

Building Fibre Dense Networks With Air-Blown Micro Cables

Phill Coppin & Michael Van Moppes

24th September 2020

Agenda

1 Network Evolution and Bandwidth Growth

2 Denser Networks with Deep Fiberization

- Cable Technologies for Building Denser Networks
- Faster Blow Installation

Industry is Witnessing Major Technology & Capex Shifts



5G

has arrived



**Massive
Data Centres**

*by cloud
companies*



**Connected
Everything**

*Enterprises
embrace IoT*

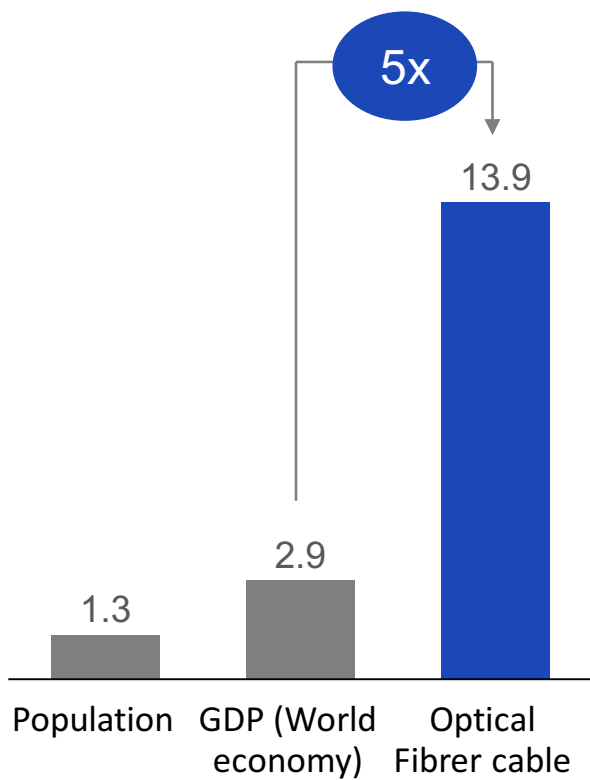


Virtualization

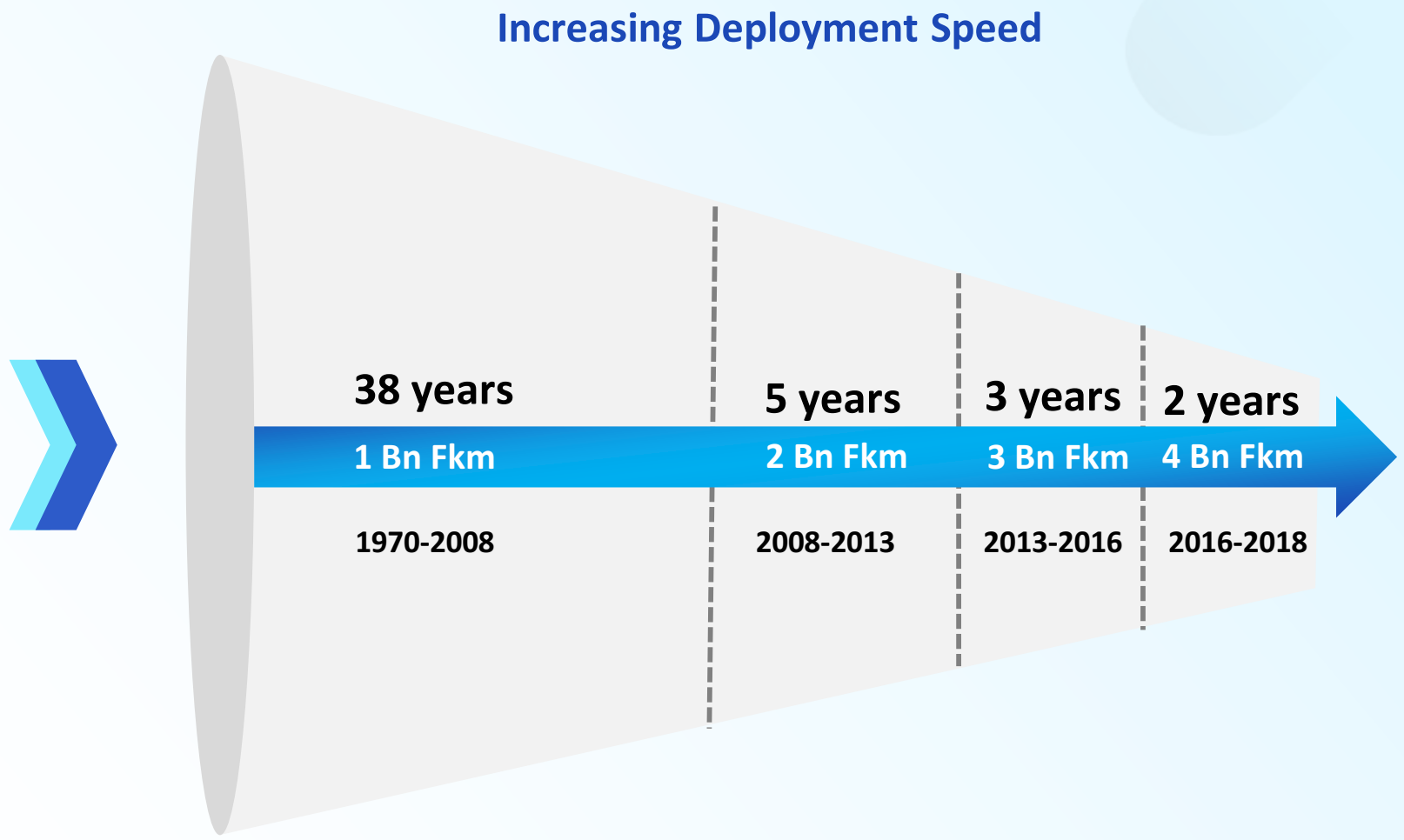
*Software
disrupting networks*

Unabated Growth in Demand of Optical Fiber

Optical fibre cable deployment has outpaced the growth of world economy by **~5x**



