	N Union Blvd		01.01.01.H5.01									
		72F CONN PANEL	CSHE-Patch Panel 04						4	Whole carrier			6935.0		657.0
		NUP01	Rack 01.01	N Union Blvd		01.01.01	Unlocated								
		072F ADC ISP	CSHE Patch Panel 04-Pigtail		6x12			1.4	4	Whole carrier		100.0	7035.0	0.0	657.0
		NUP01	FEC 01	N Union Blvd		01.00.01	19:04								
		216F CENTURY	CSK0-100		18x12			1.4	4	Whole carrier		2720.0	9755.0	350.0	1007.0
		ANTEC 8248	CSK0-1				Unlocated								

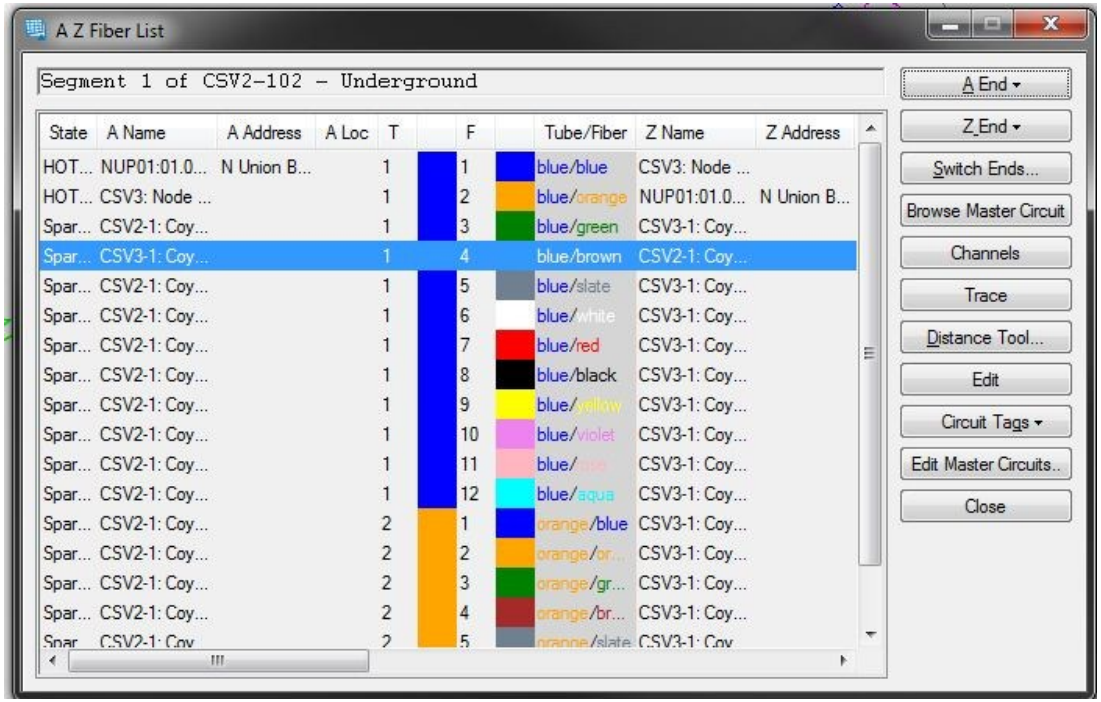


With this spatialNET report, users can choose to select, edit, display details, browse and zoom to the specific entity by clicking on the flashlight next to the entity on the report.

NOTES

A to Z List

The default directionality for spatialNET is always determined by the direction of the drafting of the specific entity. For fiber cables, the next condition that impacts directionality is usage and state codes. Depending on the dictionary definition, directionality can be controlled by the state code. Using the Switch End function on the right side of the window, spatialNET users can directly change the directionality of the selected fiber. In addition, users will be able to display the details of the entities that are at either end of the fiber. Also, users have access to other tools directly from this list.



