THE AFRICAN FTTH BOOM

Last Mile Fibre Dynamics, Economics and Outlook in African Markets

A Xalam Analytics Spotlight Report

December 2016

REPORT SUMMARY, TABLE OF CONTENTS AND SAMPLE PAGES

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REPORT SUMMARY

- **Africa is in the midst of an FTTH boom** – an increasingly loud FTTH revolution that is made even more notable by the unique nature of some of its characteristics. Between 2014 and 2016, the number of homes and premises passed by fibre has more than tripled. The cumulative number of African homes/premises passed by fibre crossed the 1m mark in 2016. We expect it to hit the 2m mark in 2017.

- **The total number of FTTH connections in Africa passed the 500k mark in 2016.** Recent growth has been strong: around 75% of Africa's FTTH connection growth since 2010 has occurred over the past two years. Last mile Fibre is upending Africa's retail broadband market dynamics – from bandwidth speeds to user experience, pricing models and market share upheavals, it's a whole new game.

- These dynamics are analyzed in our new report, "The African FTTH Boom, Last Mile Fibre Dynamics, Economics and Outlook in African Markets" - arguably the most comprehensive analysis developed on the rise and impact of FTTH in African markets.

- The African FTTH Boom takes an extensive look at FTTH adoption patterns across the continent, including key infrastructure, market structure and regulatory drivers along with current and projected levels of homes passed and connected.

- The report provides a mapping of which markets appear most attractive for an FTTH rollout; it offers an in-depth analysis of the addressable market for FTTH in Africa, from businesses in central business districts to gated communities and beyond. Finally, the report takes a close look at African FTTH economics, from cost of deployment to ARPU, profitability and potential returns, along with the implications of those dynamics on projected rollout and adoption

African FTTH – It's a Whole New Game

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SAMPLE KEY POINTS EXPLORED IN THE REPORT

XALAM ANALYTICS

The insights derived from that our research on African FTTH are distilled in this report, covering critical key questions and points, including:

- The rise of last mile fibre is transforming Africa's broadband retail market dynamics – from bandwidth speeds to user experience, pricing models and market share upheavals, it's a whole new game.
- The total number of FTTH connections in Africa passed the 500k mark in 2016. Recent growth has been strong: around 75% of Africa's FTTH connection growth since 2010 has occurred over the past two years.
- Five markets account for 85% of Africa's FTTH/P homes passed – South Africa, Kenya, Nigeria, Morocco and Mauritius. But this boom is about more than the top 5.
- Supply and demand fundamentals are coming together to push African FTTH. Only around 45% of Africa's Fixed broadband addressable demand has been reached by fixed broadband access solutions – and only 2% is currently reached by FTTH.
- We find the notion of an almost mobile-only African connectivity marketplace to be largely fallacious. The rise of FTTH is built on a realization that 3G/4G, ADSL and other technologies just aren't going to cut it for some use cases.
- Regulation has been a problem for African FTTH; for the most part, African market structures are not optimized for FTTH roll-outs. That African FTTH is picking up as much as it has been is really more a testimony to the bottled-up potential of demand for ultra high speed connectivity.
- Africa's mobile operators have traditionally ignored FTTH. As a result, they have fallen behind. Strategically, we do not believe top tier operators can afford to lose too much ground on FTTH.
- African FTTH economics are good in the first 1-2 phases of rollout, and much tougher thereafter. Along with regulation, these economics are the biggest risk to all the projections we have made in our report.
- Our business case analysis reinforces the fact that FTTH at scale is a long, long term game. Investors looking for quick returns and payback periods will not find them here.
- But providers that stick to it over the long run will hold a nearly unassailable position in Africa's digital infrastructure market.

- And more..

The Corporate/Premium version of this report includes more than 50 supporting charts and data points in Excel format (See Report Specs).

