Connected World.
Connected Experiences.

Tech Mahindra

ACCELERATING FIBER ROLLOUT FOR DIGITAL COMMUNITIES

Contents

Introduction

Today, the Internet is an essential part of our everyday lives—allowing us to be informed, transact business, and generally communicate. However, too many people still lack access to the Internet.

The drivers for expanding and augmenting Broadband Infrastructure are as under:

- Approximately 4 billion people live without Internet access, 90 percent of whom live in developing countries.
- Bridging the Digital Gap between cities and non-urban regions, especially rural areas, which was created by asymmetric roll out of Broadband Infrastructure.
- Sustainable Development - The digital economy is expected to account for a quarter of the world's GDP within the next decade. By creating new business models, products, and services, digital innovation provides unprecedented opportunities for countries to accelerate growth and skip the traditional stages of development.
- IoT: Internet access is moving towards a connected society, with smart applications provided by different Internet of Things (IoT) use cases.
- New and emerging technologies, such as artificial intelligence (AI), blockchain, and wireless systems are quickly transforming the way we are delivering services, including to poor and marginalized populations.
- Proliferation of increasingly data-consumptive devices and applications in everyday life, increasing relevance of content, readiness of the consumer market and falling service, device, and application prices.
- Tackling global public issues such as climate change and gender disparity.
- The Covid-19 pandemic has necessitated working from home resulting in an ever-increasing demand for higher bandwidth across the globe.

There are many Fixed and Wireless Access Technologies available to connect consumers to the internet. The choice of Broadband infrastructure types is based on different logistic, economic and demographic conditions.

A comparison of various internet technologies is shown in the table below:

Internet Technologies Comparisions							
	DSL	Fibre	Cable	Satellite		4G	5G
				Viasat	HughesNet		
Speed	Moderate	Very High	High	Low	Low	High	Low
Reliability	Moderate	High	High	Low	Low	Very High	Very High
Download Speed	1 to 500 Mbps	25 Mbps to >= 1 Gbps	20 Mbps to 1 Gbps	12 to 100 Mbps	Upto 25 Mbps	5 Mbps -12 Mbps	20 Mbps - 60 Mbps
Upload Speed	384 Kbps to 8 Mbps	5 to 880 Mbps	7 to 50 Mbps	Upto 3 Mbps	Upto 3 Mbps	2 Mbps -5 Mbps	65 Mbps -120 Mbps
Price (USD / Month)	20 to 300	50 to 650	50 to 500	30 to 150	60 to 150	60 to 100	70 to 100

The Broadband Infrastructure Value Chain or Internet Backbone comprises

1. Last Mile
2. Middle Mile
3. National Backbone
4. Cross Border

The pressure to expand broadband infrastructure because of the above drivers, impacts the entire value chain from local access to international connectivity. Each link in the Broadband infrastructure value chain, poses its own challenges in the process of installation, expansion, and upgrade. To meet these challenges, service providers, investors, and governments must use a variety of technical, commercial, and business solutions[1]

Fiber as a medium of choice for Internet backbone providers has several advantages.

This paper is restricted to Fiber as a medium of choice (where cost effective) for the Internet Backbone and covers the following

- Advantages of using Fiber in the internet backbone either as Last Mile Access, Middle Mile, National Backbone or Cross Border
- Cost Comparison - Last Mile scenarios
- Business Models for Infrastructure Deployment
- Business Process for Fiber Rollout, challenges faced during rollout and accelerated remedial actions
- Tech Mahindra Fiber Planning & Deployment Services

Fiber based Internet Backbone – Advantages

Fiber as a medium of choice for Internet backbone providers has several advantages:

1. Fast data speeds and large bandwidth.
2. Suffers relatively little attenuation, allowing them to cover long distances with few repeaters.
3. Immune to crosstalk and other forms of electromagnetic interference, which plague electrical transmission.
4. The technology is scalable, secure, understood, and in many cases, the most cost-effective. Essentially all metro, regional, long haul, and submarine networks today are fiber-based, meaning they can already scale to voracious Data Centre Interconnect growth by leveraging the very latest in optical transmission technologies to support increasing backhaul bandwidth requirements arising from bridging the Digital Gap and 5G rollout.
5. GPON (reach up to 20 km) is a gigabit passive optical network technology and is to date the most widely used mainstream optical access technology. Advantages of GPON
    a. Less physical equipment required
    b. Lower maintenance requirements
    c. More bandwidth, delivered more efficiently
    d. Easier network management

	GPON (Gigabit PON)	XG-PON (10 Gigabit PON)	XGS-PON (Symmetric 10 Gigabit PON)	NG-PON2 (Next Generation PON2)
Upload Gbps	1.2	2.5 / 10	10	40
Download Gbps	2.5	10	10	40

