Building future ready networks with innovative fibre optics solutions

Virtual Webinar

SPEAKER

Dr. Seldon Benjamin
Solutions Architect MEA,
STL

Looking ahead

1 Looking ahead

2. Key data growth trends and drivers

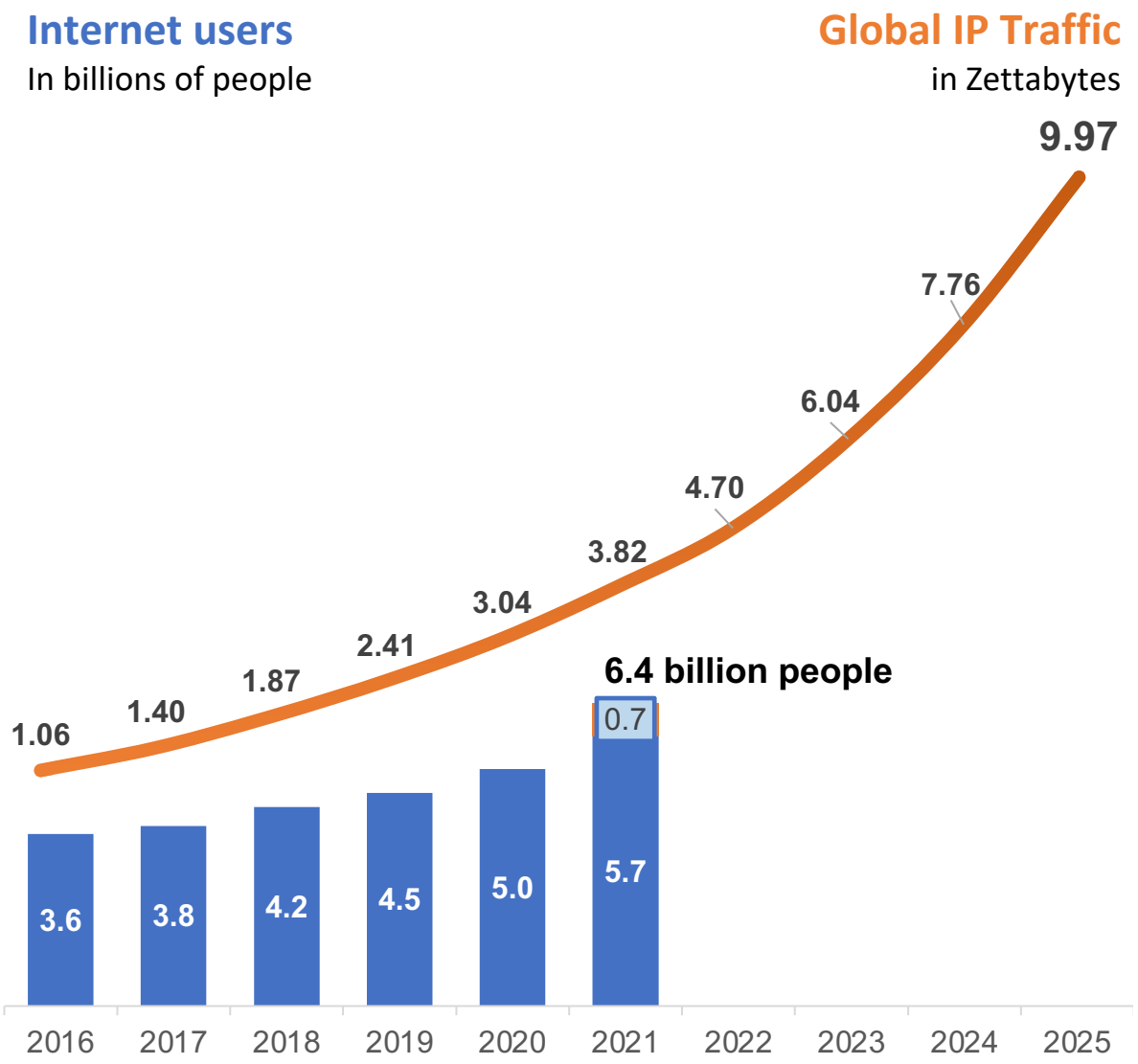
3. Conventional FTTH solutions

4. STL Opticonn solutions

5. Q&A

Looking ahead

Exponential Data Growth

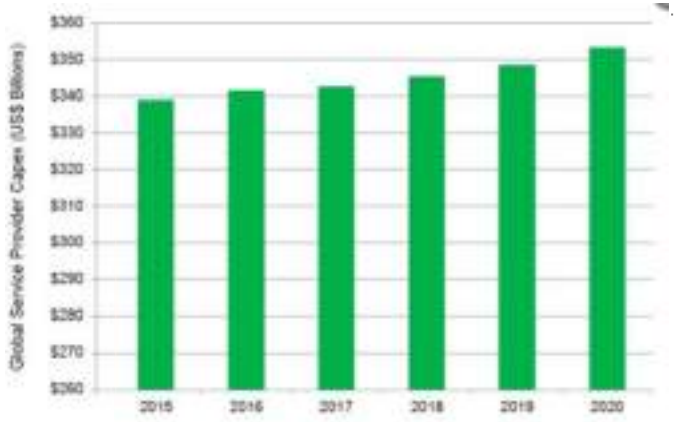


Source: Cisco for Global IP traffic Source : Internet World Stats, for Internet users

- **2.2 Mn new users everyday**
  came online since 2020
  - 3X the adoption rate vs. before
- **Global IP traffic will grow 3X**
  in the next 3-4 years

More capital is now available, including from new investor groups

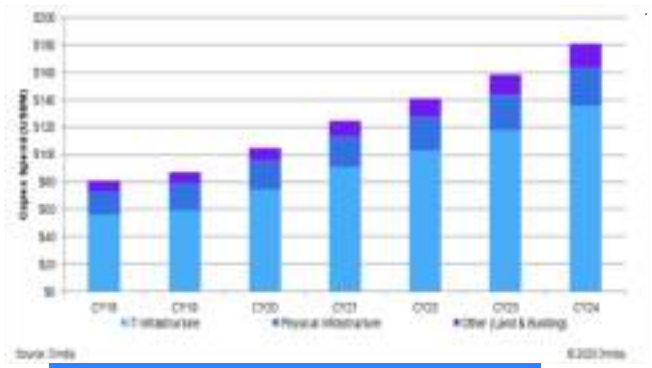
Telcos and Cloud companies are increasing their capital expenditure



Telcos

AT&T · T-Mobile · Deutsche Telekom · airtel · verizon

Much higher capex in 2021 and beyond



Data centre capex forecast by equipment category

Cloud

amazon · Microsoft

announce global Data centres expansions

While new capital is coming from PE funds, Governments and Enterprises

Private Equity

EQT · Brookfield · KKR · TPG

Enterprises

FUJITSU · ABP · AccessParks

Audi, Ford, BASF invest in private 5G

Citizen Networks

Federal Communications Commission

allocates **$9.2 bn** for RDOF

- UK invests $6.9 Bn
- India lays out $ 2.4 bn
- US to spend $65 billion to "future-proof" connectivity

Source : Analysys Mason, IHS Markit, Omdia

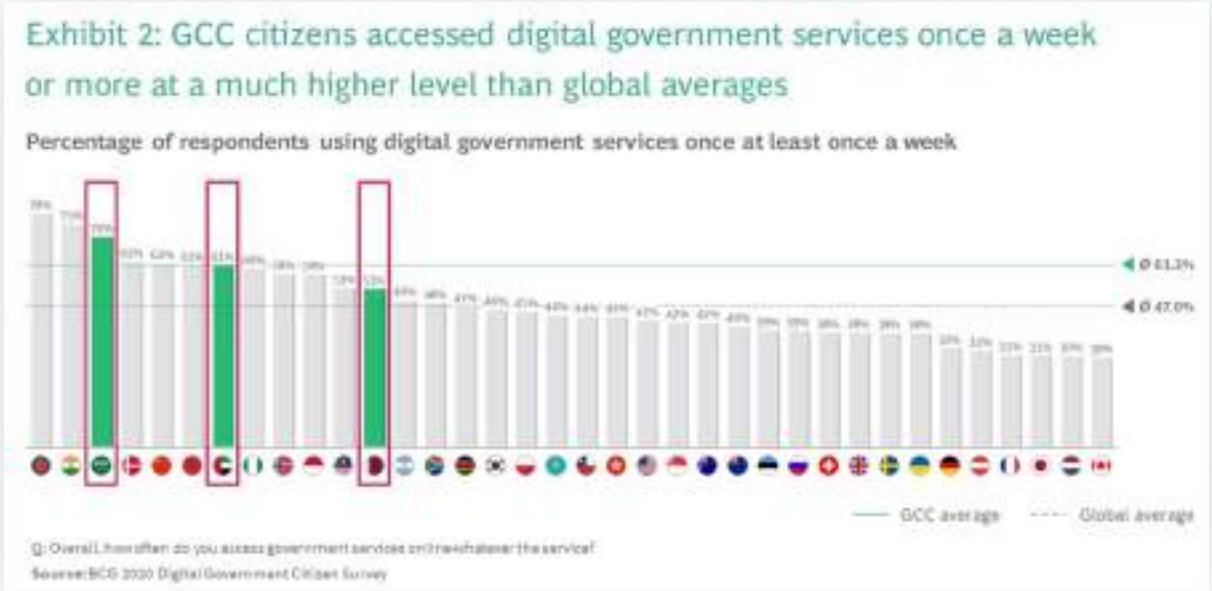
Aggressive Government Investment into Digitization in MENA

