B4B - *Build For Broadband* Webinar
Pathways

July 18, 2019

POWERFUL TECHNOLOGY SOLUTIONS
FOR THE CITY AND PUBLIC WE SERVE

Seattle
Information Technology

B4B - *Build For Broadband* Initiative

Practices that support access to competitive, high-speed broadband for the current and future connectivity needs of Seattle residents.
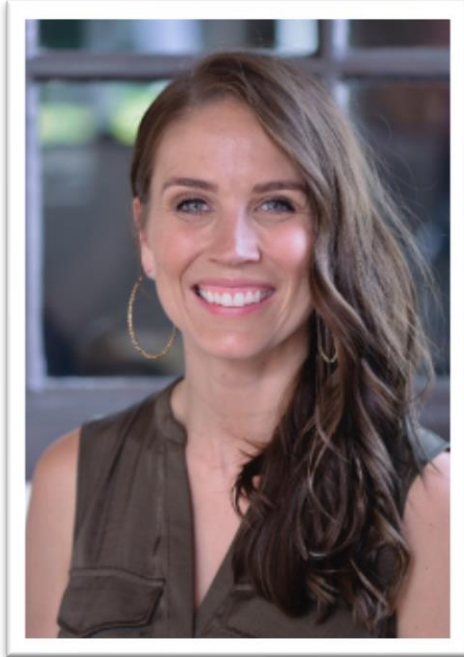
POWERFUL TECHNOLOGY SOLUTIONS
FOR THE CITY AND PUBLIC WE SERVE

Seattle
Information Technology

B4B - *Build For Broadband* Webinar
Presenters

Haley Krommenhoek
Principal – Electrical Engineering, PE

Clark Guler
Business Development Manager-MicroTechnology

"Pathways" for Broadband Services
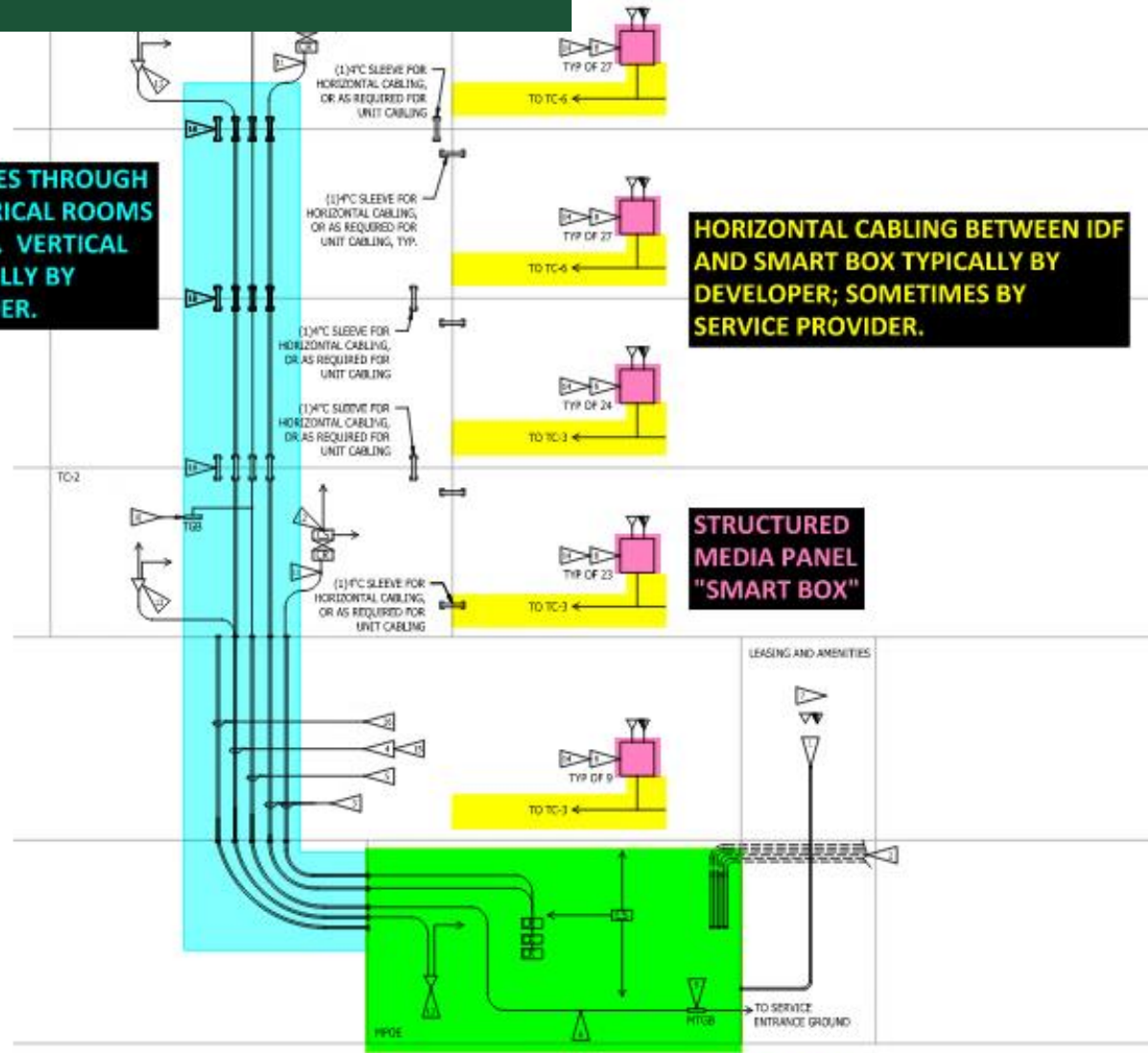
July 18, 2019

RUSHING

Typical Building Distribution

VERTICAL SLEEVES THROUGH STACKED ELECTRICAL ROOMS - BY DEVELOPER. VERTICAL CABLING TYPICALLY BY SERVICE PROVIDER.

HORIZONTAL CABLING BETWEEN IDF AND SMART BOX TYPICALLY BY DEVELOPER; SOMETIMES BY SERVICE PROVIDER.

STRUCTURED MEDIA PANEL "SMART BOX"

MPOE - MAIN POINT OF ENTRY FOR COMM

Why add future pathway?

- Remain competitive
- Entice and retain tenants
- Control vendor contracts
- Technology changes quickly. Be prepared.

Who's providing future pathways?

