Pathways and Cable Bundling

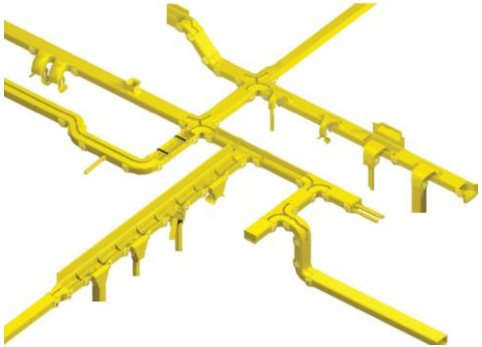
PANDUIT™

Agenda

- Pathway Offerings
- Bend Radius Control
- Fiber Pathways - FiberRunner
- Wire Mesh Pathways- Wyr-Grid
- Best Practices
- Bundling to Enhance Safety- New hook and loop colors

Pathway Offerings

- Choosing the correct pathway –Cables
  - Fiber
  - Copper



Proper Bend Radius Control

Rules to follow for Cabling -BRC

- 4x copper
- 10x fiber

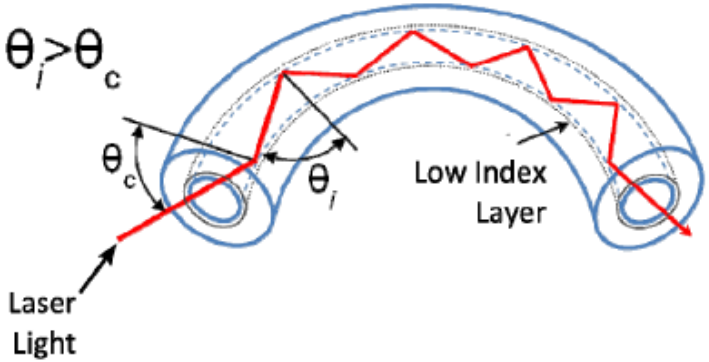
- Example .20" dia fiber needs a 2" bend radius

2” Bend Radius (0.20” x 10)

0.20” Diameter Cable During Installation (Sheath OD)

BIMMF – Bend Insensitive Multimode Fiber

- Optically Bend Tolerant
- NOT Mechanically Bend Tolerant
- Maintaining Bend Radius very critical
- Fiber completely supported
  - No openings- wire basket



Laser Light in BIMMF

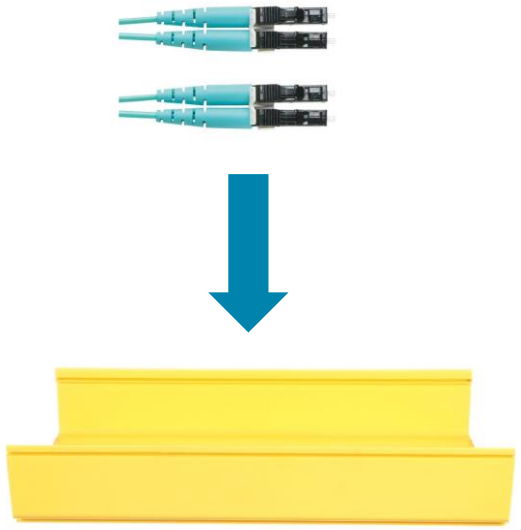
Best Selection for Fiber Cabling

- Problem: Selecting the optimal pathway to route, manage and protect fiber optic cables

- Other Factors:
  - Cost and installation labor of the product
  - Potential of failure
  - Maximizing long term performance

Other Factors: Cabling

- Fiber Optic Cables that must be in Fiber Trough
  - 1.6 and 2.0mm Patch cords
  - 3.0mm 12-Fiber Interconnect cables
  - 4.5mm Fiber Trunk



- ANSI/BICSI 002-2014: 14.7.12

  “Optical Fiber Equipment Cords and Patch Cords should be installed in a dedicated optical fiber pathway that ensures that proper bend radius control is maintained.”