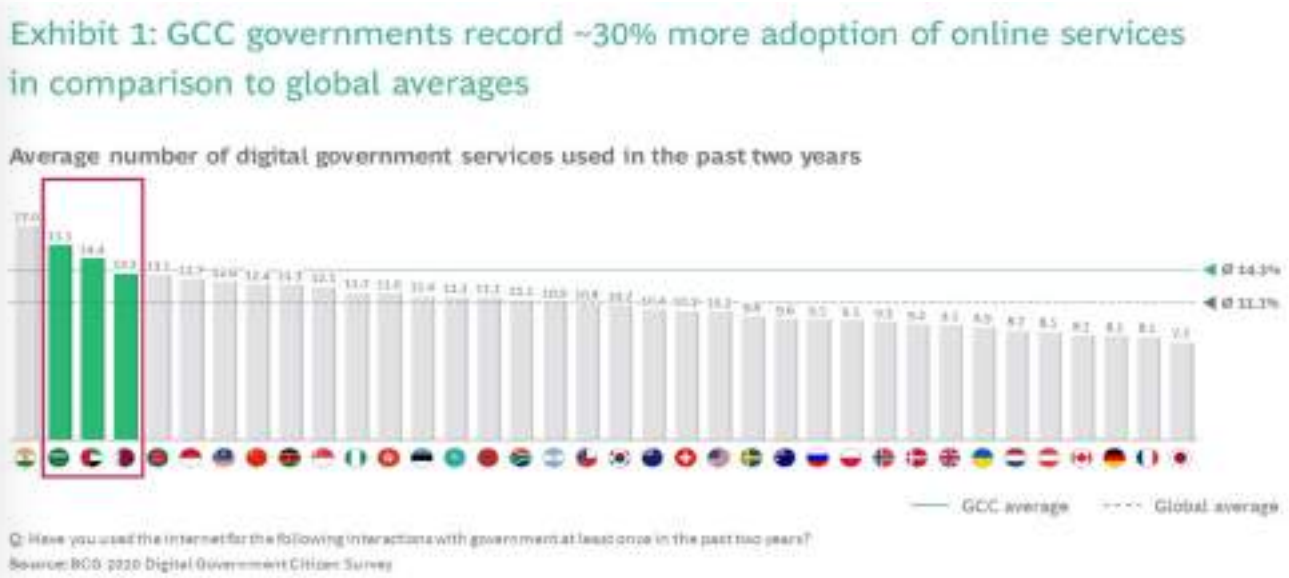
Faster & Smarter Connectivity is at the Center of MENA Governments Strategies

KSA 2030 | Oman 2040 | Bahrain 2030 | New Kuwait 2035 | Egypt 2030

- Dubai 2040 Urban Master Plan
- Abu Dhabi Economic Vision 2030
- Algeria National Strategy of AI 2020-2030
- Maroc Digital 2020

GCC Countries Rank in top 10 Globally in Government Digital Services in 2020: Accelerating Citizen Trust





Source: Industry reports

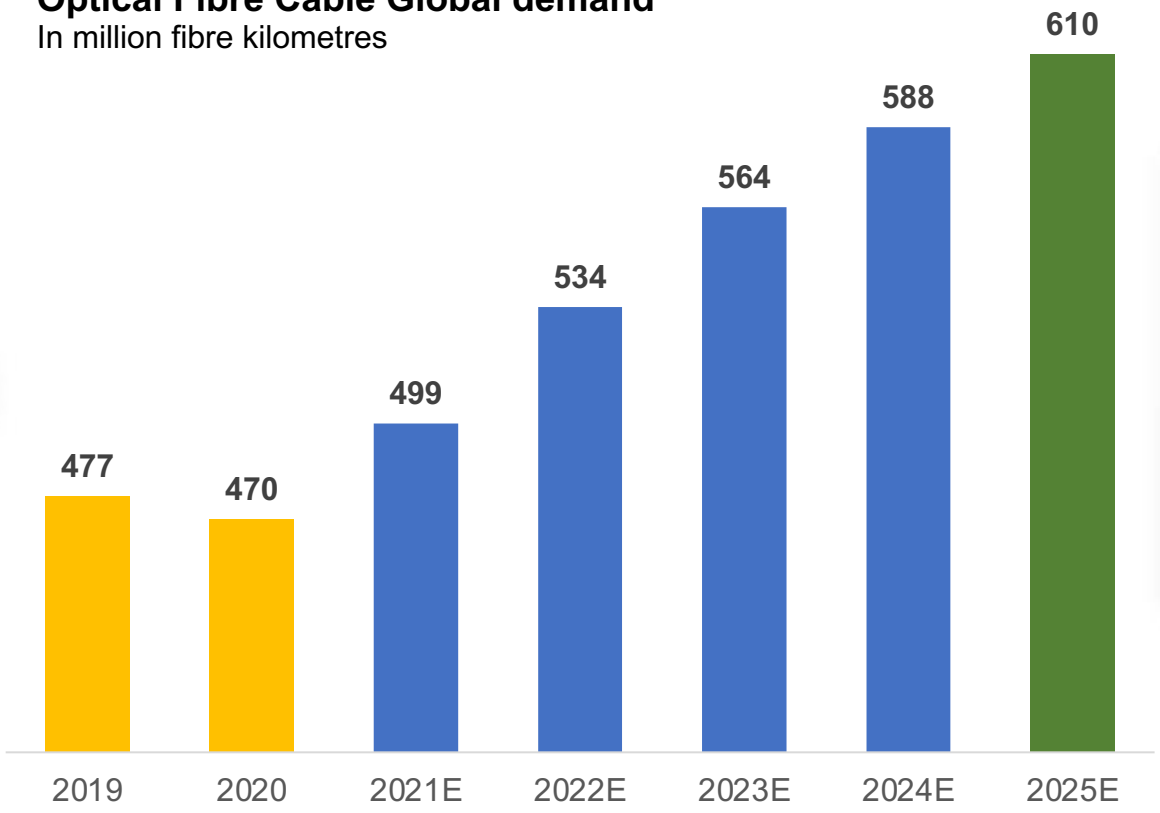
Three build cycles have coincided - Driving up Optical Fibre demand

5G

FTTx

Rural Connectivity

Optical Fibre Cable Global demand
In million fibre kilometres



The decade long digital network creation cycle is here!

Source: CRU Telecom cables market outlook: estimates in Feb'21

Digital Network Expansion Needs

Faster network roll-out

Facilitate deep fiberization

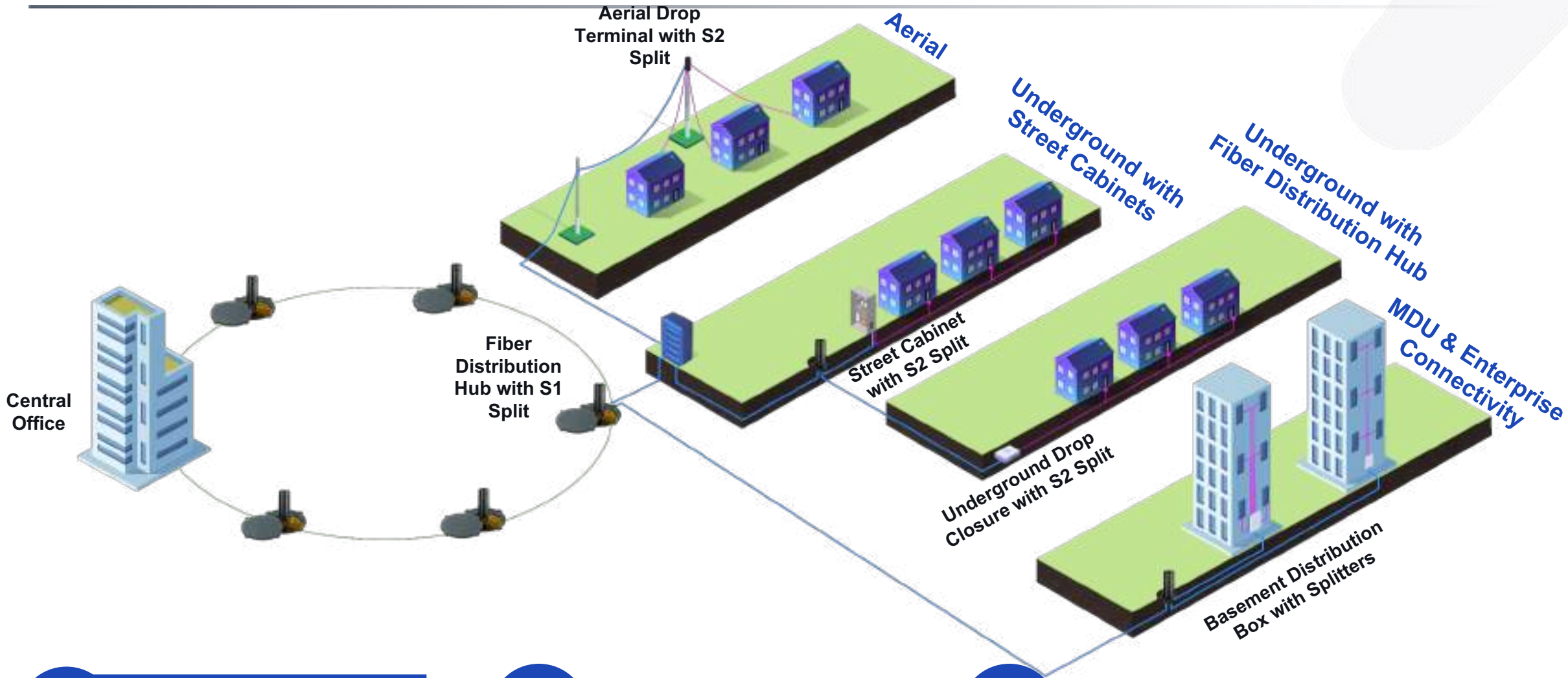
Reduce service outages

Reduce cost of network build out

Looking ahead

1. Looking ahead
2. Key data growth trends and drivers
3. **Conventional FTTH solutions**
4. STL Opticonn solutions
5. Q&A

