

Project Dissertation Report on
Telecom FTTX market growth outlook and driving forces

Submitted by:

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2K19/EMBA/542

Under the Guidance of:

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CERTIFICATE

This is to certify that the project entitled “**Telecom FTTX market growth outlook and driving forces**” has been successfully completed by **Rajesh Mehta: 2K19/EMBA/542.**

To the best of my knowledge, this is further certified that this project work is a record of bonafide work done by him under my guidance.

G C Maheshwari

Professor

Delhi School of Management
Management

Dr Rajan Yadav

Head of Department

Delhi School of

DECLARATION

I, Rajesh Mehta, hereby declare that the Project Dissertation Report titled “**Telecom FTTX market growth outlook and driving forces**” is the outcome of my own efforts under guidance of **Prof. G C Maheshwari**.

The project is submitted to the Delhi School of Management, Delhi Technological University as a part of Executive Program for the academic session 2019-2021. The timeline of the project was January 2021 to May 2021.

I also declare that this project dissertation report has not been previously submitted anywhere.

ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my mentor **Prof. G C Maheshwari** as well as **Dr Saurabh Aggarwal** who gave me the golden opportunity to do this wonderful project on the topic “**Telecom FTTX market growth outlook and driving forces**”, which also helped me in doing a lot of Research and I came to know about so many new things I am really thankful to them.

Secondly, I would also like to thank my wife, children's and friends who helped me a lot in finalizing this project within the limited time frame.

EXECUTIVE SUMMARY

The COVID-19 pandemic will continue to shape business strategies throughout the IT products and telecommunications sector growth in years to come. Telecom providers have an opportunity to shape a new future for businesses and consumers on the strength of advanced technologies such as FTTX. It is estimated that FTTX adoption will generate \$700 billion in economic value, with enterprises representing 68% of the market.

FTTx stands for fibre to the x, which is described as various topologies from where optical fibres are delivered to customers based on its termination point. Earlier metal cables were used for covering long distances but now, FTTx cables have been deployed to replace them. Fibre to the premise (FTTP) and Fibre to the cabinet (FTTC) are the two main groups of architecture. In FTTP, the optical cable runs through distribution network to a subscriber's premise, in a building or an office. In FTTC, the optical cable runs through a central node.

This dissertation will cover potential Markets in detail. The Aim is to identify Markets where growth is likely to happen. The research is exploratory in nature and the source of data presented in the report shall be prior research reports on this topic, interview with experts and Internet.

The key Motivation to take up this project is that this project will help me in my professional work to focus my energy and resources in selling my company FTTX products and services in the markets identified during this project. As a Global Sales head of my company, I need to research on the target growth market to maximize Sales and product penetration.

The bottom-up procedure has been employed to arrive at the overall size of the FTTx market from the revenue of key players in the market. After arriving at the overall market size, the total market has been split into several segments and sub segments, which have been verified through primary research by conducting extensive interviews with experts such as CEOs, VPs, directors, and executives.

The outcome of this report is tremendously helping my sales and marketing team to focus on the key markets to maximize the revenue and Sales conversion.

1.0 INTRODUCTION & Background

Lepton Software is a leading provider of innovative IT solutions and Services, offering a broad portfolio of business and technology solutions, enabling improved business performance for Indian clients leveraging on its deep domain expertise in location intelligence space.

Lepton has created a distinct niche for itself in developing solutions for Telco's around Location Intelligence value propositions, making the company a preferred business partner for many of the key customers across India.

Since its Inception in 1995, Lepton, through its Corporate and Business strategy, has been able to establish leadership position in Indian Market, while competing with global telecom GIS solution provider. It has an enviable 70% market share in the Indian market.

In line with our corporate strategy, we feel that this is the right time to go global with our FTTX product & Services. The key driving forces are

- 1) Become a globally respected product-based company
- 2) Global markets specially developed markets provide better profit margin
- 3) Telco and ISP market in India, even though one of the highest growing in world, is not providing good profit margin.
- 4) It will provide a platform to scale up our operations and footprint.
- 5) Earn revenue in foreign currency, which will act as hedge against some Input cost that our product incurs in foreign currency.

However, since the company do not have the prior experience of business development, sales, marketing and operations in global markets, it is essential to first perform the exploratory market analysis before setting us the business plan.

This research will cover potential Markets in detail. The Aim is to identify Markets where growth is likely to happen. The research is exploratory in nature and the

source of data presented in the report shall be prior research reports on this topic, interview with experts and Internet

The research is divided in two sections

- 1) Section one will attempt to identify and shortlist markets/countries where the FTTX growth is likely to happen over next 5 years
- 2) Section 2 will do the in depth analysis of the shortlisted companies

1.1 Industry Profile

Lepton Software competes in the “Location Intelligence” or Telecom GIS space. With more than 80% of all enterprise data having location attribute, this is a highly lucrative space to be in. There are thousands of Large , medium and small size companies providing product & services in this domain.

An important factor responsible for the soaring requirement of geographic information systems (GISs) in the telecom industry is the increasing utilization of these systems for tracking broadband and mobile infrastructure across the world. Many telecom companies use GISs for studying the regions in which they want to set up their operations in the future. This is because of the fact that these systems allow the collection of information and data from various sources on a single platform, which assists the organizations in assessing the challenges that they will face during the development of broadband infrastructure in those areas.

The other major factor fueling the usage of the GISs in the telecom industry is the huge funding being provided to many telecom companies by both private and public organizations for expanding their broadband network and improving its speed and connectivity across the globe. Besides these factors, the growing requirement of broadband and mobile network installation in several countries around the world is also pushing up the sales of GISs.

Hence, with the surging usage of these systems, the global geographic information system (GIS) in telecom market will surge, in valuation, from \$1.3 billion to \$4.6 billion from 2019 to 2030, demonstrating a CAGR of 12.2% from 2020 to 2030. These systems are widely used in both small and medium enterprises (SMEs) and large enterprises. Of these, the utilization of these systems was observed to be higher in the large enterprises in the last few years, mainly because of the high requirement of these systems in big

telecommunication firms for improving the network connection and installation processes.

This study forecasts the market, in terms of demand for Lepton product line, for various segments with regard to 4 main regions North America, Europe, APAC, and RoW.

2.0 Research Methodology

The research methodology used to estimate and forecast the FTTx market begins with capturing data on key vendor revenues through secondary research. Secondary sources used for this research study include government sources; associations (Fiber Broadband Association, FTTH Council Europe, FTTH Council Africa, and The Fiber Optic Association); journals and magazines (Broadband Communities Magazine, International Fiber Journal, and Journal of Optical and Fiber Communication Research); and corporate filings (such as annual reports, investor presentations, and financial statements).

By vertical, the FTTx market has been segmented into industrial, commercial, and residential. The commercial vertical is expected to dominate the FTTx market during the forecast period. The increasing penetration of 5G and VoLTE technologies is driving the growth of FTTx network in the commercial vertical. FTTx is widely used in industrial, commercial, and residential verticals. The industrial vertical includes applications such as telecommunications, railway, transportation, utilities, and energy & power. Commercial and residential verticals include buildings, apartments, offices, homes, multiple dwelling units, single dwelling units, and malls.

Overall Market analysis strategy is as follows

- The world is divided into 3 regions
- Within each Region , twelve priority countries are identified, based on defined criteria.
- Sales Manager to proactively focus marketing , inside sales cold calling, local partner engagement, personal visit (if required), event participation in priority countries
- If the lead is coming through Global partner/web site / any other channel for a region, it shall be taken up by responsible sales manager for the .

- Priority country selection based on criteria and score range is attached to each criteria. Maximum score 2 , Minimum 0.
- Top 12 countries with highest cumulative scores shall be chosen

This research report is primarily focussing on analyzing FTTX software needs for the Middle east, Africa and Europe region.

For each of the countries in this region, marks have been provided as per the fitment taking into account

- 1) Population
- 2) Fiber network market growth in last 5 years
- 3) GDP growth in last five years
- 4) whether english speaking
- 5) whether local partner available

3.0 Global Market Analysis

The leading fiber markets are concentrated only in a few fiber hot spots, such as Africa, Southeast Asia, the Middle East and East Europe.

<i>Region</i>	<i>Annual growth</i>
Africa	9.09%
Asia - Other	8.45%
Asia - East	6.29%
Oceania	5.44%
America - Other	4.83%
Europe - East	4.52%
America - North	3.91%
France	2.34%
Europe - Other	2.26%

Predicted growth in fixed broadband subscribers by region.

Region	Predicted growth, 2019-2030
Middle East and Africa	69%
Latin America	48%
South and East Asia	26%
Asia-Pacific	24%
Eastern Europe	22%
North America	16%
Western Europe	12%
World	33%

Predicted growth in fixed broadband subscribers by market type.