6. Super PON Scales the Passive Optical Network (PON) to a longer reach (up to 50 km) and to a significantly higher number of Subscribers
    a. Larger serving area per Central Office (CO)
    b. Fewer central offices
    c. Possibly lower network latency
    d. No active equipment outside the central office

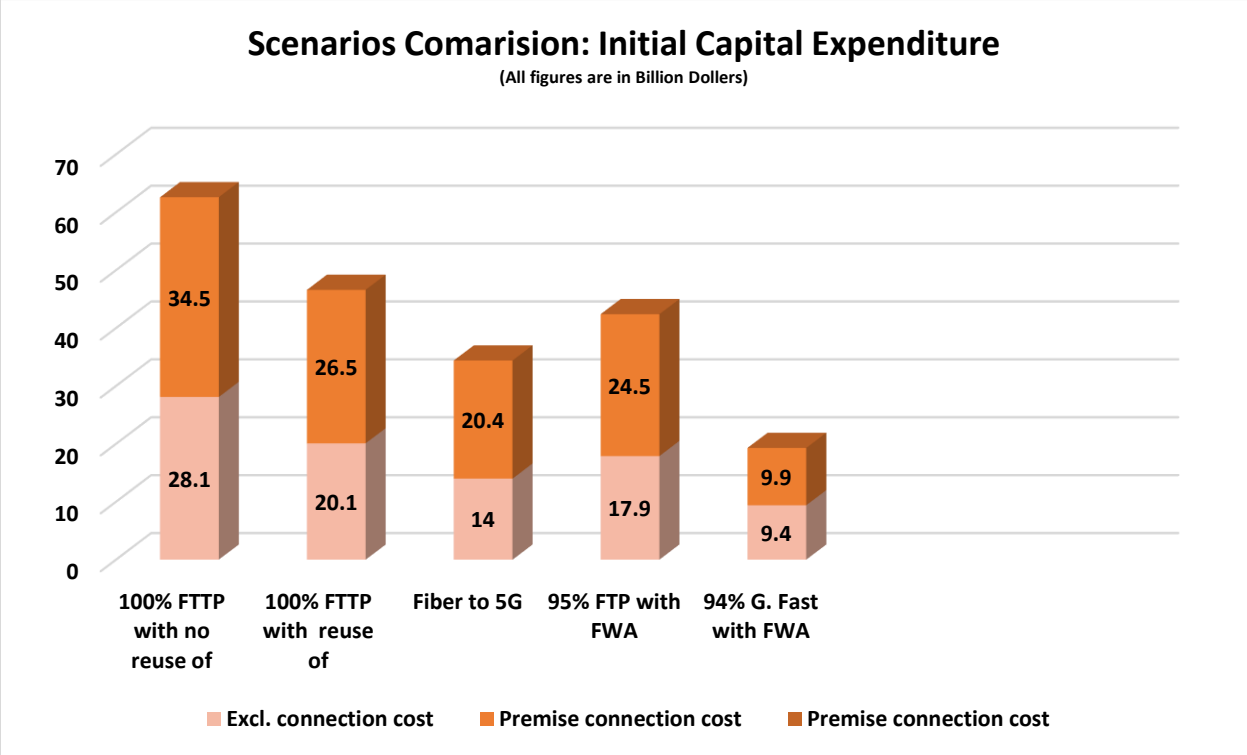
Cost Analysis of Fiber Product Provisioning

1. Diverse geographical conditions and different approaches

A Technology wise comparison of Fiber Rollout reported by the following report[2] are listed below

Key observations made

- Initial Capex is high for the 100% of FTTP without reuse of the infrastructure at the premises.
- Cost of initial Capex will get reduced significantly by reuse of infrastructure such as using micro trenching, reuse of ducts, poles, asset infrastructure sharing and cheap labor cost, etc.
- By using G. Fast as last mile technology, the initial Capex reduces significantly.



1.1 Cost of upgrade from existing Infrastructure to fiber

In some scenarios, Telecom service provider will opt for upgrading the existing infrastructure including copper connection as last mile to fiber connection. However, below cost of upgrade analysis depicts that, total cost of upgrading from copper to fiber is more expensive than upgrading straight to fiber1

In order to upgrade existing infrastructure at site to Fiber, there are 2 options to do this:

Option 1 (Sweating The Copper): This is step by step procedure to upgrade existing copper cable to Fiber cable.