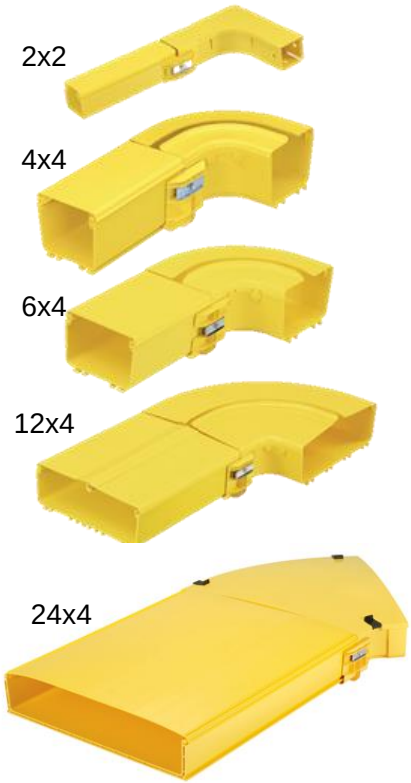
FIBERRUNNER Cable Routing System Benefits

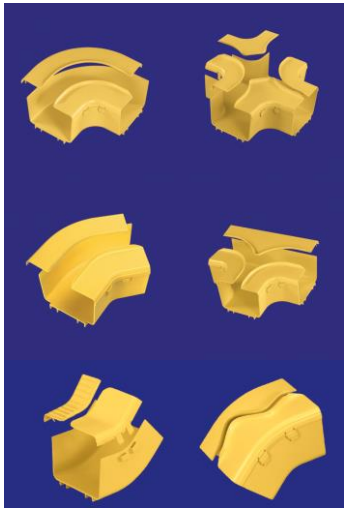
Benefits:

- Reduces installation labor costs compared to competitive fiber ducting systems
- Protect fiber optic cables maximizing long term performance
- Provides scalability and design versatility for data center applications
  - Range of Sizes
  - Fittings
  - Mounting Options

FiberRunner Offering

- 5 Channel Sizes Provide Capacity for High and Low Density Applications
- Range of Fittings, Brackets & Spill-Outs adapt system to any structure
- Offered in Fiber Yellow, Black & Telco Orange
- Integral Bend Radius Control and Snap-On Covers Provide Maximum Cable Protection



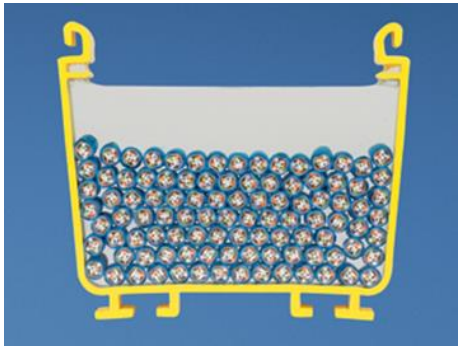


Directional Fittings

- 2X2, 4X4, 6X4 and 12X4 sizes offered in 6-foot and 2-meter lengths
- 24X4 size offered in 10-foot lengths

Selecting the Optimal Pathway Size

Recommendations per TIA-569-B



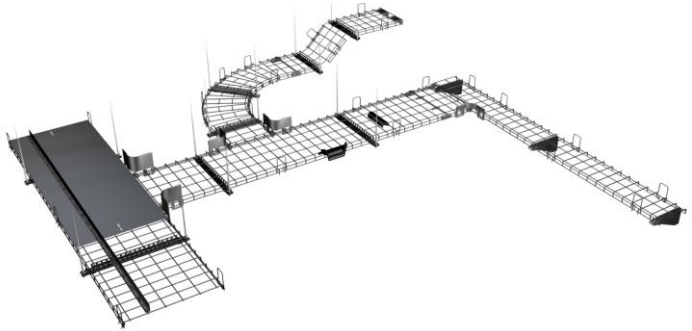
- Spec = 25% cable fill
  - Leaves room for future moves, adds and changes
- Max = 50% cable fill
  - Based on interweaving and packing factors.