Typical FTTH Network

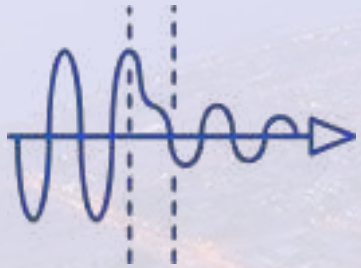


1 Trunk
G.652.D Fibre

2 Distribution
UG & OH

3 Drop
SDU & MDU

Network Deployment Challenges



A

Attenuation

Signal Decay

B

Bend Sensitivity

Signal Leakage

C

Compatibility

Legacy and Future Technology

Source: GSMA, Canalys, Company & Industry Estimates

Looking ahead

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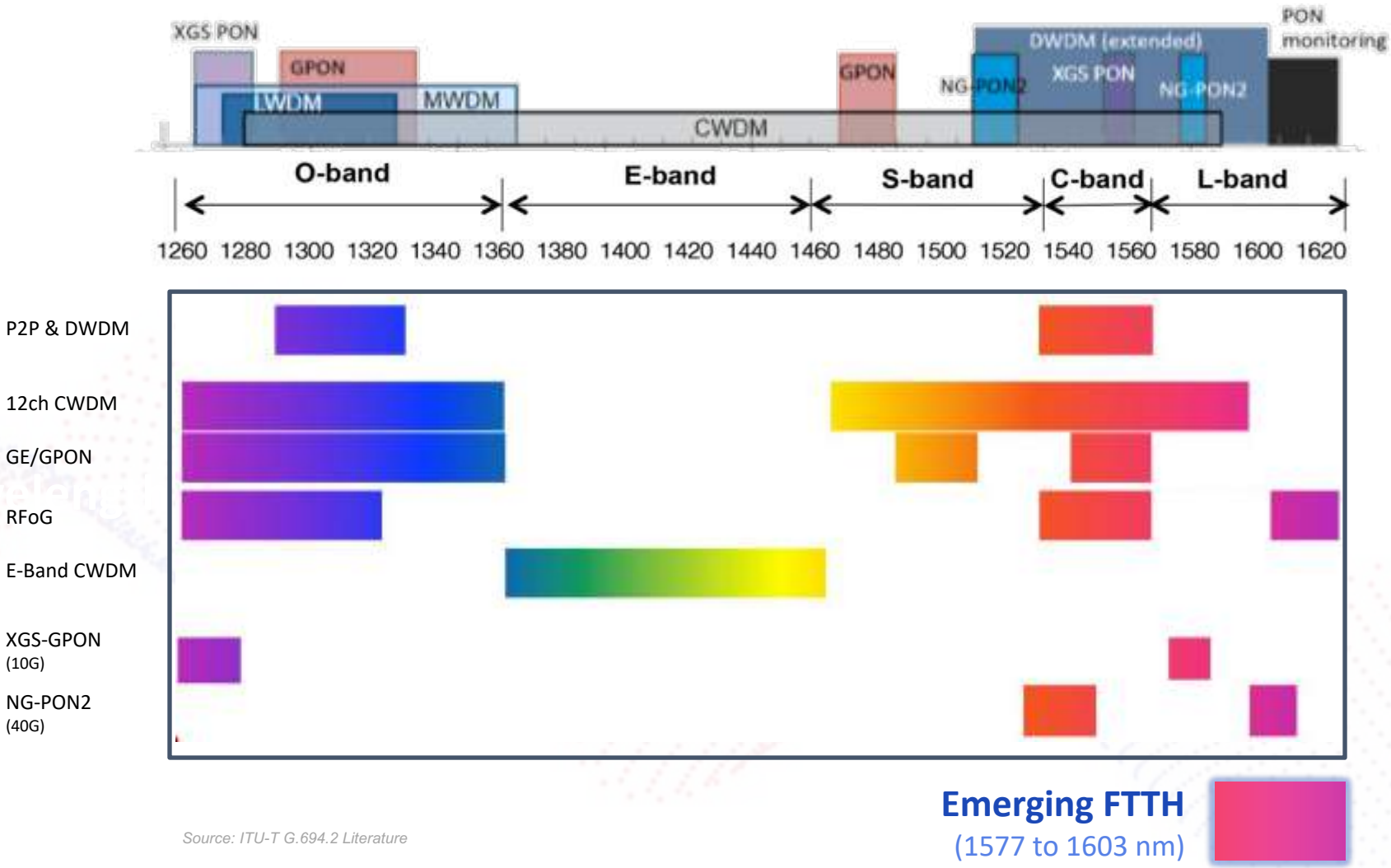
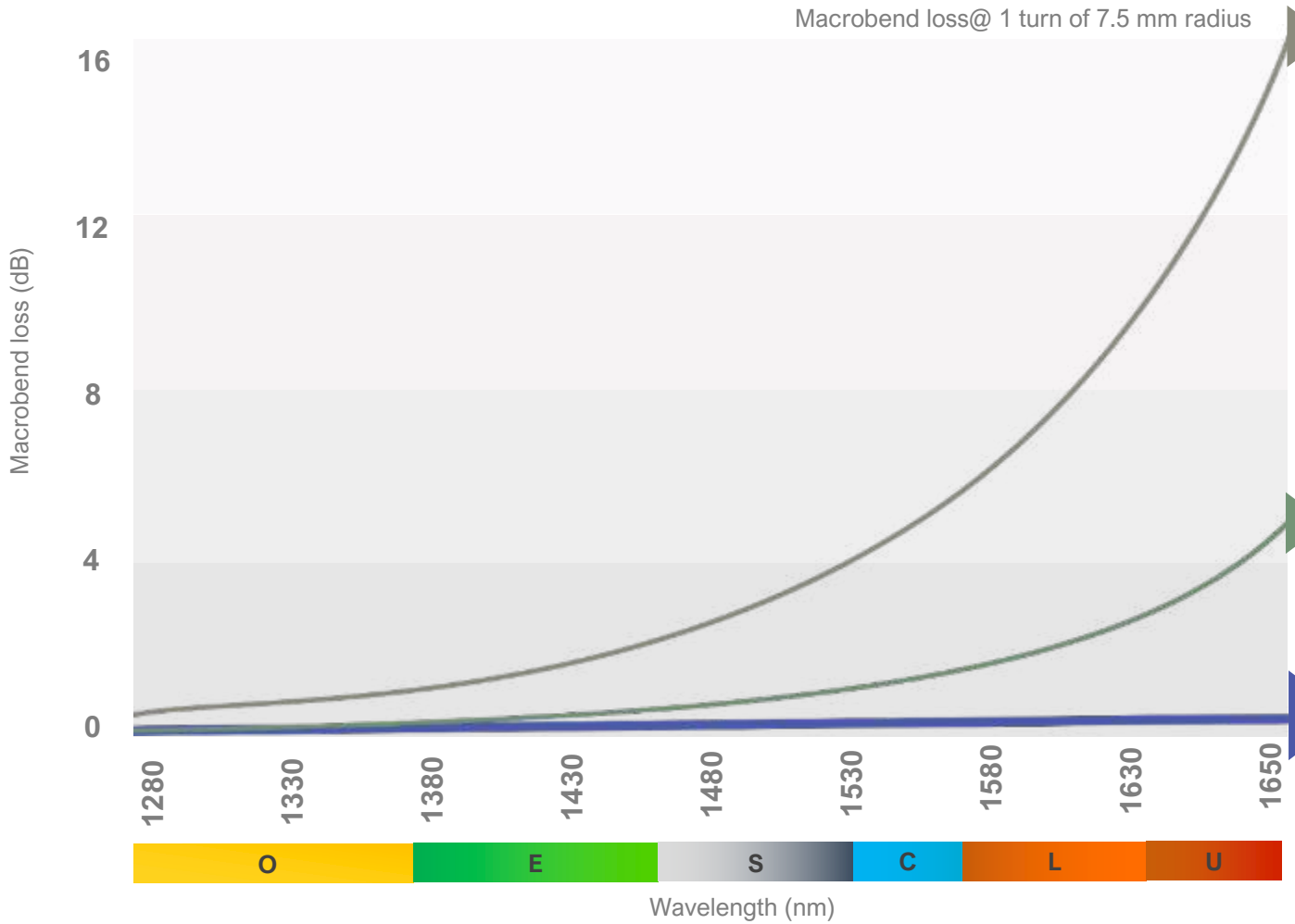
Accidental Fibre Bends Happen in Real World Network Installations