20 years CAGR: 1997 to 2017

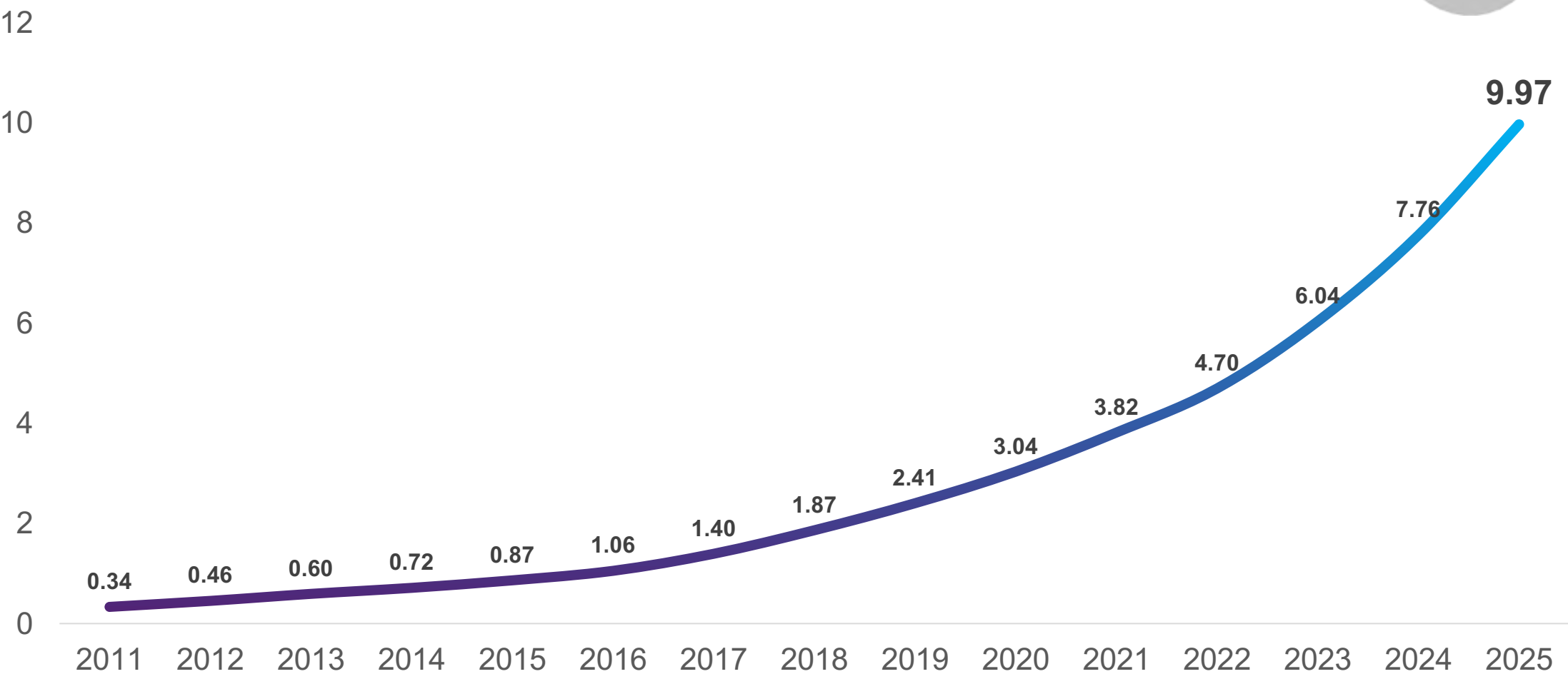


World's rate of deployment of **1Bn fkm cable** has shrunk drastically from **38 years** to **less than 2 years**

