COUNTRY ANALYSES AND PLANS

Rwanda

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$11M of CapEx funding and $5M of annual OpEx funding will enable Rwanda to connect 1,796 schools.

This investment will bring **1.3 million students and teachers** online and connect **2 million community members** who live locally, potentially enabling up to $400M USD in GDP growth.

Source: Dalberg Analysis based on Giga mapping and modelling data, 2020

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“The internet is a much needed public utility as much as water and electricity.”

PRESIDENT PAUL KAGAME
Transform Africa Summit 2013

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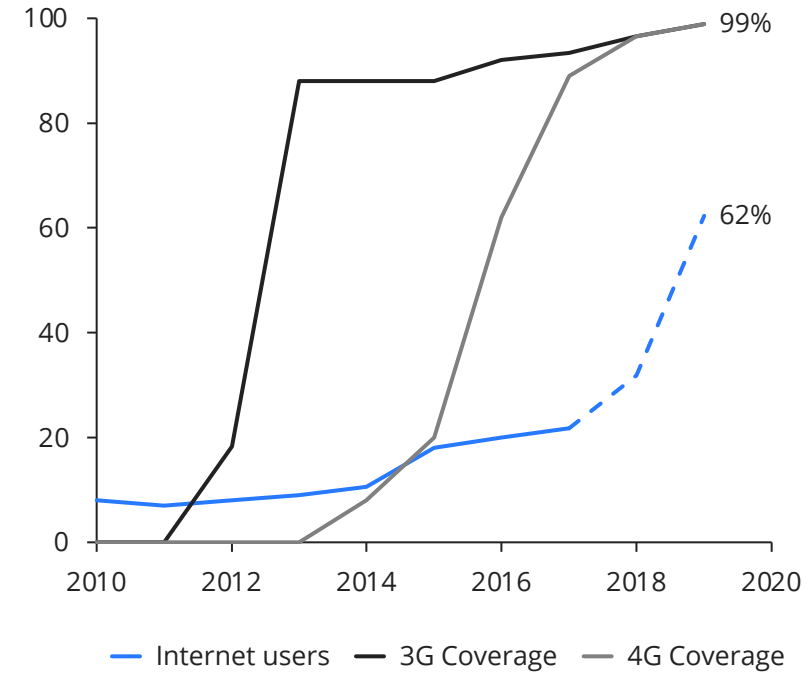
Rwanda has achieved universal coverage but internet penetration lags behind. Efforts are now focused on connecting all users to the internet

Although coverage is nearly universal, internet penetration lags behind

Broadband coverage and internet penetration, % of population. (ITU, 2020; RURA, 2020)



The Government of Rwanda is aiming to grow the digital economy and public services through universal broadband usage by 2024

Rwanda hopes to achieve this target through the following broadband connectivity policies:

- Overarching: National Strategy for Transformation & Prosperity, Vision 2020, 2035 and 2050, and the Smart Rwanda Master Plan
- ICT Sector Strategy 2018-2024: Establishes access to broadband connectivity as a basic utility and right for all Rwandans. Aims increase access to high speed Internet to through aggressive expansion of last mile and household connectivity as well as smart device penetration
- Digital Talent Policy: Aims to increase digital literacy and skills across Rwanda society in terms of quality and quantity. Initiatives embed digital training into everyday lives to mainstream ICT, build a digitally savvy workforce, and close the rural-urban skills gap
- Education Sector Strategy 2018-2024: Major goals include developing digital content aligned to the curriculum; increased ICT penetration and usage in education through smart classrooms; the development of ICT for education leadership and teacher training courses for teachers. Includes SMART Classroom program

Note: Internet users is based on ITU estimates up to 2017 supplemented with Quarterly ICT Statistics Report by RURA in June 2020.
Source: Dalberg analysis; ITU World Telecommunication/ICT Indicators Database 2020; MINICT, ICT Sector Strategic Plan (2018-2024), 2017; MYICT, Digital Talent Policy, 2017; MINEDUC, Education Sector Strategic Plan (2018-2024)

