2014

Telkom

Wholesale and Networks

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Chief Technology Officer

Agenda

01 Landscape

02 Service Challenges

03 Network Transformation

04 Transformation Programme review

05 Technology

06 Wholesale

Telkom

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LANDSCAPE

01

Competitive Landscape

01

The quality and reach of telecommunications infrastructure in South Africa has improved dramatically over the last decade. The most notable areas of improvement are:

- The number of undersea cables that have landed on our shores
- National and regional data backhaul networks being built out by Telkom and others
- Significant Metro and access fibre roll-out
- Satellite coverage covering the country and beyond; and
- Significant build out of mobile networks

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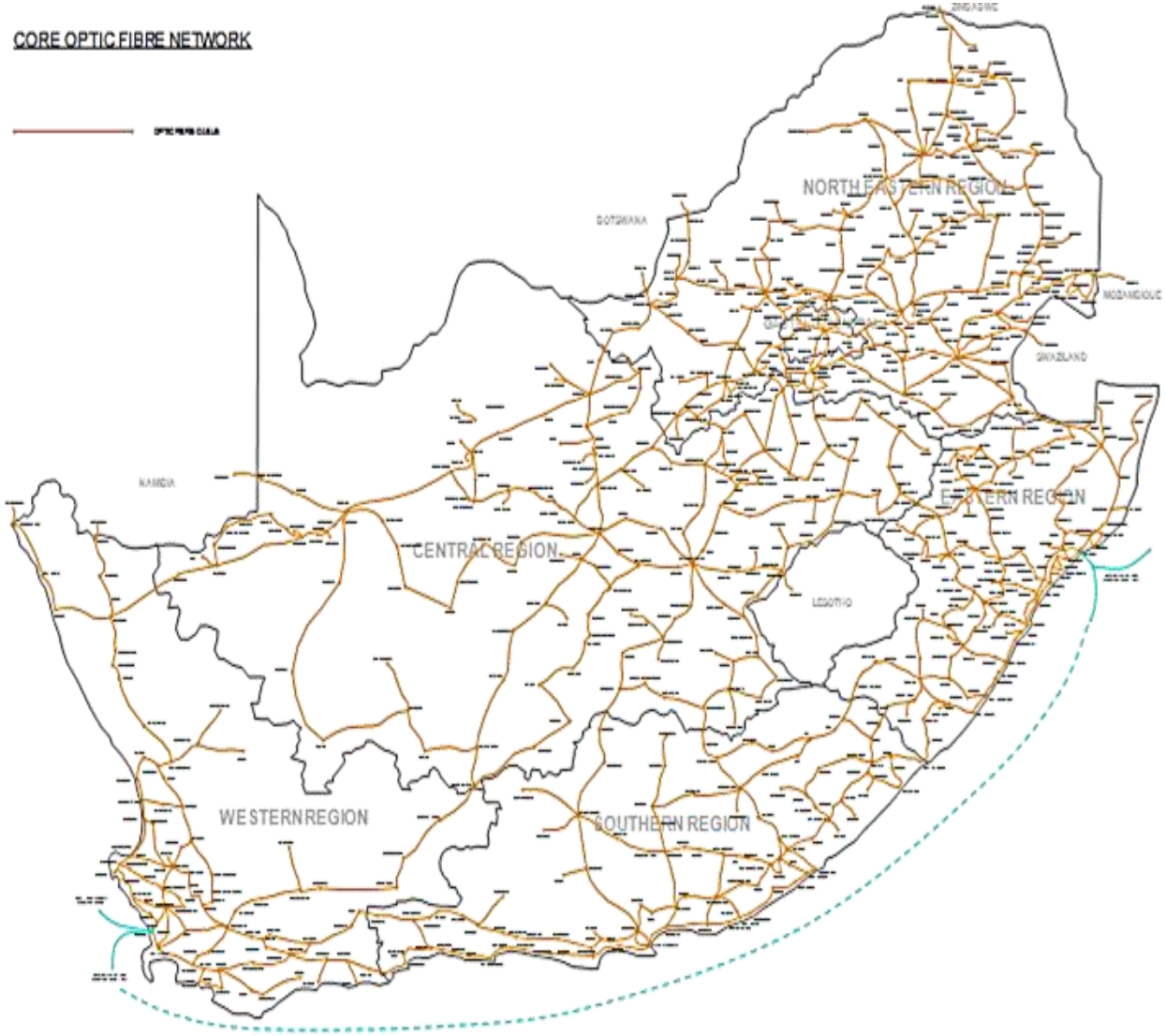
Telkom's national fibre network



- Telkom has more than 147,000 km of fibre (largest footprint in SA – critical to support a nationwide deployment)
- 16,588 Fibre Distribution Points already enabling more than 100,000 services
- 948,868 ADSL subscribers

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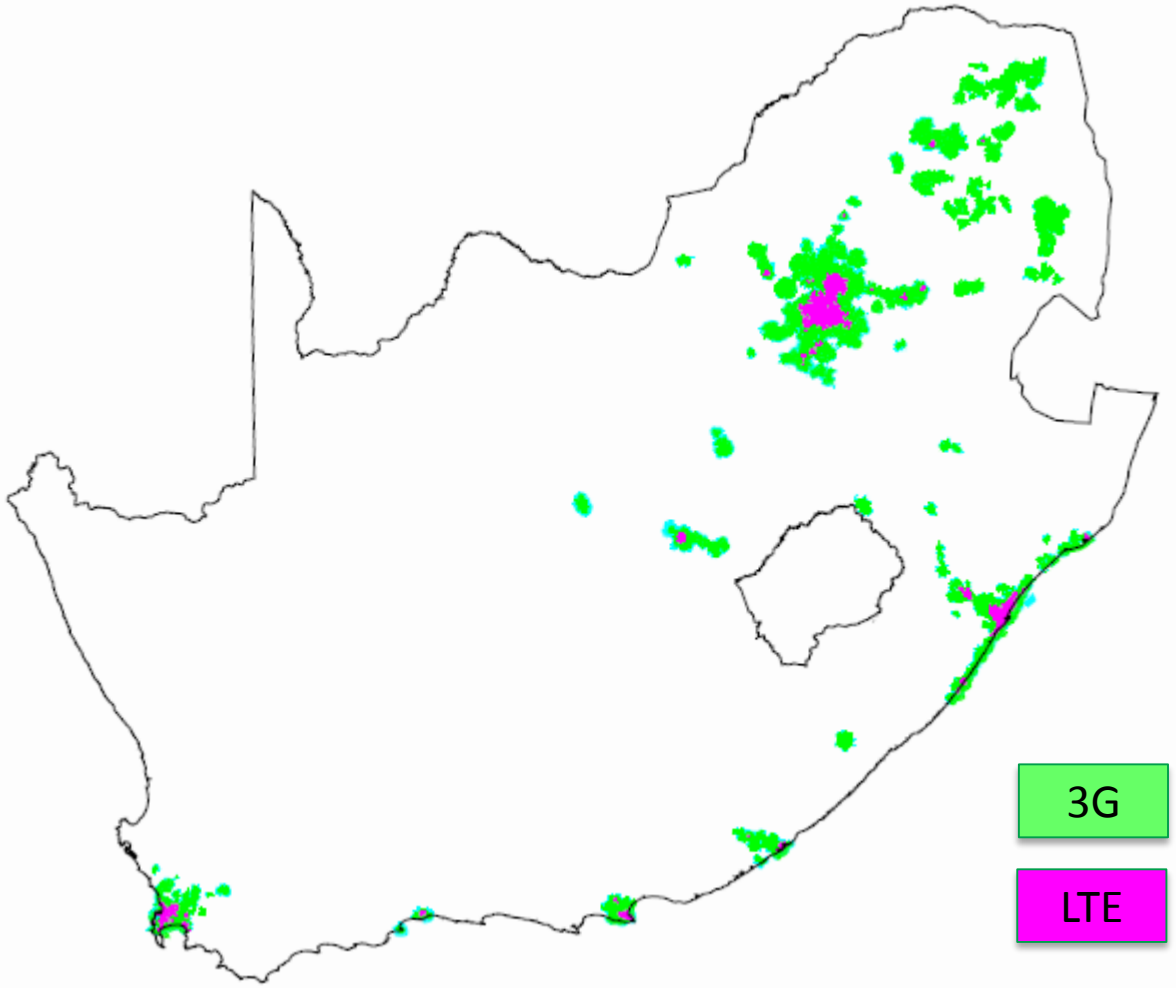
National Mobile Network Coverage

01



Telkom mobile 3G coverage reaches approx. 55% of the population

2428 sites on air

1165 LTE sites on air

2426 WiFi access points

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Global Reach Connecting Our Customers to the World 24/7

Submarine cables (3-2-3)

- 3 gateways out of the country (Yserfontein, Melkbosstrand, Mtunzini)
- 2 rings around Africa (WACS/EIG/EASSY and SAT#/SAFE/SMW3)
- 3 diverse routes (WACS and SAT2/EIG and EASSY/EIG or SMW3)

Terrestrial fibre connects SADC countries

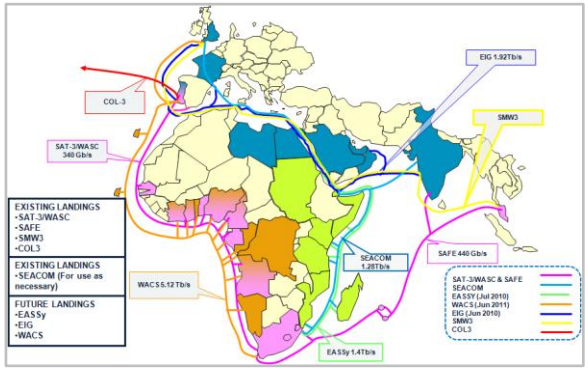
International IPNet

- POP's (London, Amsterdam, NY, HK, Frankfurt)
- Our Global VPN extended coverage spans across 111 Countries and over 700 Cities globally

