Connecting Networks: Urban to Rural

Broadband India Summit 2024

New Delhi, October 2024

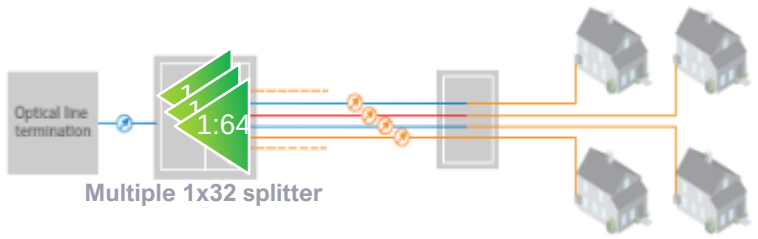
Saket Saraogi

COMMSCOPE®

Network Topology Choices

All modelling analysis based on aerial installation utilizing 'Non-Hardened Connectivity'

Centralized

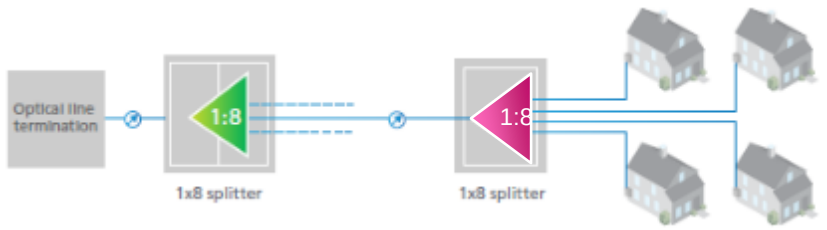


Single Level Splits, Co-located At The Same Location

Distributed

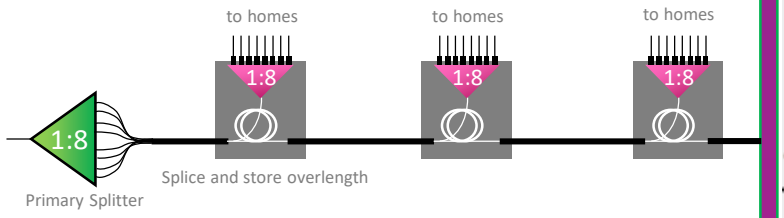
Single Level Split Distributed Throughout The Network

Cascaded - Star



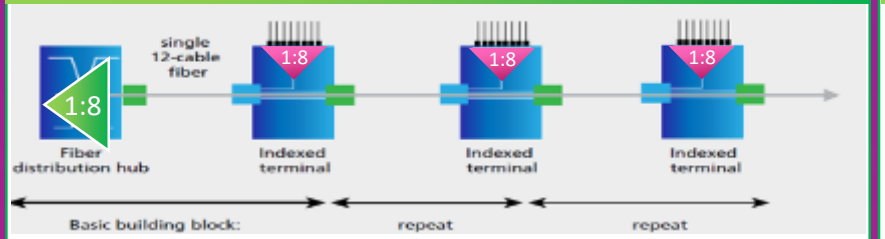
Multi-level Splitters Cascaded Within The Network

Cascaded - Daisy Chain



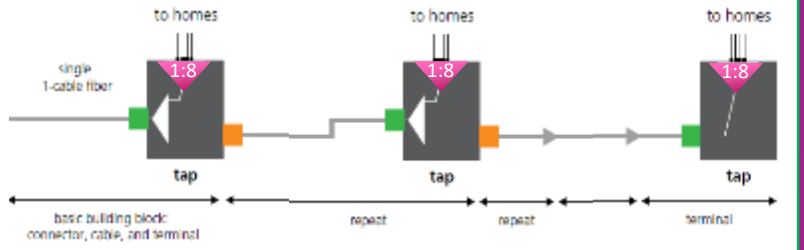
Cable Accessed At Each Terminal Location And Spliced To Splitter