Deploying higher wavelengths is mandatory for future applications



Source: ITU-T G.694.2 Literature

Legacy Fibre (G652.D) More Susceptible to Bend Loss



G.652.D

G.657.A1

G657.A2

reduces losses at longer wavelengths

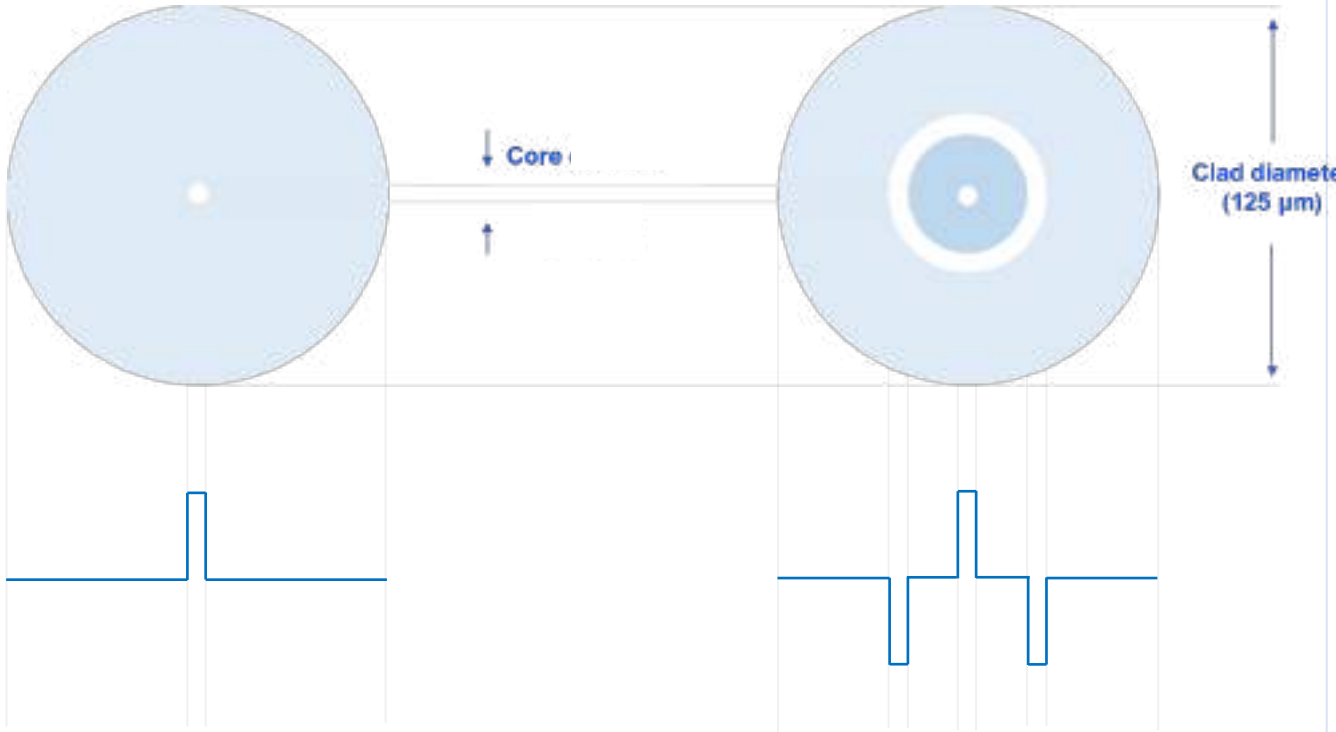
for a future proof network

urce: STL and ITU-T

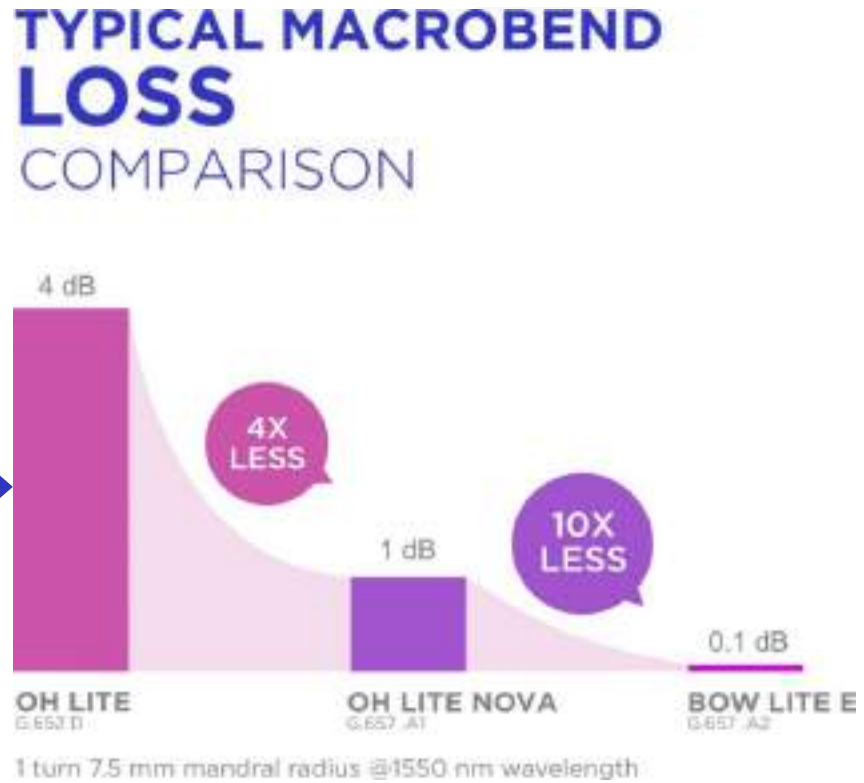
G.657.A2 – Lower Bend Loss Due to Trench

Refractive Index profile ITU-T D / A1

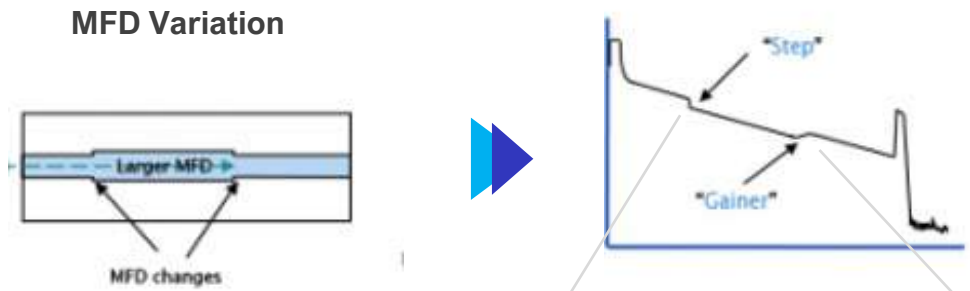
Refractive Index profile ITU-T A2



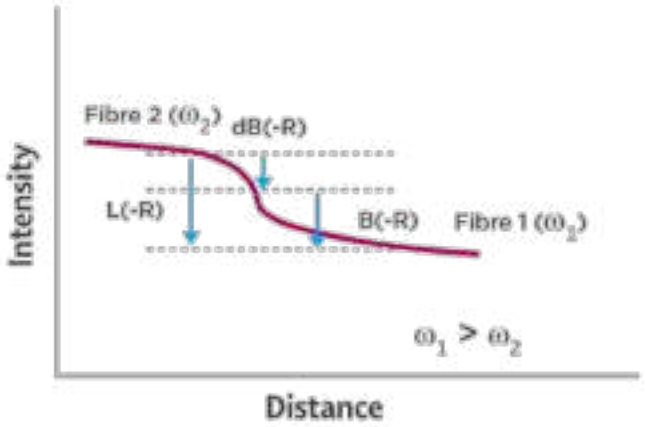
…to provide more than **40x reduced Macro Bend Loss**



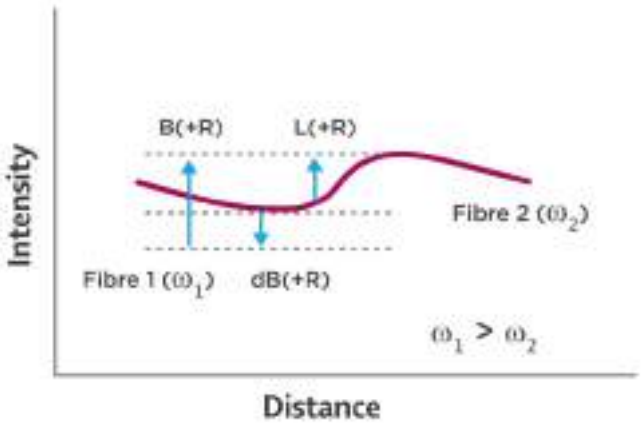
…. But MFD Mismatch Makes G657.A2 Splicing Difficult to Legacy G652.D Network



Loser
High MFD to Low MFD
9.1um to 8.6um
G652D to G657.A2



Gainer
Low MFD to High MFD
8.6um to 9.1um
G657.A2 to G652.D



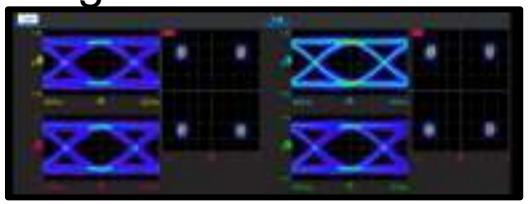
Legacy Compatibility A2 with First Time Right (FTR) Installation

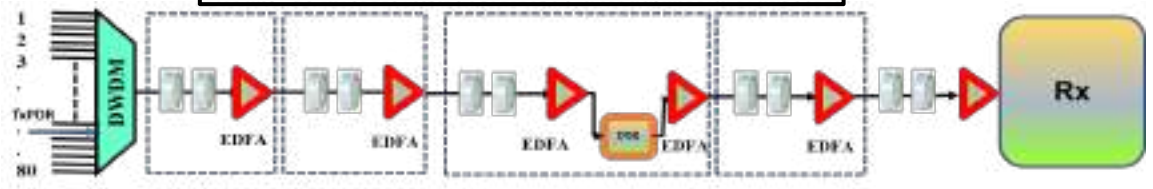
Stellar Transmission Testing 100G/200G x 80 Ch DWDM

