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Connecting the Dots

IMPACT OUTLOOK 2021

unicef
for every child

ITU

Contents

In the following pages you will find progress Giga has made across priority countries and the outlook and plans for each country over the next few years.

This work is broken into: **Critical Insights** to guide our tailored and precise approach for the country;

the support we are now **Looking Ahead** to provide and advance on our pillars of work;

followed by **Country Analyses and Plans** to connect the dots.

Foreword

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Imagine being a young person and connecting to the internet for the first time. Imagine finding at your fingertips all the tools you need to learn, to build skills, to find employment, and to communicate globally.

In 2019, we launched **Giga** – an ambitious initiative to connect every school and its surrounding community to the Internet. By mapping every school's connectivity and identifying gaps, through Giga we can aggregate demand and collaborate on the financing necessary to connect the disconnected.

Since then, we all experienced our first truly global crisis – one which proved that connectivity is a **must-have,** and that 'normal' was never good enough to begin with**.** This March marks one year since classrooms closed doors to an estimated **1.6 billion students** in over **190 countries**. And over **463 million** of these were children and young people without internet access at home, preventing them from accessing remote learning.

Despite and because of this, we saw remarkable progress in Giga. Ten partners and collaborators joined across Giga's pillars of work, helping us map over 800,000 schools in 30 countries and raise over US$15 million — and leverage an additional $400M — to catalyze our efforts. 17 governments joined and we're well on our way to connecting over 86,000 schools – and more than 25 million students and teachers.

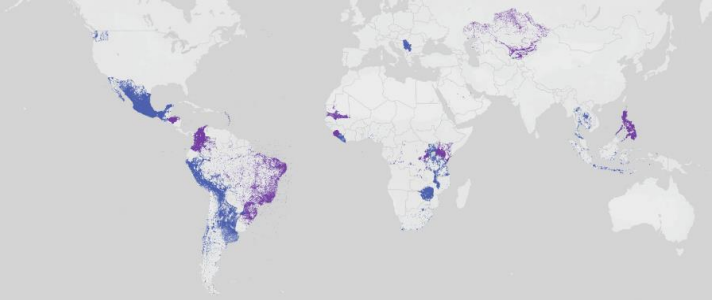
We are proud to present **"Connecting the Dots"** which summarizes the key accomplishments of Giga in 2020, and our visionary plan for 2021 – the achievement of which requires solidarity across technologies, sustainable models, conducive regulatory environments, and partnerships powered by the global community.

We thank our partners and governments that are already part of Giga and urge others to join us in this unprecedented effort to transform the world through education and technology.

Mr. Fayaz King
Deputy Executive Director,
Field Results and Innovation
UNICEF

Ms. Doreen Bogdan-Martin
Director, Telecommunication
Development Bureau
International Telecommunication Union

Executive Summary



As the COVID-19 pandemic unfolded globally in early 2020, Giga focused on extending immediate and accelerated support to a few priority countries.

In 2020, we mapped over 800,000 schools, welcomed 10 partners and developed work plans in 17 countries. Giga was highlighted as a *Key Way Forward toward Digital Transformation* in the UN Secretary-General's Roadmap for Digital Cooperation, and as a practical step toward extending connectivity in post-conflict, post-disaster settings by the UN Security Council.

Over 2021 and beyond, we plan to provide effective support to scale connectivity in these 17 countries, based on 5 key insights.

- The key areas of support needed to achieve universal connectivity in these 17 countries are:
  - **Financing** of US$453M of upfront capital expenditure for last-mile connectivity and US$305M of annual operational expenditures
  - Increasing **transparency and accountability**
  - Promoting healthy **market competition**
  - Taking advantage of **new technologies**
  - Developing **sustainable models** for innovative financing of long-term connectivity
- Ensuring conducive regulatory environment can accelerate connectivity expansion and foster market competition.
- Every country is different, but some are different in similar ways. We have put them into clusters to develop tailored support.
- Giga needs to work with a new and existing set of partners – from tech startups to venture capitalists to new technology providers while ensuring inclusion, affordability and sustainability.
- Connectivity needs to connect to something meaningful. Governments want to see the better education and digital learning systems to improve skills for their young people – and initiatives such as UNICEF's Reimagine Education provide us with a valuable partner in making those links.

Giga will continue to make progress on the mutually identified priorities with national governments described in the pages that follow. We invite you to join us in globally establishing meaningful connectivity and a sustainable system for digital learning.

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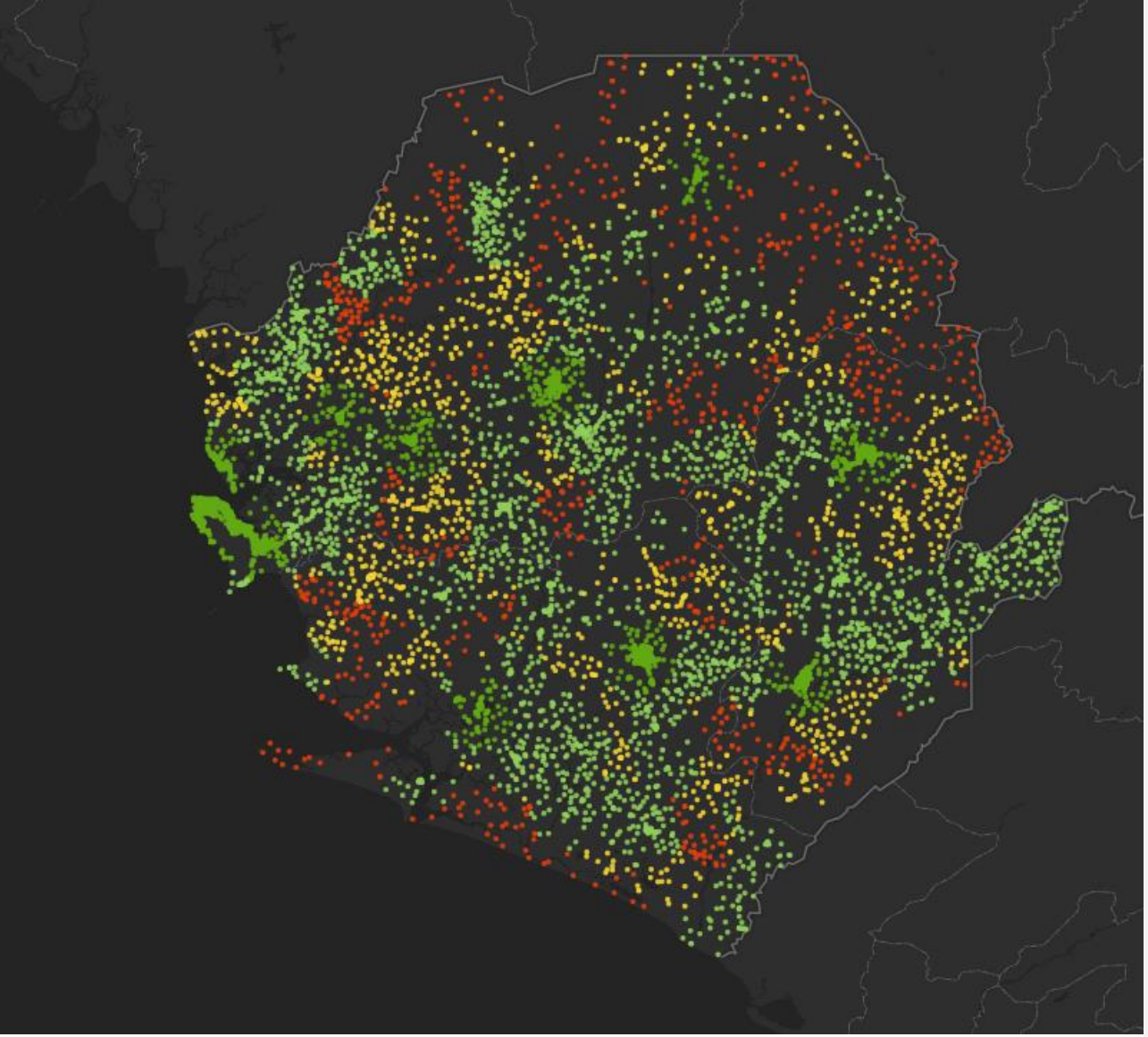

These dots are every school in Sierra Leone

- 2G coverage
- 3G coverage
- 4G coverage
- No Service

2020 Milestones

$15M+ raised in 2020

from global partners including Ericsson and Dubai Cares

800,000+ schools mapped

across 30 countries

First 100+ pilot schools connected

in Kenya with similar pilots planned in Rwanda and Kazakhstan in early 2021

10 partners joined

World Bank, EIB, IsDB, ADB, and AIIB, GSMA, Liquid Telecom, NIC.br, Ericsson

17 countries joined

to connect over 86,000 schools and more than 25.8 million students and teachers

$400M+ funding mobilized

to governments and UNICEF Country Offices to accelerate connectivity

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INTRODUCTION

Here we present Giga's work in 2020 and strategic plans for 2021 and beyond for these 17 countries:

Kyrgyzstan, Kenya, Niger, Rwanda, Sierra Leone, Zimbabwe, El Salvador, Honduras, and 9 member states of the Organisation of the Eastern Caribbean States (Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines).