Cascaded - Indexing



FLX™ ODN Solution

Cascaded - TAP



Singe Fiber Network Diverting Part Of The Signal To The Splitter

Centralized Architecture

Single Level Splits, Co-located At The Same Location

Pros	Cons
Centralized fiber configuration location	High Fiber count cables
Maximum Network flexibility	Increased splice quantity
Consolidated splice locations	Increased permitting requirements
	Increased civils requirements

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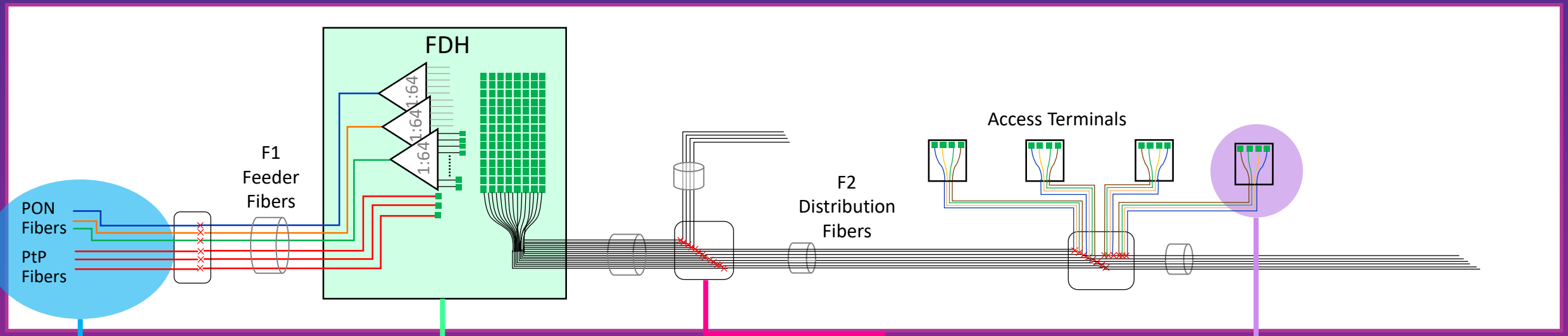
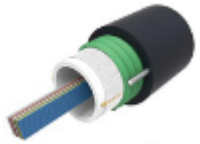
Centralized Architecture



Cable Options

SLT (Stranded Loose Tube)



Central Tube Ribbon

Rollable Ribbon

Primary Splitter

FDH Cabinet

Hub in Ped

FDH 4000

1x64 Splitter – PnP

Splice Closure

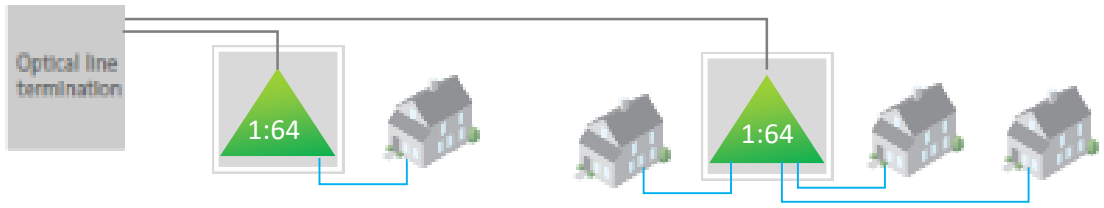
FOSC 400

Raymech

Terminal Options (Non-Hardened)