Exponential Growth in Bandwidth

Exponential Growth

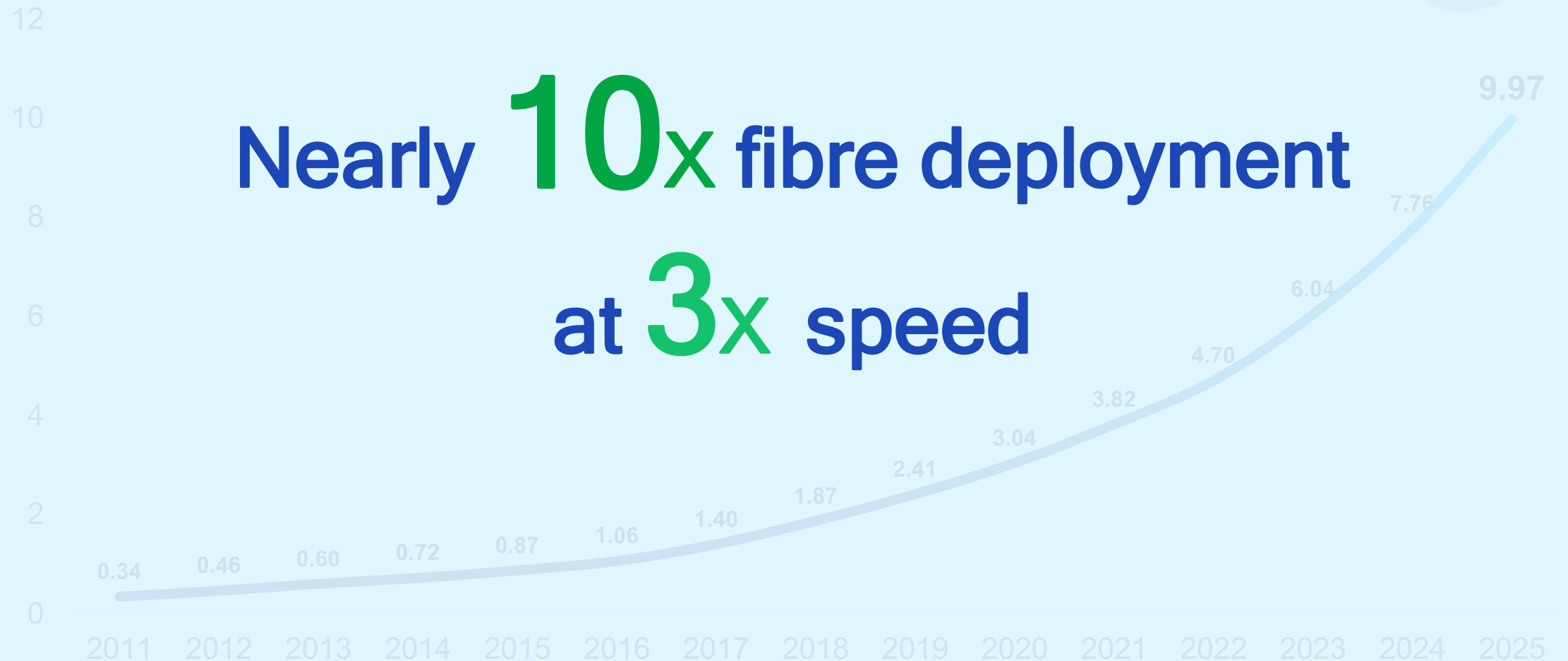
Global IP Traffic Growth in Zettabytes



Exponential Growth in Bandwidth

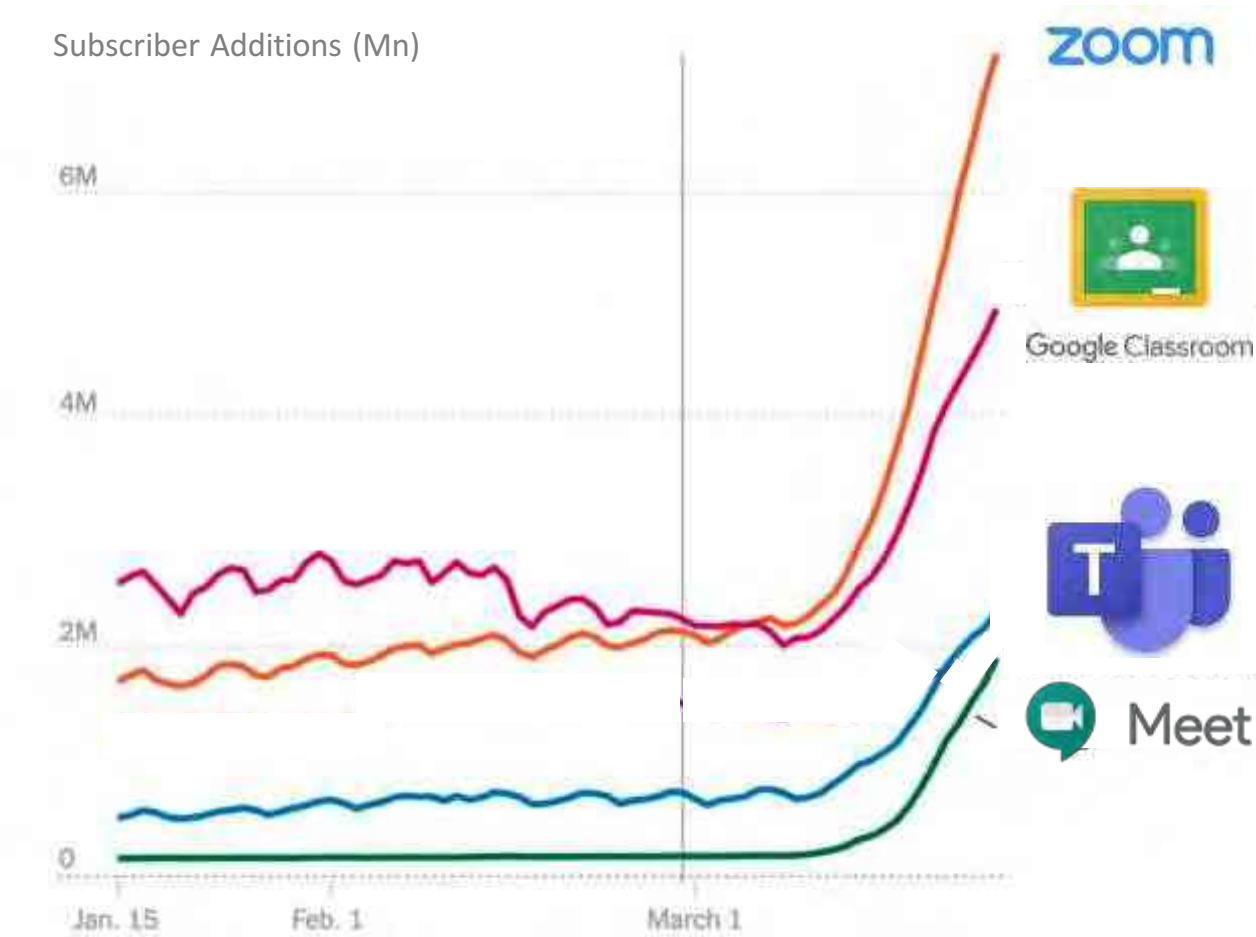
Exponential Growth

Global IP Traffic Growth in Zettabytes

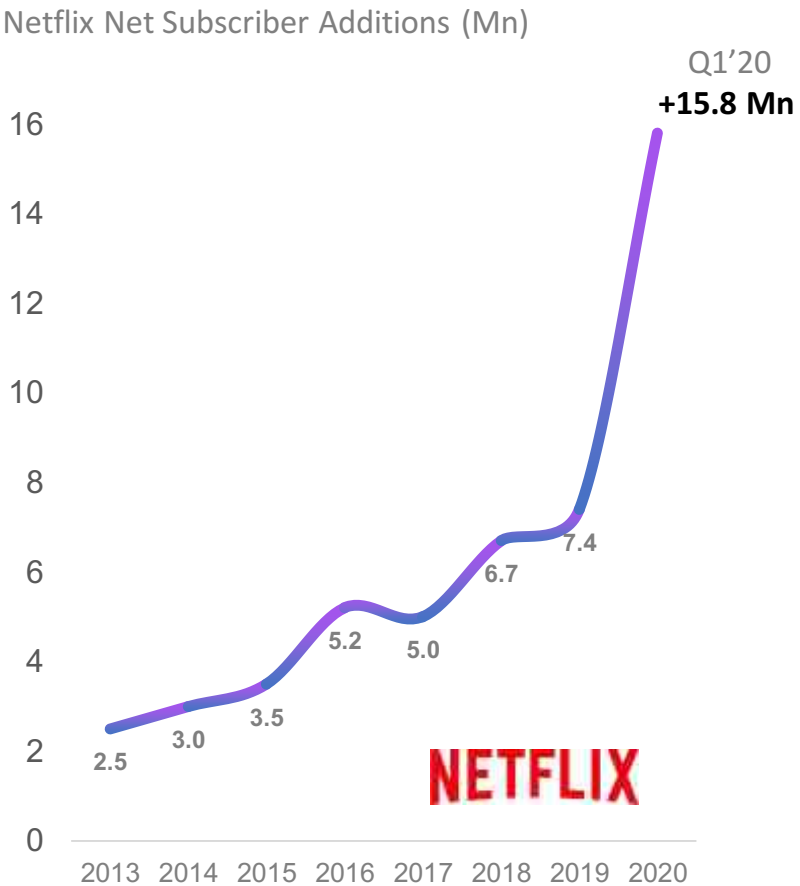


Covid has Significantly Accelerated this Journey

Study and Work from Home have become second nature



Online viewing has doubled



All this is Resulting in...

Significant Network Creation Opportunity

More
networks
need to be
created

New players
are building
networks

Networks are
transforming
to fibre rich

Focus on
speed of
installation

The need for speed

How can we Build Denser Networks Faster !!

Denser



Micro Cable Technology

Faster

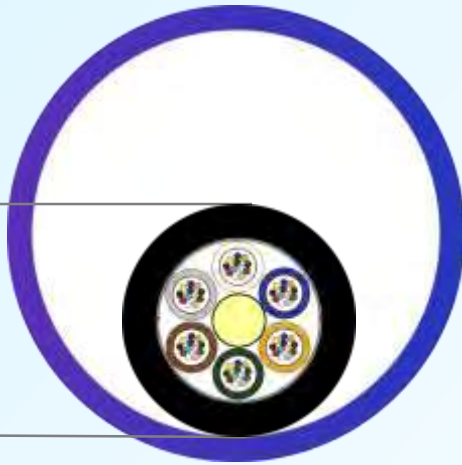


Blow Installation

Traditional duct

25mm/20mm

10.6 mm



72F

**Conventional
Duct Cable**



Microduct

12mm/10mm

Maximum Duct Space Optimization

**4x
Fibre
Density**



8 mm

288F

**Next Generation
Micro Cable**

Micro Cabling Technologies

Micro Cable
96F (12F x 8 LT)



5.8 mm

Micro Cable
144F (24F x 6 LT)



6 mm

Micro Cable
288F (12F x 24 LT)



8 mm

Micro Cable
576F (24F x 24 LT)



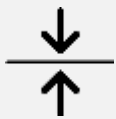
10.3 mm

Micro Ribbon Cable
432F (12F Ribbon x 36)



12.5 mm

Features



Thinner Jacket



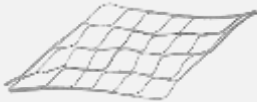
Smaller Tubes



More Fibres per
Tube



200um Fibre



IBR Ribbon

Benefits



Blow Optimized



Reduced Cable
Diameter



Light Weight



Easy Handling



Smaller Drum
Efficient Logistics



Reduced Risk of
Cable Damage

Denser - 7x Fibre Capacity



7
12.7/10
Duct bundles

X

288
Fibres

=

2016 Fibres
41mm OD Duct

7 Pathways !!

Scalable

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

Flexible

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

Smart

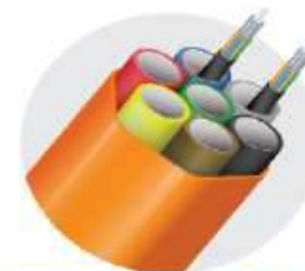
- Limit investment to what's needed today
- No need to predict future bandwidth demands or technology