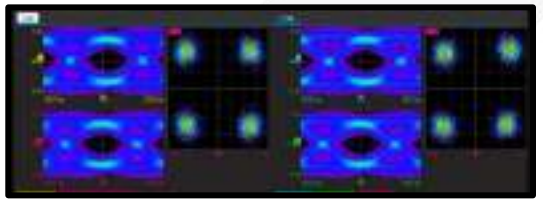
Long-haul link – 480 km

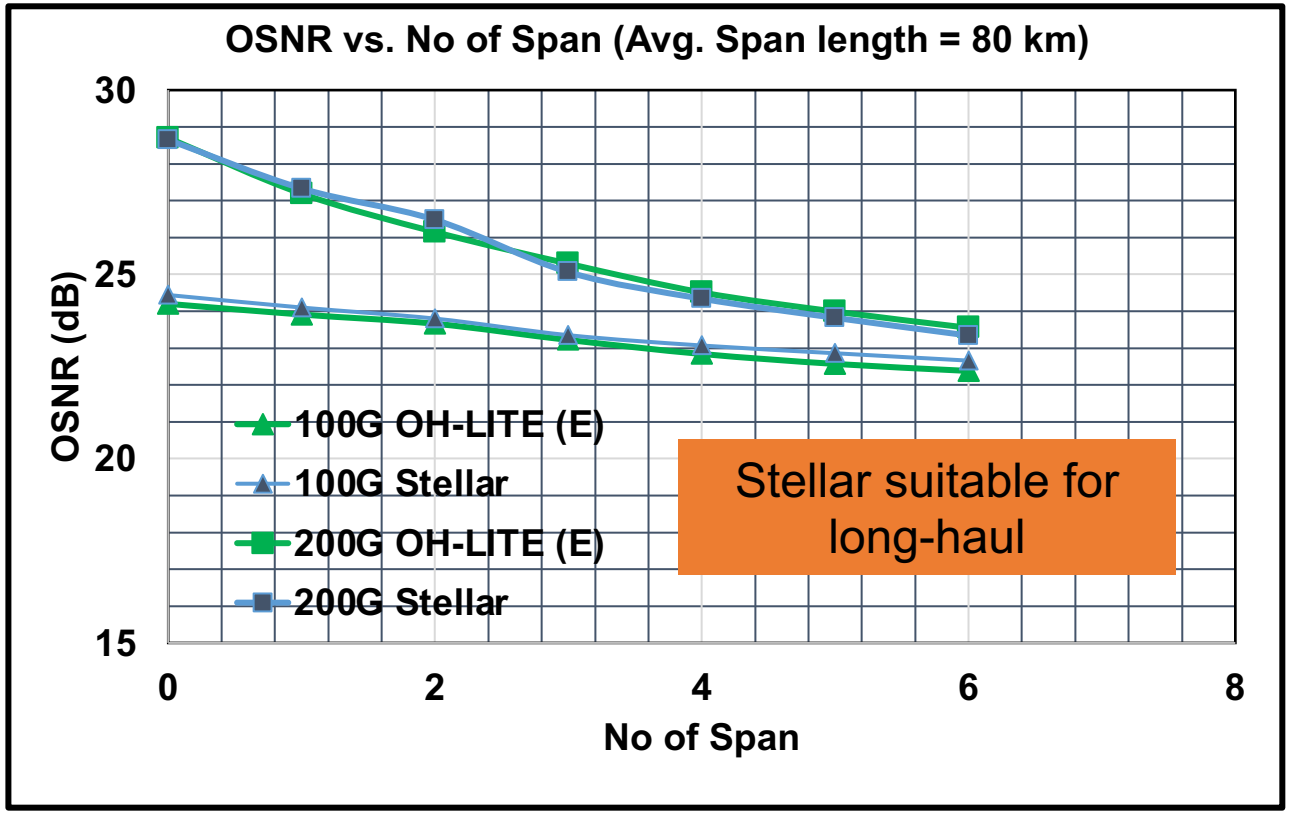
100G: Finisar Transponder MSA

Tx









STL's Stellar G.657.A2 with 9.1um MFD

World's 1st G.657.A2 fibre compatible with legacy G.652.D

stellar™
The Installer's Fibre

2020 LIGHTWAVE 4.5 INNOVATION REVIEWS

Awarded in 2020 Lightwave Innovation Reviews

Legacy G.652.D splice compatible

9.1 MFD ensures seamless splicing

Future Ready

Superior Macro Bend performance at higher wavelength

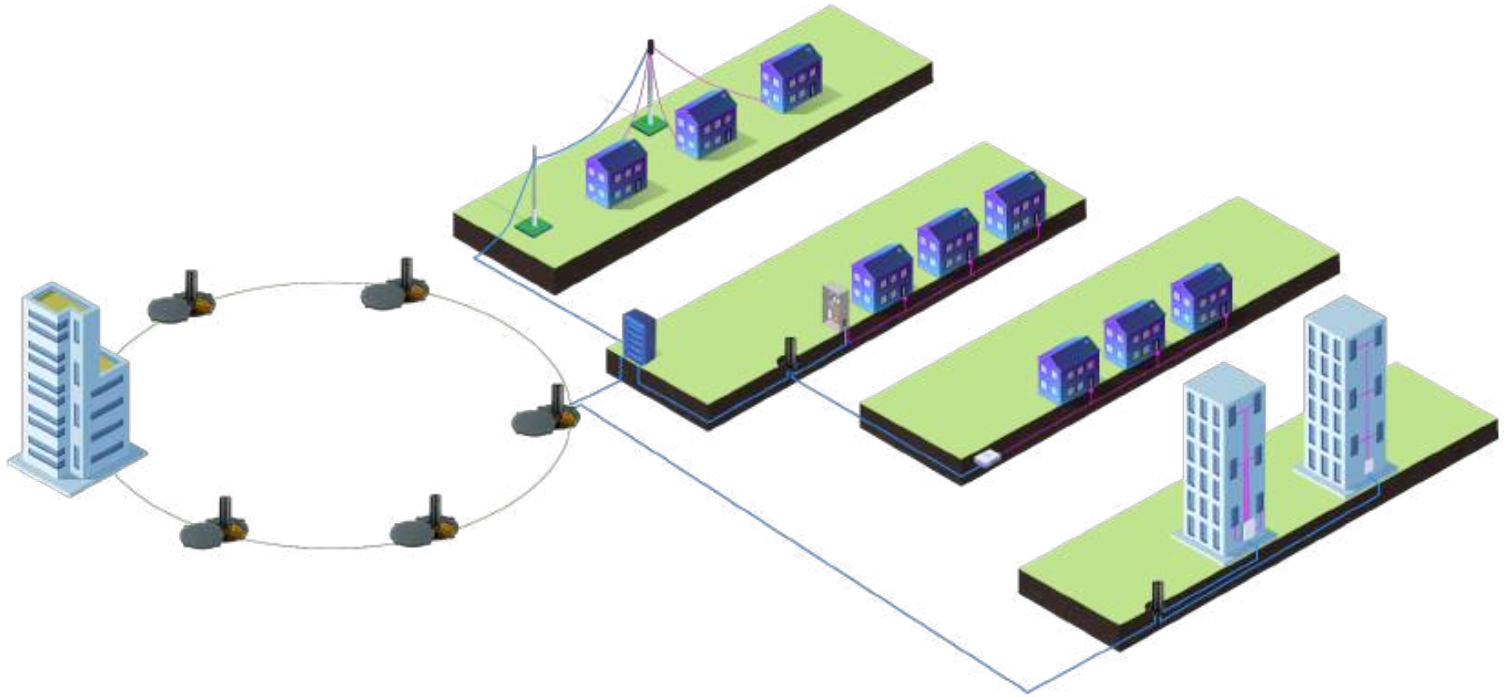
Cost Saving

Reduced FTTP faults due to accidental bends

First Time Right Deployment

Worry free interconnectivity of the new denser cables to connect to legacy network sections having G.652D fibre routes

Conventional Drop Solution Challenges



Slow Deployment

- Availability of skilled man-power
- Requirement of special splicing equipment

Low reliability

- Multiple points of failure
- Unpredictable losses
- Touching live network

Field Installable Connector

Fusion Splice

X

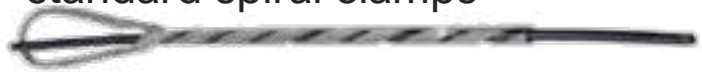
Require skilled manpower

Hardened Outdoor Pre-connectorized drop

IP68 Ruggedised outdoor connector

Round Drop cable with zero preferential bend

Easy aerial installation with standard spiral clamps



Compatible for both aerial and underground deployment

Fast and skill-free outdoor installation

Hardened Connector Distribution Terminal- Pre-Stubbed

12F, 8F and 4F cable

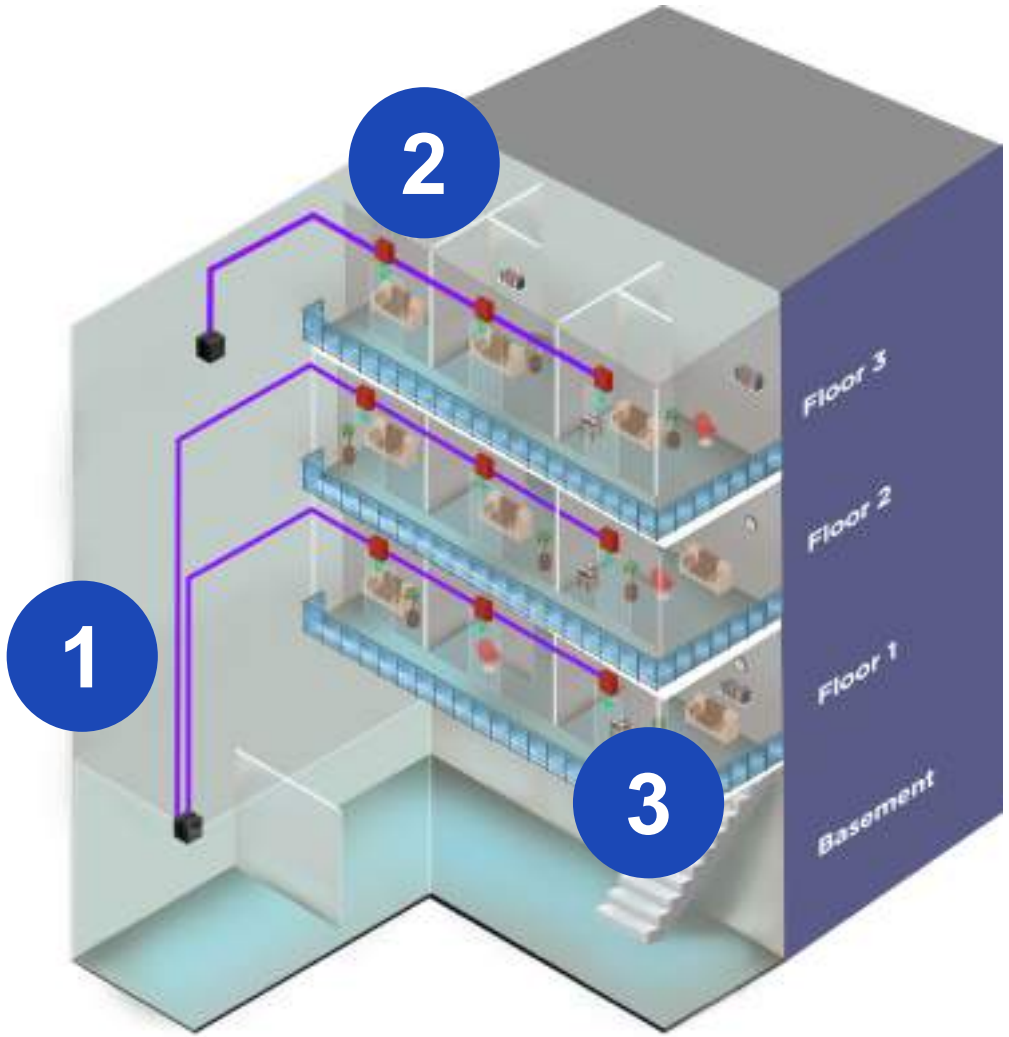
Input: Pre-stubbed
Output: Hardened Connector

4,8,12 port Terminals

Stepped port design

- Fully factory assembled
- Direct Plug and play
- High connector spacing for improved access
- Simple port identification

MDU Solutions



1 Mini breakout cable - 12/24 1F Retractable Modules

- Easy fibre mid span, retract and premise drop
- Low skill and craft friendly installation