Market type	Predicted growth, 2019-2030
Emerging Countries	65%
Youthful Countries	34%
Mature Countries	13%

As per study following countries in Asia have least FTTX deployment and hence provides growth opportunities

- 1) Laos
- 2) Cambodia
- 3) Thailand
- 4) Indonesia
- 5) Philippines
- 6) Australia

7) Malaysia

8) Vietnam

Belgium, Colombia, Thailand, Pakistan, UK, and Brazil were among the countries which recorded FTTH/P quarterly growth rates in double figures – 23.4 per cent, 16.5 per cent, 14.2 per cent, 13.9 per cent, 12.6 per cent and 12.2 per cent respectively in recent times.

Country	FTTH/B/P quarterly growth, Q2 2020
Ghana	44.9%
Cote d'Ivoire	39.5%
Jamaica	18.7%
Thailand	16.4%
Brazil	14.4%
Algeria	13.5%
Colombia	13.3%
Mauritius	12.7%
Ireland	11.4%
Puerto Rico	10.9%
Pakistan	10.3%
Philippines	9.7%
Belgium	8.9%
France	8.3%
Argentina	8.2%

Table : Top Markets in FTTH growth in Q2 2020

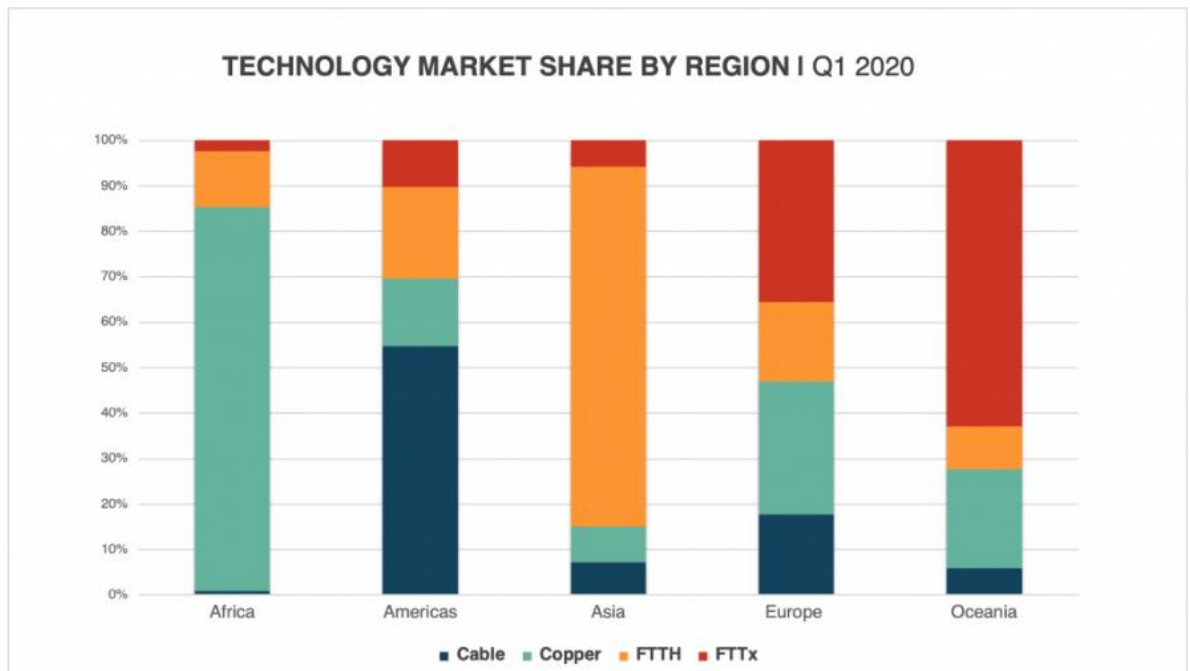


Fig : 1 Technology Market share by region (Source Point Topic)

From the figure following inferences can be derived

- 1) Over the next few years, there is tremendous scope of FTTX penetration in Africa
- 2) Asia is mostly fiberized however there could be a market for selling Fiber management applications.

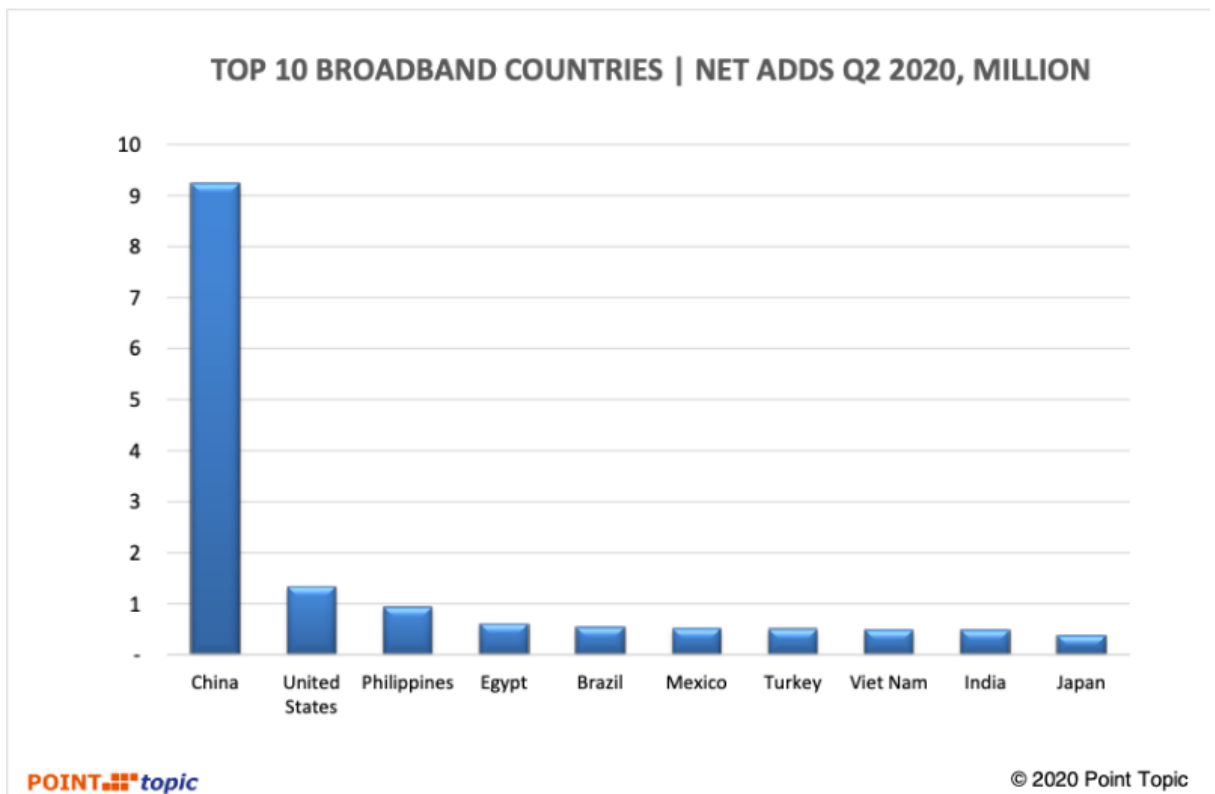
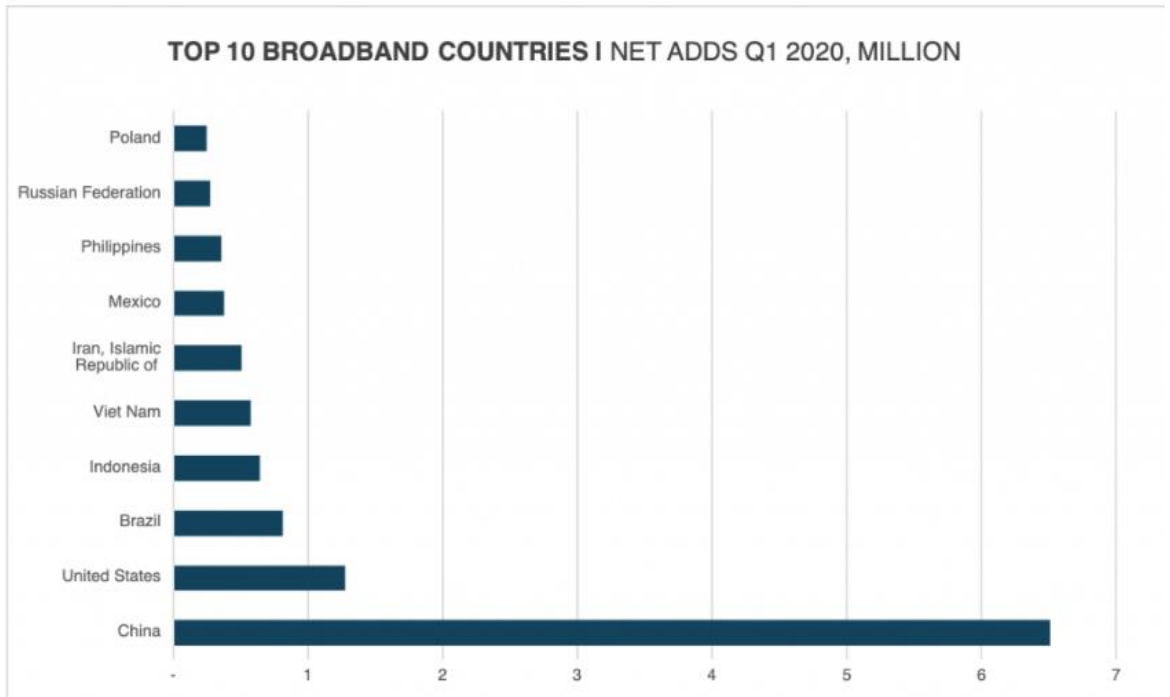


