POWERING HIGH-SPEED BROADBAND WITH
NEXT GENERATION FTTx

In today's telecommunication scenario almost all telecom service providers have a plan to provide high speed broadband and quad play services to their subscribers. Quad play consists of Data, Voice, Video and IPTv services. Now comes FTTx (Fibre to the x), the next generation broadband technology that provides a high-speed access to subscribers for different type of quad play services.
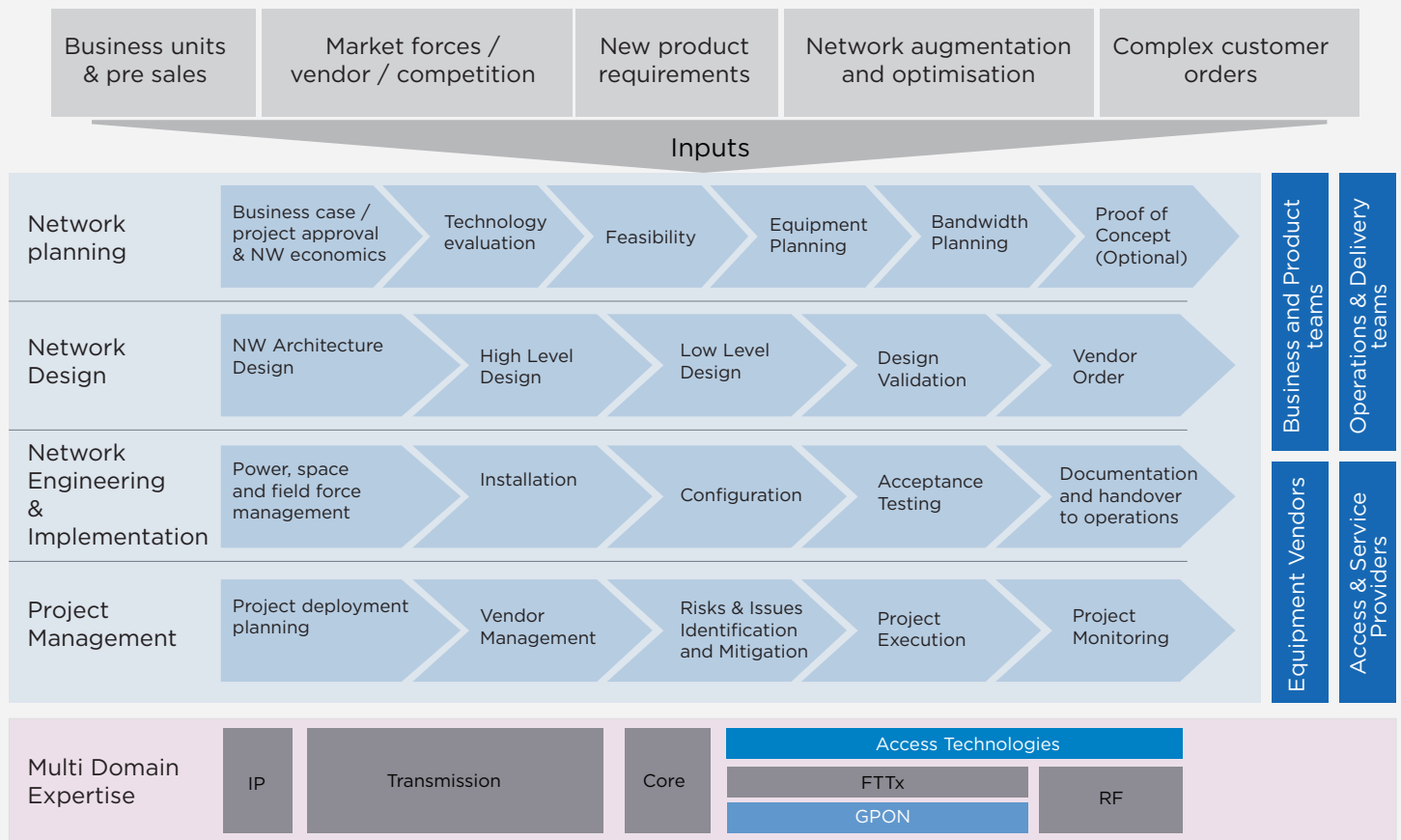
Broadly, Tata Communications Transformation Services (TCTS) delivers end-to-end services for FTTx including:

- Network Planning, Design and Engineering
- Network Roll out and
- Network management

Let's look at each of the components that go into delivering FTTx services.