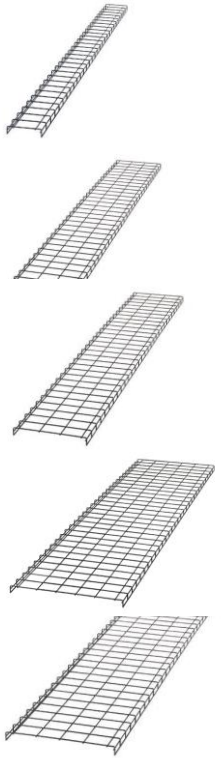
Cable Fill Formula per TIA-569-B

$$\text{Numbers of cables} = \frac{\text{Internal area}}{\text{Cable Diameter}^2 \times 0.7854} \times \text{percentage fill desired}$$

Wire Mesh Pathway: Larger Diameter Fiber and Copper Cable

- Consider the following:
  - Strength
    - Amount of cables
    - Load Rating
      - EN61537:2007
      - NEMA VE1/CSA 22.2
  - Flexibility of Design
    - Future Expansion
  - Ease of Installation





Tray Width (In.)	Cable Load (lbs/ft)*			Safe Working Load (lbs/ft)					
	Category 6A (SD)	Category 6A	Category 6	4 Foot Support Span	5 Foot Support Span	6 Foot Support Span	7 Foot Support Span	8 Foot Support Span	9 Foot Support Span
12	24.21	18.06	25.02	113	90	69	54	43	34
18	36.15	26.99	37.36	115	90	67	52	41	31
24	48.09	35.91	49.69	116	92	69	54	53	33
30	60.00	44.80	62.00	116	92	69	54	53	33

Wyr-Grid Overhead Cable Pathway Benefits

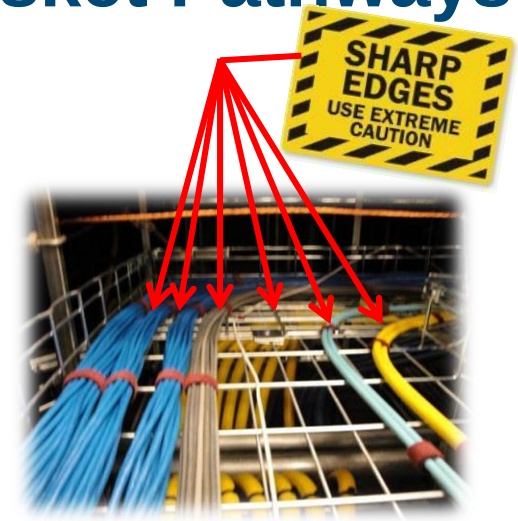
- **Reduces installation labor costs by 50%** compared to traditional wire basket and ladder rack systems
  - Wyr-Grid **pathway sections are bonded** as they are assembled
  - **Less Cutting** Required
  - **Snap-On Accessories**
  - **Fewer Supports** Required

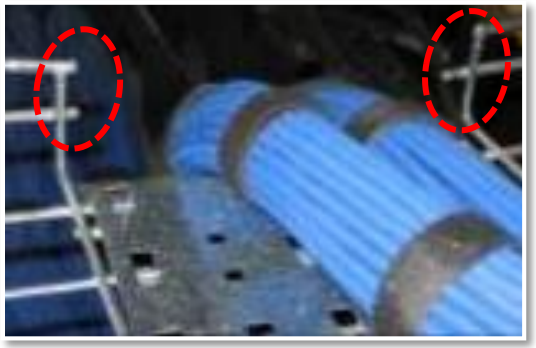
Competitive Intersection:
Lower Strength
Requires Loose Hardware
Sharp Edges In Pathway
Longer Installation Time

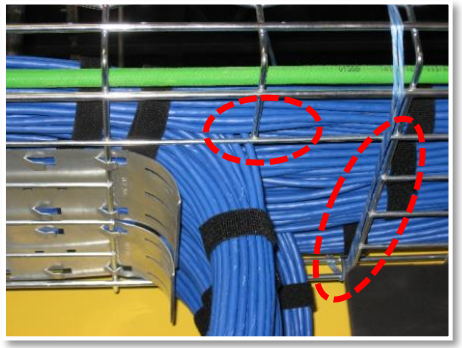
- Versatile systems adapts to any telco, building or data center environment