2 OptoDomus Branching Box

- This allows re-access to individual fibres/ joints for the integration of new users
- Ensures protection, splicing and branching of vertical cable fibres

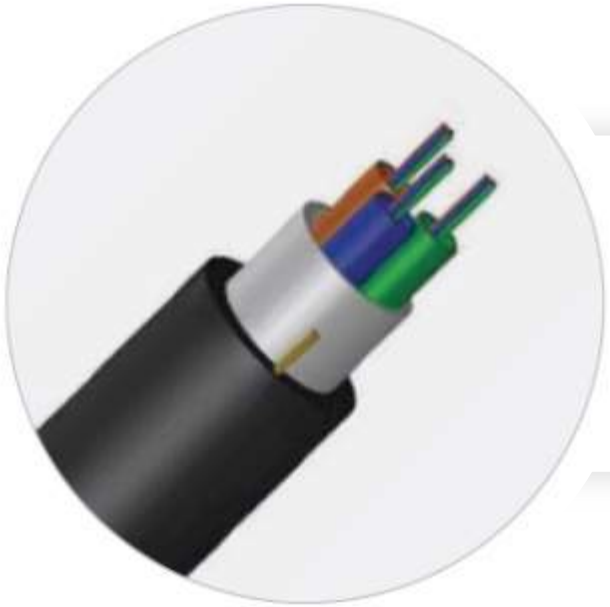
3 Indoor Horizontal Drop Cable

- 1.3 mm discreet cable with LSZH
- Aramid yarns distributed over & around fiber for strength

Conventional Aerial Cable Solutions

- Fig-8 cables cannot be used near transmission lines due to the metallic strength member
- ADSS cables can bring down pole infrastructure in case of vehicle or tree strike or natural calamity, resulting in prolonged network restoration times

Ultra Light Weight Micromodule Aerial Cable Solutions



Work Safe construction + **Faster Aerial Deployment**

Ultra Light weight aerial cable
100m span

Safe overhead working – max breaking load 2000N

Craft friendly easy install micromodule optical unit for rapid network rollout

Aerial Drop

High Flexibility

UV Protected

Strippable

µODC Closure for Distribution Network

Aerial ULW – Micromodule Cable

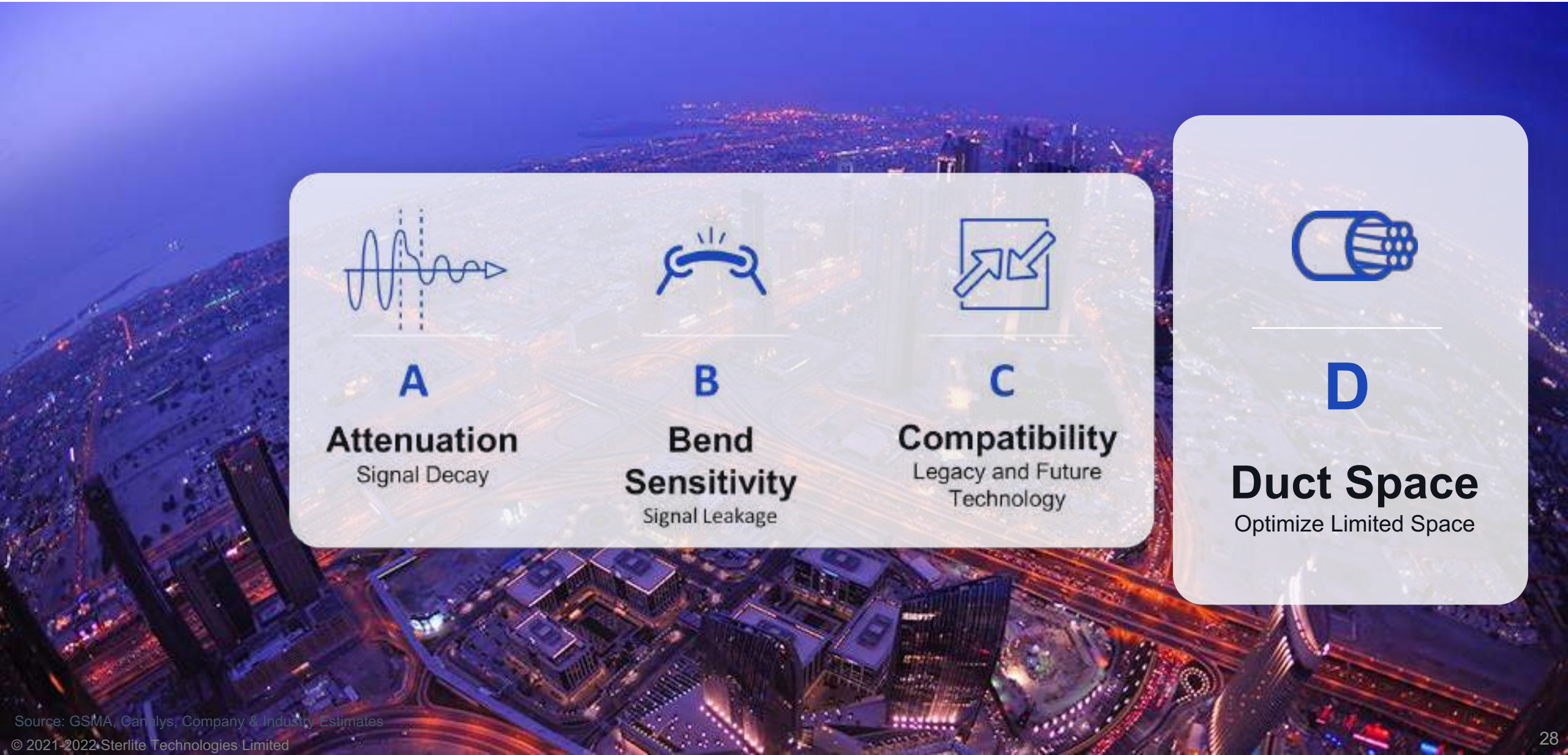
Micro Cable

µODC closure

µODC closure for UG and OH

- Very compact closure (<2L volume)
- Micro Cable and Micro Module optimised, fast and efficient jointing
- Toolless installation
- Splice cassettes (up to 96 splices)
- Exists in connectorized version too (12 SC)
- Underground and aerial application IP68

Network Deployment Challenge # 2
Congested Underground Cable Infrastructure



A

Attenuation

Signal Decay

B

Bend Sensitivity

Signal Leakage

C

Compatibility

Legacy and Future Technology

D

Duct Space

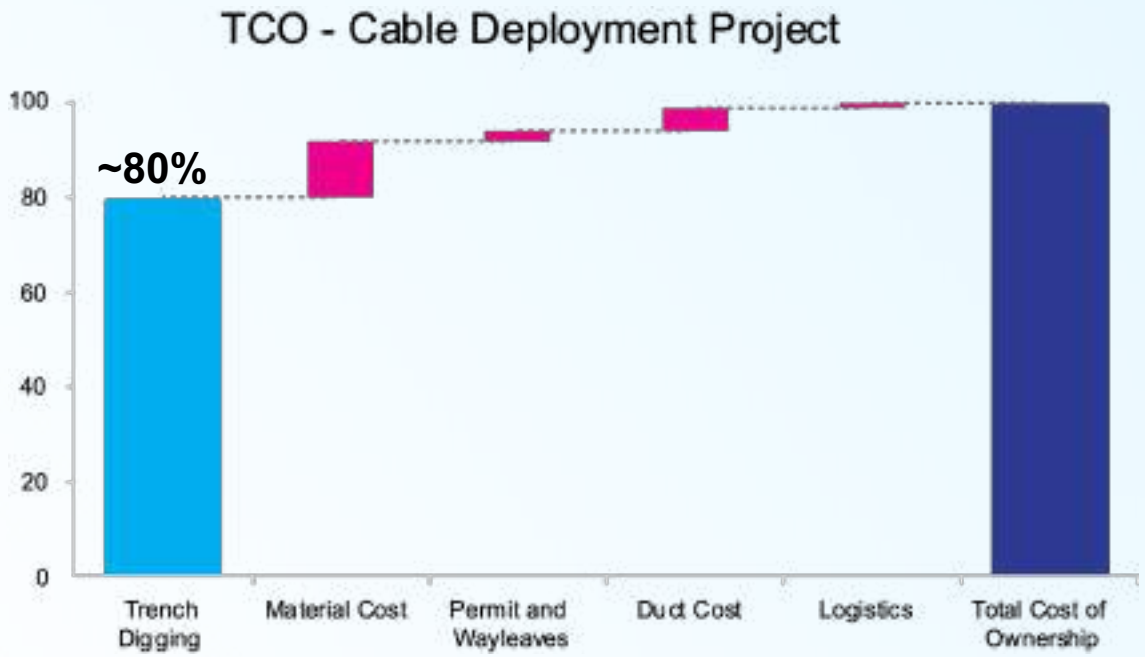
Optimize Limited Space

Source: GSMA, Canalys, Company & Industry Estimates

High Installation Cost and Limited Duct Space

80% **Civils Trenching Cost in Cable Deployment**

Rest 20% constitutes Cables, Ducts and supplementary products



To meet this exponential growth

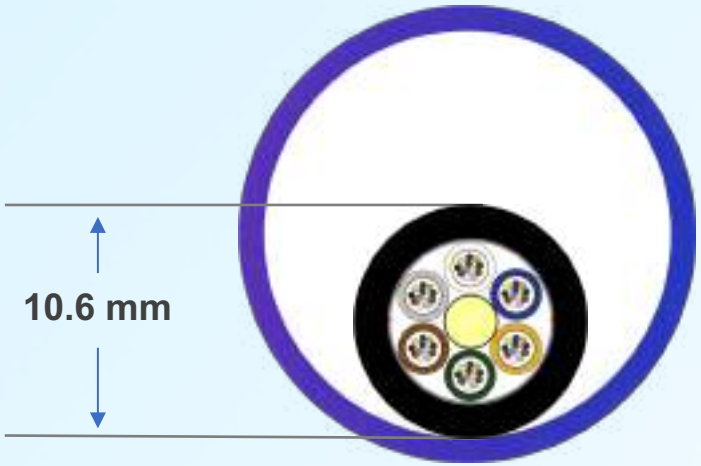
Need 10X Fibre

In the same available duct space

- **Minimize the size of Cable** with same fibre count
- **Maximize Fibre Count** in the same cable diameter

