Fiber :: Cable Management System Installation Guide



Applys to : Cable Management System



Fiber :: Cable Management System

Table of Contents

Chapter 1: Description	4
1.1 Overview	4
1.2 Sample Layout	5
1.3 Covers	6
1.4 Types of Components	6
1.4.1 Channel	6
1.4.2 Coupling Kit	6
1.4.3 Transitions	6
1.4.4 Turns	7
1.4.5 Reducers	7
1.4.6 Drops	7
1.4.7 Off-Ramps	7
1.4.8 CableLinks	7
1.4.9 Vertical Cable Management	8
1.4.10 Trough End Attachment	8
1.4.11 Competitive Adapters	8
Chapter 2: Basic Design Concepts	10
2.1 Overhead or Underfloor Design	10
2.2 Channel Size	10
2.3 Changing the Path	11
2.4 Covering the Channel	11
2.5 Mounting to Auxiliary Framing	11
2.6 Dropping from the Channel	12
2.7 Sample Applications	13
Chapter 3: Site Survey	16
3.1 Overview	16
3.2 Requirements	16
3.3 Conducting the Survey	16
3.4 Site Survey Checklist	19
3.5 Complete a Materials List	19
	19
Chapter 4: Assembling wave I rax	20
4.1 Overview	20
4.1.1 Hand Tool Requirements	20
4. L2 Culling a Channel	21
4.3 Notching a Channel	21
4.4 Installing Couplers	22
4.4.1 Assembling a Coupling Kit	22
4.4.2 Installing a Coupler	∠3 24
4.5 nemoving Coupling Kit	24
4.5.1 nemoving a Loggov Coupler	24 24
4.5.2 Demoving Components with Locking Pipe	24 25
4.0 Connecting Components with Locking Pins	20 25
4.7 Removing Components with Locking Fins	20 0E
4.0 Auapung wave max channels to CableLINKS	20



Fiber :: Cable Management System

4.9 Dropping into Backs and Bays	27
4.9 1 Installing an Intersection	27 27
4.9.2 Installing a Center Drop	، ے مر
4.0.2 Installing a Center Drop	20 20
4.9.3 Itisiali all'Expless Oll-hallip	20
4.9.4 Drop from the End of a Channel	
4.10 Completing the Drop	
4.11 Feeding Up into Racks and Bays	30
4.12 Adapting to a Competitive System	32
Chapter 5: Working with CableLinks	33
5.1 Overview	33
5.2 Connecting Modules	
5.3 Separating Modules	
5.4 Adjusting Modules	34
Chapter 6: Support Hardware	35
6.1 How Many Brackets Do I Need?	35
6.2 Common Support Brackets	
Chapter 7: Installation	
7.1 Inspection	
7.2 Preparation	
Chapter 8: Supplemental Information	41
8 1 Channel Canacities	
8.2 Technical Specifications	۲۲ ∩ار
0.2 Technical Opecnications	

List of Figures

Figure 1 - WaveTrax™	4
Figure 2 - CableLinks™	4
Figure 3 -WaveTrax Components	4
Figure 4 - Sample Layout	5
Figure 5 - Covers	6
Figure 6 - 4" Channel Converted to	10
Figure 7 - Changing the Path	11
Figure 8 - Threaded Rod	11
Figure 9 - Channel Exits	12
Figure 10 - CorelDraw Site Sketch	18
Figure 11 - Custom Miter Box Drawing	21
Figure 12 - Notching Tool	21
Figure 13 - Notching	22
Figure 14 - Coupling Kit	22
Figure 15 - Lining up	23
Figure 16 - Top Stops	23
Figure 17 - Bottom Stops	23
Figure 18 - Removing Top of Coupling Kit	24
Figure 19 - Coupling Kit	24
Figure 20 - Removing a Coupler	24
Figure 21 - Connecting	25



Fiber :: Cable Management System

Figure 22 - Adapter,	26
Figure 23 - Adapter,	26
Figure 24 - Adapter,	26
Figure 25 - Adapter,	
Figure 26 -Drop Attachment	
Figure 27 - Adapter, Transition to	26
Figure 28 - Adapter, Coupler,	27
Figure 29 - Sliding the CableLinks	27
Figure 30 - Installing an Intersection	27
Figure 31 - Installing a Center Drop	28
Figure 32 - Express Off-Ramp	28
Figure 33 - Dropping from the	28
Figure 34 - Installing the Express Off-	29
Figure 35 - Vertical drop with	29
Figure 36 - T-Transition with Drop	29
Figure 37 - Vertical drop with Split Tube	30
Figure 38 - Vertical Dropwith Slotted Duct (Shownwithout Cover)	30
Figure 39 - Exploded View	31
Figure 40 - Assembled View	31
Figure 41 - Feeding up using CableLinks	32
Figure 42 - Competitive Adapter	32
Figure 43 - CableLinks	33
Figure 44 - Connecting Modules	33
Figure 45 - Separating Modules	33
Figure 46 - Pressing in Channel Sides	34
Figure 47 - The Locking Teeth	34
Figure 48 - Brackets and Hardware	35
Figure 49 - Channel Support System	35
Figure 50 -Installing Couplers	
Figure 51 - Adding	40



Fiber :: Cable Management System

Chapter 1: Description

1.1 Overview

Telect's **WaveTrax**[™] Cable Management System is an open channel optical cable raceway system that combines rigid channels with transitions, intersections, drops, reducers, couplers, optional covers, and articulating channel to create a secure, high-capacity fiber-optic cable routing path between fiber distribution frames and terminal equipment.

WaveTrax is available in 2", 4", 6" and 12" widths that physically protect cable and maintain a minimum 2" bend radius throughout the cable's path. Its rigid channels are self-supporting up to 175 lbs (79.5 kg) at up to six-foot intervals.

Custom-engineered support brackets provide convenient fastening for every work space, whether overhead or under floor.

WaveTrax also allows easy reconfiguration in the future using drop-in or snap-on components like an Express Off-Ramp, which creates an instant drop with no channel disassembly or cutting.