Challenges With Traditional Wire Basket Pathways

- Cabling and installers are exposed to sharp cut pathway wires at intersections
- Lose strength at intersections & spill outs
- Intersections require more installation time
- Small grid openings limit cable exit capacity
- Extra care needed to comply with regulatory standards that prohibit sharp edges in the cable





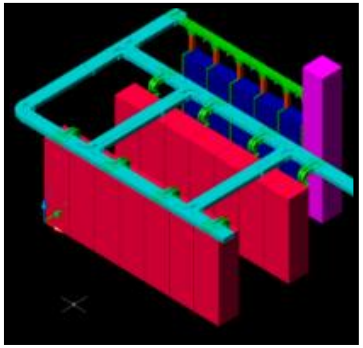


Best Practices

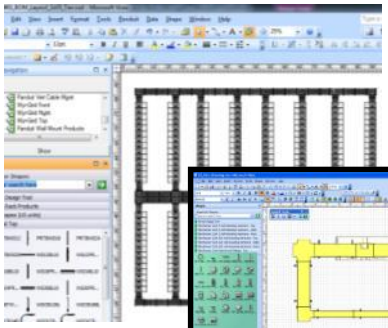
Design Tools

- **Complimentary Design Tools Provide:**
- Drag & Drop part functionality
- BOM Generator

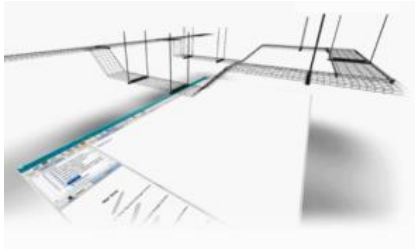
- **Design tools available for the following…**
  - AutoCAD – Design in 2D or 3D
  - Visio – 2D Design Tool
  - BIM shapes For Revit Tool (on www.BIMOBJECT.com website)