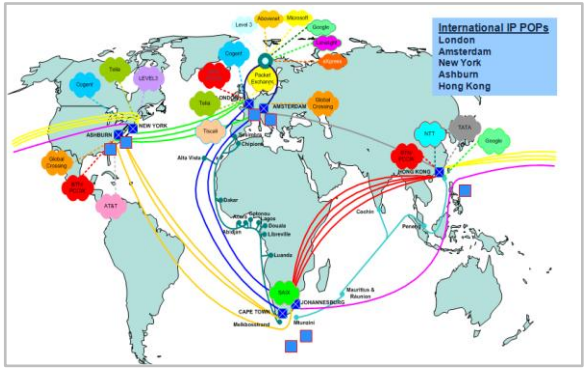
Satellite services

- 3 major earth stations
- Covering Africa

Submarine cables



International IPNet



Satellite Services

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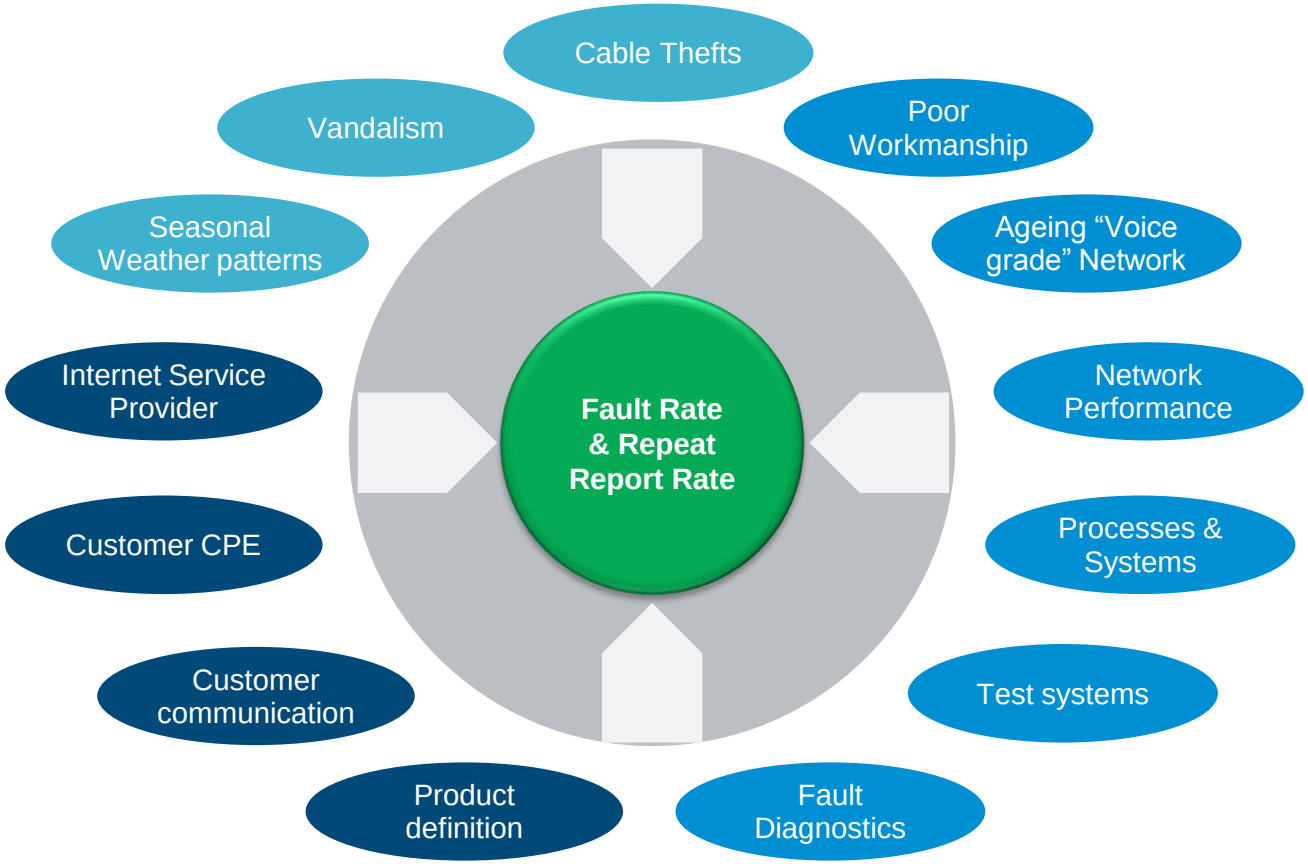
SERVICE CHALLENGES

02

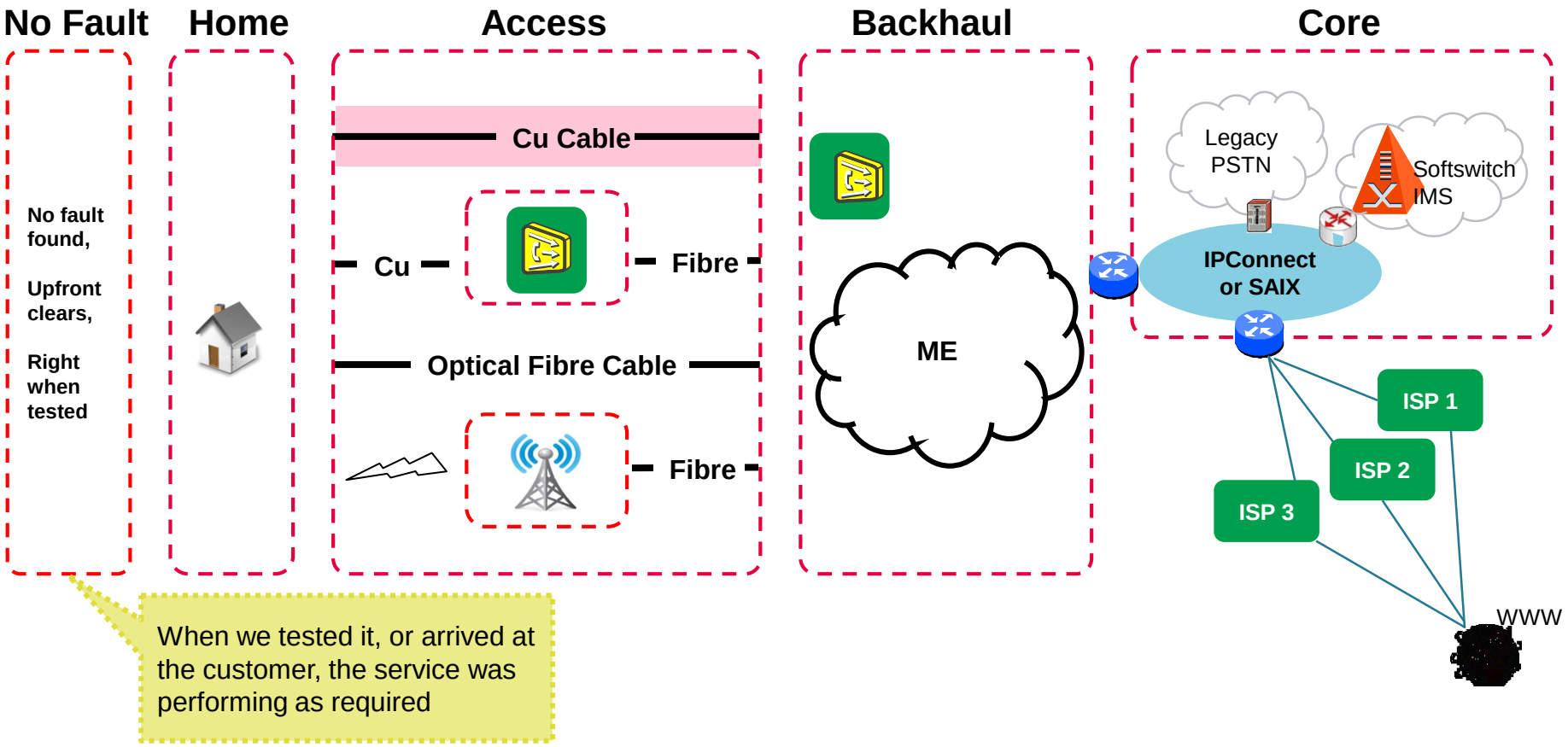
Drivers of Fault Rate and Repeat Report Rate (RRR)



Fault Rate and Repeat Report Rate impacting factors are diverse, for each product/service type, each with its own unique set of circumstances and challenges

Where are the faults / “costs” in existing network?