CableLinks[™], Telect's articulating components, are available in 2", 4", and 6" widths that protect cable and maintain a minimum 2" bend radius just like WaveTrax. However, it flexes 25° from center both horizontally and vertically to easily create a cable path requiring multiple and/ or frequent changes in direction.

CableLinks snaps together and installs with no special tools. The inter-connecting links create a cable management solution that is flexible and easy to thread through the most complex environment, without cutting or waste. **CableLinks** components connect with **WaveTrax** using simple adapters.

Features and benefits of WaveTrax and CableLinks include

- · simple, intuitive components that simply snap together
- · uncomplicated configuration and support
- · straightforward installation
- · fast deployment-installs three times faster than its fastest competitor
- · comprehensive solution-2", 4", 6", and 12" channel widths
- · lower cost of installation, engineering, and end solution
- · lower total cost of ownership
- · comes in yellow



Figure 1 - WaveTrax™



Figure 2 - CableLinks™



Figure 3 -WaveTrax Components



Fiber :: Cable Management System

1.2 Sample Layout

The following diagram shows the components available in a **WaveTrax** system. Any one system will not typically use every component. This example shows a 6"-wide system; WaveTrax is available in 2", 4", 6", and 12" widths, along with reducers to transition to smaller channels.

CableLinks® articulating channels are available in 2", 4", and 6" widths. All components are 4" high except for 2" widths, which are 2" high.

- 1. 6' Trough
- 2. Reducer
- 3. Trumpet Attachment
- 4. End Cap
- 5. Flexible Tube
- 6. T-Junction
- 7. Slotted Duct
- 8. Express Off-Ramp
- 9. CableLinks® (2")
- 10. Center Drop

- 11. Competitive System Adapter
- 12.Intersection
- 13. Drop Attachment
- 14. 45° Elbow
- 15. Coupling Kit
- 16. L-Junction
- 17. Upsweep
- 18. Downsweep
- 19. CableLinks Adapter
- 20. CableLinks



Figure 4 - Sample Layout



Fiber :: Cable Management System

1.3 Covers

All channels and many connecting transitions and drops also have available covers. The following figure shows some samples of the available covers.



Where covers are available, their part numbers are listed immediately following their matching WaveTrax component in the Ordering Guide. Note that covers do not provide watertight protection.

1.4 Types of Components

This section provides an overview of the most common components that comprise a WaveTrax cable management system.

1.4.1 Channel

Straight Channel is the primary carrier of your fiber-optic cable. It comes in six-foot lengths that support up to 175 lbs. (79.5 kg) each and can be cut to size. It should be supported by a bracket at the coupler you attach at either end; you can add mid-span support using a sliding bracket on a standard bracket

1.4.2 Coupling Kit

Use a Coupler to connect channels to each other or another component such as an Intersection or CableLinks Adapter.



Coupling Kit



Legacy Coupler

1.4.3 Transitions

A transition is any part that adds to the channel's path. This includes the T-transition, shown here, as well as an L-transition, Intersection, and other components. A transition attaches to a channel or other components with a Coupler. Every transition is designed with two





Fiber :: Cable Management System

locking pins (on top of either side of the channel) and teeth (on the exterior bottom and sides of the channel) that allow a Coupler or other components such as an End Cap or Trumpet to snap on easily and firmly.

1.4.4 Turns

A turn is any part that changes the channel's path. This includes the 45° Upsweep shown here, as well as a 45° Downsweep, 45° Elbow, and other components. It attaches to Channel or other components with a Coupler. Use a Coupler and Pin Adapter to add the locking pins and teeth required for components such as End Caps and Trumpets.

1.4.5 Reducers

Use a Reducer to change channel widths. A reducer attaches with a Coupler at either end.

1.4.6 Drops

Use a Center Drop (shown), Drop Attachment, or Trumpet for cableradius-bend -protected exit points. A Center Drop fits inline with Channel using a Coupler at either end. A Drop Attachment converts ahorizontal cable path to vertical. A Trumpet adds radius-bendprotection to any transition exit.

1.4.7 Off-Ramps

Use an Off-Ramp to add a 2" or 4" cable exit along any straight channel path. The Express Off-Ramp is shown here, is for WaveTrax. Both should be bracket -supported due to the concentration of fiber weight at the exit.

1.4.8 CableLinks

Use CableLinks modules to add horizontal and vertical articulation to your cable path. CableLinks are ideal for bringing an off-center cable drop down precisely where an enclosure requires, as well as navigating horizontally through tight spaces where HVAC, plumbing, electrical conduit, and other facility structures make long straight runs impossible. CableLinks connect to WaveTrax using one of four different adapters. CableLinks should be bracket-supported every two horizontal feet.













Fiber :: Cable Management System

1.4.9 Vertical Cable Management

Use 2" Split Tube, 2" or 4" Slotted Duct, or any size Cablelinks for vertical cable management. Split Tube attaches to WaveTrax with a Single or Dual Split Tube Adapter. Slotted Duct attaches to a Coupler. CableLinks attaches with an Adapter.

1.4.10 Trough End Attachment

Use a Pin Adapter on a Channel to add the pins and bottom tooth required by components such as an End Cap or Trumpet. The adapter attaches to a channel with a Coupler.

1.4.11 Competitive Adapters

Use a Competitive Adapter to convert from any of five competitor channel transitions to WaveTrax. The competitive end of the adapter connects to the competitive transition, and the other end connects to a WaveTrax Coupler









Fiber :: Cable Management System

This page intentionally left blank.



Fiber :: Cable Management System

Chapter 2: Basic Design Concepts

2.1 Overhead or Underfloor Design

A cable path consists of both straight channel and transition components like elbows and upturns combined to create a continuous cable path.

Overhead cable management systems (CMS) such as WaveTrax direct cables down into the equipment racks. Most central offices are served by an overhead CMS, though under-floor systems are also common. A channel is typically mounted a minimum of seven feet high.

Under-floor CMS also direct cables up into equipment racks installed on raised floors. The principles of overhead design are essentially identical to those of under-floor design.

