



Policy Opportunities for CN Development in Africa

Impact of Communication Networks

Malaria Journal



Research

Open Access

Role of information and communication networks in malaria survival

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Received: 24 April 2007

Accepted: 10 October 2007



Simple proximity to communication networks decreases the chance of dying from Malaria

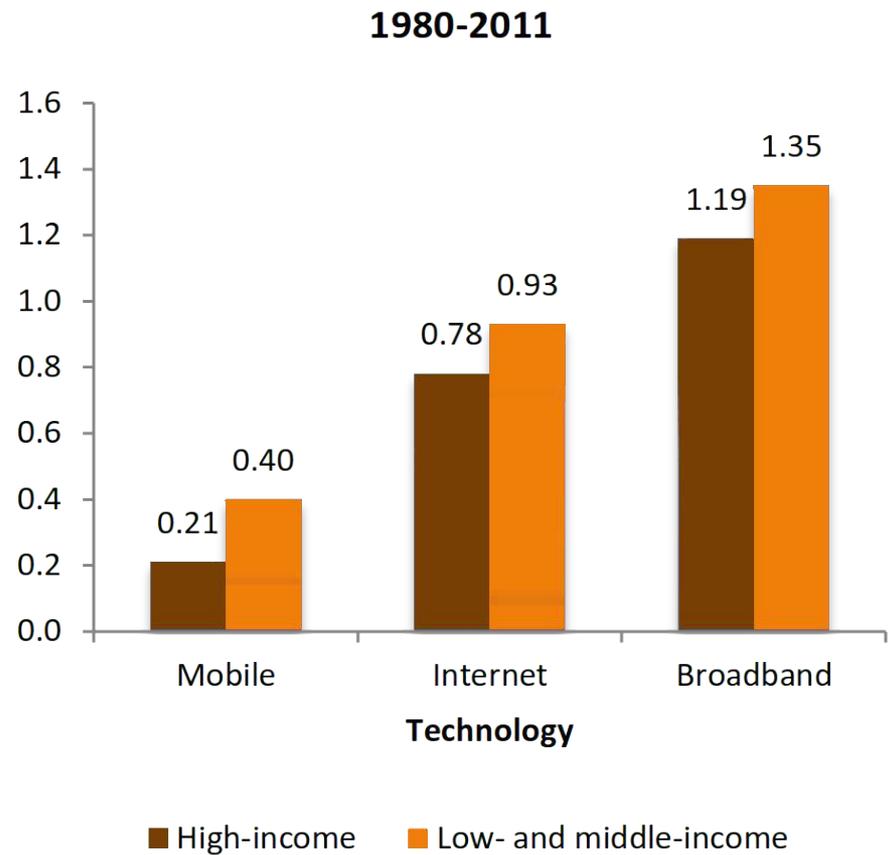
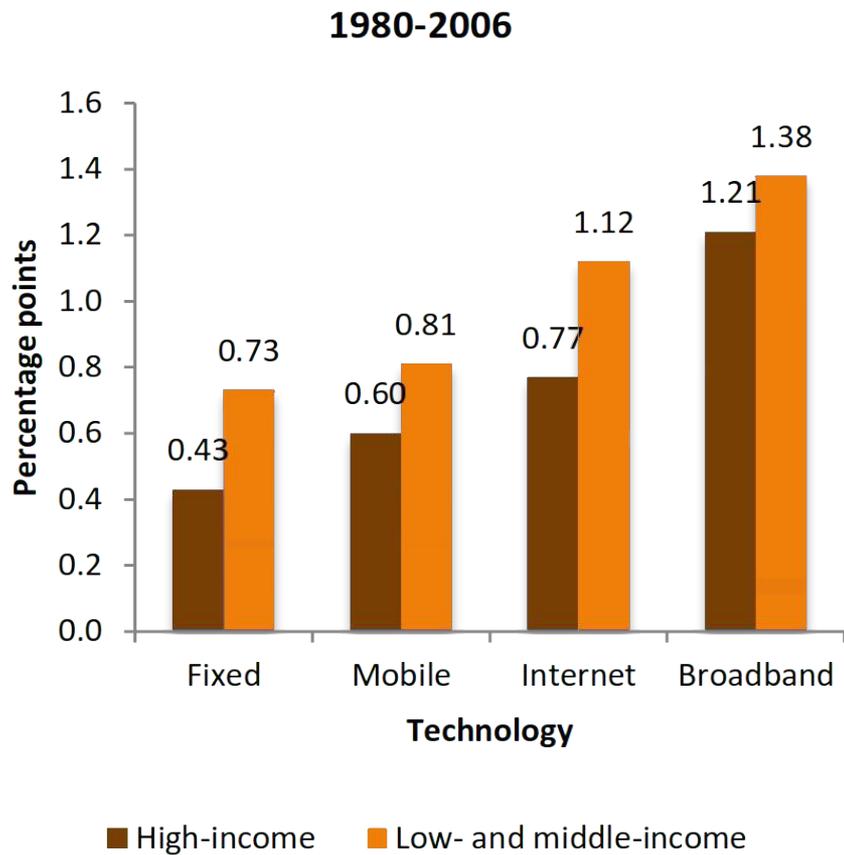
Abstract

Background: Quite often symptoms of malaria go unrecognized or untreated. According to the Multilateral Initiative on Malaria, 70% of the malaria cases that are treated at home are mismanaged. Up to 82% of all malaria episodes in sub-Saharan Africa are treated outside the formal health sector. Fast and appropriate diagnosis and treatment of malaria is extremely important in reducing morbidity and mortality.



CC by @stevesong

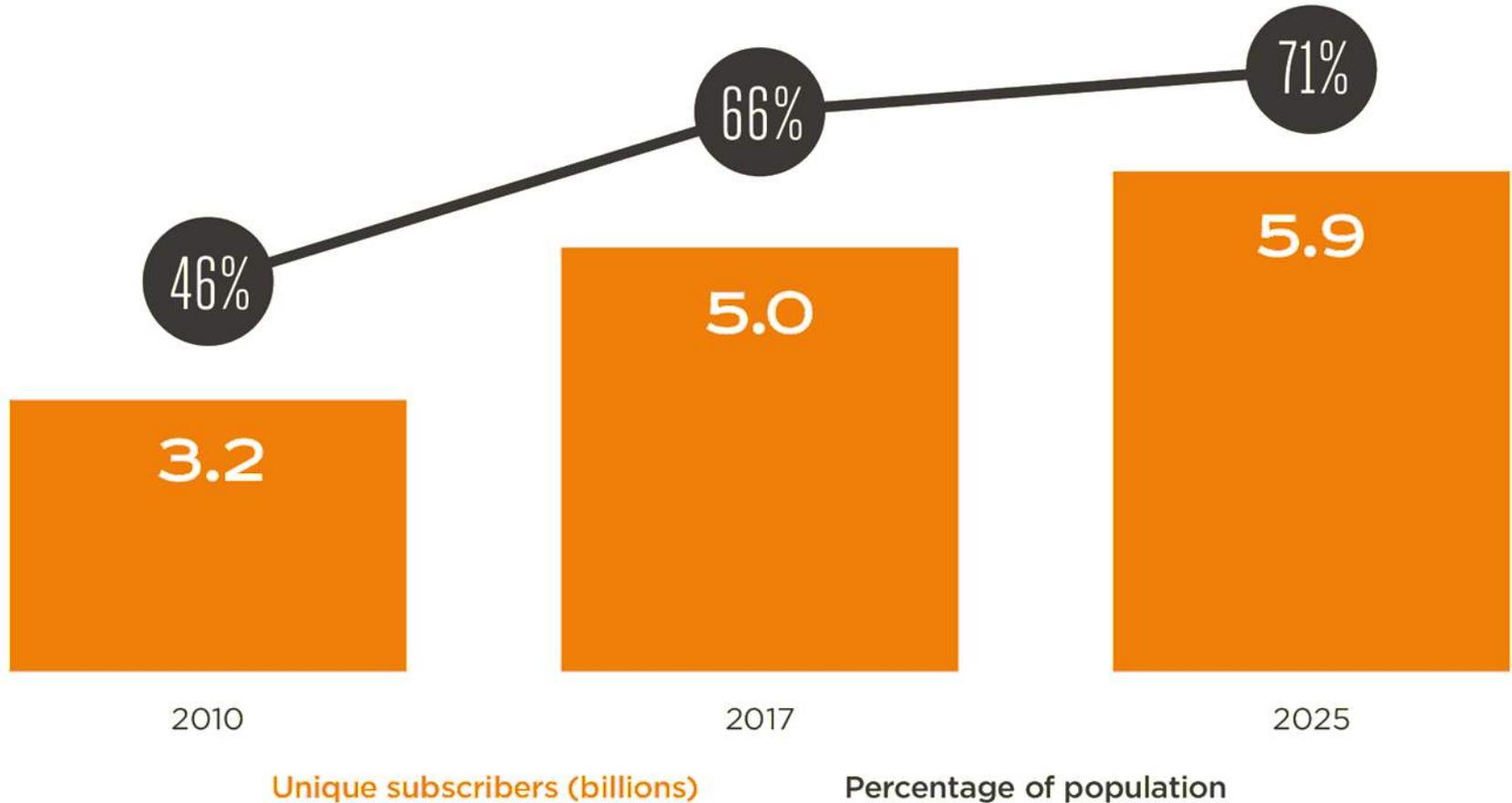
Impact of ICTs on GDP



Source: Qiang et al. 2009 and Scott 2012.

CC by @stevesong

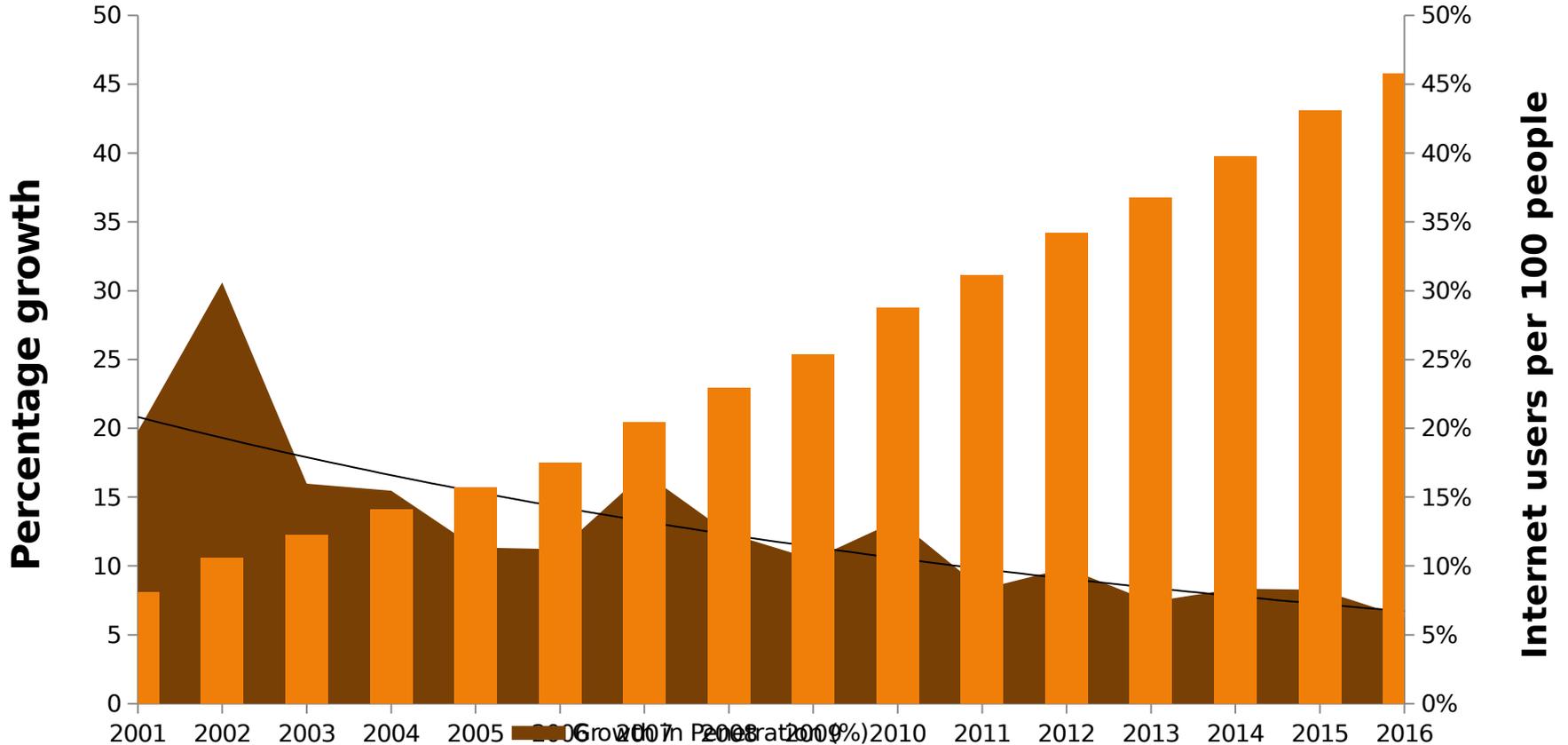
Mobile Subscriber Growth Slowing



Source: GSMA Intelligence

CC by @stevesong

Internet Growth Slowing



Source: ITU/World Bank/Richard Thanki



CC by @stevesong

Africa
Total Population: 1.2
Billion

960 million
people covered
by 2G signal in
Africa

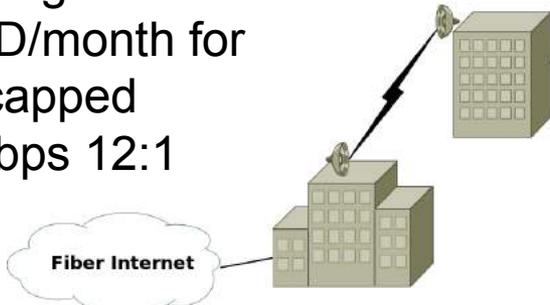
310 Million
Internet Users
in Africa

Solutions?