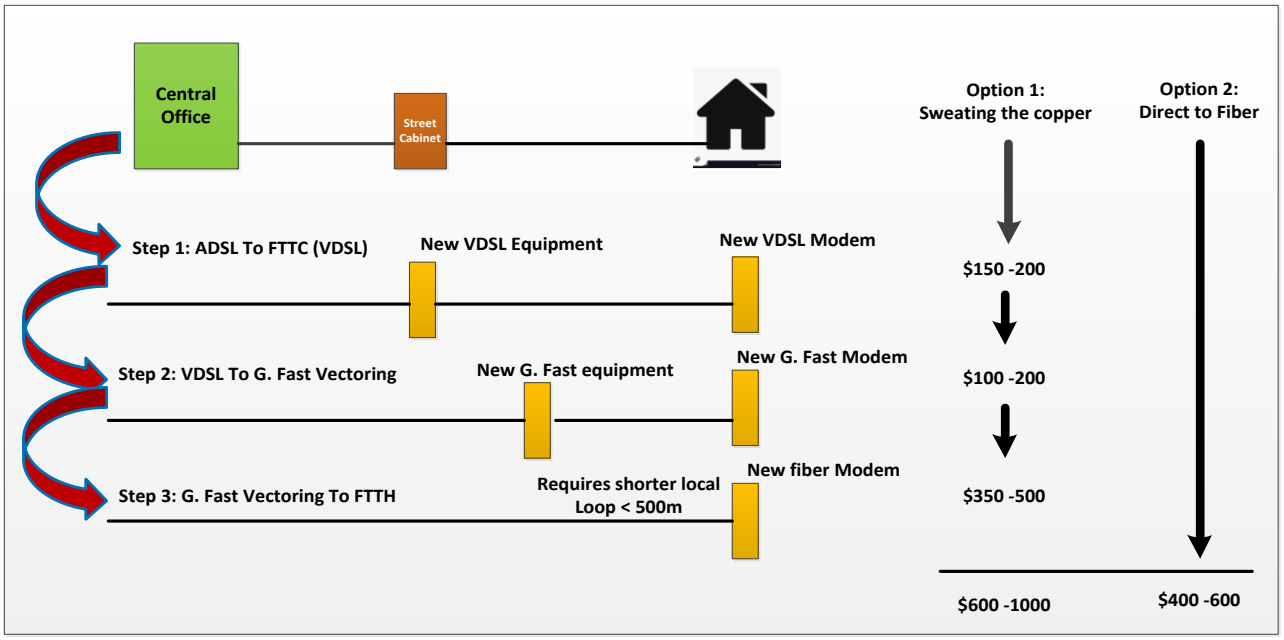
Step 1: Upgrade existing ADSL to VDSL.

Step 2: Upgrade VDSL to G. Fast vectoring.

Step 3: Upgrading G. Fast vectoring to FTTH.

Step 1 will incur cost around $ 150 – 300; Step 2 will incur cost around $ 100 – 200 and Step 3, upgrading to fiber to the premises will incur cost around $ 350 – 500. The overall cost of sweating the copper comes around $ 600 – 1000.

Option 2 (Direct to Fiber): In this option, instead of upgrading gradually to Fiber and sweating the copper, direct fiber cable is laid down at customer premises. The cost of laying down fiber cable will come around $ 400 – 600, which is way lower than sweating the copper option.



1.2 Country wise Cost of Premises Passed

The major component of Fiber Rollout cost is depending on the Cost per Premise / Home passed. The last mile connection consumes major cable infrastructure cost. In some countries, re-use of infrastructure assets, both existing telecom aerial and duct infrastructure, along with electricity network assets, is allowed and utilized wile laying down fiber cable that reduces cost of home passed.

While in some countries, use and sharing of ducts, micro trenching is prohibited and so dedicated ducts and trenches need to be created for fiber cable laying so cost of home passed becomes very high.

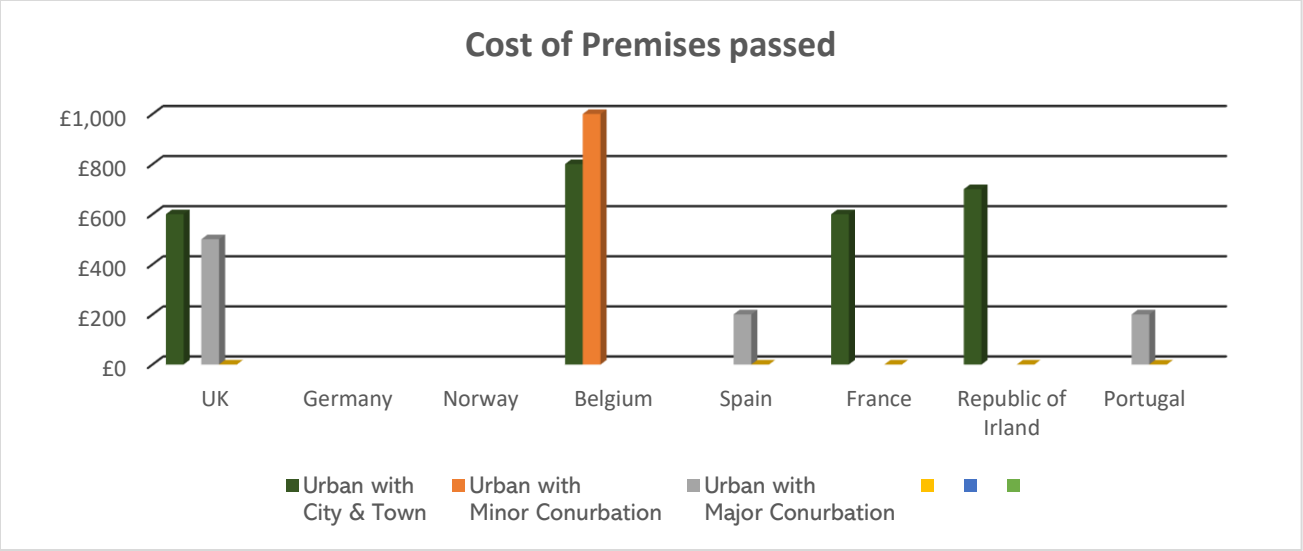
A country wise comparison of Fiber Rollout from the following Report.