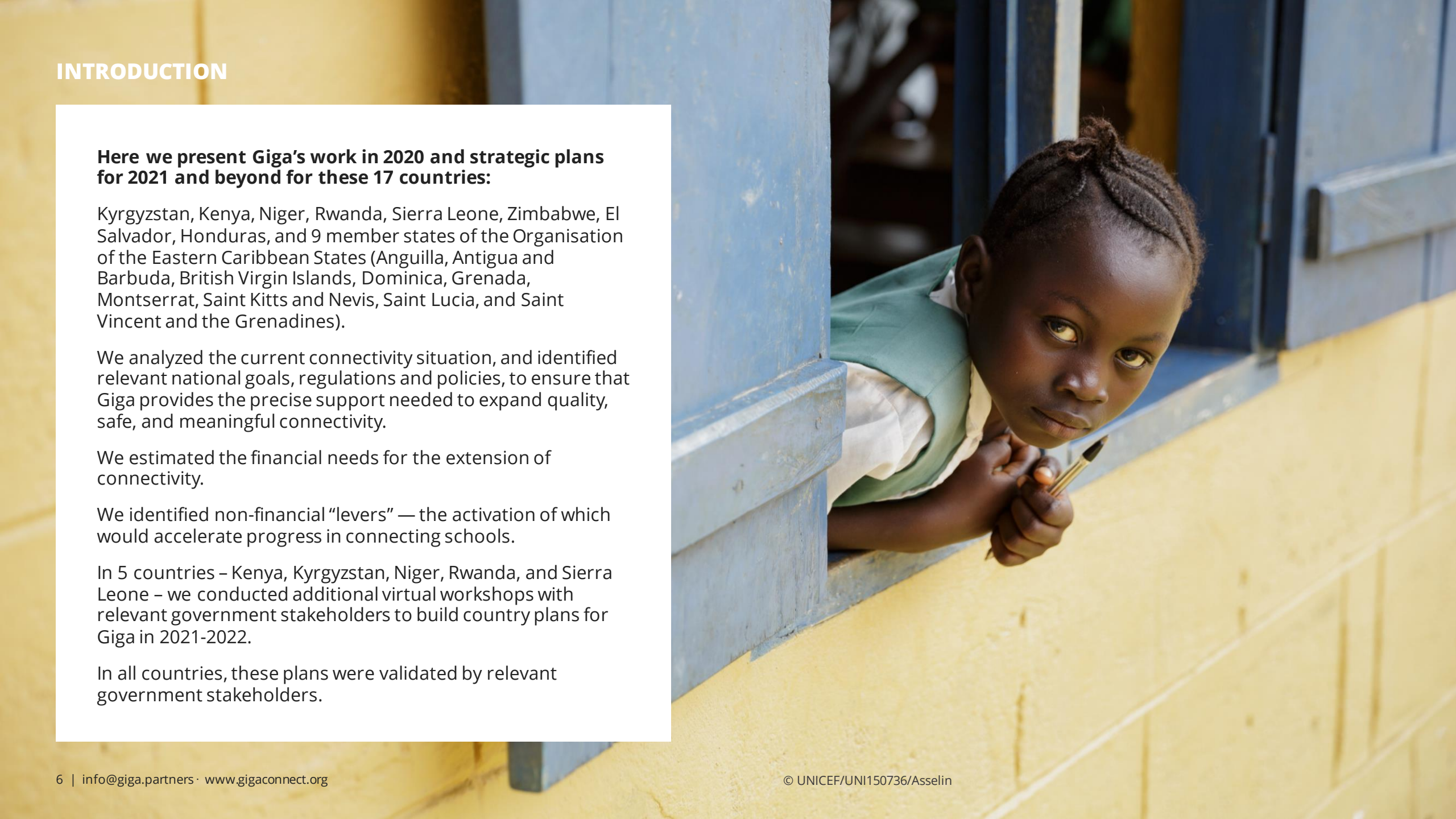
We analyzed the current connectivity situation, and identified relevant national goals, regulations and policies, to ensure that Giga provides the precise support needed to expand quality, safe, and meaningful connectivity.

We estimated the financial needs for the extension of connectivity.

We identified non-financial "levers" — the activation of which would accelerate progress in connecting schools.

In 5 countries – Kenya, Kyrgyzstan, Niger, Rwanda, and Sierra Leone – we conducted additional virtual workshops with relevant government stakeholders to build country plans for Giga in 2021-2022.

In all countries, these plans were validated by relevant government stakeholders.



01

Critical Insights

We identified and gathered key insights in 5 areas which have shaped Giga's work plans for and with each country.

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CRITICAL INSIGHTS

Levers for Connectivity

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A Lever Example: CapEx And OpEx

CapEx: US**$454m*** in upfront capital expenditure is needed for last-mile connectivity in these 17 countries. This includes only last-mile costs (e.g. receivers, routers, repeaters, last-mile fiber) and not the high costs for new national backhaul infrastructure such as a fiber.

OpEx: US**$1.53b*** is needed in these 17 countries for operating expenses over the next 5 years to provide quality service to all 86,000 schools.

In this case, costs for last-mile CapEx can be reduced by increasing investment in national broadband infrastructure. Costs for OpEx can be reduced by working with providers, providing cheaper data to them, creating incentives for lower costs for certain services and schools, and more.

Both CapEx and OpEx have “levers” that can be pulled, and if done correctly, can reduce the total costs for a country, or for the entire project.

**These are only pre-feasibility estimates developed at a high level. We plan to conduct feasibility studies to further refine our understanding of the financial needs and will continue to update the estimates as more accurate information becomes available.*

Categories of non-financial support or "levers" that are potentially high-impact actions and would help reduce capital and long-term costs, improve affordability, and bring connectivity to remote or hard-to-connect areas are:

Transparency and accountability	Increasing transparency in procurement and transactions with real-time monitoring to confirm service levels and report on current coverage
Competition	Supporting increased market competition through regulatory reform and support to small and medium local providers
New technologies and innovative solutions	Exploring new and innovative solutions for last- and middle-mile connectivity for remote and hard-to-reach areas while supporting enabling policy and regulatory environments
Sustainability	Developing innovative models for financing ongoing internet service for schools

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CRITICAL INSIGHTS

Regulatory Impact

Some regulatory areas with potential for improving conditions for connectivity are:

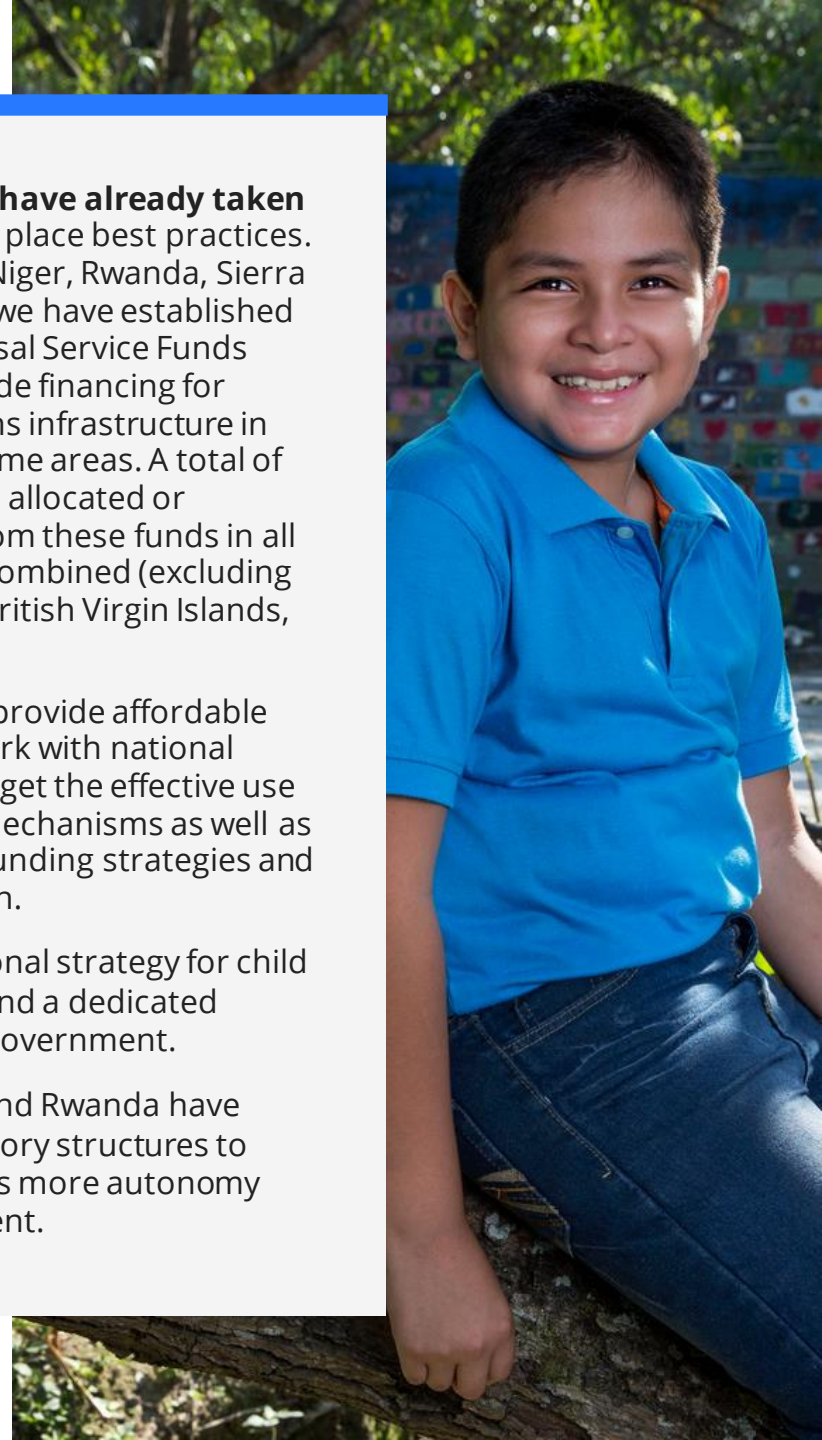
1. Leveraging public funding mechanisms for connectivity such as the establishment and use of Universal Service Funds (USFs), and promoting their utilization, potentially for funding school connectivity.
2. Improving competitiveness of the ICT sector by encouraging measures such as ease of market entry, transparency of spectrum access, effective spectrum management, infrastructure sharing/open access, and innovative regulation.
3. Establishing procurement mechanisms such as tender processes allowing for transparent equipment/bandwidth/service purchase and use of blockchain for the tendering process.
4. Establishing child online protection policies and related measures - having a national strategy in place, creating a responsible agency, and establishing non-discriminatory inclusive use policy.
5. Improving policy and laws on data protection and privacy.

Several countries have already taken a lead in putting in place best practices. Honduras, Kenya, Niger, Rwanda, Sierra Leone and Zimbabwe have established operational Universal Service Funds (USFs), which provide financing for telecommunications infrastructure in remote or low-income areas. A total of US$187M has been allocated or disbursed so far from these funds in all priority countries combined (excluding Anguilla, Antigua, British Virgin Islands, and Montserrat).

In Giga's efforts to provide affordable internet, we will work with national counterparts to target the effective use of public funding mechanisms as well as help in defining a funding strategies and increased utilization.

Rwanda has a national strategy for child online protection and a dedicated agency within the government.

Honduras, Kenya and Rwanda have established regulatory structures to allow ICT regulators more autonomy from the government.



CRITICAL INSIGHTS

Tailored Approach

We have grouped countries into three cohorts: 'Emerging' are provided the broadest support in all four focus areas, while 'Advanced' are provided tailor-made support to enhance existing national efforts, and support for 'Established' falls in between.