FAT / Mini-FAT / OTB / FDC

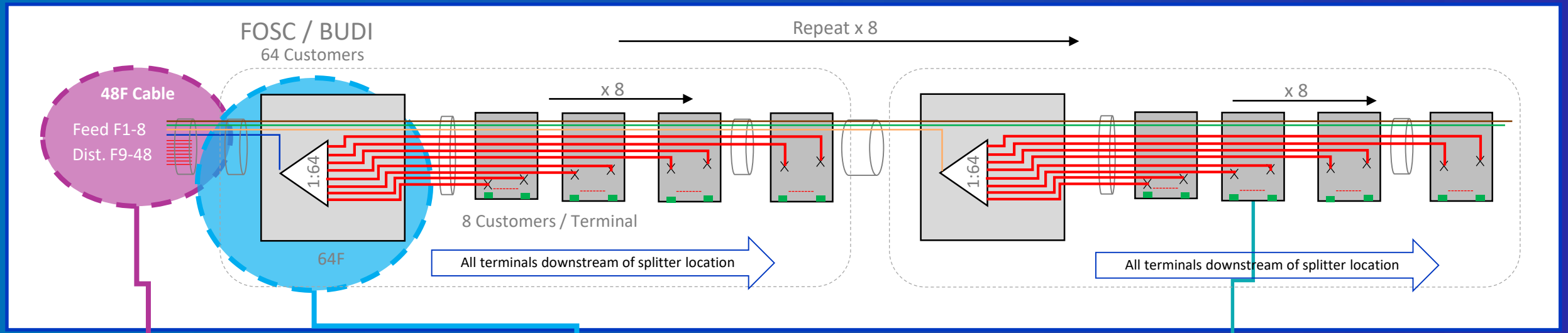
Distributed Architecture



Single Level Split Distributed Throughout The Network

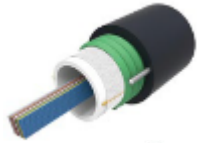
Pros	Cons
Centralized fiber configuration location	Multiple Splice locations
Good Network flexibility	Mid-sheath access at each terminal & splitter location
Reduced Fiber count solution, reuse of fibers	
Compatible with legacy OSS/BSS Systems	
Small number of SKUs repeated	

Distributed Architecture



Cable Options

SLT (Stranded Loose Tube)



Central Tube Ribbon

Rollable Ribbon

Primary Splitter

BUDI-S

FOSC-450B

1x64 Splitter – PnP

1x32 Splitter – Field Installable

Terminal Options (Non-Hardened)

FAT / FDC / Mini-FAT / OTB

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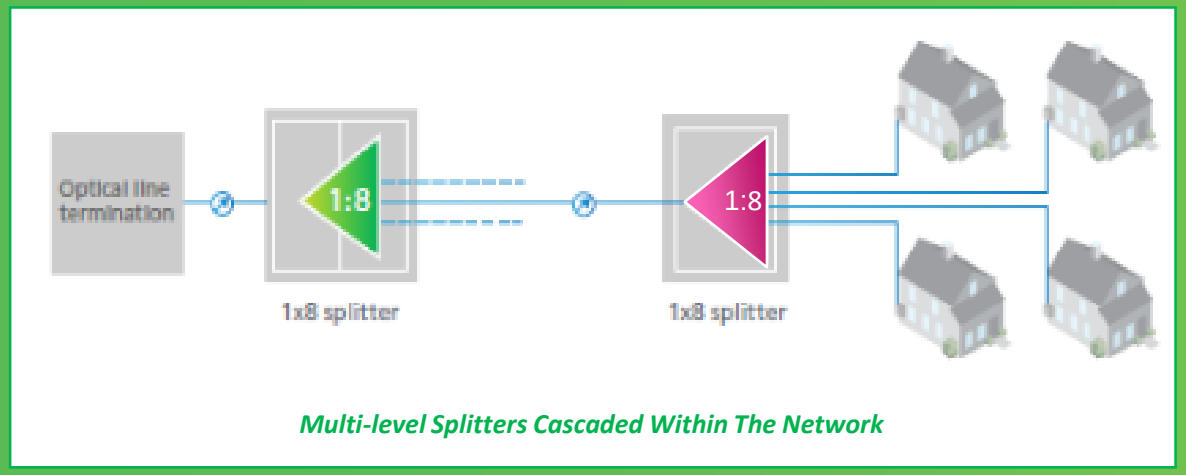
Cascaded Star Architecture



Multi-level Splitters Cascaded Within The Network

Pros	Cons
Reduced Fiber Counts – Reduced Splicing	Higher Splicing Locations
Smaller Cable Diameters	
Reduced Permitting Requirements (no cabinet)	