An ideal channel path would travel a straight path, dropping or rising into racks as required, then make one turn and service another row of racks. In the real world, traveling a straight path is often impossible—racks may be scattered, HVAC ducting may cross the ideal channel path multiple times, and existing fire sprinkler and electrical conduit may force numerous path adjustments.

2.2 Channel Size

Selecting the proper main channel width depends on how much cable you have now, how much you expect to add in the future, and how much will be in the same channel. If all cable enters the facility from one location and travels to only one row of equipment racks, ensure the main channel is wide enough to accommodate all the cable. If the cable enters from two locations and each services a different row of equipment racks, each main channel must only accommodate half the total facility cable. If two channels cross at an intersection, ensure the combined cableload does not exceed the maximum for that size of channel.

If a channel divides into runs requiring less cable-carrying capacity, use a reducer to switch to a smaller channel width.

In areas with extreme height restrictions, use transitional components like an intersection, elbows, and reducers to convert down to multiple 2" channels that together can carry at least the same fiber capacity as the larger originating channel. The photo at right shows a 4" channel on the left converted into three 2" channels on the right.

WaveTrax channel capacities are listed in "Supplemental Information" on



Figure 6 - 4" Channel Converted to Three 2" Channels



Fiber :: Cable Management System

2.3 Changing the Path

When the channel path requires a change in height, try to use a 45° Upsweep and 45° Downsweep instead of two 90° Usweeps (one used to turn up, one to turn down), as this provides a straighter path and keeps cable from falling out of the vertical channel as the cable pile increases.

Likewise, when the channel path requires a left or right turn, and particularly if you expect the channel to carry over half its capacity, use 45° Elbows for a straighter path.

To accommodate compound turns or negotiate a particularly cramped path, consider converting that portion of the channel to CableLinks articulating channel, which easily adjusts to accommodate both horizontal and vertical path changes. (See "Working with CableLinks" on page 31.)

2.4 Covering the Channel

Most WaveTrax channels and connecting components have optional snap-on covers available. Cover channels to protect against other installation activity or wherever it is possible some thing could be dropped on the cable, such as if the channel runs near a suspended walkway from which a workman may drop a tool. Cover channels that run under a floor to protect the cables from dropped objects and abrasive grit that may trickle down from foot traffic.

2.5 Mounting to Auxiliary Framing

Auxiliary framing and cable racks provide the most common means of support for an overhead channel. After attaching a threaded rod kit to a cable rack, you can set the channel support bracket at the precise height required.

Note that you can mount the threaded rod so it stands above the mount or hangs below, whichever better suits your installation requirements.

Telect's Threaded Rod Bracket and Adjustable Bracket (shown at right) both mount directly to a threaded rod without having to slide them down the entire length of the rod or remove existing components already bolted to the end, a feature especially time-saving when using existing threaded rod.



Figure 7 - Changing the Path



Figure 8 - Threaded Rod Bracket and Adjustable Bracket



Fiber :: Cable Management System

When working with grid cable racks you will usually want to mount the channel below the grid because of the difficulty in routing vertical drops through the grid. Even so, since the grid is normally positioned within a few inches of an equipment rack, it may only leave room for 2" channel between the grid and the rack, forcing the larger channel to run in the main aisle.

2.6 Dropping from the Channel

There are different ways to exit a channel:





- The **Center Drop, Intersection, T-Junction, Drop Attachment**, or **Trumpet** are best suited to new installations since they are installed inline with the channel using couplers.
- The **Off-Ramps** and end-of-**Channel** exits do not require any modification of existing channel and are ideal for use when working around existing cable.

After installing one of the above, guiding the cable down from the exit is called Vertical Cable Management. Whenever possible, cable drops should be enclosed in one of the following at least to the top of the equipment rack:

- · CableLinks or rigid channel
- Split tube
- Slotted duct

See Section "4.9 Dropping into Racks and Bays" on page 24 for step-by-step instructions on how to integrate drops and vertical cable management into your channel design.



Fiber :: Cable Management System

2.7 Sample Applications

The following photos are of real WaveTrax and CableLinks applications. Lists of components used follow those shown in the accompanying photo from left to right. Some components, such as couplers, are used more than once in one application photo.

6" CableLinks suspended from a ceiling channel

Components used:

027-0000-6400 CableLinks Modules 027-1000-4004 Universal Bracket, 4"-6" (4) (Extended threaded rods provided by client)

Converting WaveTrax to CableLinks

Components used:

027-2000-12450 Reducer, 12" to 6" 027-2000-6499 FastLock Coupler 027-1000-6490 Adapter, Coupler to CableLinks, Adjustable 027-0000-6400 6" CableLinks Modules

Dropping into a Bay using a flexible split tube

Components used:

027-2000-6401 6" Channel 027-2000-6499 FastLock Coupler (2) 027-2000-6410 T-Transition 027-1000-6472 Adapter, Transition to CableLinks, Reducing 027-1000-4092 Collar 027-2902-0005 2" Flexible Split Tube, 5 feet 027-1000-4009 Universal Bracket, 4"-6" (2)







Fiber :: Cable Management System

Dropping from channel to bays using CableLinks

Components used:

027-2000-4001 4" Channel 027-2000-4099 FastLock Coupler (6) 027-2000-4426 Center Drop (3) 027-2000-4215 Adapter, Transition to CableLinks, Reducing, 4" to 2" (3) 027-0000-4200 2" CableLinks Modules 027-1000-4054 L-Bracket, 4" - 6" (3)

Adapting to a legacy system

Components used:

027-2000-4007 Competitive Adapter 027-2000-6450 Reducer, 6" to 4", used inversely 027-2000-6499 FastLock Coupler 027-2000-6401 Channel







Fiber :: Cable Management System

This page intentionally left blank.



Fiber :: Cable Management System

Chapter 3: Site Survey

3.1 Overview

A site survey is required to determine the layout of your facility and how best to route WaveTrax channels to serve it. You can perform this survey yourself or request a Telect Field Application Engineer do it for you.

A site survey includes sketching out the layout of your facility, taking general measurements, and listing the expected components required. With this information, a Telect engineer can create a quote for parts and installation, as well as time to delivery. You can arrange your own installation or purchase Telect's installation services.