Status of the country's school connectivity strategy		EMERGING	ESTABLISHED	ADVANCED
Type		End-to-end	Selected	Adapted
	Map	**Mapping enables formal planning** - broad planning and monitoring	**Mapping fills knowledge gaps** - planning and monitoring focus	**Mapping augments existing tools** -ongoing real-time monitoring focus
	Connect	**Holistic support for creating a connectivity roadmap** - helping shape enabling regulatory conditions, providing knowledge and insights, and identifying appropriate connectivity solutions according to each country's reality	**Targeted support** - helping optimize conditions and undertaking pilot projects ahead of wider rollout programs	**Limited support** - helping adapt appropriate solutions to existing conditions
	Finance	**Growing CAPEX and OPEX** - a focus on resource mobilization	**Topping up CAPEX and OPEX** - a more efficient way to fill gaps	**Cheaper CAPEX but OPEX focus -** upgrades and ongoing cost focus
	Empower	**Linking to Reimagine Education, Generation Unlimited and Digital Public Goods Alliance to ensure meaningful connectivity -** near term focus on deploying world-class digital education and skilling solutions and scaling Open Source solutions in country. Longer term focus on building local ecosystems.		
Examples:		**Niger, Sierra Leone**	**Rwanda, Kenya**	**Kyrgyzstan**

CRITICAL INSIGHTS

Principles for Partnerships

Giga will work with a new and existing set of partners – from tech start-ups to venture capitalists to connectivity providers, while making the case for a principled approach to ensure inclusion, affordability and sustainability. Giga and its partners will help achieve universal connectivity adhering to the **Principles of Digital Development.**

Inclusion: Disadvantaged groups such as girls, rural populations, persons with disabilities, ethnic minorities, refugees, forcibly displaced persons and out-of-school children, are often left out of solution development. The poorest schools are almost always the least connected. This has to change.

Affordability: Connectivity is not a luxury service and needs to be cheaper to be affordable by all. Giga is focusing on identifying financing modalities that could support reduction of upfront costs and create an environment for lower service costs.

Sustainability: Solutions cannot connect a school for one year and then vanish. Giga works to create investment opportunities that can provide returns over multiple years thus ensuring continuity of quality and affordable connectivity.

CRITICAL INSIGHTS

Collaboration with Other Platforms

Access to internet connectivity is simply a system enabler. In order to meaningfully connect schools and communities, related challenges such as sufficient devices, proper teacher training and vetted, relevant, high quality educational content need to be addressed.

Giga collaborates closely with global actors that are key to ensuring meaningful connectivity. Giga works with UNICEF's **Reimagine Education** initiative aiming to radically scale up digital learning solutions for the most marginalized children and young people.

Giga links with **Generation Unlimited**, a global multi-sector partnership, to ensure that the largest generation of young people in history is prepared for the transition to work and engaged citizenship; and with **Generation Connect**, an ITU led initiative to engage global youth as equal partners of today's digital change.

The **Digital Public Goods Alliance** is a critical partner in developing and scaling the Open Source digital solutions that can be used once connectivity is established.

Giga is not only noted as a way to implement the **UN Secretary-General's Roadmap for Digital Cooperation**, we also work with all the stakeholders involved in advancing the 8 action areas identified and a safer, more equitable digital world.

The **Broadband Commission for Sustainable Development** offers another platform for Giga through the working groups on School Connectivity and Digital Learning. The outcomes of Giga's work led to the production of the report on The Digital Transformation of Education: Connecting Schools, Empowering Learners.

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02

Looking Ahead

LOOKING AHEAD

Over 2021, Giga will map more than a million schools, and connect up to 1000 schools* in each of the priority countries.

Giga will continue to make progress in 2021 and beyond. We will:

- map over one million schools across the world
- conduct in-depth feasibility studies to further refine cost estimates
- connect up to 1000 schools* as part of Giga Accelerate in each priority country
- explore approaches for sustainability and community access
- set up an Interim Advisory Group for global Giga governance

LOOKING AHEAD

For countries in an early stage, we will continue to identify precise connectivity needs through mapping **over a million schools** on our global platform – Project Connect.

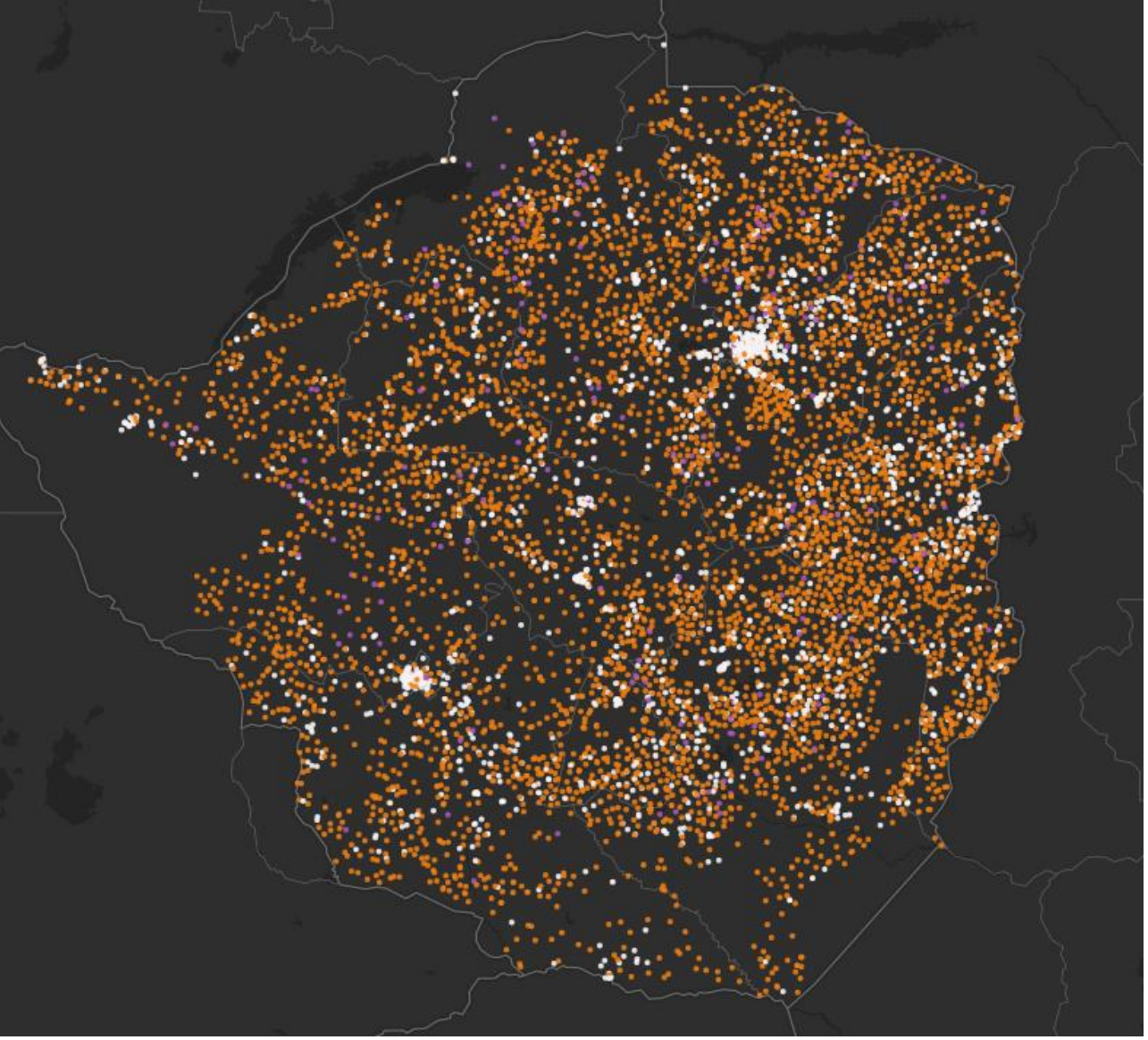
In each of our priority countries, we will **connect** up to **1000 schools** under Giga Accelerate to pilot technology and partnerships, and **test models and approaches** for extending connectivity to the community while reducing the cost burden of ongoing connectivity service on schools.

We will conduct further in-depth **feasibility studies** to further refine our CapEx and OpEx estimates.

Giga will constitute an **Interim Advisory Group** which will support a Board and other effective governance structures for Giga, enabling Giga to support large capital deployments and engage all key stakeholders across the UN, government, and private sector. This interim body will guide the design of Giga until more permanent governance structures are in place.

Giga will continue to further strengthen **local ownership** and ensuring sustainability with national and regional steering committees chaired by the host country governments.

We look forward to realizing our plans with our partners and supporters in 2021! If you would like to join us, reach us at info@giga.partners or through our website www.gigaconnect.org.



These dots are every school in Zimbabwe

- with Internet
- no Internet
- no data

LOOKING AHEAD

Tools for Connectivity

Project Connect

Using high-resolution satellite imagery and applying Deep Learning techniques, Project Connect aims to map real-time connectivity of every school in the world. This map, hosted on an open data platform, will serve as a foundation to work with governments and service providers to connect every school to the internet and eliminate the digital divide. To date, over 800,000 schools in 30 countries have been mapped and are viewable live on projectconnect.world.

Supporting Tools: Last Mile Connectivity Toolkit and ITU Broadband Maps

The Last-Mile Internet Connectivity Toolkit aims to drive new collaborative strategies to extend connectivity to those at the bottom of the social pyramid, and to enable key stakeholders to take a more holistic approach towards broadband.

The ITU Broadband Infrastructure Maps provide a global data platform for policy makers, regulators and industries to connect the unconnected. By layering school data from Project Connect with ITU connectivity maps, Giga has been able to show the schools that are without mobile coverage and their distance to connectivity nodes, as well as to estimate the costs of extending connectivity to disconnected schools.

03

Country Analyses and Plans

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COUNTRY ANALYSES AND PLANS

El Salvador

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$34M of CapEx funding and $15M of annual OpEx funding will enable El Salvador to connect 3,893 schools

This investment will bring 0.84 million students and teachers online and bring connectivity to 2.7 million community members who live locally, potentially enabling up to 1.4 billion USD in GDP (2.4%) growth.

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: COATL; Analysis based on Giga mapping and modelling data, 2020

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“Innovation is one of the fundamental pillars to move a country and its people forward, we are obliged to reduce the digital divide, improve services and join industry 4.0, we will work tirelessly to achieve it.”

VLADIMIR HANDAL
Secretary of Innovation, El Salvador

Source: @Vladimirhandal twitter
Original: “La innovación es uno de los pilares fundamentales para sacar adelante un país y su gente, estamos obligados a reducir la brecha digital, mejorar los servicios e incorporarnos a la industria 4.0, trabajaremos incansablemente por lograrlo."