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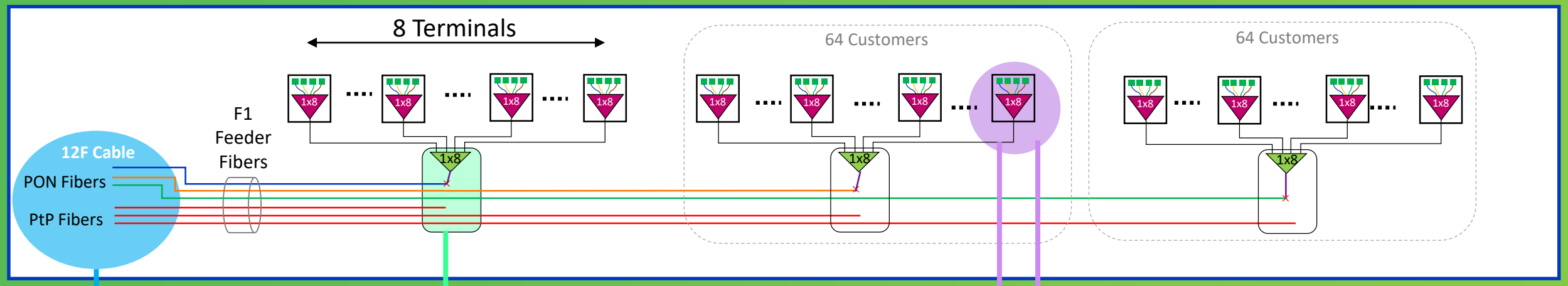
Cascaded Star Architecture



Cable Options

SLT (Stranded Loose Tube)

12F Flat Drop

HeliARC

Primary Splitter

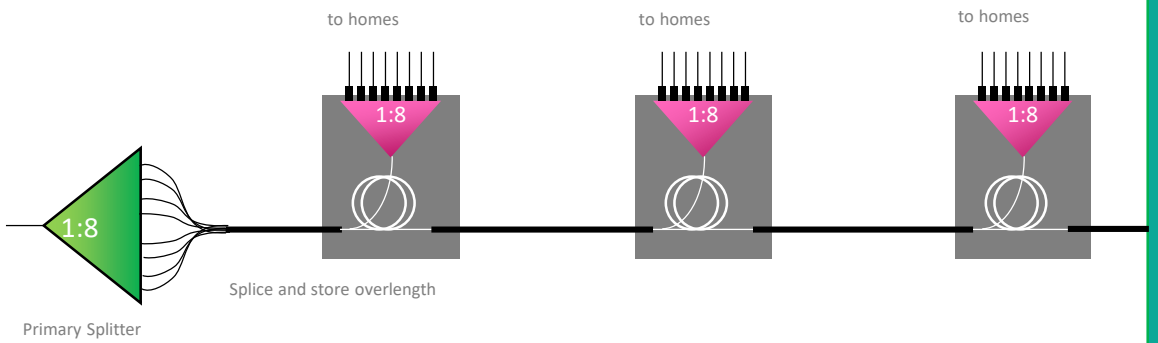
FOJC

FDC

Terminal Options (Non-Hardened)