1. Network Planning, Design and Engineering

TCTS has operational experience in handling network engineering, planning and designing for core network of global telecom operators. Through a skilled team of highly experienced professionals, we provide Service Fulfilment operations for end-to-end delivery of customer orders. While ensuring highest quality standards, the team uses industry best practices and Continuous Improvement Plans (CIP) to deliver services within agreed KPI/SLAs. This function consists of Order Management, Feasibility, Provisioning, Testing and Handover.

Business units & pre sales	Market forces / vendor / competition	New product requirements	Network augmentation and optimisation	Complex customer orders

Inputs

Network planning	Business case / project approval & NW economics	Technology evaluation	Feasibility	Equipment Planning	Bandwidth Planning	Proof of Concept (Optional)
Network Design	NW Architecture Design	High Level Design	Low Level Design	Design Validation	Vendor Order	
Network Engineering & Implementation	Power, space and field force management	Installation	Configuration	Acceptance Testing	Documentation and handover to operations	
Project Management	Project deployment planning	Vendor Management	Risks & Issues Identification and Mitigation	Project Execution	Project Monitoring	

Business and Product teams | Operations & Delivery teams
Equipment Vendors | Access & Service Providers

Multi Domain Expertise	IP	Transmission	Core	Access Technologies
				FTTx
				GPON
				RF

2. Network Planning & Engineering

The network planning & engineering focuses on managing complexity across multiple teams, vendor neutral network agnostic and planning for First-Time-Right delivery of network. The key deliverables include:

- Feasibility check, preparation of link budget and business case validation
- Evaluation of technologies
- Planning for equipment and bandwidth
- Analysis of requirement, new site rollout or expansion request
- Route survey and finalisation, obtaining financial concurrence
- Placement of material request with material and logistic department
- Co-ordinate with contractor and field engineer

for Quality Assurance and Acceptance Testing
- Management of drawings like singe line diagram, As-built diagram, Termination details, Site diagram, civil engineering drawings
- Creation of GIS or AutoCAD drawing
- Project planning, provides overall project time lines, plan, procure, coordinate & provide all inputs on time, Load and monitor the project progress
- Obtain signoff on documentation from Operations

3. Network Design

The Network Planning and Design function supports service providers with high-level design (HLD) and low-level design (LLD) documentation. The design can be for network rollouts including core, customer access, edge and other complex orders. This function works closely with internal and external stakeholders to come up with the best fit and right sized network design for implementation.

The primary task for this Network design team is to issue the network design document for core or complex customer network order. This team works closely with different engineering teams and project management to create and issue the network design for implementation. The key scope of work includes:

- Study of existing network and feasibility report and network constraints
- Co-ordinate with operations and field force to validate the site parameters, ensure availability of desired rack space and power.
- Creation of first design document which include requirements analysis, feasibility analysis functional or black box specification, options analysis, system architecture, implementation plan, training and cutover plan
- Creation of final design document which includes physical and logical network designs
- Final implementation schedule
- Update inventory management with new design
- Support to implementation team at the time of commissioning
- Verification of implementation of correct design or update inventory in case of any alteration

4. FTTx Network Roll-out

It is very important that the network design is installed on ground systematically within defined assets and provide services to customers as expected.

Below are high level functions during network rollout delivered by TCTS

- Project Management – this involves end to end project management which helps to rollout of network as per schedule with required specifications. During rollout it requires a good coordination among different functions in field operations to avoid repetitive tasks within given resources and with an optimised cost and time.

Some of the functions of TCTS project managers are listed below –
  - Co-ordination between multiple functions
  - Monitoring available resources and their utilisation
  - Track project time lines
  - Scheduling multiple tasks to avoid repetition and delays
- Network rollout in field - This includes physical installation of assets as per design and completing activities like digging and laying of conduits, pipes, joints, man holes, etc. This involves installation of active network elements and nodes in field. There are multiple type of nodes such as Ethernet and IP, transmission, other technologies like xDSL, GPoN and Wifi.

- As-Built Update - Once a network is installed in field, it is verified that it is installed as per design. If there are any deviations, then those are noted, validated by design team and then updated in GIS inventory system. This helps to prevent any anomalies during feasibility and activation of customer services and reduces time to connect for any new connection. All such documents and as-built are stored on share point for future reference.

- Acceptance testing – Before commissioning services on installed network, the network is tested thoroughly and fine-tuned with specific requirement of the operator. TCTS uses various templates which makes easy for acceptance of the network. During this intense testing, network is tested for normal working and it is seen that standard configurations are applied on network components.

- Material management – Delivering required material at work site is a crucial step towards adhering work schedule and reducing project cost. TCTS project managers monitor material deliveries and align the movement of material on the specific sites and locations as per schedule.