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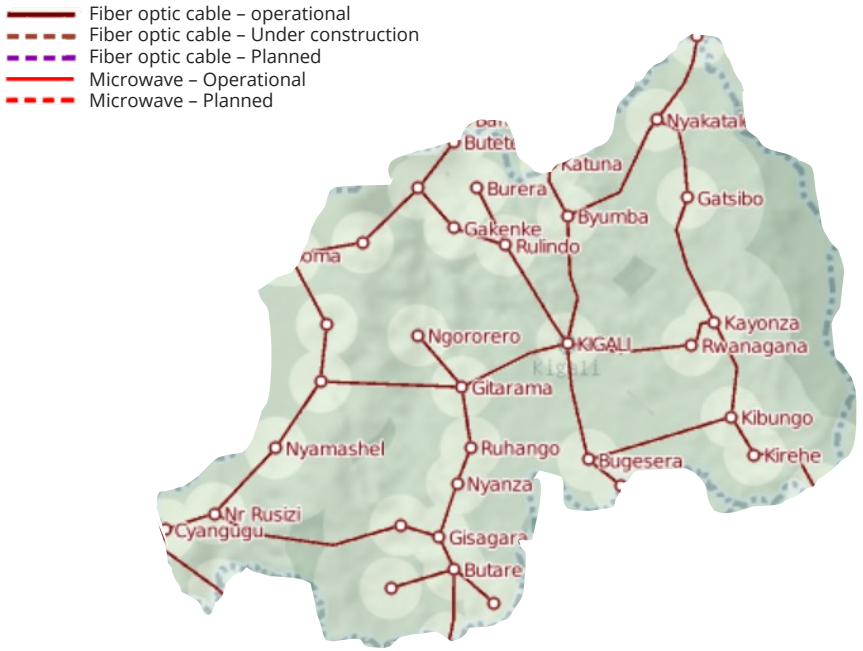
National fiber network



	Mobile	Fixed
Subscriptions per 100 inhabitants	42	<1
5-year CAGR	+28%	+22%

The Goal: National Coverage and Connectivity

Rwanda has invested in expanding its fiber network by 45% since 2015, spanning 6,100km of backbone in 2019. 3G and 4G network coverage is nearly universal. Given the countries hilly geography, significant investment is needed for last-mile fiber connections.

Source: Map – ITU Broadband Map; Table – ITU (2020) World Telecommunication/ICT Indicators Database

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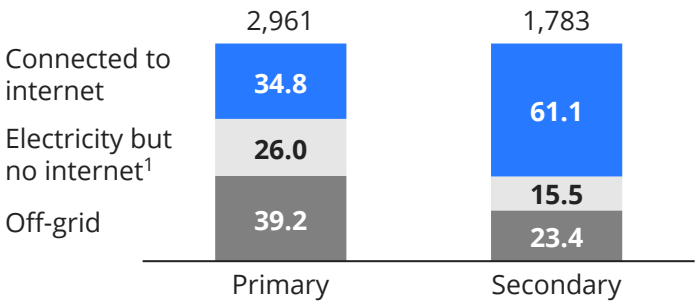
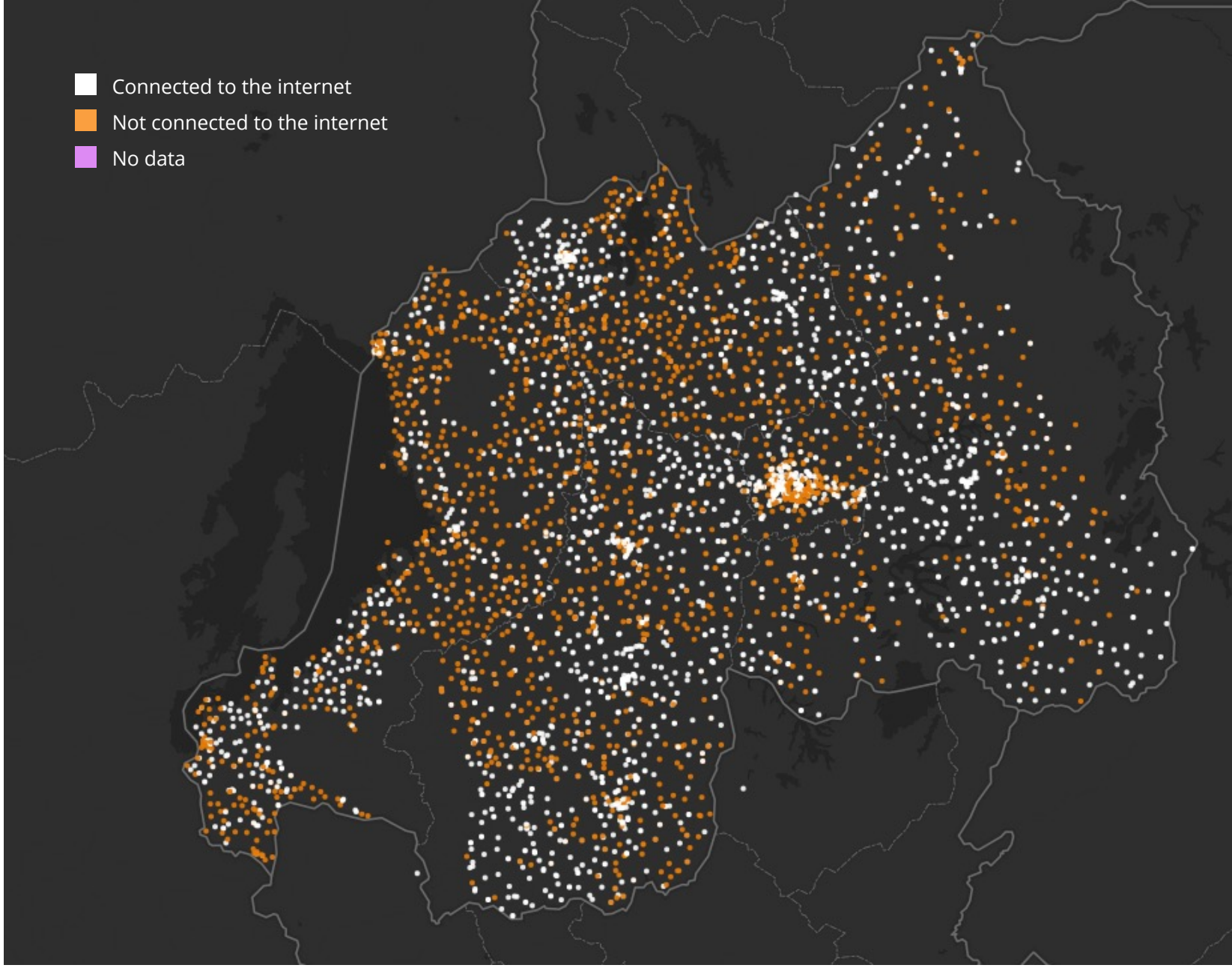
School Coverage and Connectivity



