

CORNING

## Solutions To FTTH Challenges In Africa

Mike Knott C.Eng., M.I.Mech.E.

Market Development Manager - FTTH

# African Diversity

A collage of fiber optic service advertisements from various African providers. The ads include:

- zuku FIBER**: Logo with a colorful dot.
- ZOL fibre**: Logo with a blue and orange background.
- NX FoS**: Advertisement for fiber service with a woman's image.
- LA FIBRE OPTIQUE**: Advertisement for home fiber service, mentioning "Jusqu'à 100 MEGA" and "Raccordez votre maison à la Fibre Optique à partir de 75 000 F".
- Falba**: Logo with a green and blue background.
- VUMA**: Logo with a red and blue background.
- Up to 100Mbps La Fibre**: Advertisement for high-speed fiber service.
- Get Africa Superonline**: Advertisement for superonline fiber service.
- FLY WITH FIBRE**: Advertisement by link africa.
- rahaFIBER**: Advertisement with the tagline "It's not enough to be a trendsetter - sometimes you have to be the trend."
- Fibre Connect**: Advertisement with the tagline "The speed of now." and website "getraha.com.za".

# What Are The Outside Plant Challenges Specific To Africa?

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## 1. Cost of Network Build And Operation

- Requirement to build fast and monetize investment
- Availability Of Skilled Splicing Resource