Figure 15. Country ranking by fixed broadband net additions in Q2 2020. Source – Point Topic.

Examples of fast growing broadband markets. Source: Point Topic.

Market Type	Region	Country	Predicted growth, 2019-2030
Emerging Countries	South and East Asia	Indonesia	198%
Emerging Countries	Latin America	Bolivia	140%
Emerging Countries	Middle East and Africa	South Africa	128%
Emerging Countries	South and East Asia	Thailand	81%
Youthful Countries	Latin America	Argentina	78%
Youthful Countries	Latin America	Mexico	75%
Emerging Countries	South and East Asia	Viet Nam	70%
Emerging Countries	Middle East and Africa	Turkey	52%

4.0 Shortlisted Market Analysis

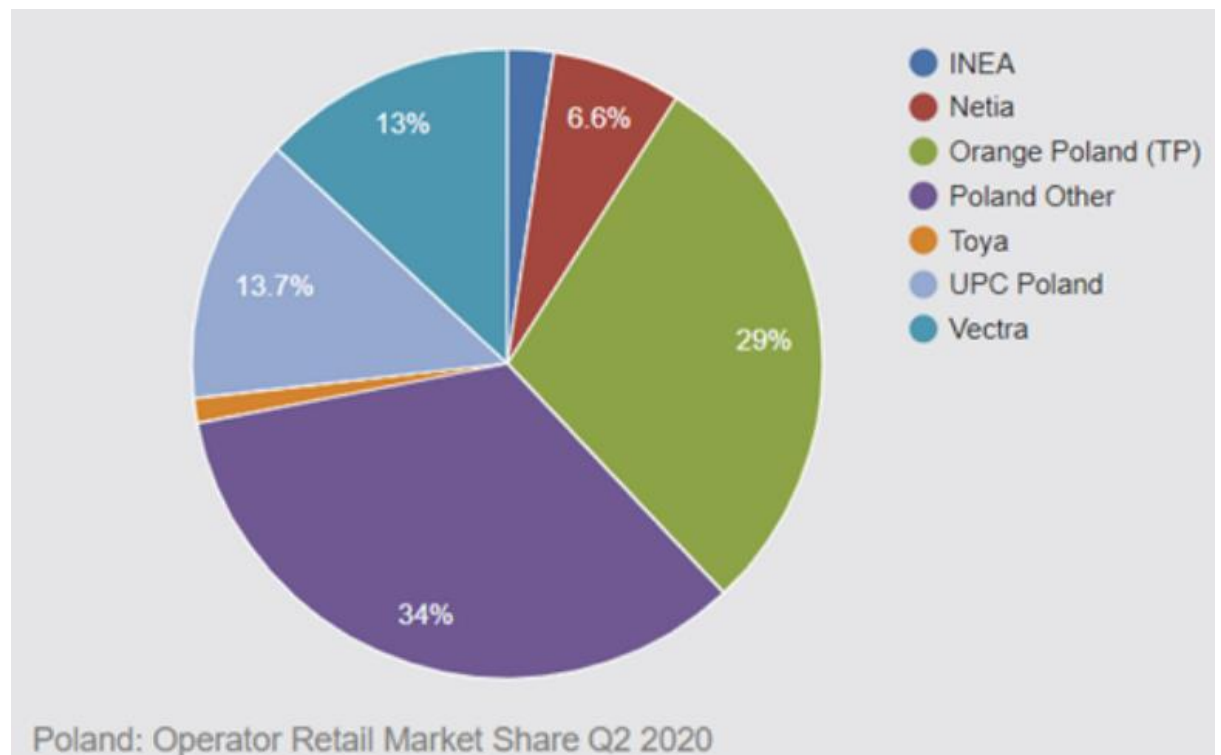
Poland

There were 9.1 million fixed broadband subscribers in Poland at the end of Q2 2020. The annual growth rate stood at 12.3%, while population penetration reached 23.6%.

The penetration of fixed broadband in the country is at the lower end of the scale, so growth in the fixed broadband take-up is expected to continue.

Poland ISP market shares

The fixed broadband market in Poland is highly fragmented, with the incumbent Orange holding only a 29% market share. UPC Poland and Vectra are the other two significant market player with 13.7% and 13% market shares respectively (Q2 2020).



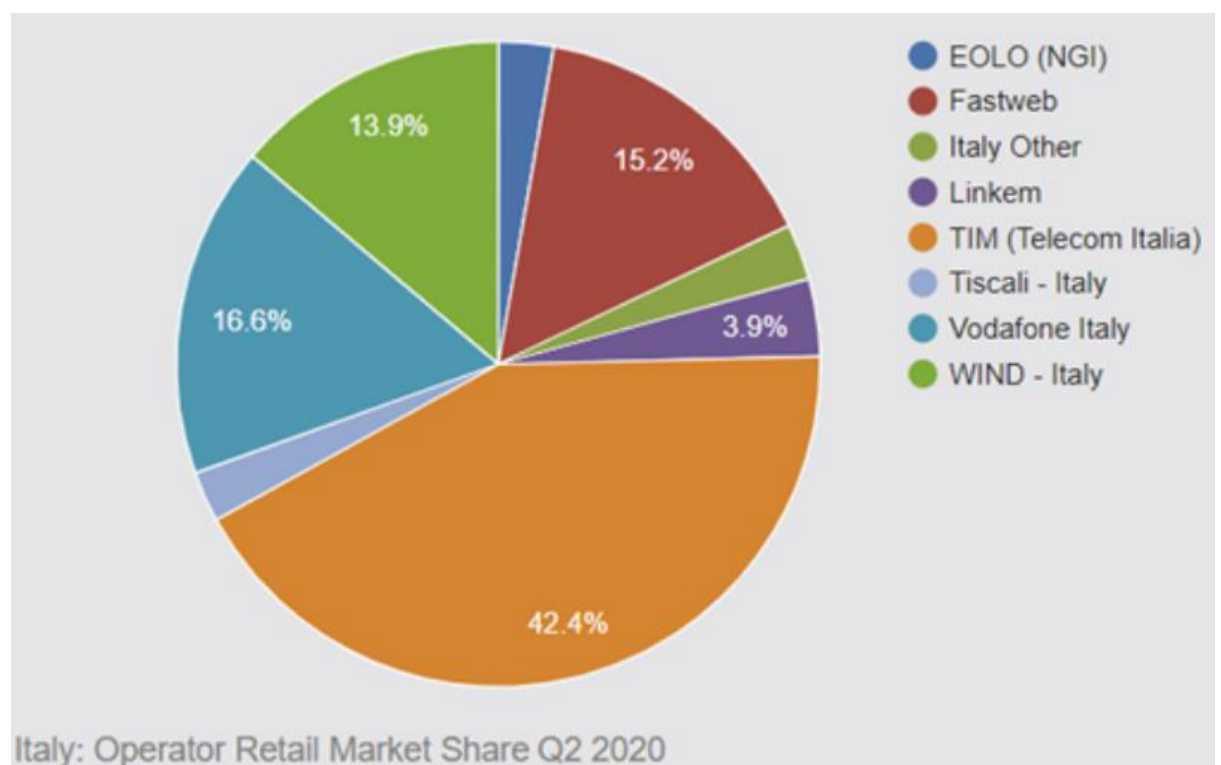
Italy

There were 17.7 million fixed broadband subscribers in Italy at the end of Q2 2020. The annual growth rate stood at 2.8%, while population penetration reached 28%.