- Vulcan
- High end condo projects
- High rise residential projects

Design Considerations

- What will service providers offer?
  - Cabling & pathways vs. actual install

- Ask for pricing alternates during bid time

- Recommend increasing smart box to plastic, vented, 42" size if futureproofing is desired
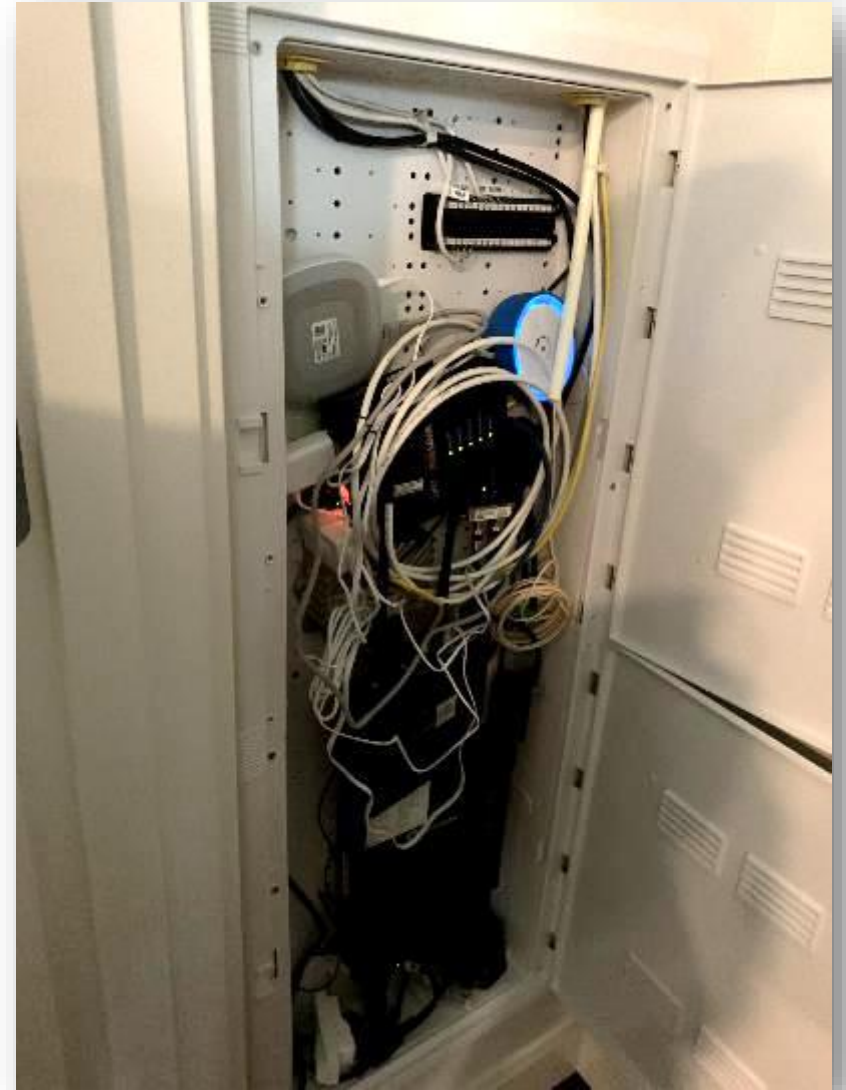
RUSHING

- Mechanical, Electrical, Plumbing Engineering
- Energy
- Sustainability
- Lighting Design
- Commissioning

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B4B: Seattle

Micro Ducts & MDUs
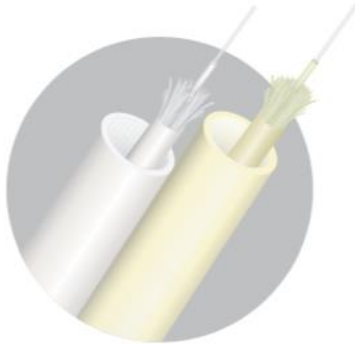
Understanding MicroDucts

- What are MicroDucts ?

- Where to use MicroDucts ?

- How to use MicroDucts ?

- Who uses MicroDucts ?

- Why use MicroDucts ?

What are MicroDucts?

-Small conduits-

Fiber Installation Options

Pull String: MicroDucts can be provided with factory pre-installed pull string for fiber placement at a later date.

Pull String

Pre-installed Fiber: MicroDucts can be provided with factory pre-installed fiber for easy one-step placement of fiber and MicroDuct pathway.

Pre-installed Fiber

Empty: MicroDucts can be provided empty for future cable placement. Hand-held cable jetting equipment can be used to install fiber quickly and easily.

Riser and Plenum MicroDuct Specs

	OD/ID (MM)	NOM OD (MM/IN)	MIN ID (MM/IN)	WEIGHT (#/FT)	SAFE WORKING PULL STRENGTH (LBS)†	STANDARD PUT UP	WOODEN REEL
RISER	8.5/6	8.5/0.33	5.9/0.23	0.022	89	1,000'	24 "
						2,500'	24 "
	12.7/10	12.7/0.50	9.5/0.37	0.042	172	1,000	24 "
						2,500	35 "
	16/12	16/0.63	11.6/0.46	0.06	285	1,000	24 "
						2,500	35 "
PLENUM	8.5/6	8.51/0.33	6.7/0.26	0.024	89	1,000'	24 "
						2,500'	24 "
	12.7/10	12.7/0.50	10.2/0.40	0.049	177	1,000	24 "
						2,500	35 "
	16/13	16/0.63	12.8/0.51	0.08	293	1,000	24 "
						2,500	35 "

Outside Diameter

Inside Diameter
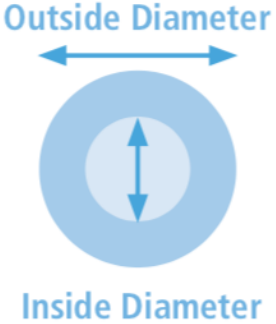
Riser MicroDucts:
ETL Listed to UL 2024 & CSA C22.2 No.262-04 and UL-94 V-2 & CSA FT4

Plenum MicroDucts:
ETL Listed to UL 2024 & CSA C22.2 No.262-04 and UL-94 V-0 & CSA FT6

MDU MicroDuct Facts

1. MDU MicroDuct is supplied on small, disposable wooden reels in 1,000 ft. to 4,000 ft. lengths.

2. Is available empty, with a pull string (50# test), or with CIC (Cable in Conduit) fiber cordage pre-installed, saving time and labor costs.

3. Available in either Riser or Plenum versions for MDUs or MBUs (Multi-Business Units).

4. Sizes available are 8.5mm OD x 6mm ID, 10mm OD x 8mm ID, 12.7mm OD x 10mm ID, and 16mm OD x 10mm ID.

5. Contains a permanent layer of Silicore for extremely low co-efficient of friction.

6. Has internal longitudinal ribs to reduce friction even further. The installed cable performs as though riding on rails inside the MicroDuct.

7. Is designed for inside applications and does not have UV (ultraviolet) inhibitors. Riser and Plenum products should be stored to protect from sunlight.

8. Is the only product available to provide fiber to the unit and maintain a permanent protected pathway for the fiber for upgrades or repairs.

Where to use MicroDucts

Mixed Use

&

High Rise

Garden Style

How to use MicroDucts

In greenfield installations, the MicroDuct pathway should be placed prior to the dry wall installation.