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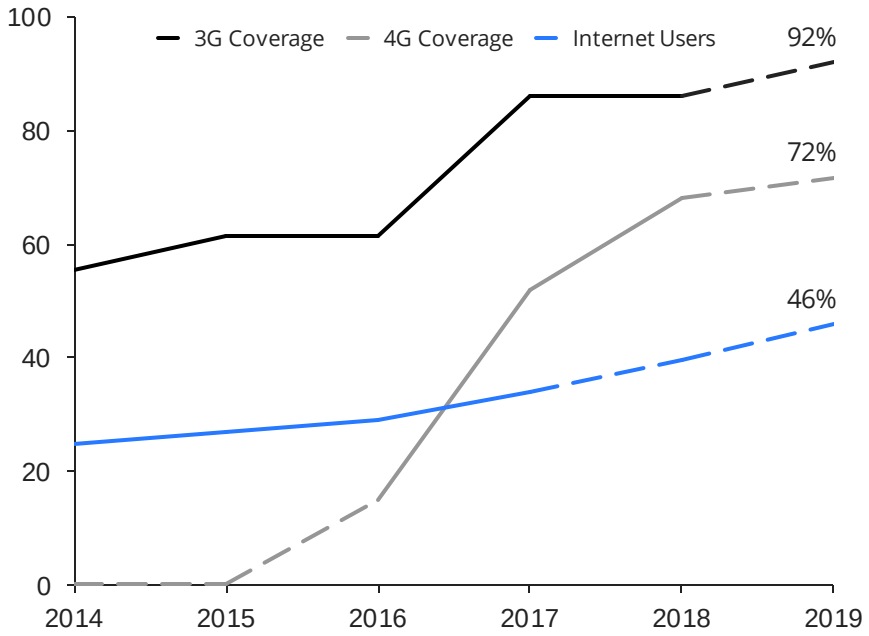
El Salvador has significantly expanded mobile connectivity, and has policies in place to promote future broadband expansion

Both 3G and 4G coverage have expanded rapidly since 2015, leading to greater usage. Fixed broadband uptake remains low.

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



El Salvador has been working to expand connectivity and integrate ICT in schools since 2009, and continues to make growing the digital economy a national priority through the 2020 Digital Agenda.

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

- **National Digital Agenda 2020-2030:** Seeks to create a digital economy that supports El Salvador to achieve greater economic growth and boost its standing in the Global Competitive Index (currently 103 of 141). The 4 axes include: Digital Government, Digital Identity, Modernization of the State, and Innovation, Education and Competitiveness. Under the education axes, El Salvador aims to invest in middle and last mile infrastructure to connect the entire country by 2024, expand digital literacy, and focus on equitable digital inclusion across all communities
- **FOMILENIO II 2015-2020:** a US$365M investment compact in partnership with USAID's Millennium Challenge Corporation (MCC) to enhance logistical infrastructure, improve the investment climate and build human capital. Under the human capital pillar, funds have been used to invest in school infrastructure, education curriculum, and teacher training, including investment towards the One Girl, One Boy, One Computer strategy
- **One Girl, One Boy, One Computer:** Aimed to equip pupils with relevant skills needed in today's digital world through the distribution of devices in schools. To date 119,504 devices have been distributed, with devices in 98.7% schools and additional investment on digital content, teacher training, and electricity supply

Source: ITU (2020) World Telecommunication/ICT Indicators Database; National Digital Agenda 2020-2030, One Girl, One Boy, One Computer (2019) policy report, FOMELENIO II website

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Fiber networks and 3G coverage

	Mobile	Fixed
Subscriptions per 100 inhabitants	55	8
5-year CAGR	+41%	+11%

The Goal: National Coverage and Connectivity

Investments in the National Backbone have resulted in most communities covered by 3G and 4G, however, uptake remains low (55 mobile subscribers out of 100, and 8 fixed subscribers). El Salvador's plans aim to bridge this coverage gap, exploring opportunities to use TV White Space End Client Antennas + Wifi APs or Wifi Mesh Networks to achieve 100% coverage in the near term, and then increase connectivity and use.

Sources: ITU (2020) World Telecommunication/ICT Indicators Database; ITU Broadband Map, Dalberg analysis

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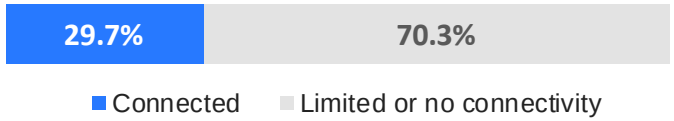
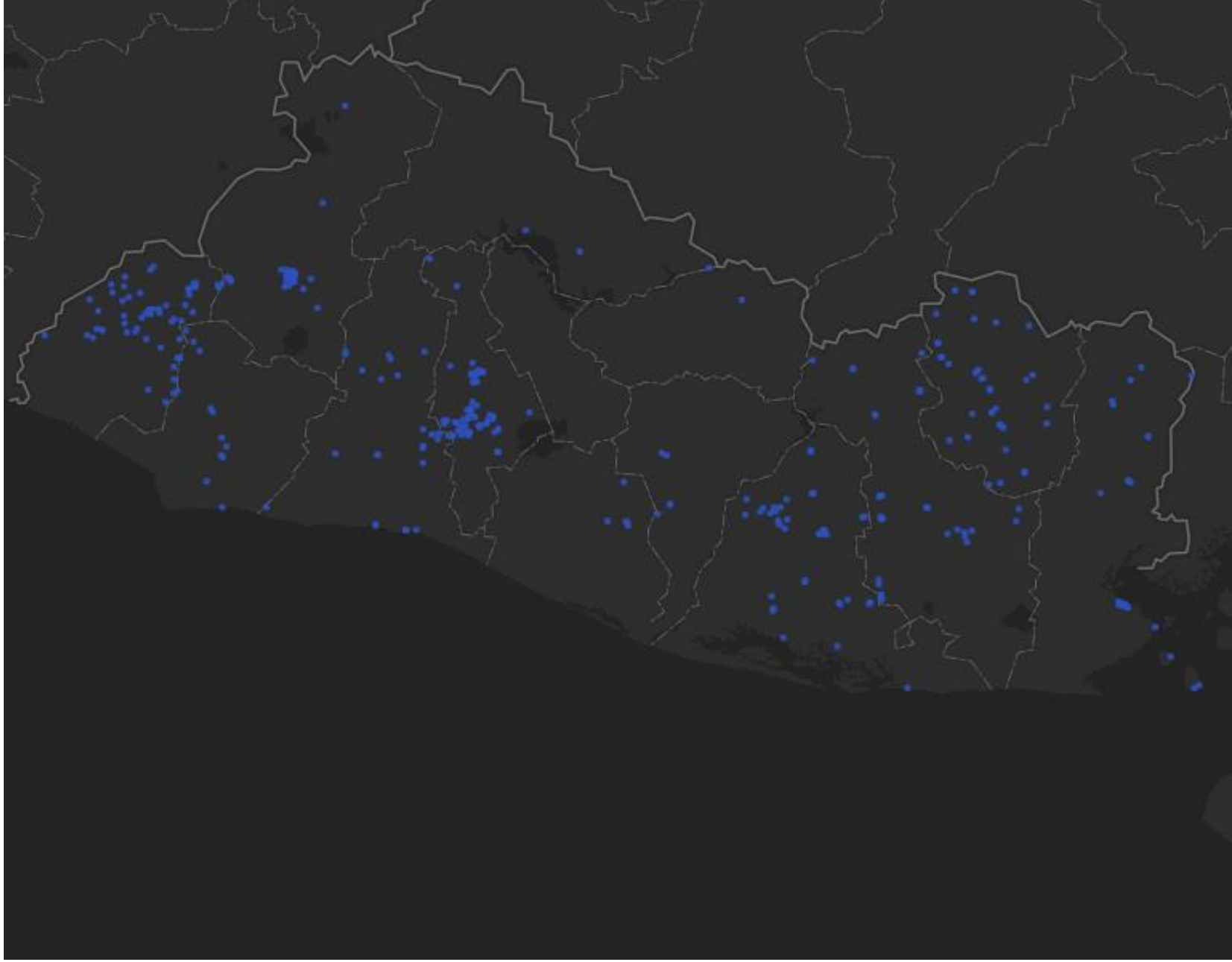
School Coverage and Connectivity

Total schools: 5,540



29.7% of schools are connected (1,647), however they have coverage below 10 Mbps, with the remaining schools unconnected. Full school location connectivity is currently being mapped.



School Data from Ministry of Education. Spatial location of schools from Open Street Maps. Giga is currently working with the government to map all schools and their connectivity status.

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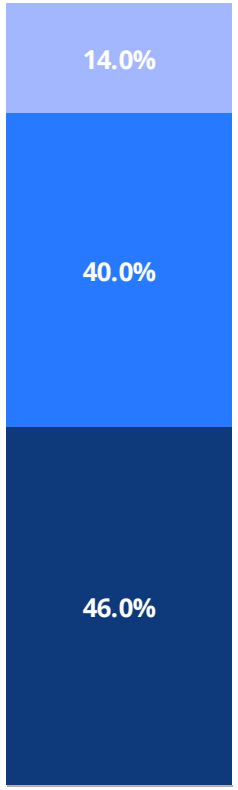
14% of El Salvadorians lack coverage and 40% face affordability, electrification and other challenges

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
14.0%	COVERAGE GAP **No mobile internet**	Increase coverage	+0.9M El Salvadorians not covered
40.0%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase digital literacy Increase electrification	100% of population electrified Reduce data cost by 2.97 USD/GB (-32%) Increase digital literacy through academic and vocational education
46.0%	CONNECTED **Active mobile internet use**	Boost El Salvador's competitiveness	Boost standing in the Global Competitive Index (currently 103 of 141)

Notes: Prices based on ITU Data-only mobile broadband basket 1.5GB, pro-rated down to 1GB for comparison against the Broadband Commissions 2% target
Sources: Dalberg analysis, ITU (2020) World Telecommunication/ICT Indicators Database; National Digital Agenda 2020-2030, One Girl, One Boy, One Computer (2019) policy report, FOMELENIO II website