02



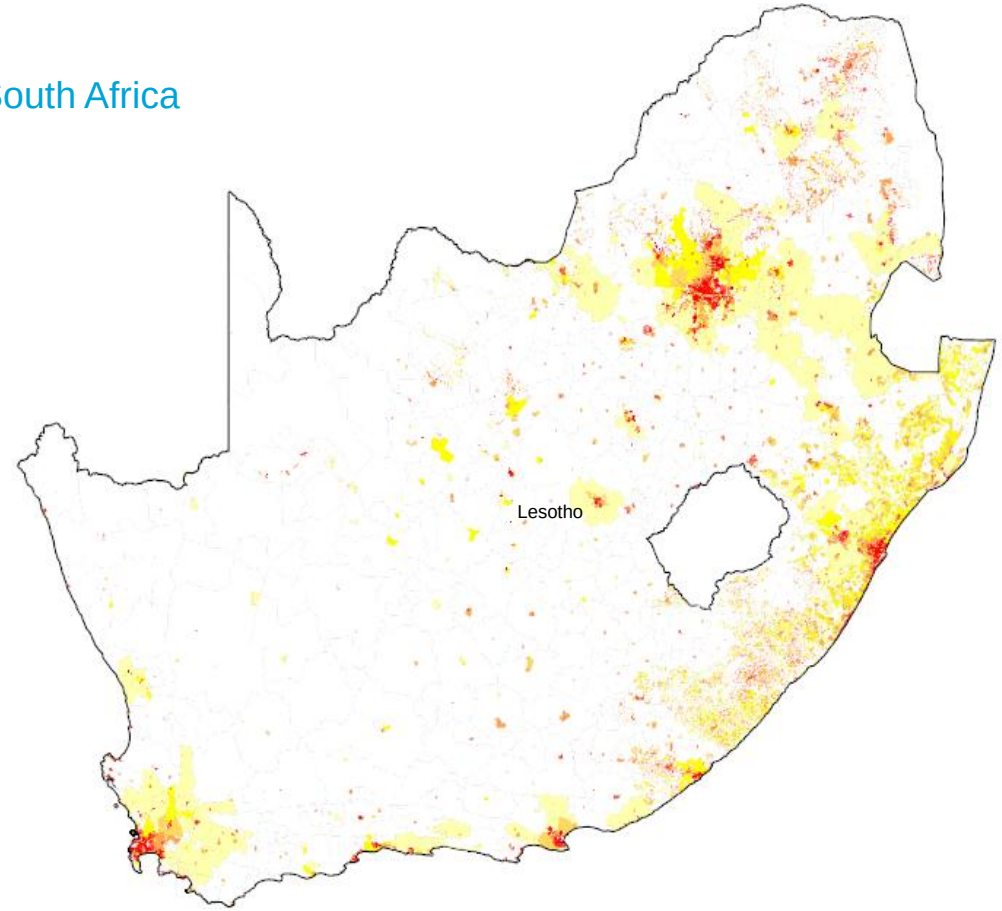
25% to 30%	10% to 15%	45% to 50%	5% to 10%	5% to 10%

VALUE CONCENTRATION AND GEOGRAPHIC CHALLENGES

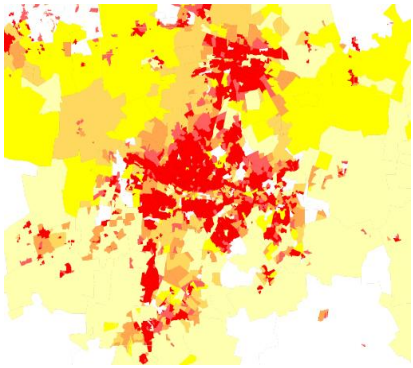
02

Low income areas | Low-mid income areas | Mid income areas | Mid-high income areas | High income areas

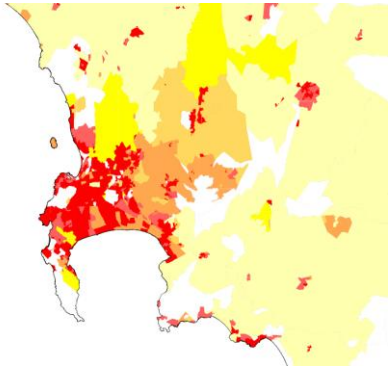
South Africa



Johannesburg and Pretoria



Cape Town



- 2% of South Africa's area concentrates 50% of population and 77% of national income
- Mid and high income areas are highly concentrated in a few urban and suburban areas
- 59% of households represent 83% of total income

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Vast geography and relatively dispersed customer base makes for a unique challenge…

02

Area type	Disposable income	Broadband needs	Target solution
Urban corp. & business parks	• Very high	• High bandwidth requirements (> 100Mbps)	• FTTB & PON
SMMEs, branch offices & Campus	• High	• High bandwidth requirements (> 100Mbps)	• SHDSL, VDSL & 2.6 GHz hotspots
Gated comm & SOHO	• Medium	• High bandwidth requirements (10 - 100 Mbps)	• PON & VDSL
Urban suburban & SOHO	• Medium	• Medium bandwidth requirements (10 - 40 Mbps)	• ADSL2/2+ & VDSL
Urban township	• Medium-low	• Low bandwidth requirements (4 - 10 Mbps)	• 3G/LTE in 2.1 GHz and 900 MHz
Farms, rural bus. & game lodges	• High	• Low bandwidth requirements (4 - 10 Mbps)	• LTE in 800 MHz and satellite
Rural settlements	• Low	• Very low bandwidth requirements (1 - 2 Mbps)	• LTE in 800 MHz and satellite
Deep rural	• Very low	• Very low bandwidth requirements (less than 1 Mbps)	• Satellite

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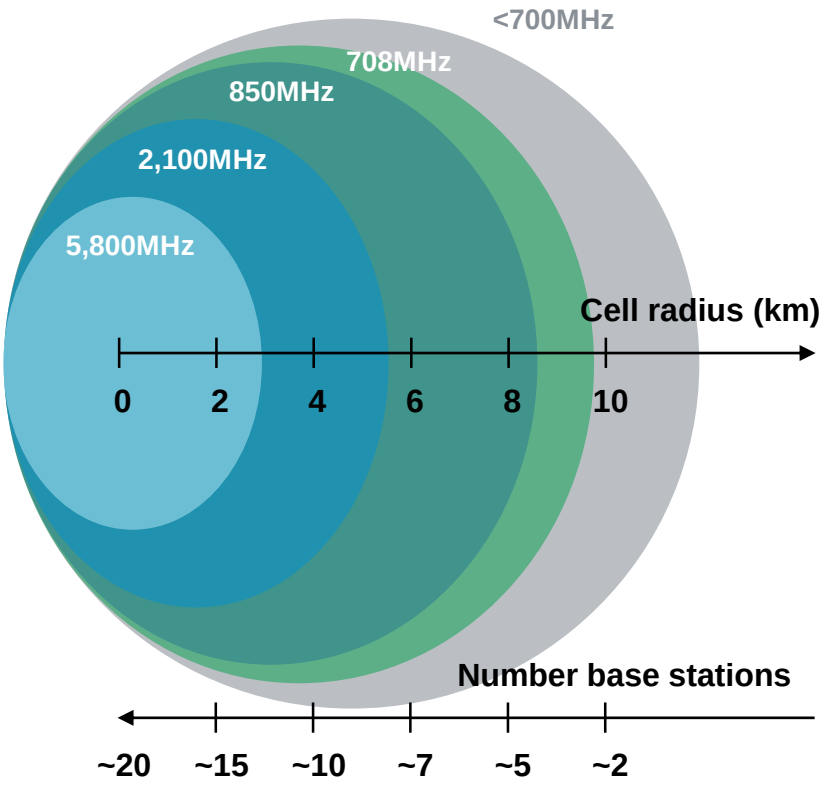
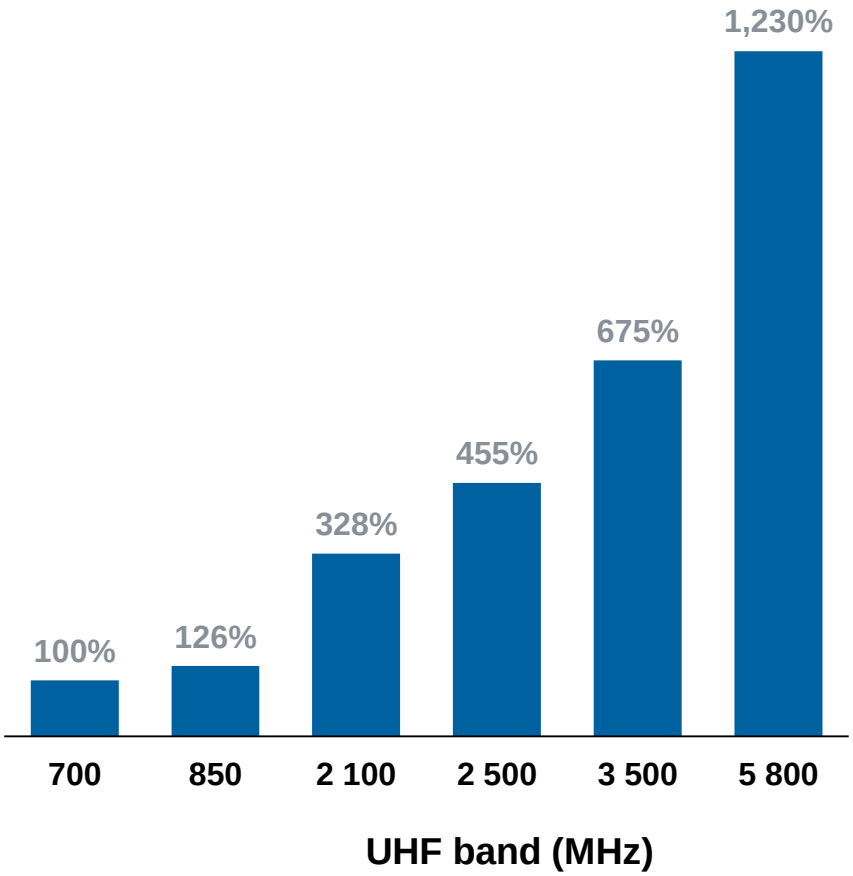
Value Concentration and Geographic Challenges: Spectrum in the 700/800 Mhz

The propagation characteristics of spectrum



Source: BBC R&D

Relative CAPEX required for network infrastructure investment



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NETWORK TRANSFORMATION

July 2014

03

Telkom's Transformation Programme
A key enabler to drive Broadband expansion

Recap

Telkom's transformation strategy

Voice centric

- Significant portion of the revenue coming from voice (and declining)
- Limited broadband capabilities on the back of legacy technologies (e.g. copper based)
- Low economies of scale limiting potential growth and affordable services
- Manual driven processes (ultimately driving high cost to serve)
- Slow to market – new lines and services
- Economically not sustainable

Data centric

- Revenue driven by data services (stabilizing revenue or growing)
- Future proof capabilities based on fibre technologies (e.g. FTTx) and mobile
- High economies of scale allowing high speed data intensive services at affordable prices
- Automated processes bringing efficiency and lower cost to serve
- Improved Speed to market & Enhanced services
- Focus on economically viable areas