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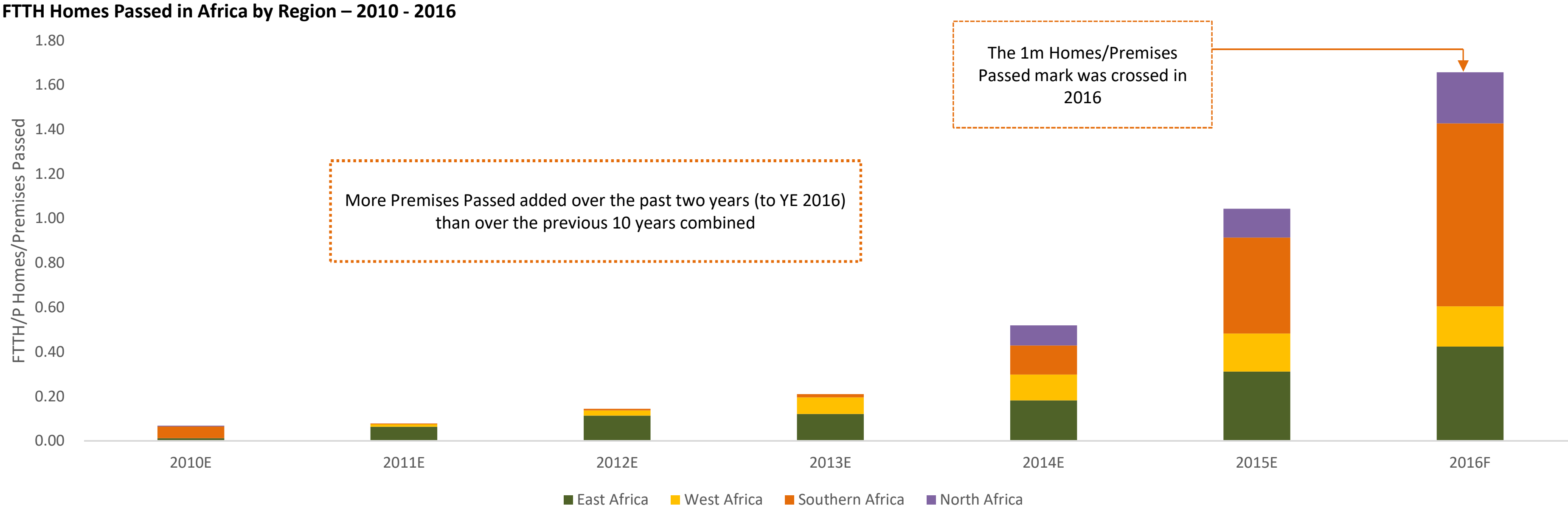
African FTTH – The 1m Homes/Premises Passed Rubicon Has Been Crossed

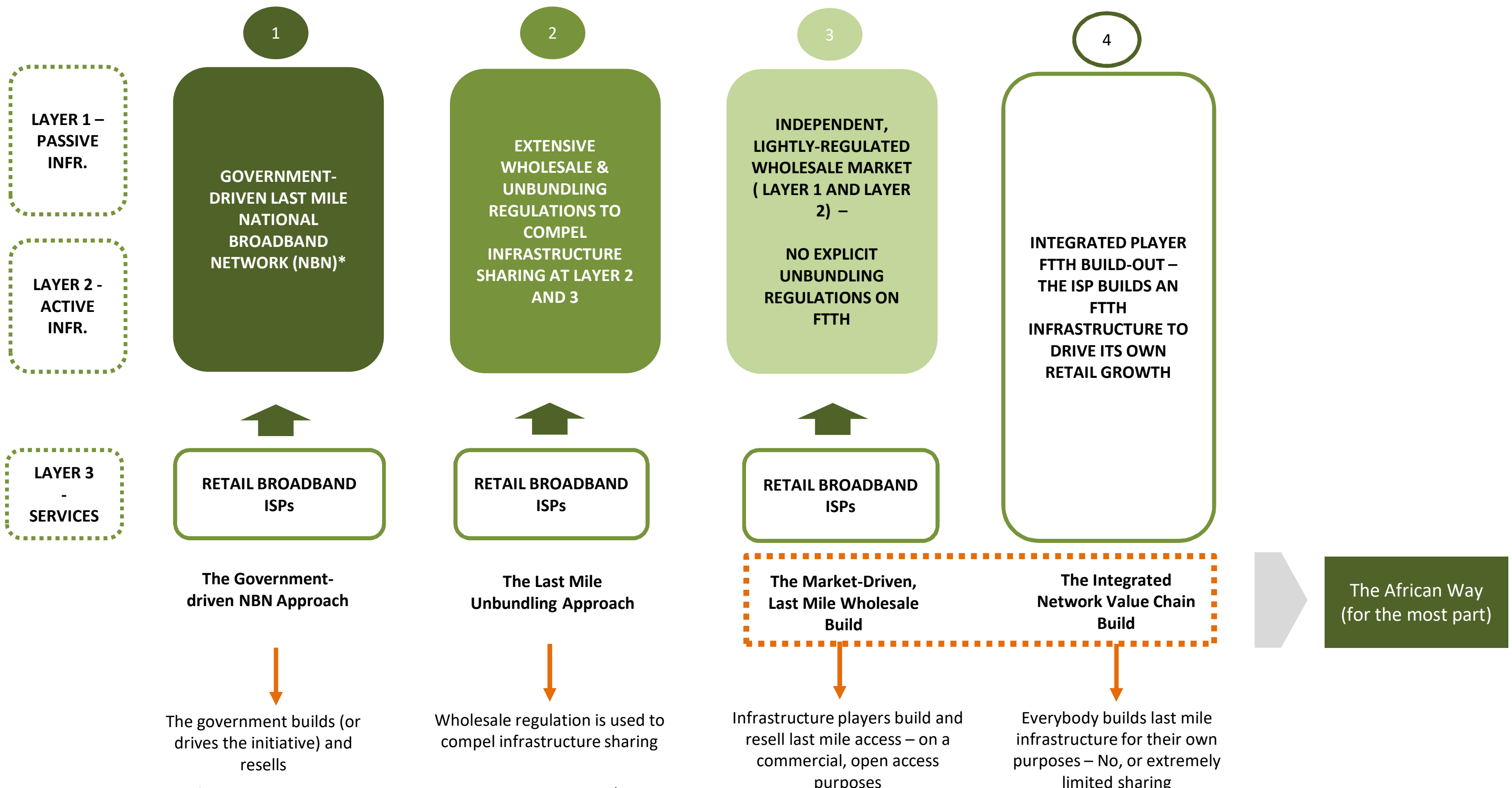
FTTH Homes Passed in Africa by Region – 2010 - 2016