Key observations made

- Micro trenching, Reuse of Poles in urban areas asset infrastructure sharing/reuse approach, asset infrastructure sharing/reuse approach reduces cost of premises passed.

- Façade construction techniques not allowed in some countries, that lead up increasing Fiber rollout cost to the premises.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
	Mainly Rural	Largely Rural	Urban with Significant Rural	Urban with City & Town	Urban with Minor Conurbation	Urban with Major Conurbation
UK				**£600**		**£500**
Belgium				**€800.00**	**€1,000.00**	
Spain		**£350**				**£200**
France	**£1,250**	**£800**	**€300.00**	**€600.00**		
Republic of Ireland				**€700.00**		
Portugal						**£200**



Note 1. In Spain, it is reported that much lower figures are achieved in the very dense center of old towns also using façade mounted cabling. Façade mounted cabling is not accepted in most areas of London costs can easily reach £1200 or more.

Note 2. It should be noted that in France, re-use of infrastructure assets, both existing telecom aerial and duct infrastructure, along with electricity network assets, is very common. Micro trenching is a common practice in Germany, Norway and Malaysia achieving on average 200 meters per day per team/vehicle.

Note 3. Research into the PT (Portugal Telecom) case studies shows that the cost of £200 per premise was achieved through a combination of duct sharing, a high volume of Multi-Dwelling Units (MDUs) and an abundance of cheap labor.

Business Models

Adopting innovative Business Models enables Infrastructure investors and operators to ensure that the technological progress and innovation in Broadband infrastructure can help bridge the digital gap with a sound business case.

Business model means the combination of market segmentation, managerial, financing, and revenue generation approaches that define the overall commercial approach to the infrastructure deployment as shown in the figure below. (Reference)

The various approaches are briefly described below. For a more detailed description and the lessons learned by adopting these different approaches, refer the following report[1]

Wholesale Open Access	Wholesale Commercial Access	Retail	Vertical Integration	Procure: Build / Access / Swap	Private	Public	Community	Vendor	DFI
Market Segment					Financial				
Management					Revenue				
State	Contract / Lease / Subscription	SPV	Private Company	Private Consortium	Service Pipe / Usage	Down-Payments	Contracts / 2 Sides / Other	Government Contract	Subsidy

1.3 **Market Segment**

- **Wholesale Open Access**- Network layers and network services are provided on an open access basis.
- **Wholesale Commercial Access**- Terms and conditions of infrastructure service provision are offered on a fair, nondiscriminatory, transparent, and reasonable basis
    - Passive Layer Open Access (PLOA) – applies to physical infrastructure alone
    - Active Layer open Access (ALOA)- provided in conjunction with services requiring active equipment
- **Retail-** Operator makes use of passive and network active equipment purchased on a wholesale basis and limit its own infrastructure deployment to that required for retail service provision (RSP).
- **Vertical Integration**- Combines wholesale commercial access and Retail.
- **Procure: Build / Lease / Swap-** Wholesale, retail, and vertically integrated may build, lease, or acquire-by-swap their capacities.

1.4 Financing Option

- **Private-** Project bonds, Direct loans, Syndicated loans, Corporate bonds etc.
- **Public-** Equity capital, Debt capital, Subordinated loans, Minimum guarantees etc.
- **Community-** Asset transfer (rights of way), Community bonds, Community, Subscriber equity etc.
- **Vendor-** Terms finance, Lease option finance, Bank guaranteed loan etc.
- **DFI-** Investment project financing, Trust funds and grants, Development policy financing etc.

1.5 Management

- **State**- In thinner markets the government may choose to run the management of the infrastructure as a public service.
- **Contract / Lease / Concession**- The state cedes (increasing degrees of) management control to a private contractor.
- **SPV-** This model is a truly integrated cooperation between various public and private stakeholders that have created the new joint venture. Governance, along with the ownership and funding, is shared among public and private entities.
- **Private Company-** In buoyant markets, it is the private sector that generally designs, builds, operates, and owns the infrastructure.
- **Private Consortium-** In large-scale deployments covering multiple markets, a private consortium is often established.