Single paradigm: commercial large operators

Non-commercial & cost-based models: Community Networks

Each user paying 83 USD/month for uncapped 5Mbps 12:1

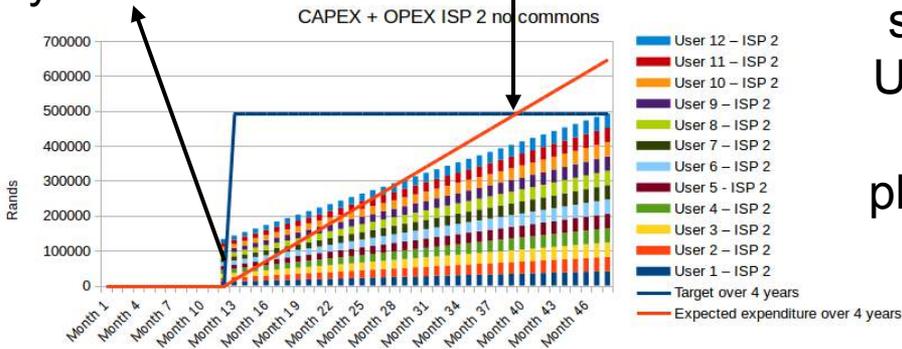


Tower: R113/month
Router: R9/month
Batteries: R35/month

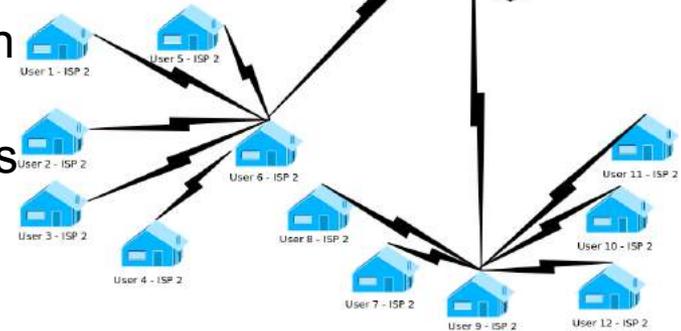
“Users share costs:
- equipment amortization
- maintenance
- internet gateway

9.7K USD initial CAPEX covered by users

RoI by month 29



Each “user” spending 110 USD/month on cap mobile phone services



Hotspot: 25 people spending 4.4 USD/month

RECOMMENDATION ITU-D 19

Telecommunications for rural and remote areas

Final Report

**World
Telecommunication Development
Conference (WTDC-17)**

Buenos Aires, Argentina, 9-20 October 2017



3 that community access to ICT facilities and services is particularly important in rural and remote areas: business models which can achieve financial and operational sustainability can be operated by local entrepreneurs supported by a variety of initiatives, and these facilities, where necessary, should also be supported by universal service funds as an essential component of rural communications;

6 that enhancing local technical expertise and adoption are important for successful implementation of ICT services and applications in rural and remote areas, and attention should thus be paid to training, exchange of information and sharing of maintenance facilities in order to achieve sustainability and viability;

10 that it is important to consider small and non-profit community operators, through appropriate regulatory measures that allow them to access basic infrastructure on fair terms, in order to provide broadband connectivity to users in rural and remote areas, taking advantage of technological advances;

11 that it is also important that administrations, in their radio-spectrum planning and licensing activities, consider mechanisms to facilitate the deployment of broadband services in rural and remote areas by small and non-profit community operators;

Licensing

- Requirements to get licensed
 - Business model, technical details
- Costs to get a licence
 - National, regional
- Compliance
 - Ongoing bureaucracy
 - Annual fees, contributions to USF
 - Tax return
- Spectrum fees



Certificate of Registration

CR10

Registration Number: 2014 / 002051 / 24
Enterprise Name: ZENZELENI TELECOMMUNICATIONS NETWORK PRIMARY CO-OPERATIVE LIMITED

REPUBLIC OF SOUTH AFRICA
CO-OPERATIVES ACT, 2005

CERTIFICATE OF REGISTRATION
OF A CO-OPERATIVE
(SECTION 7)

I hereby certify that

ZENZELENI TELECOMMUNICATIONS NETWORK PRIMARY CO-OPERATIVE LIMITED

was registered on

5/2/2014

under Section 7 of the Co-Operatives Act, 2005 (Act 14 of 2005),
with registration number

2014 / 002051 / 24

as a Primary Co-Operative with a limited liability.
Its constitution was also registered on the same date.

I further certify that

ZENZELENI TELECOMMUNICATIONS NETWORK PRIMARY CO-OPERATIVE LIMITED

is with effect from **5/2/2014** entitled to commence business.

REGISTRAR OF CO-OPERATIVES

Page 2 of 2



Independent Communications Authority of South Africa
Pinmill Farm, 164 Katherine Street, Sandton
Private Bag X10002, Sandton, 2146

Licensing and Compliance
Tel: +27 11 566 3645
Fax: +27 11 566 3646
Email: ahlabio@icasa.org.za
Ref: PECN/0018/2014/ECSLE/0003/2014

Masibulele Siya

Zenzeleni Telecommunications Network
Primary Co-Operative Limited
Mankosi Administrative area
Ward 26, Nyandeni Municipality
Eastern Cape

Per email: jaysiya26@gmail.com

Dear Masibulele Siya

**RE: APPLICATION FOR PECN AND ECS LICENCE EXEMPTIONS:
ZENZELENI NETWORK**

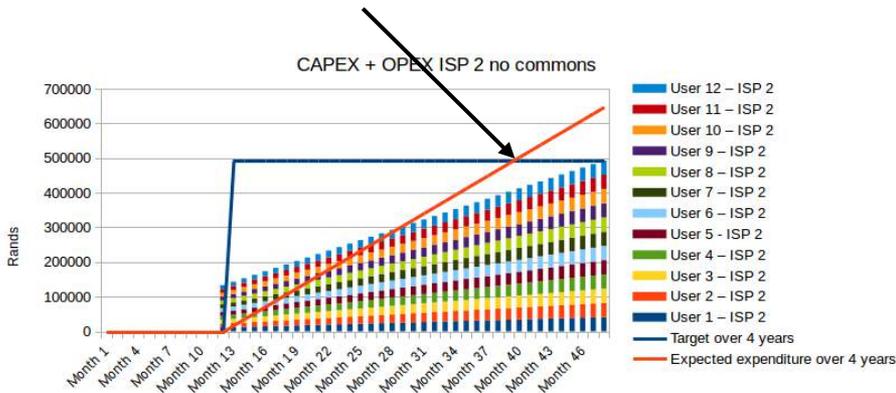
1. We refer to your application received on 14 April 2014 for Private Electronic Communications Network Service (PECN) and Electronic Communications Service licence exemption.
2. We advise that the Authority has granted Zenzeleni Telecommunications Network Primary Co-Operative Limited a licence exemption to construct, maintain and operate a PECN to be used principally for or integrally related to the internal operations of Zenzeleni Network.

Funding these initiatives

Cost is past down to the users

Crowdsourced by users

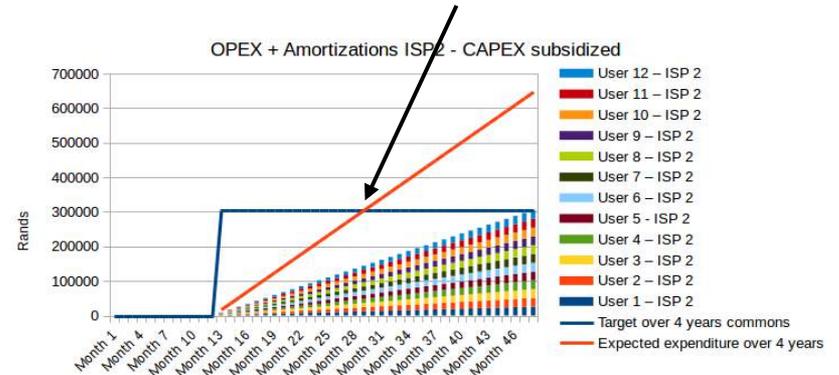
Rol by month 29



Each user paying 83 USD/month

Subsidized CAPEX

Rol by month 17



Each user paying 51 USD/month

Universal Service and other Funds

COUNTRY	YEAR OF MOST RECENT REPORT	ESTIMATED UNSPENT FUNDS (US\$ MILLION)
BENIN	2016	9.65
BOTSWANA	2016	14.02
BURKINA FASO (currently inactive and preparing for disbursements)	2016	77.71
CÔTE D'IVOIRE	2017	0.00
GHANA	2016	5.89
KENYA	2016	42.01
LIBERIA (currently inactive and preparing for disbursements)	2016	0.47
MADAGASCAR	2015	15.54
MOZAMBIQUE	2016	1.32
NIGERIA	2016	0.00
RWANDA	2016	0.00
SOUTH AFRICA	2016	10.00
UGANDA	2015	0.00
TOTAL		176.6

Source: A4AI Interviews with USAFs (2018), ECOWAS surveys (2017), and publicly available information.

Community Networks 12 March 2018

EN ES

Internet Society and the OAS through CITELE sign an agreement to bring the Internet closer to rural areas of the Americas

Buenos Aires, 12th of March 2018 – The General Secretariat of the Organization of American States (OAS), through its Inter-American Telecommunication Commission (CITELE), and the Internet Society (ISOC), a global organization that promotes the development of the open Internet, signed a collaboration agreement to promote the creation of new community networks that provide access to rural and remote areas of the Americas.