If you design your own layout, keep in mind not only your current fiber needs, but your future needs as well. Use a channel width that can handle your facility's maximum fiber capacity. Add in T-Transitions or Intersections where future channels may need to branch off. Order extra sixfoot Channel lengths and Couplers to account for cutting and extra junctions.

3.2 Requirements

A site survey needs to include the following information:

- 1. a completed checklist (See Section "3.4 Site Survey Checklist " on page 16.)
- 2. a sketch of the facility layout, including all bays, racks, and potential obstructions. Telect recommends obtaining current floor plan facility drawings as they show equipment, auxiliary framing, and cable rack locations.
- 3. a sketch of the intended channel route, sizes, height changes, support points, rack heights, and types of drops
- 4. a list of other pertinent information or special considerations, such as expectations for future expansion, racks that may be removed or replaced, new racks to be added later, or alternate scenarios that may arise

3.3 Conducting the Survey

Begin your survey with a close examination of your facility and sketch its layout. Ideally, start with a CAD drawing of your facility floor plan, then overlay it with Visio[™] SmartShapes[®] (www.telect.com) for a dimensionally accurate channel layout.

If a CAD drawing isn't available, measure off the room and create your own drawing. If you are skilled in the use of a particular graphics software program, you may find that software useful at the facility.

- 1. Using a tape measure, record distances, and then sketch the size and location—within an inch is sufficient accuracy—of every rack or bay to be serviced. Include aisle numbers, bay numbers, which side is the front, and the dimensions of the room. If a bay is not to be serviced, include it on your drawing but note accordingly.
- 2. Note any equipment you expect to replace and what it will be replaced with. This is important for estimating channel capacity requirements.
- 3. Draw in any new equipment you expect to add to the system, including bays and patch cords, and estimated additional fiber requirements.



Fiber :: Cable Management System

- 4. Note the quantity and location of existing patch-cords.
- 5. Note the location of obstacles. Use a ladder if necessary to obtain actual line-of-sight above equipment racks to ensure that existing infrastructure such as support wires, posts, racks, and HVAC ducting won't compromise your planned channel path. If adding covers, ensure sufficient clearance will remain for opening hinged covers.
- 6. With the Site Survey and drawing of your facility complete, make a few copies of your drawing to continue with, saving the original in case you need more.
- 7. Draw in the complete WaveTrax path as if it were one continuous channel, preferably in a width relative to the other items in the drawing. Make sure you place it accurately in relation to existing support structures like auxiliary bars and cable racks. If height changes are required, consider a second side-view drawing showing vertical path changes.
- 8. Mark transitions such as T's, intersections, turns, and elbows. You may find it advantageous to use symbols and write a key.
- 9. Draw in drops and describe how they are formed. For example, a drop from an Intersection may only be the addition of a Trumpet, but dropping a channel from an intersection to an offset bay would require a Drop Attachment, CableLinks Adapter, and several CableLinks Modules, plus other components if bend radius protection is required at the exit.
- 10. Draw in any new auxiliary framing or cable racks required.
- 11. Note where the channel will be mounted, system height (from the floor to the top of the mounting bracket), and types of support hardware required. (See "Support Hardware" on page 33.) As with channel components, you may find it advantageous to use symbols and write a key.

Since most support brackets can mount to infrastructures already in place, note whether the channel will be supported from a rod or cable rack already in place or if new threaded rod kits or cable racks are required for new mounting locations; often it will be a combination of the two.



Fiber :: Cable Management System

The following site sketch was produced in CorelDraw® in under an hour:



Figure 10 - CorelDraw Site Sketch



Fiber :: Cable Management System

- 12. Assuming the system designer will not be able to visit your site, make a bullet list of any additional information he or she would need to know, such as
 - name and address of the installation site (add to all pages of the site survey)
 - · potentially complicated portions of the site survey sketch
 - · special traits of obstacles, such as minimum clearances or object movement
 - potential changes: equipment to be pulled, new equipment arriving, racks that should not be serviced, expected changes in capacity, etc.
 - · special site requirements
 - any other considerations

3.4 Site Survey Checklist

Complete the Site Survey Checklist, an example of which is shown below. This is a tabular summary of your site survey sketch, covering information like bay numbers, direction of cable entry, and types of drops.

						Site	Survey Checklist		
Date			-					Office City/State	
Bay Number	Bay Height (7,9,11.5)	Equipment	Front	Fiber E Rear	intry () Left	() Right	Size and Type of Exit	No. of Cables	Notes

3.5 Complete a Materials List

Complete the materials list based on your site survey and checklist and use it when you order.

3.6 Telect Review

You can design, order, and install your WaveTrax cable management system completely yourself. However, if you would like a Telect engineer to review your design work, including system sketch, survey checklist, and materials list, copy each and forward to Telect Application Engineering. We will review your system design and offer comments and suggestions to make your ordering and installation as accurate and complete as possible. It's the details that count, and we want to help you catch them all the first time.



Fiber :: Cable Management System

Chapter 4: Assembling WaveTrax

4.1 Overview

This installation guide describes the components that comprise the WaveTrax cable management system, describes common tasks such as connecting components and adapting to CableLinks, lists support hardware and shows how to install it, lists the ideal order of installation, and illustrates sample real-world applications. For part-specific information, see the Cable Management Ordering Guide and Telect's RUS-Listed Products at www.telect.com.

Laying out a WaveTrax solution for your facility takes time and attention to detail. Whether you are a field technician or design engineer, your system will come together easier and require less redesign if you review the Ordering Guide and this installation guide fully before beginning the design.

WaveTrax shapes are available as Visio[™] SmartShapes[®] and AutoCAD[™] Blocks shape libraries for on-site engineering; you may download them at www.telect.com/support/. This chapter describes common tasks like notching channel, connecting and removing a coupler, and adapting to CableLinks. Review this chapter completely before continuing with the "Installation" on page 37.