1.6 Revenue

- **Service Pipe / Usage-** If the market is buoyant enough, standard service pricing on a capacity or usage basis may be adequate to achieve business case objectives. However, telecommunications service pricing has long exhibited schemes designed to attract low-usage or high-cost consumers "on net." Two-part tariffing (subsidized access pricing, combined with profit-making usage) is a traditional market solution to the problem. Regulation in the sector as well has often required price averaging.
- **Down-payments-** For larger scale infrastructure deployments or where service take up might be protracted, further revenue innovation may be required. Down payments are standard feature of subsea cables, for example.
- **Content / 2-sided / Other-** Private actors, pursuing a "double-bottom line," effectively subsidize operations without the intention of recouping losses in service profitability (even in the long run). Instead, they expect value being created in brand or unrelated markets.
- **Government Contract-** in some community contexts in developing markets, there are less-traditional approaches:
  •• Service providers require minimum purchase of specific content;
  •• Two-sided market solutions in which, for example, the end-user is subjected to advertising while using the service, thus advertising assists in the funding of the infrastructure rollout; or
- **Subsidy-** Higher cost and/or less-affluent demand render internal revenue solutions inadequate. Revenue subsidies are a typical response in these cases. Revenue subsidies can simply be recurring grants or payment waivers (for example, tax holidays) provided to the service provider or can be directed at stimulating demand through vouchers to consumers.

5. Fiber Provisioning Process Activities

The Fiber product Provisioning by Telecom Service Provider is subdivided into three major processes:

A. Planning Process
B. Build Process
C. Commissioning Process

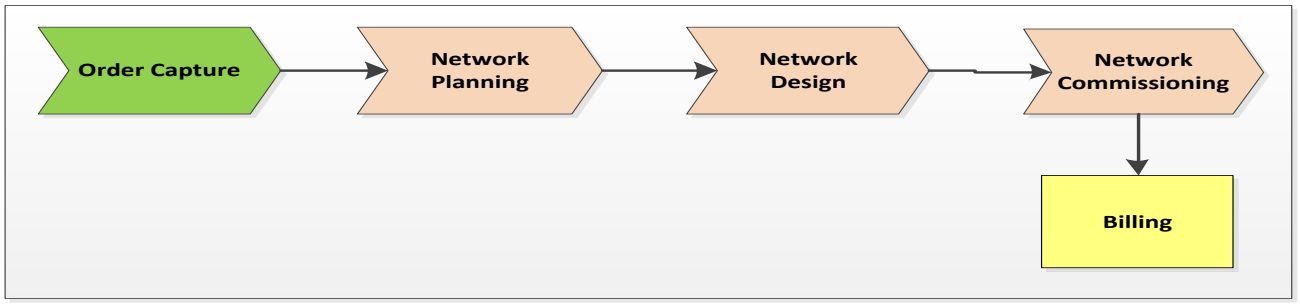
Below are the short summary of the these processes:

A. **Planning Process:** This process is subdivided into
    a. Pre Survey Planning
    b. Post Survey Planning

In Pre Survey planning, Network Planner prepare work job document for Field Engineer to survey the site location and assess network feasibility of site. Once done, FE returns Survey Edit Report to Planner and in the Post Survey Planning, Planner prepares final work job document for Network Build Team.

B. **Build Process:**This process is done by Network Build Team and assembles network at site with reference to final work job document. The Network Build work is done manually by arranging appointment at customer site.