## 2. Range of Installation Environments

- Product Flexibility



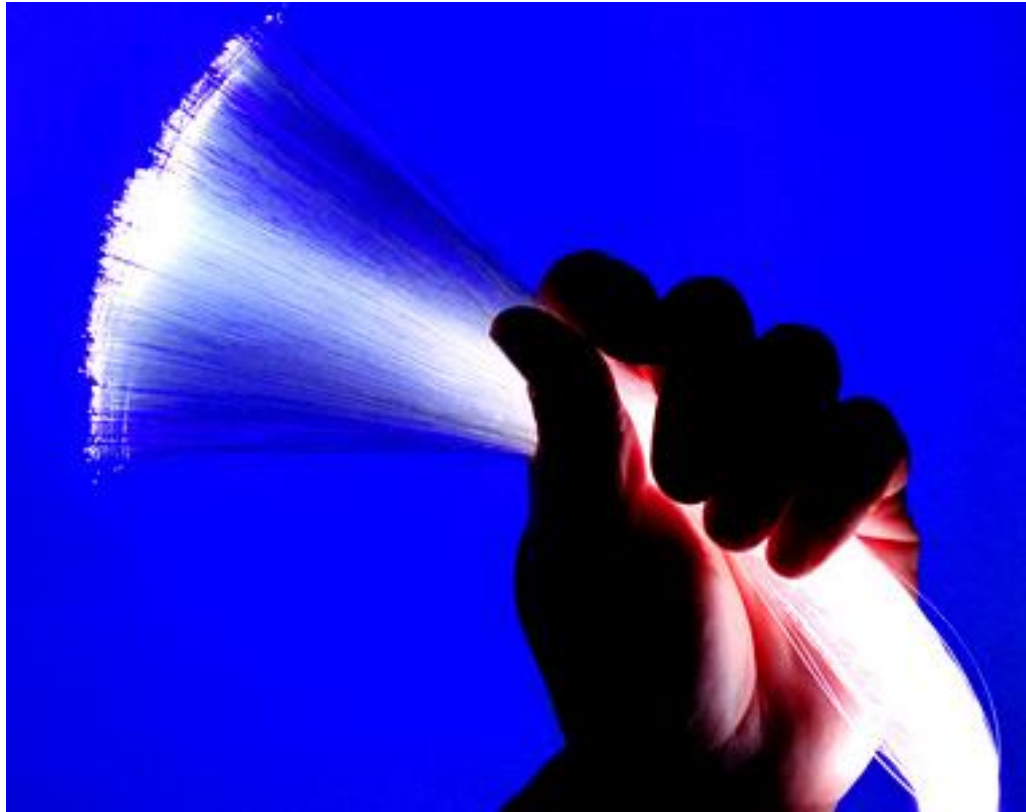
## 3. Network Security

- Product Reliability



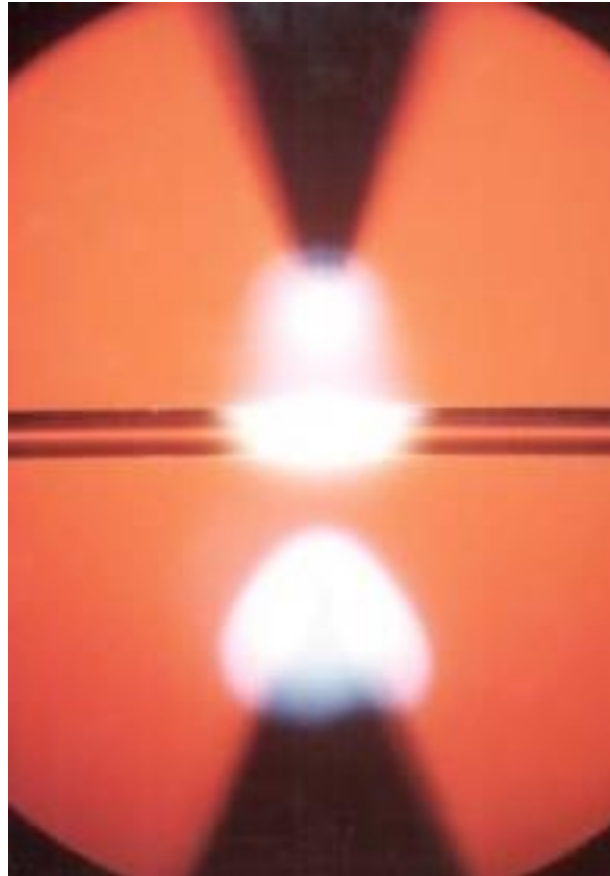
# Optical Fibre Has Changed The World...

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# ...But Splicing Fibre Takes Time and Skill

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# ...And There's Lots Of Fibre To Be Spliced In FTTH



- Costly equipment needed
- Non-productive time can be significant
- Residential customers demand minimum disturbance



# Splice vs. Connectors

Replace This...



With This



# Splice vs. Connectors

Difficult and time consuming splicing ...



...becomes as simple as plug and play.



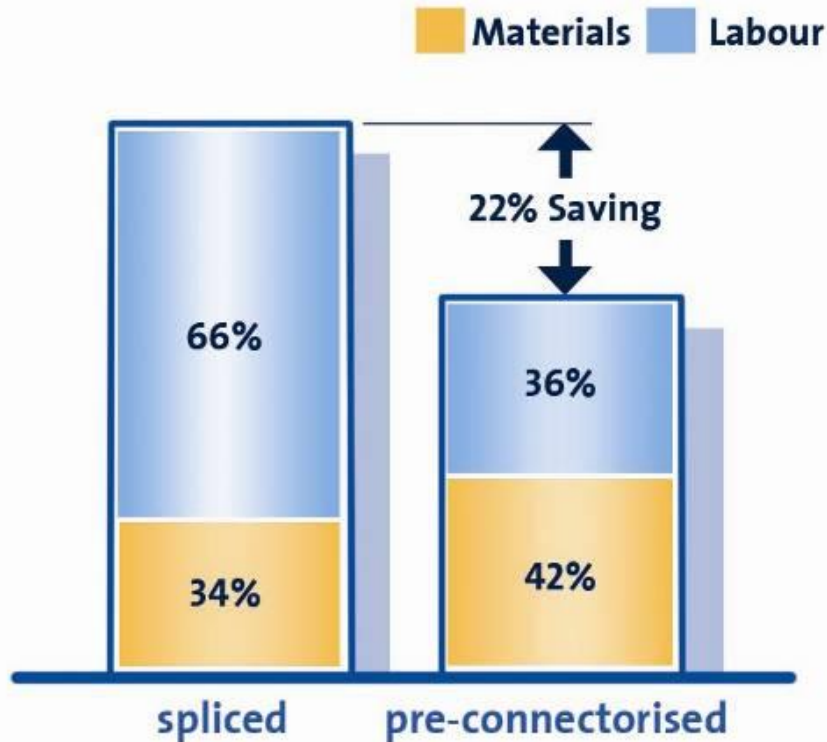


# The Benefits

- **Faster**
  - More customer connections per day with fewer installers
  - Faster Homes Passed Deployment
  - Shorter time to revenue
- **Easier**
  - Customer installs by unskilled technicians
  - Fibre that handles like copper and can be joined like copper
  - Avoidance of skilled labour shortages for mass rollout
- **Reliable**
  - All components assembled and tested in factory controlled conditions
  - Easy reconfiguration and access for testing
  - Modular upgrade path and flexibility in design