The penetration of fixed broadband in the country is relatively modest, and the country's operators are rolling out fibre broadband as well as satellite services targeting rural areas, so growth in the fixed broadband take-up is expected to continue.

Italy ISP market shares

The incumbent TIM has the largest share of the fixed broadband market at 42.4%. Vodafone, Fastweb and Wind are the other significant market players with market shares of 16.6%, 15.2% and 13.9% respectively (Q2 2020).



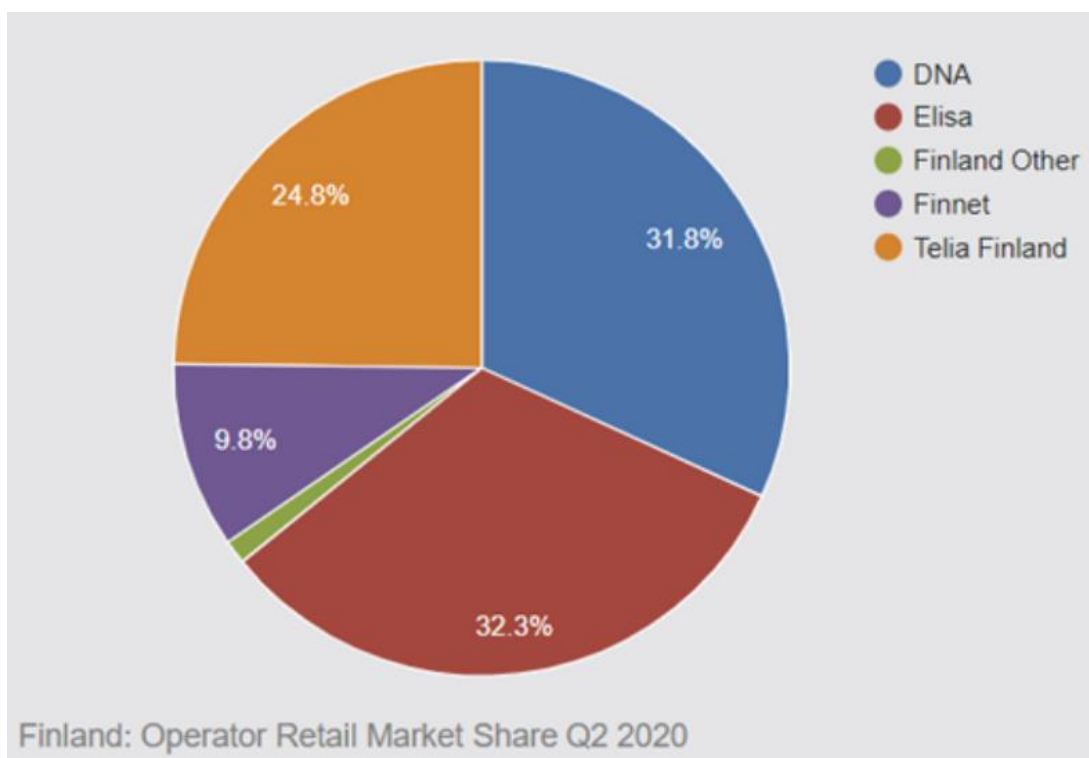
VDSL is the most widely available NGA broadband technology in Italy, while FTTP is also gaining ground slowly, with all major providers investing in the infrastructure.

Finland

There were 1.8 million fixed broadband subscribers in Finland at the end of Q2 2020. The annual growth rate stood at 3.6%, while population penetration reached 32.8%.

Finland ISP market shares

Three major ISPs dominate Finland's fixed broadband market – Elisa with 32.3%, DNA with 31.8% and Telia with 24.8% market shares (Q2 2020).



VDSL (45%) is the most widely available broadband technology in Finland, albeit its coverage has remained stable since 2014. FTTP and Docsis 3 are closely matched in the second place, although the latter's footprint has been declining.

Greece

There were 4.2 million fixed broadband subscribers in Greece at the end of Q2 2020. The annual growth rate stood at 4.4%, while population penetration reached 35.9%.

Greece ISP market shares

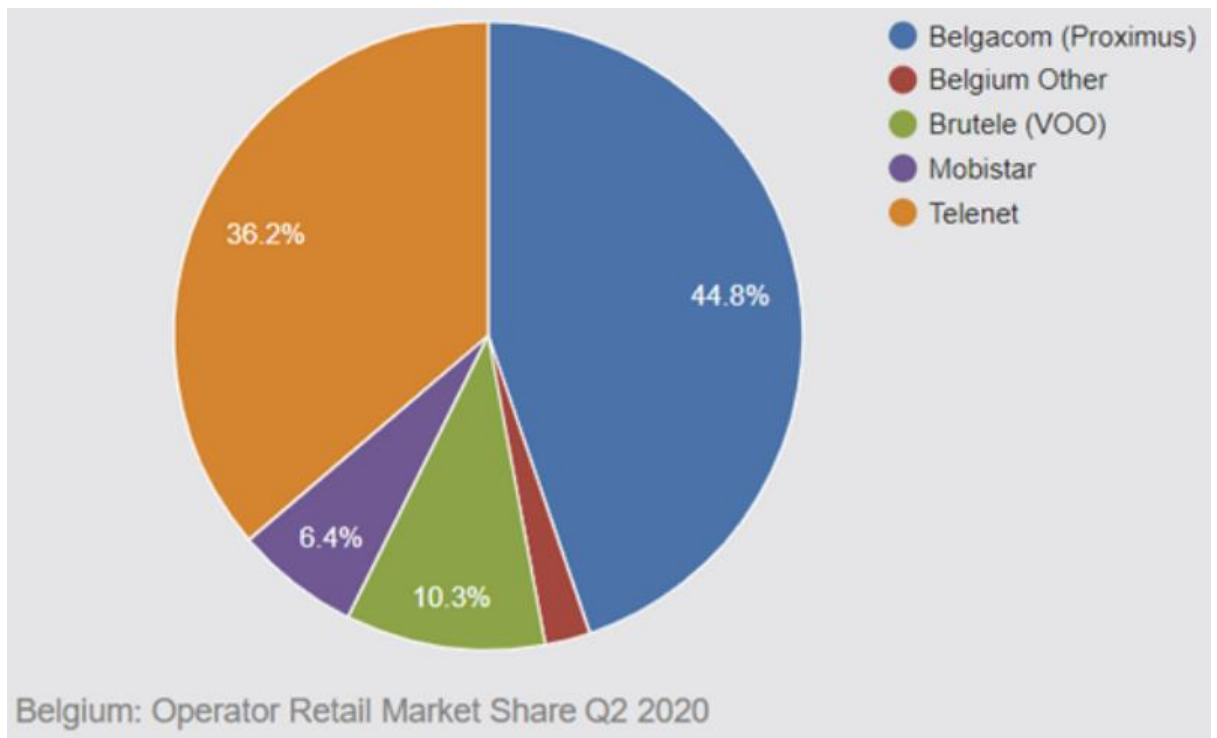
The fixed broadband market in the country is dominated by the incumbent Cosmote with a 49.6% market share. The other large fixed broadband providers are Vodafone with a 22.7% share and Forthnet with a 13.2% share (Q2 2020).

Belgium

At the end of Q2 2020, there were 4.63 million fixed broadband subscribers in Belgium. The annual growth rate stood at 2.13%, while population penetration had reached 41.3%. A slowdown in the fixed broadband take-up growth is expected in the coming years.

Belgium ISP market shares

Belgacom and Telenet are the two largest ISPs in Belgium, with market shares of 44.8% and 36.2% respectively (Q2 2020). Brutele is another significantly sized operator with a market share of 10.3%.



VDSL and Cable / Docsis technologies are almost as broadly available in Belgium as DSL, while FTTP is in the nascent stages.