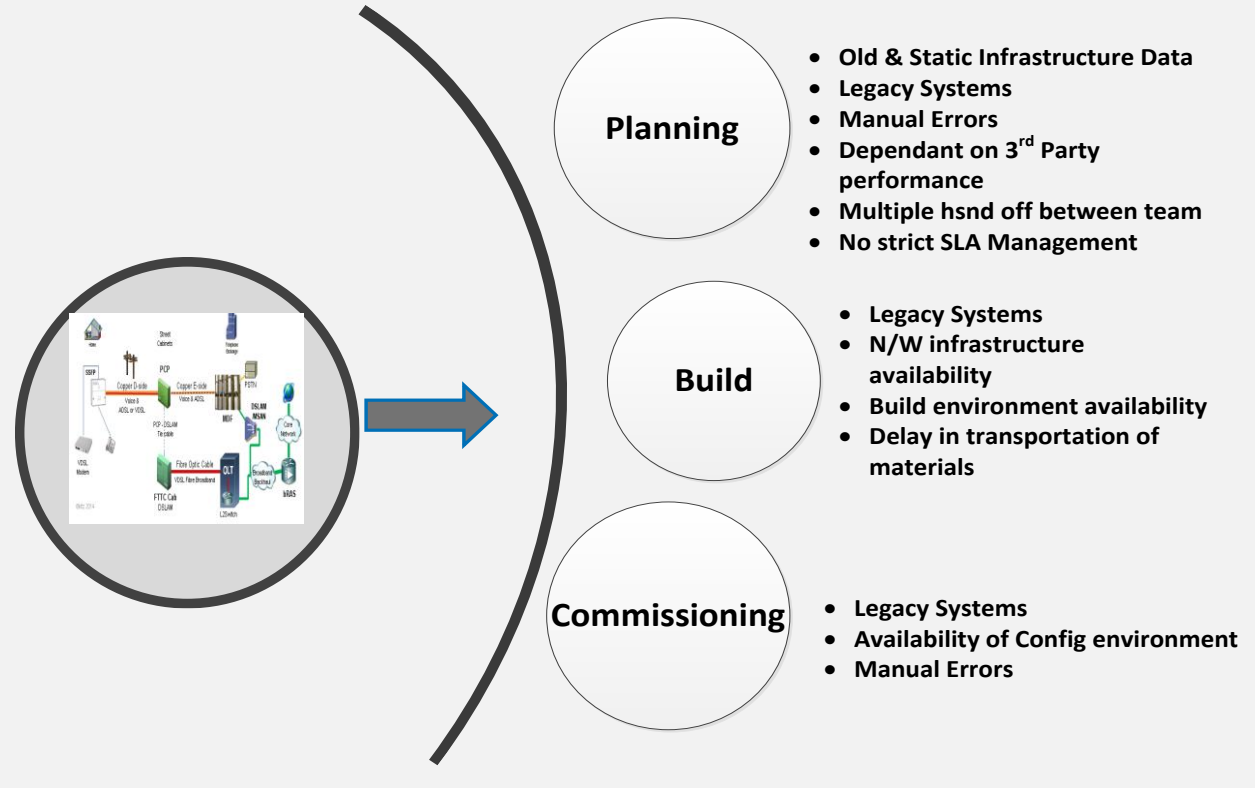
C. **Commissioning Process:** This process is done by Network Implementation Team and configures all elements on network system and confirm test report. This is network configuration ready activity and measured in terms of THP (Total Home Passed).



1. Pain Points in Fiber Provisioning

The major concern of delay in delivering fibre product is due to delays happening in the Planning phase of the process. In this phase, The Planner has to work on the static infrastructure data mostly and prepare plan accordingly and discrpencies detected during field survey visit by the engineer. There are also multiple handoff happening during Planning phase. This can be minimised by having auto creation of the geo surface by advanced technologies. Also there should strong SLA Management between Planner Team and Field Survey team to received feedback in timely manner. This will improved Cycle Time of the provision process significantly.

Also during Network Build Process, duct and cable laying takes significant amout of time. This includes obtaining permission from Local Regulatory Board (like Municiple Corporation, Highway autorities, Traffic Controller Board, Local Society, Electricity Department, Telephone Department, Water & Sewage Department etc.) and engaging with the construction company for digging trenches and ducts and laying & pulling of the fiber cables. This requires lot of coordination between TSP, Local Authorities and Construction workers. In traffic desnisty areas, it also affects on regular commutation pattern which adds to displeasure of daily commutors.



In order to minimise this kind of issues, TSP should think of alternate approach for digging ducts and laying and pulling of fiber cables. The various approach for easing out fiber provisioning is deatiled out in subsequent section.

1.1 Deliverables & Cycle time

Planning Process:

- Deliverables: Understand Business Needs, Pre-Design (HLD / LLD), Redundancy Analysis, Backhaul Planning, Capacity Planning, Vendor Evaluation & Selection, Capex Analysis
- Cycle Time: Avg. Manual Efforts: (550 Min.= 9.16 Man Hrs.) to perform planning of 1 PON). This is actual on system cycle time of Planner. There are multiple handoffs between Planner Team and Field Survey Time. The standard SLA is 2 weeks to complete Field Survey job but in practical, it takes more than 6 weeks and thereby delays entire provision cycle time.

Build Process:

- Deliverables: Site Readiness, Network Roll out Plan, Implementation of Design, Program Management, Final network acceptance
- Cycle Time: Avg. Manual Efforts: (450 Min.= 7.5 Man Hrs.) to perform Network Build of 1 PON)

Commissioning Process:

- Deliverables: Network configuration, Network Element activation
- Cycle Time: Avg. Manual Efforts: (450 Min.= 7.5 Man Hrs.) to deliver for 1 PON (Avg. 85 THP).

6. Accelerated remedial solution to reduce cycle time for the provision of Fiber

Various techniques to accelerate Fiber rollout are listed below and detailed in the following sections.

A. Advanced Computing Techniques
B. Different Construction Techniques
C. Use of Water Systems
D. Use of Power Distributions (Poles)
E. Use of Facades

While all these techniques are external to automation in IT system, below are the automation tools deployed and used for day to day operations of Network Planning & Commissioning team of UK tier 1 Telecom Service Provider.

Below is the list of IT Tools prepared and deployed to reduce AHT (Average Handling Time) of the respective process function.