Micro Cables – Minimise the Size of Cable

25mm/20mm



72F

Conventional Duct Cable

4x Fibre Density

12mm/10mm

Maximum Duct Space Optimization

288F

Next Generation Micro Cable

Densify with Multiway Ducts

7 Pathways !!

7 12.7/10 Duct bundles **X** **288** Fibres **=** **2016 Fibres** 41mm OD Duct

Scalable

- Install what's needed today
- Easily / quickly / cheaply upgrade as demand grows

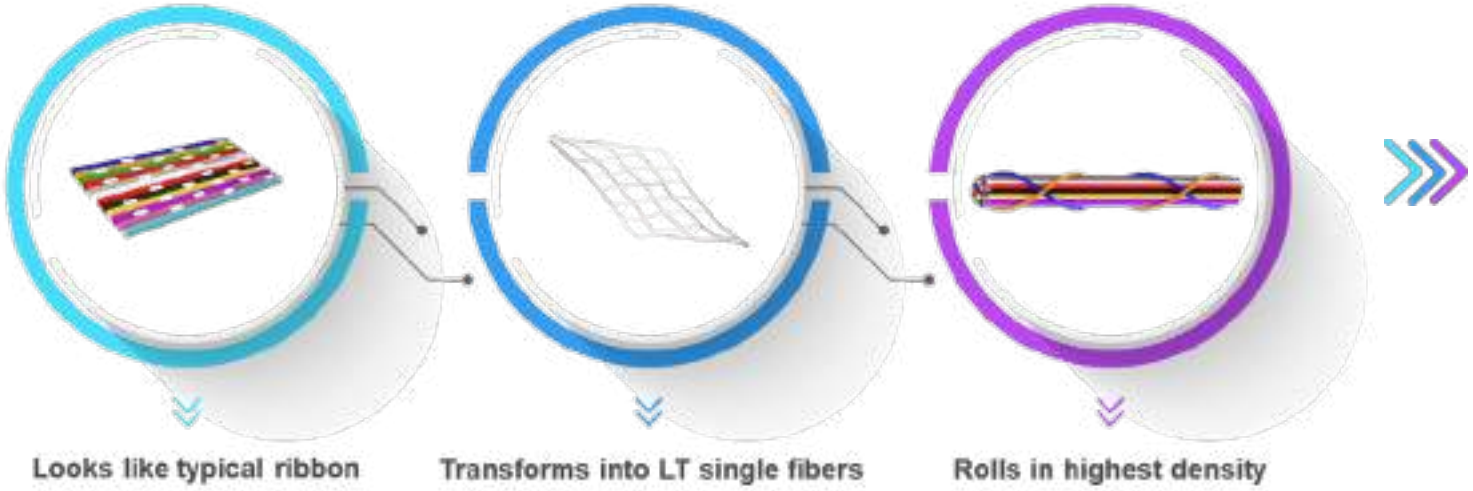
Flexible

- Moves, adds & changes
- Re-route / re-configure

Smart

- Limit investment to what's needed today
- No need to predict future bandwidth demands or technology

IBR is great for access network densification



Celesta Ribbon Cable
288F- 6912F

70%
Lighter Cable*

50%
Lower Diameter

Pulling + Blowing

A. Benefits in brownfield deployments (1/2)

1 Longer cable lengths in same drum size

432F Flat Ribbon Cable
@ 22mm dia & 330 kg/km
3km length / drum

432F Celesta IBR Cable
@ 15 mm dia & 102 kg/km
4-6km length / drum

- Celesta's lesser weight and smaller profile allows longer lengths on same drum size
- Longer cable lengths reduce splicing requirements by 33%

INCREASE ROLL-OUT SPEED BY UP-TO 25%

2 Smaller coiling lengths without preferential bending or memory

Celesta 432F vs Flat-ribbon 432F

Flat ribbon
Min. coil diameter

IBR
Min. coil diameter

- Smaller coiling diameter reduces space requirements, removing need to deploy larger chambers like JRC14
- No need for cable grounding, making deployment easy and fast
- No preferential bending makes cable handling and storage easy and effective
- Reduce cost of passive ancillaries by 20% by deploying smaller joint closures and chambers

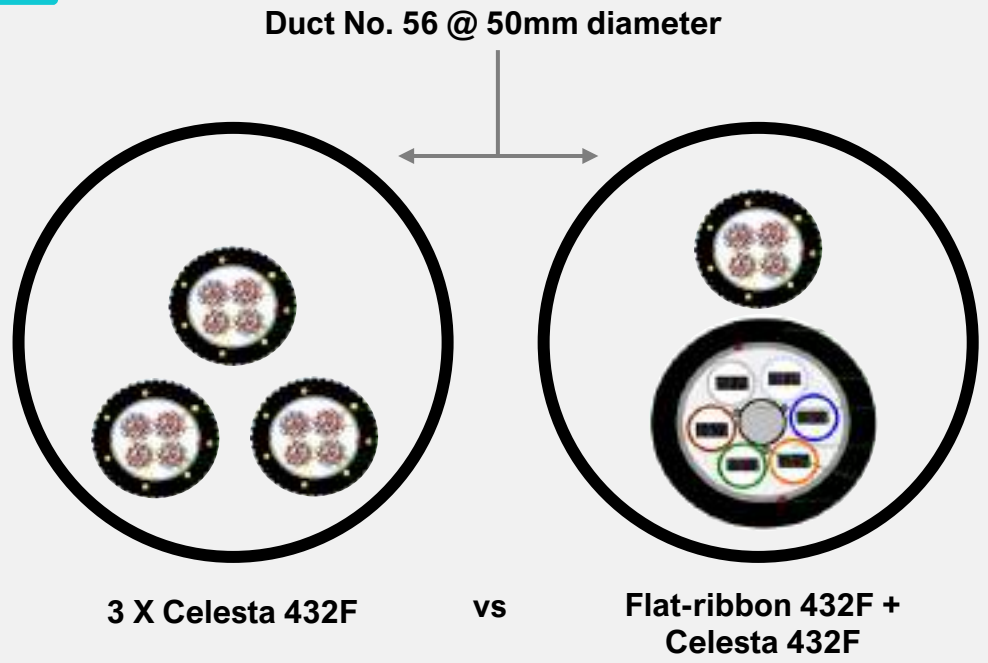
A. Benefits in brownfield deployments (2/2)

3 Passive hardware miniaturization with Double Density Ribbon closures

Double density IBR splice solution

- Same thickness as Single Element (SE) tray
- Doubles splice density compared to SE trays in the same form factor
- Terminate 2x ribbons in the same enclosure size

4 Pull multiple cables in existing ducts



- Only IBR cable that can support both pulling and blowing. This offers significant flexibility in deployment method
- Save significant time and money by overbuilding in existing ducts without need of replacing legacy cables
- Save cost on additional ducts in future

B. Benefits in greenfield deployments

5 Compatible with micro-ducts

Flat Ribbon

96F	144F	288F	432F	864F
✗ 18 mm	✗ 20 mm	✗ 21 mm	✗ 22 mm	✗ 26 mm

IBR

96F	192F	288F	432F	576F
✓ 8.5 mm	✓ 10 mm	✓ 12 mm	✓ 13 mm	✓ 14 mm

- Leverage standard 20/24 mm micro-duct systems for 288F and higher fibrecounts, improving duct space utilization by more than 50%
- Reduce micro-duct size and cost further when deploying 96F and 48F IBR Celesta
- Can opt for Multi-duct system for future scaling
- Greener deployment with lesser plastic on ground

6 Blow optimized for long distances

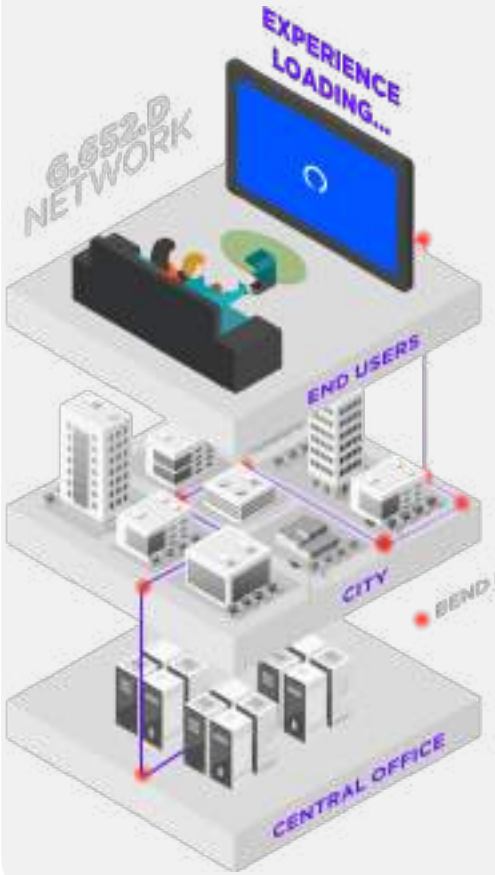
Parameters	Pulling with Flat Ribbon	Blowing with Celesta
Machine Set-up time	10 mins	30 mins
Personal needed for installation	3 - 5 personnel	3 - 5 personnel
Typical Installation Length	200 - 400 meters between consecutive manholes	2 kms in a single blow
Cable distance pulled for 2 km install	6000 meters	2000 meters
Cable pulling/blowing length per minute	~20 meters / min	60 – 90 meters / min
Process Time to install 2 km cable	**~6 hours**	**~1 hour**

- Can be blown for 2kms in less than 40 mins
- Save deployment time and effort with blowing Celesta vs pulling ‘bulky and heavy’ flat ribbon cables
- No need for ‘pulling’ pits after every ~200m-300m