MDU Route Guidelines

When placing MicroDuct:

- Number of bends should not exceed eight 90° turns, or sixteen 45° turns
- Bends of 45° or less are easier to pull through and should be used when possible
- Run lengths of 200' are recommended, but routes can be designed with longer distances
- Long sweeping bends are encouraged with a minimum 13" bend radius for easiest fiber cable installation or removal for repair or upgrades

REMEMBER:

- If storing the MicroDucts outside, protect from prolonged exposure to the sun
- Install in accordance with all local fire codes
- Avoid shortcuts that affect installation quality

Bend Radius Gauge

- Each shipment of MicroDuct should contain a Bend Radius Gauge that will be taped to the outside of the reel.
- The bend radius gauge serves as a guide to encourage sweeping bends in the MicroDuct pathway for all future fiber installations.

13" radius gauge

For more detailed installation information, see Technical Bulletin DCEB-06004
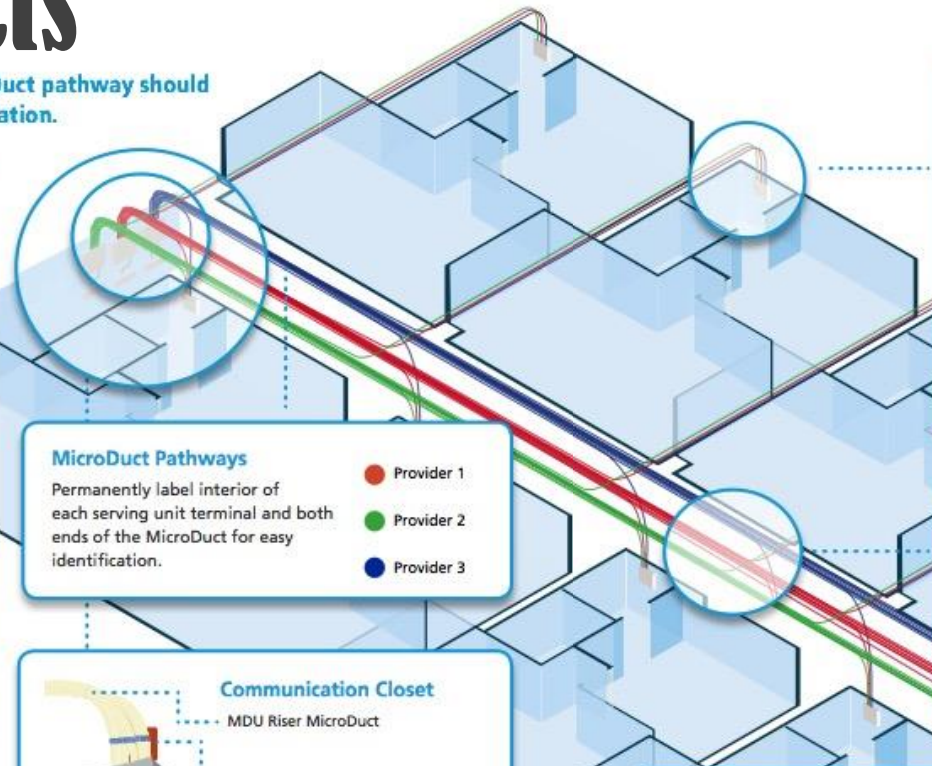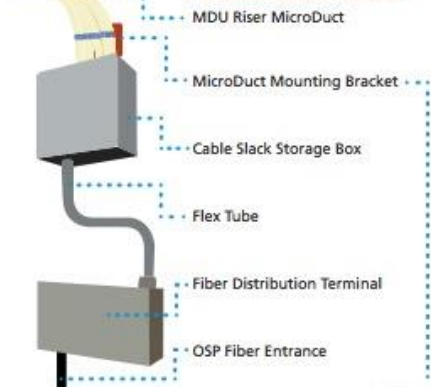
MicroDuct Pathways

Permanently label interior of each serving unit terminal and both ends of the MicroDuct for easy identification.

- Provider 1
- Provider 2
- Provider 3

Communication Closet

- MDU Riser MicroDuct
- MicroDuct Mounting Bracket
- Cable Slack Storage Box
- Flex Tube
- Fiber Distribution Terminal
- OSP Fiber Entrance

MicroDuct Mounting Brackets

MicroDuct Mounting Brackets are available for the following MicroDuct sizes: 8.5mm, 12.7mm and 16mm.

Serving Unit Terminal

- When MicroDuct reaches the serving unit terminal, insert MicroDuct and pull 8' to 10' of MicroDuct into terminal housing. Coil MicroDuct and secure with cable ties.
- Do NOT remove the MicroDuct from the cable in the terminal housing. Secure MicroDuct with connector or a cable strap clamp. Avoid sharp bends.
- If MicroDuct kinks, pull additional MicroDuct into terminal housing and remove kink, or remove and discard damaged MicroDuct.

Serving Unit Terminal

Fiber Installation Options:

(further details on following page)

- Pull String
- Pre-installed Fiber
- Empty – ready for Cable Jetting

MDU Installation Techniques

- For straight runs, either horizontal or vertical, secure MicroDuct every 16" - 24"
- Plastic cable strap clamps recommended (A)
- On runs with multiple MicroDucts, use two-hole cable straps or cable ties (B)
- MicroDucts should be properly secured along entire length of route (C)
- Utilize nail plate prior to dry wall installation (D)
- Do not over tighten cable ties or crush MicroDuct
- Label MicroDucts at both ends, preferably at three places, outward facing for easy ID
- MicroDuct Organizing Bracket is designed to be used where multiple MicroDucts are terminated

A B C D

Recommended Installation Techniques

The purpose of this presentation is to show installers proven steps that ensure the MicroDuct is installed correctly.

Some of the images shown here may not apply to every job since no two buildings are the same. Even in the same complex buildings can be very different from one another.