Combined Benefit for Deep Fiberization

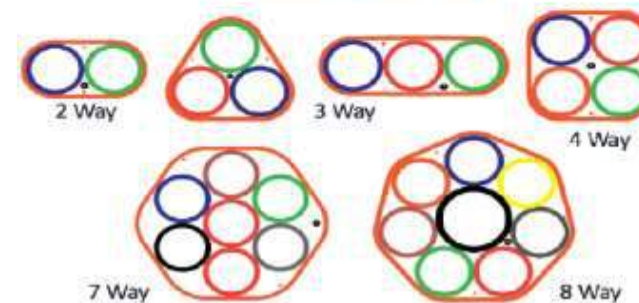
← **Micro cable**

>10x
+

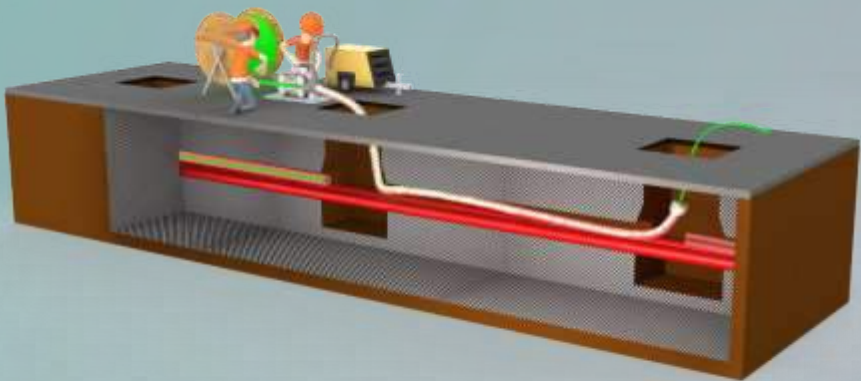
**7 Way
Microduct** →



MicroDucts or FuturePath with high-density fiber cables



Faster – Blow vs Pull Installation



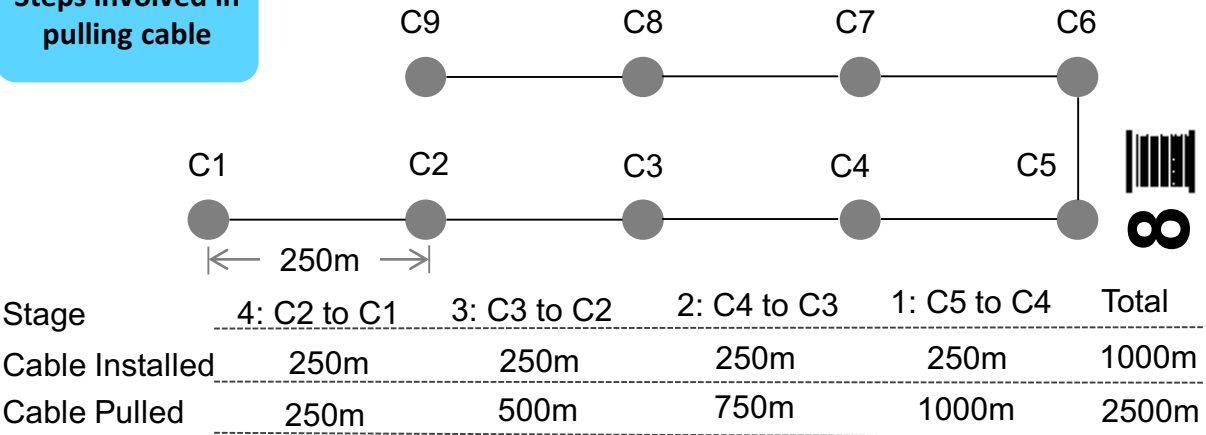
- Pulling manhole every 250m
- For 1 km install cable is pulled for 2.5km
- Blow in single shot

Pulling requires 2.5x effort and 6x time

Faster deployments with Micro cables blown into UG ducts

Parameters	Cable Pulling	Cable Blowing
Machine Setup time	10 mins	30 mins
Required Manpower	3 to 8	3
Typical Installation Length	upto 250 m	2 kms in a single blow
Cable distance pulled for 1 km installation	2500 m	1000 m
Cable pulling/ blowing length per minute	~20 m/min	60-90 m/min
Time taken to install 1 km cable	~3 hours	~ 30 min

Steps involved in pulling cable



Denser and Faster

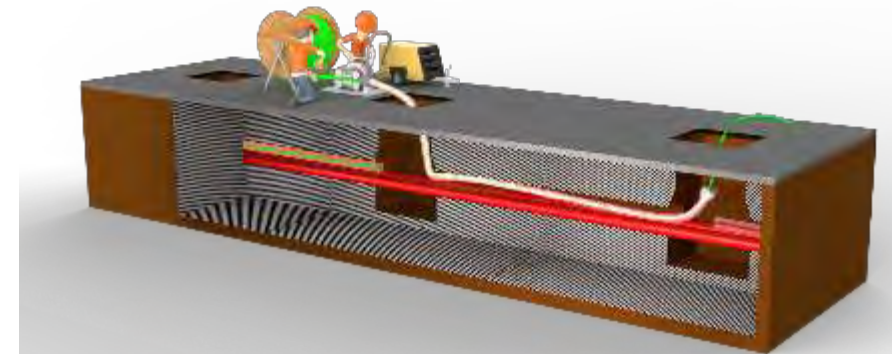
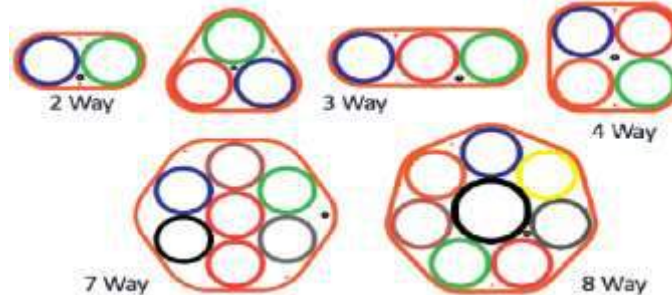
← **>10x** →

Micro cable + 7 Way Microduct + Blowing

← **>6x** →



MicroDucts or FuturePath with high-density fiber cables



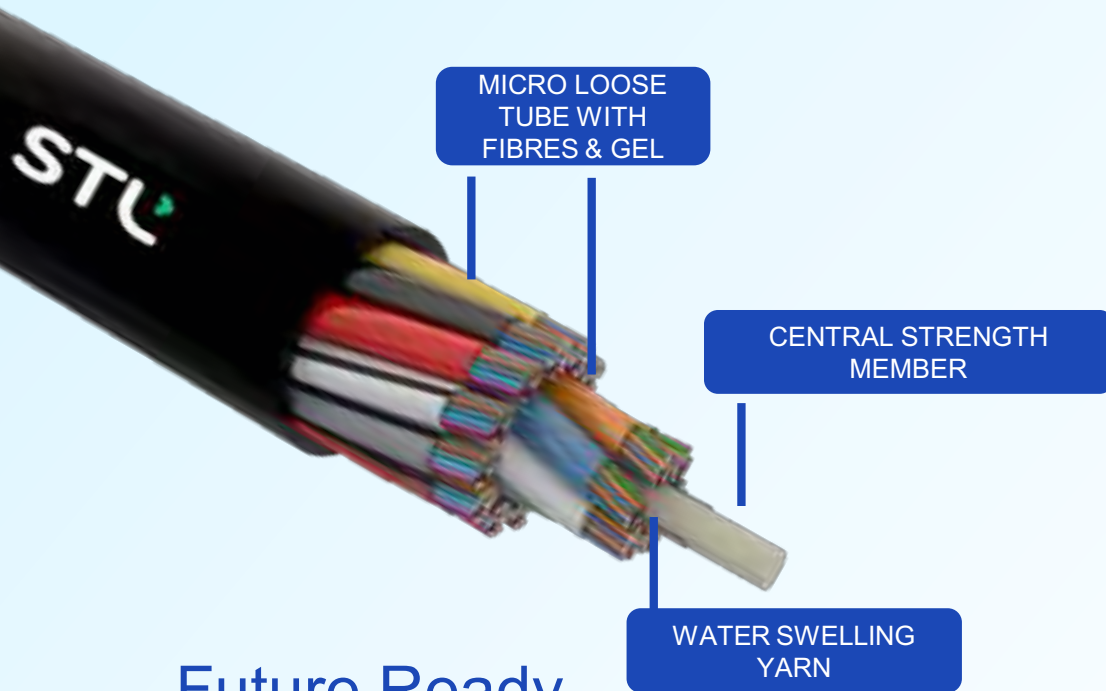
Our Success Stories

Results from the Field



576F Next-Gen Micro Lite Cable in Philippines

World's slimmest 576F cable



Future Ready

2X more fibre

10.3 mm overall diameter with 200μ fibre

Ideal for future expansion

Faster

**Quick
installation**

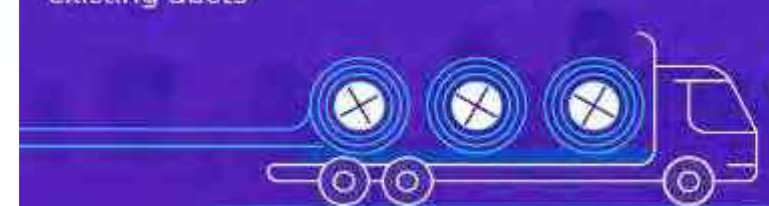


Provides greater ease of handling in manholes and hand holes

Cost effective

Efficient logistics & asset utilisation

Lesser spool weight and facility to over-blow in existing ducts



10.3 mm Diameter 576F in 18/14 Duct



Even after blowing 1500 m, blowing speed of 85 m/min was achieved.