FAT / Mini-FAT / OTB

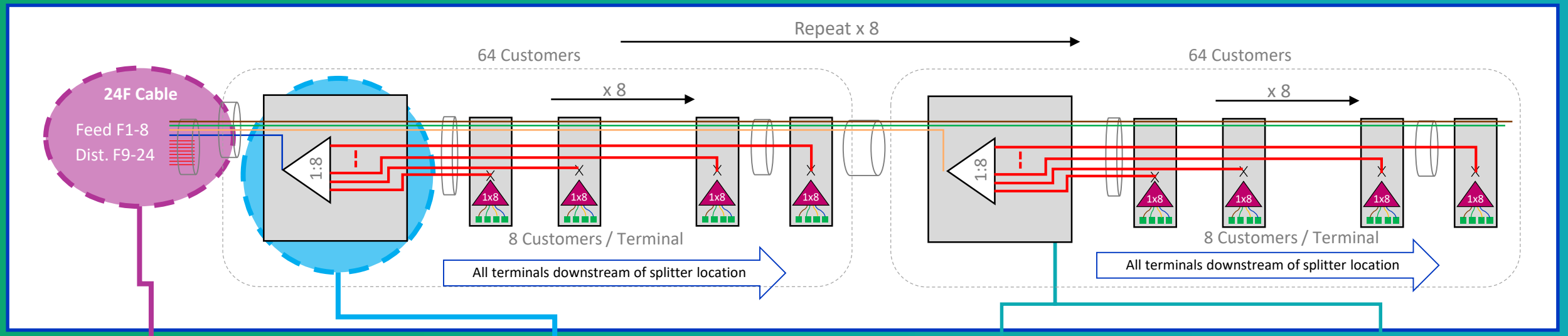
Cascaded – Daisy Chain Architecture



Cable Accessed At Each Terminal Location And Spliced To Splitter

Pros	Cons
Reduced Fiber Counts – Reduced Splicing	Increased number of splicing locations
Smaller Cable Diameters	Mid-span cable prep at terminal locations
Re-use of distribution fibers within cable	
No-overhauling of cables	
Simple Point-to-Point inclusion	
Minimal pre-engineering efforts, enables deferred terminal placement	

Cascaded – Daisy Chain Architecture



Cable Options

12F / 24F Flat Drop

HeliARC

24F SLT

Primary Splitter

FOJC

FDC

Terminal Options (Non-Hardened)

FAT / Mini-FAT / OTB

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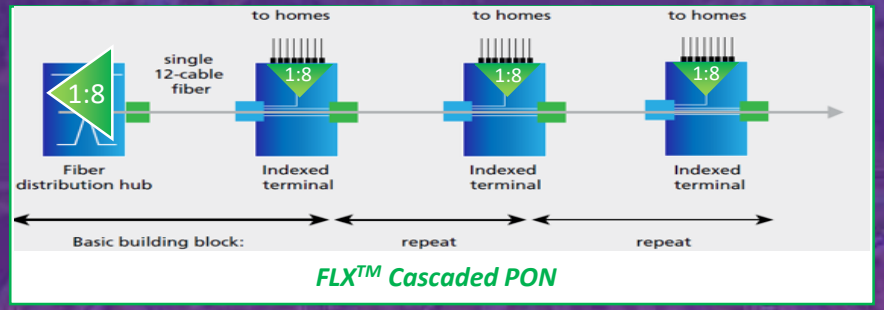
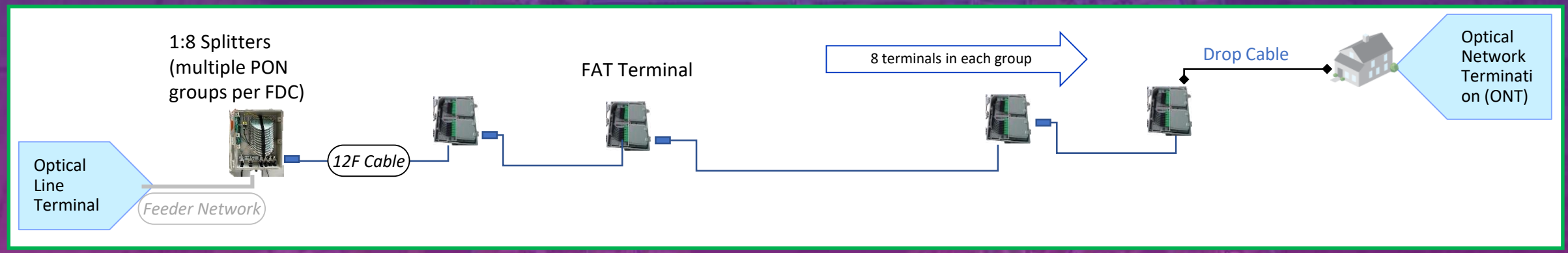
Indexing Architecture Video