67% of secondary and 58% of primary schools have ICT resources for teaching and learning

Giga mapping shows that nearly all Rwandan schools are within 30km of the fiber network and covered by mobile broadband, but 1,796 schools (43%) remain without internet. Electrification and ICT resources are major barriers.



Note: (1)On-grid electricity is a government pre-condition for computers to be distributed to schools (MINEDUC statistics 2019)
Source: Map – Project Connect; Chart – MINEDUC Statistics 2019

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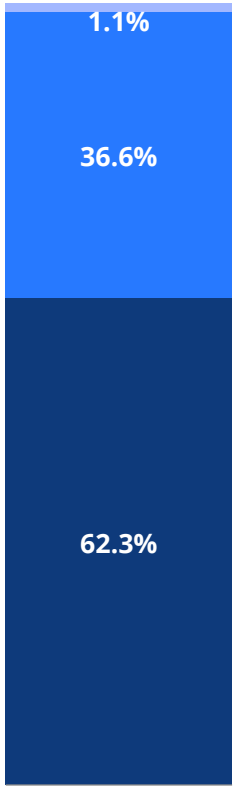
While 62% of Rwandans have access to mobile internet, 36% are constrained by affordability, energy, and literacy

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
1.1%	COVERAGE GAP **No mobile internet**	Increase coverage	Universal connectivity
36.6%	USAGE GAP **Covered by 3G/4G but not connected**	Increase electrification Increase affordability Increase digital literacy	Power 7 million off-grid users -58% (1.80/GB) reduction in data cost +11 million Rwandans with ICT skills
62.3%	CONNECTED **Active mobile internet use**	Fuel the digital economy	+175k new skilled employment

Notes: (1) Figure used is from ITU. The Rwandan MINICT measures broadband prices at 14% of GNI. Also note that individuals in rural locations will likely spend a higher proportion of income due to lower income levels.
Sources: ITU (2020) World Telecommunication/ICT Indicators Database; USAID (2020) PowerAfrica Rwanda Fact Sheet; National ICT Sector Strategic Plan 2018-2024; National Institute of Statistics, Labor Force Survey (2018); Quarterly ICT Statistics Report by RURA (2020).