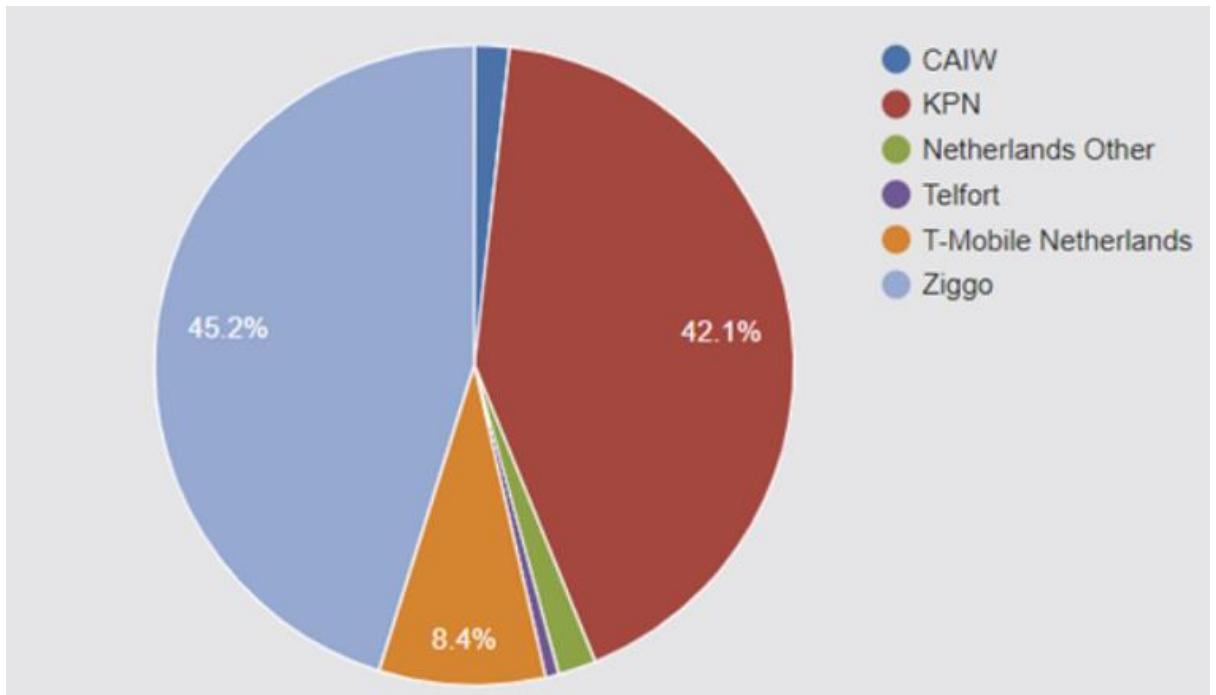
Broadband coverage in Belgium (%HH)								
	2011	2012	2013	2014	2015	2016	2017	2018
>2Mbps	97.0%	97.3%	99.4%	99.8%	99.8%	99.8%	99.9%	99.9%
>30Mbps	79.8%	83.7%	92.7%	98.0%	98.1%	98.1%	96.1%	98.9%
>100Mbps	65.5%	71.5%	83.8%	96.2%	96.4%	96.4%	91.6%	96.4%
DSL	99.8%	99.8%	99.8%	99.9%	99.9%	99.9%	99.9%	99.9%
VDSL	44.4%	45.6%	84.9%	90.1%	91.6%	92.8%	94.0%	94.5%
FTTP	0.2%	0.3%	0.3%	0.4%	0.4%	0.6%	0.8%	1.4%
FWA	14.7%	15.1%	15.2%	15.1%	15.0%	14.8%	14.9%	14.8%
Standard cable	93.7%	93.8%	95.1%	96.1%	96.2%	96.1%	95.4%	96.0%
Docsis	93.7%	93.8%	95.1%	96.1%	96.2%	96.1%	95.4%	96.0%

Netherland

There were 7.5 million fixed broadband subscribers in The Netherlands at the end of Q2 2020. The annual growth rate stood at 0.6%, while population penetration reached 43.6%.

Netherlands ISP market shares

The fixed broadband market in the country is dominated by two providers – Ziggo with a 45% market share and the incumbent KPN with 42%. The third placed T-Mobile serves 8% of the Dutch fixed broadband subscribers (Q2 2020).



Docsis is the most widely available broadband technology in The Netherlands, while FTTP is also growing fast as major providers are investing in the fibre infrastructure. VDSL coverage meanwhile has been declining as the operators are upgrading their networks to direct fibre.

Turkey

17th place in internet user around the world.

Turkey currently boasts roughly 245,000 km of fibre-optic cables laid, with nearly 182,000 km belonging to Türk Telekom and 33,000 km to Turkcell and 16,000 km to Vodafone. Turknet is another smaller player.

The country's entry-level fixed broadband penetration is still at 44 percent, compared to 70 percent in the EU. With high-speed broadband penetration at 13 percent, only about 26 percent of subscribers are high speed. Ultra-fast penetration stands at merely 0.1 percent.

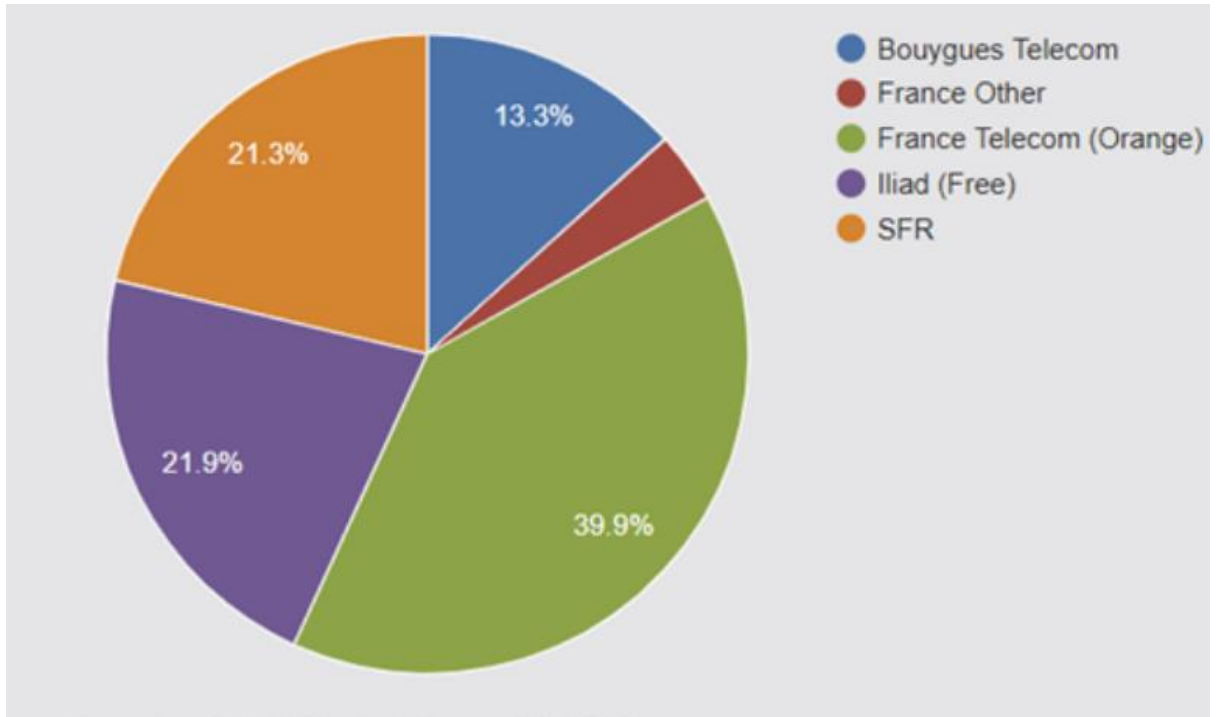
Significant investments in expanding fibre-optic broadband networks are continuing in Turkey and overall it offers substantial opportunities for fixed broadband growth considering its current penetration is only around 16%. xDSL services are still the leading fixed broadband access method in 2019, with over 9 million subscribers.

France

At the end of Q2 2020, there were 30 million fixed broadband subscribers in France. The annual growth rate stood at 2.34%, while population penetration had reached 45.4%.