Legacy technologies limit Telkom's abilities to offer advanced data services at affordable prices

Strategy will enable ICT play through future proof more efficient technologies

'One Network, all IP'

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Recap

Obsolescence	**Voice**	• E10 • EWSD
	Broadband & Data	• ATM • ADSL • Diginet
Revenue generation and protection	**Consumer**	• 60 : 40 revenue protection versus new revenue
	Business	
	Wholesale	
Cost & Customer	**Cost**	• Utilities • Centralised Control & configuration • Combo ports • Cost per bit
	Customer	• Lower fault rate • Higher speeds • Reputation: Fixed/mobile differentiation
IT	**Enhanced IT**	• Cost avoidance • Product & services (rationalise legacy systems & applications) • Enable the improvement of customer experience

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Multi Service Access Node (MSAN) is the chosen solution to revamp the access network

03

MSAN solution

The MSAN provides the ability to enable different service types, which target various segments from the same access node

- Four use cases differentiate four demand patterns
- International leading players' best practices and industry trends have been used to benchmark the access solution

MSAN specifications (non-exhaustive)

MSAN enables a future-proof access network

- Addresses current and future demand requirements by being scalable and flexible
- Based on Next Generation Network technologies
- Aligned with international standards
- Specification based on evolving open standards, ensuring interoperability
- Upgradable to FTTx: Capability to support next generation xPON technology
- DSL standards
- Ethernet & Networking specifications
- Supports emerging voice protocols

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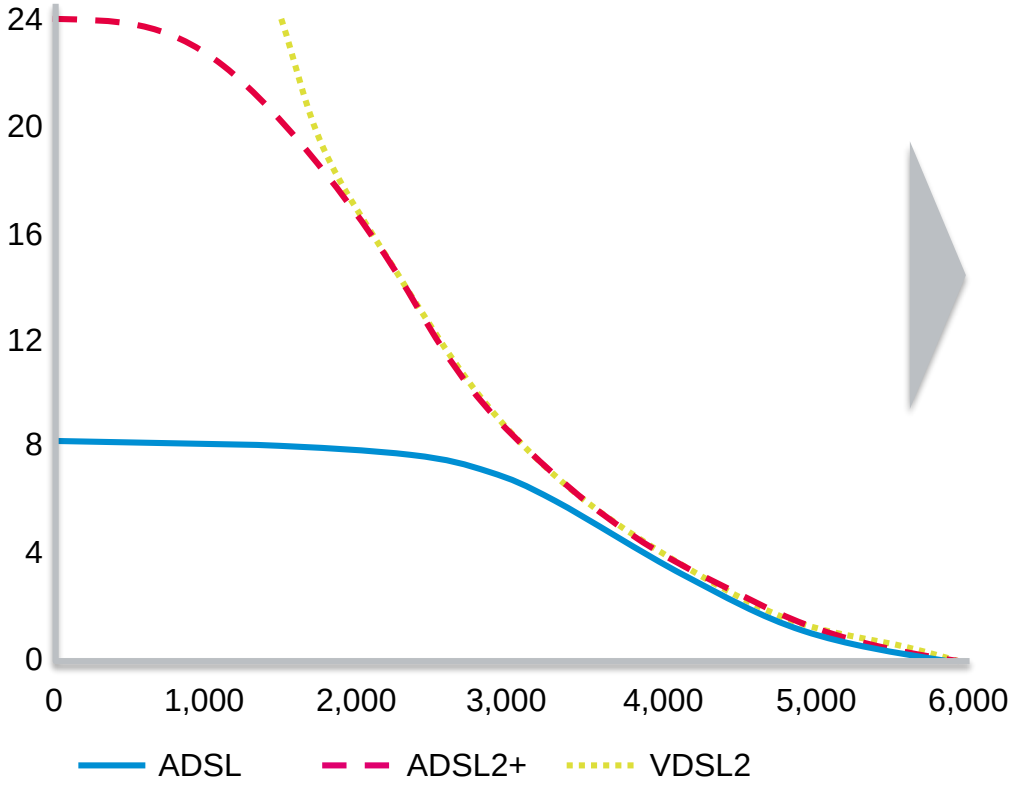
xDSL speed is influenced by copper thickness and its length

03

Maximum attainable speed in copper networks

Maximum attainable speed for DSL technology[1]

(Mbps vs. meters)



MAS (meters)	ADSL (Mbps)	ADSL2+ (Mbps)	VDSL2 (Mbps)
580 m	8.0	23.9	63.6
1,160 m	8.0	22.1	30.9
2,320 m	7.7	13.8	14.0
2,552 m	7.5	11.6	11.6
3,480 m	5.4	6.0	6.0
4,060 m	3.4	3.7	3.7
4,640 m	1.8	2.0	2.0
4,988 m	1.0	1.4	1.4
5,568 m	0.1	0.4	0.4

After 2.5 km all technologies deliver the same speed

The thickness of the copper cable determines the signal transmission loss per km, thus impacting on the maximum attainable speed for a given distance

Note: [1] Considering a wire gauge of 22 AWG (loss of 8.62 dB/km)
Source: Speedguide.net

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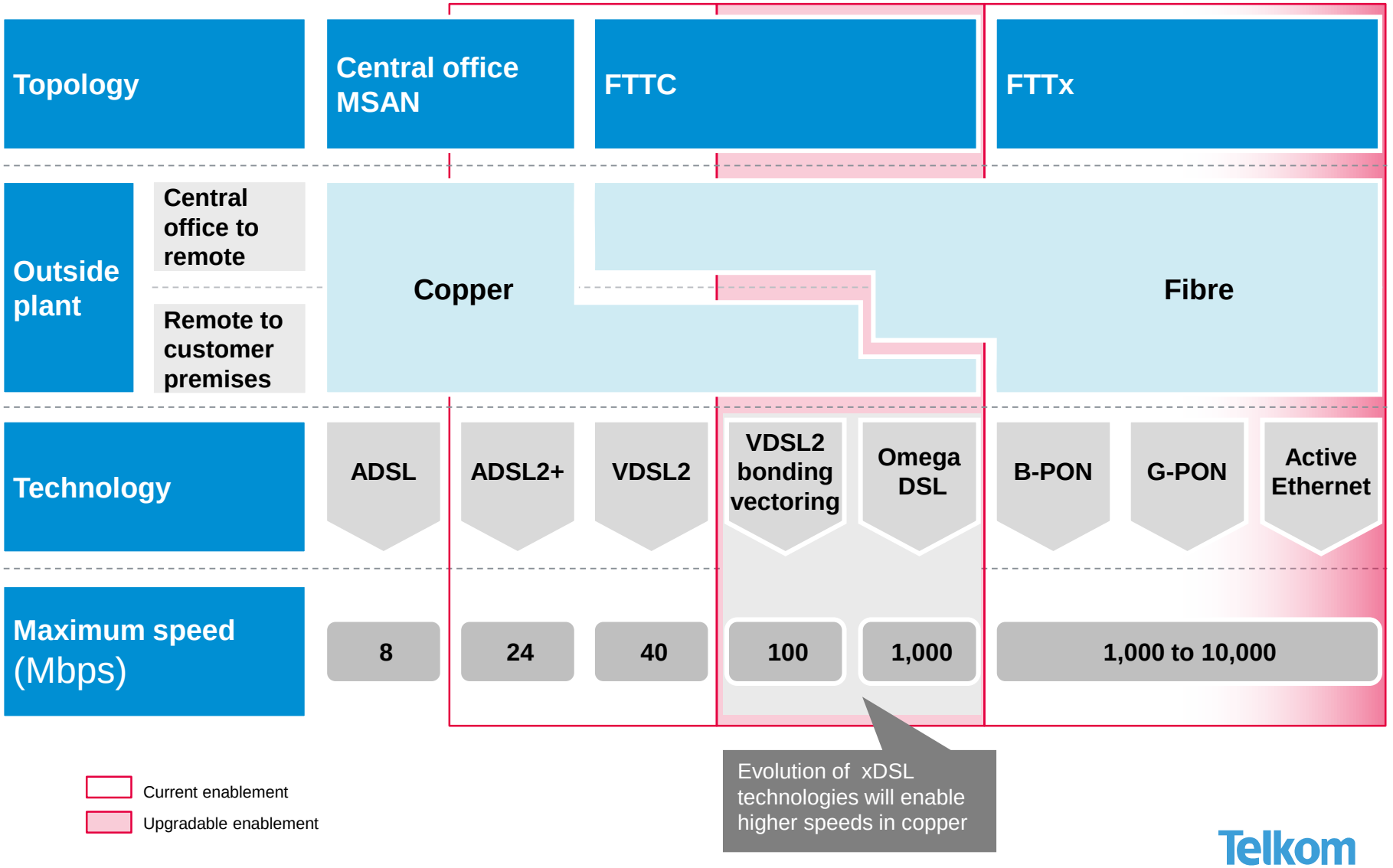
FTTx broadband architecture is our chosen path and best fit for SA

Revamp Access: The Options



Transformation Progress

03

			IT	Operations
Revamp of access	FTTH (>100 Mbps)		Building a Service Orientated Architecture (SOA) for NG product and services	State of the art network operations centre
	FTTC (40 Mbps)			
	Local exchange upgrade and Fibre capabilities set	Wireless, Fixed-Wireless and Satellite access		
Enhancement of aggregation	Increased aggregation capacity and better customer experience			
Evolution of core	Access agnostic and Enabling Fixed-Mobile Convergence			
Transmission network	Evolved from Gbps to Tbps with resilience and manageability			
International connectivity	World-wide reach with superb capacity and resilience			

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Current NGNEC rollout status

FTTC Active Ports = 574,288 **FTTH/B Homes Passed = 1,733**

I_1 Revamp access

Enable differentiated broadband product

- **FTTC**
  - Remote sites = 455 (239,152 ports)
  - 139 Remote sites waiting cut-over = 66,813 ports
  - 42 remotes sites in store (no power)
- **FTTH/B**
  - 6 x TPoC sites for FTTH/B completed
  - Homes passed 1,524
  - Homes connected 16
- **Downtime improvement**
- **Fault reduction**

I_2 Enhance aggregation

Protect business data revenue
Decommission legacy P&S

- New NG BRAS (BNGs) deployed
- Additional Metro Ethernet nodes have been deployed
- Identified buildings which has existing fibre or requiring fibre to be provided.