4.1.1 Hand Tool Requirements

All WaveTrax components snap together easily and firmly without any tools. Only a simple Notching Tool is required to prepare the end of a WaveTrax channel to lock into a coupler. CableLinks also snap together without any tools, though the adapters to connect to WaveTrax require a socket or wrench for the two locknuts. Tools often used in the course of installation:

- 5/8" socket or wrench
- · adjustable wrench
- hack saw/miter box
- level
- tape measure
- file
- · flat and Phillips screw drivers
- notching tool
- deburr tool



Fiber :: Cable Management System

4.1.2 Cutting a Channel

Channels come in six-foot lengths. As necessary, you can cut it to the precise length required. Always use a miter box so the cut remains perpendicular to the channel; otherwise, it may not completely lock in to other components. Remove all cuttings and burrs with an appropriate tool prior to connecting to a coupler.

Place the channel in the miter box upside down. Apply only light-to-medium downward pressure on the saw, letting it cut gradually. If you anticipate making a lot of cuts, consider building a custom miter box or adding stops for the wall of the channel that rests in the middle of the box. The following shows a custom miter box that accommodates all WaveTrax channel sizes; if you are not using the larger channel sizes, build the box narrower for easier cutting.



Figure 11 - Custom Miter Box Drawing

You only need to build the miter box as wide as required to accommodate the widest channel to be cut. Note the side wall overhang at the lower left; this is extremely helpful at keeping the box from sliding away while cutting.

Use any convenient wood furring strip to create the stops.

4.3 Notching a Channel

Prior to fitting a channel to a Coupler, the channel end must be notched so it will stay locked in. Use Telect's Notching Tool (p/n 027-2000-1100) to create channel notches.

Note the arrow and label "PLACE OUTSIDE" on the lower jaw; the lower jaw must go on the outside of the channel or the notch will be backwards.



Figure 12 - Notching Tool



Fiber :: Cable Management System

The channel requires one notch on each side and up to three on the bottom as specified below:

Size	Notches required		
	Bottom	Side	
2"	1	1	
4"	1	1	
6"	2	1	
12"	3	1	

- 1. Open the tool fully and slide it over the channel with the bottomof the tool on the outside of the channel.
 - For 2" channel, slide the channel edge into the guide on the side of the notching tool's lower jaw.
- For all other channel widths, slide the channel in to the full depth of the jaw.
- 2. Compress fully to create a notch.
 - Place side notches at the middle of the top half of the channel. For a four-inch high channel, that's about one inch down.
 - Distribute the bottom notches evenly across the bottom of the channel.

4.4 Installing Couplers

4.4.1 Assembling a Coupling Kit

The coupling kit consists of two parts: the top part has two clips on the bottom and a slot on each side to help nest the top and bottom pieces together. The bottom part has four mounting slots and two square holes to receive the clips from the top piece.

To assemble the kit,

- 1. Slide the top down into the slots as shown.
- 2. Press down until the clips snap into the square holes in the bottom piece.



2" Channel



4"-12" Channel





Figure 14 - Coupling Kit



Fiber :: Cable Management System

4.4.2 Installing a Coupler

Use a coupler to connect channels to each other or another component such as an Intersection or CableLinks Adapter. While a coupler is comprised of two pieces that must be separated to remove components, installing a coupler to a notched channel or other component does not require any disassembly.

- 1. Line up the channel or other component so it slips between the inner and outer surfaces of the coupler.
- 2. Slide the coupler on firmly. You should hear a distinct snap from the locking tabs.
- 3. Make sure the intersection and channel have reached the stops on the coupler both on top and on the bottom



Figure 15 - Lining up a Channel



Figure 16 - Top Stops



Figure 17 - Bottom Stops

When cutting channel to length, remember that each coupler adds approximately 1" to the channel length.



Fiber :: Cable Management System

4.5 Removing Couplers

4.5.1 Removing a Coupling Kit

To remove the top of the coupling kit, squeeze together the two clips on the bottom and pull up the top section.



Clips

Figure 19 - Coupling Kit

Figure 18 - Removing Top of Coupling Kit

4.5.2 Removing a Legacy Coupler

To remove a coupler, follow these steps:

- 1. Push in the snap with small screwdriver and then pull up slightly on that side of the inside portion of the coupler. For a 2" channel, skip to step 4.
- 2. While maintaining upward pressure on the inside portion of the coupler, squeeze together the bottom pair of snaps on the same side so they disengage from the lower portion of the coupler.
- 3. Squeeze together the other pair of snaps so they also disengage the lower half of the coupler.
- 4. Push in the other snap and pull out the inside portion of the coupler.
- 5. Squeeze channel sides together slightly to remove from outside portion of coupler.



Figure 20 - Removing a Coupler



Fiber :: Cable Management System

4.6 Connecting Components with Locking Pins

Transition components such as an Intersection and L-transition are pre-fitted with locking pins and teeth that allow other components such as Trumpets, End Caps, Pin Adapters, and Drop Attachments to snap right on.

- 1. Make sure the pins on the transition are clear of any worksite debris.
- 2. Set the pin holes of the component being added over the pins of the transition.
- 3. Rotate the new component down until the tab on the bottom (not visible in Figure 21) snaps over the locking tooth on the transition.

4.7 Removing Components with Locking Pins

To remove a component from the locking pins on a transition, simply bend the tab (not shown here) on the bottom down until it clears the locking tooth and rotate the component up.

4.8 Adapting WaveTrax Channels to CableLinks

WaveTrax channel connects to CableLinks using one of four Adapters. The adapter required depends on the component you are connecting to and whether you want the cable path to continue horizontal or drop to vertical. Note that CableLinks is available up to 6" width.



Figure 21 - Connecting Components with Locking Pins



Fiber :: Cable Management System

To continue horizontally, use one of the following:



To change horizontal WaveTrax to a vertical CableLinks drop:

Figure 26 - Drop Attachment	Figure 27 - Adapter, Transition to CableLinks, Reducing
Attach to any transition and add any of the transition-to adapters above.	This 6" reducer includes a built-in drop to 2" CableLinks.