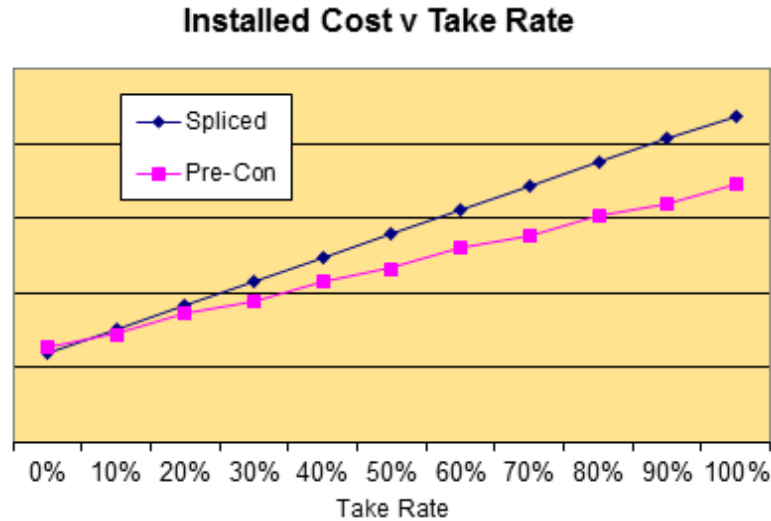
# Typical Cost Per Home Comparison



- Based On 40% Take Rate
- Costs include outside plant materials and installation costs
- Costs exclude civils, duct and electronics

# Financial Considerations

- Variation Of Installed Cost v Take Rate



- Day 1 costs are slightly higher for pre-connectorised
- But break even take rate is only 6%

# Availability Of Skilled Labour

- For a spliced solution, each residential installer needs a fusion splicer .... and the skills to use it

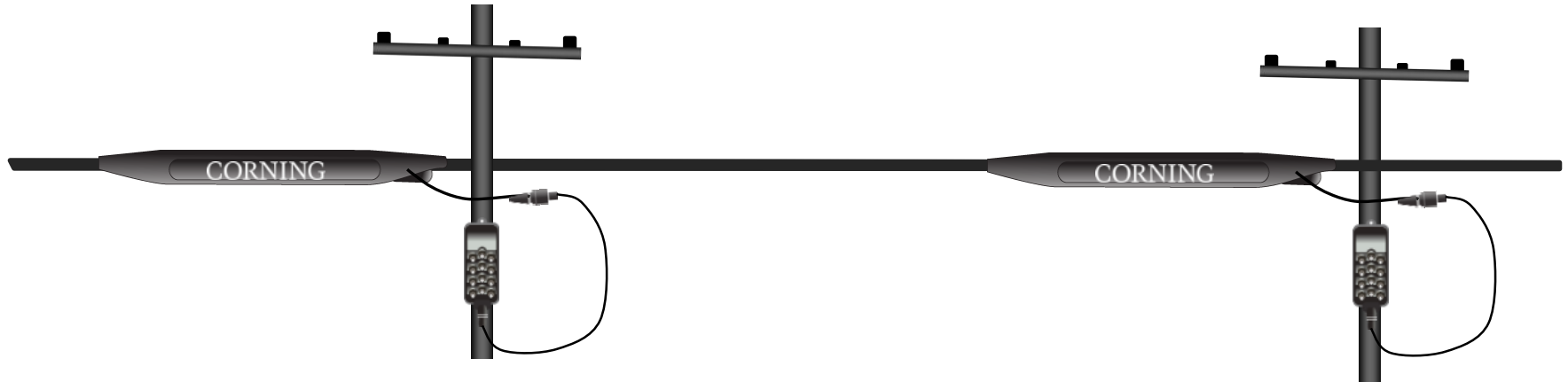


- Any large scale FTTH deployment means skilled splicing resource will become scarce – *“Certain private FTTH providers noted a skills shortage developing in this area of the market – with the availability of technicians with appropriate qualifications a hindrance to last-mile connections.” UBS Global Research Paper on South African Telecoms Feb 17*
- Skilled splice resource needed to pass 1000 homes and connect 40% could install 500 km of long haul 96f trunk route

# Cost Deferment At Homes Passed - FlexNAP

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- Hardened connectors also enable a pay as you go strategy
- FlexNAP is a custom designed solution with factory installed tap points installed where they are needed



- Only install the terminal when a customer requests service

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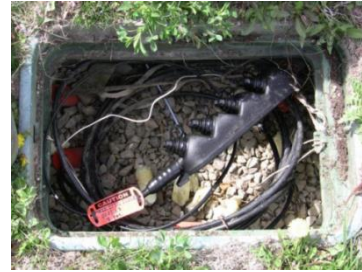
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1. Cost of Network Build And Operation
  - Availability Of Skilled Splicing Resource
2. Range of Installation Environments
  - Product flexibility
3. Network Security
  - Product Reliability



# Range Of Civil Infrastructures

- Telecom civils infrastructure may be less well developed in Africa compared to other regions
- Aerial, underground duct, direct buried, building facade, power infrastructure - wherever it will go!