France ISP market shares

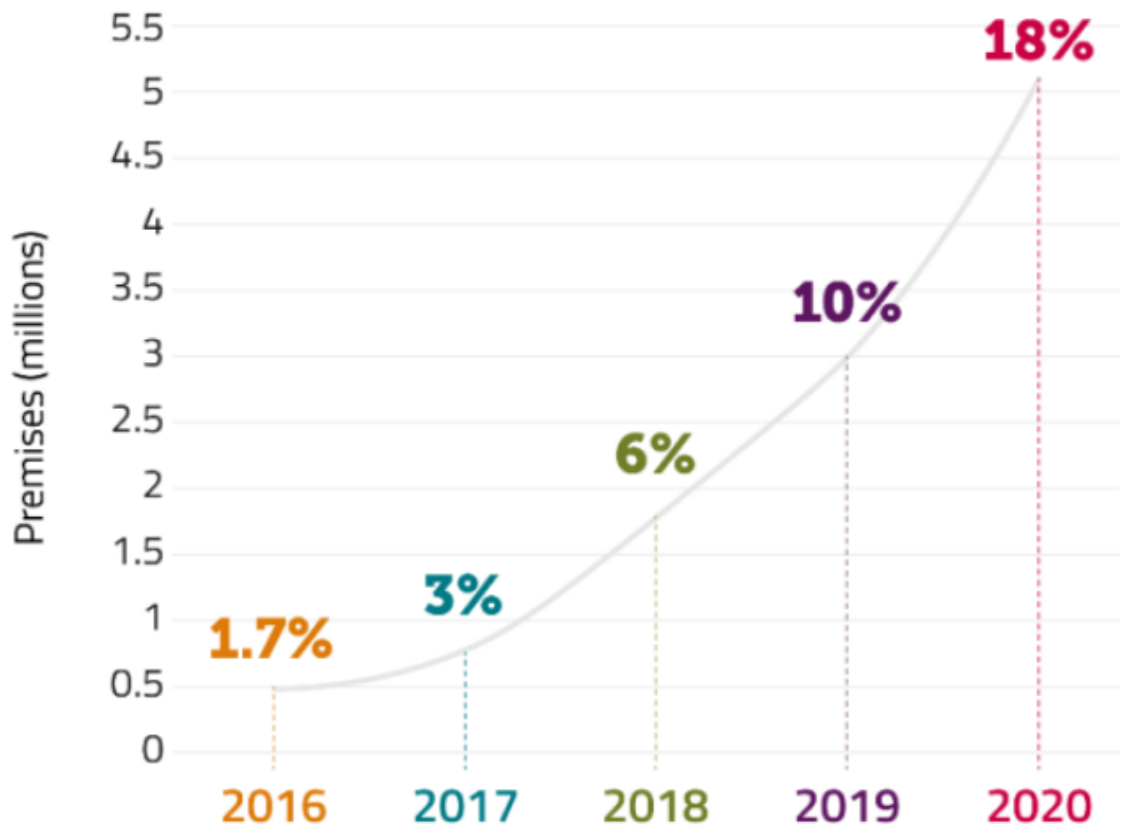
Orange, Iliad and SFR are the three largest ISPs in France, with market shares of 39.9%, 21.9% and 21.3% respectively (Q2 2020). Bouygues Telecom is another significantly sized broadband provider with a market share of 13.3%.



UK

The Government's new **£5bn UK Gigabit Programme**, which is focused on trying to identify and tackle the final 20% (aka – **F20**) of hardest to reach locations (up to **6 million premises**) using an *“outside-in”* approach to deployment (i.e. build out from rural areas first, rather than leaving them until last), is also set to further boost this effort by targeting 85%+ coverage of gigabit-capable networks by the end of 2025.

Growth of full-fibre broadband availability in the UK



UK's households used an average of 429 gigabytes (GB) of data each month in 2020 – up 36 percent from last year (315GB), and 225 percent from four years ago (132GB in 2016).

Kenya

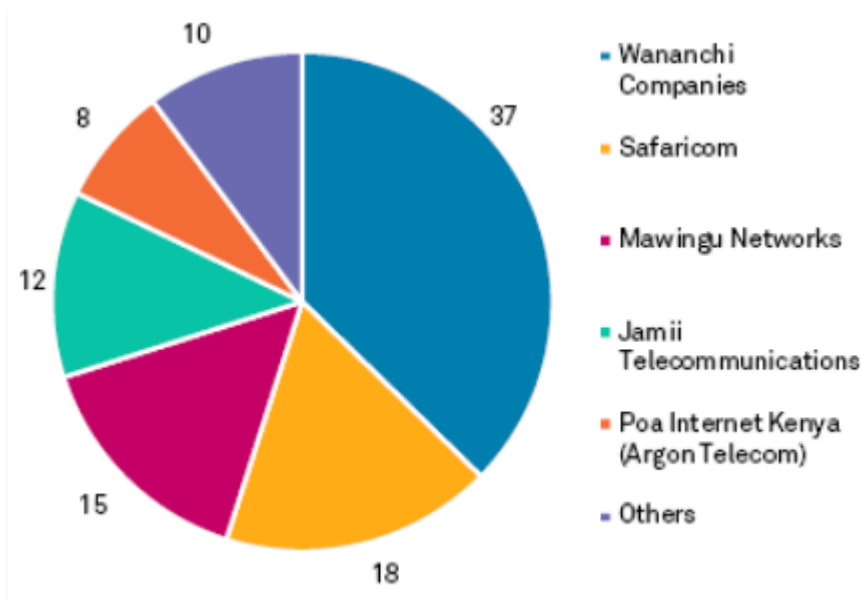
Fiber Project in Kenya

[Access Kenya](#)

National Optical Fibre Backbone Infrastructure (NOFBI)

Safaricom
Kenya Data Networks
Telkom Kenya
Jamii Telecom
Kenya Power (formerly KPLC)
Airtel Kenya

Kenya's fixed-broadband market is largely concentrated in the hands of four operators – Zuku, Safaricom, Mawingu, and Jamii.



Algeria

Internet coverage in Algeria is about 46% of the population mainly through 3G and 4G technology. FTTH adoption has been very slow.

Development of Algeria's fixed-line broadband market has long been hampered by the limited reach of the fixed-line network and the capability of the infrastructure to provide broadband services. This created an environment which encouraged alternative operators to invest in fixed-wireless accesses.

The licensing of 3G spectrum to the three mobile network operators in late 2013 and the provision of LTE by all three MNOs since September 2016 has done much to ensure the availability of mobile internet access across the country. In addition, three telcos were awarded Universal Telecommunications Service (UTS) authorisations in early 2016 which allow them to provide wireless or fixed telecoms services to underserved areas. By the end of 2017 mobile internet accounted for about 92% of all internet connections.

Tanzania

The market is very competitive with the following operational service providers:

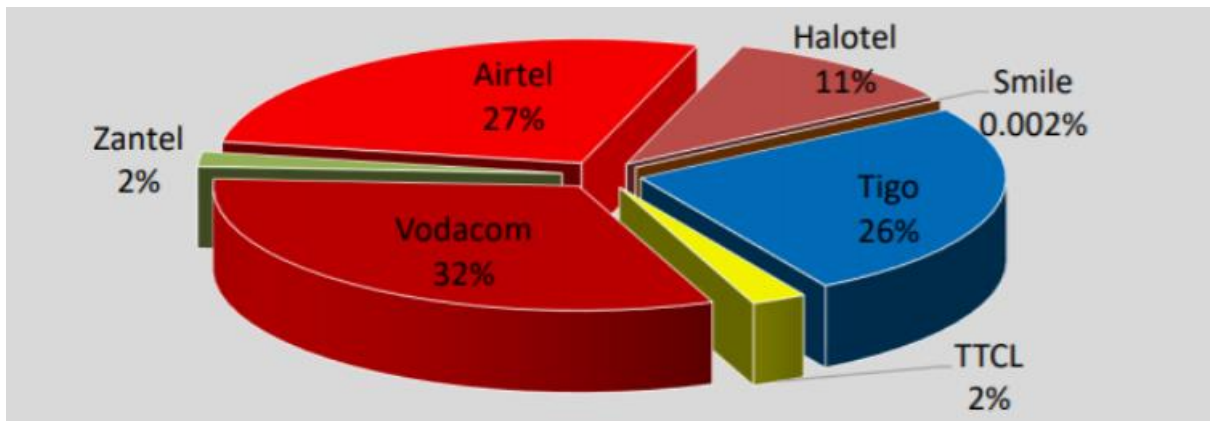
Fixed network operators:

1. Tanzania Telecommunications Company Limited (TTCL)
2. Zanzibar Telecommunications Limited (ZANTEL)

Mobile network operators:

1. Tanzania Telecommunications Company Limited (TTCL)
2. Zanzibar Telecommunications Limited (ZANTEL)
3. Vodacom Tanzania Limited
4. MIC Tanzania Limited (TIGO)
5. Airtel Tanzania Limited
6. Smile
7. Viettel (HALOTEL)

Operators Subscription Market Share



Saudi Arabia

KSA intends to enhance high-speed broadband Internet connectivity as part of its Vision 2030. The targets include exceeding 90% of housing coverage in densely populated cities and 66% in other urban areas.

Saudi Arabia is also betting on boosting its FTTH performance by launching a new open access initiative in cooperation with all operators in the market.

Integrated Telecom Company (ITC), the leading Information and Communications Technology Company in Saudi Arabia and Sofrecom, an Orange Group subsidiary, signed an agreement to lead the Outside Plant (OSP) implementation and management in all regions of Saudi Arabia for the next 3.5 years and to provide planning, design and supervision expertise and knowledge transfer to ITC employees.

Saudi Telecom Company (STC) has making great strides in the field of fiber deployment, mainly with the help of its partner, Corning Incorporated. Earlier this year, STC and US industrial materials manufacturer, Corning Incorporated, announced that Corning will supply and share its FTTH optical solutions with STC, as an enabler to the STC national network for high-speed connectivity and fiber-to-the-home (FTTH) applications.