Fiber :: Cable Management System

To adapt from WaveTrax channel to CableLinks,

- 1. Notch the channel and install a coupler as described beginning on page 18.
- 2. Add an Adapter, Coupler To Cablelinks, Adjustable to the Coupler by firmly sliding the end with the locking tabs in until all three tabs lock in. (See Section "4.4 Installing Couplers" on page 19.)
- 3. Seat the adapter in the CableLinks channel.
- 4. Insert the included carriage bolts through the top of the adapter, ensuring they are sitting flush with the surface.
- 5. Install the corresponding nuts from below.
- 6. Before tightening the nuts, terminate the other end of the CableLinks run and install the required support brackets.
- 7. Slide the CableLinks module in the adapter as needed to adjust for length, then tighten nuts. Do not over-tighten. See Figure 29.

4.9 Dropping into Racks and Bays

The components required to drop into racks and bays depends on the equipment being serviced, the volume of cable, whether the cable will hang free or travel in vertical channel, and whether the drop is for a new system or added to an existing one. Review each of the following scenarios before deciding which is best for your project. Each assumes a run of WaveTrax channel is or will be installed above the rack.

4.9.1 Installing an Intersection

This is the most versatile option and is best suited for new installations.

- 1. Notch the channels, add couplers, and connect to the intersection. If you only need one exit, install a Ttransition instead.
- 2. Continue with "4.10 Completing the Drop " on page 26.
- 3. Install a Pin Adapter. At this point the channel exit is identical to a transition exit.



Figure 28 - Adapter, Coupler, CableLinks, Adjustable



Figure 29 - Sliding the CableLinks Module into the Adapter



Figure 30 - Installing an Intersection



Fiber :: Cable Management System

- 4. Continue with Section "4.10 Completing the Drop " on page 26.
- 4.9.2 Installing a Center Drop

This is also best suited for new installations.

- 1. Notch the channels, add couplers, and connect to the Center Drop (shown here with a trumpet attached).
- 2. Continue with "4.10 Completing the Drop" on page 26.
- 4.9.3 Install an Express Off-Ramp
- 1. For an Express Off-Ramp, follow the instructions that accompany the component to install the off-ramp to the channel at the drop location.
- 2. Continue with "4.10 Completing the Drop " on page 26.
- 4.9.4 Drop from the End of a Channel
- 1. Notch the channel.
- 2. Install a Coupler.



Figure 33 - Dropping from the End of a Channel



Figure 31 - Installing a Center Drop



Figure 32 - Express Off-Ramp



Fiber :: Cable Management System

Need pic of intersection T w drop attachment & T with trumpet

4.10 Completing the Drop

After completing one of the preceding four methods of installing a drop, continue below.

- If dropping the cable freely from this point, install a Drop Attachment and/or Trumpet for bend radius protection. Whenever possible, avoid long drops of unprotected cable above a rack by using one of the following three vertical cable management solutions to channel the cable to at least the top of the rack.
- 2. There are three options for vertical cable management (Figures 35 to 38):
 - To continue in a Channel (easiest), install a Cable Links Adapter and then the required number of CableLinks Modules. If you locate the drop at the precise correct location, you can use regular rigid channels instead of CableLinks for the vertical run. Using a channel requires precise advance planning of the overhead channel location to ensure the channel drops where it can be bracket-mounted to the rack.
 - To continue with a flexible split tube, add a single or dual Split Tube Adapter to the Drop Attachment and install the tubing with the included retention brackets. The adapter comes with additional brackets to secure the tube at the midpoints and end.



Figure 36 - T-Transition with Drop



Figure 34 - Installing the Express Off-Ramp and Trumpet



Figure 35 - Vertical drop with CableLinks



Fiber :: Cable Management System

• To continue with a Slotted Duct (hardest, with no bend radius protection at the slots), add a Coupler to the drop attachment and install the duct. Like a regular channel, using rigid slotted duct requires precise advance planning of the overhead channel location to ensure the duct drops where it can be bracket-mounted to the rack.

4.11 Feeding Up into Racks and Bays

A WaveTrax channel that is run under a raised/computer room floor, such as in a server room or data center, uses the same components and layout logic as a channel run overhead. In most cases you will use Below Floor Brackets to secure the channel to



Figure 37 - Vertical drop with Split Tube



Figure 38 - Vertical Dropwith Slotted Duct (Shownwithout Cover)



Fiber :: Cable Management System

the vertical struts that hold up the floor. Telect recommends using channel covers for under-floor applications.





Figure 39 - Exploded View

Figure 40 - Assembled View

To feed up into a rack or bay using WaveTrax:

- 1. Install an Intersection, T-Transition, or Off-Ramp on the channel as described in Section "4.9 Dropping into Racks and Bays" on page 24.
- 2. Install a Reducer, if appropriate.
- 3. Install a Coupler and the proper length Channel to reach the rack. In this example no channel is used after the reducer.
- 4. Install a second Coupler at the rack end of the channel.
- 5. Install a 90° Upsweep or use two 45° Upsweeps combined with a Coupler, or other turn component variations as necessary, to turn the channel path up to the rack.
- 6. Add bend protection to the top of the upsweep by adding a Coupler, then a Pin Adapter, and then a Trumpet.



Fiber :: Cable Management System

To feed up into a rack or bay using CableLinks:

- 1. Install an Intersection, T-Transition, or Off-Ramp on the channel as described in Section "4.9 Dropping into Racks and Bays" on page 24.
- Install the proper Adapter and add the required number of CableLinks Modules. It takes approximately four modules to complete a 90° turn, in this case, an upturn.
- 3. Add bend protection to the end of a CableLinks module (not shown here) by adding another Cable Links "transition-to" Adapter, then a Trumpet

4.12 Adapting to a Competitive System

WaveTrax includes Competitive Adapters to convert from five different legacy cable management systems: ADC FiberGuide®, Ditel Lighttrax[™], Siemon Light-ways[™], Panduit FiberRunner[™], and Newton Fiber Cable Management.

- 1. Locate the legacy coupler where the WaveTrax channel will connect.
- 2. Remove the existing legacy channel.
- 3. Insert the proper Competitive Adapter into the legacy coupler. Different legacy systems will require different procedures for connecting a component to their coupler.
- 4. Install a Coupler on the Competitive Adapter.
- 5. Continue installing WaveTrax components asrequired.



