



Creating Infinite
Possibilities.

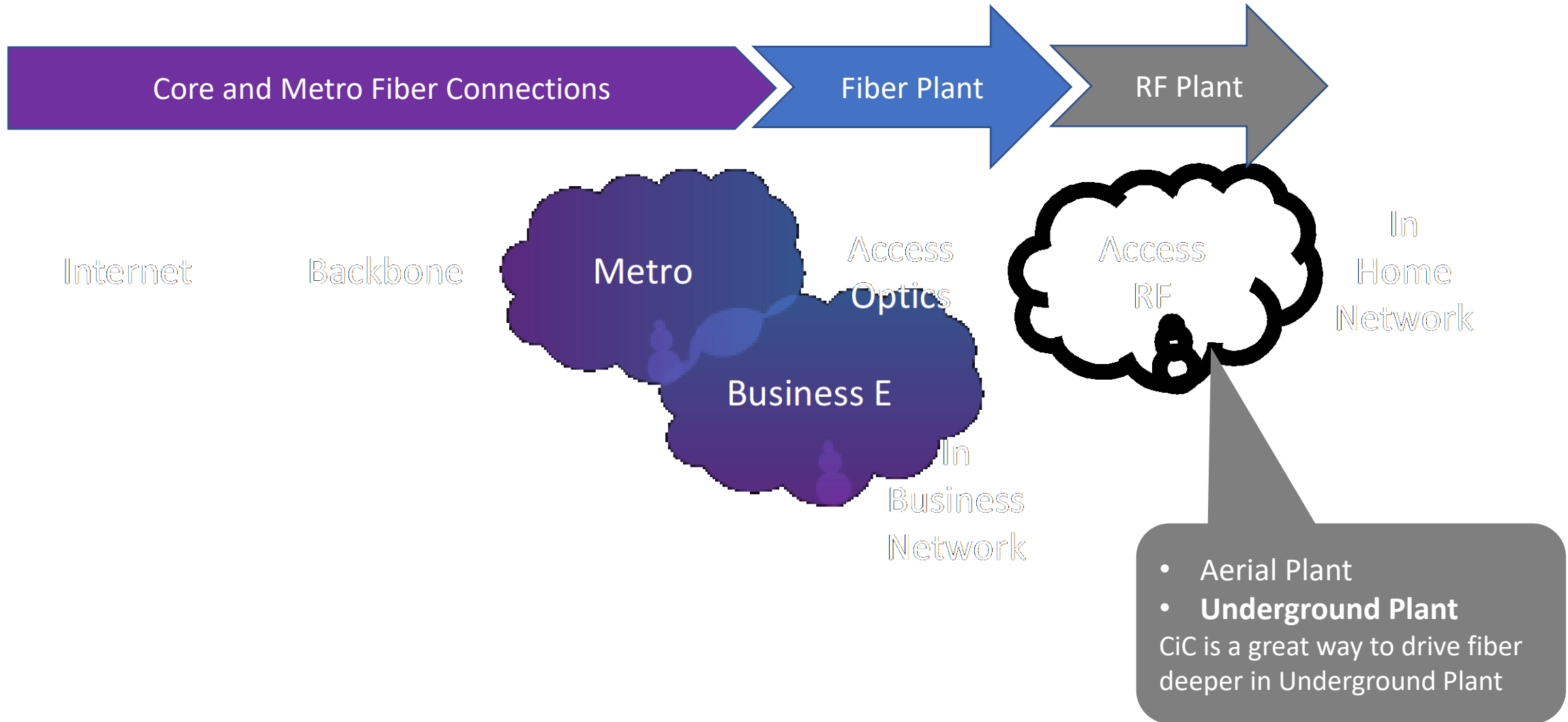
Comcast Underground: Innovative Fiber Deployments Over Existing Underground Critical Infrastructure