There is no obvious scientific approach to estimate fiber homes passed in a precise manner (other than using a GIS model and quite literally counting them) – even more so at an African level. Estimates here are based on operator reports; while these estimates are net of coverage duplication, some degree of duplication may remain. All numbers are provided for indicative purposes – and because they are key assumptions in our FTTH forecasts.
Source: Xalam Analytics Estimates

- **We project the number of FTTH homes and premises passed in Africa to reach around 1.6m in 2016** – up ~60% from 2015 levels.
- The deployment boom is recent - ~1m homes passed added since the end of 2014
- **Deployments especially active in East and Southern Africa**
- **West and Central Africa largely lag the rest of the continent in FTTH/P deployment**, for reasons ranging from good ADSL networks to regulatory and competitive inflexibility on FTTH rollouts.

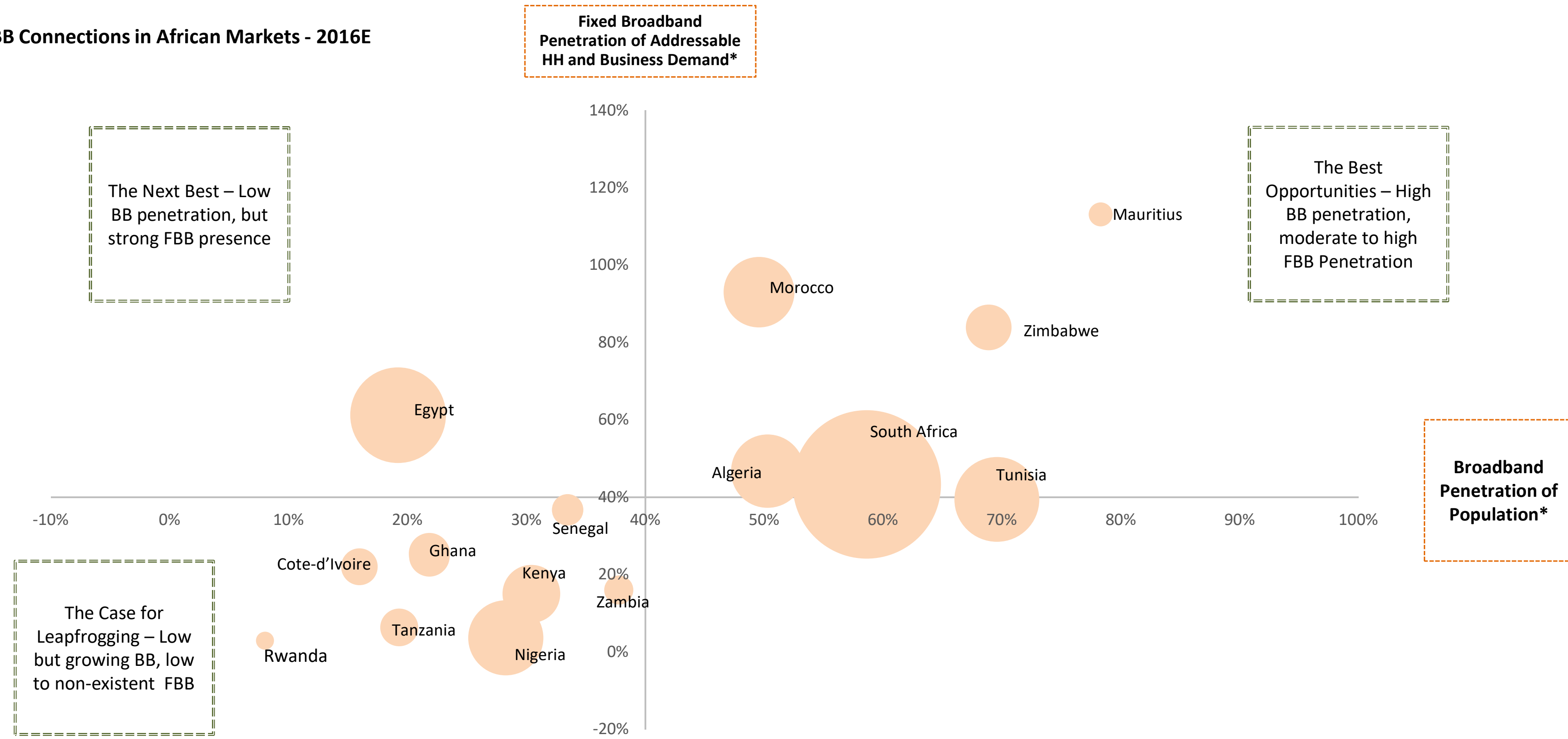
Breaking Down Optimal FTTH Market Structures