The goal of the installation is to create a Reusable Pathway

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13"
radius gauge

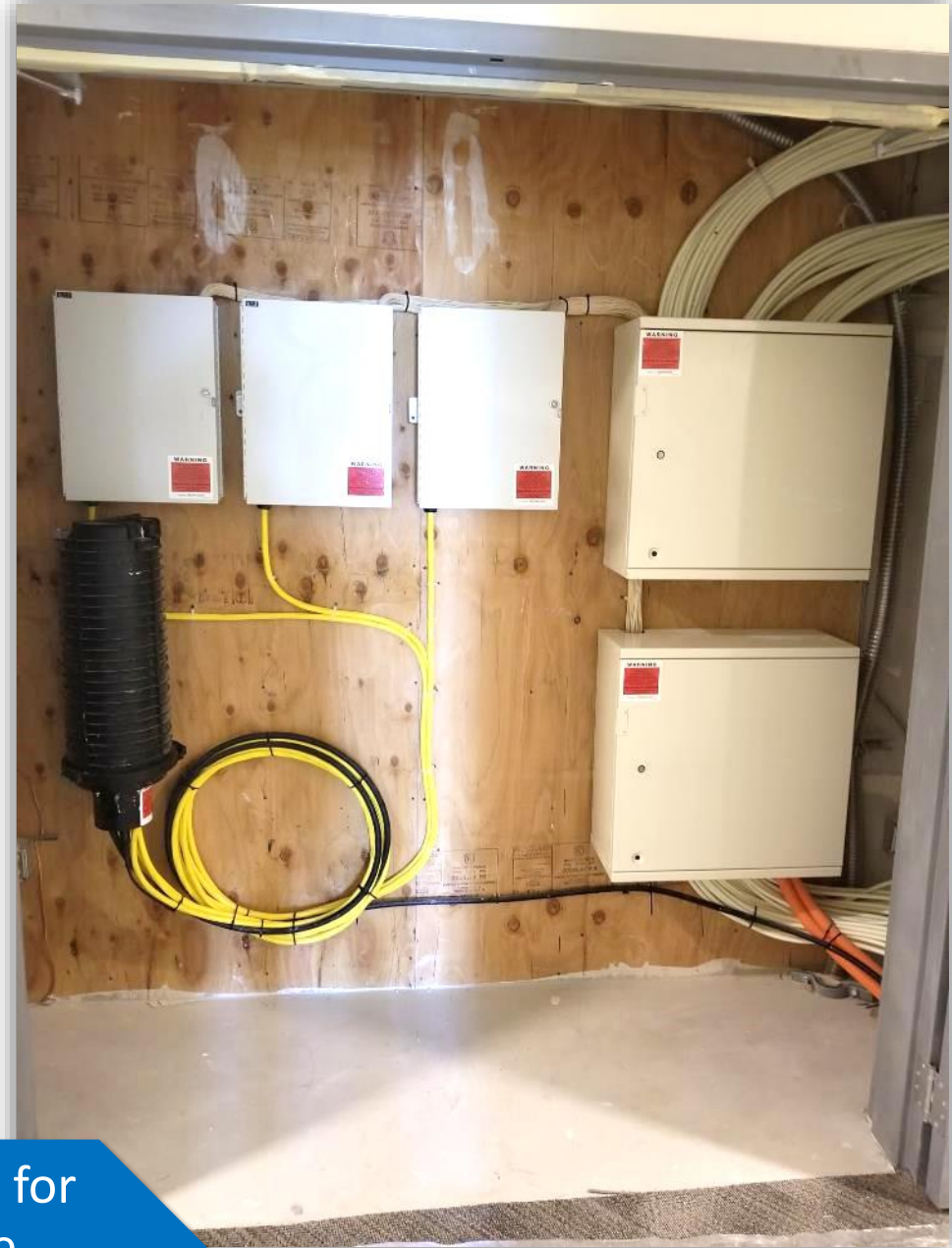# Home Run from IDF Closet to each Media Panel
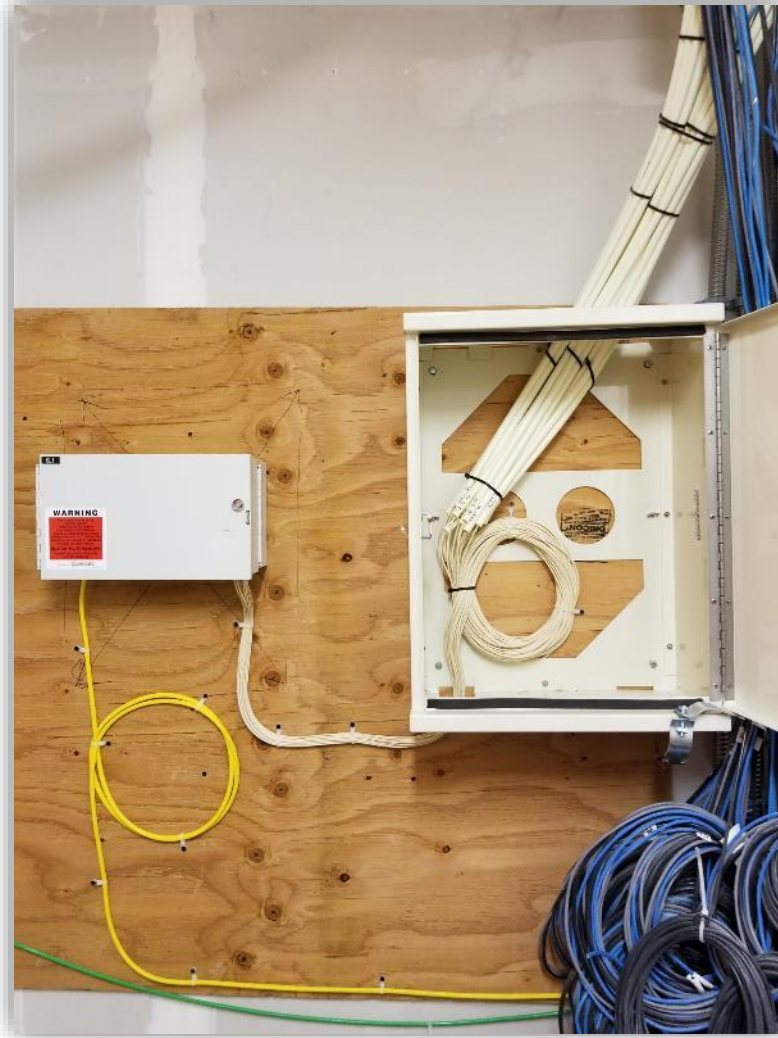
IDF Closet
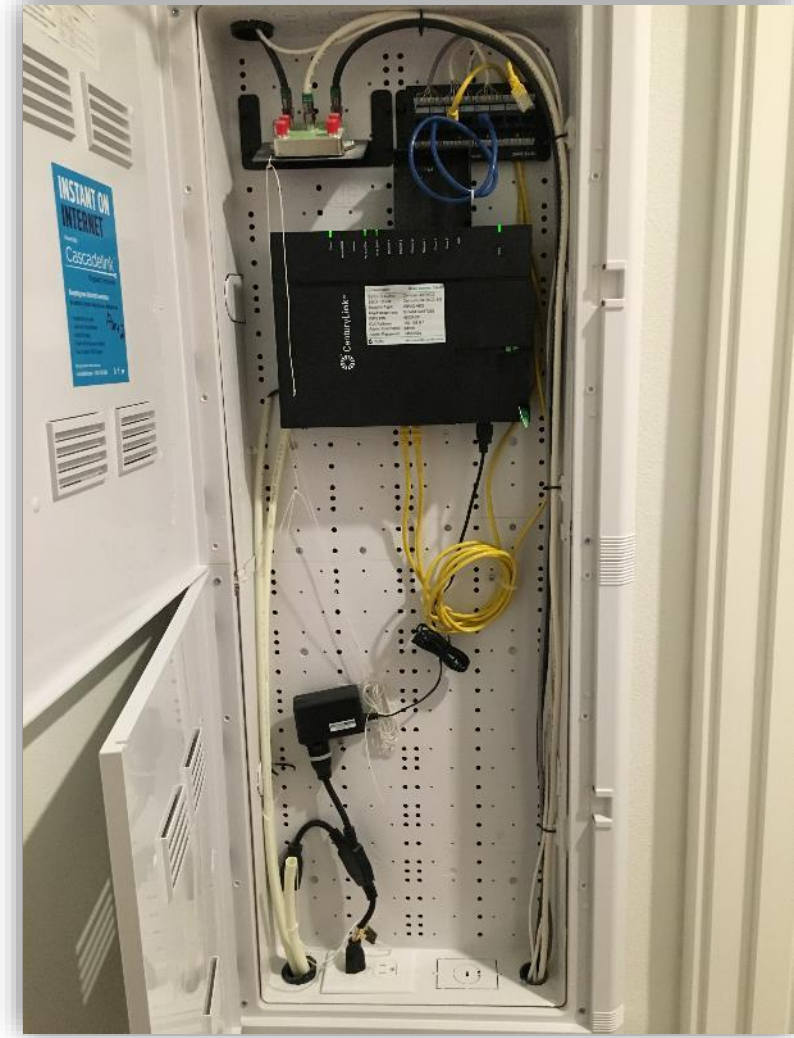
Media Panel