- Quality monitoring – Quality of installed network is a crucial aspect, as this have a long term and deep impact on network performance and hence on customer satisfaction. So it is obvious that good network will have able quality managers who regularly inspects various quality aspects for material used, implementation methods and standards, configuration checks, performance parameters etc. TCTS have a pool of quality managers who will check each and every aspect of network deployed for good performance of network once services are live on that network.

5. FTTX Network Management

TCTS have skills to manage very complex networks and improve customer satisfaction with its customer centric approach.

TCST can manage multiple domains and technologies in a today's telecom scenario.

When it goes to FTTx networks, this involves multiple technologies like Ethernet and IP, transmission and xDSL or GPON equipment connecting to each other.
TCTS with its multilayered NOC approach is able to manage different technologies and many vendors from a single NOC. TCTS is a vendor agnostic organisation and have expertise on legacy as well as next gen equipment.
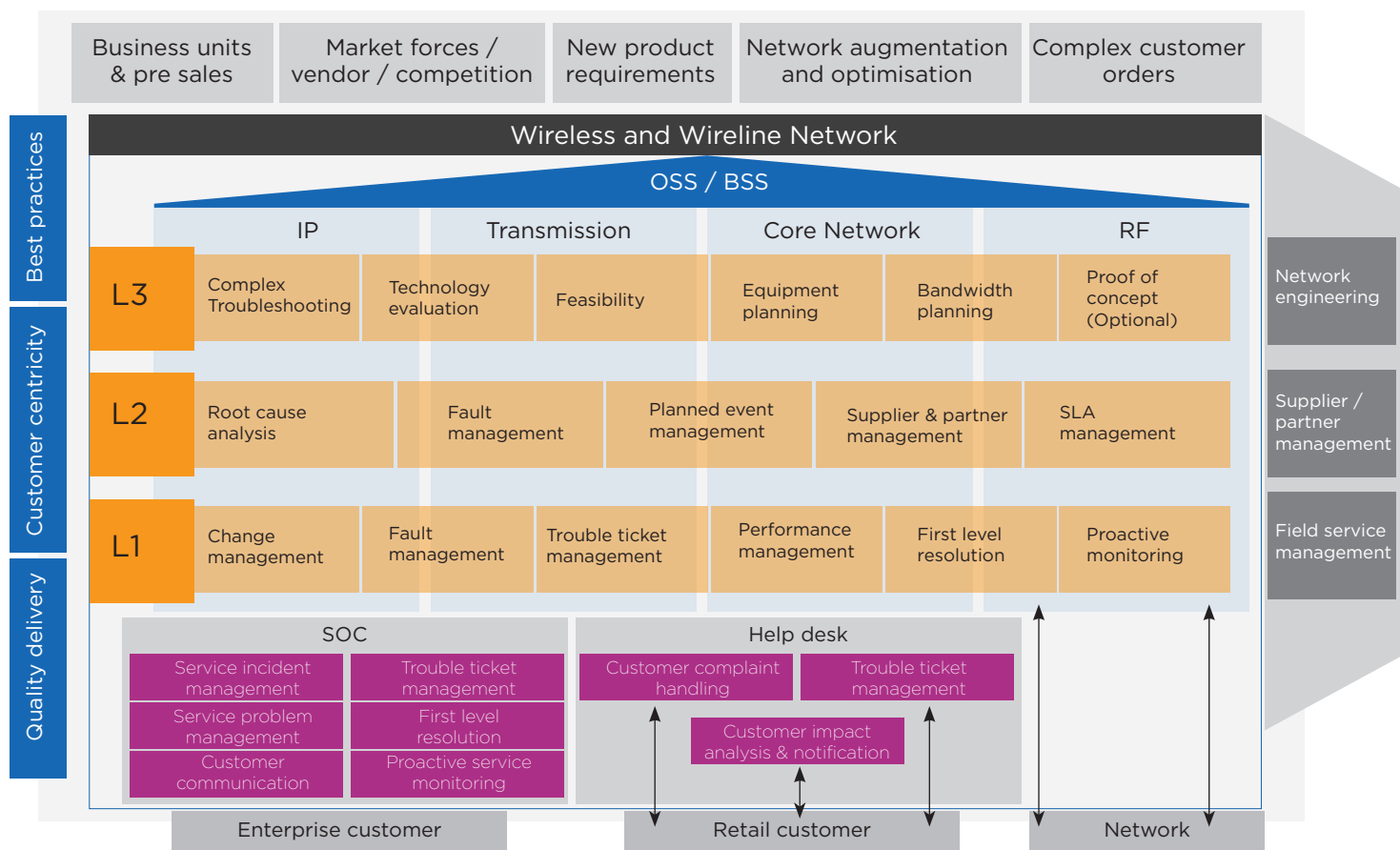
TCTS assurance framework have different layers given below.