Hungary

Hungary benefits from having a developed telecom infrastructure, with a focus among operators to develop the 5G sector and upgrade fixed networks to provide a 1Gb/s service. Services based on 5G have been supported by the January 2021 multi-spectrum auction for spectrum in the 900MHz and 1800MHz bands. Digi Mobile failed to secure spectrum, which prompted the operator's parent company to sell the unit to 4G.

As in many other markets in the region, the number of fixed-lines continues to fall as subscribers migrate to the mobile platform for voice and data services. Operators have thus looked to bundled packages to boost revenue and retain subscribers. This strategy encouraged Vodafone Group to acquire UPC Hungary in mid-2019.

The broadband market has effective infrastructure-based competition, with an extensive cable network competing against DSL services and a vibrant and rapidly expanding fibre sector. The regulator has also introduced a number of measures aimed at promoting market competition, which is pushing the drive for higher speed platforms and encouraging operators to invest in technology upgrades. As a result, Hungary now has the highest fixed broadband penetration rate in Eastern Europe. By the beginning of 2021, the incumbent telco Magyar Telekom provided a 1Gb/s service to about 2.5 million premises across the country. The number of superfast broadband connections (above 30Mb/s) accounted for 78% of all fixed broadband connections.

The dynamic mobile market is served by four MNOs and a small number of MVNOs. Mobile penetration is relatively high for the region, and there remains considerable growth in mobile broadband services delivered via upgraded networks. Revenue growth is focused on mobile data as operators struggle with competition and regulated tariff reductions, as well as reductions in the MTR.

Hungary's broadband market has benefited from intense infrastructure-based competition, with the result that broadband penetration is the highest in Eastern Europe. By late 2019 the incumbent telco delivered a gigabit broadband service to about a third of all premises in the country and was in the process of replacing all of its copper infrastructure with fibre nationally.

Key developments:

- Maygar Telekom launches a 2Gb/s fibre service;
- Government invests HUF150 billion in program to deliver universal 30Mb/s broadband services;
- Vodafone Group acquires UPC Hungary from Liberty Global;
- Digi Telecom acquires Invitel;
- Telcos strike deal with the government to extend broadband to underserved areas;
- Utility Tax amendments favouring superfast broadband network roll-outs;
- FttX subscriber base reaches 668,000

Sudan

Sudan's national fibre optic backbone and international fibre connections have placed its telecommunication infrastructure among the regional frontrunners according to a report by Research and Markets. The country remains subject to United Nations Security Council (UNSC) sanctions which include (inter alia) an arms embargo, travel bans, and a freeze on certain assets.

This economic climate has made it difficult for operators to develop revenue from services and sufficiently invest in infrastructure upgrades.

Nevertheless, Sudatel in 2016 began investing in rural tower infrastructure to improve connectivity, though such measures remain far below what is required, and in early 2018. The telco also signed deals with Nokia to upgrade mobile infrastructure and with Liquid Telecom to build out a fibre broadband network across the country.

Competition in the fixed-line market comes from Canar Telecom, which was majority-owned by Etisalat until Etisalat sold its 92.3 per cent interest to the Bank of Khartoum in mid-2016. The operator opted to adopt CDMA2000

technology to cost-effectively roll out fixed services and in April 2017 it secured spectrum in the 2.5GHz band which has enabled it to launch LTE services.

South Africa

South Africa's fibre market is billed as one of the highest-growth industries, with fibre-to-the-home (FTTH) or fibre-to-the-building Internet subscriptions increasing by 168.2% between 2015 and 2019.

Fiber Infrastructure Providers

OpenServe

OpenServe is a licensed [telecommunications service providers](#) through an [open access network](#). They are majority owned by [state owned Telkom](#). They provide broadband services to over 3 million households and having laid over 147,000 kilometres of [fibre optic cables](#) in [South Africa](#).

Vumatel

Vumatel is an [Open Access Fibre Provider](#), that specialize in building Fibre networks. They are majority owned by [Remgro](#) and provide [Fibre to the Home\(FTTH\)](#) services in [South Africa](#).

Frogfoot

Frogfoot is an [Open Access Fiber Provider](#), that specializes in building [fiber networks](#). They currently provide [fiber](#) to over 102,000 homes in [South Africa](#).

Octotel

Octotel is an [Open Access Fiber Provider](#), that specializes in building [fiber networks](#). They provide [fibre connectivity](#) to over 100,000 [homes](#) and [businesses](#), mostly in [Cape Town](#).

Uganda

The ongoing expansion and improvement of data infrastructure in Uganda is playing a major role in the country's economic development and boosting the contribution of the information and communications technology (ICT) sector to gross domestic product (GDP). This has risen from 2.5% in 2015 to] approximately 3.1% currently. It is estimated that the sector employs over two million people (with direct employment of about one million). A significant number of young people are engaged in activities such as ICT hubs, resale of value-added services and ICT innovation, bolstering much-needed youth employment

The total optical fiber network, both Government and private owned, spans around 12,000 km covering 49 percent of the districts in Uganda. As a mode of boosting data infrastructure, Government launched the National Data Transmission Backbone Infrastructure (NBI) Optic Fiber network in order to boost the usage of the internet among citizens and government departments. There are 3517 mobile towers in the country, thereby leaving a gap of at least 3500 additional towers required to cater for full connectivity. As such, the uptake of ICT services, made possible through the substantial investments that Government and private sector players have made in data infrastructure, is changing the face of government service delivery and industries such as the financial sector.

Botswana

Until the global recession, Botswana maintained one of the world's highest economic growth rates since independence in 1966. Diamond mining fueled much of the economic expansion and currently accounts for one quarter of GDP, approximately 85% of export earnings, and about one-third of the government's revenues. Tourism is the secondary earner of foreign exchange and many Batswana engage in subsistence farming and cattle rearing. Through fiscal discipline and sound management, Botswana transformed itself from one of the poorest countries in the world to a middle-income country with a per capita GDP of approximately \$16,900 in 2016. Botswana also ranks as one of the best credit risks in Africa.

Key Developments:

- BTC improves satellite connectivity to improve rural broadband access and support e-learning and e-government services;
- Orange Botswana expands its Digital Schools Project, extends the reach of LTE-A services;
- Alphabet secures clearance to trial project Loon in Botswana;
- Government imposes m-money transaction limits;
- Regulator ends off-peak mobile wholesale call rates;
- Korea Telecom advises BTC on LTE network optimisation;
- Orange Money initiates cross-border m-payment platform;
- BTC reports 3.7% increase in revenue for the first half of fiscal 2020.

Czech Republic

FTTH services include in [Prague](#), a FTTH 1/10/100 Mbit/s service called ViaGia provided by [T-Systems](#) is available in newer homes built by CentralGroup. UPC provides Triple Play Services over FTTH in new buildings. In December 2013, Czech operator CentroNet, a.s. launched a 1 Gbit/s FTTH service in [Prague](#).

In [Brno](#), SMART Company offers service branded NETBOX. Other networks operate in [Brno](#), Frýdek-Místek, Šumperk and Most.

Spain

Spanish eyes are currently smiling on record growth in the [fiber to the home \(FTTH\) market](#), as operators compete to roll out super-fast broadband across a country that has previously been slow to embrace new technology.

A Council of Europe analysis published earlier this year found that, among EU countries, Spain was making the most progress in rolling out FTTH, having previously been bottom of the list.

Following Orange Spain's acquisition of Jazztel this summer, the company is investing an impressive 1.5 billion Euros in Spain and now has a 28.41 per cent share of the market. It hopes to reach 10 million Spanish households (via FTTH and other means) next year and 14 million by the end of 2023. It will mean that the company will be able to cover 80 per cent of Spanish cities with more than 20,000 inhabitants - key in a country with a huge rural population and as well as small towns desperately in need of internet access.

Meanwhile, Vodafone acquired local operator Ono last year and currently has 22.19 per cent of the Spanish FTTH market. It has a network-sharing scheme with Orange and is looking at ambitious expansion plans across Spain as well as into Portugal and Italy.

Ethiopia

The outbreak of the Coronavirus in 2020 is having a significant impact on production and supply chains globally. During the coming year the telecoms sector to various degrees is likely to experience a downturn in mobile device production, while it may also be difficult for network operators to manage workflows when maintaining and upgrading existing infrastructure. Overall progress towards 5G may be postponed or slowed down in some countries.

On the consumer side, spending on telecoms services and devices is under pressure from the financial effect of large-scale job losses and the consequent restriction on disposable incomes. However, the crucial nature of telecom services, both for general communication as well as a tool for home-working, will offset such pressures.