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Fellow

Comcast

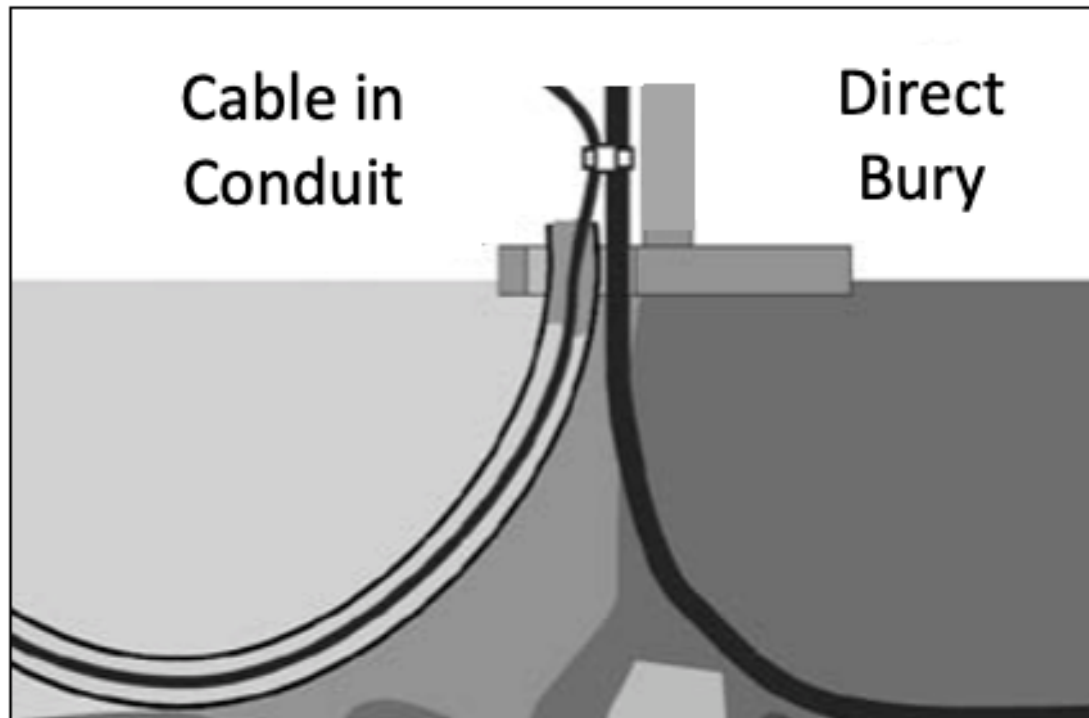
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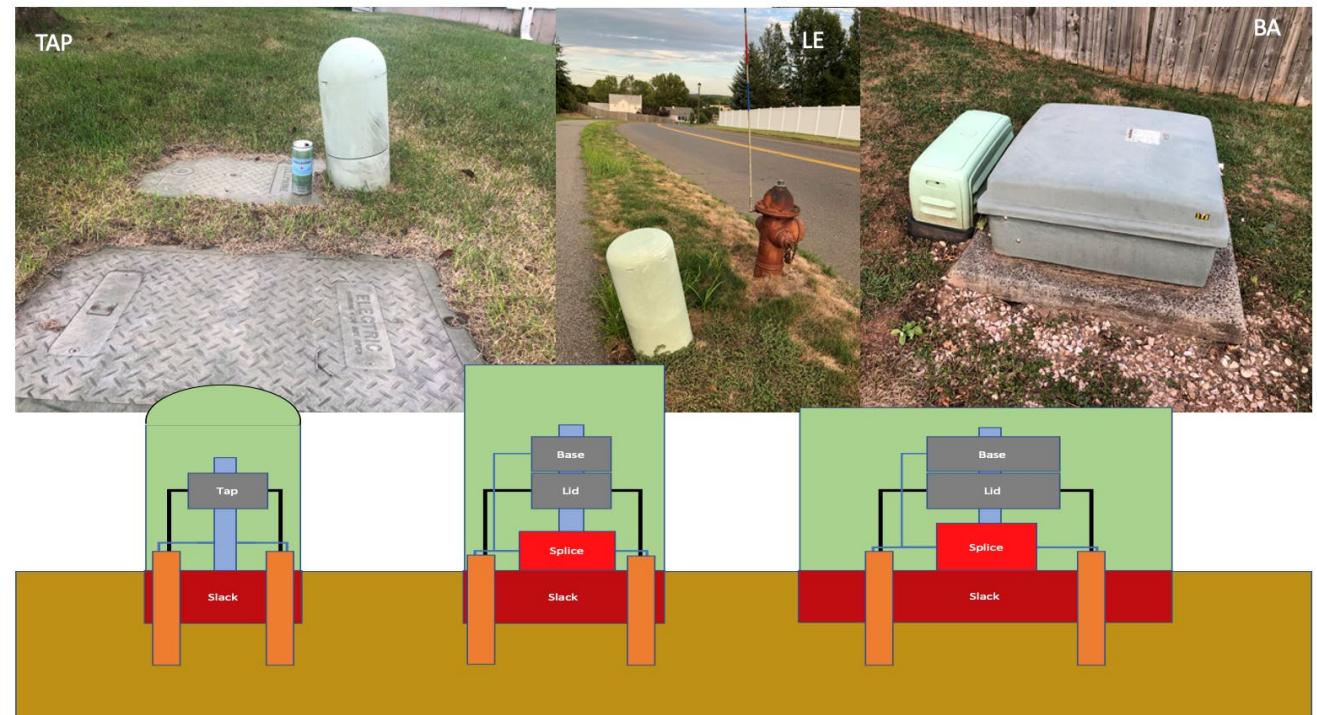
Introduction