# Aerial + Low Premise Density Applications

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- Aerial network is the lowest cost civils infrastructure
- Aerial deployment is more common outside cities
- All FTTH components must be suitable for aerial deployment
  - Network Access Points
  - Drop Cables
  - Closures
- Mounting Options
  - On steel lattice, concrete or wooden poles
  - On messenger wires
  - On building facades





# Cables Designed For Simple Low Cost Aerial Fittings

- Ruggedised cable design enables the use of wedge clamp fittings
- Simple fittings originally used for copper drops
- Low cost, fast and easy to deploy, widely available

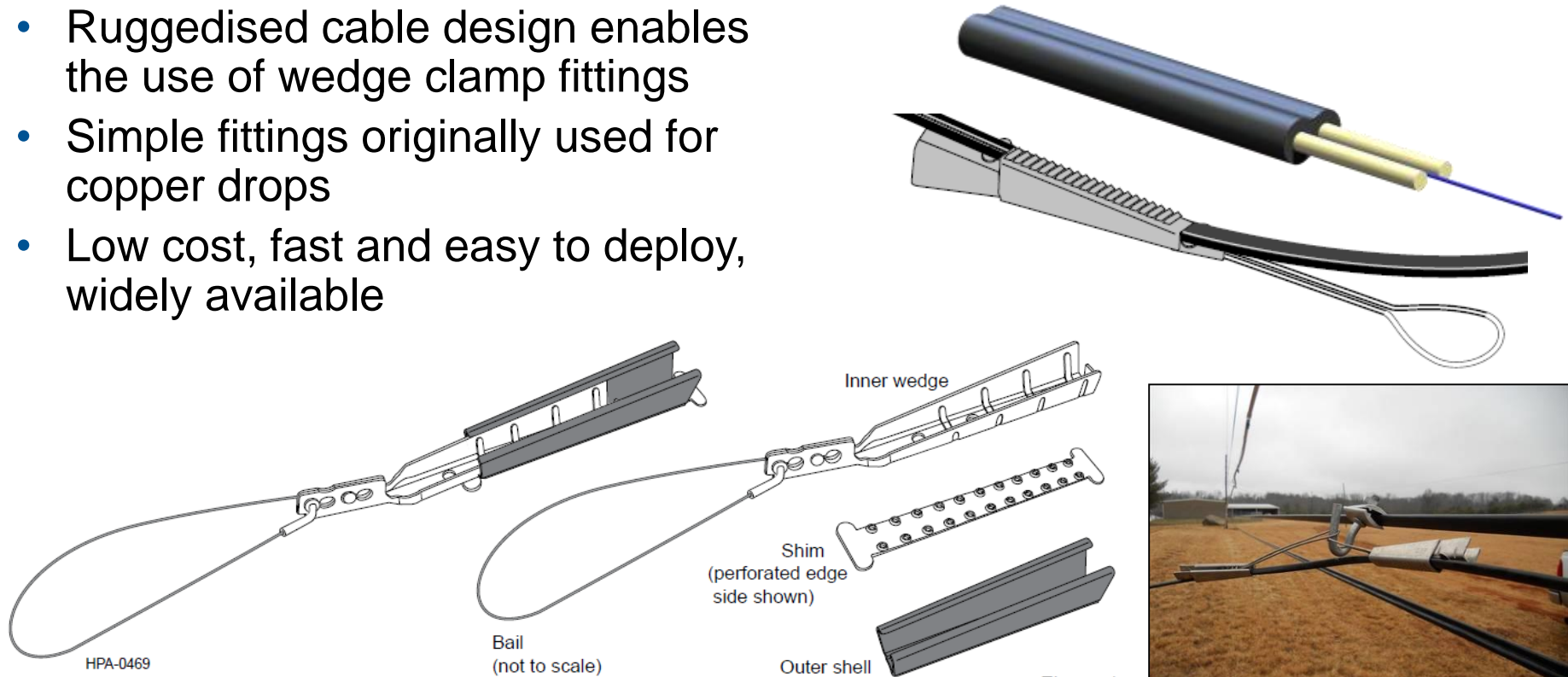
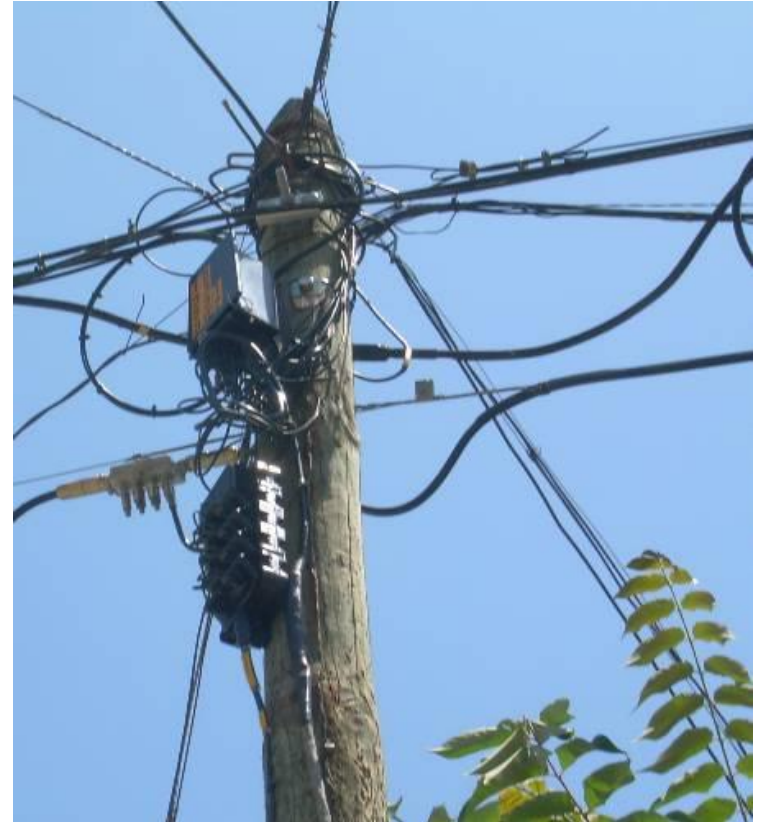