Other public support

- Other departments involved
 - S&T, Industry, Rural Dev, Education...
- Endorsement
- Training (vocational colleges)
- Interns
- Accessible Information
- Access to other resources (towers, fiber, spectrum)

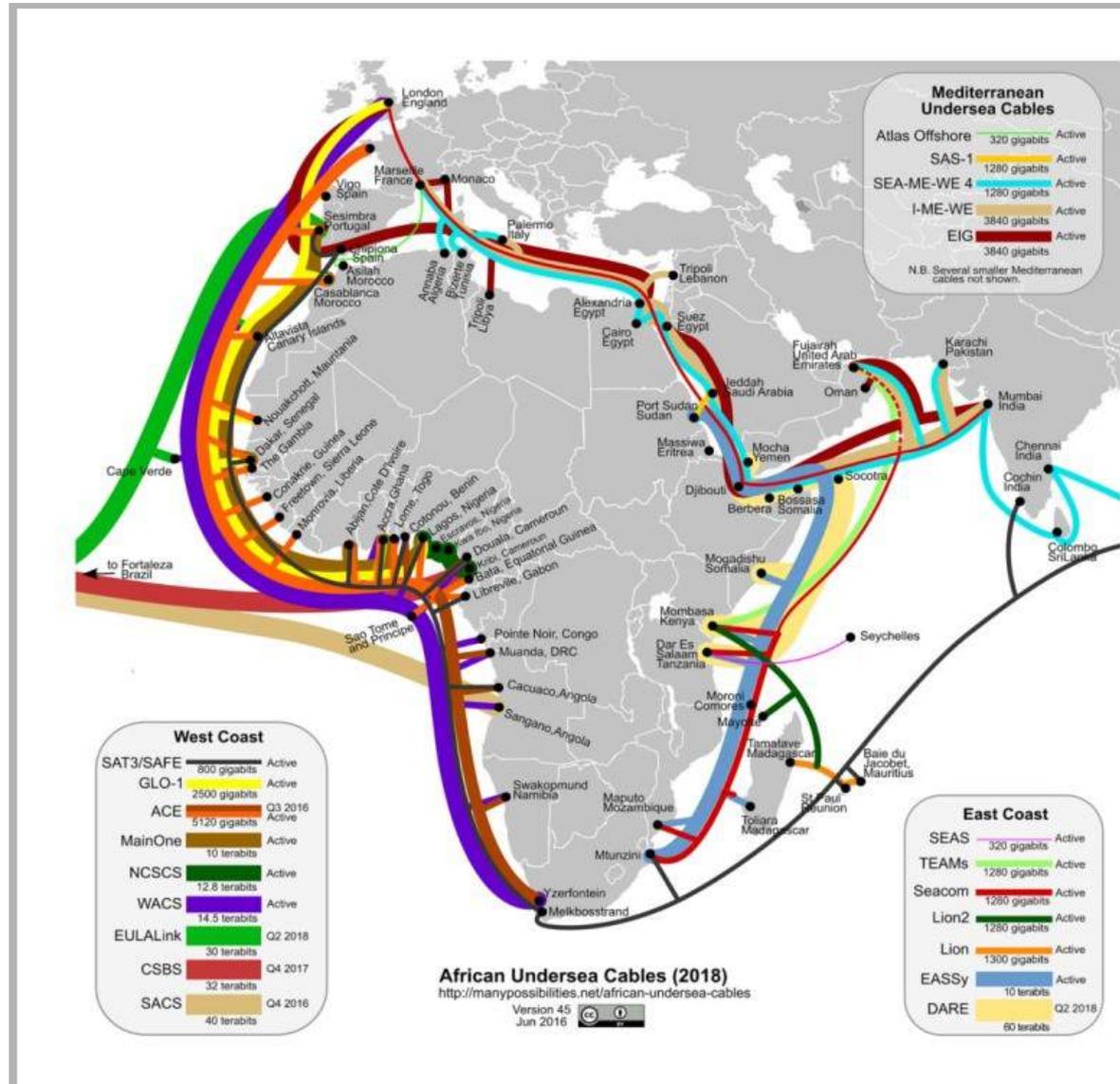


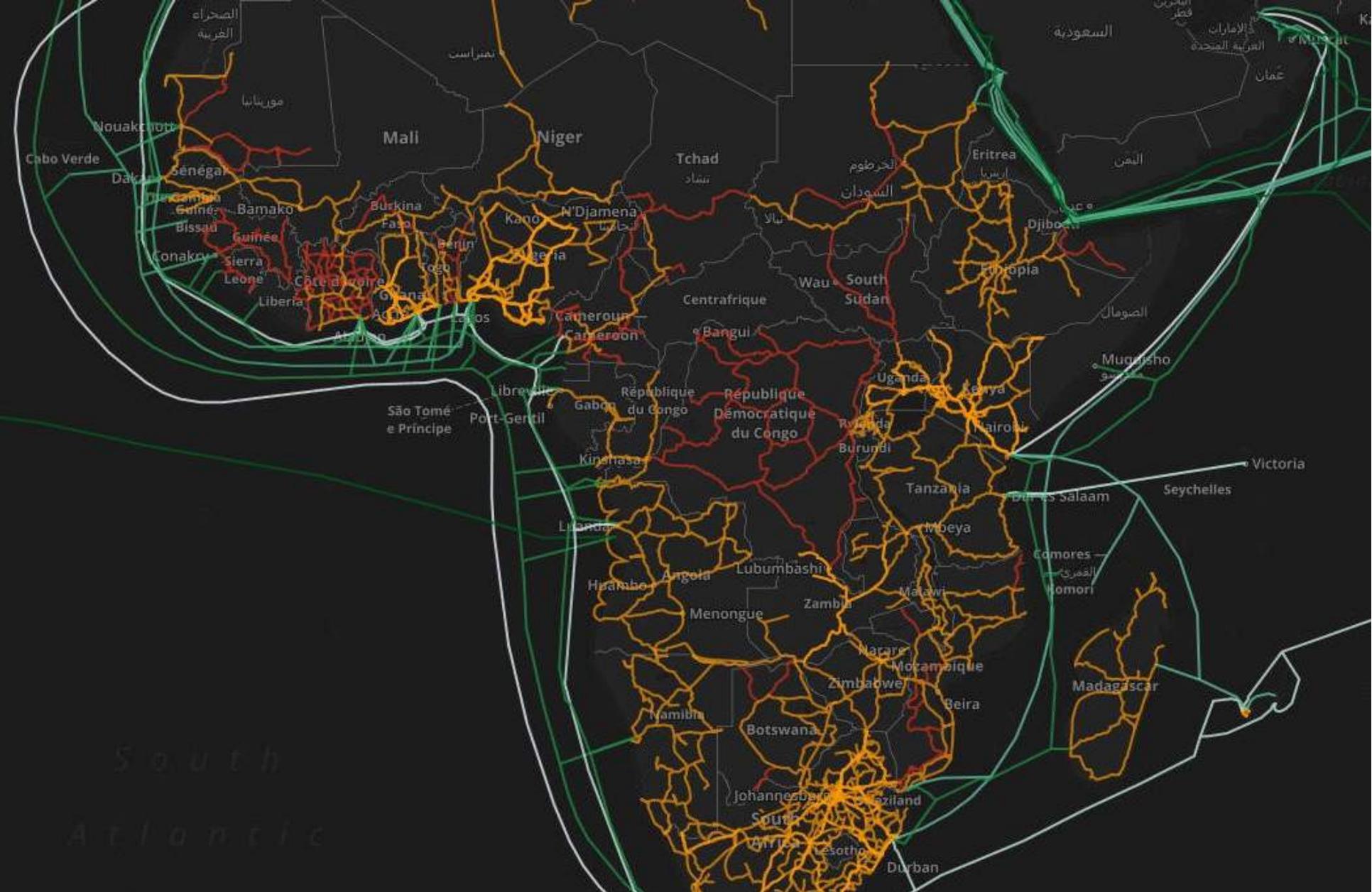
Opportunity

FIBRE OPTIC INFRASTRUCTURE

Impact of Fibre Optic Undersea Cables

The growth of undersea fibre optic capacity has been a catalyst for change.







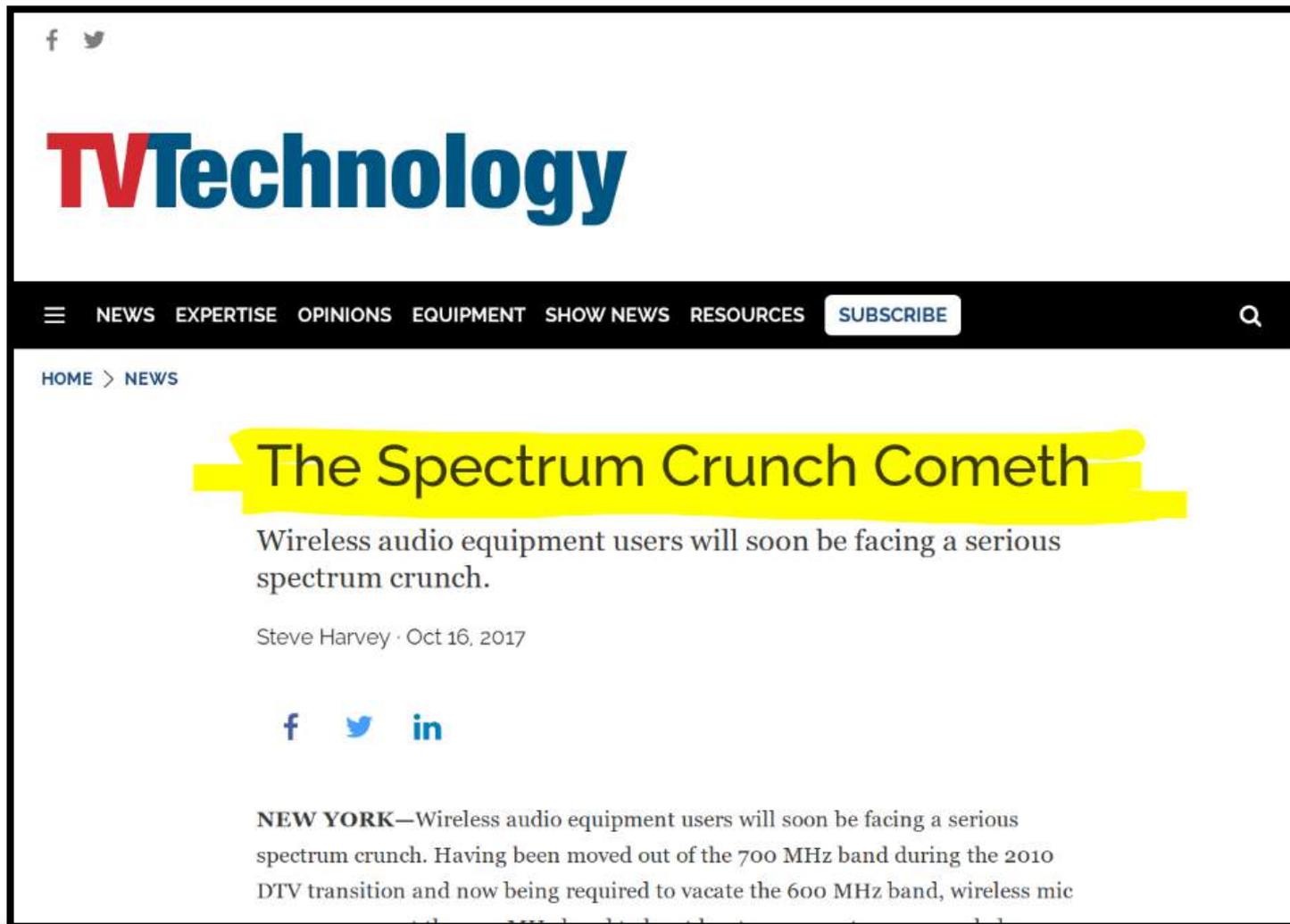
Challenge

ACCESS TO SPECTRUM



APC
ASSOCIATION FOR
PROGRESSIVE
COMMUNICATIONS

Access to Spectrum Has Become a Challenge for Regulators



The screenshot shows the TVTechnology website interface. At the top left are social media icons for Facebook and Twitter. The main header features the 'TVTechnology' logo in red and blue. Below the logo is a navigation bar with a menu icon, links for 'NEWS', 'EXPERTISE', 'OPINIONS', 'EQUIPMENT', 'SHOW NEWS', and 'RESOURCES', a 'SUBSCRIBE' button, and a search icon. The breadcrumb trail reads 'HOME > NEWS'. The article title 'The Spectrum Crunch Cometh' is highlighted in yellow. The sub-headline reads: 'Wireless audio equipment users will soon be facing a serious spectrum crunch.' The author is 'Steve Harvey' and the date is 'Oct 16, 2017'. Below the article text are social media sharing icons for Facebook, Twitter, and LinkedIn. The main text of the article begins with 'NEW YORK—Wireless audio equipment users will soon be facing a serious spectrum crunch. Having been moved out of the 700 MHz band during the 2010 DTV transition and now being required to vacate the 600 MHz band, wireless mic

Spectrum Auctions: Not the whole answer?

Country	Year	Spectrum	Price	#successful bidders
Nigeria	2014	2.3GHz (30MHz)	\$23,000,000	1
Ghana	2015	800MHz (20MHz)	\$67,500,000	1
Nigeria	2016	2.6GHz (60MHz)	\$96,000,000	1
Mozambique	2013	800MHz (10MHz)	\$30,000.000	0

Source: Song, 2018 forthcoming

Evidence that high spectrum spends result in:

Lower quality networks and reduced take-up of mobile data services owing to reduced incentives for investment;
Higher consumer prices for mobile broadband data; and
Lost consumer welfare with a purchasing power of US\$250bn across a group of countries where spectrum was priced above the global median.

Source: <https://www.gsma.com/spectrum/wp-content/uploads/2017/02/Effective-Spectrum-Pricing-Full-Web.pdf>



CC by @stevesong

Can We Look Beyond Auctions?