- What is CiC?
- How Pervasive is CiC?
- Important Parameters in CiC
- Proof of Concept of CiC
- Comcast Trial of CiC
- Conclusions

Cable in Conduit



Multiple Surface Pedestals



Cable in Conduit

Plant that is

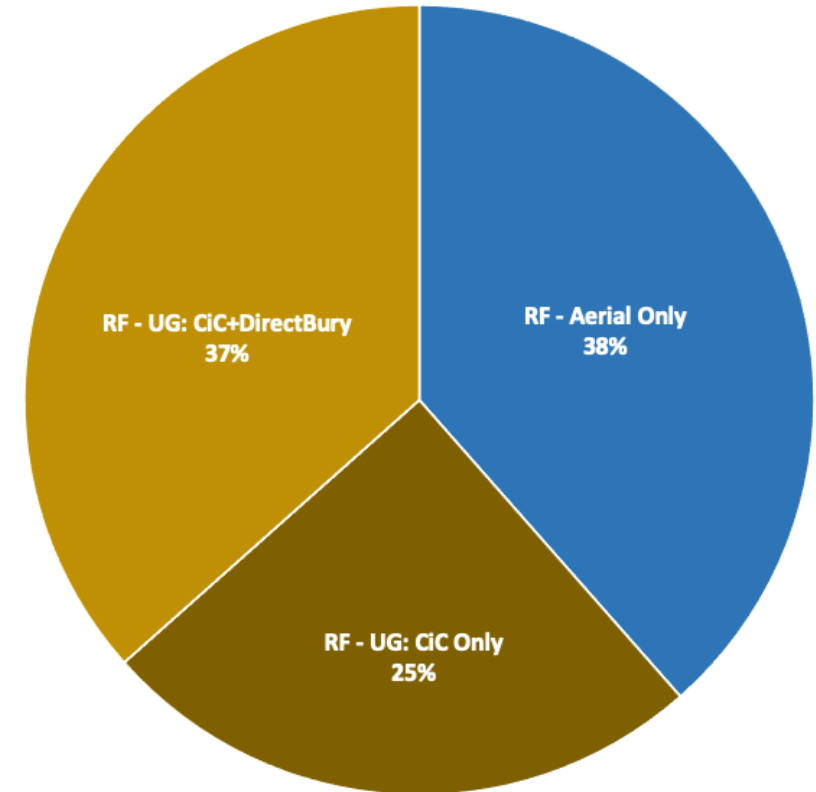
- Denver and West of the Continental Divide
- If built after ~1995
- High Percentage of plant is Conduit built
- Might be applicable in some dense Eastern areas

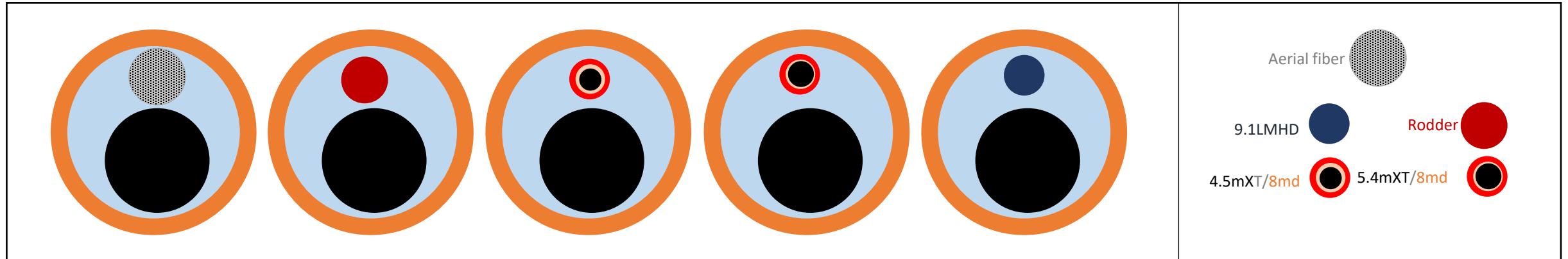
Typically, 0.625in Coax in 1-1/4 Conduit