*   Helpdesk
*   Service operations center(SOC)
*   L1 network operations center
*   L2 and L23 network operations center

This layered architecture helps to categories every activity in NOC with specific focus.

A list of activities in NOC is given below –

*   Network Monitoring – Reactive and proactive
*   Fault management
*   Inventory management
*   Configuration management
*   Complex troubleshooting
*   Trouble ticket management

*   Network performance management
*   Service activations and provisioning
*   OEM co-ordination
*   Vendor and third party communication
*   Data security management

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Wireless and Wireline Network

OSS / BSS

	IP		Transmission	Core Network		RF
L3	Complex Troubleshooting	Technology evaluation	Feasibility	Equipment planning	Bandwidth planning	Proof of concept (Optional)
L2	Root cause analysis	Fault management	Planned event management	Supplier & partner management		SLA management
L1	Change management	Fault management	Trouble ticket management	Performance management	First level resolution	Proactive monitoring

Best practices
Customer centricity
Quality delivery

| Network engineering |
| Supplier / partner management |
| Field service management |

SOC

Service incident management	Trouble ticket management
Service problem management	First level resolution
Customer communication	Proactive service monitoring

Help desk

| Customer complaint handling | Trouble ticket management |
| Customer impact analysis & notification | |

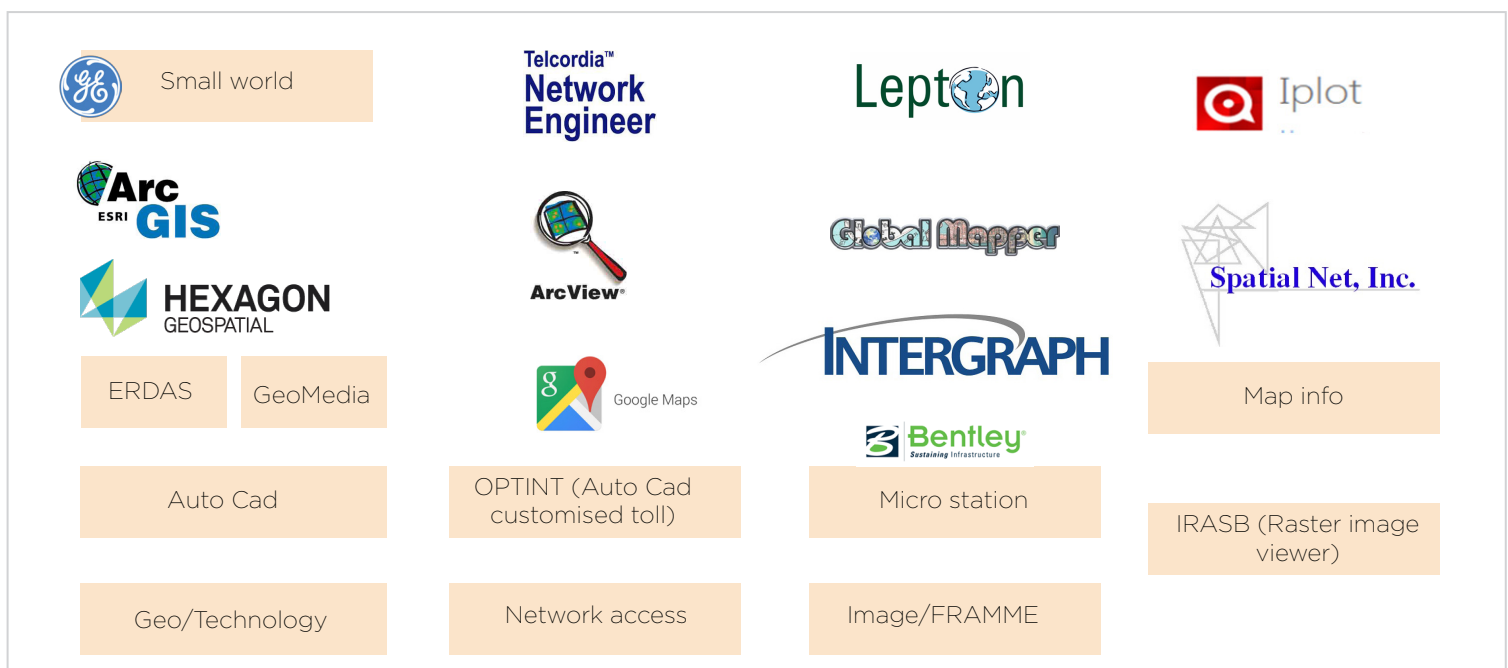| Enterprise customer | Retail customer | Network |

6. FTTX Network Management

TCTS have hands on expertise to work on various GIS tools used in multiple telecom operators across globe.