- Planning Process Tools designed & deployed
    - Spine Duct Job Pack creation
    - PON Creation from Infrastructure details
    - Customer End (Network Build) Job Pack Creation
    - T – Code Finder Tool
- Commissioning Process Tools designed & deployed:
    - Survey Sheet validation to find NAD Key
    - LODE Report validation
    - LLR Validation
    - Commissioning work tracking tool

  These process automation tool helps to reduce cycle time of planning and commissioning activities of the desktop users. These tools also contribute to improve RFT of the planning deliverables as they reduced lot of manual activities of Ops team.

6.1 Advanced Computing Techniques

Use advanced computing technologies such as AI, Machine Learning, LiDAR Technology, Cloud Technologies to prepare Fiber layout planning automatically by capturing geo surface and filtering out the prospective fiber layout site (Trenches, Duct, Arial layout, Overhead, underground etc.). This advanced tool will help to reduce the planning time of the fiber deployment in geographical areas. This tool will identify and filter out geo surfaces to be used for duct & trenches for optimal routing of the cable and will reduce cost & time of field survey activities during planning phase of fiber deployment.

6.2 Different Construction Techniques (Narrow/ Slot / Micro Trenching)

Experience shows that trenching in urban environments is a very costly method, both in terms of materials cost and time (through noticing periods etc.

Operators and network providers consider it to be the biggest contributor to urban build costs by a significant percentage. There is also a dramatic ‘social cost’ in terms of the impact on the day

to-day lives of people living in the construction zone. This is compounded in dense urban areas due to the level of footfall and traffic etc.

As a result, significant effort has been applied to research and development of alternative construction techniques. Of these, micro trenching has developed the furthest and been adopted the most. Micro trenching refers to civil works using narrow and low depth trenching making use of purpose-built machines that can be used in urban environments. As a consequence, the cost per meter deployed using such techniques is drastically reduced versus normal trenching.

- Speed of construction
- Cost of noticing - it is the time required in getting permission from concerned authorities to lay fiber cable laying work.
- Materials costs

The greatest impact is found through the dramatic increase in meters per day. Construction crews using traditional 'dig and backfill' techniques tend to average 100 meters per day in dense urban areas. Micro-trenching crews report between 200 and 250 meters per day. This is quite often limited to this output due to traffic management planning constraints of 200 meters per day per location. With the civil labor cost alone representing up to 50% of network deployment, a 40% reduction in build time could reduce the Capex by up to 20% overall.

6.3 Use of Water Systems

Alternative approaches have also explored the use of other utilities that already have a direct 'path' both along roads and into premises. These include the use of both the potable water and sewage systems, both of which have ubiquitous and highly connected coverage in urban areas, and allow existing pipe infrastructure to be re-purposed to also carry broadband Fiber. Extra-urban and rural areas generally have potable water trunk mains to service them, so these existing pipes may provide a conduit to carry bulk fiber to the hard or expensive to reach locations.

An additional benefit that would derive from large-scale use of water infrastructure is the notable contribution towards next generation SMART Water Networks for telemetry, control and condition monitoring.

The primary issues surrounding the use of sewer has been resolved with liner system used with techniques that combines pipe relining/ refurbishment with a fiber micro-duct integral to the liner wall.

• The Liner system (sewer pipes)
• Thermo-plastic in-situ laminated re-liner
• Fiber micro-ducts built into the wall of the liner
• Issues of poor pipe condition permanently resolved
• No ragging or blockage problems
• Minimal civil works and traffic disruption

The impact on total costs would amount to an average 4% cost reduction:

6.4 Use of Power Distribution (Poles)

Depending on the height of power poles; the use of local mains voltage distribution could provide alternatives in certain cluster deployments. In Ireland, and France fiber deployment is made possible by local electricity distributors under certain transparent rules.
These include:

- The installation of fiber cable a specified minimum distance underneath power
- The use of a physical load calculator for pole load including under severe weather conditions
- General Health and Safety priorities.

The benefit of using power distribution poles is a cost saving from new civil infrastructure provision where none currently exists. The general provision cost of a new pole in the UK is around £260. However, it is difficult to predict the extent that new duct or pole would be required without detailed survey. Power poles will be used if they reduce the linear length of the network deployed.

6.5 Use of Facades

The use of building facades is already a very common practice in certain countries; Spain and its territories being one. It is clearly a very flexible means for deploying fiber, particularly where terrain or geophysical constraints are particularly difficult. It is also used on Multi Dwelling Units, MDU's or terraced housing, or when houses are close but not touching, with the use of catenary wiring. The cost of Façade needs to include consent costs, consenting normally requires both the resident and the landlord if different. Consenting normally takes on average 3 visits per home to gain the correct authorizations.
This cost is offset by the cost reduction in deployment, however it still ranks 3rd in the cost of deployment, after aerial and ducted vaulted deployment methods. This technique does not require specific tools to deploy but requires a large coordination effort in licensing and Wayleaves.