Areas of Discussion:

- Channels
- Browse Master Circuit
- Edit Master Circuits

Notes:

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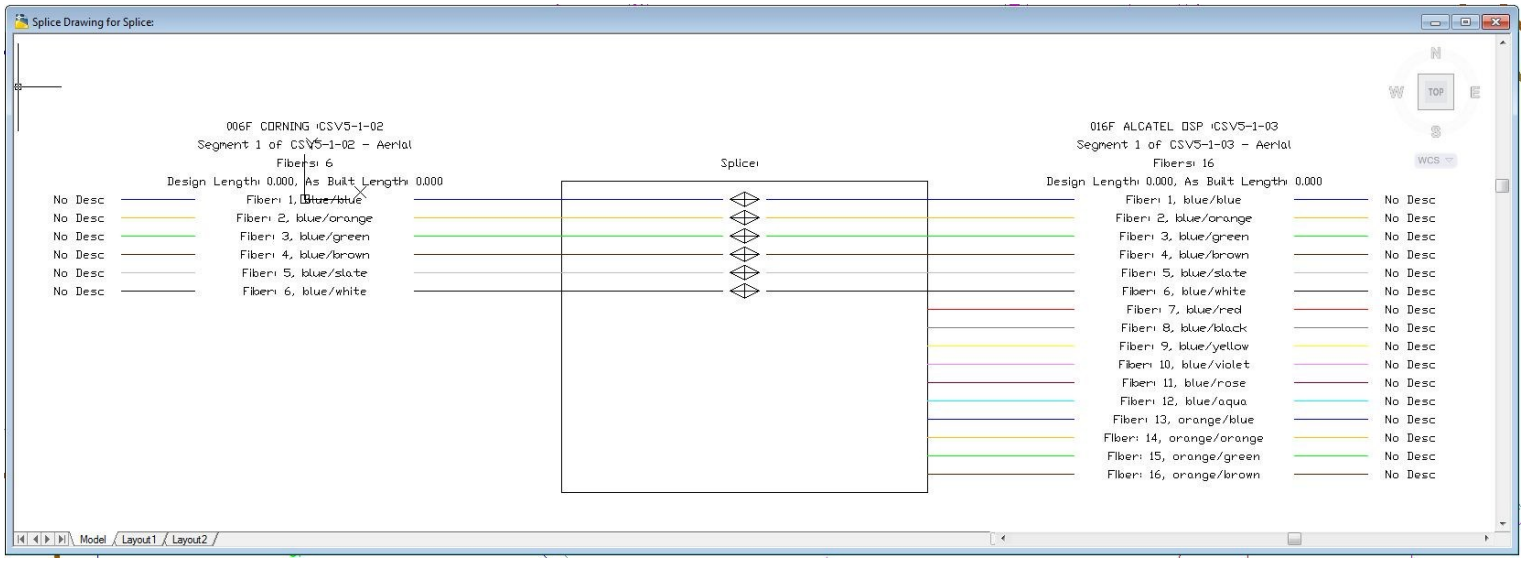
Splice View/Splice Drawing

spatialNET can also provide an view of the splicing in an unique format without using simple table layout. When users click on the Splice View icon, spatialNET will render a splicing schematic in AutoCAD to provide the user a high level view of how the fibers are spliced across multiple splicing locations.



If splicing trays are used in the network design, splice trays display in the Splice Drawing. If users select a fiber in the splice drawing, tracing can be performed directly from this view. If multiple map views are open, the trace highlight will display on those views as well.