- Conduit Inner Diameter ~1.4in
- Coax Outer Diameter ~0.85in
- Ability in pushing/pulling 12-48 count fiber
- Go around Taps typically every 125-250ft

Similar to Use of Fiber Tails just like in current MDU builds

West Division





Construction Description	ID Conduit/ Duct (in)	OD 0.625 in RF Cable (in)	OD micro-fiber / micro-duct (in)	LFR micro-fiber / micro-duct	AFR micro-fiber / micro-duct	Pull Strength micro-fiber / micro-duct (lbs)	Crush Strength micro-fiber / micro-duct (lbs/in)	Bend Radius micro-fiber / micro-duct (in)	Weight micro-fiber / micro-duct (lbs/kft)
CiC Basic with just RF Cable	1.4	0.85		61%	37%				
+ 11.7mm 48ct armored fiber (for comparison only)	1.4	0.85	0.46	94%	48%	600	125	4.6	80
+ Rodder (for initial install support only)	1.4	0.85	0.38	88%	44%				
+ 8.5mm/6.0mm micro-duct	1.4	0.85	0.33	84%	42%	100	125	3.3	18
+ mXT 4.5mm 72ct micro-fiber in micro-duct						200	30	3.3	30
+ mXT 5.4mm 72ct micro-fiber in micro-duct						200	30	3.3	35
+ LMHD 9.1mm 72ct micro-fiber Only	1.4	0.85	0.36	86%	43%	600	125	5.0	44