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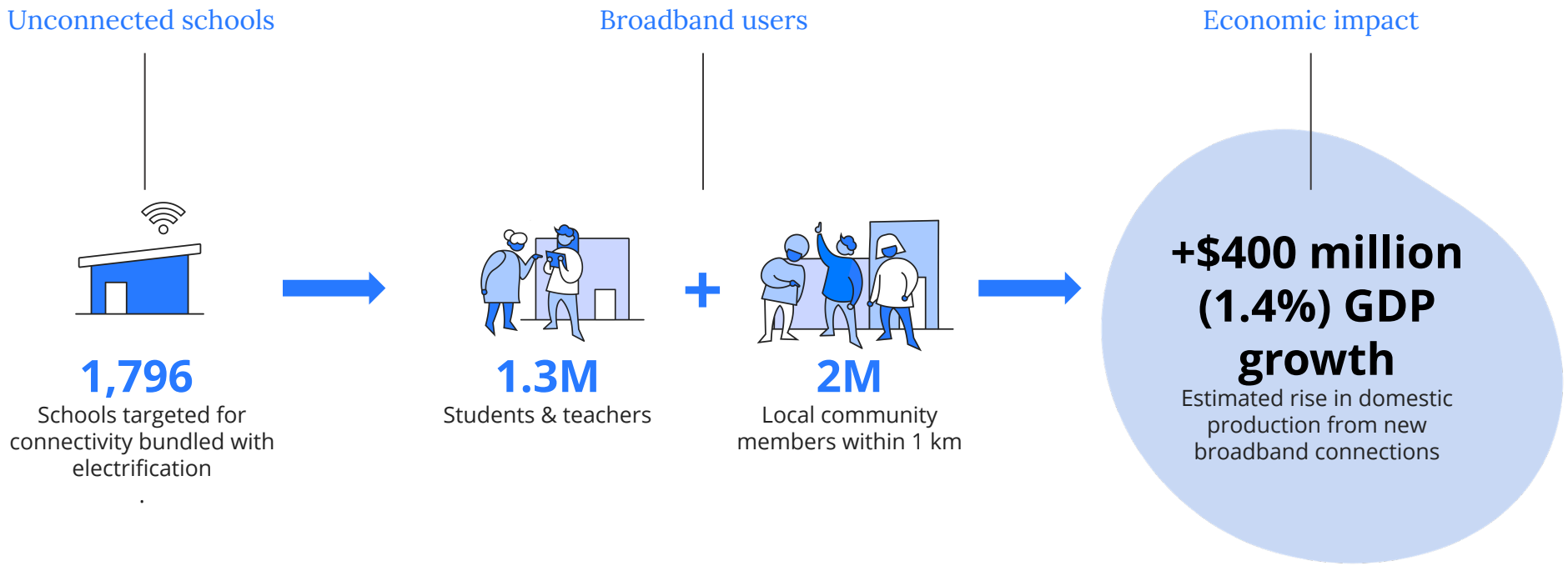
Targeted financing for powering and connecting 1,796 schools can create GDP growth of over $400 million

Universal expansion to all schools provides a gateway to community connectivity



Note: Economic impact calculation assumes that school connectivity is comparable to gaining access to a fixed line connection in a middle/lower income country in terms of reliability, bandwidth, use etc. Assumes middle income fixed broadband which is a conservative assumption when compared to low income mobile broadband

Source: Dalberg Analysis;; ITU (2020) World Telecommunication/ICT Indicators database; UNESCO UIS.Stat, 2018; World Bank (2020) World Development Indicators (WDI); ITU (2018) The Economic Contribution of Broadband

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School connectivity will require an estimated $11M of upfront capital expenditute and up to $5M of ongoing annual funding

Giga will help to mobilize investment and financing to bridge initial infrastructure gaps and provide mechanisms to supply longer-term financing to boost geographic reach and affordability through smart subsidies

(Schools to be connected: 1,796)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 50% Fiber, 48% WISP, and 2% 4G:

$11M

Estimated total investment needed to reach 1,796 schools*

*This does not factor in potential volume discounts or other sources of funding

ONGOING ANNUAL FUNDING FOR REGULAR SERVICE FEES

Estimates based on an all-in service, technical support and maintenance fee:

$5M[a]

Potential service fees for 1,796 schools (Giga estimate)*

*This does not factor in potential volume discounts or other sources of funding

Government of Rwanda has invested $580,000 in connecting 724 schools and currently spends $960,000 annually on service fees for schools.[b]

Notes: These high-level estimates can be further refined as the workflow progresses and more mapping and specific cost date is established. A) Pre-feasibility preliminary estimates based on Giga's ACTUAL model school bandwidth requirements and annual service fee estimates in Kenya, adjusting for country costs based on 'Fixed-broadband Internet 5GB' values and 'Data-only mobile broadband 1.5 GB' reported by each country in ITU's World Telecommunication/ICT Indicators database (2020)
B) Rwanda Education Board
Source: Dalberg Analysis based on Giga Mapping/Modelling Data, 2020.