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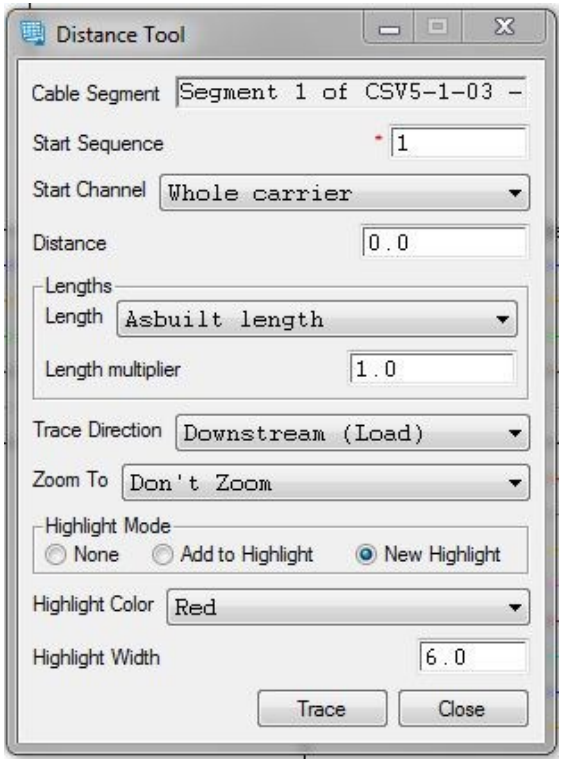
Distance Tool

Managing the network can be a challenging task. The Distance Tool is helpful when specific distances need to be measured on the map view of the network especially in outage scenarios. The distance information is controlled by the Lengths option in the Distance Tool. Users can select as-built, design and model lengths. There are other options that are controlled and customizable for the user depending on the situation.



Areas of Discussion:

- Start Sequence
- Start Channel
- Distance
- Length
- Length Multiplier
- Trace Direction
- Zoom To

Notes:

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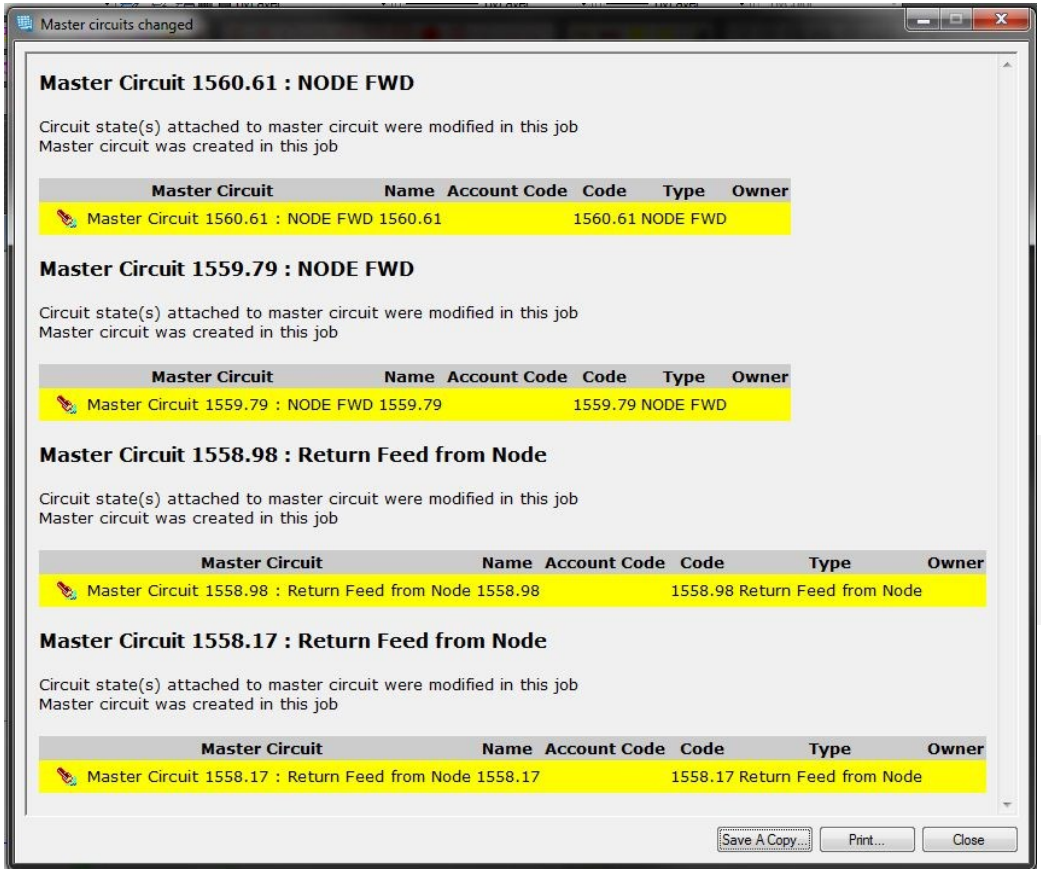
Master Circuit Touched By Job