Current regulation
empowers large operators

**Regulation
ought to enable
small-scale
operators to
address niche
markets,
geographies,
and to stimulate
access
innovation.**



For Small Operators



Even Subsistence Operators

CC by @stevesong

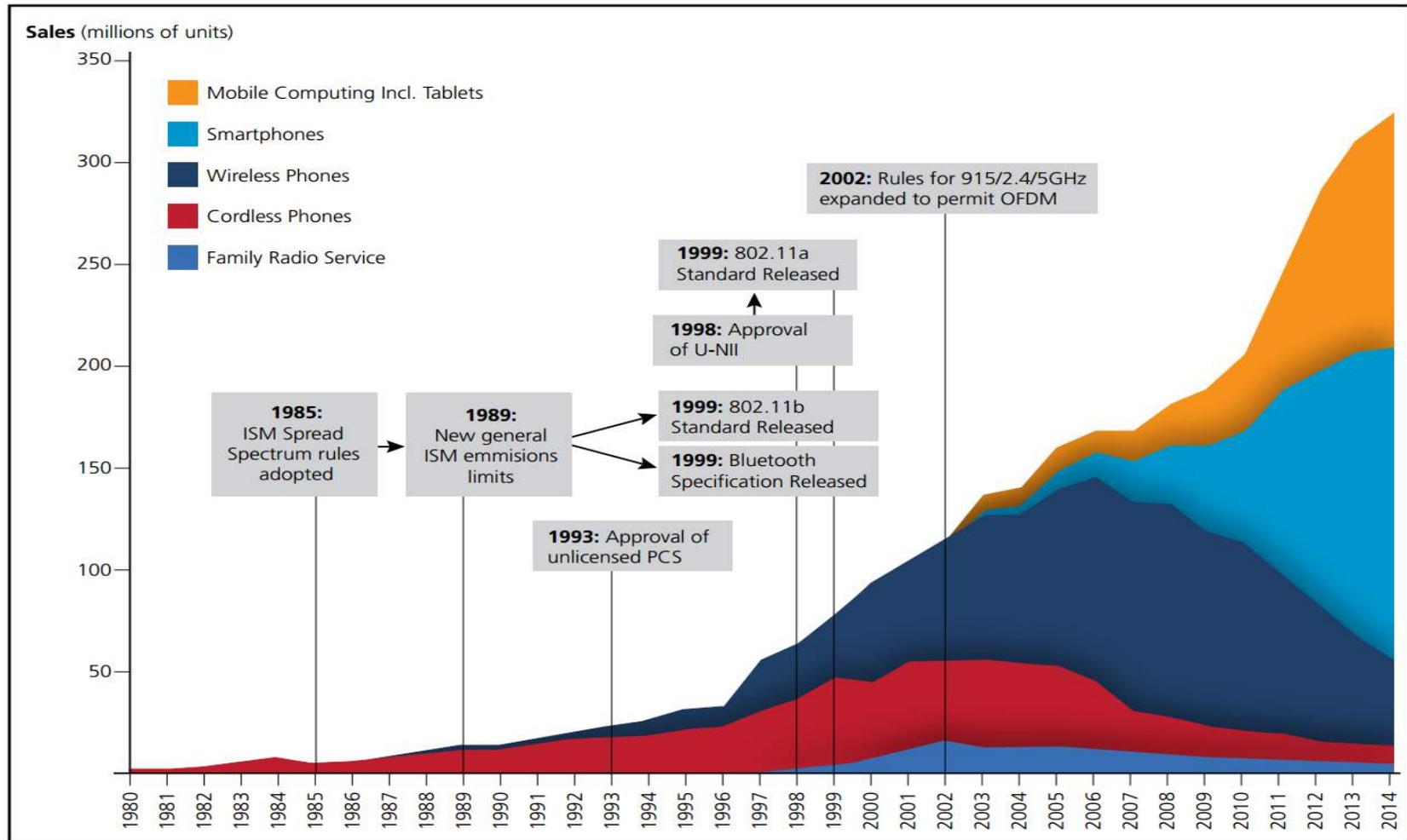


Opportunity

UNLICENSED SPECTRUM (WIFI)

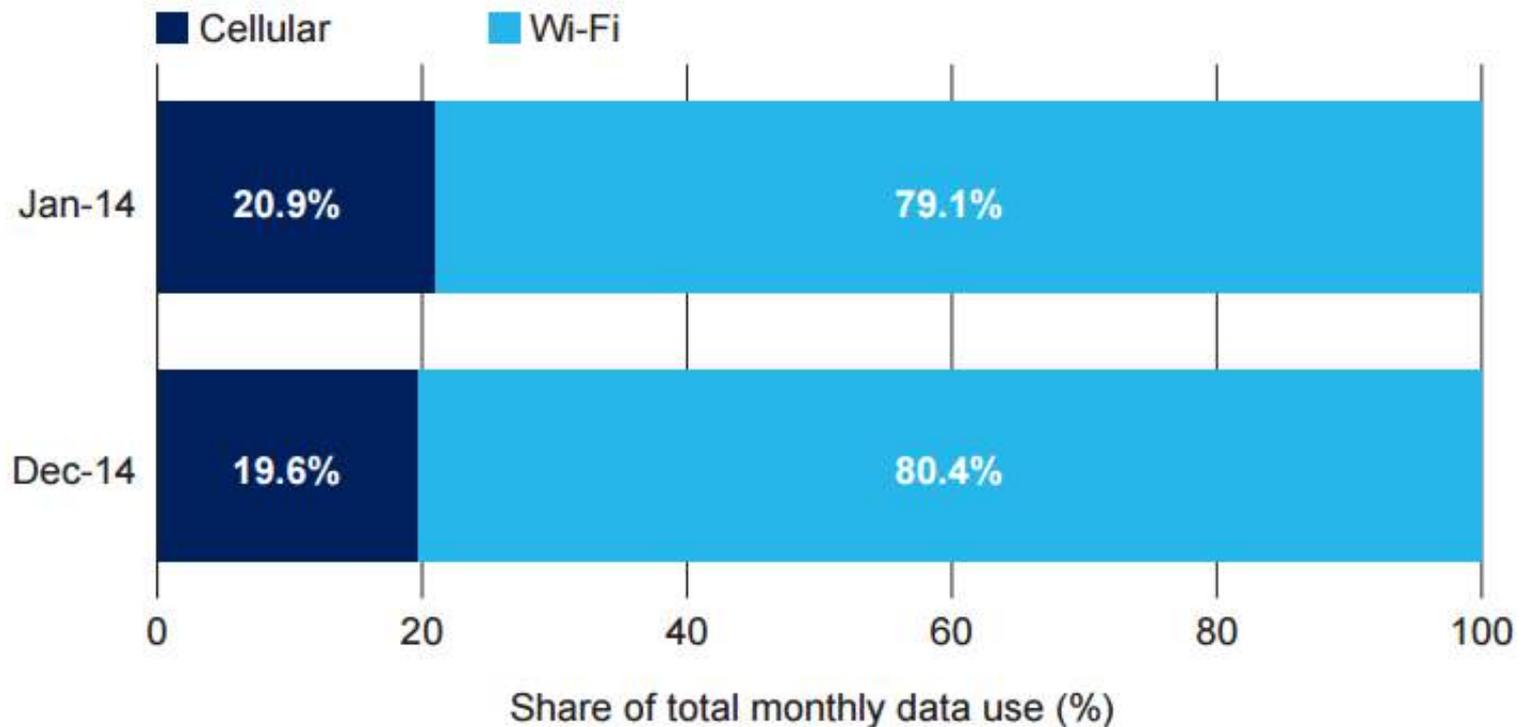
Unlicensed Spectrum Growth

Figure 1: Unlicensed Spectrum Milestones and Selected Device Categories – Growth Over Time



Growth of Unlicensed Spectrum Use

Figure 2: Global, cellular device users, cellular and Wi-Fi share of total monthly data use, January 2014 and December 2014



Source: Mobidia

HOME • ALL NEWS • AFRICA • INTERNET PROVIDER PROPOSES TO MAKE SEYCHELLES...

Internet provider proposes to make Seychelles a Free Wi-Fi Nation

December 3, 2015 Africa 0 295



ROKESpot

Subscribers are given free Wi-Fi service that greatly amplifies the quality, accessibility and affordability of the internet for users at around 2000 points. The Wi-Fi service is made possible by a network of wireless signal points called ROKESpots. With these ROKESpots, one is able to enjoy a superior Wi-Fi connection that offers a remarkable internet experience within walkable at the most affordable prices.

With over 200 ROKESpots in Kampala, you are now able to access our ROKESpot Wi-Fi service in malls, hotels, restaurants and public places. The service has different price categories which cater to various categories, for instance their budget.

- USA: 1,000 gives you access for 1 day
- USA: 5,000 gives you access for 7 days
- USA: 10,000 gives you access for 30 days

Government of Kenya to rollout free internet across the counties

TECHMORAN

Movement, at last, to extend WiFi into unconnected communities

HOT SPOTS

news24WIRE

South Africa: Joburg Promises Free Wi-Fi for 'All Residents'

Mayor Mkhwebane, Head of Board for the City of Johannesburg said that 1,000 hot spots for access to the internet would be installed around the municipality by year end.

Mmegi online

loFINet rolls out 600 Wi-Fi hot spots

IT NEWS AFRICA

Kenya: Libraries to offer free internet to public

Fast affordable WiFi internet for Kenya.

Our coverage in Kibera is provided by 56 *mmf* zones giving over 1,760,000 m2 coverage.

How to connect to the portal.

Easy as 1-2-3...

Total offers free Wi-Fi to customers in SA

September 8, 2015 • Mobile and Telecoms, Top Stories

FREE PUBLIC INTERNET ACCESS (WIFI) NITA - Google Chrome

NITA SCANDA

FREE PUBLIC INTERNET ACCESS (WIFI)

Friday, September 30, 2016

As pledged by NITA the president in the 2010 manifesto, the Ministry of Information Technology and National Guidance through its mandated agency National Information Authority Uganda (NITA-U) has commenced the trial provision of free wireless access in Kampala Central Business District and parts of Entebbe effective 1st October, 2016.

FREE WIFI INITIAL COVERAGE MAP

#MYUG

Internet access is no longer a luxury but a necessity for all Ugandan citizens. The IT remains at the center of this country-wide transformation steering Uganda to world class and productivity!

With NITA the President's support, Phases I and II of the National Backbone Initiative were completed and Phase III of the NBI is facing completion.

As a result, 189 MINISTRIES, Departments and Agencies (MDAs) and local governments are now connected. 102 MDAs are being connected this FY 15/17, and more will be connected in the next FY.

ECHCENTRAL

pe Town MyCITI buses to get free Wi-Fi

City of Cape Town has announced the launch of a free Wi-Fi pilot on buses.

expresswifi

SURFSPOT

Fast. Public. WiFi Hotspots. Across Nairobi.

Find your nearest Surfspot here: surfspot.ke

WiFi

CC by @steviesong

Unlicensed Spectrum Potential

Phenomenal
Cosmic Powers



Itty Bitty Living Space



FCC discussing expansion of the unlicensed bands

Freq. (GHz)	Width (MHz)	U-NII Rules (Sec. 15.407)	Digital Modulation Rules (Sec. 15.247)
5.15-5.25	100	U-NII-1 50 mW max indoor only	
5.25-5.35	100	U-NII-2A 250 mW max DFS required * TPC required *	
5.35-5.47	120	U-NII-2B (new -- proposed)	
5.47-5.725	255	U-NII-2C 250 mW max DFS required * TPC required *	
5.725-5.825	100	U-NII-3 1W max must cut back power at high point-to-point antenna gains	1W max no power penalty at high point-to-point antenna gains
5.825-5.85	25	not U-NII (proposed expansion)	
5.85-5.925	75	U-NII-4 (new -- proposed)	

Source FCC 13-22

* DFS: dynamic frequency selection required to detect and avoid certain federal radar systems.

* TPC: transmit power control required (for EIRP \geq 500 mW) to minimize interference to certain other users.