Figure 1

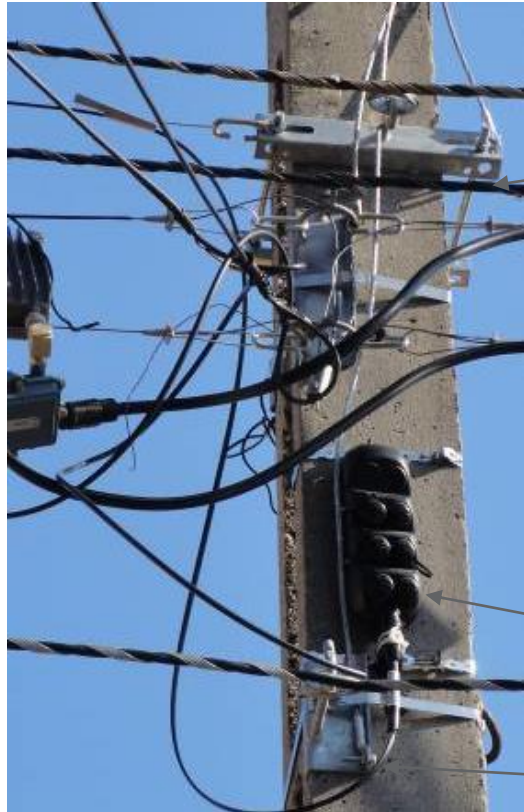
# Aerial Deployment



# Aerial Deployment



# Aerial Deployment – Power Utility Network

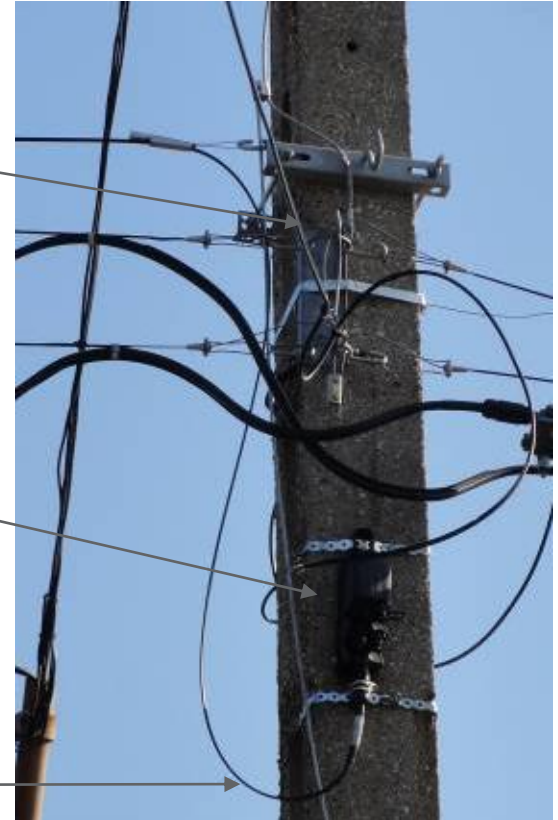


Existing Aerial Plant

4 Port Terminal

8 Port Terminal

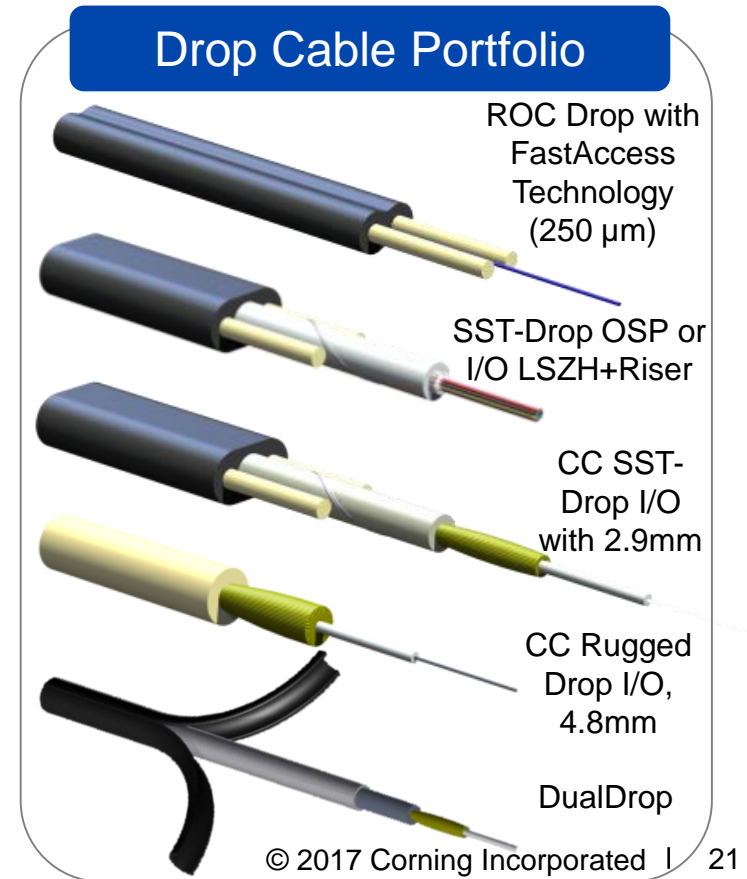
Stub Cable



# Drop Cable Is Has The Most Demanding Application

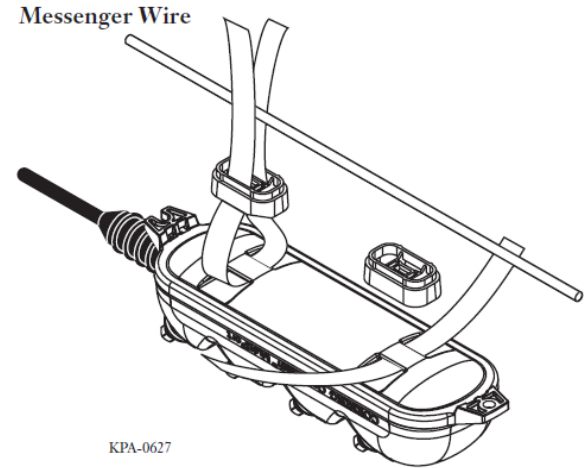
A variety of solutions to fit any network configuration

- OptiTap on ROC Drop – Fast Access Technology
- OptiTap on 5mm round
- OptiTap on SST
- Hybrid OptiTap to SCAPC
- Multi-Fiber (up to 12F OptiTip) on SST
- Multifiber (2F OptiTip) on round FREEDm fanout
- DualDrop Indoor/Outdoor Fast Access cable



# Product Implications

- Civil costs can be up to 80% of the overall network build