TCTS have worked on below GIS tools –

- Small world
- Spatial net
- Map Info
- Arcnet
- Telecordia
- AutoCad

Working experience on these various tools makes TCTS unique among managed service partners.

Small world	Telcordia™ Network Engineer	Lepton	Iplot
Arc GIS (ESRI)	ArcView®	Global Mapper	Spatial Net, Inc.
HEXAGON GEOSPATIAL		INTERGRAPH	
ERDAS / GeoMedia	Google Maps	Bentley Sustaining Infrastructure	Map info
Auto Cad	OPTINT (Auto Cad customised toll)	Micro station	IRASB (Raster image viewer)
Geo/Technology	Network access	Image/FRAMME	

TCTS through its vendor agnostic knowledge and skill set combined with telco lineage is the preferred FTTx partner for deploying telecommunication fibre network and infrastructure.

With its proven program management and project management framework, TCTS enables faster time to market for telcos and a quality framework, ensuring First Time Right (FTR) and Right Every Time (RET) approach to the network implementation aspect.

Case studies

FTTx network Design POC for broadband network in Middle East Region

The customer is national broadband network service provider in Middle East region, aspiring to connect 6.5 million homes with high speed broadband network by 2020. TCTS helped the leading network service provider with:

FTTx Plan and Design:

- POC within 5 days for one Fiber Distribution Terminal
- In FDT Survey, design prepared for duct and fiber for 200 Households
- Preparation of bill of material and services.

Outcome of POC:

- Design comparison for duct layout
- Duct optimisation
- Cost optimization in bill of material
- Reduction of cable on single route
- Digitisation of the network

Case studies

FTTH network Design, Activation and Assurance for broadband network in ANZ region

The customer is national broadband network service provider in ANZ region, aiming to connect 8 million homes with high speed broadband network by 2020. TCTS helped the leading network service provider with:

FTTx Plan and Design:

- Active in 3 Australian states (Victoria, NSW, WA)
- In first 6 months - 120 SAMs delivered – (per SAM - approx. 10 sq km, 16 nodes and 3500 houses)
- 50 SAMs under progress
- FTTx Service Assurance:
- Service assurance process design and implementation
- Design and creation of NOC structure with 24/7 ops of NOC
- NOC POC onshore for 3 months
- Transitioned to offshore after POC in 3 weeks
- FTTx Service Activations:
- Migration from old service provider to new implemented network
- Transitioned to offshore delivery center in 1 month duration

Case studies

End-to-end Solution in Field Operations for Leading Mobile Operator in India

The customer is a leading telecom operator in India, and was looking to centralise and manage FCAPS functionalities, multi-vendor, multi-technology, multi-circle ops, resources and network availability.

Benefits delivered include the following:

1) OSP:

100%
adherence to MTTR SLA
for NLD backbone and Access

100%
adherence to fiber cut threshold
for NLD backbone and Access

>0.65%
network uptime above
threshold for NLD backbone

2) ISP:

>99.99%
infra availability for wireline
own build sites

~99.99%
network availability and 100%
node availability for core element

100%
adherence to internal/external
audit and compliance

About Tata Communications Transformation Services (TCTS)

Tata Communications Transformation Services (TCTS), a 100% subsidiary of Tata Communications Ltd, provides leading business transformation, managed network operations, network outsourcing and consultancy services to telecommunication companies around the world. TCTS delivers operational efficiency, cost transformation and revenue acceleration solutions for all the stages of the carrier process lifecycle including but not limited to network engineering and design, implementation and operations functions.

TCTS is a part of the USD $100+ billion Tata group. Tata group comprises of over 100 operating companies in seven business sectors. TCTS leverages the market expertise of Tata group's global telecom operation capabilities and globally established IT, process and consulting skills. It carries the rich traditions and business ethics of the Tata companies.

For more details on TCTS and how we can help your company build, operate and transform, please contact us at **tcts.marketing@tatacommunications.com** or visit **www.tatacommunications-ts.com.** To hear more from TCTS experts, join us on LinkedIn **https://www.linkedin.com/company/tata-communications-transformation-services** and follow us on Twitter **https://twitter.com/Tata_TCTSL.**