Additionally exploring expansion into
5.925-6.425 GHz and 6.425-7.125 GHz bands

Source Notice of Inquiry, GN Docket No. 17-183



Opportunity

LOW-COST GSM

Uganda

Population Coverage: 97.6%
Unserved: 896K

2G Coverage

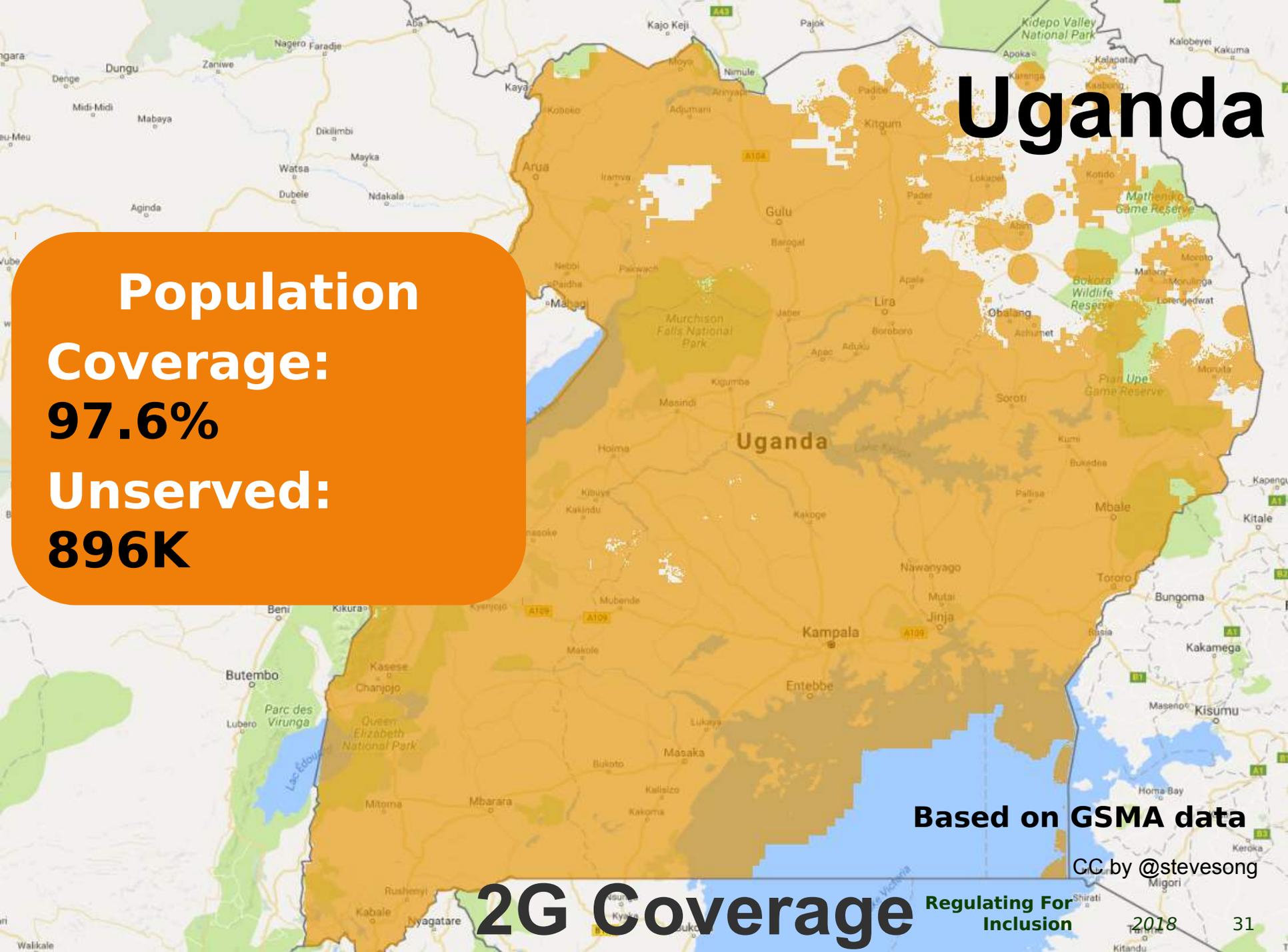
Based on GSMA data

CC by @stevesong

Regulating For Inclusion

2018

31



Uganda

Population

Coverage: 81%

Unserved: 6.5M

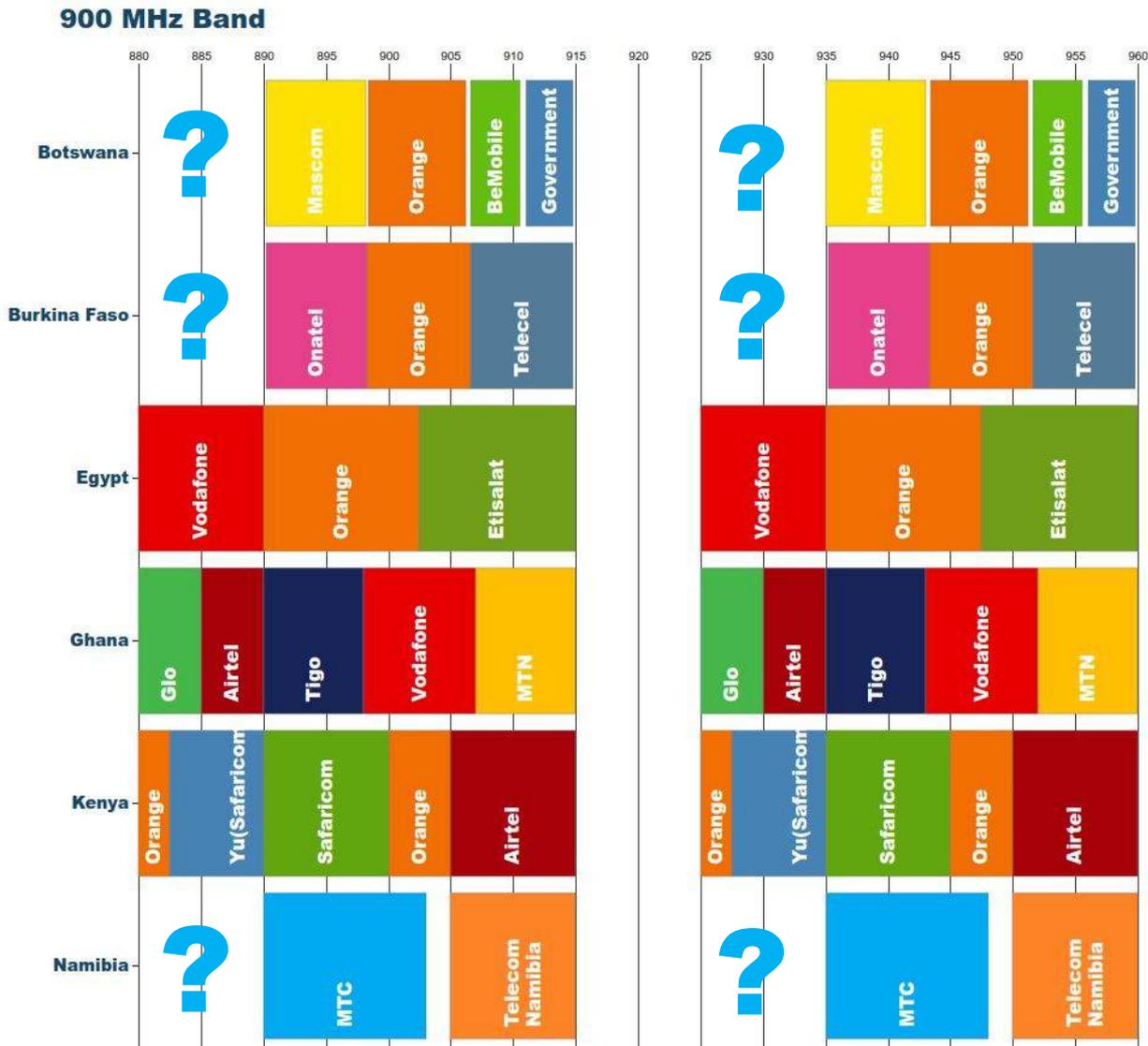
Research by RIS based on tower data
CC by @stevesong