Surface Rodder, cable sock to fiber/duct, pull fiber/duct back, slack and repeat



Rodding thru the Coax + Conduit

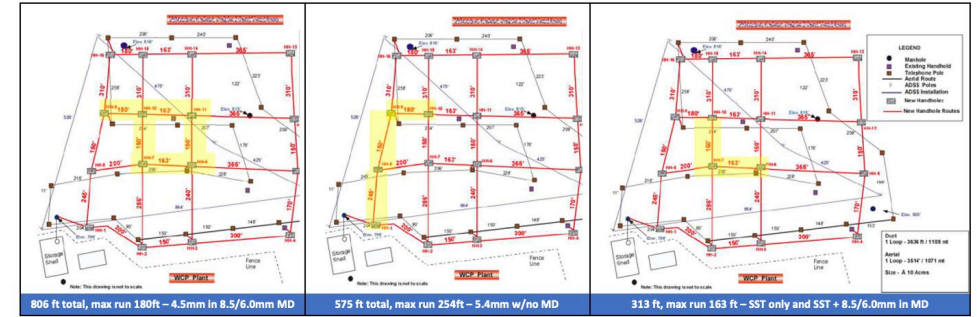


Attach the micro duct

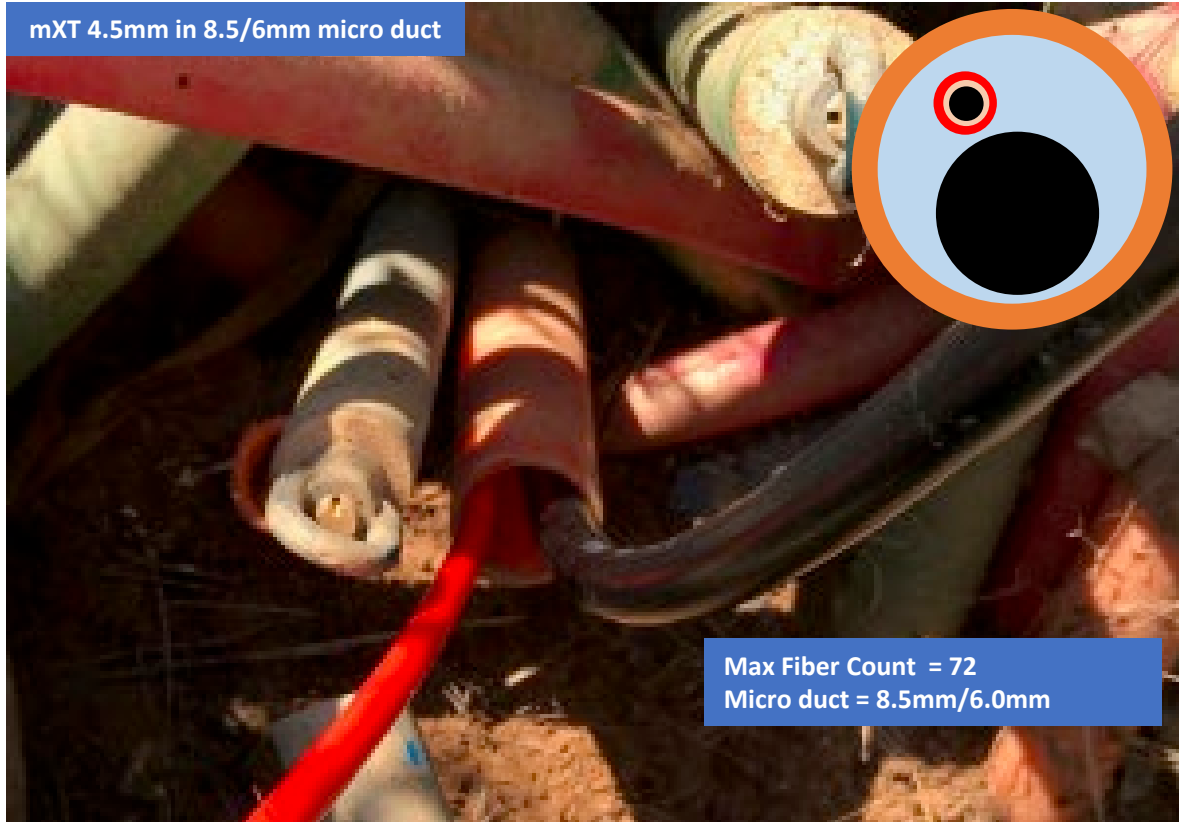


Push Fiber thru the 806 ft Plumettaz/U E101

10 sections – 130-245ft, Total of 1694 ft
Time Estimates - 2000-2250ft/day
for a 4-Crew team