*In this case, the NBN is not a mere national backbone for backhaul purposes; it goes all the way to the premise/home.
Sources: Xalam Analytics Research

The Best FTTH Opportunities are where Broadband is and Fibre Isn't (Quite Yet)

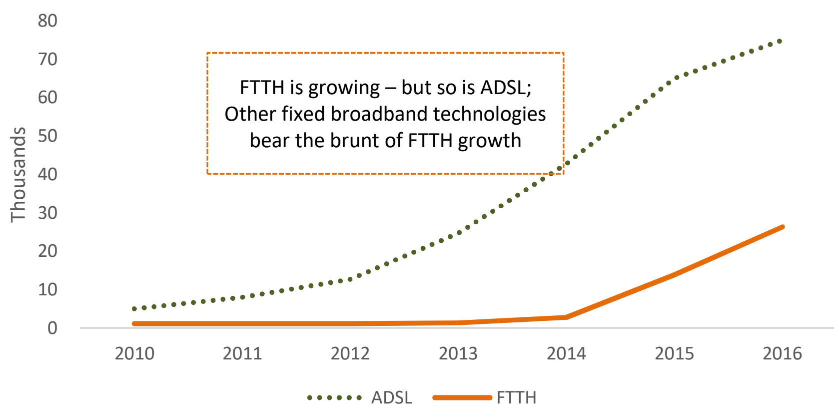
FTTH as % of FBB Connections in African Markets - 2016E



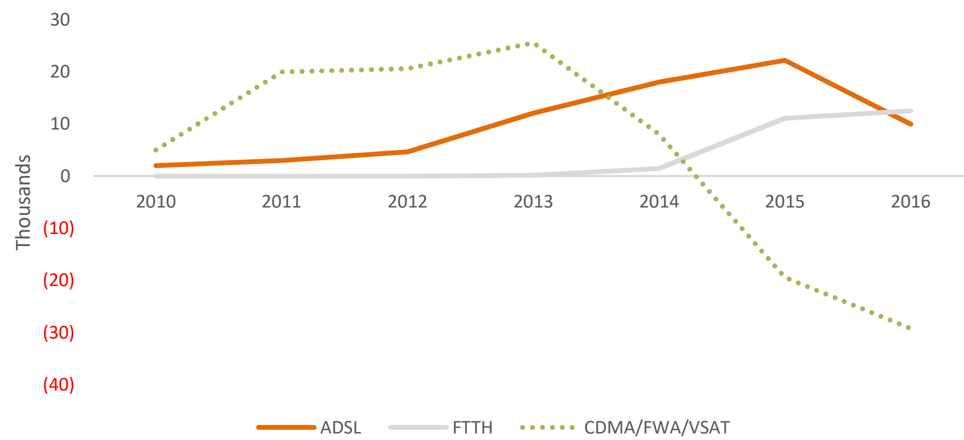
*Broadband including Fixed Broadband + 3G and 4G connections; "Fixed Broadband includes discrete connections through ADSL, Fixed Wireless Access (Wi-Fi, WiMAX, CDMA), FTTH, leased lines and VSAT satellite; LTE (TDD and FDD) are counted as "mobile" and excluded from these estimates; Addressable Households are households able to afford $20/month connection, based on income levels; addressable business demand includes formal businesses only (i.e. excl. informal sector establishments); all data is 2016 estimate; Bubble size indicates annual USD connectivity market size (2016E)
Source: Xalam Analytics Estimates