2G coverage

**Regulating For
Inclusion**

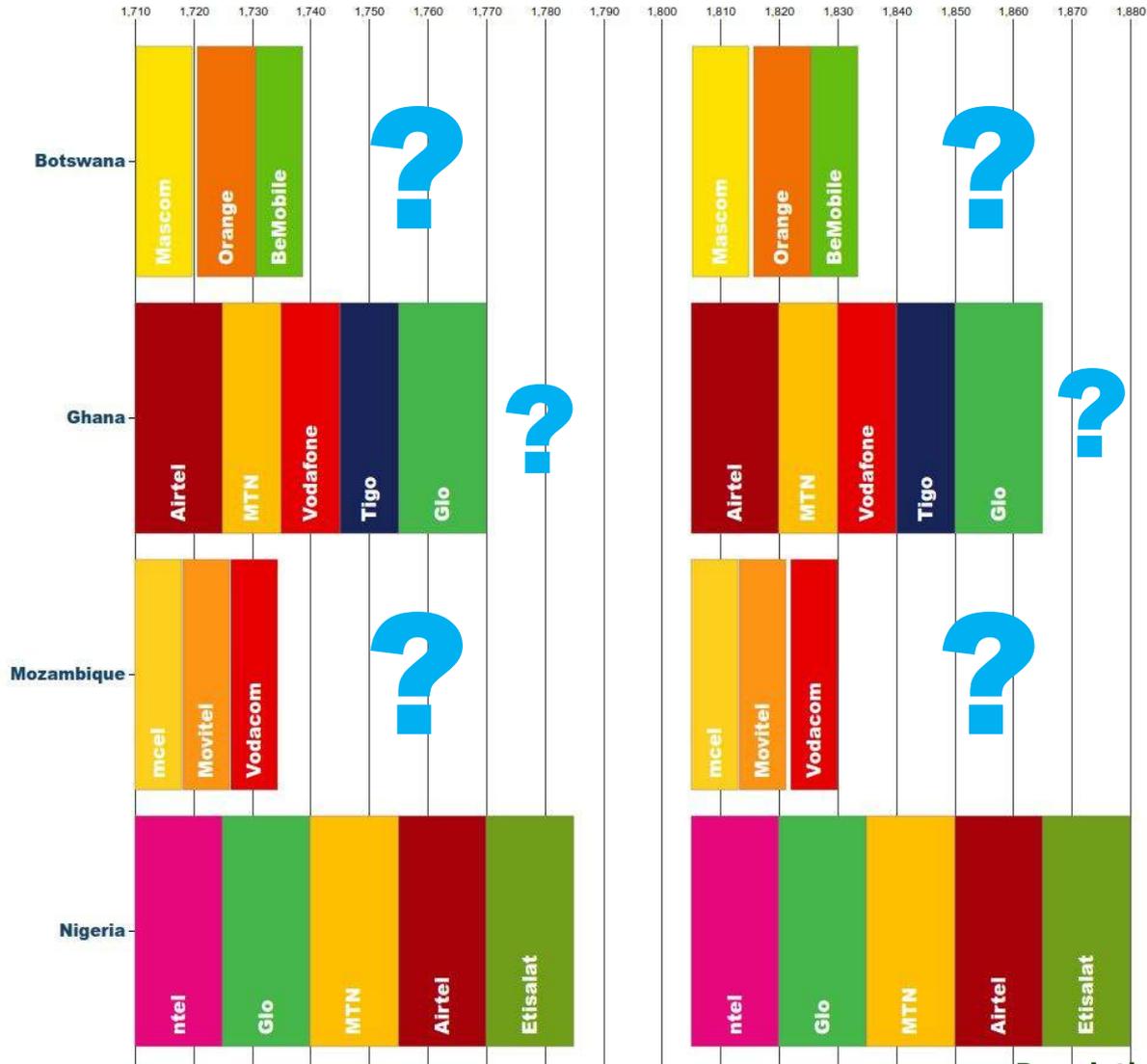
2018 32

Spectrum Availability



Spectrum Assignments

1800 MHz Band



Regulating For
Inclusion

CC by @stevesong

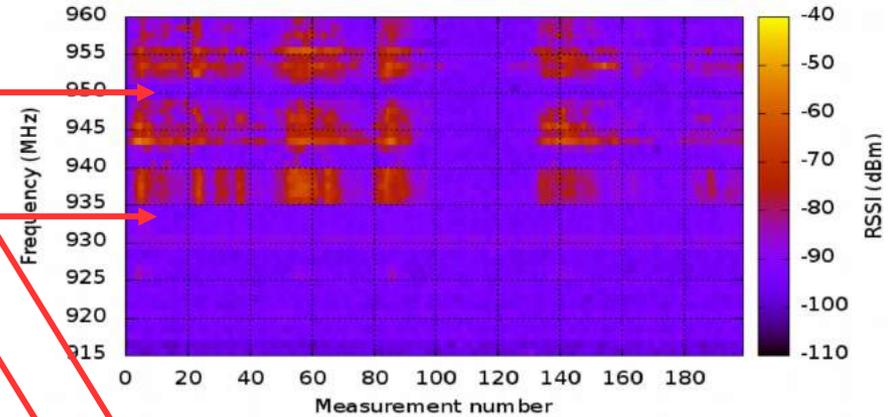
Monitoring Spectrum Use

4km measurement / rural Eastern Cape

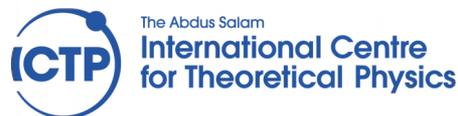
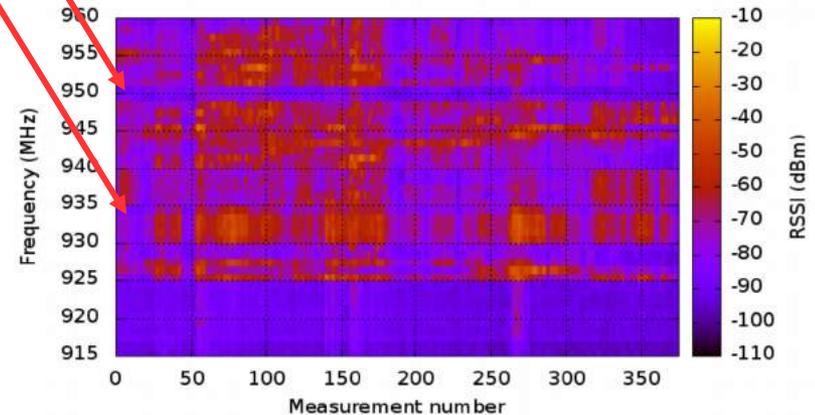
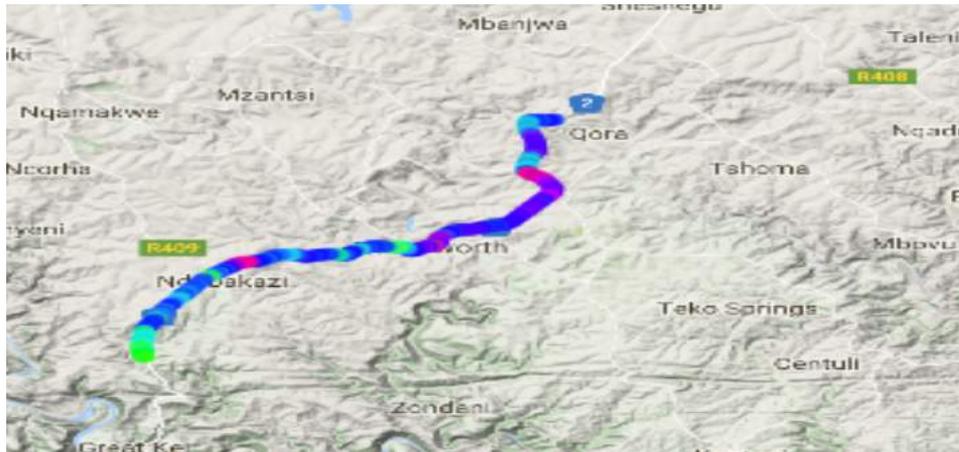


1.4 MHz empty all over!

10 MHz empty in deep rural!

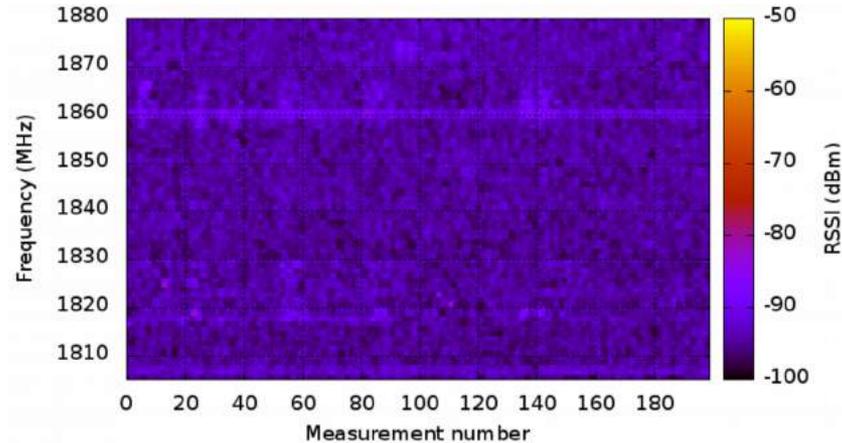


80km measurement / along the N2 (EC)

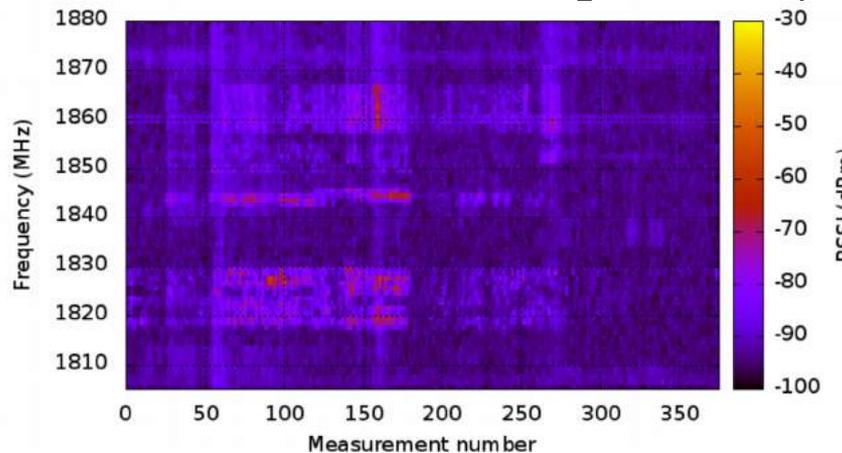


Monitoring Spectrum Use

4km measurement / rural Eastern Cape



80km measurement / along the N2 (EC)



Innovative uses of Spectrum

theguardian

home › world › americas asia australia africa middle east cities developn ≡ all

World news Half full: solutions, innovations, answers

'It feels like a gift': mobile phone co-op transforms rural Mexican community

In indigenous communities like Nuyoó, where almost every family has members who have migrated for work, low-cost phone calls are seen as an essential service



People gather in Santiago Nuyoó's main square to hear about the new mobile phone network. The TIC social cooperative has a licence to install networks in 356 marginalised municipalities. Photograph: Nina Lakhani

Mexico – In 2015 IFETEL set aside 2x5MHz in the 850MHz band for Social Purpose Licencees.

With 2x2 MHz Rhizomatica has enabled 20 communities to provide themselves with voice services

SMMEs like Zenzeleni already have ECS and ECNS exemption, “only” a spectrum licence (exemption) needed

From 22% to 3% of disposable income

Other models

AMN Extending mobile network Operators' coverage deep into rural Africa

Home About Us For Operators For Investors For Suppliers For Careers Our Technology Our Coverage Latest News Partner Portal Contact Us

SELECT COUNTRY
 ANGOLA
 BENIN
 COTE D'IVOIRE
 ETHIOPIA
 GHANA
 GUINEA
 MALI
 NIGERIA
 SIERRA LEONE
 SUDAN
 TANZANIA
 ZAMBIA

Many African countries have good mobile network coverage in the towns and cities, but in not the rural areas - and the population coverage falls well short of the maximum that is economically viable. This is due to limitations on the availability of affordable capital, with Operators forced to prioritise their precious capex on technology upgrades and coverage improvements in the high-population-density cities, rather than invest in expanding coverage into the rural areas. AMN offers Operators across Africa a simple and compelling solution - expanded coverage, more subscribers, increased revenues, guaranteed positive margins and no capex.

LATEST

- Nov 1. [and Al](#)
[Preser](#)
[Scalini](#)
[Conn](#)
- Mar 3. [Workit](#)
[ETB](#) [to](#)
[Million](#)
[Invest](#)
- Feb 24

VANU

PROVEN INNOVATION FOR WIRELESS COVERAGE CHALLENGES

We innovate to provide coverage in places without coverage today.

Click each to see examples of Vanu solutions around the globe

Vanu Offices Vanu Solutions

RURAL SOLUTIONS
 TO CONNECT THE UNCONNECTED

Vanu rural technical innovation focuses on low power consumption and small size to reduce both OPEX as well as site related CAPEX costs.

DISCOVER >

CELLULAR SUPPRESSION
 FOR SAFETY AND SECURITY

The Vanu® SpectrumShield™ solution prevents the use of illicit cell phones in correctional facilities and secure government compounds.

DISCOVER >

COVERAGE AS A SERVICE
 FOR MOBILE OPERATORS

Vanu pioneered a combination of technical and business innovation to provide economically viable service to uncovered rural areas.

DISCOVER >



Opportunity

DYNAMIC SPECTRUM

Television White Spaces

Allows for the dynamic re-use of spectrum without interfering with the primary spectrum holder