FLX™ ODN Cascaded Indexing



FLX™ Cascaded PON



Pros

Smaller cable diameters

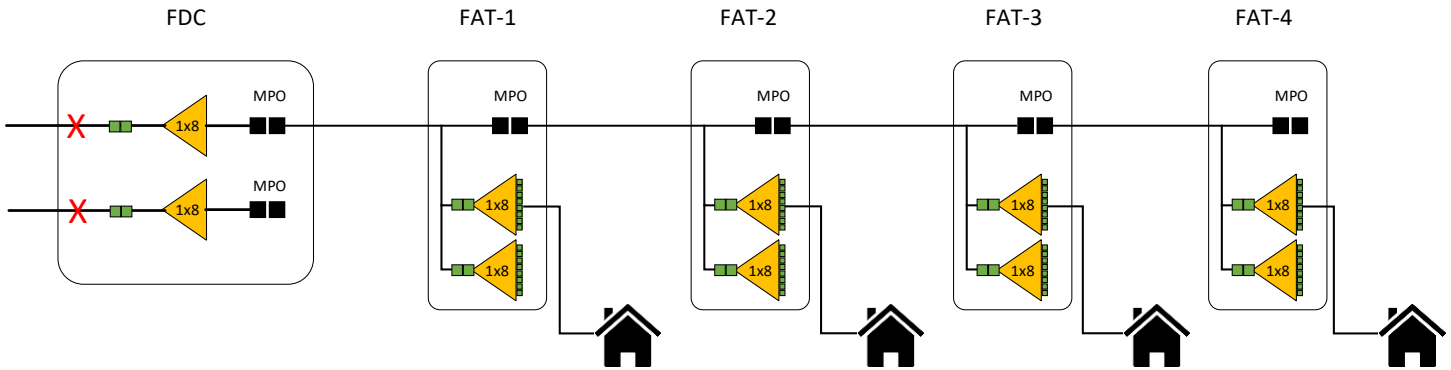
Faster speed of deployment

Low installation skills required

Significantly reduced splicing needs

***Flexible ODN allows Feeder and Distribution on same cable**

FDC



FAT

For fiber serving area of **2048** homes*

	Splice	Connectorised
Total splices:	~~608~~	32 [**95%** reduction]
No splice locations:	~~144~~	16 [**89%** reduction]

Benefits:

- Speed of deployment – VERY FAST with **connectorised plug and play** for fast turn up
- **Low labour skills** – splicing only on input fiber (day 1 activity only)
- **Quality & performance** – factory terminated cable assemblies

* Requires 16 FDC and 128 FAT

FLX™ ODN

Two key products: FDT & FAT

A single FAT type – **simple**

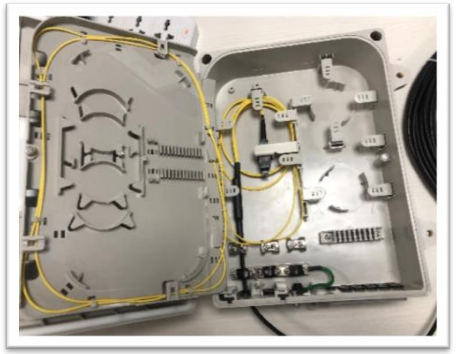
Different cable lengths – **optimised products**