FTTH vs. ADSL – When (and Where) ADSL Keeps Up with FTTH

ADSL vs. FTTH Connections - Zimbabwe



ADSL vs. FTTH Net New Connections - Zimbabwe



Sources: Operators, POTRAZ, Xalam Analytics estimates

ADSL RESISTANCE

- Typically occurs in markets with low to moderate broadband penetration
- FTTH is introduced, but ADSL continues to resist – ADSL connections take-up keep up with FTTH
- Occurs when FTTH is available, but has yet to offer superior proposition – speeds, pricing are similar to existing offers
- In some cases, FTTH cannibalizes ADSL in specific coverage areas – but ADSL continues to grow where FTTH is not available
- In such cases, other fixed broadband technologies bear the brunt of FTTH growth
- Typically a transition phase towards competition-driven FTTH migration ; over time, FTTH cannibalization is largely inevitable
- Example: Zimbabwe

Mapping Out the Outlook for FTTH: West & North Africa

	Beyond Words: Government Impetus & Backing	Wholesale & Retail Regulation and Market Structure	Availability of Fibre Backhaul at Competitive Prices	Depth/Size of FBB Addressable Market	FTTH is a Critical Component of Key Telco Strategy		Summary Outlook
Nigeria	✗	✗	✗	✓✓✓	✓✓	→	**Low**. The demand depth is unquestionable, but the supply fundamentals are mostly woeful; deployments will remain small scale, with potential for strong acceleration.
Egypt	✗	✓	✓✓	✓✓✓	✓	→	**Low to Moderate.** The biggest wildcard of our Africa FTTH forecasts; CapEx impact means little appetite for FTTH, but a change would materially impact projections. .
Morocco	✓	✓	✓✓	✓✓✓	✓✓	↑	**Very good.** Good underlying fundamentals, with a few moderate limitations – FTTH growth has started to pick up.
Tunisia	✓✓	✓	✓	✓✓✓	✓✓	↑	**Very good.** Good underlying fundamentals, with a few moderate limitations – FTTH growth has started to pick up.
Cote-d'Ivoire	✓	✗	✗	✓✓	✓	↑	**Low to Moderate.** Good demand fundamentals, but impetus to roll out FTTH is limited; will remain ADSL market over our forecast period
Senegal	✓	✗	✗	✓✓	✓	↑	**Low to Moderate.** Good demand fundamentals, but impetus to roll out FTTH is limited; will remain ADSL market over our forecast period
Cameroon	✗	✗	✗	✓✓	✓✓	→	**Low**. Supply fundamentals are not good, but FTTH push by Camtel; deployments will remain small scale.

(1) Beyond Words: Government Impetus & Backing – refers to active government support and action, including on rights of way, etc; also refers to government ability to get out of the way; (2) Wholesale & Retail Regulation and Market Structure: assesses whether regulation and structure have driven or hampered FTTH rollout; (3) Availability of Fibre Backhaul at Competitive Prices- level of competitiveness, flexibility of the wholesale capacity market; (4) Depth/Size of FBB Addressable Market – potential size of addressable fixed broadband demand;(5) FTTH is a Critical Component of Key Telco Strategy: based on explicit plans, actions; ✗ indicates that item is a critical obstacle to FTTH