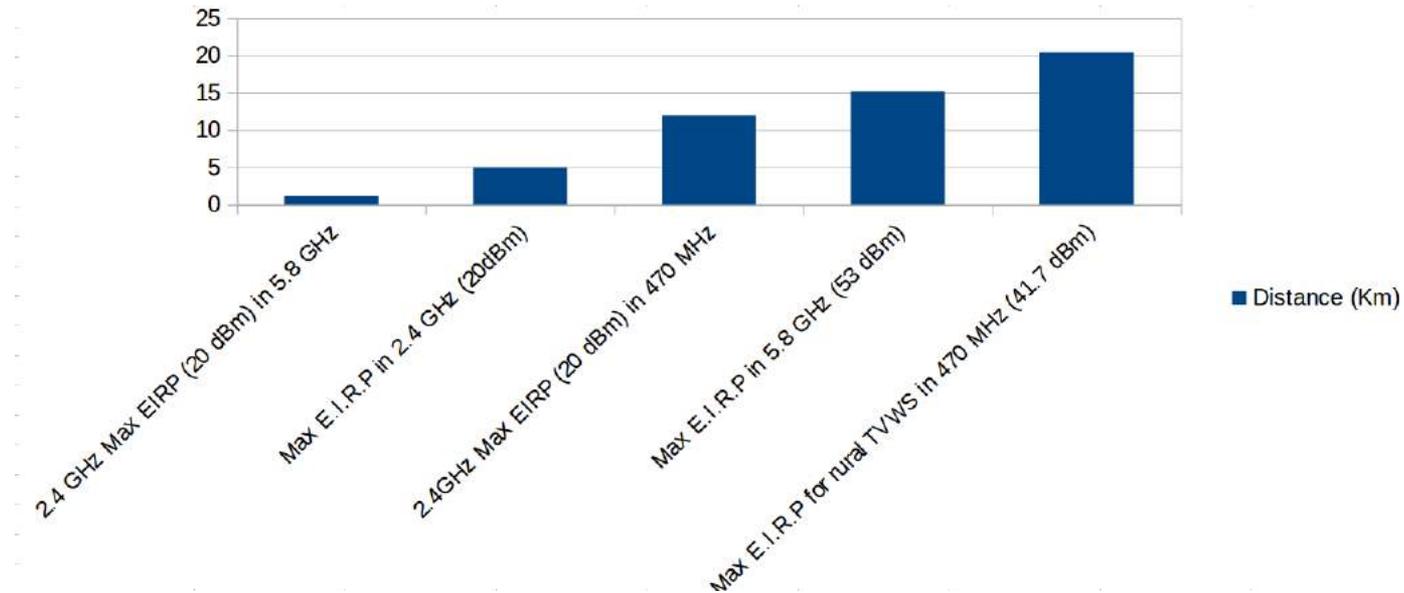
Ideal for rural access

Low television spectrum occupancy in Africa

No re-allocation of spectrum required



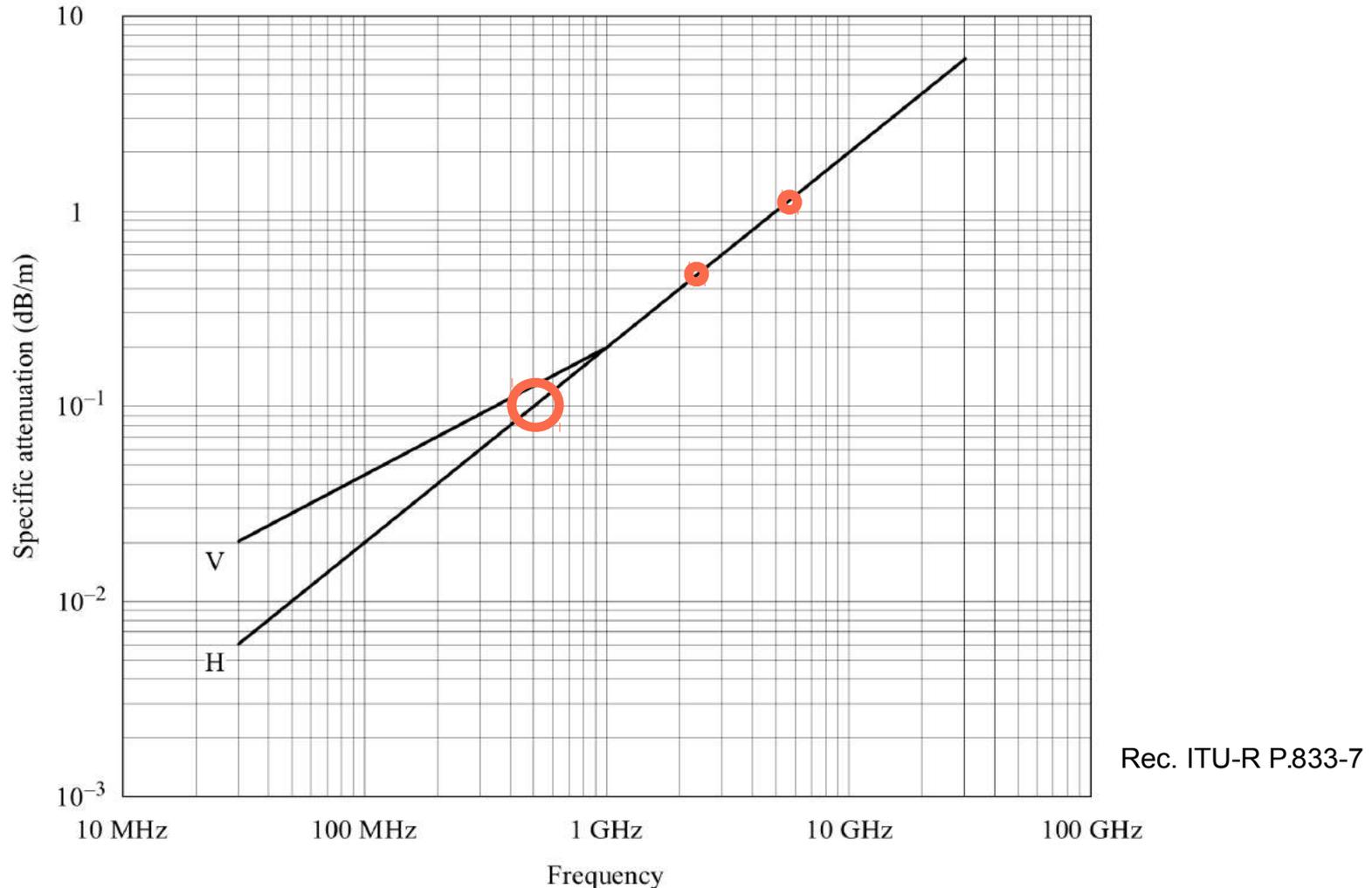
Free Space Loss



In the same conditions, a link at 470 MHz is 11.5 Km longer than a link at 5.8 GHz and 7.5 Km longer than a link at 2.4 GHz

In real conditions in South Africa, a link at 470 MHz is 15.5 Km longer than a link at 2.4 GHz and 5.5 Km longer than a link at 5.8 GHz

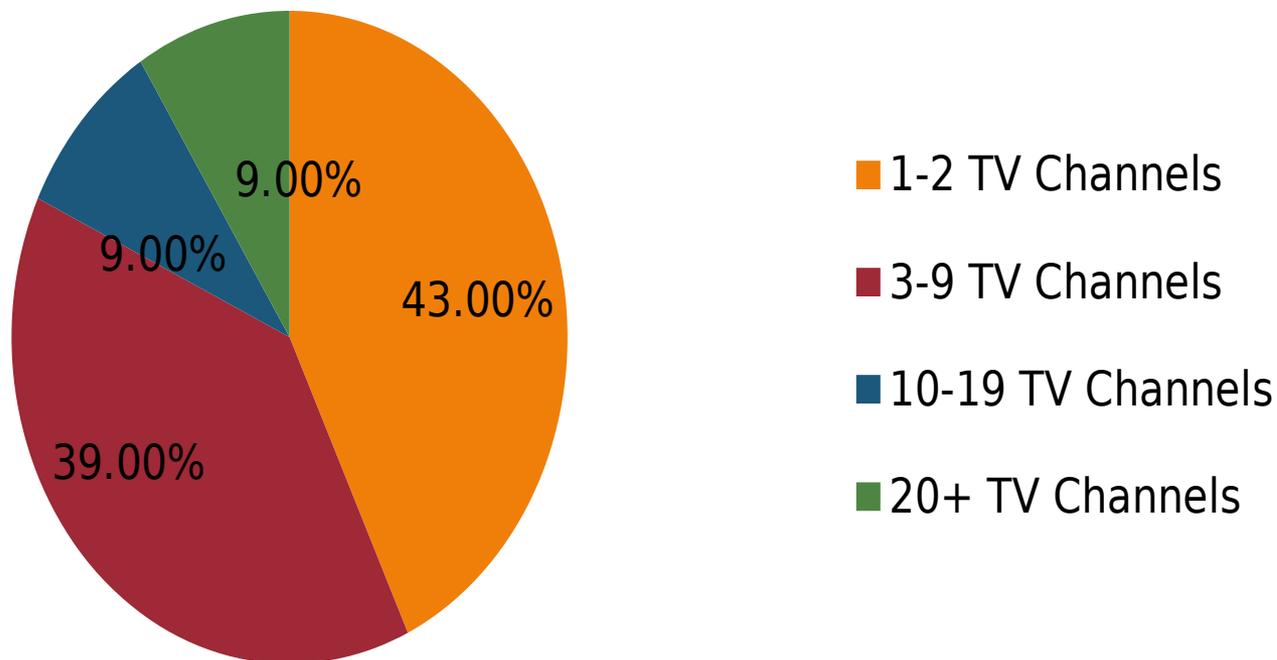
Radio Attenuation in Vegetation



4 times less attenuation in 470 MHz compared to 2.4 GHz, 16 times less compared to 5.8 GHz

UHF Spectrum Occupancy in Africa

Television Spectrum Occupancy in African Countries in 2012

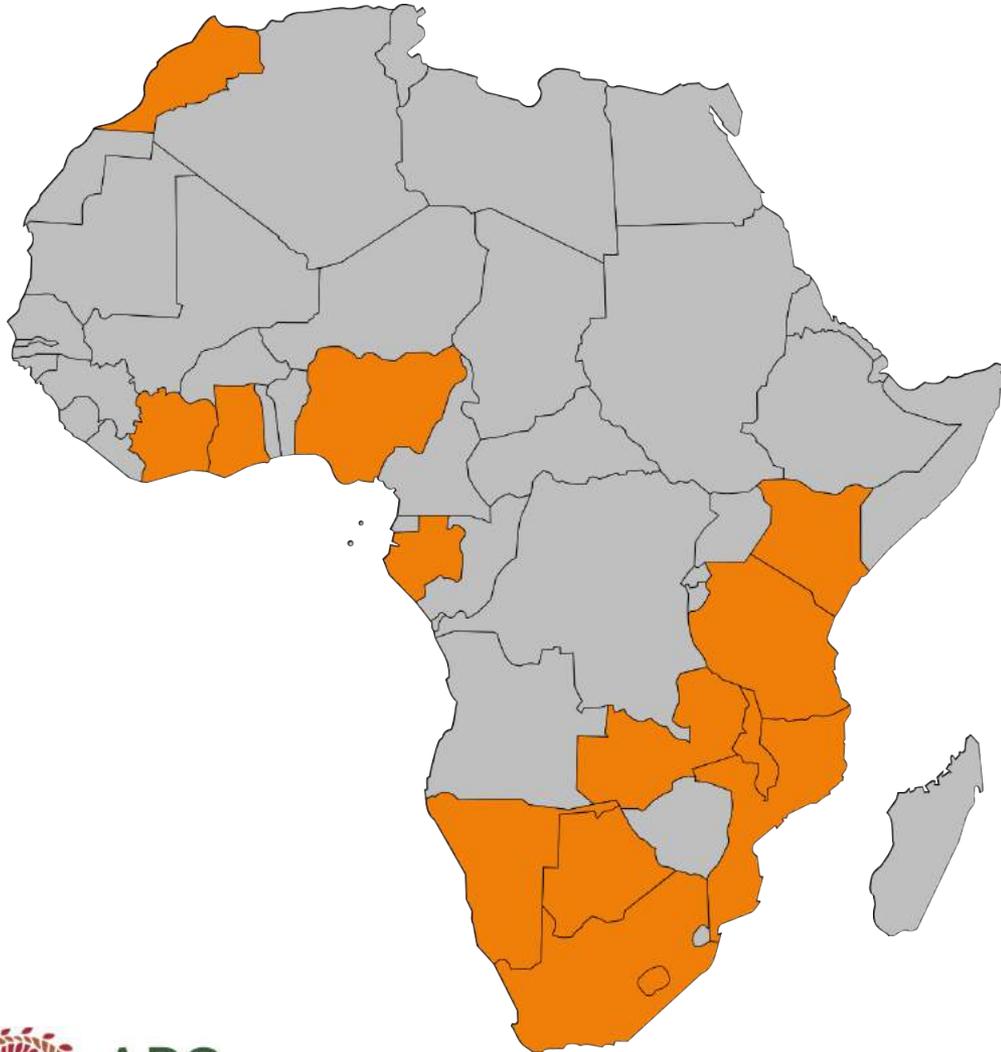


Source: **Balancing Act**

Presentation to African Telecommunications Union (ATU) Digital Migration Summit (May 2014)

<http://www.atu-uat.org/index.php/download-categories/category/10-afriswog-events?download=299:session-3-ppt-1-balancing-act-presentation>