- The key to a successful FTTH business case lies in exploiting the existing civils infrastructure
- Products must meet universal application
  - Specified for harshest environment
  - IP68 across the product range
- Fitting kits to be included
  - Universal kits for many applications
  - Parts supplied with products
  - Mounting facilities are a design feature
- Cable properties are challenged in diverse applications
  - An aerial cable **is** different to a minicable
  - Hardware must be compatible with all cable designs



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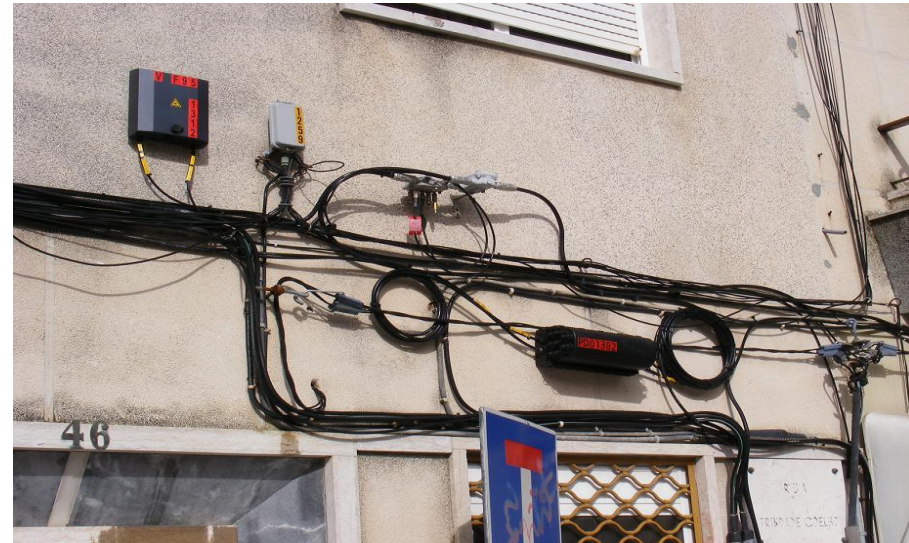
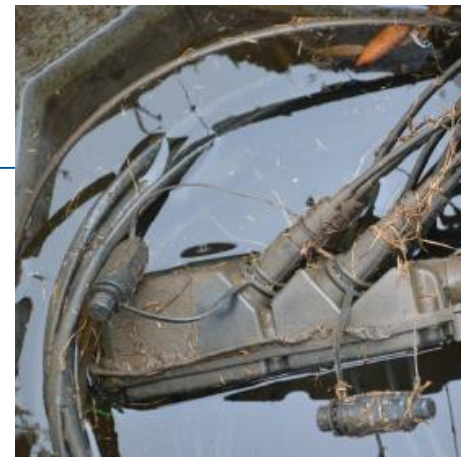
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# Network Security