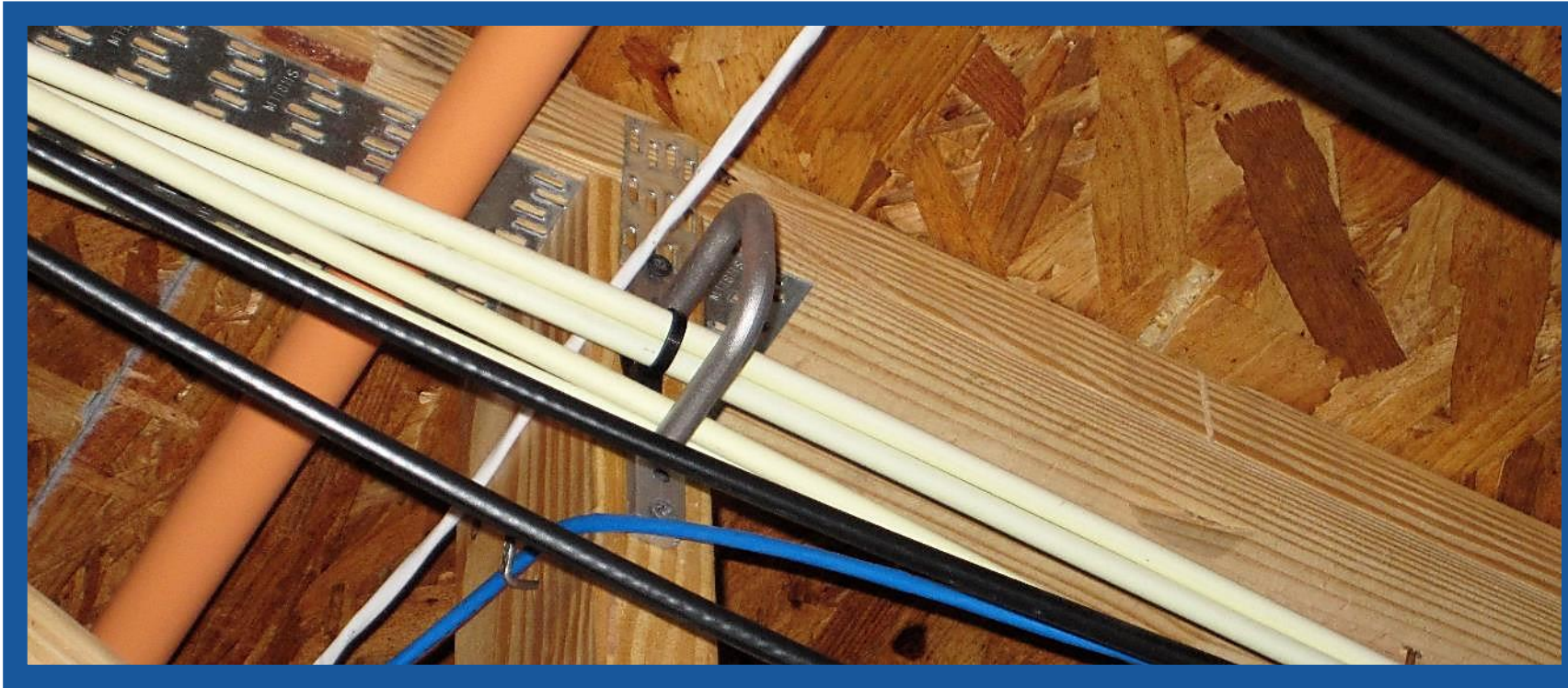Reduced Material Costs → Lower Construction Costs → Capacity for Future Upgrades

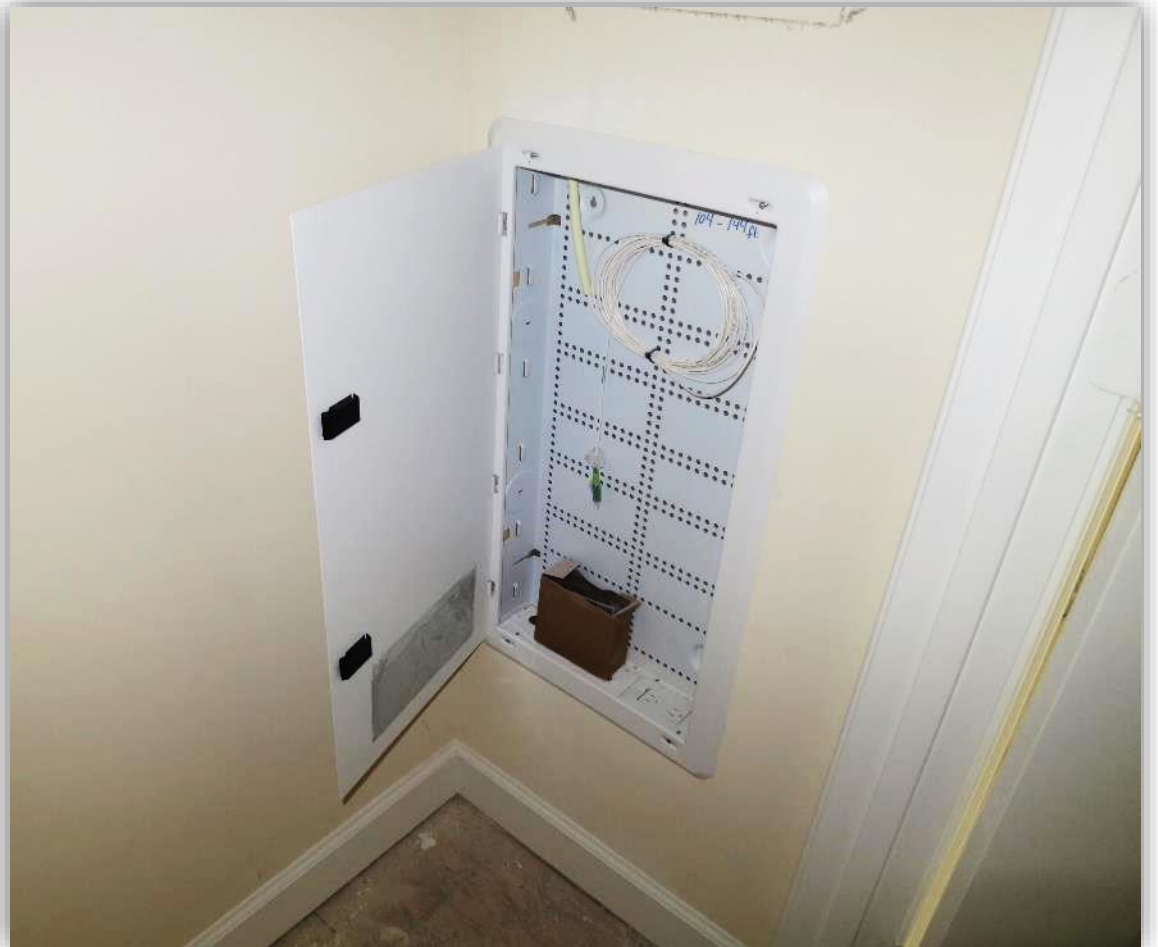Reduced Material Costs → Lower Construction Costs → Capacity for Future Upgrades