Dynamic Spectrum in Africa



2012 - 2018

Africa countries leading the world in deployments

Opportunity to use fallow UHF spectrum to connect underserved communities

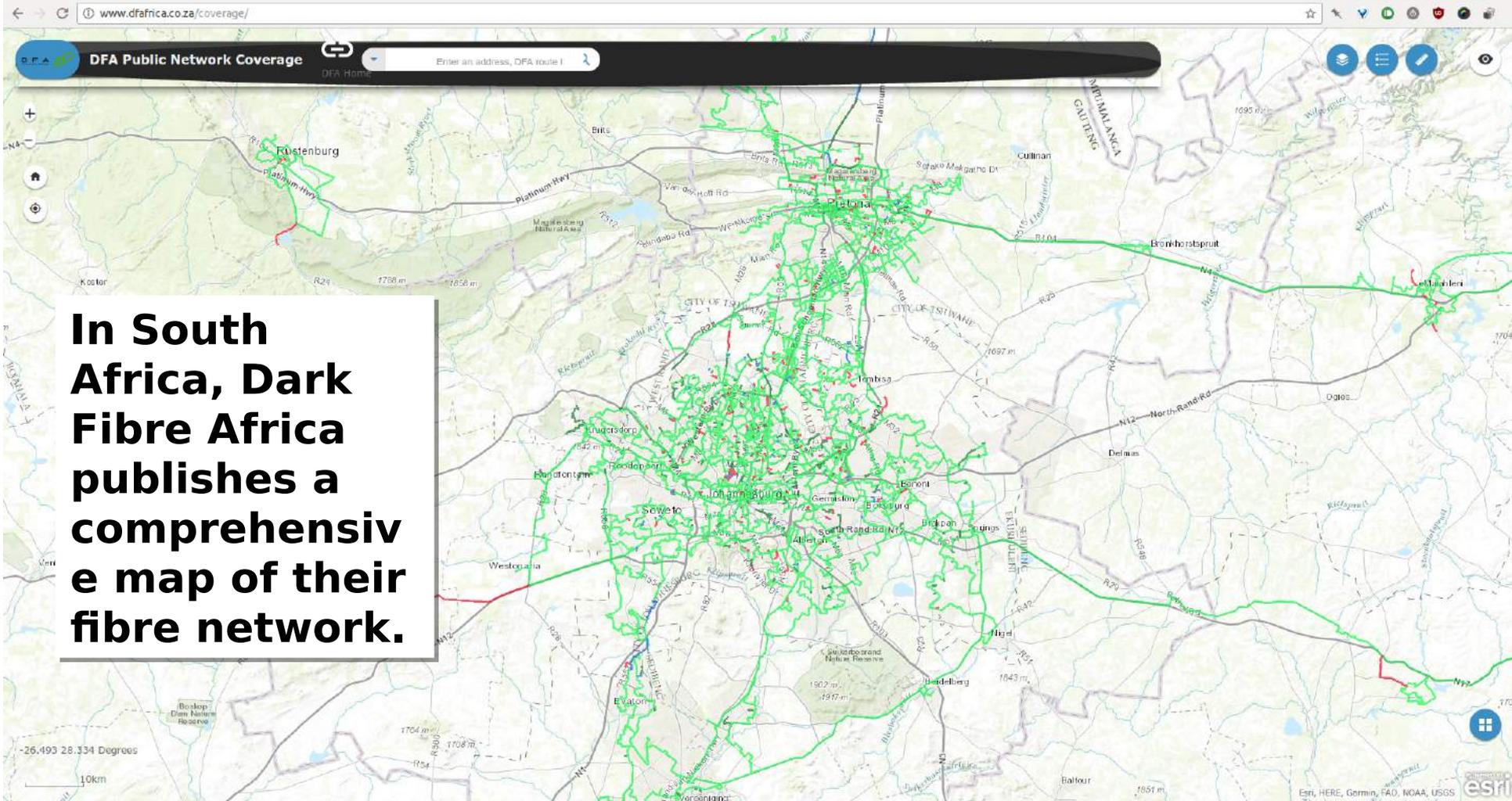
Progress in 2018

- ✓ Mozambique
- ✓ South Africa

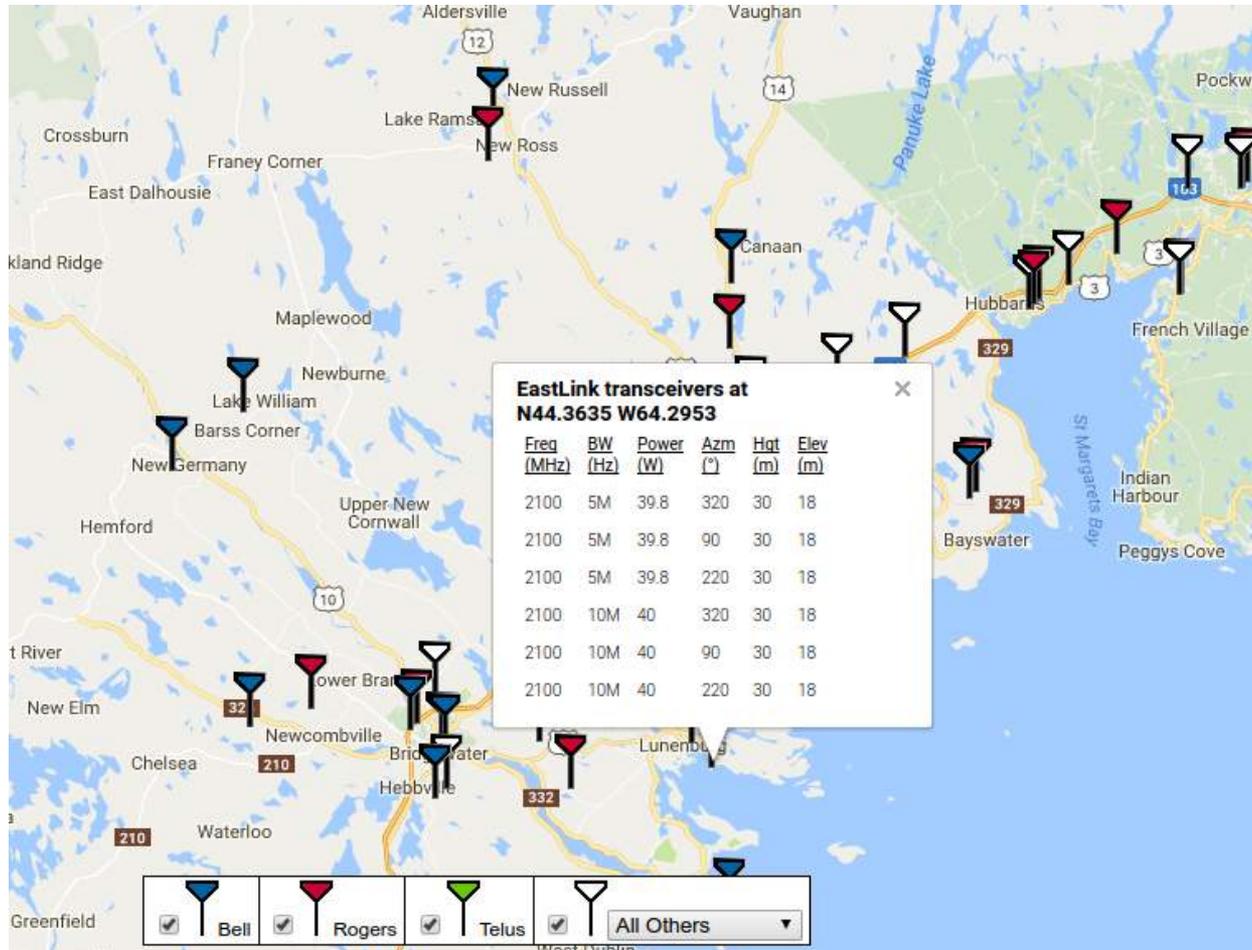
CC by @stevesong

The Case for Open Telecom Data

Good Practice



Good Practice



- Operator
- Location
- Frequency
- Height
- Power

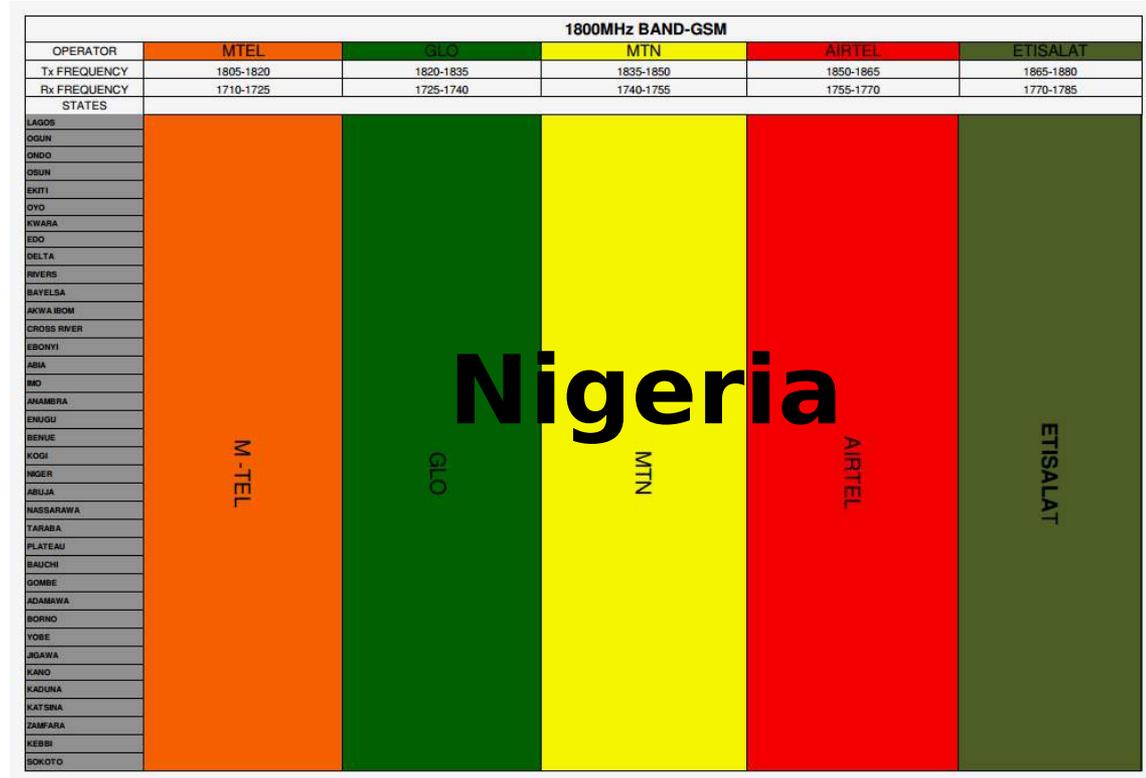
Good Practice

LIST OF ACCESS FREQUENCIES ASSIGNED TO OPERATORS

A. MOBILE WIRELESS ACCESS

Frequency Band	Amount of Spectrum	Assigned Operator
800 MHz	5MHz paired	Telkom Kenya Limited P.O. Box 30301-00100 NAIROBI
900 MHz	10MHz paired	Safaricom Limited P.O. Box 46350-00100 NAIROBI
900 MHz	10MHz paired	Celtel Kenya Limited P.O. Box 73146-00200 NAIROBI
900MHz	7.5MHz paired	Telkom Kenya Limited P.O. Box 30301-00100 NAIROBI
900MHz	7.5MHz paired	Essar Telecom Kenya Limited P.O. Box 45742-00100 NAIROBI
1800MHz	10MHz paired	Safaricom Limited P.O. Box 46350-00100 NAIROBI
1800MHz	10MHz paired	Celtel Kenya Limited P.O. Box 73146-00200 NAIROBI
1800MHz	10MHz paired	Telkom Kenya Limited P.O. Box 30301-00100 NAIROBI
1800MHz	10MHz paired	Essar Telecom Kenya Limited P.O. Box 45742-00100 NAIROBI
2100MHz	10MHz paired	Safaricom Limited P.O. Box 46350-00100 NAIROBI
2100MHz	10MHz paired	Celtel Kenya Limited P.O. Box 73146-00200 NAIROBI
2100MHz	10MHz paired	Telkom Kenya Limited P.O. Box 30301-00100 NAIROBI

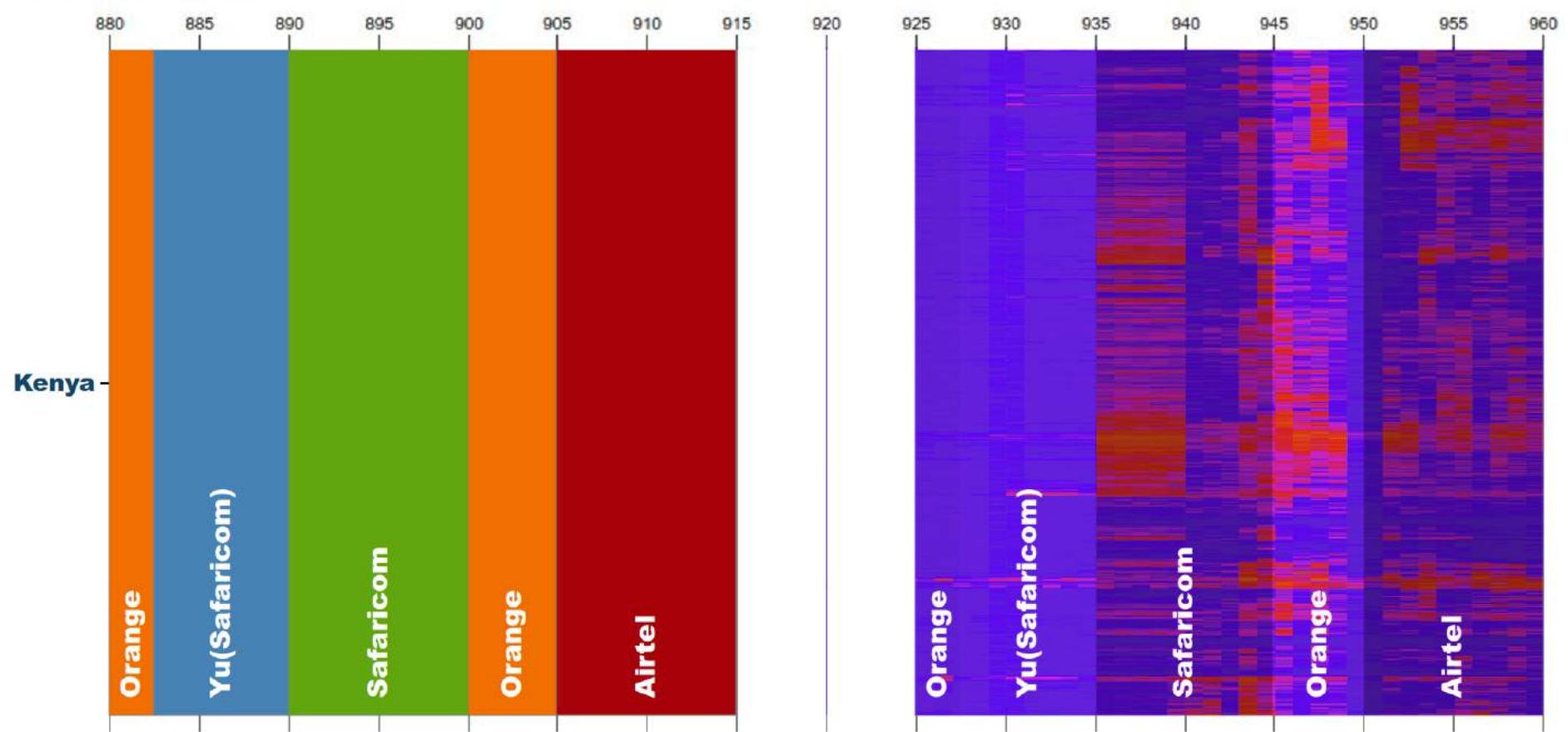
Kenya



Nigeria

Monitoring Spectrum Use

900 MHz Band



CN friendly regulatory and policy frameworks?

Let's answer that question together