Blow Target 3 x 1.5 km, Achieved 5 x 1.5km

Better than expectation

Expectation



1 deployed



2 deployed



3 deployed



3+1 deployed

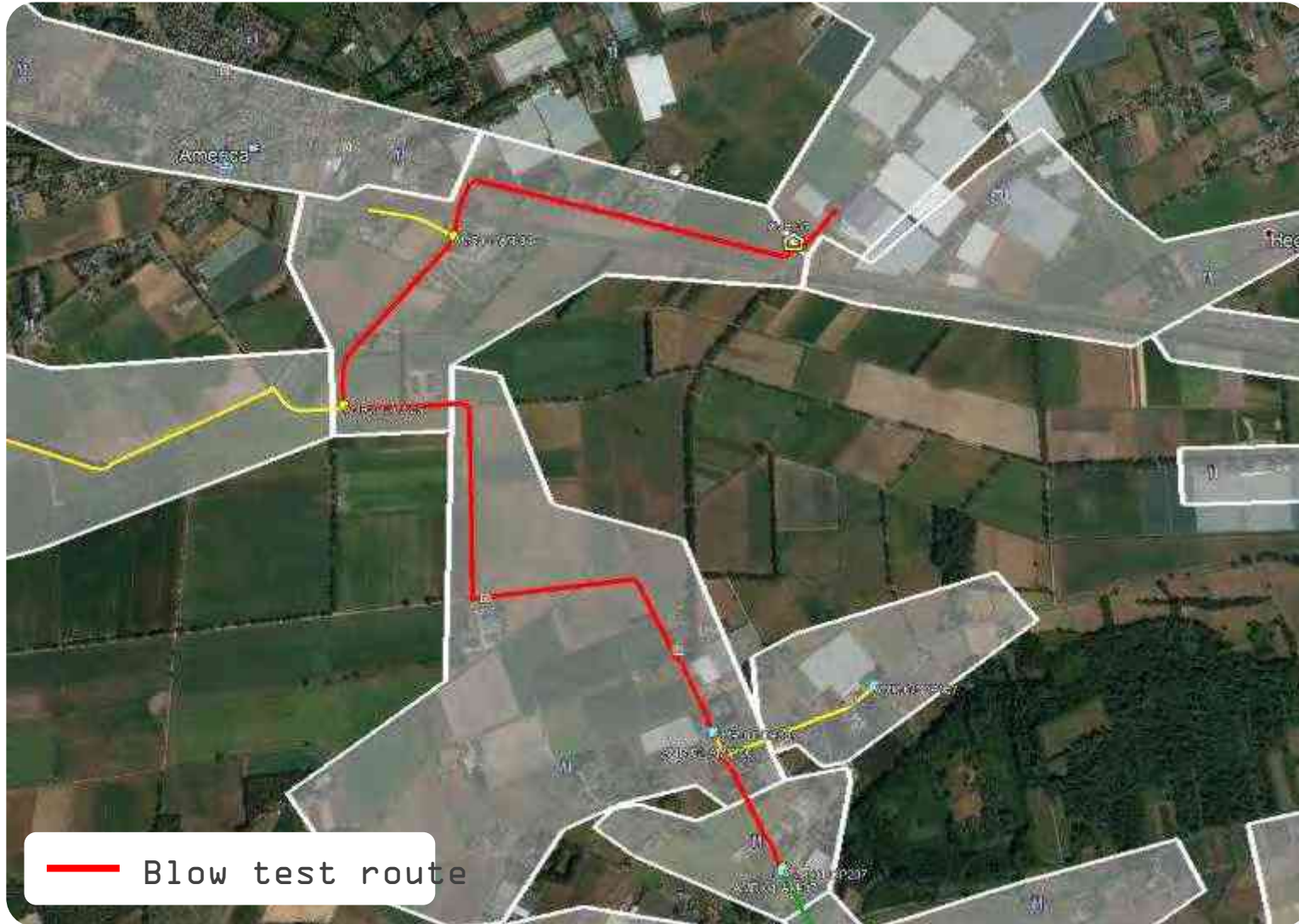


3+2 deployed

Record Blow Speed Installation



Complex Deployment with Multiple Turns in Netherlands



Route length

4km

(Mid span blow, 2 km in each direction)