Future

Revaluate present technology & vendors of core IP & Transport networks

I_3 Migrate voice

Mitigate risks resulting from end-of-life equipment

- Central Offices = 51 (251,232 ports)
- One Central Office decommissioned
- 7 additional central offices deployed representing 54,958 ports
- 3 FTTH/B enabled C.O.
- Utility savings

I_4 Evolve core

Enable multi access technology management and multiservice control

- IMS phase 1 completed .
- IMS Phase 2 to commence
- Develop future plan for the convergence fixed and mobile plans

Future

Revaluate present technology & vendors of core IP & Transport networks

I_5 Overhaul OSS/BSS

Meet next generation customer experience demands

- Continual improvements in a phased approach based on services and efficiency introduced.

I_6 Enable innovation

Enable new business models

- 20 & 40 meg services
- Legacy Diginet (n * 64k) replacement with Ethernet being `developed
- FTTH/B products being developed
- New training systems

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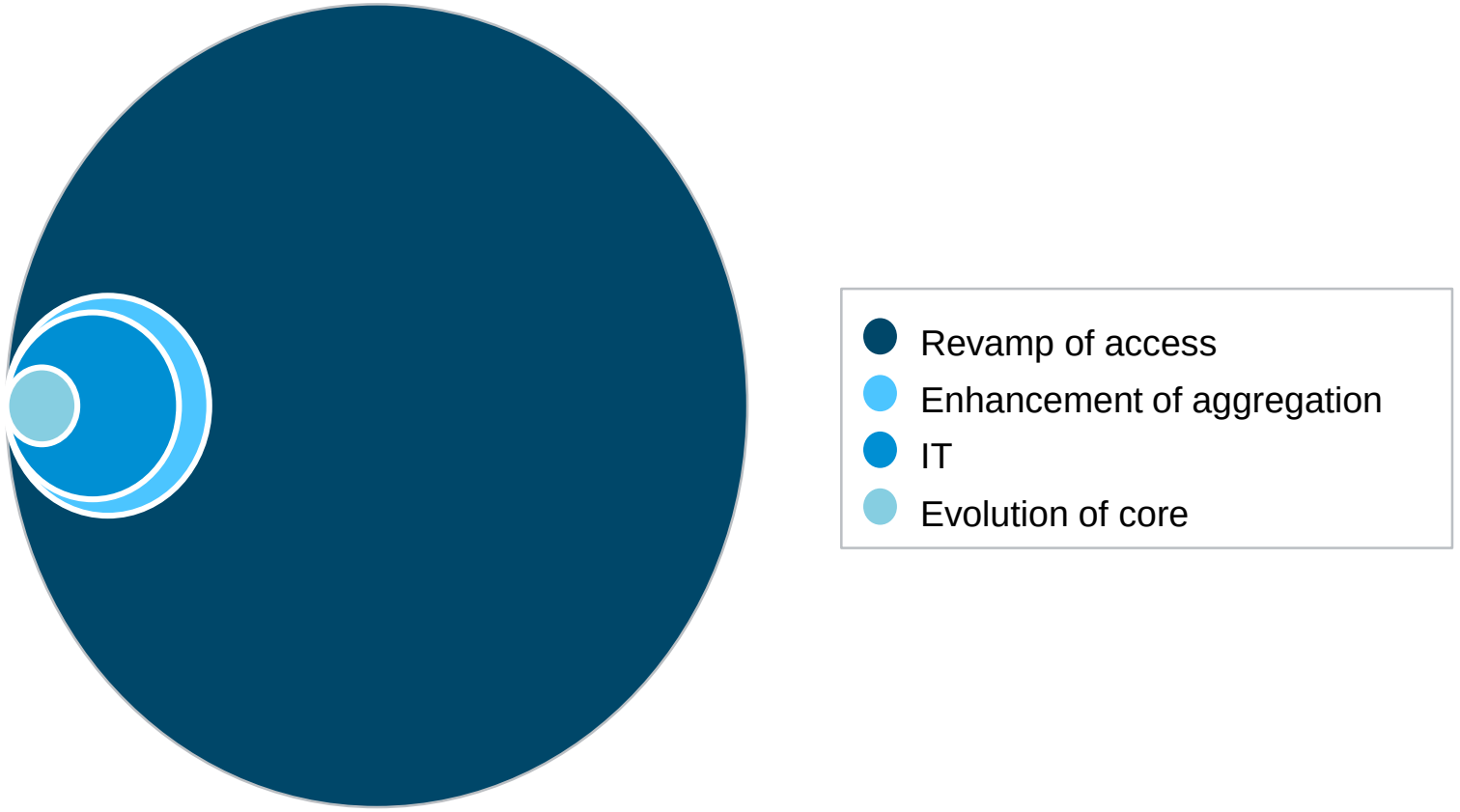
TRANSFORMATION PROGRAMME REVIEW

FTTH / LTE MIX

04

Relative Network Transformation Investment sizing

04



The journey to a future-proof network is based on a comprehensive set of interventions. Investment in the revamp of access is the crucial last step and the most challenging

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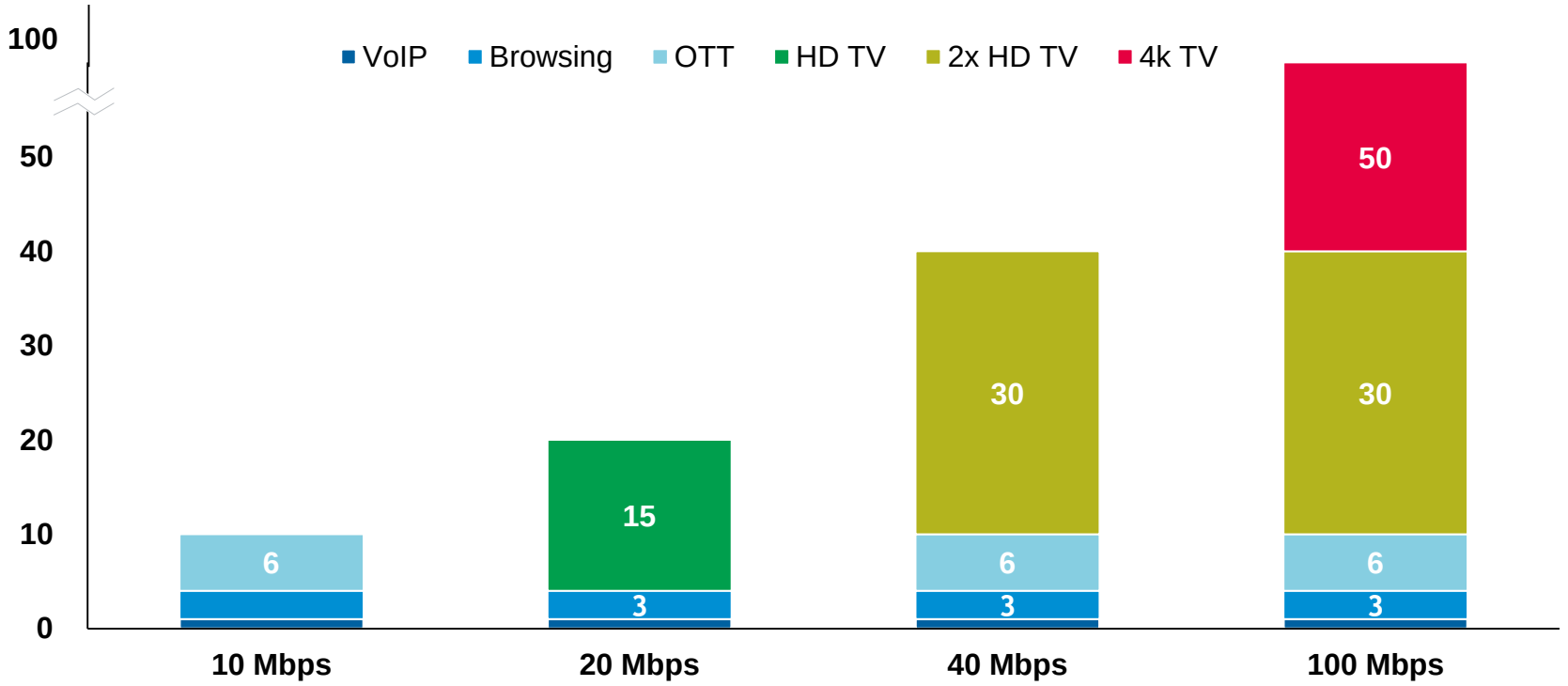
NGN and LTE are able to answer the growing demand for higher bandwidths of several applications

04

Basket of services per bandwidth (Mbps)