Zimbabwe FTTH: Somehow Thriving Despite Terrible Macro-Economic Environment

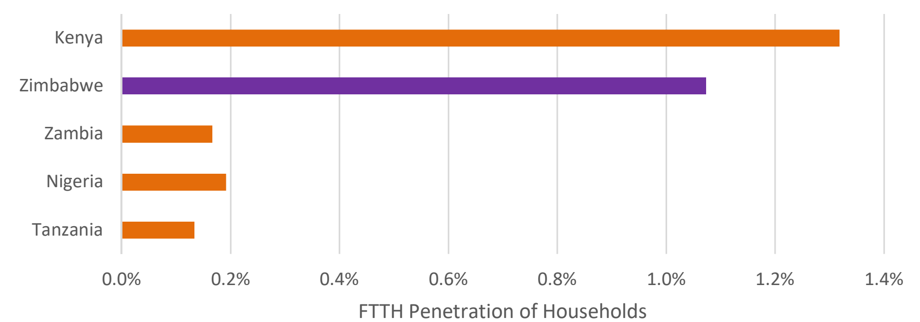
Population ~14m

FTTH Connections (2016E) ~26k

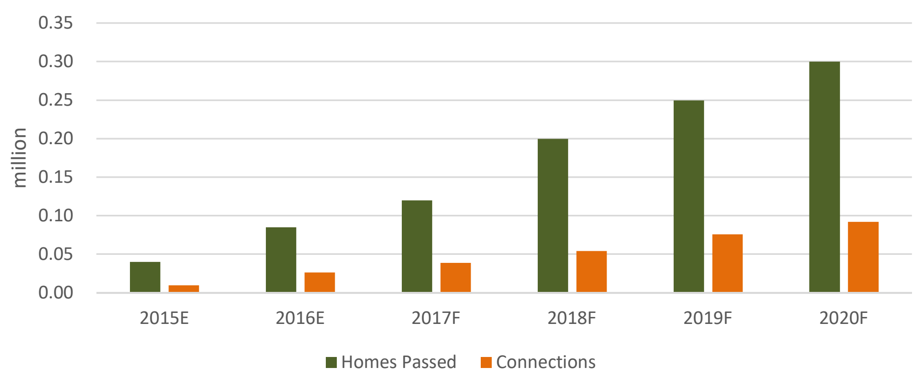
Zimbabwe Key Broadband Indicators - Past 3 Years

	2014	2015	2016
Household + FBU Addressable (k)	230	235	240
Fixed Broadband Connections (k)	151	166	159
Mobile Broadband Connections (million)	5.7	7.7	9.2
FTTH Connections (k)	2	13	26

Zimbabwe FTTH Penetration of Households vs. Peer Markets – 2016E



Zimbabwe FTTH Outlook (Homes Passed vs. Connections)



Sources: Operators, POTRAZ, Xalam Analytics Research; For indicative purposes, penetration of households in abo chart is based on all FTTH connections (rather than residential connections only).

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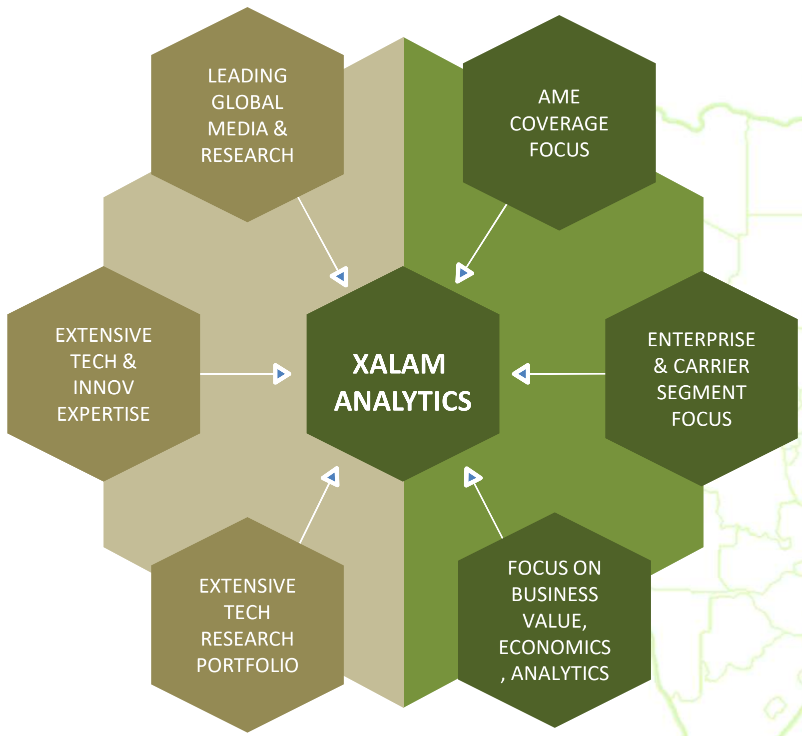

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