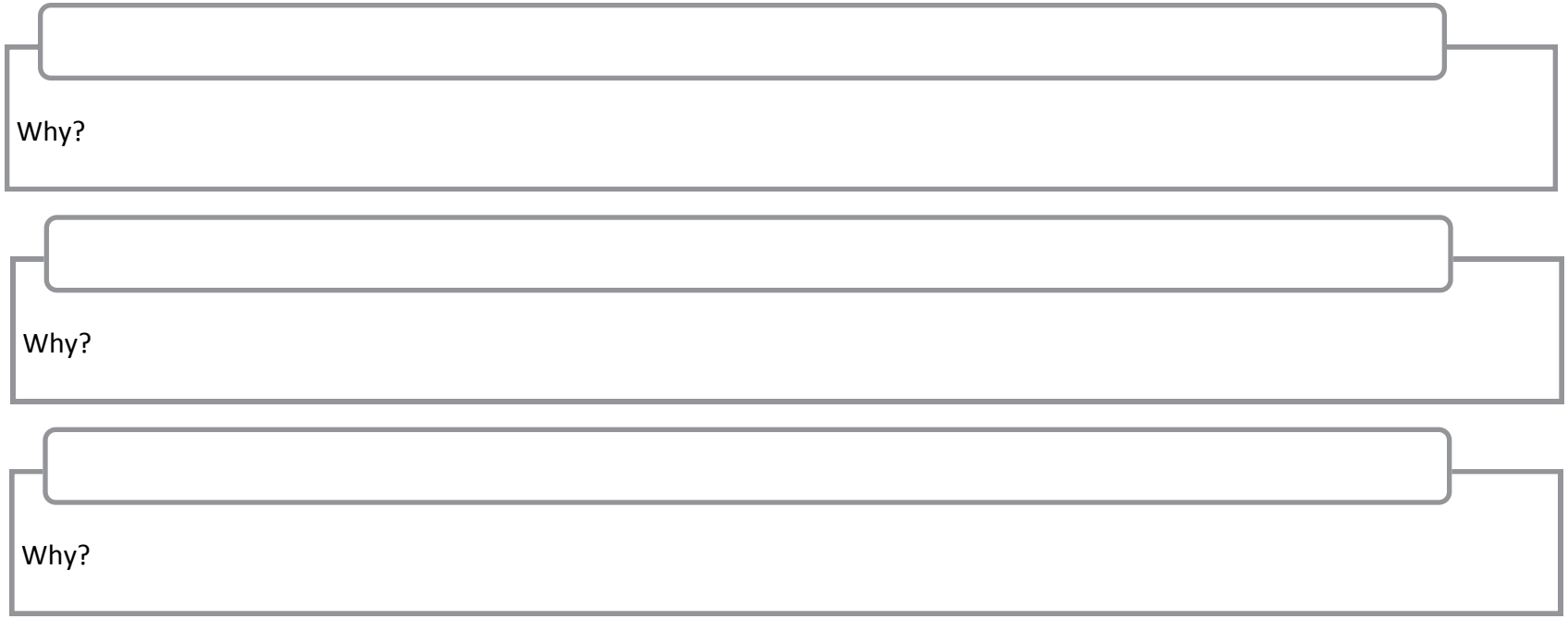
When modifying different fibers, it might difficult to know exactly which fibers belong to master circuits and their impact can be wide sweeping based on the numbers of fibers involved. When modified, pessimistic locking prevents other users from modifying those fibers and the master circuit itself.

With this spatialNET report, users can choose to select, edit, display details, browse and zoom to the specific entity.

Notes:

LEARNING MOMENTS

What are your top three learning moments from this discussion? Why?



Which topics in this training do you think will be the most challenging to apply?

_____

_____

What will you do differently as a result of this training?

_____

_____