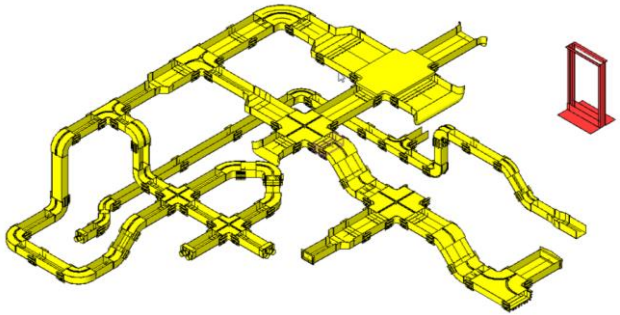


3D AutoCAD Tool



2D Visio Tool





Options For Design Flexibility

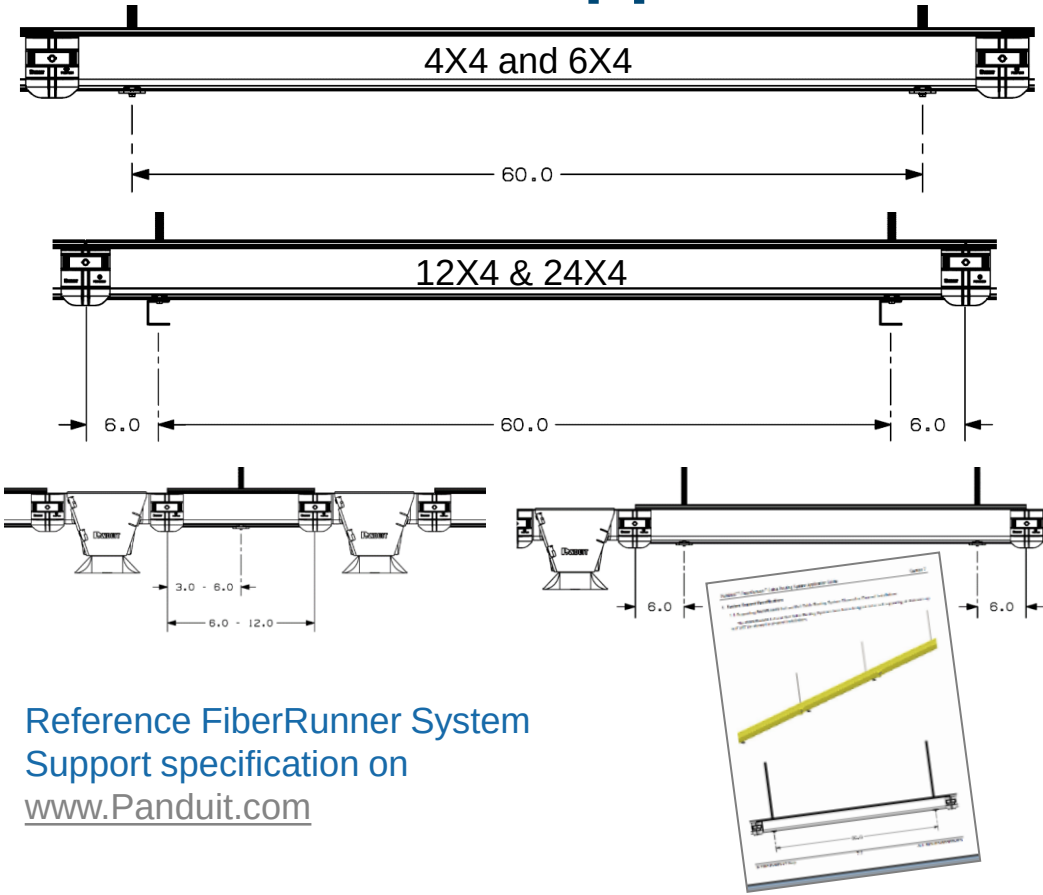
Fiber Runner™ Vertical Tee Fittings

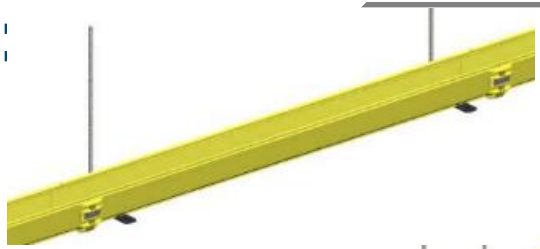
- Offered in 2X2, 4X4, 6X4 and 12X4
- 4x4 & 6x4 include QuikLock barbs
- Integrated hinge doors

Fiber Runner™ Spillover Junction

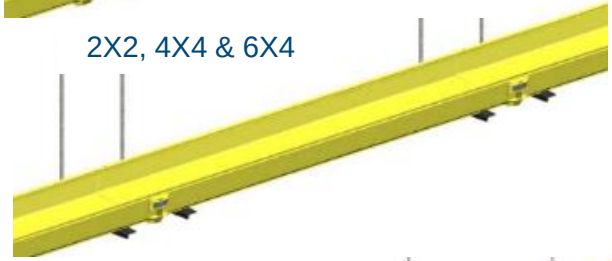
- Available with 2x2 or 4x4 exit
- Install anywhere on existing channel
- Snap-on hinged channel covers are available (shown above)

FiberRunner Support Locations

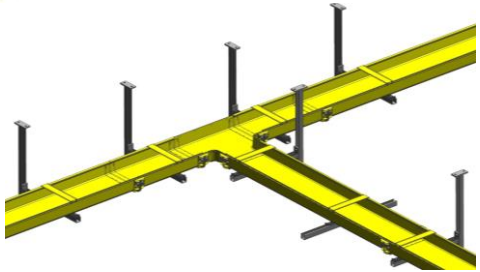




2X2, 4X4 & 6X4



12X4 & 24X4



Reference FiberRunner System Support specification on www.Panduit.com

Wyr-Grid Safe Working Load

Safe Working Load: Is an evenly distributed load at which the midspan deflection of the cable tray is less than 1/100th of the span between support brackets.