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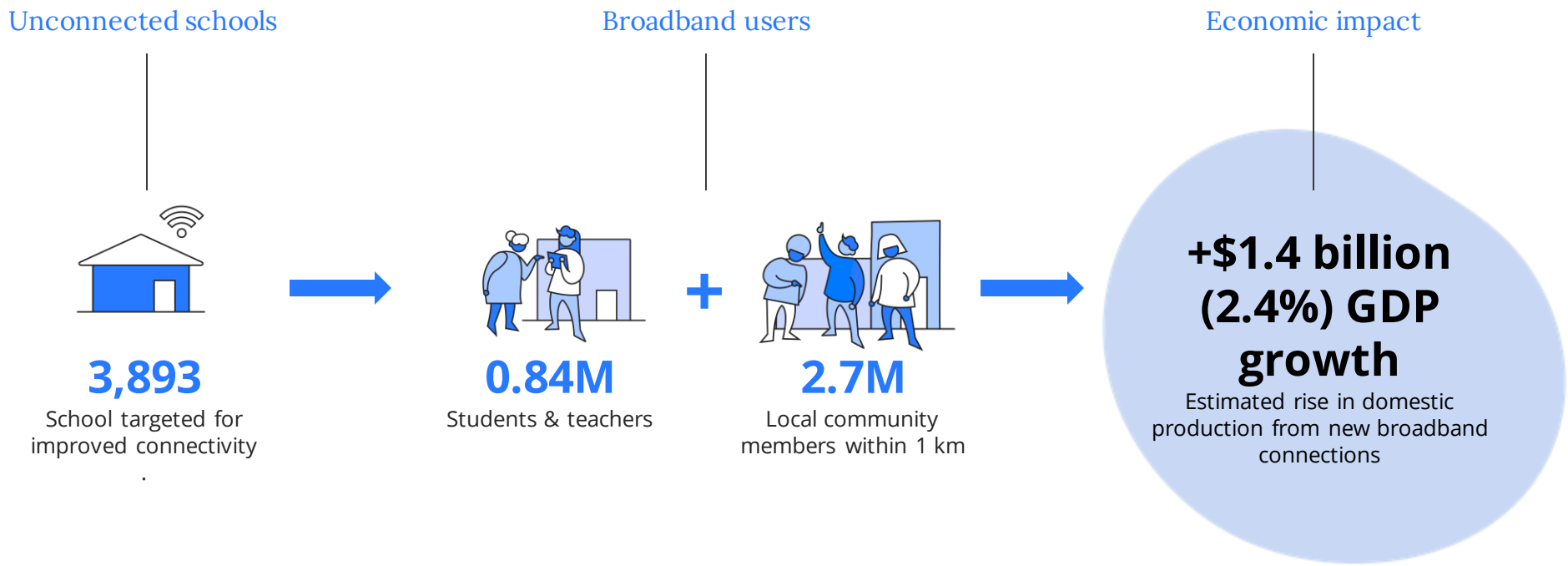
Targeted financing for connecting 3,893 schools can create GDP growth of over $1.4 billion

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 $34M of upfront capital expenditure and up to $15M 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: 3,983)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 49% Fiber, 40% WISP, and 11% 4G

$34M Estimated total investment needed to reach 3,893 schools*

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

ONGOING ANNULAL FUNDING FOR REGULAR SERVICE FEES

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

$15M Potential service fees for 3,893 schools (Giga estimate)*

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

Notes: These high level estimates can be further refined as the workflow progresses and more mapping and specific cost data 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)
Source: COATL; Analysis based on Giga Mapping/Modelling Data, 2020.

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Giga has already engaged significantly with the Government of El Salvador

Key Stakeholders: Ministry of ICT, Ministry of Education and Secretary of Innovation (within Office of the President), Superintendent of Electricity and ITC (SIGET), COATL, ETECSA

Giga engagement to date

- High level buy-in from Min of ICT, Education, SEGET and COATL
- Completion of an upfront assessment to align on opportunities and constraints

Giga actions to date

- Developed a proposed way forward on connecting 1,000 schools (with a focus on FOMILENIO investment communities) 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 GoES, Giga has identified the following activities to support the cost-effective connection of 3,893 schools

Use Project Connect mapping to update the location and connectivity data of GoES and refine business cases that size the investment opportunity

Refine school connectivity strategy based on benchmarks and set targets for connectivity

Provide technical assistance to address spectrum allocation, infrastructure sharing and mobile sector taxation to boost competitiveness and improve affordability

Provide technical assistance to address child online protection, intellectual property and data protection laws to protect consumers

Mobilize funding to connect schools outside of FOMILENIO II project scope that currently lack connectivity

Explore mechanisms to provide funding to the GoES PPP model, with COATL to possibly receive investments from development banks & other private funders

Provide support to develop local, regionally relevant digital public goods and identify gaps where global DPGs can be combined with local solutions, adapted and scaled

Support business model development and explore financing options to scale open data/content solutions, including local hosting

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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?	Partial
Responsible agency?	Yes
Non-discriminatory inclusive use policy?	Partial
Data sharing:[2]	
Data protection policy?	Partial
Privacy and data protection laws	Partial

ICT Regulatory Tracker[3]

Sector strategies:	
Generation of ICT Regulation	G3
Overall	73/100
C1: Regulatory Authority	19/20
C2: Regulatory Mandate	15/22
C3: Regulatory Regime	14/30
C4: Competition Framework	26/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	No
Regulatory autonomy from the government	Yes
Clear planning and licensing process?[8]	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?[8]	No
Wireless Operators Market HHI[4]	2596
Fixed Broadband Operator Market HHI[4]	3686

Taxation

Services	
VAT[5]	13%
Sector specific tax on internet services[5]	5%
ITA Participant[6]	Yes
ICT Equipment import duties[7]	0-7.5%
Ongoing regulatory/license fees[1]	Tbc

Universal Access

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

Strength
Neutral
Limitation

Notes: 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 ICTEye

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COUNTRY ANALYSES AND PLANS

Honduras

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HONDURAS

$85M of CapEx funding and $47M of annual OpEx funding will enable Honduras to connect an estimated 16,445 schools.

This investment will bring **1.8 million students and teachers** online and bring connectivity to **4.9 million community members** who live locally, potentially enabling up to 1.3 billion USD in GDP (2.3%) growth.

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

giga

HONDURAS

“We should all be aware that COVID-19 is going to change people's lives a lot, we don't know how, although one thing is known, and that is that life is going to become digital and is already becoming much more digital.”

EDUARDO ALMEIDA
Representative of the Inter-American Development Bank (IDB) in Honduras

Source: @Vladimirhandal twitter
Original: “La innovación es uno de los pilares fundamentales para sacar adelante un país y su gente, estamos obligados a reducir la brecha digital, mejorar los servicios e incorporarnos a la industria 4.0, trabajaremos incansablemente por lograrlo."

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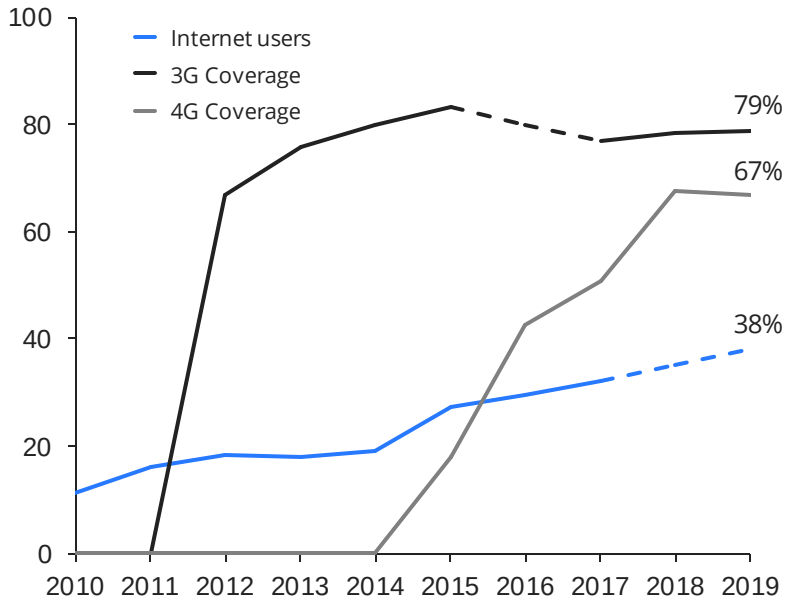
HONDURAS

Honduras has expanded 4G coverage and use, but ambitious national broadband goals set in 2013 have not yet been met

Network coverage has expanded, but a large gap remains. Broadband uptake is low.

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



Progress towards expanded coverage has lagged the targets set out in the National Digital Agenda 2014-2018. The GoH is redoubling efforts toward digitization in light of COVID-19

There has been some progress towards that goal, but recent education policies and initiatives around COVID-19 have emphasised the need to progress more quickly:

- National Digital Agenda 2014-2018: aims to reduce the digital divide, promote efficient government, and develop a digital economy in line with the Honduras Vision 2010-2038[1]. The strategy contains four strategic axes: (1) internet penetration through equity in access; (2) digital government initiatives; (3) ICT training and education at all levels; and (4) legislative and institutional framework for ICT development
- Strategic Plan for the Education Sector 2018-2030: aims to equip Honduran learners with equitable, quality education that allows them to effectively participate in a modern economy. It acknowledges the need to expand internet access (and electrification to support connectivity), teacher training, and ultimately student digital literacy efforts
- We want you studying at home – COVID-19 policy: aims to enable Honduran learners to study at home while classes are suspended. Utilizing virtual classes and interactive workbooks using primarily mobile devices. Additional content will be recorded and broadcast on the radio and will then be available for download on virtual portals
- Legislative Decree 60-2020: ensures use of the internet for educational purposes will be free for the current school year and during specific emergency circumstances such as COVID-19 for children, young people and other apprentices, as well as teachers from the public sector.

* Country Vision 2010-2038: aims to improve Honduras' economy and standing in the Global Competitive Index by reducing poverty, improving the democratic process, ensuring safety, increasing employment, protecting natural resources, creative more efficient governance including through the introduction of broader digitization initiatives.
Source: National Digital Agenda 2014-2018, Strategic Plan for the Education Sector 2018-2030, We want you studying at home – COVID-19 policy; ITU (2020) World Telecommunication/ICT Indicators Database

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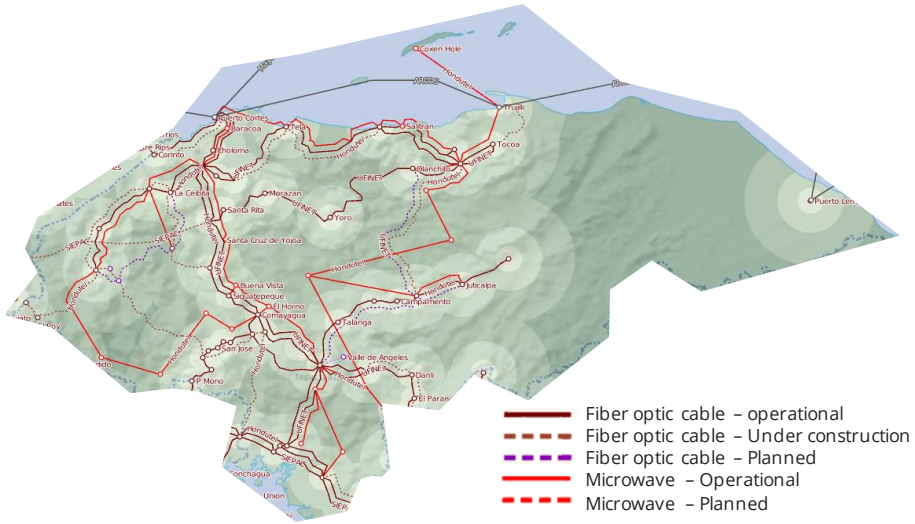
HONDURAS

National fiber network



	Mobile	Fixed
Subscriptions per 100 inhabitants	28	4
5-year CAGR	+13%	+18%

The Goal: National Coverage and Connectivity

Honduras has added to its national fiber backbone to just over 2,000 km, with 70% of the population living within a 25km range of the network. Although many communities are now covered by 4G, a large portion of the population remains unconnected (68%). Growth in mobile and fixed subscriptions lags network expansion.