Access network capacity

- ADSL 2+
- VDSL 2
- G-PON
- LTE

Today's Home | **Future Homes**

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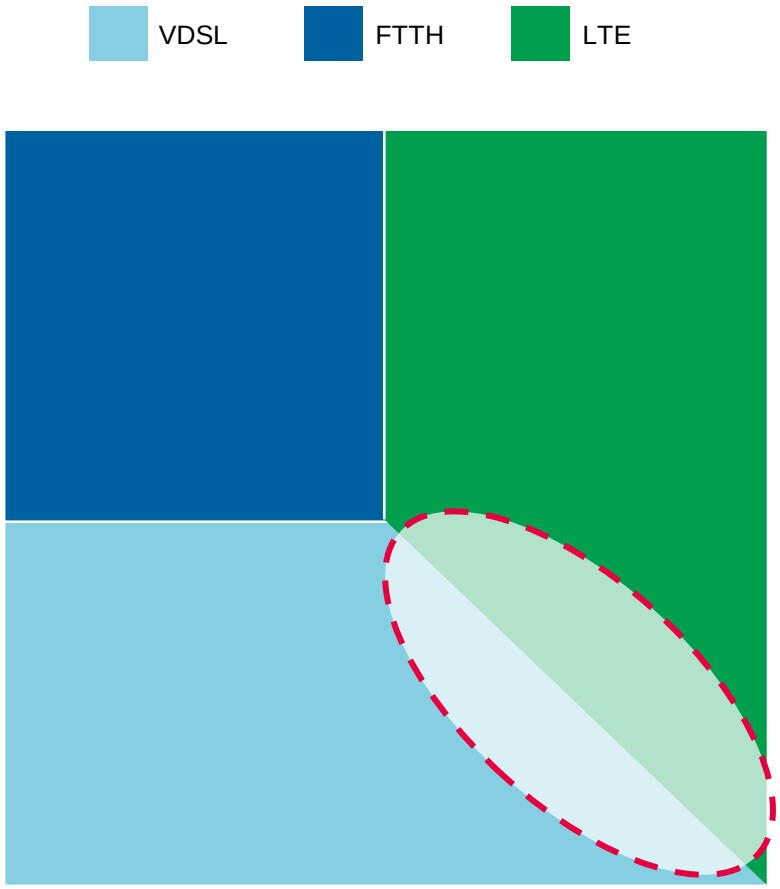
Review in progress to provide high speed Broadband access using LTE technology in/as fixed wireless solution

Illustrative



Network coverage

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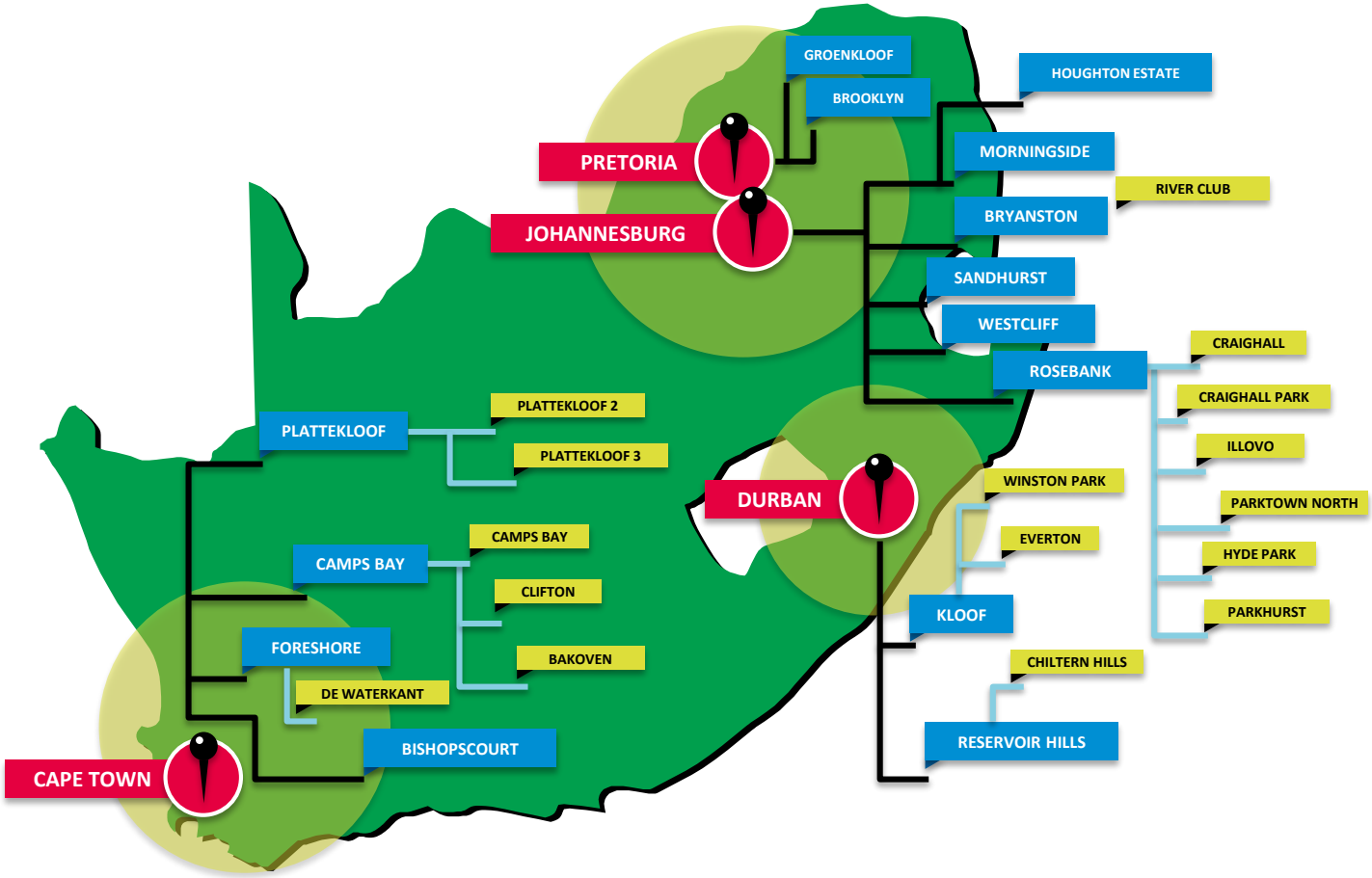
Installing fibre to the home



Target

- 23 suburbs covered by December 2014
- 25,000 homes passed by Mar'15

Current Status

- 1,733 Homes Passed

Telkom announced on 13 June 2014 plans to roll out FTTH connectivity to over twenty suburbs. Commercial launch of basic voice & broadband FTTH/B to enable the sale of up to 100Mbps resell DSL by October 2014

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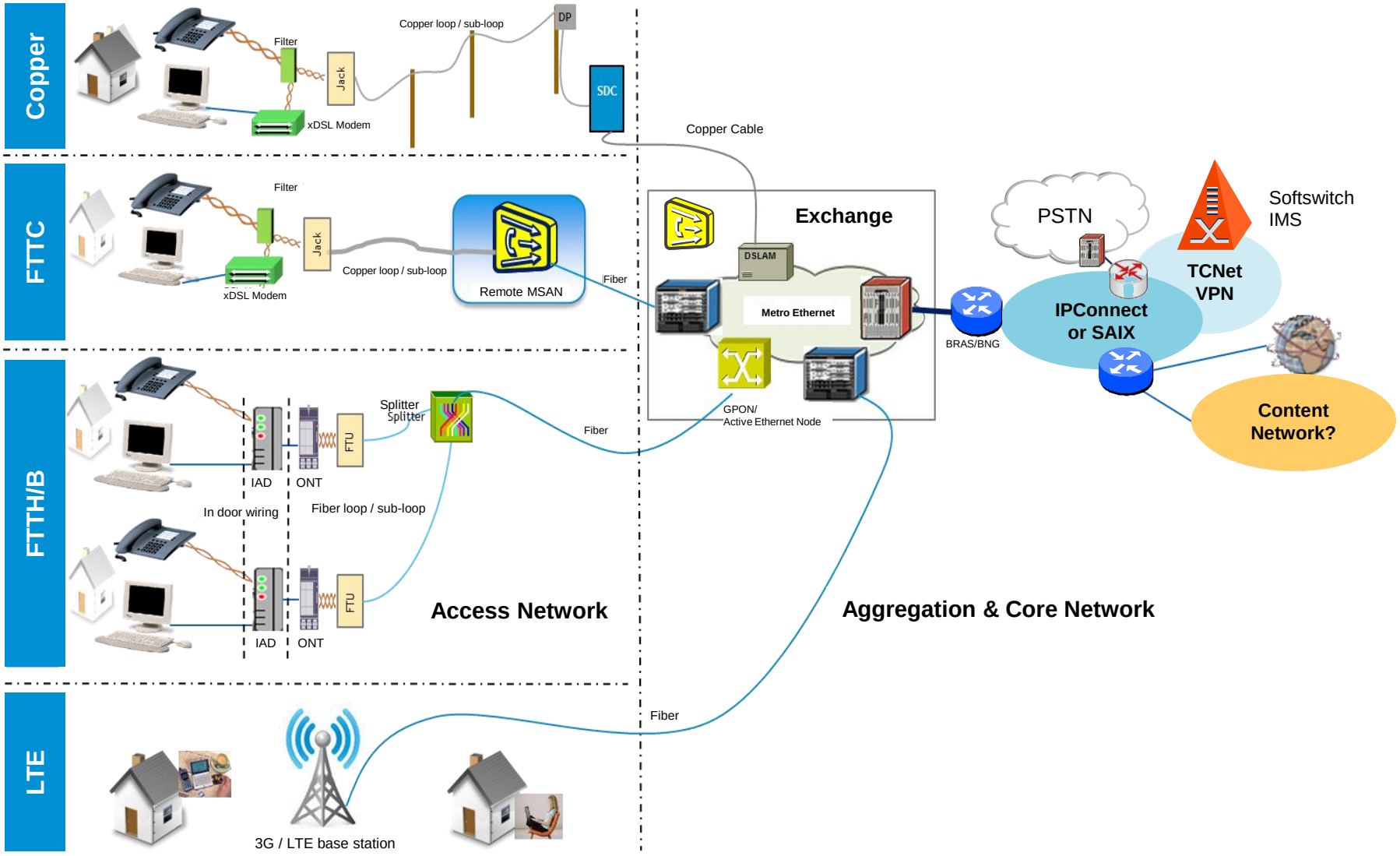
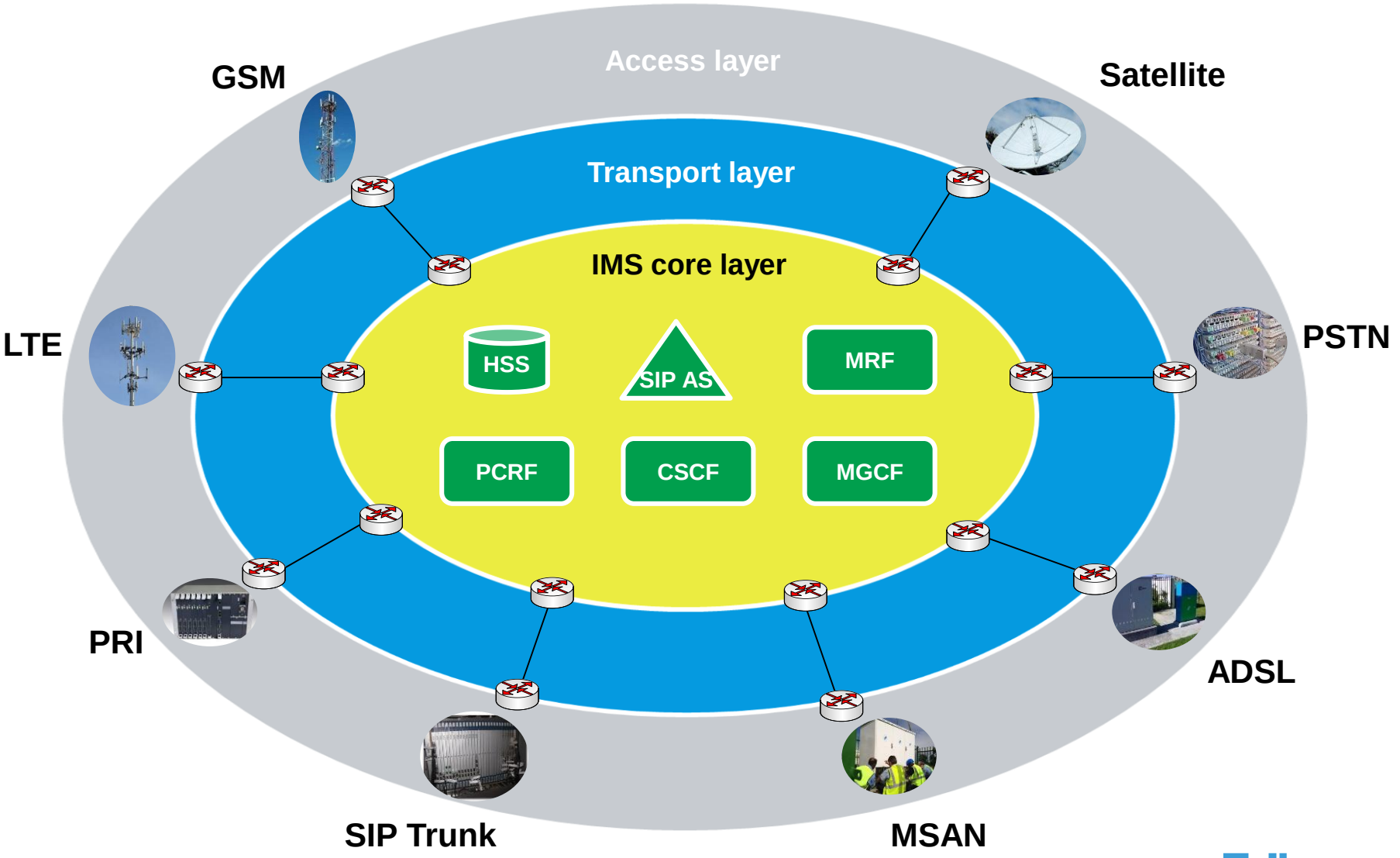
Network Topology showing Copper, FTTC and FTTH/B Access