Duct type

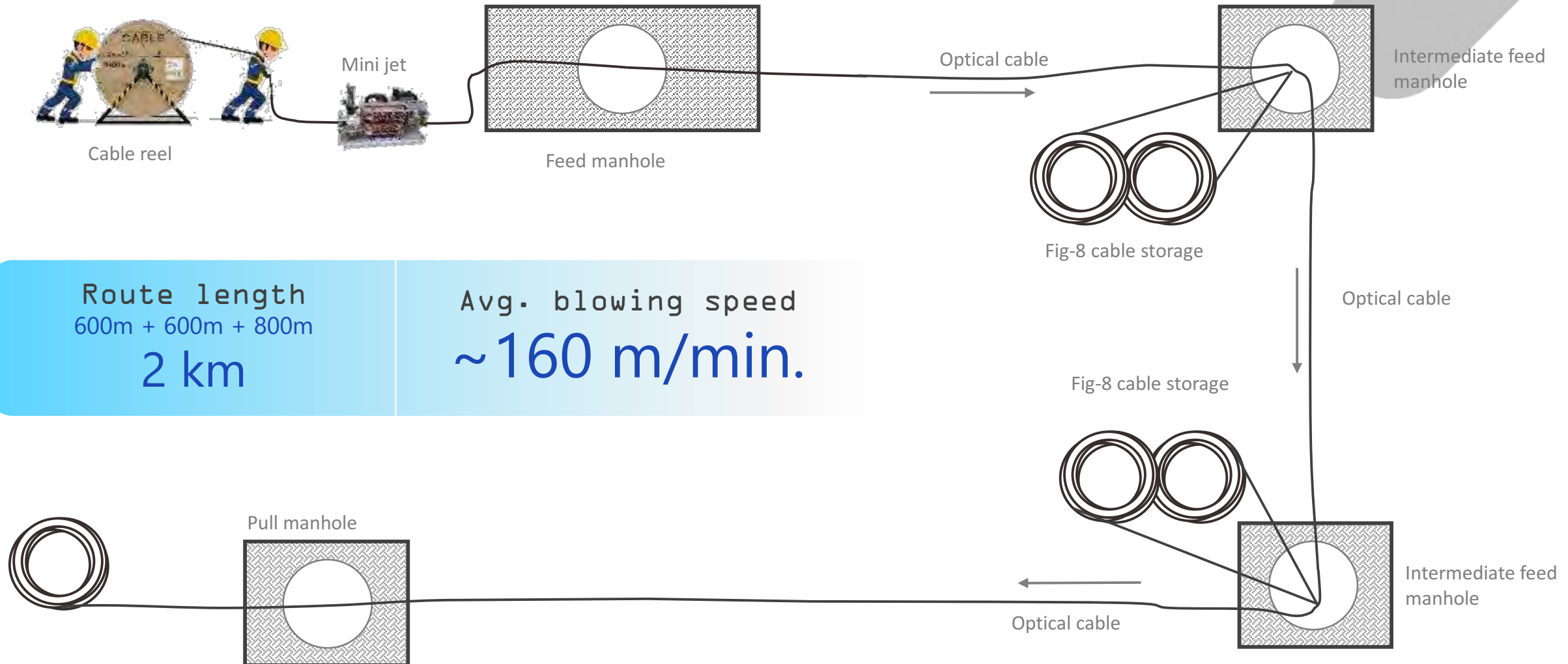
7x14/16 mm

Fibre Count

192F 7mm

Limited time

Plus NextGen Blowing Methods Results In 3X Faster Blowing



STL's Optical Fibre Cable CoE



Superjet - H 01

Cable Diameter: 11 – 28 mm
Duct outer diameter: 20 – 63 mm



Minijet – P 01

Cable Diameter: 4 – 12 mm
Duct outer diameter: 7 – 42 mm



Microjet – PRM 196

Cable Diameter: 1.5 – 7 mm
Duct outer diameter: 3 – 12mm

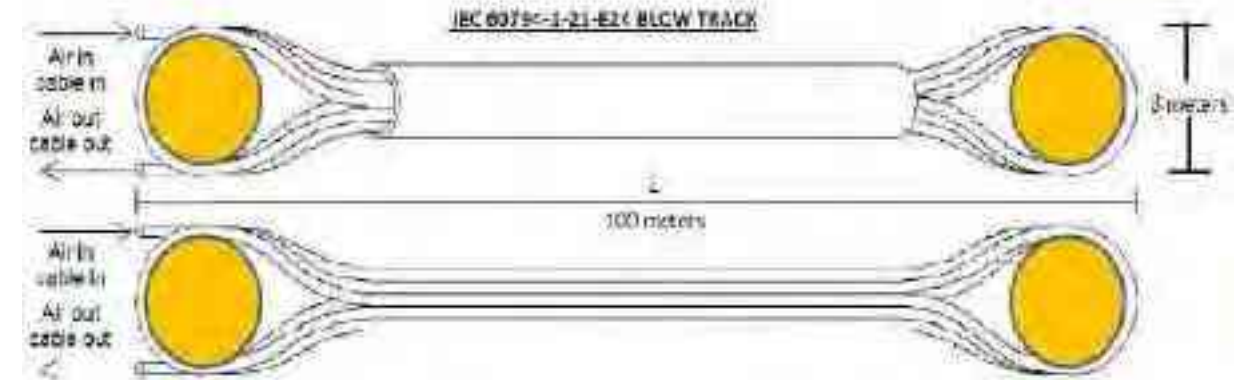


**KAESER M122 &
KAESER M17A**

Blowing/Jetting and Aerial Route@ STL OFC Cable Track



Jetting Track



Jetting Track as per IEC standards

STL Academy Training to Improve Skilling



Bringing in next-gen deployment expertise through

ACADEMIC SKILLING

Upto **30%** enhanced productivity with STL Academy



Academic training

Trenching, Ducting, Backfilling, Blowing and Splicing



Expert skilling

Project management, Methodical execution, Safety procedures



360 Degree program

Collaboration with key OEMs, and mandatory certification

Content



- ① Company
- ② Aerial vs Underground
- ③ Pulling vs Blowing
- ④ Use of PE duct
- ⑤ Key Factors for Success
- ⑥ Equipment and Accessories

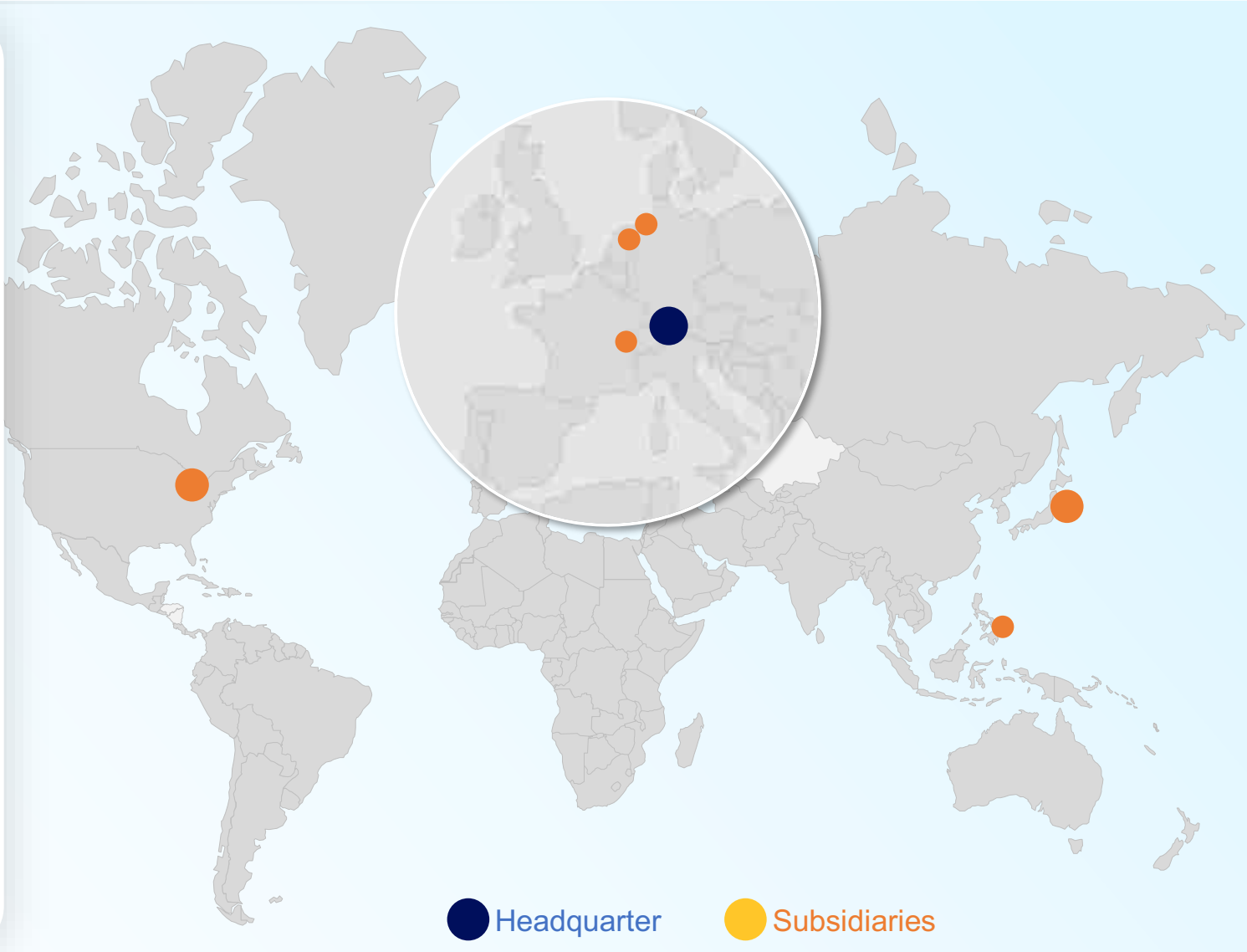
A **global leader** in the design, production and distribution of telecommunication **cable installation** equipment.