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

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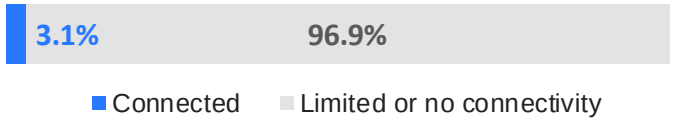
HONDURAS

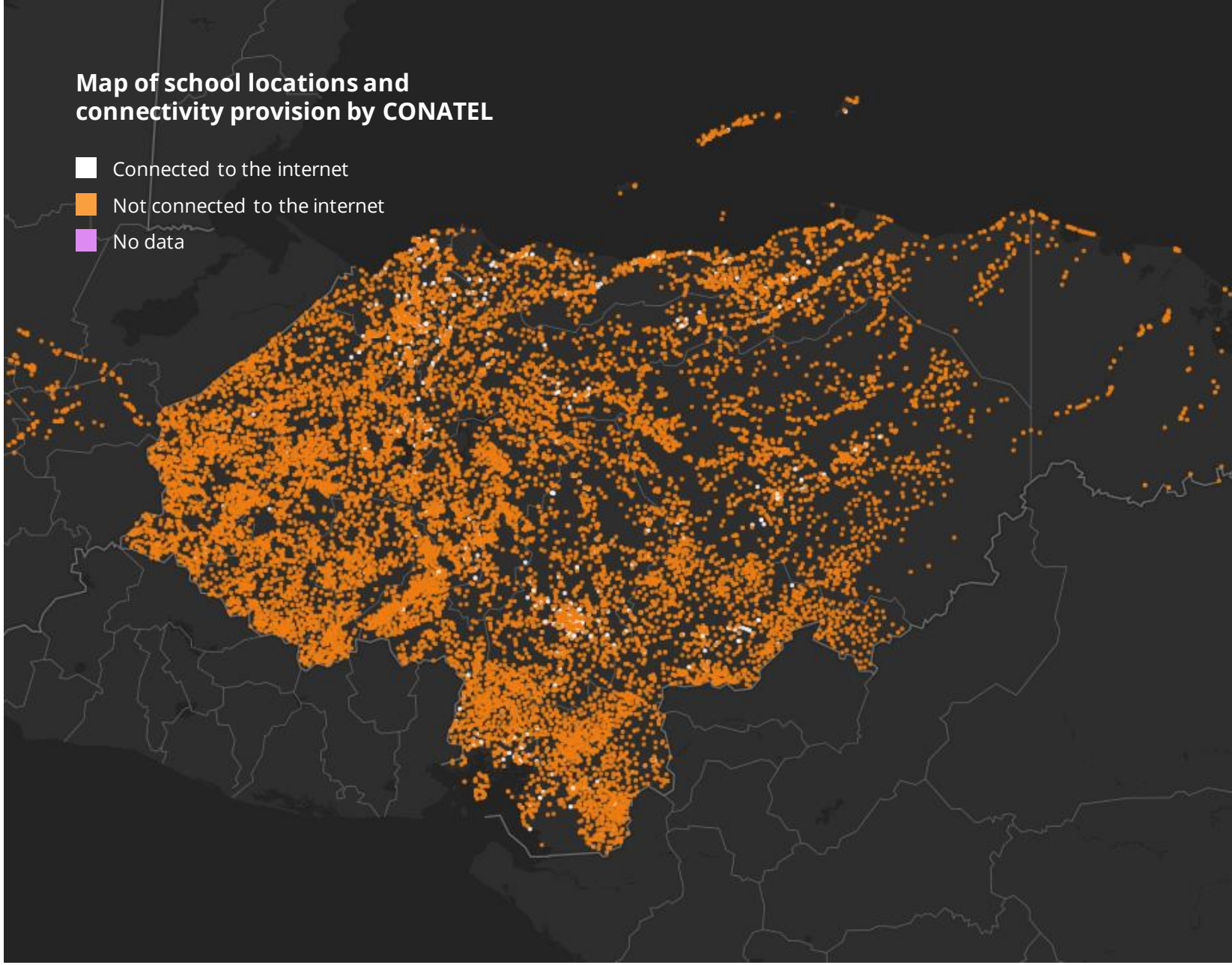
School Coverage and Connectivity

Total schools: 17,000



45% of Honduran schools lack access to electricity

Only 3% of all Honduran schools (545) are currently connected by CONATEL. While a few additional primary and secondary schools are connected to the internet through private support, all remaining 16,445 schools are in need of connectivity supported by the government.



Source: Dalberg analysis; UNESCO UIS data; ITU (2020) World Telecommunication/ICT Indicators Database; SEDUC, Proyecto Plan Maestro de Infraestructura

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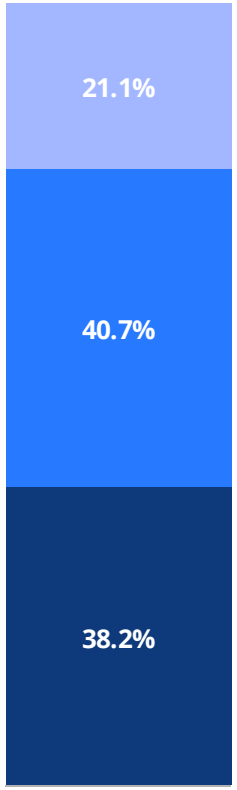
HONDURAS

21.1% of Hondurans lack coverage and 40.7% face affordability, electrification and other challenges

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
21.1%	COVERAGE GAP **No mobile internet**	Increase coverage	+2.1M Hondurans not covered by mobile broadband
40.7%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase digital literacy Increase electrification	Reduce data cost by 7.27 USD/GB (-65%) Increase digital literacy through academic and vocational education 2m Hondurans to gain access to power
38.2%	CONNECTED **Active mobile internet use**	Close the digital divide	Increase formal employment and associated incomes

Notes: Prices based on ITU Data-only mobile broadband basket 1.5GB, pro-rated down to 1GB for comparison against the Broadband Commissions 2% target
Sources: Dalberg analysis; ITU (2020) World Telecommunication/ICT Indicators Database; Broadband Commission; World Bank, Jobs Diagnostic Honduras; IDB; Encuesta Productividad y Formación de Recursos Humanos en Establecimientos (EPFRH, BID).

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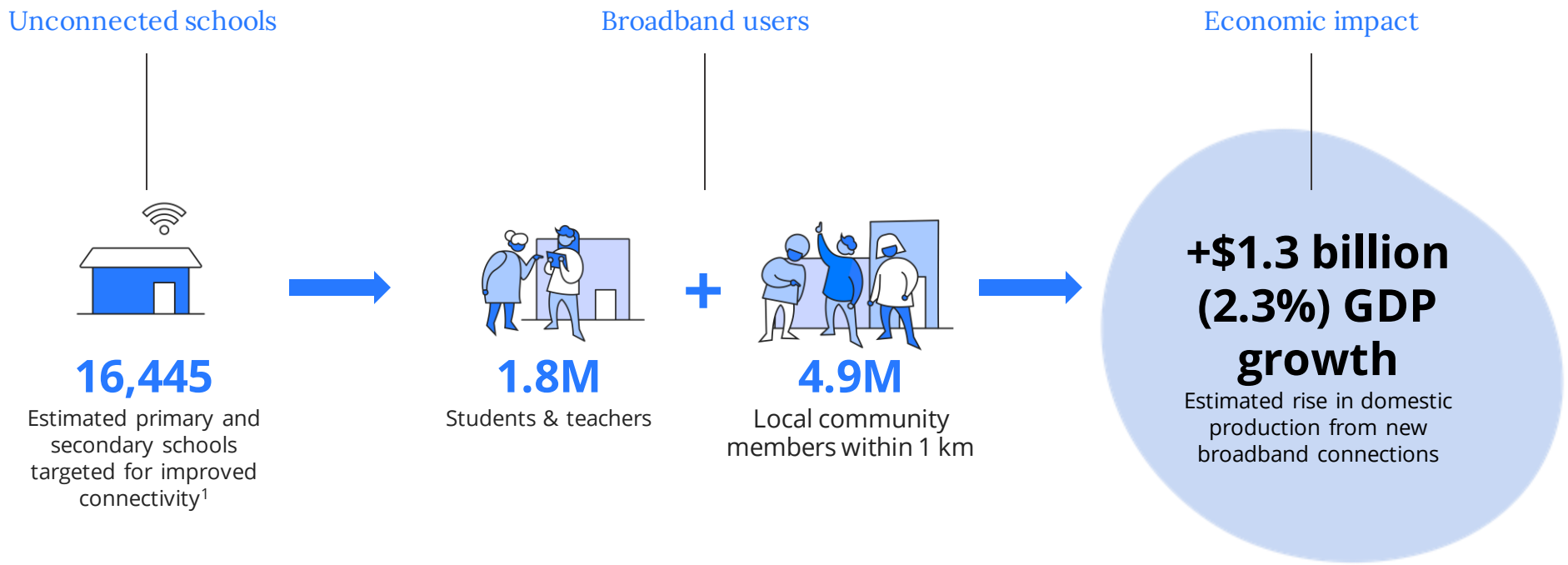
HONDURAS

Targeted financing for connecting 16,445 schools can create GDP growth of over $1.3 billion

Universal expansion to all schools provides a gateway to community connectivity



Notes: (1) Estimation uses national mobile penetration rates as a proxy for secondary school connectivity. Accurate numbers will be added pending Giga mapping. 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 . This estimate does not take into account the unique circumstances of COVID-19, and is based on stable economic growth in middle/lower income countries.