1. When securing MicroDuct in straight runs, space supports about 16" to 24" apart.
2. Cable strap clamps work well on single runs and to stabilize bundles.
3. On large multiple runs, cable straps or "D" ring guides can be used (below).

Reduced Material Costs

Lower Construction Costs

Capacity for Future Upgrades

Reduced Material Costs → Lower Construction Costs → Capacity for Future Upgrades

Lined staples may be used with care taken not to damage MicroDucts.

Reduced Material Costs

Lower Construction Costs

Capacity for Future Upgrades

Reduced Material Costs

Lower Construction Costs

Capacity for Future Upgrades

Who Uses MicroDucts ?

- Service Providers
- Developers / Building Owners

North American Consumers To Have 13 Connected Devices

by **Chuck Martin** , Staff Writer, June 11, 2017

The number of Internet connected devices that people have is going up, especially in North America.

There will be four networked devices and connections per person globally by 2021, according to the latest annual visual networking index forecast by Cisco.

However, in North America, there will be 13 networked devices and connections per person, up from eight last year.

The means that beyond smartphones and connected TVs, North American consumers will be adopting many more connected gadgets.

North America is well above the average by region when it comes to getting connected. For example, here are the projected number of networked devices and connection per person by region by 2021:

- 13 – North America
- 9 – Western Europe
- 4 – Central and Eastern Europe
- 3 – Latin America
- 3 – Asia Pacific
- 1 – Middle East and Africa

The only solution for ever increasing bandwidth demands - Fiber Optics
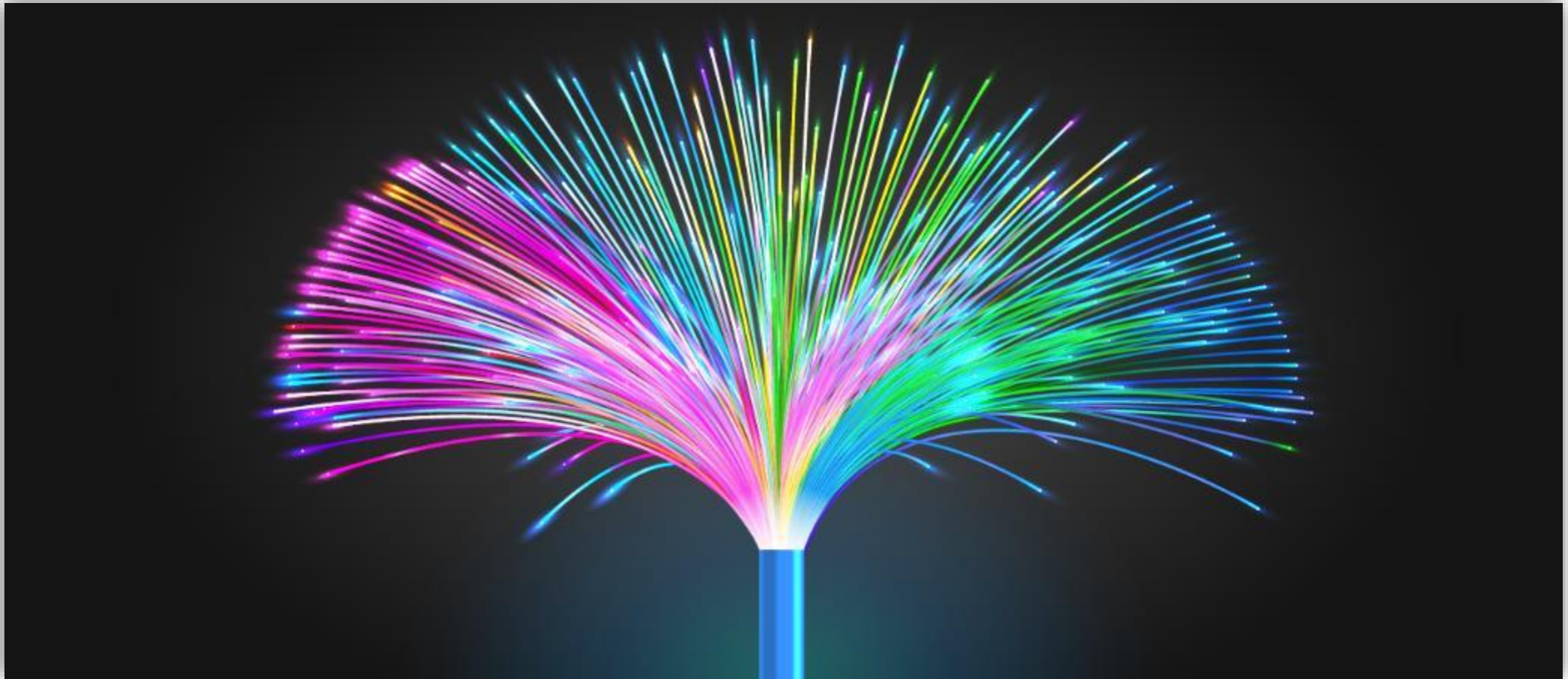
How are the MDU Fttx Builders keeping pace?

Adapting new approaches

◦ Reducing deployment costs

◦ Reducing operating costs

◦ Increasing service revenues

Why Use MicroDucts ?

Best Long-Term Solution

○ Lowest Cost of Ownership

○ Easy Repair / Maintenance

○ Permanent pathway /Access to Tenant

1. "It is quick and easy to install. Our people are able to keep up with the very large build-outs year after year. We install in areas out of sight of the tenants in the attic or crawl space/basement. We then feed through commonly stacked coat closet. This minimizes amount of time and disturbance to tenants. And keeps it out of sight. "

2. "There is less chance of damaging the fiber during installation due to the protective MicroDuct in place. There is less chance of crushing in a crawl space."