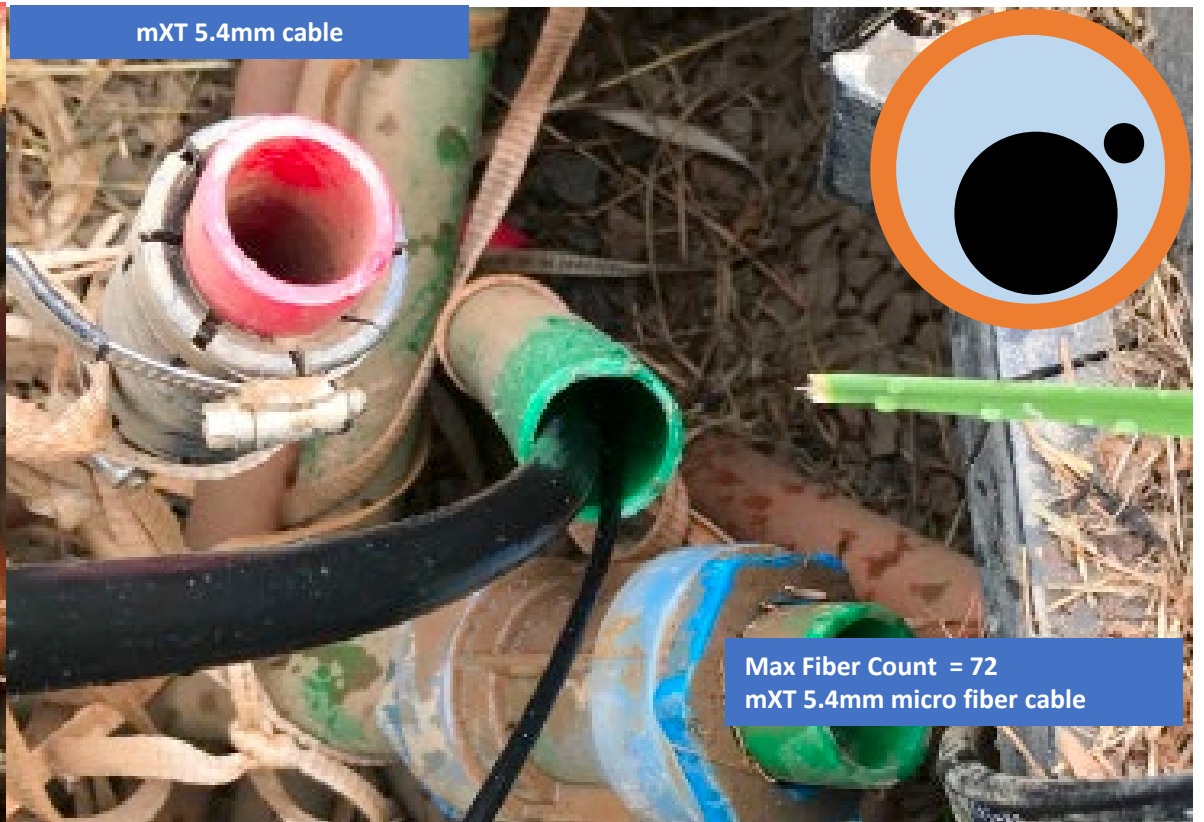


mXT 4.5mm in 8.5/6mm micro duct

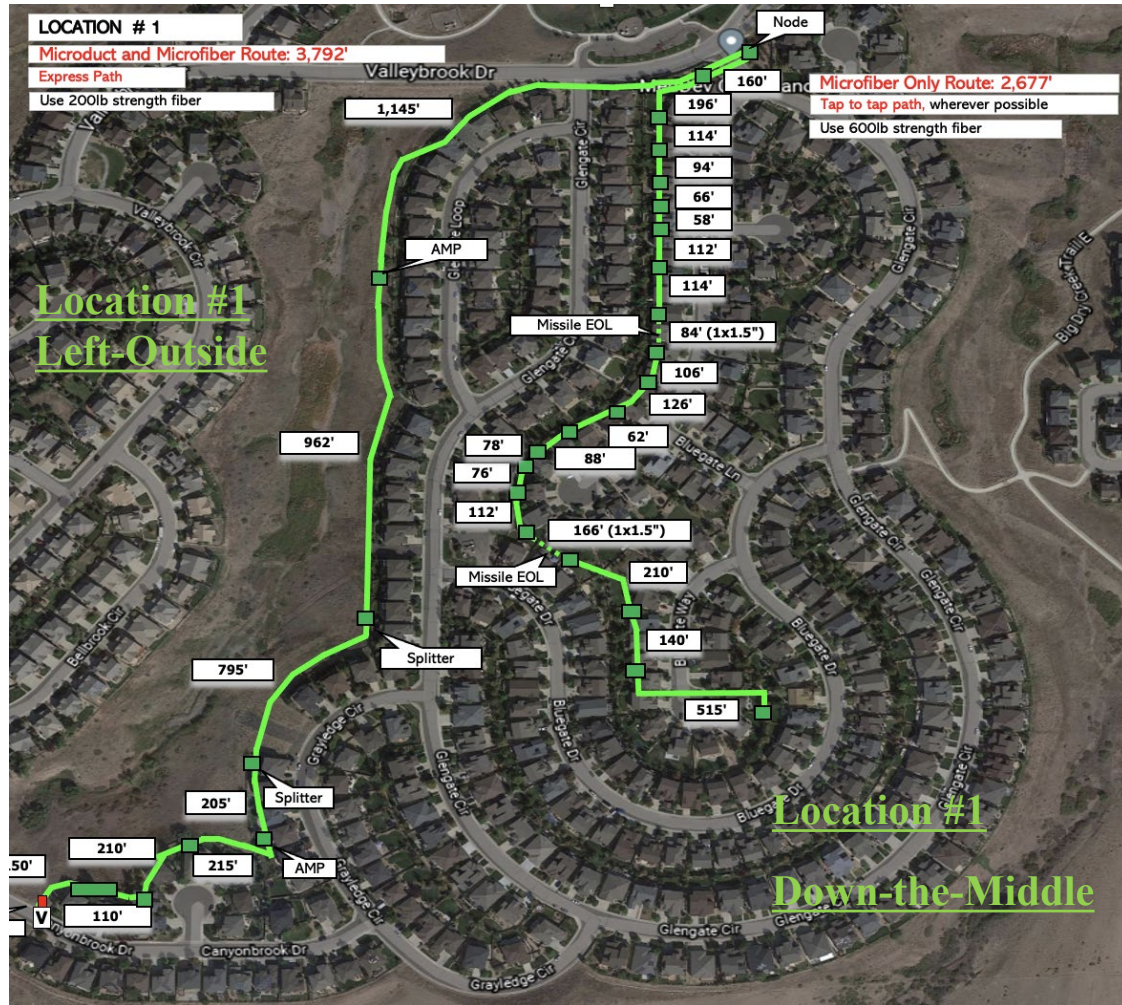


Max Fiber Count = 72
Micro duct = 8.5mm/6.0mm

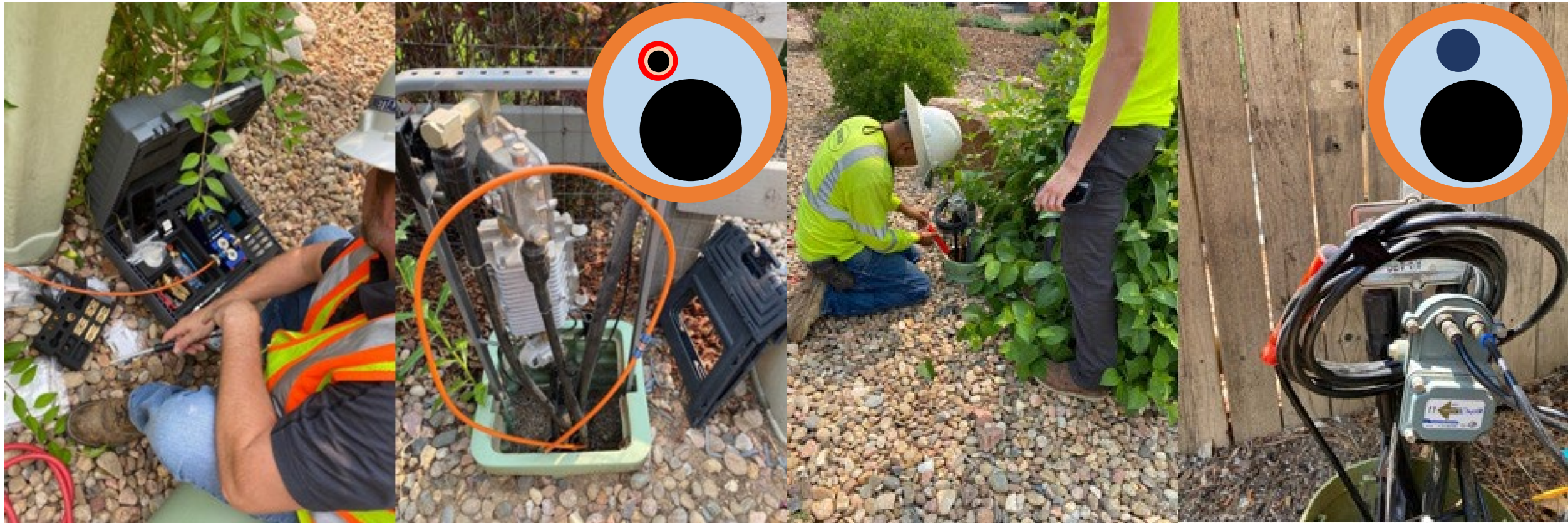
mXT 5.4mm cable



Max Fiber Count = 72
mXT 5.4mm micro fiber cable



Micro-Fiber/Micro-Duct AND High Strength Micro-Fiber construction trialed Valuable field experience confirms construction time and cost estimates



Conclusions

- CiC is a valuable tool in the toolbox. Skillful use of this technique along with innovative optical systems ...
 - Helps drive fiber deeper into the network
 - Allows Fiber to the Curb deployments
 - Provides an efficient path for multiple types of fiber deployments, including fiber-to-the-premises, in areas where that makes sense



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Thank You!

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