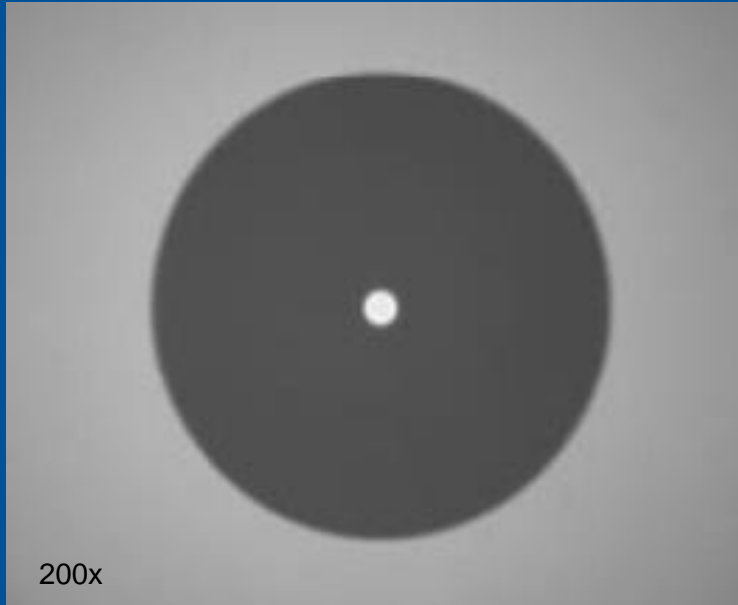
- The FTTH network has to operate in an uncontrolled and unprotected environment
  - Subject to disturbance from the outside world
- Rugged and reliable products are required
- Products which reduce external risk for installation staff





# Aren't Optical Connectors Too Fragile For Outside Plant?

How do you achieve this level of cleanliness...



In an environment like this?



# One Operator Took the Risk...

...and it paid off!

*“The drop is accomplished by employing a **hardened connector** to reduce maintenance issues. The cost per drop may be initially higher than a splice, though it can be **done quicker and requires less skill** and auxiliary equipment.”*

– Verizon, FTTP: Lessons Learned, OFC 2005

After 2 years deployment ...

*“The outside plant **troubles just go away** to literally zero when we're doing this”*

– Verizon CFO,  
Doreen Toben,  
Earnings Call,  
December 2006

Paving the way  
for millions of HP  
globally!



# And Many Followed...

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# Test Specifications

- IP68 rating is typically applied to optical OSP for outdoor deployment.
  - 1<sup>st</sup> digit 6 = No dust ingress
  - 2<sup>nd</sup> digit 8 = Water immersion over 1m
- Telecom standards for Hardened Fibre Optic Connectors go a step further ...
  - Telcordia GR-3120 (connector) and GR-771 (closures + terminals)
  - Environmental conditions wider than any individual African country
  - Mechanical conditions more severe than conventional optical OSP specifications