3. "If we have damage, it is easy to fix and repair the duct, and pull in a new section of fiber cordage. We use MicroDuct rodders for that occasionally. We have had rodents chew on the MicroDuct and damage the fiber, but were able to perform quick repairs with just a short section of MicroDuct and two couplers."

4. "If we were to use a product that installed like cat 5 or drop, there is no way to pinpoint a damage should it occur. Yes we can shoot the fiber with an OTDR, which would tell us that there is a break 45 feet away, but by that time, no one recalls how the fiber was run, or between which support studs!"

5. "MDU repairs always require you to disturb every tenant to re-wire the building or disturb multiple tenants to replace or upgrade a fiber. Building a pathway from the terminal to each living unit for a fiber to quickly and easily be pulled through virtually eliminates ever having to disturb any tenant than the one whose service is being worked on. "

6. "If our company decides to upgrade or change the fiber design, having a pathway is the only way to perform that efficiently. Fiber is the only thing that will sustain future bandwidth requirements for our customers. Fiber in MicroDuct creates a Pathway which provides the best long term solution for low-cost maintenance and repair."

7. "We use less expensive contractor to place MicroDuct so higher wage Technician can quickly do their portion of connecting the customer's service."

8. "You can defer cost of the fiber until customer takes service."

Why Use MicroDucts (Developer)

Now Building Owners are deploying their *own* microducts.

- They install all the microducts themselves and negotiate with service provider access to tenant.

- They add an "extra" micro duct for themselves that can be used for 3 main reasons:

  ◦ Future unknown use, building life of 50-100 years.
  ◦ Sell access to extra micro Duct to "new" service provider in the market e.g. AT&T, Verizon, Google, etc.
  ◦ Partner with an Internet Service Provider to offer broadband directly to tenants
    ◦ Being done with Irvine Companies & Google
    ◦ Gives better control over their tenant broadband customer experience
    ◦ Creates revenue stream for owner

Why Use MicroDucts (Developer)

- Taking Ownership of Building Infrastructure

  - Owning everything in the wall / Limiting Risk (Fire Stop)

- Bigger Piece of the Pie $$

  - More Leverage and Revenue Sharing Options

  - Why let the ISP get the $$ for perpetuity?

- Broadband is major factor in Tenant happiness

  - Taking Control of Tenant Experience

- Over-the-Top Service more common (subscription model)

  - Future (Broadband Only)

Questions to Ask ?

❏ What am I going to do when a new Service provider wants in my building?

    Lease them an empty duct or tell them 'Sorry'?

    Example: Verizon doing 5G now in Seattle (new provider) Currently mostly CenturyLink, Comcast & Wave. What about AT&T or someone else new?

❏ What is access to my Tenant worth?

❏ How much could a 'fiber ready' property realize higher rent?

What do MicroDucts cost?

This is the lowest cost way to *futureproof a* building.

Pull String
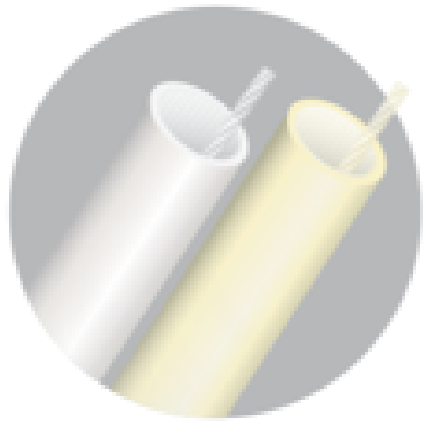
Pre-installed Fiber

8.5/6mm RISER w/string $.20/ft

8.5/6mm RISER w/fiber $.30/ft

125' average distance $.20 = $25/per unit

125' average distance x $.30 = $37.50/per unit

Why do we need a reusable pathway?

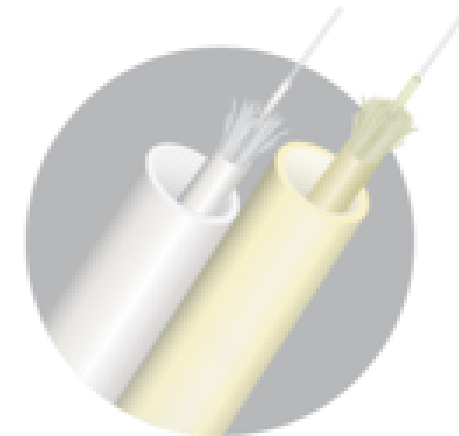✓ Simplify repairs

✓ Conduit protects the fiber and because the fiber is in the conduit, you install one pathway and then connectorize your fiber. Simple and efficient.

✓ One step placement saves labor.

✓ Future upgrades can be achieved by attaching a newer fiber cable to the old one. You pull out the old cable and pull in the new. Almost zero disturbance to the occupant.

✓ This pathway is then available for the life of the building. This is a major selling feature for building owners.