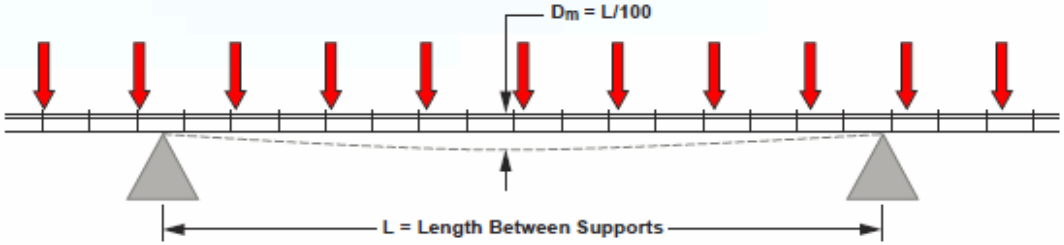
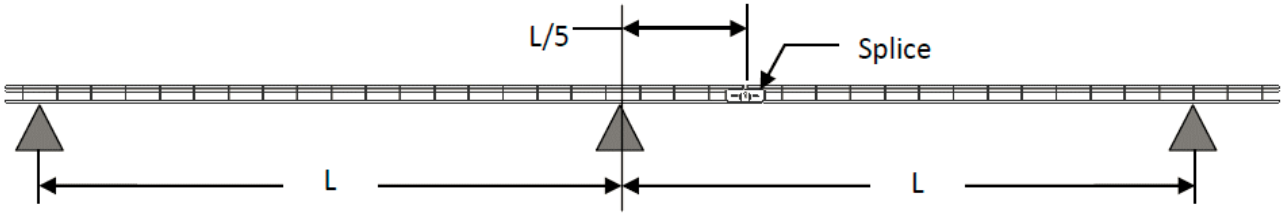
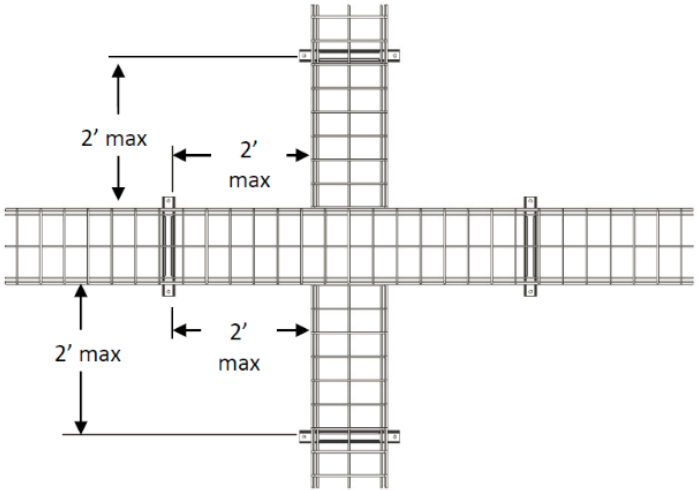


Figure 1. Midspan Deflection Schematic of Cable Tray, Side View

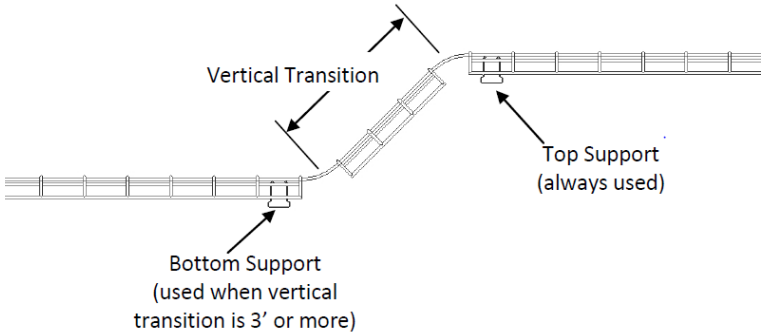
Panduit Part #	Tray Width	Safe Working Load (lbs/ft)					
		4' Support Span	5' Support Span	6' Support Span	7' Support Span	8' Support Span	9' Support Span
WG12**10	12"	113	90	69	54	43	34
WG18**10	18"	115	90	67	52	41	31
WG24**10	24"	116	92	69	54	53	33
WG30**10	30"	116	92	69	54	53	33

Recommended Wyr-Grid ™ Support Locations





Intersections Support



Level Changes

Bundling: Color Variety

- Improved Material
- Higher Tensile Strength
- Maintains strength at higher temperatures
- Product can be cycled through 100+ Cycles
- Improves traceability and protects cables