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Rwanda is Giga's regional lead for Africa, and has engaged broadly across its public entities

Key Stakeholders: Rwanda Ministry of ICT, Ministry of Education, Ministry of Youth and Culture, Rwanda Education Board (REB), Rwanda Information Society Authority (RISA), Rwanda Utilities Regulatory Authority (RURA), the Office of the President

Giga engagement to date

- High level buy-in from Minister of ICT and Innovation Paula Ingabire and Minister of State for Education Claudette Irere
- Identification of key government focal points across ministries and relevant agencies
- July 16 Giga workshop with representatives from MINEDUC MINICT as well as supporting agencies to define priorities and next steps (see next page)

Giga actions to date

- Developed a proposed way forward on connecting 1,000 schools using a variety of connectivity technologies to achieve quick wins that extend connectivity during COVID-19, and test potential solutions for broader implementation
- Sought out financing opportunities to support Giga efforts

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In partnership with the Government, Giga has identified several activities to support the cost-effective connection of 1,796 schools

Use Giga mapping to identify school-level energy resources and internet connectivity needs, and refine business cases for separate packages of investment

Provide the government with ongoing transparent data on service delivery, such as internet pricing and quality (speed, reliability) to inform contracting decisions

Explore ways to build on regulatory reforms/activities to increase investment attractiveness and boost affordability and protect consumers

Explore innovative and appropriate last-mile connectivity solutions

Structure procurement lots to bring broadband to SMART classrooms and targeted primary schools

Mobilize concessionary investment to deploy last-mile solutions and middle-mile networks to connect the remaining 1,796 schools

Work with MINEDUC, MINICT and RISA to negotiate lower services fees from ISPs and develop and NREN to lower data costs further

Leverage the Digital Public Goods Alliance to adapt global DPG resources into local languages and scale up use of digital textbooks and content for remote learning

Collaborate with local entrepreneurship initiatives, such as Rwanda Innovation Fund and Rwanda Polytechnic IPRC Incubation Center, to help close funding gaps and integrate open source principles

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Rapid Regulatory Scan

Policies

Sector strategies:[1]	
Digital transformation/broadband strategy	Yes
Planned e-government roll out	Yes
Digital education in strategy	Yes
Child Online Protection:[2]	
National strategy/policy?	Yes
Responsible agency?	Yes
Non-discriminatory inclusive use policy?	Yes
Data Sharing:[2]	
Data protection policy?	Yes*
Privacy and data protection laws	Yes

ICT Regulatory Tracker[3]

Sector strategies:	
Generation of ICT Regulation	G3
Overall	82/100
C1: Regulatory Authority	20/20
C2: Regulatory Mandate	20/22
C3: Regulatory Regime	18/30
C4: Competition Framework	24/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	Yes
Regulatory autonomy from the government	Yes
Clear planning and licensing process?	Yes
Procurement or competition agency?	Yes

Competition

Regulatory structure[1]	
SMP in national anti-trust/competition law	Yes
Spectrum technology neutrality in place	Yes
No foreign investment restrictions?	Yes
Infrastructure sharing?	Yes
Wireless Operators Market HHI[4]	5030
Fixed Broadband Operator Market HHI[4]	3495

Taxation

Services	
VAT[5]	18%
Sector specific tax on internet services[5]	0%
ITA Participant[6]	No
ICT Equipment import duties[7]	0%
Ongoing regulatory/license fees[1]	Tbc

Universal Access

Services[8]	
Is school broadband a universal service?	Yes
Operational Universal Service Fund (USF)?	Yes
Total amount allocated/disbursed so far	5.9M
Contributions as % of revenue	2%
Other public financing mechanisms?	No
Fully utilized currently?	No
Fully active in the last 5 years?	Tbc

Strength
Neutral
Limitation

Notes: *Rwanda has also progressed open data regulations following the 2017 Data Revolution Policy. HHI – Hirschman Herfindahl Index (HHI) Score, > 4,000 Highly concentrated. Import duties based on a review of several Telecommunications, Electrical and Radio Transmission Equipment HS codes

Sources: 1) Latest ITU World Telecommunication/ICT Regulatory Survey 2019 2) ITU (2019) Global Cyber Security Index 3) ITU (2018) ICT Regulatory Tracker 4) EIU (2020) The Inclusive Internet Index 5) ITU (2019) Taxation Survey Country
6) World Trade Organization (2020) Information Technology Agreement Website 7) WITS (2020) World Integrated Trade Solution – Tariff Database 8) Latest ITU Global Report (2020) and, where available, the country's Universal Service Fund website

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