Additional Resources
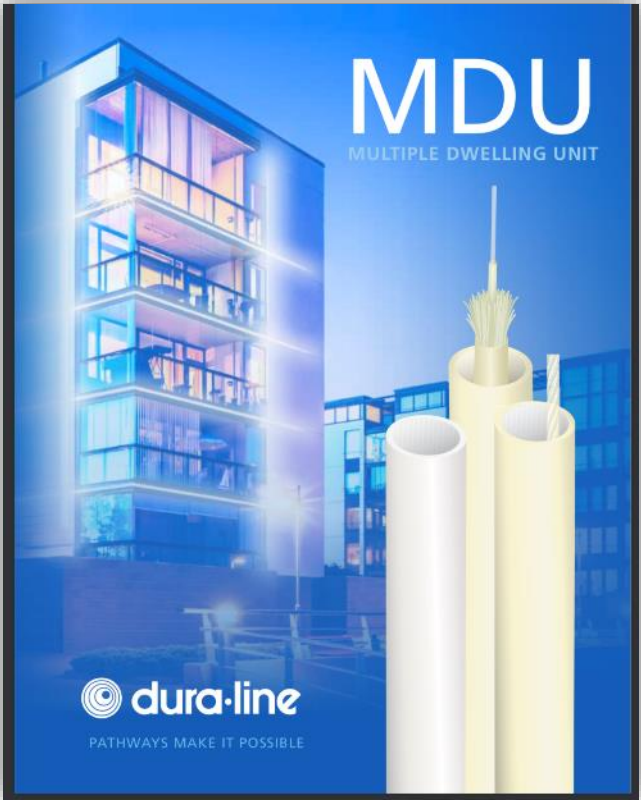
Four Page Brochure Available
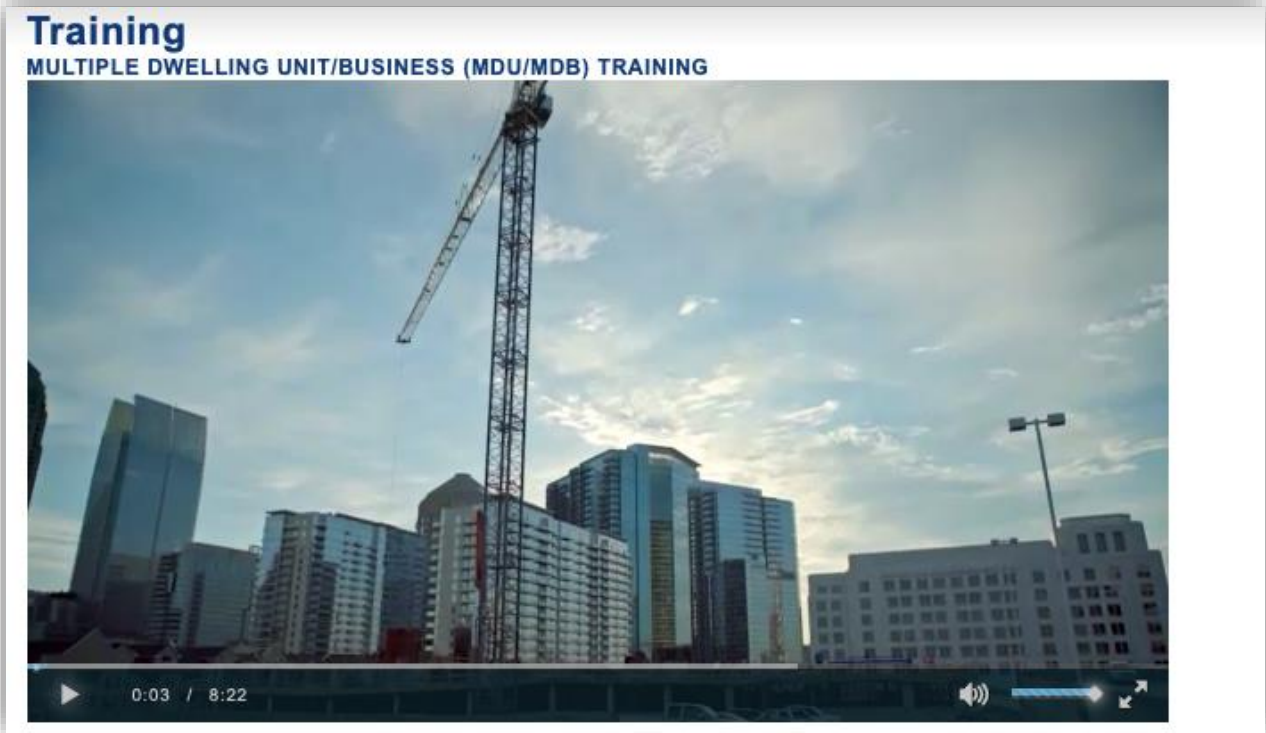
8 Minute Introduction and Training Video

www.duraline.com/training

Division 27 Specification

a. The MPOE shall be a dust-free environment, and the floors sealed. The room should have a nominal temperature range of 55 to 85 degrees Fahrenheit with an operating relative humidity range should be between 5 and 55 percent.

b. Provide Terminal boards (3/4"x4'Wx8'H) for each service in the Demarcation (MPOE) room.

c. Provide (1) dedicated 120V-20A duplex receptacles for each carrier where their main head-end entry equipment is located.

d. Confirm all MPOE requirements and device mounting heights with the service providers prior to installation. See drawings for anticipated layouts.

2. On-floor telecom distribution rooms
   a. Provide terminal board divided into sections for each service.
   b. Confirm all IDF requirements and coordinate terminal board physical space with all service providers prior to installation including power requirements.

D. General Requirements:
1. Electrical Contractor to provide sleeves and raceway for all riser cabling as required and provide EMT or in-slab ENT or PVC in horizontal garage ceilings.
2. Telecom subcontractor to provide firestop per Code.

E. Riser Cabling Pathway:
1. Riser penetrations to be provide by electrical contractor. Penetrations will include (1) 4" sleeves for Century Link, (1) 4" sleeves for Comcast, (1) 4" sleeve for Cascade Link, and (1) 4" sleeve for DirecTV. Provide capped weatherheads as shown on telecom riser. Confirm all final sleeve quantities with service provider, owner requirements, and final cabling quantities.

F. Riser Cabling:
1. All riser cabling to be provided and installed by carriers. Coordinate installation schedule with carriers so as not to delay construction schedule and no later than 60 days after award of contract.

G. Backbone Cabling (On-floor telecom distribution rooms to Residential Unit ADF):
1. Telecom subcontractor to provide and install (1) RG-6 cable to smart box located in entry closet of each unit from the appropriate telecom room. For units over 150 feet from the telecom closets, provide RG-11 cabling.
2. Contractor to provide and install (1) Category 5e cable with terminated end on smart box side to the smart box located in entry closet of each unit from the appropriate telecom room for use of an additional data service provider.
3. Contractor to provide and install (1) Duraline Futurepath 2-way microduct with (2)8.5mm chambers to smart box located in entry closet of each unit from the appropriate telecom room.
4. Contractor to install (1)12.7mm Duraline microduct provided by Comcast.

H. Apartment Distribution Frame (ADF) – "Smart Box":
1. Smart Box: Electrical contractor to provide a Leviton 42" plastic enclosure with louvered cover or equivalent enclosure capable of containing telephone, data, CATV termination, and distribution components.
2. Locate the Smart Box as shown on drawings. Locate within a stud space on an interior wall and avoid exterior or shared walls. Selected location to have sufficient space for tenant access.
3. The enclosure to include an internal electrical outlet that is on an AFCI protected breaker and a dedicated circuit.
4. Provide Suttle SAM-D8 8-port CAT5e 8-port Voice/Data Patch Module. Note: Coax splitter provided and installed by others. Slots shall be designated as follows: Slot 1: Data; Slot 2: Phone; Slots 3: Living room; Slot 4: Bedroom; Slots 5 through 8: Other space ports.
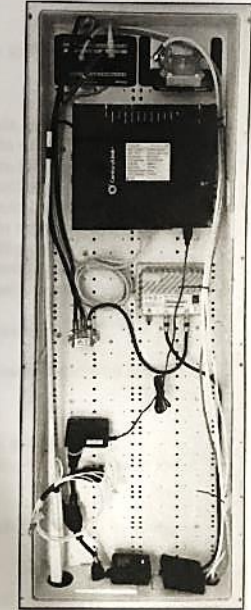
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B4B-Building For Broadband Initiative

Building Community Awareness
- Early Telecommunication Planning
- Benefits of Infrastructure Investments

Planning problems magnified by trying to design for something that's hard to predict

Tips

Website

Webinars

www.seattle.gov/tech/initiatives/broadband/build-for-broadband

Thanks for Participating!

www.seattle.gov/tech/initiatives/broadband/build-for-broadband

Alice Lawson, Broadband & Cable Program Manager, alice.lawson@seattle.gov

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