Key Developments

- National Bank opens up Ethiopia to m-money services;
- Ethio Telecom secures mobile network monitoring platform;
- Safaricom shows interest in securing a mobile licence;
- Government audits Ethio Telecom in preparation for privatisation, sets up a new telecom regulator;
- Fibre cabling on the Addis Ababa and Djibouti rail route to be used for telecom services;
- Government launches mobile apps as part of the e-Government Directorate, announces plan for \$3 billion technology city;
- Major changes anticipated in the second Growth and Development Plan to 2020;
- Includes Telecom Maturity Indexes charts and analyses, Ethio Telecom data to September 2019, assessment of the global impact of COVID-19 on the telecoms sector, recent market developments.

Ghana

The telecom services revenue in Ghana is estimated to grow at a CAGR of 5.4% during 2021-2025, primarily driven by growth in mobile data revenue. Mobile voice will be the largest revenue-contributing segment until 2022. Mobile data will be the fastest-growing segment in the telecom market and is estimated to grow at a CAGR of 16.3% during 2021-2025, primarily driven by operators' investments in 3G and 4G network coverage and attractive data bundles offered by telcos. Going forward, operators look to invest in 3G/4G network upgradation, extend coverage and fiber-optic network deployments to improve and extend broadband connectivity in the country, which will provide significant opportunities for vendors and investors.

The telecommunication industry in Ghana has undergone various stages of transformation. The industry has experienced exponential growth over the last decades. Sustaining this growth hinges on efficient infrastructural deployment and management. Fiber optics technology has become the primary network

infrastructure and a communication medium, which provides higher bandwidth capacity high speed for current and emerging technologies. As the demand for new technology and services increases, fiber optics technology brings the promise of a flexible, scalability, full-service network platform with potentially unlimited capacity. Although mobile network operators have invested significantly and strategically in fiber optic infrastructure, there has been an increase in the number of network outages caused by frequent failures in fiber optics networks such as fiber cable cuts. Fiber cable cuts have become the single most significant cause of transmission failure or disruption to telecommunication services in Ghana with an enormous impact on the subscriber's experience. This research seeks to investigate the challenges in fiber cable deployment in Ghana, with emphasis on the technical, regulatory, managerial challenges and recommend the appropriate solutions. The challenges of frequent fiber cuts can be attributed to external factors such as dig-ups during road construction. Lack of regulatory guidelines and policies on fiber deployment and management poses a major threat to the fiber management in Ghana.

Germany

Fiber optics have determined Telekom's network expansion in 2020. Despite Corona, the company has continued to massively expand in the fixed network and mobile communications. 5G can now already be used by 55 million people in Germany. Telekom's technical teams have made around 45,000 antennas fit for 5G. The LTE network also continued to grow in 2020 and now covers 98.6 percent of the population. Telekom has installed more than 5,000 additional antennas this year. In mobile communications as a whole, data volumes rose to a new high, as expected. In 2020, 1.6 billion gigabytes of data went through the network. Data volume via 5G is also increasing month by month.

Telekom's fixed network has proven to be a strong backbone in Corona times and has carried Germany safely through the crisis. Home office and homeschooling have led to an increase in usage for telephony and data. The

network was able to handle this volume at all times without any problems. The average call volume during the lockdown phase was around 50 percent higher than normal. Data volumes in the fixed network also increased by an average of 30 to 40 percent. In terms of fixed-network expansion, the focus was on fiber optics. This year, Deutsche Telekom more than doubled the number of new households that can get FTTH to around 600,000. This means that a total of around two million households already have the option of booking a fiber-optic connection.

Kuwait

Like many countries, it has seen its telecommunications industry grow and evolve to an extent which the pioneers of the field would have never even dreamed of. Various telecom and software development organizations have succeeded in marketing their offerings within the region through their partnerships and collaborations with both public and private enterprises which have contributed immensely to the overall telecoms sector. Foreign investment and intervention, along with government spending, have caused the country to adopt new technologies at such a rapid pace, resulting in their current position as a relatively mature market within the MENA region.

This does not just apply to broadband, but it also to fiber optics along with 3G, 4G and more recently, 5G services. The GCC region alone currently has around 200 telecom companies. In fact, Kuwait has one of the highest rates for mobile penetration and market saturation in the world.

Historically, like many of the GCC countries, Kuwait's economy was initially driven by oil which has in turn enabled them to generate strong revenues. This has enabled the country to provide high quality services in major sectors such as education, healthcare and housing.

In terms of Kuwait's telecoms sector, it was previously stated-controlled by a

government monopoly which imposed tariffs and services. To improve services for their consumer and to reap the benefits of a more competitive market, other operators were introduced

The operators available in Kuwait are Zain (formerly MTC), VIVA and Ooredoo (formerly Wataniya), which have all extensively worked towards building 5G infrastructure, mobile broadband services and extensive LTE networks.

Zain is the first telecom operator in Kuwait and was founded in 1983 as MTC (Mobile Telecommunications Company), but was then officially privatized in 1999 and was eventually rebranded as Zain in 2007. Zain also operates in eight other countries in the MENA region, with a consumer base of 2.6 million by the end of 2018. Zain previously had 49.2 million users in all its markets which include Lebanon, Sudan, Jordan, Iraq, Kuwait, South Sudan, Saudi Arabia, Morocco and Bahrain in the first half of 2019.

For the first half of 2019, Zain Group achieved around 4 billion USD which accounted for a 28% year on year growth and consolidated EBITDA increased by 25%, reaching 1.7 billion USD. They offer 4.5G LTE network as of yet and was the first operator in 1994 to launch commercial GSM services in the whole of the MENA region.

South Sudan

South Sudan has one of the lowest mobile penetration rates in Africa. Growth in the sector in coming years is premised on a resolution to the political crisis and a recovery of the country's economy. The virtually untapped internet and broadband market also depends to a large extent on the country gaining access to international fibre optic cables and on a national backbone network being in place. Sophisticated infrastructure solutions are needed to reach the 80% of the population that live outside of the main urban centres. With a negligible rate of bank account ownership, mobile payment and banking

solutions also have a strong potential once a reliable mobile infrastructure is built.

The limits to growth are currently defined by widespread poverty and a low literacy rate, but the government recognizes the positive feedback loop on development that access to ICT can have and is providing a range of investment incentives. The international community has provided billions of dollars in aid to strengthen governance and institutions in the young nation.

Some improvement has followed from the cable link completed by Liquid Telecom in February 2020 which connects Juba directly to the company's submarine landing station at Mombasa. The cable is South Sudan's first direct international fibre link and has helped drive down the price of retail internet services for residential and business customers.

5.0 Conclusion

The FTTx market is expected to reach USD 1.277 billion by 2027 witnessing market growth at a rate of 8.12% in the forecast period of 2020 to 2027. This Research report on FTTx market provides analysis and insights regarding the various factors expected to be prevalent throughout the forecasted period while providing their impacts on the market's growth.

Rising demand from telecom industry, growing need of advanced multimedia services such as IPTV, HDT and many more, growing adoption of FTTH broadband connections and the rising demand for quadruple and triple play services are the driving factors for the growth of global FTTx market. High initial costs for setting up infrastructure as well as high concurrent costs for network upgrading are the restraining factors for the growth of global FTTx market.

Nascent stage of FTTH, growing trend of IOT devices and adoption of an advanced network strategy are the opportunities for growth of global FTTx market. Difficulties in deployment, high right of way (RoW) charges and inadequate government support are the challenges faced by global FTTx market.

Global FTTx market is analysed and market size, volume information is provided by country, solution, distributed network, application and end user as referenced above.

The countries covered in the FTTx market report are the U.S., Canada and Mexico in North America, Brazil, Argentina and Rest of South America as part of South America, Germany, Italy, U.K., France, Spain, Netherlands, Belgium, Switzerland, Turkey, Russia, Rest of Europe in Europe, Japan, China, India, South Korea, Australia, Singapore, Malaysia, Thailand, Indonesia, Philippines, Rest of Asia-Pacific (APAC) in the Asia-Pacific (APAC), Saudi Arabia, U.A.E, South Africa, Egypt, Israel, Rest of Middle East and Africa (MEA) as a part of Middle East and Africa (MEA).

Asia-Pacific will dominate the growth in FTTx market owing to the government's push for higher investments in fibre broadband which resulted in higher penetration of FTTx network and its increasing demand from the consumers.

The country section of the report also provides individual market impacting factors and changes in regulation in the market domestically that impacts the current and future trends of the market. Data points like down-stream and upstream value chain analysis, technical trends and porter's five forces analysis, case studies are some of the pointers used to forecast the market scenario for individual countries.