Figure 41 - Feeding up using CableLinks



Figure 42 - Competitive Adapter

	2 inch	4 inch	6 inch	12 inch
ADC	027-1000-4207	027-2000-4007	027-2000-6407	027-2000-12407
Ditel	027-2000-4299	027-2000-4099		
Siemon	027-2000-4299	027-2000-4099		
Panduit	027-1000-4207	027-2000-4007	027-2000-6407	027-2000-12407
Newton	Newton 027-2000-	Newton 027-2000-		027-1000-12499
	4299	4299 027-2000-4099		

Table 1 - Competitive Adapters



Fiber :: Cable Management System

Chapter 5: Working with CableLinks

5.1 Overview

CableLinks modules can be adjusted 25° off center both horizontally and vertically to create a cable channel that can easily negotiate the most crowded work environment. Four modules can make a 90° turn in any direction and then continue straight or undertake additional turns without the addition of any additional components.

CableLinks modules ship with the vertical joints connected as shown.

5.2 Connecting Modules

To connect additional modules, simply slide opposite ends together until the center tab clicks into place. For 6" CableLinks, slide the modules together and then press in the black locking button in the center of the horizontal joint.

To connect modules at the vertical joint, first squeeze and remove one end of the H-shaped gates on top of the female end, then press in the channel sides and slide the opposite end in.

5.3 Separating Modules

To separate CableLinks modules, simply depress the center button in the horizontal joint—use a screwdriver or similar tool if necessary—and pull the modules apart. For 6" CableLinks, pop out the black locking button fromunderneath and the modules come right apart.

To separate at a vertical joint, repeat the connecting process above but pull the modules apart.



Figure 43 - CableLinks



Figure 44 - Connecting Modules



Figure 45 - Separating Modules



Fiber :: Cable Management System

5.4 Adjusting Modules

To adjust CableLinks modules horizontally, simply flex the modules at the horizontal joints as needed.

To adjust CableLinks modules vertically, first squeeze and remove one end of the H-shaped gates on top of the female end, then press in the channel sides to disengage the locking teeth in the joint. Flex the modules at the joint as needed, then release to reengage the locking teeth.

Horizontal and vertical joints will catch or lock, respectively, at about every 8 degrees of travel.



Figure 46 - Pressing in Channel Sides



Figure 47 - The Locking Teeth



Fiber :: Cable Management System

Chapter 6: Support Hardware

6.1 How Many Brackets Do I Need?

Support WaveTrax channel a minimum of every 6 feet and at every coupler. Support intersections and transitions with three or more arms in at least two places.

In some cases, connecting components may be so close together that supporting every one is neither practical nor necessary. For example, when a Center Drop is connected directly to an Intersection, the connecting Coupler does not require a bracket if the couplers on the opposite ends of the center drop and intersection already have one.

Support 2" and 4" CableLinks modules a minimum of every 3 feet, 6" modules a minimum of every 2 feet, and all sizes at transitions.

In some cases a mid-span location may be the only means of support for a particular section of straight channel. To securely support a channel in mid-span, simply add a Slide Bracket to the top of any standard bracket.

A typical channel support system looks like this:



Figure 48 - Brackets and Hardware



Figure 49 - Channel Support System



Fiber :: Cable Management System

6.2 Common Support Brackets

The most common means of supporting a WaveTrax channel, CableLinks modules, or a slotted duct is by using a Threaded Rod Kit to hang or stand a threaded rod from an existing cable rack, then attaching a bracket to the rod for the channel to rest on, as is shown above right. Telect stocks several different types of brackets to provide secure mounting for different configurations of threaded rod on a cable rack or rail, floor support, equipment rack face, and wall. If you can plan your channel to run adjacent to an existing row of threaded rods, you can add brackets to those rods instead of installing more.

The brackets shown in the following table are listed in order of most commonly used to least used and include all hardware shown. Couplers mount to brackets; add a Slide Bracket for mid-span support. While the following table shows brackets supporting WaveTrax channel, with the exception of the slide bracket, all brackets also fit CableLinks modules.

If you need to mount brackets to a facility structure not specified in the following table, contact Telect Application Engineering without charge at 800-551-4567 or 509-926-6000 for a custom bracket solution.

Description	2" Bracket	4-6" Bracket	12" Bracket
Threaded Rod Bracket Supports the channel from a threaded rod at adjustable heights. Use with the Threaded Rod Kit.			
	027-1000-4251	027-1000-4051	027-1000-12405
Universal Bracket Mounts to threaded rod, cable rack, or vertical surface to support chanels at adjustable heights. Use with a Threaded Rod Kit for threaded rod mounting.			
	027-2000-4205		

Table 2 - Common Brackets



Fiber :: Cable Management System

Table 2 - Common Brackets

Description	2" Bracket	4-6" Bracket	12" Bracket
Threaded Rod Kit Mounts to most styles of cable rack and auxiliary bar. Includes 5/8" x 18" threaded rod, clamshell brackets, and hardware. Use with the appropriate bracket.	a a b b b b b b b b b b		
		027-1000-4002	
Center Trough/ Slide Bracket Two sliding catches mount directly to most brackets and attach to the channel as a mid-span support. Order the appropriate bracket separately			
	027-2000-4260 U-bracket fixed at 2" width	027-200	00-4060
Adjustable Bracket Supports the channel from a flat surface. Often used for channel or CableLinks traveling vertically down the front of an equipment rack.			
	027-1000-4216 for	troughs 027-1000-42 ⁻	11 for CableLinks
Center Below Bracket Supports the channel directly above the threaded rod. Use with Threaded Rod Kit.			
	027-1000-4252	027-1000-4052	027-1000-8450



Fiber :: Cable Management System

Table 2 - Common Brackets

Description	2" Bracket	4-6" Bracket	12" Bracket
C-Bracket Supports the channel directly below the threaded rod. Use with Threaded Rod Kit.		And the second	
	027-1000-4253	027-1000-4053	027-1000-8453
Cable Rack Bracket Supports the channel level with most cable racks/ auxiliary bars	5		



Fiber :: Cable Management System

Chapter 7: Installation

7.1 Inspection

Please read and understand all instructions before starting installation. If you have questions, contact Telect Technical Support at support@telect.com or call 1.509.926.6000.