Our Worldwide Organization



PLUMETTAZ S.A.	SWITZERLAND
PLUMETTAZ AMERICA CORP.	UNITED STATES
PLUMETTAZ PROJECT EQUIPMENT (SHANGHAI) CO. LTD.	CHINA
PLUMETTAZ SINGAPORE PTE. LTD.	NETHERLANDS
HMS MACHINES B.V	SINGAPORE
INFRARENT BV	NETHERLANDS
EXTER SAS (JV 50%)	FRANCE



● Headquarter ● Subsidiaries

Our key Figures



+130

EMPLOYEES

+10,000

BLOWING
MACHINES

+50

PATENTS

+100

COUNTRIES

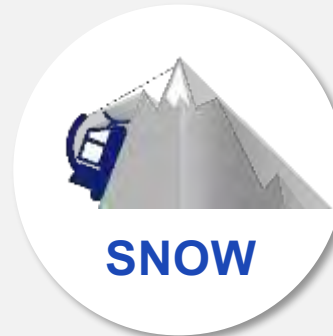
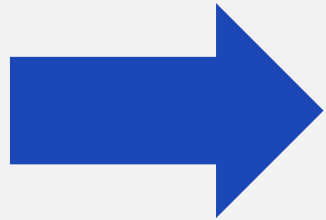
+40

DISTRIBUTORS

+97

YEARS OF
EXPERIENCE

The Industries We Serve



Blowing



Blowing originated with British Telecom in 1982 for the installation of FU's



Cable Blowing/Jetting was invented 1986 by Dutch operator PTT, now KPN and Plumettaz was licensed to build and sell the necessary equipment.

The inventor Dr. Willem Griffioen is since 2009 working for Plumettaz



Aerial VS Underground



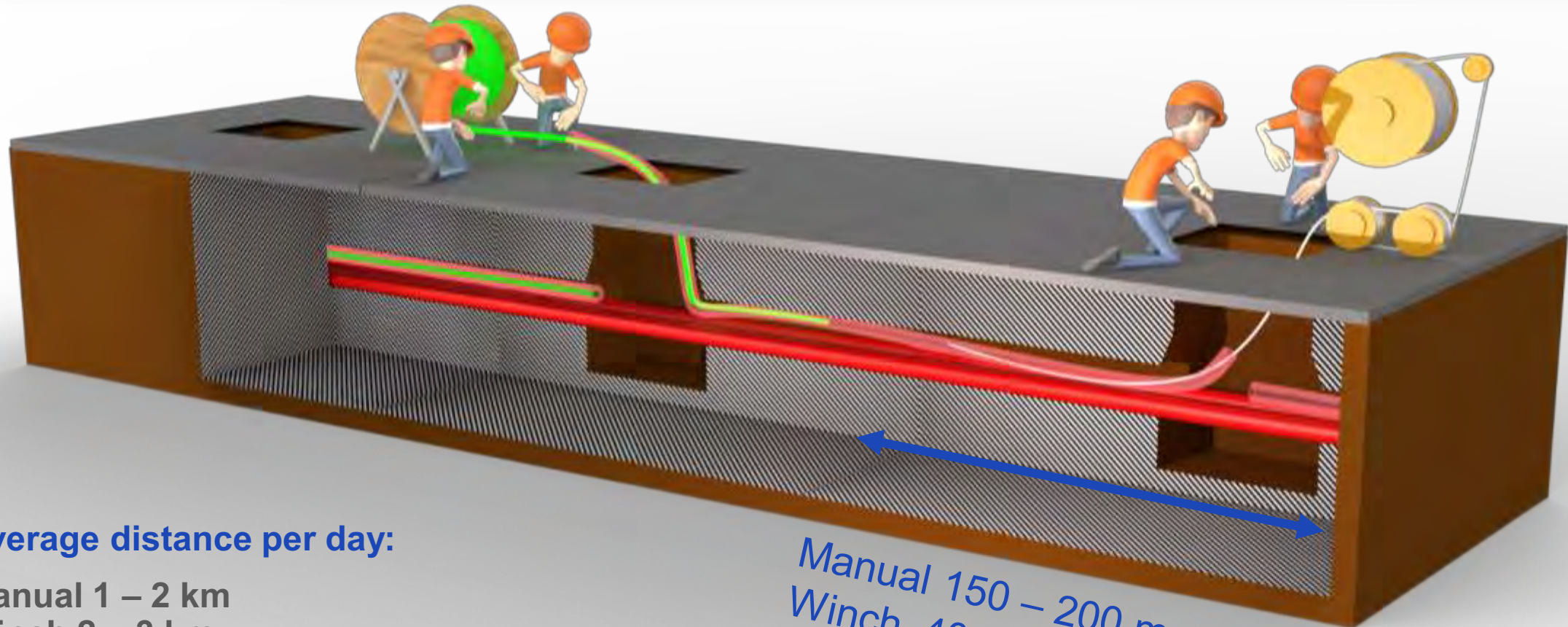
	Aerial	Underground
Subject to damage	High (lightning, fire, typhoon, tsunami, earthquake)	LOW
Disaster prevention	LOW	HIGH
Disturbance	HIGH	LIMITED
Aesthetics	LOW	NOT VISIBLE
Cost	LOW??	8 – 10 x Aerial

Aerial VS Underground



Pulling VS Blowing

Pulling cable using a winch or manual pulling



Average distance per day:

Manual 1 – 2 km

Winch 2 – 3 km

Manual 150 – 200 m
Winch 400 – 500 m

Pulling VS Blowing



Pulling	Blowing
<p>PVC duct 110 mm</p> 	<p>7-Multi-way 40 mm or   </p>
<p>Manhole every 150 – 200 m</p>  	<p>Handhole every 500 – 1'000m</p> 
<p>Space for max. 4-5 cables</p>	<p>Space for 7 cables or 21 cables</p>
<p>Installation distance per day 1 – 2 km</p>	<p>Installation distance per day 8 km</p>



A comparison of conventional fiber and blown cable - Labor & Material costs for 8 km duct route and installation of 3 cables

Total cost :
Conventional 3 x ABF

Pulling



Performance of water and gas duct systems during 6 earthquakes in the US, Japan, Thailand and Columbia.

Source: 15th Plastics Pipe Conference Vancouver September 2010

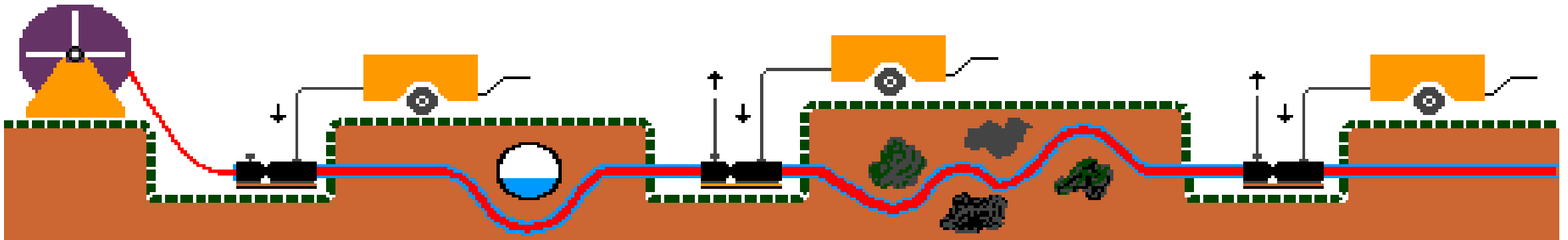
Table VI: Kobe Earthquake Failure Rates of Water and Gas Pipes

Type of Pipe	PE	Steel	DCIP	PVC	CIP	AC
Water Pipe Damage/ km	0.000	0.437	0.488	1.430	1.508	1.782
Gas Pipe Damage/ km	0.000	1.210	0.052			

The 2005 Thailand Tsunami reported about the prevalent use of HDPE for potable water and the piping system performed ‘very well with few failures’.