Add-on modules for FATs – **flexible design**

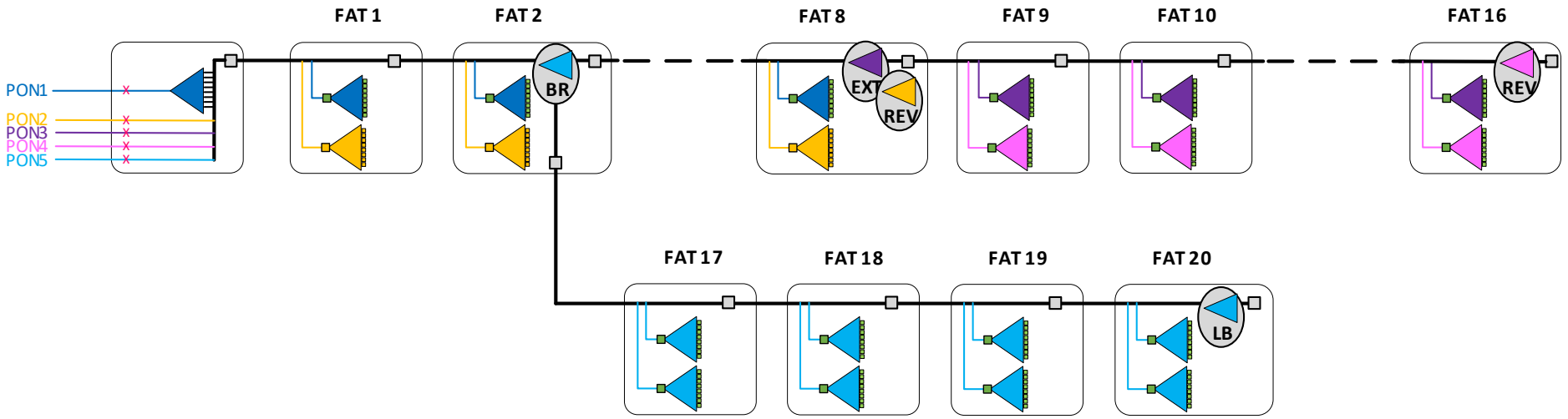
S1 splitters in FAT add-on modules – **efficient design**

A single cable between FATs – **less fibre**

Indexed FDT



Indexed FAT



CommScope FLX™ ODN
Forward
Reverse
Branching
Loopback

FLX™ ODN

CommScope FLX™ ODN Case Study in India

Based on the analysis, CommScope FLX™ ODN Solution **can be constructed 43% quicker** as compared to the traditional splice solution. With this time savings the sites can be quicker to market and help Airtel accelerate Return on Investment (ROI)

For example, a 25M Homes passed **ODN construction program taking an average of 3 yrs to build, which can be reduced to 1.7** yrs using CommScope FLX ODN solution

Intangible Benefits

- XGS PON Ready –Ready For future
- Reverse Port giving Additional capacity
- Faster Commissioning & less field splicing issues
- Design Efficiencies
- Less Project Management Effort
- Less Skill Labour required
- **Accelerate Return on Investment (ROI)**
- **Time to Market**