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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HONDURAS

School connectivity will require an estimated $85M of upfront capital expenditure and up to $47M 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: 16,445)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 39% Fiber, 29% WISP, and 32% 4G

$85M Estimated total investment needed to reach 16,445 schools*

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

ONGOING ANNULAL FUNDING FOR REGULAR SERVICE FEES

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

$47M[a] Potential service fees for 16,445 schools (Giga estimate)*

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

Of the Inter-American Development Bank's allocation to the improvement of the education sector in Honduras, $11M have been committed to connect 750 schools.[b]

These high level estimates can be further refined as the workflow progresses and more mapping and specific cost data 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) Based on existing Inter-American Development Bank funding allocation to connect 750 schools as part of their $60M education sector improvement project
Source: Dalberg Analysis based on Giga mapping and modelling data, 2020

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HONDURAS

Giga has started to engage with the Government of Honduras

Key Stakeholders: La Secretaría de Educación (SEDUC), Dirección General de Construcciones Escolares y Bienes Inmuebles (DGCE), Secretario de Gobierno Digital, Comisión Nacional de Telecomunicaciones (CONATEL)

Giga engagement to date

- High level buy in from Government including the establishing of a focal point in SEDUC and Secretario de Gobierno Digital
- Completion of an upfront assessment to align on opportunities and constraints
- Engagement with IDB to align on shared vision and objectives

HONDURAS

In partnership with the GoH, Giga has identified the following activities to support the cost-effective connection of 16,445 schools

Expand Project Connect mapping to identify connectivity vs coverage in order to articulate needs and refine the business case and investment opportunity

Use mapping to monitor real time connectivity and ensure project sustainability and accountability

Refine school connectivity strategy with the Government based on benchmarks and set targets for connectivity in the coming years

Survey the landscape of implementation options to identify appropriate last mile connectivity cases for schools

Provide technical assistance on the development of performance contracts/results-based financing impact bond models for connectivity that can become best practices in the sector

Prepare procurement lots with the Government for school connections to ISPs and MNOs

Strengthen the Honduran entrepreneurial ecosystem, to build a pipeline of locally developed digital public services and goods and identify solutions to scale in other Giga countries

Work with GoH to put in place processes to strengthen accountability and ensure good governance

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HONDURAS

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?	No
Non-discriminatory inclusive use policy?	No
Data Sharing:[2]	
Data protection policy?	No
Privacy and data protection laws	No

ICT Regulatory Tracker[3]

Sector strategies:	
Generation of ICT Regulation	G3
Overall	79/100
C1: Regulatory Authority	16/20
C2: Regulatory Mandate	19/22
C3: Regulatory Regime	24/30
C4: Competition Framework	20/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	Yes
Regulatory autonomy from the government[9]	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	No
No foreign investment restrictions?	No
Infrastructure sharing?[9]	Yes
Wireless Operators Market HHI[4]	5063
Fixed Broadband Operator Market HHI[4]	3347

Taxation

Services	
VAT[5]	15%
Sector specific tax on internet services[5]	0%
ITA Participant[6]	Yes
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 in 2019	16.7M
Contributions as % of revenue	1%
Other public financing mechanisms?	No
Fully utilized currently?	No
Fully active in the last 5 years?	Yes

Notes: 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 9) Latest ITU ICTEye

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COUNTRY ANALYSES AND PLANS

Kenya

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KENYA

$124M of CapEx funding and $67M of annual OpEx funding will enable Kenya to connect 23,300 public primary schools

This investment will bring **8.5 million students and teachers** online and bring connectivity to **12.8 million community members** who live locally, potentially enabling up to 3.3 billion USD in GDP (1.4%) growth.

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

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KENYA

“Broadband is expected to facilitate connections … that will help in transforming Kenyans’ lives regardless of their location and thus enable the societal and economic benefits of digital transformation to be realized.”

HON. JOE MUCHERU
EGH. Secretary, Kenya Ministry of ICT

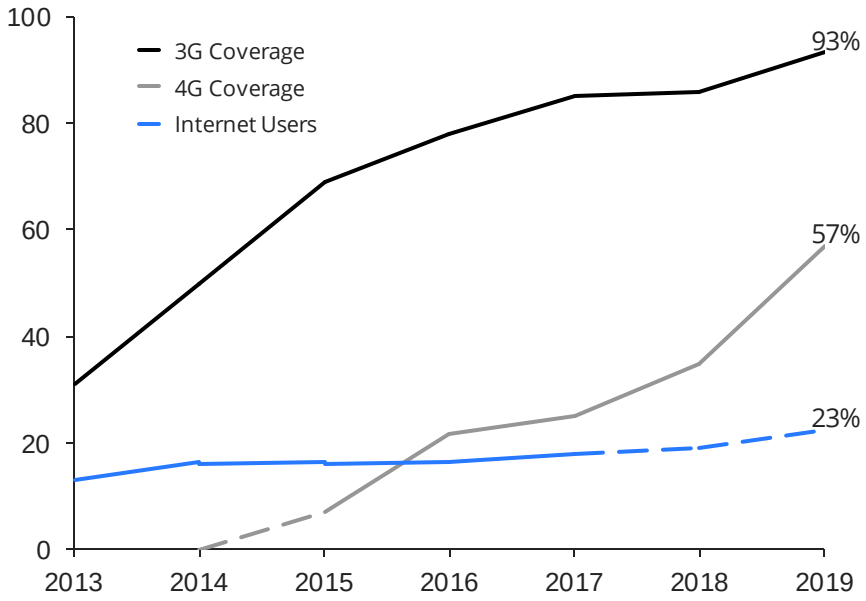
giga

KENYA

Kenya has significantly expanded mobile connectivity, and has policies in place to promote future broadband expansion

Mobile connectivity has expanded since 2013, with 57% of the population covered by 4G

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



The Government of Kenya is aiming to grow the digital economy with universal access to connectivity by 2023

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

- Kenya National Broadband Strategy 2018-2023: Aims to provide last mile infrastructure through fixed or wireless technology to achieve 95% national broadband coverage, with fixed infrastructure available in every ward by 2020. The target is to provide 2 MBPS in communities and 10 MBPS in high impact economic areas, schools and other essential public services by 2023
- Kenya Digital Economy Blueprint: Seeks to create a digital economy that supports Kenya in its aim to emerge from a low middle-income economy to an emerging markets/advanced economy. The 5 pillars include: Digital Government, Digital Business, Infrastructure, Innovation Driven Entrepreneurship, and Digital Skills and Values
- Kenya Basic Education Framework 2017: Outlines the competency-based curriculum strategy that Kenya will adopt across all levels of education. Digital Literacy is one of the strategic pillars within the framework
- Kenya Digital Literacy Programme – DigiSchool: Aims to equip pupils with relevant skills needed in today's digital world. To date 1,148,160 devices have been distributed to 21,232 schools with additional investment on digital content, teacher training, and electricity supply

Source: ITU (2020) World Telecommunication/ICT Indicators Database; Kenya National Broadband Strategy 2018-2023, Kenya Digital Economy Blueprint, ICT Authority Digischools webpage

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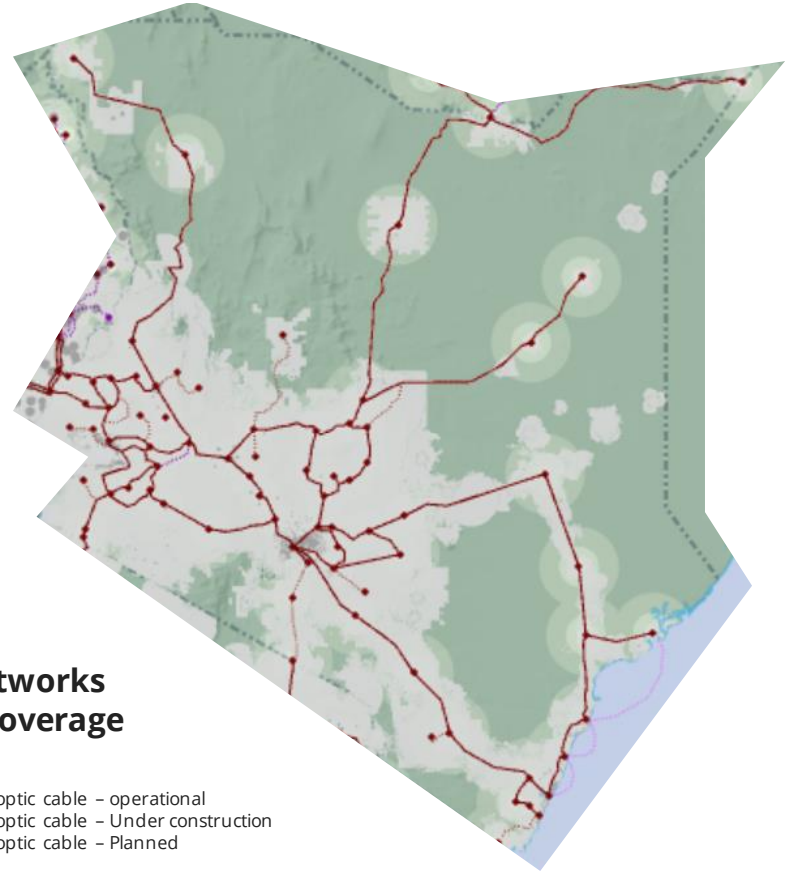
KENYA



Fiber networks and 4G coverage

	Mobile	Fixed
Subscriptions per 100 inhabitants	41	1
5-year CAGR	+36%	+34%

The Goal: National Coverage and Connectivity

GoK has made significant investments in the National Backbone, and most of the population is now covered. Remaining gaps are in low population density areas such as ASALs (arid and semi-arid lands), although new technology is beginning to bridge these gaps.