7. Tech Mahindra Capability

Tech Mahindra offers end to end fiber planning & deployment services. Our solution is powered by Super PON technology and Automation. The primary agenda is to connect homes, schools, hospitals, libraries, Business: small and large and broadcasters and government to the new world with high bandwidth connectivity and build best possible network with the highest quality of service, make sure everyone are connected ensuring a last mile service while meeting the sudden spike in the demand.

7.1 Our Solution

- Strategic Planning: Tech M provides consultancy service based on its global experience with other customers.
- Field Survey: Detailed field survey with the customer premise to finalize suitable location.
- Network Planning: High level E2E design from the backbone till the customer end networks.
- Documentation: Creation of the documents for the survey and validation purpose to represent the cost and design of the network elements captured.
- High Level Automation: Eliminating dependencies and enhancing the work flow to achieve gain in efficiency resulting in an enhanced roll out.
- Network Build / Rollout: End to End project management tracking and measurement of progress of SLA's dash-boarding and reporting work in progress.

- Service Fulfillment & Assurance: Conducting acceptance test and ensuring the service for the hassle free experience.
- Network Operations: End to End maintenance of the network by carrying the corrective field services with resolution management.

7.2 Benefits of the Solution

- Cost Effective Solution: Achieved 60% reduction in per PON deployment cost for tier 1 operator
- High Performance: Survey Job Packs, network build packs have been automated with 60% efficiency gain.
- Faster TTM: Optimized fiber rollout timelines with quality
- High Reliability: Decrease in failure rate, leading to improvement in efficiency
- High Scalability: Wider area coverage with less number of Central Offices (CO) through Super PON technology.

References

1. Manin World Bank Report 2018 - Innovative Business Models for expanding fiber - optic networks and closing the Access gaps

2. Costs for Digital Communications Infrastructure - A Cost Analysis of the UK's Digital Communications Infrastructure options 2017- 2050 – Final Report, commissioned by the National Infrastructure Commission from Prism Business Consulting Ltd and Tactis, to inform the National Infrastructure Assessment

Authors

Dr. Aniruddha Shembavanekar, Enterprise Consultant

Global leader of TechM's Business Excellence Consulting practice. Extensive experience with the management and execution of Strategy, business transformation, customer experience & Operations consulting projects in multiple verticals.

Prashant Chede, Process Consultant

Part of TechM's UK & Europe Business Excellence Consulting practice. Highly experienced in the execution of Service Design & CX Design program management and consulting services for Business transformations and Technical implementations, predominantly focussed on businesses in the Telecom industry.

Richard Sequeira, Principal Consultant

Part of TechM's US Business Excellence Consulting practice. Extensive experience in strategic transformation programs across telecom process journeys.

Upendra Dharmadhikary, Sr. Vice President

Global Leader of TechM's Business Excellence and C Consult Group. Thought Leadership & Extensive experience in strategic transformation programs across telecom process journeys with focus on digital technologies & customer experience improvements.

About Tech Mahindra

Tech Mahindra represents the connected world, offering innovative and customer-centric information technology experiences, enabling Enterprises, Associates and the Society to Rise™. We are a USD 5.2 billion company with 123,400+ professionals across 90 countries, helping 981 global customers including Fortune 500 companies. Our convergent, digital, design experiences, innovation platforms and reusable assets connect across a number of technologies to deliver tangible business value and experiences to our stakeholders. Tech Mahindra has been recognized amongst India's 50 best companies to work for in 2020 by the Great Place to Work®? Institute. We are part of the USD 21 billion Mahindra Group that employs more than 240,000 people in over 100 countries. The Group operates in the key industries that drive economic growth, enjoying a leadership position in tractors, utility vehicles, after-market, information technology and vacation ownership
(*Figures as per Q1,2020)

About Tech Mahindra's Business Excellence Services

We are the Business Excellence team, Tech Mahindra's consulting unit. We help clients achieve business objectives in the digital era

- We work with clients to develop and implement digital transformation strategies that impact their products and business models
- We help our clients transform their operations and processes in line with this strategy
- We also help them build a key enabler for achieving these objectives: agility and automation in the technology function
- Our program and change management services ensure on-track implementation of the various transformation initiatives

All of these services are underpinned by proven methodologies, frameworks and tools. These are based on design thinking approaches that ensure stakeholder buy-in at each stage. Our clients find our global experience, collaborative approach, and the ownership we bring to ensure outcomes in every one of our engagements, as a key differentiator.

Contact us at befutureready@techmahindra.com

BE. Tech Mahindra Consulting

Tech Mahindra

www.techmahindra.com
connect@techmahindra.com
www.youtube.com/user/techmahindra09
www.facebook.com/techmahindra
www.twitter.com/tech mahindra
www.linkedin.com/company/tech-mahindra