30% cost Investment In Materials

Cost

3% Overall Saving on Deployment Cost

43% Saving on Construction duration

Benefits

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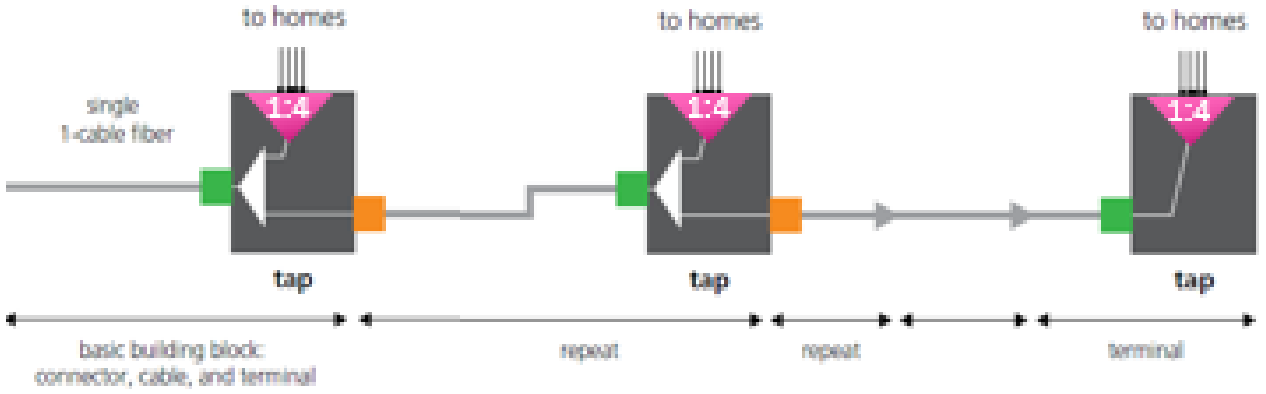
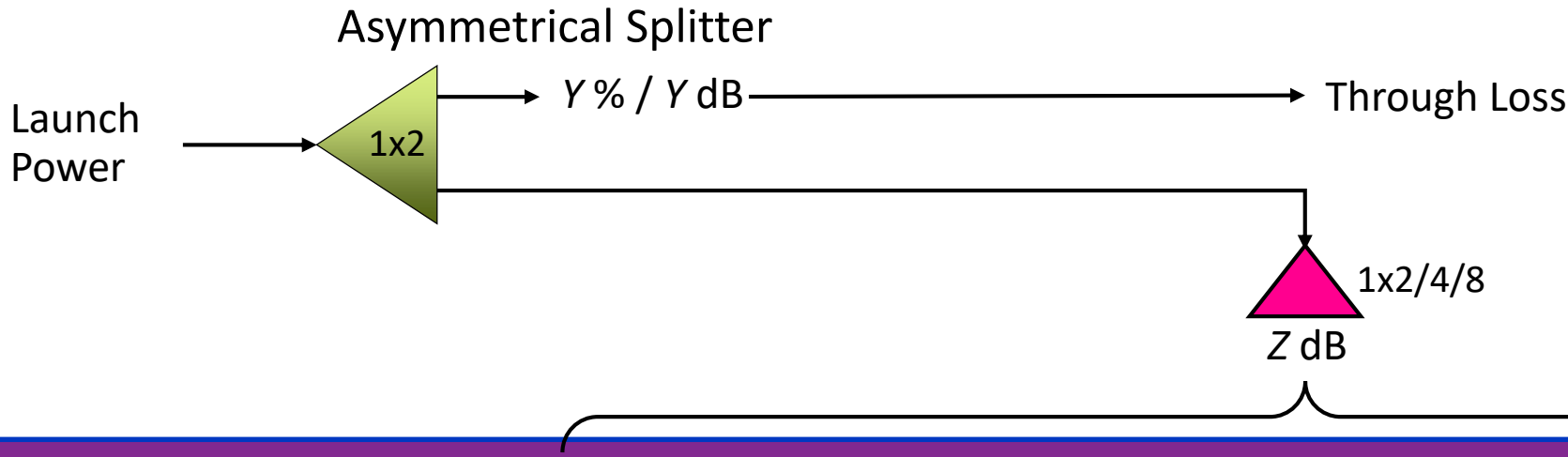
Cascaded Optical Tap Architecture



TAP Cascaded PON

Pros	Cons
Very lean fiber network topology	Inventory holding of various TAP ratios
Reduced splicing needs	
Best efficiency of OLT optical power	

Cascaded Optical Tap Architecture



Tap/thru split ratio %	2 port taps		4 port taps		8 port taps	
	Thru loss max (dB) *(Y)*	Drop loss max (dB) *(Z)*	Thru loss max (dB) *(Y)*	Drop loss max (dB) *(Z)*	Thru loss max (dB) *(Y)*	Drop loss max (dB) *(Z)*
Terminating	NA	3.70	NA	7.10	NA	10.40
30/70	6.00	5.80	6.00	9.20	6.00	12.50
45/55	4.10	7.00	4.10	10.40	4.10	13.70
60/40	2.70	8.50	2.70	11.90	2.70	15.20
70/30	2.00	9.80	2.00	13.20	2.00	16.50
80/20	1.30	11.60	1.30	15.00	1.30	18.30
85/15	1.00	13.00	1.00	16.40	1.00	19.70
90/10	0.80	15.00	0.80	18.40	0.80	21.70
93/7	0.60	17.30	0.60	20.70	NA	NA
95/5	0.50	18.20	NA	NA	NA	NA
97/3	0.40	21.70	NA	NA	NA	NA

MDU Tap Terminal

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