## GR-3120: Seal under load test setup



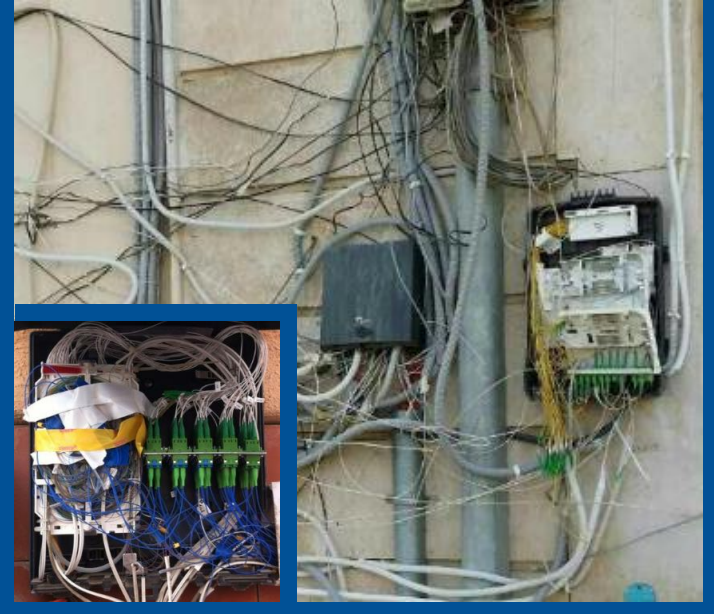
# Network Security

GR3120 Connector Mechanical + Environmental Testing	Duration
GR-1221 6.2.4: Extended Heat Aging +85 °C	84 days
GR-1221 6.2.7: Extended Thermal Cycle: -40 °C +70 °C 100 Cycles	84 days
Proof Test: 740N Plug-Cap	
Impact: 5m drop 3 axes onto rigid surface	
Freeze / Thaw: Mated connector pair in water frozen & held at -5 °C; thawed & held at +5 °C	10 cycles
GR-326 4.4.4.3: Airborne Contaminants Cl <sub>2</sub> H <sub>2</sub> S NO <sub>2</sub> SO <sub>2</sub>	20 days
GR-326 4.4.4.1: Dust Test SAE Fine "Arizona Road Dust" 39% 0-5micron	7 days
GR-326 4.4.9: Ground Water Immersion (sect 5.3.8) Detergent, Chlorine, Fuel, Aqueous Ammonia	7 days

# Non-Hardened Connector Solutions Exist

- Well established with SC or LC connectors inside conventional closures
- No demarcation between network build and customer connection
  - Each drop needs closure access and cable sealing
  - Customer connection teams not focused on fibre management

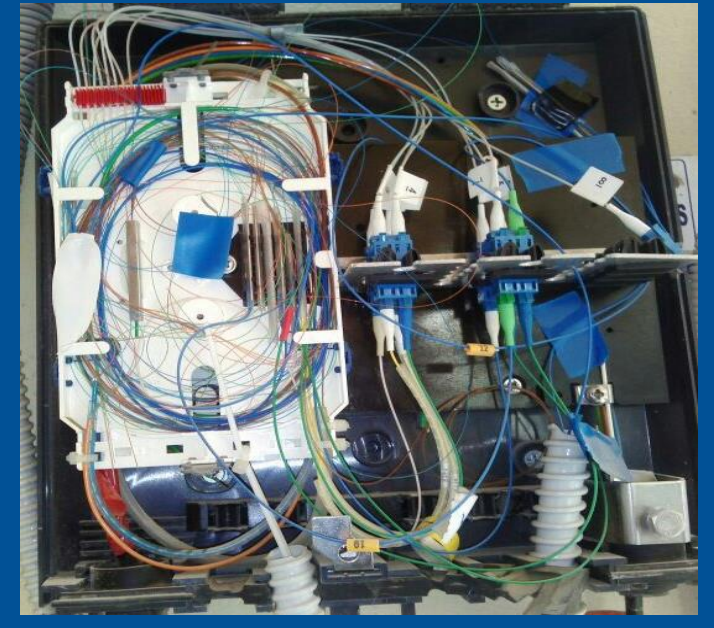
Increased risk of  
subscriber disruption



# Non-Hardened Connector Deployment Challenges

- Reliability can be severely compromised with non-hardened connectors
- High attenuation and fibre breaks at terminals can be the highest cause of network faults

Avoid high attenuation and fibre breaks



# Security For Installation Staff

- Increasing frequency of fibre installation teams being targeted by criminals
  - Splicing equipment is recognised as a valuable asset
- FTTH Council Africa established equipment database



**FTTH COUNCIL AFRICA**

**WHITE PAPER ON THEFT OF EQUIPMENT IN THE FIBRE INDUSTRY**

- Connectorised solutions don't need splicers!





# Hardened Connectors Continue to Evolve

- New products to meet operators' demands
  - Balance of added flexibility while maintaining toughness
- There are a range of hardened connector formats now available
  - Some formats have multi-vendor interconnect capability
  - Single-fibre versions mostly based on SC interface
  - Multi-fibre versions based on MT interface

## Continued development



Female OptiTap® Connector



Multi-fibre OptiTip® Connector

# Summary

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- Pre-Connectorised FTTH solutions offer significant benefits for FTTH Deployment in Africa
  - Faster network rollout and customer installs
  - Low skill plug + play connections
  - Reliable proven solutions
  - Lower cost deployment
  - Reduced dependence on skilled splice labour
- Fibre install is like a CATV install
  - Simple redeployment of current resource
- Outside Plant products are flexible and versatile to meet the wide range of installation environments
- Reliability is proven through successful mass deployments throughout the world

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