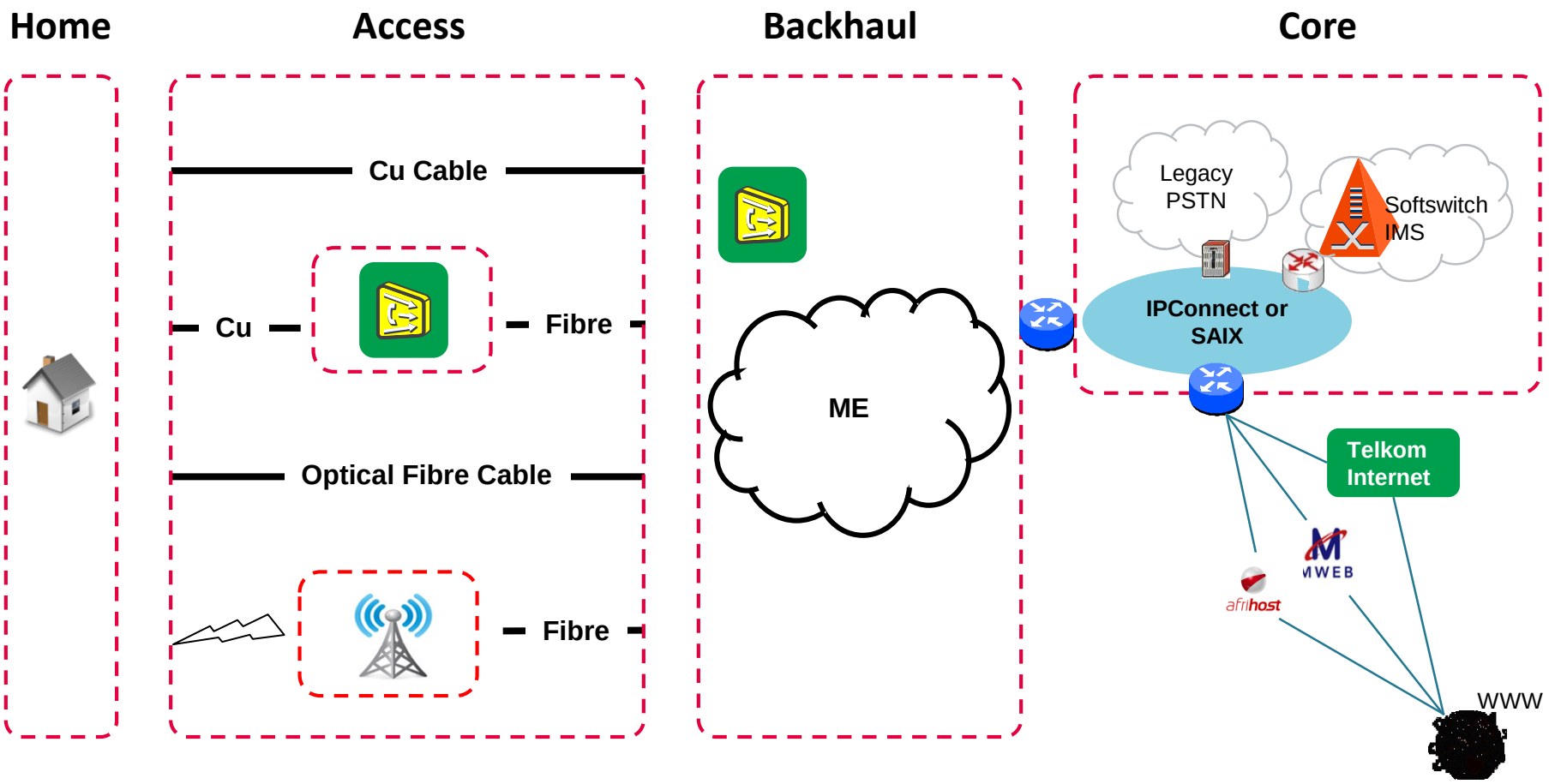
TECHNOLOGY

July 2014

05


Access layer
GSM
Satellite
Transport layer
IMS core layer
LTE
HSS
SIP AS
MRF
PSTN
PCRF
CSCF
MGCF
PRI
ADSL
SIP Trunk
MSAN

End-state Network Access Topology



Extend Ethernet / Metro Ethernet as close as possible to the customer, especially business customers

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WHOLESALE

06

Principle provider of Wholesale Services

06

Strategy

- To become the Wholesale Provider of choice, a leader in Broadband and Connectivity Services - Your Partner in Business.

Repositioning of Telkom Wholesale by:

- Secure long term agreements with key MCO's and OLO's
- Evaluate adjacent growth areas and define opportunities
- Advance Wholesale Sales and Business Development Capabilities

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Successful wholesalers have managed to develop their non-voice revenue, both locally and internationally

06

Global wholesale markets trends

1. Most of the wholesale revenue in mature markets is non-voice related
2. FTTH better allows incumbents to defend their investment
3. Fixed incumbents have an opportunity to enable digital players' CDN strategies
4. Successful wholesalers have managed to extend their activities internationally