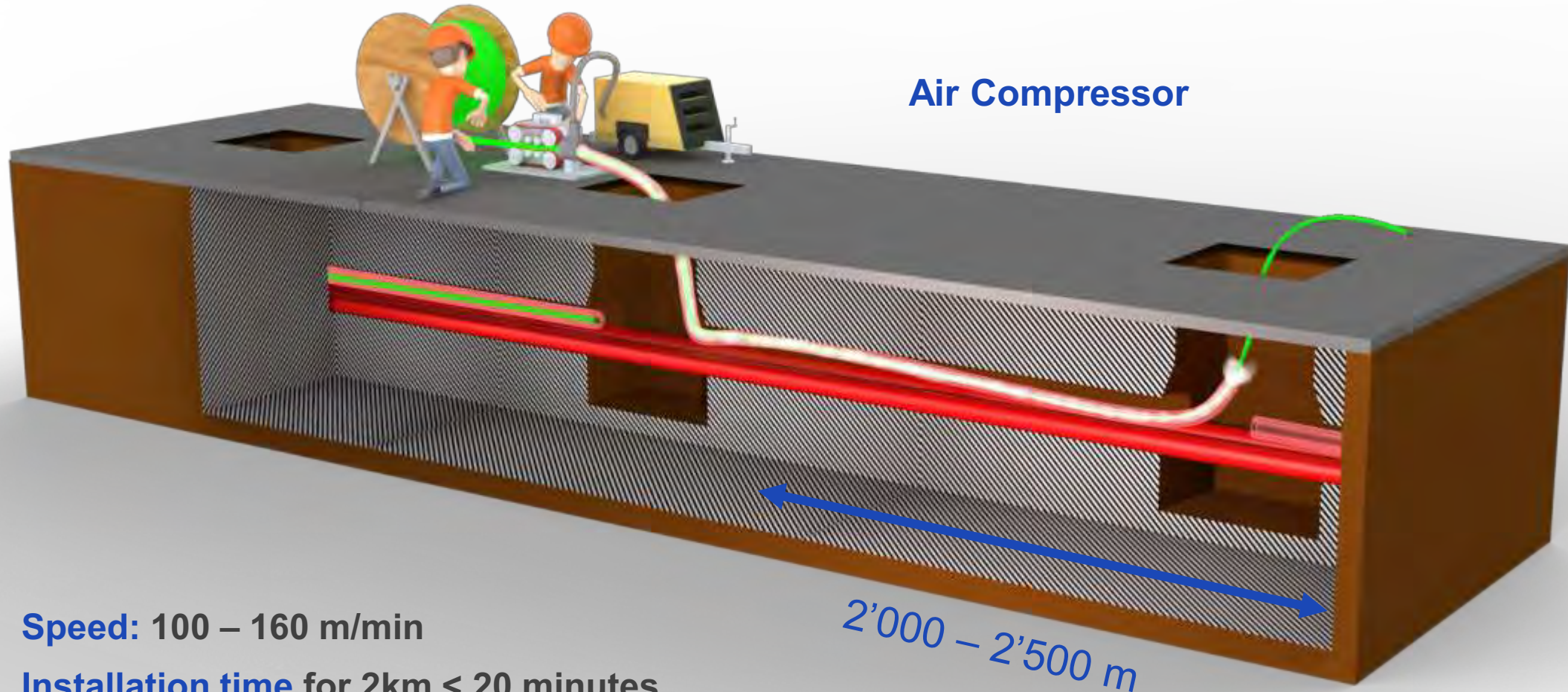
Blowing

Blowing/Jetting = high speed air flow + pushing
Jetting synergy > high speed air flow + pushing
Operation at cable insertion side only
Worldwide proven as better alternative over pulling



Blowing

Air Compressor



Speed: 100 – 160 m/min

Installation time for 2km < 20 minutes

Distance installed 8km/day

Key Factors to Success



Use quality duct:

- HDPE with $> 940 \text{ kg/m}^3$ from virgin material
- min. pressure rating 16 bar for micro-duct

Use the proper duct handling and laying procedures

Duct to be laid, straight, without any deformations and/or kinks and respecting min. bending radius $> 30 \times \text{OD}$ at all times

IMPORTANT: Training and/or Supervision



Duct may never be in contact with stones/rocks

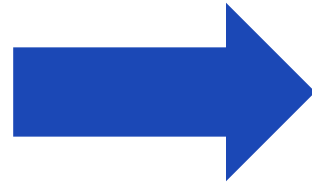
Material in contact with duct must fulfil:

- no particles larger than 16 mm in diameter
- content of particles with diam. 8 – 16 mm < 10%

Layer of 10 cm sand/gravel at bottom trench with alignment of +/- 4 cm per meter must be done by hand. Layer of 20 – 30 cm sand/gravel to cover the duct.

Thereafter excavated material can be used to back-fill the trench

Duct Laying



Duct Laying

H.D.D.



Trenchers



Key Factors to Success



- In Asian climate with ambient temperatures $> 25^{\circ}\text{C}$ use of a compressed air cooler is mandatory
- Use the proper duct-cutting, -slitting and -deburring tools
- Use MicroJetting Lube, a water based lubricant
- Use a proper drum-stand with drum-shaft with rotating ends and centering cones

- **MICRO-CABLES WITH DIAM. 0.8 – 3 mm**
Diameter range 0.8 – 1.65 mm designated as Fibre Units
Installed into duct ID 2 – 4 mm
- **MICRO/MINI-CABLE WITH DIAM. 3 – 11 mm**
Installed into duct ID 4 – 14 mm
- Rule-of-thumb: Do not exceed “filling ratio” of 80%
- Filling ratio defined as ratio between cable diameter/ duct ID

Jetting Equipment



ULTIMAZ™ - P2P

Fixed, Variable, Pusher

Cable Diam. 1 – 4 mm

Drop Cable 5 x 3 mm

Duct OD 3 – 12 mm

Pushing Force

Fixed: 5, 7 and 15 N

Variable: 0-20 N

Drive : Cordless drill

Jetting Equipment





Details

Name of Building: Republic Plaza

Height: 280m

Number of Levels: 66

“Tied 2nd tallest Building in Singapore”

Jetting Equipment



Equipment : Ultimaz P2P – F15

Fibre Unit : 1.6mm, 12 F

Micro-duct : 5/3.5 mm

2 x MDF Rooms - one is located in Basement , the other is located on Level 55

Horizontal distance = 50m

Vertical upwards distance = 195m

Jetting Equipment

Speed achieved over 90 m/min



Compressed air 12 bar





ULTIMAZ™ - E25 Evolution

Cable Diam. 0.8 – 4 mm
Duct range 3 – 12 mm

Quick set-up, no tools needed
Build in electric motor
Battery powered
Installation monitoring
Variable pushing force 0 – 23 N

Max. speed up to 200 m/min



MINIJET™-P02

Installation of cables
diameter 4 to 16 mm

Duct OD 7 to 42 mm

Pneumatic drive
Speed up to 190 m/min

Max. pushing force 300N

Jetting Equipment



Installation of 96 core cable diameter 6 mm into duct 14/10 mm at installation distance of 2'040 m with speed of 115 - 119 m/min

Cable was installed over 2.4 km within 20 minutes using Minijet, MicroJetting Lube and drum-stand DS-12

A large, dimly lit room filled with people, mostly seen from the back, with many hands raised in the air. The scene suggests a Q&A session or a presentation. The image has a blue tint. The text "Q&A" is centered in white.

Q&A

Let us know your thoughts
#STLWebinar

Linked in



twitter