When you receive the equipment, carefully unpack it and compare it to the packaging list. Please report any defective or missing parts to Telect Quality at <u>quality@telect.com</u> or call 1.509.926.6000.

Telect is not liable for transit damaged. If the product is damaged, please report it to the carrier and contact Telect Quality.

7.2 Preparation

() ALERT

ALERT! It requires two people to install WaveTrax channel safely and efficiently.

For easiest installation, follow this order:

- Make sure the layout of the installation location is the same as it was during system design. a. Look for any new wiring, conduit, or other obstructions that may have been installed since your last visit.
 If new obstructions can't be moved enough for the channel to be installed as designed, reschedule the installation, determine the new parts needed to skirt the obstruction, and order the new parts.
- 2. Install the support hardware along the channel path.
 - a. If your channel uses multiple sizes, begin with the largest size and work your way down.
 - b. Make sure you use the correct size of bracket for the channel it will support.
 - c. Try to keep C-brackets and above-channel threaded rods on one side of the channel or the other to avoid having to fish wire around the support hardware.
 - d. Tighten the fittings only enough to hold the bracket steady until all brackets are installed and leveled, as some brackets will require height adjustments.
 - e. Leave clamps on the auxiliary bars and cable racks just loose enough so the location of the bracket on the end of the threaded rod can be adjusted slightly when fitting in the channel. When all brackets are installed and level, tighten all bracket bolts, but leave the auxiliary bar/cable rack clamps loose for now.



Fiber :: Cable Management System

- 3. Install couplers onto their respective brackets.
 - a. Add bolts (from the bracket packaging) to the slots on the bottom of a coupler.
 - b. Insert the bracket.
 - c. Screw the nuts on hand-tight, in case you need to remove the bracket during channel installation.
- 4. Add transition components, such as an intersection, to the appropriate couplers.
- Measure a channel length between two transitions and/or couplers. Make sure to measure to the point where the channel is fully seated in the transition. (See Section "4.4 Installing Couplers" on page 19.)
- 6. Cut the channel to size, and, prior to notching it, fit it into the transitions and check the length. With the channel fully seated in both transitions, the threaded support rods (if used) should remain vertical. If they aren't, trim the existing channel or cut new channel to the correct length.
- When the channel is the right length, remove it, notch it (See Section "4.3 Notching a Channel " on page 18), and snap it into place.
- 8. Repeat steps 6 and 7 until you have added all channels.
- 9. With the main channel and transition components added, double check that the system is level, straight, and at the correct height.
- 10. Tighten all auxiliary bar/cable rack clamps and mounting bracket nuts. A snug fit with hand tools is sufficient; do not over-tighten on plastic components.
- 11. Install components for cable drops, such as trumpets or drop adapters and CableLinks.
- 12. Install support hardware for vertical cable management components (CableLinks, rigid channel, flexible split tube, or slotted duct).
- 13. Install covers if ordered.
- 14. To prevent rust, paint the end of any threaded rods that were cut.
- 15. Double-check that all required fasteners are present and tight. A channel that moves easily probably has one or more loose mounting bolt(s).
- 16. Store extra parts for future use.



Figure 50 -Installing Couplers



Figure 51 - Adding Transition Components



Fiber :: Cable Management System

Chapter 8: Supplemental Information

8.1 Channel Capacities

Recommended density refers to Telcordia recommended cable pile-up (Generic Requirements and Design Considerations for Fiber Distributing Frames, GR-449-CORE, issue 1, March 1995). This includes random jumper placement into the channel system. Trough pile-up refers to the maximum number of fiber jumpers in a given cross-section of a Cable Management System (CMS) installation.

Table 3 - Recommended Density

	2 mm Patch Cords	3 mm Patch Cords
Recommended patch cord density per square inch	90	40

Table 4 - Recommended Density

Channel Pile-up	2" CMS		4" CMS		6" CMS		12" CMS	
	2 mm	3 mm	2 mm	3 mm	2 mm	3 mm	2 mm	3 mm
2"	360	160	720	320	1080	480	2160	960

Table 5 - Maximum Density

	2 mm Patch Cords	3 mm Patch Cords
Recommended patch cord	140	60
density per square inch		

Table 6 - Recommended Density

Channel	2" CMS		4" CMS		6" CMS		12" CMS	
Pile-up	2 mm	3 mm	2 mm	3 mm	2 mm	3 mm	2 mm	3 mm
2"	560	120	1120	480	1680	720	3360	1920
3"			1680	720	2520	1080	5040	2160
4"			2240	690	3360	1140	6720	2880



Fiber :: Cable Management System

8.2 Technical Specifications

Table 7 - WaveTrax

Channels*	Yellow UL 94V-0 fire-retardant plastic				
Transition components*	Yellow UL 94V-0 fire-retardant plastic OR cold-rolled steel				
Covers*	Yellow UL 94V-0 fire-retardant plastic				
Capacity/weight of	2" channel	242 3-mm fibers	1.17 lbs/ft		
components	4" channel	915 3-mm fibers	4.43 lbs/ft		
	6" channel	1382 3-mm fibers	6.69 lbs/ft		
	12" channel	2635 3-mm fibers	12.76 lbs/ft		
	Universal mounting bracket: 64 lbs. holding capacity per bracket				

Table 8 - CableLinks

Links*	Yellow UL 94V-0 fire-retardant plastic				
Capacity/weight of	2" channel	242 3-mm fibers	0.6 lbs/ft		
components	4" channel	915 3-mm fibers	1.8 lbs/ft		
	6" channel	1382 3-mm fibers	1.95 lbs/ft		
	Universal mounting bracket: 64 lbs. holding capacity per bracket				

*WaveTrax and CableLinks are certified UL-94v0, UL-2024, GR-63-CORE (NEBS-3), and ETSI