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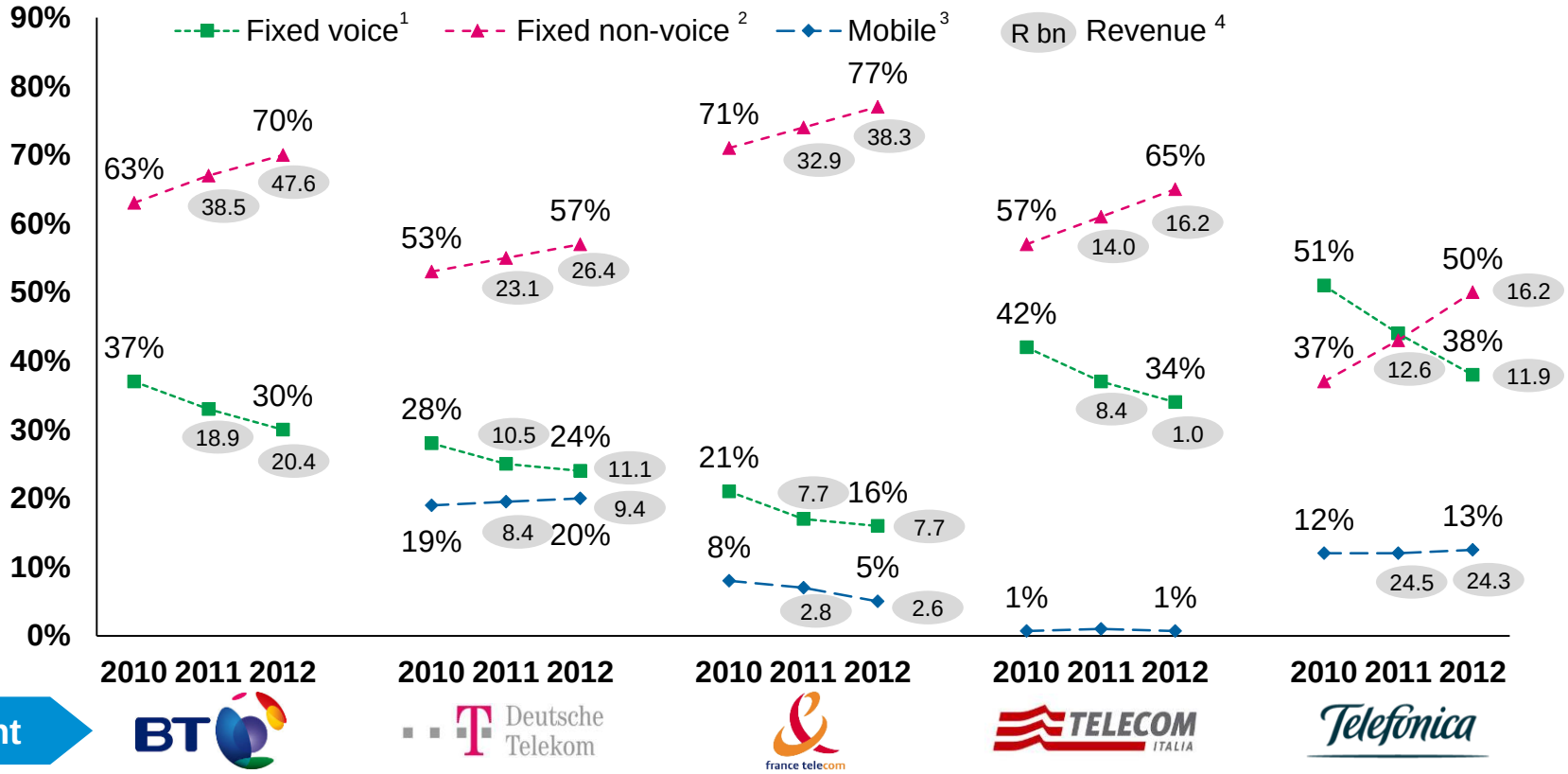
The current wholesale revenues in mature markets are mostly generated through non-voice products

06

Evolution of European incumbent wholesale revenue mix



Source: OVUM, Oanda.com, Delta Partners analysis

1 *Includes Transit voice, Wholesale line rental, Pre-selection, etc. – Excludes interconnection terminating on the operator network;*

2 *Includes data connectivity services (WDM, ATM, Frame Relay, Ethernet, etc.), access services (DSL, fibre, etc.), infrastructure (e.g. dark fibre) and VAS (e.g. CDN, hosting, etc.);*

3 *includes services to MCOs, MVNOs and MVNEs and wholesale mobile-originated voice traffic;*

4 *ZAR/USD exchange rate: 7 (2011) and 8.5 (2012);*

5 *based on BT and FT revenue -*

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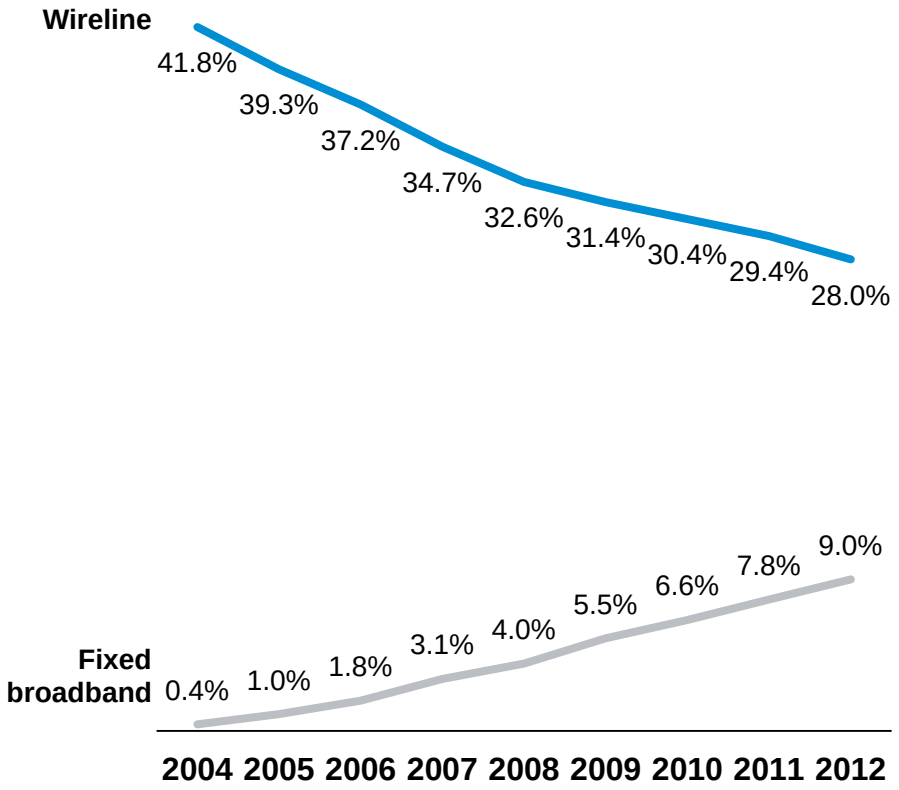
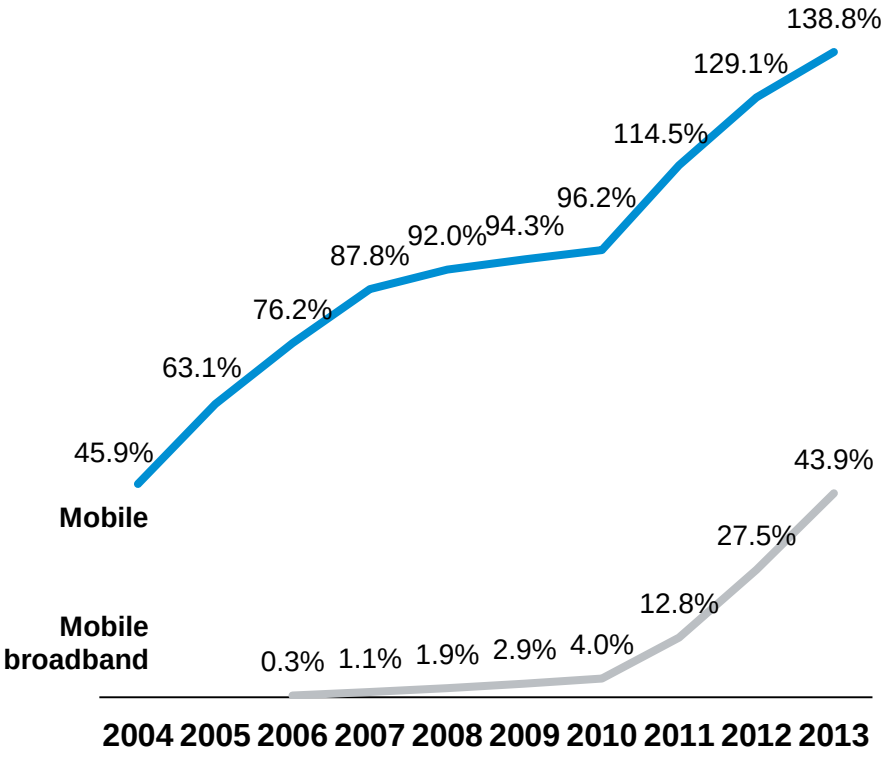
Fixed and Mobile Penetration

Fixed tele density (subs / households)



Source: Globalcomms

Mobile penetration (subs / population)



Source: GSMA Intelligence 26/06/2014

Mobile market has been growing faster than the fixed line market in both in voice and broadband

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Commercialisation of New Products

Telkom Wholesale is expand its connectivity offerings by strengthening its overall propositions with relevant value added services

Sold by Telkom WHS

Not sold by Telkom WHS

	Telkom	TELECOM ITALIA	Deutsche Telekom	BT
Infrastructure	Towers co-location			
	Facility co-location			
Connectivity	City to City Intl. Fiber Optic	Bitstream NGA and VULA1	Carrier line sharing	Bitstream
	Diginet	Wholesale Line Rental	Ethernet & SDH carrier Serv	xDSL
	Ethernet (Metro & Express)	P2P Ethernet and SDH	Carrier fixed connection	Leased lines
	SAIX	TDM Interconnect	Interconnection port	IP Connect
	IP Connect	Satellite	IP/ATM Bitstream Access	P2P Ethernet
	Intl. Private Leased Lines	Giganet (& shared Giganet)	Wholesale Internet Access	Satellite
	Megalines	VoIP	Voice	VoIP
	Resell ADSL	Easy IP ADSL		Broadband
	VPN (layer 2)	Voice		Voice
	Voice hubbing			
VAS	Being developed	Data Center	Data Center	Data Center
		CDN	CDN	CDN
		Bulk SMS	Bulk SMS	Managed network solutions
		Managed Security	VOD (VideoRise)	Cloud Services
		Cloud Services (white label)	IPTV3	

Source: Operator reports, Operator websites

Non-exhaustive

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END