C. Benefits during Operation and Maintenance

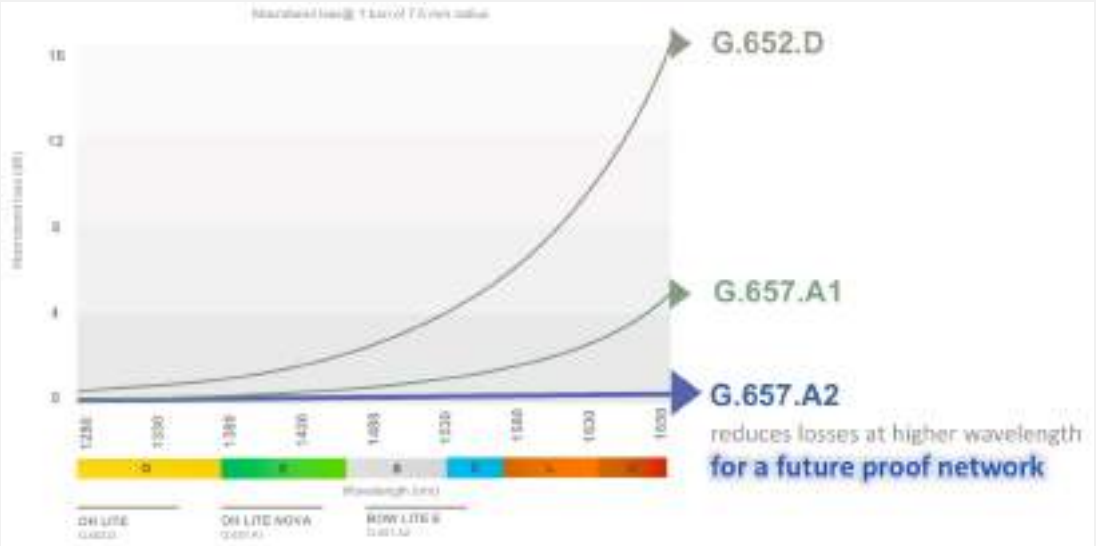
7 Reduce fault rates due to macro-bends
in closures, cabinets and ODCs

G.657.A2 fibre provides 10x more resilience to bend losses compared to G652D fibre. Reduce truck-rolls associated with addressing macro-bend situations

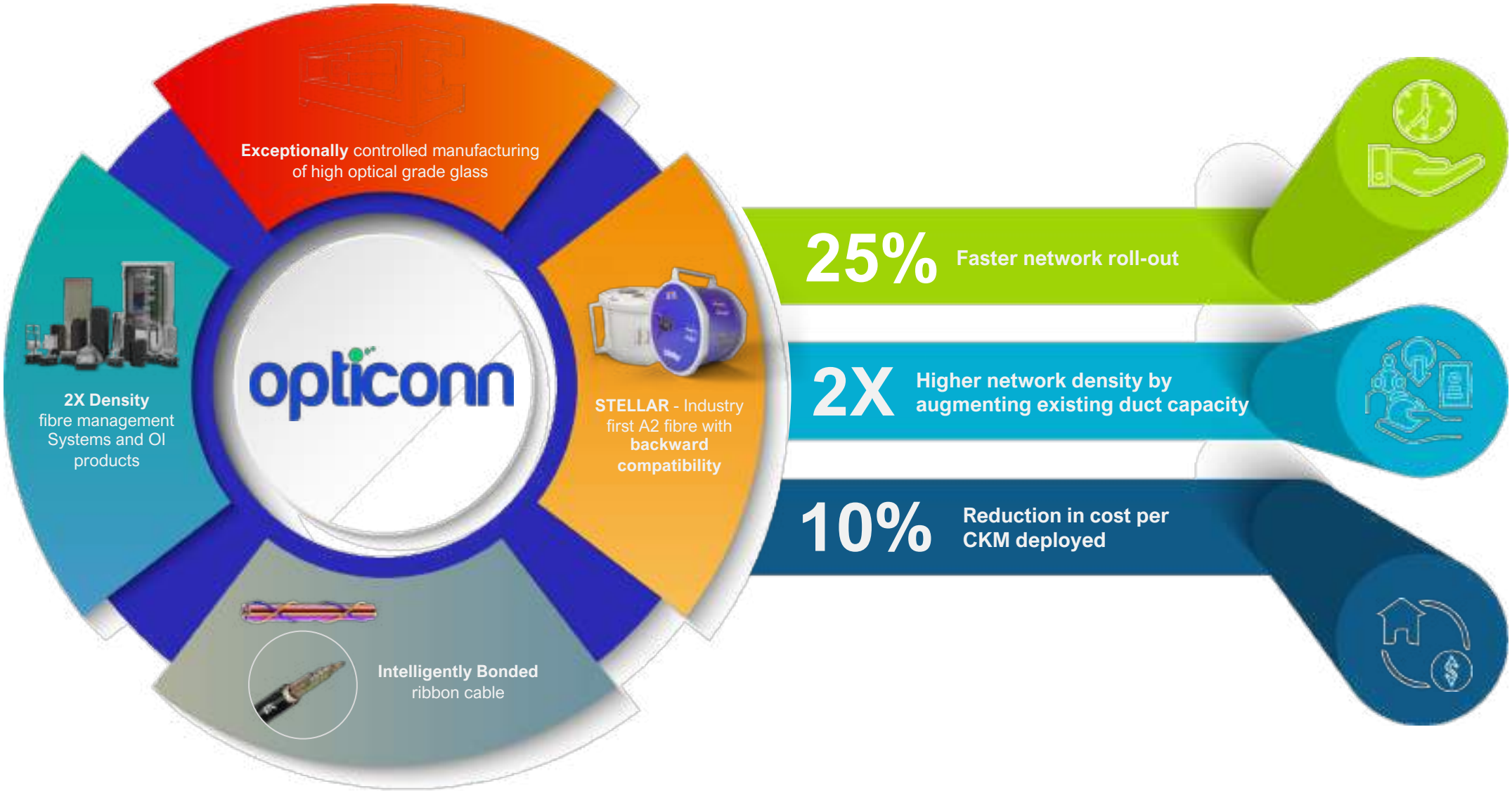


8 Ensure future scaling to Next generation PON systems

Greater optical loss control in PON network ensures easy scaling to longer wavelength systems



Opticonn solution for OSP network

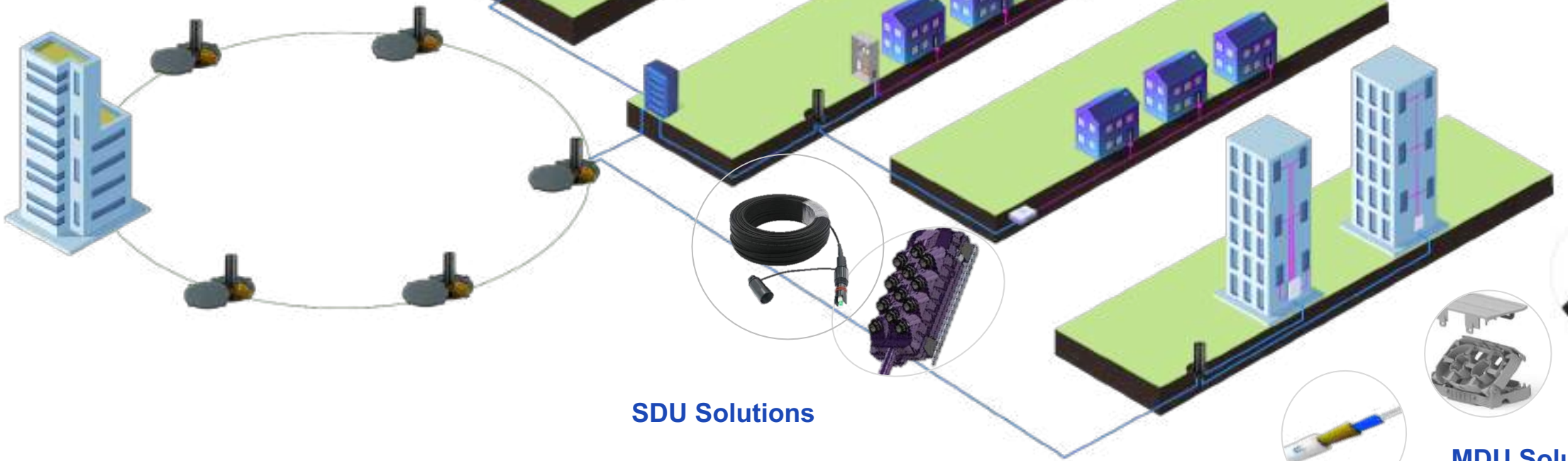


Summary

One fibre for the network

ULW Micromodule Aerial Cable

Underground Cable Solutions

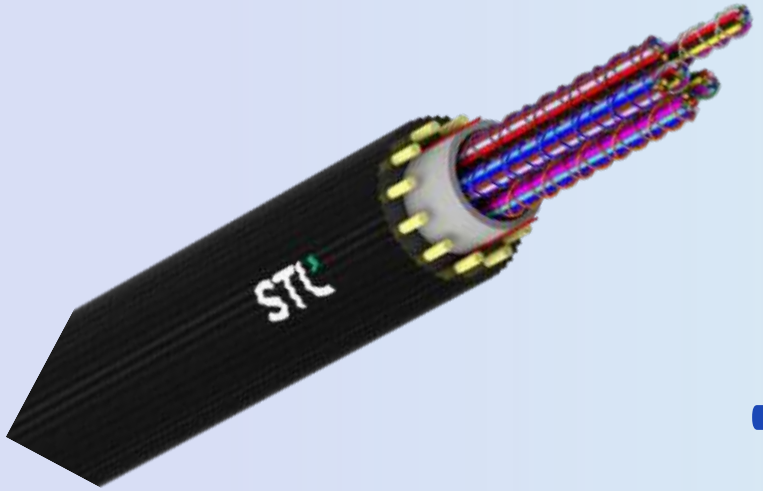


SDU Solutions

MDU Solutions

STL Opticonn – Building Advanced FTTH Networks

Backward Compatible Bend Insensitive Fibre



Aerial and Underground Optical Fibre Cable

Innovative Optical Interconnect Kits

25% faster deployment of future proof bend resilient network

opticonn

Optical Connectivity

Global leader in E2E optical physical layer solutions

Higher density network - 100% existing duct capacity augmentation

Digital Network Expansion Needs

Faster network roll-out

Facilitate deep fiberization

Reduce service outages

Reduce cost of network build out

Q&A

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beyond tomorrow