Note: 1) Broadband is defined as access to 4G or fiber networks. The Kenyan government has targeted reaching 94% of population with 3G coverage by 2020.
Source: ITU (2020) World Telecommunication/ICT Indicators Database; ITU Broadband Map, Dalberg analysis

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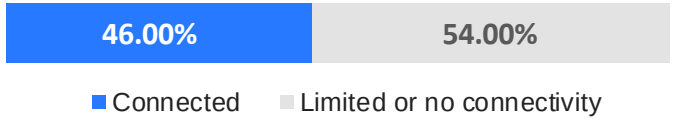
KENYA

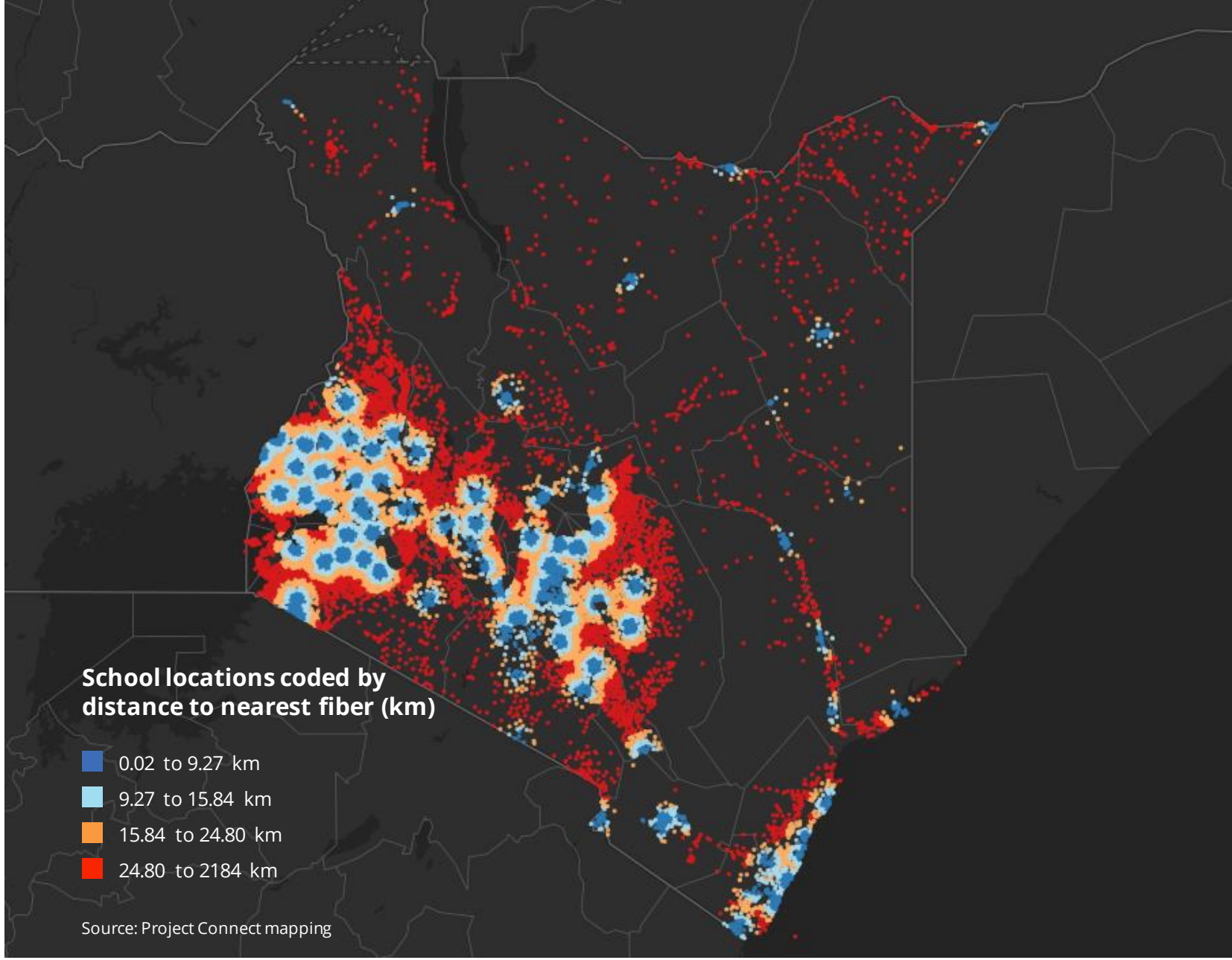
School Coverage and Connectivity

Total schools: 43,000



The National Broadband Strategy sets a goal of reaching 100% connectivity of all schools with 1GBPs by 2030, with 50% coverage of primary schools by 2022.

The Giga initiative will prioritize these public primary schools (23,300 out of 43,000 total schools).

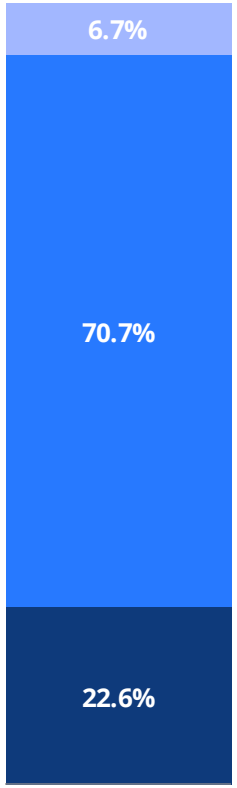


Source: ITU (2020) World Telecommunication/ICT Indicators Database; Giga Project Connect mapping

KENYA

6.7% of Kenyans lack coverage while 70.7% face affordability, electrification and other challenges

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
6.7%	COVERAGE GAP **No mobile internet**	Increase coverage	+3.5 million Kenyans not covered
70.7%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase digital literacy Increase electrification	43% cite affordability as barrier Digital literacy mainstreamed in the education system 75% of population electrified
22.6%	CONNECTED **Active mobile internet use**	Bridge the digital divide	$425m (13%) annual growth

Notes: Prices based on ITU Data-only mobile broadband basket 1.5GB, pro-rated down to 1GB for comparison against the Broadband Commissions 2% global recommendation. Note that Individuals in remote locations will likely spend a higher proportion due to lower income levels. 43% of mobile users aware of mobile internet who identified the following as the single most important barrier to using mobile internet.
Sources: Dalberg analysis; ITU (2020) World Telecommunication/ICT Indicators Database; Kenya National Broadband Strategy 2018-2023; GSMA, Hjort and Poulsen, Internet in Africa, 2019

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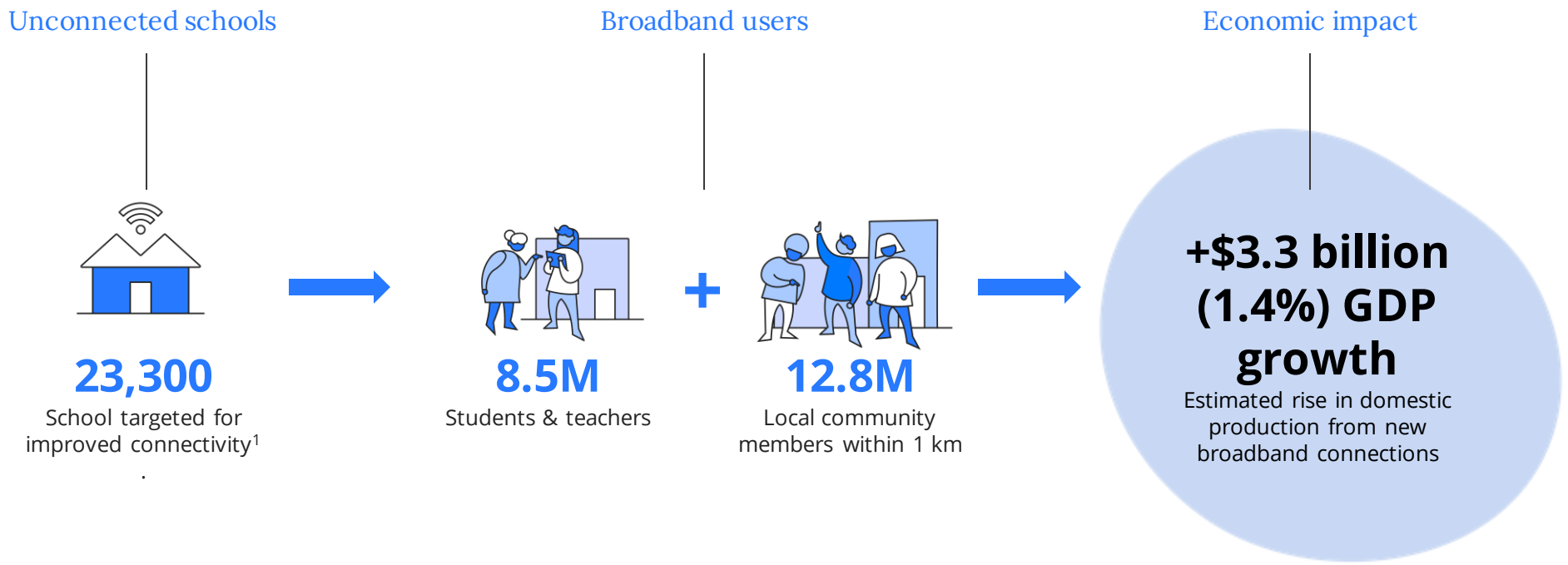
KENYA

Targeted financing for connecting 23,300 schools can create GDP growth of over $3.3 billion

Universal expansion to all schools provides a gateway to community connectivity



Note: 1) Number of Kenyan primary and secondary schools lack access to internet with speeds over 10Mbs. This is around half of the country's 43,000 schools. 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; Giga Project Connect 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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KENYA

School connectivity will require an estimated $124M of upfront capital expenditure and up to $67M 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: 23,300)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 32% Fiber, 25% WISP and 43% Satellite

$124M Estimated total investment needed to reach 23,300 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, maintenance and technical support fee:

$67M[a] Potential service fees for 23,300 schools (Giga estimate)*

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

Notes: These high level estimates can be further refined as the workflow progresses and more mapping and specific cost data is established
A) Pre-feasibility preliminary estimates based on Giga's ACTUAL model school bandwidth requirements and annual service fee estimates in Kenya
Source: Dalberg Analysis based on Giga Mapping/Modelling Data, 2020.

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KENYA

Giga has already engaged significantly with the Government of Kenya (GoK)

Key Stakeholders: Ministry of ICT, Kenya ICT Authority, Ministry of Education, Communications Authority of Kenya, and Kenya Institute of Curriculum Development

Giga engagement to date

- High level buy in from Ministry of ICT and Ministry of Education established and currently in the process of being formalized
- Set up a sub-committee on school mapping to coordinate efforts amongst different stakeholders including MoE, USAID, Kenyan National Examination Council
- Co-creation workshop to identify 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
- Engaged with Kenyan ministries to determine options for open-source software across tele-education, tele-health, tele-work, and financial services

THE VALUE OF GIGA

"Digital literacy is one of our strategic pillars in the Basic Education Curriculum Framework. We want young Kenyans to be able to access and acquire skills useful not only for solving real-life problems, but also so they can participate meaningfully and thrive in the digital economy – and working with Giga helps us achieve this."

Prof. George Magoha
Cabinet Secretary, Kenya Ministry of Education

KENYA

Rapid Regulatory Scan

Policies

Sector strategies:[1]	
Digital transformation/broadband strategy	Yes
Planned e-government roll out[9]	Yes
Digital education in strategy[10]	Yes
Child Online Protection:[2]	
National strategy/policy?	Yes
Responsible agency?	Yes
Non-discriminatory inclusive use policy?	No
Data Sharing:[2]	
Data protection policy?	Yes
Privacy and data protection laws	No

ICT Regulatory Tracker

Regulatory assessment:[3]	
Generation of ICT Regulation	G5
Overall	88/100
C1: Regulatory Authority	18/20
C2: Regulatory Mandate	22/22
C3: Regulatory Regime	21/30
C4: Competition Framework	27/28

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?	No
Infrastructure sharing?	Partial
Wireless Operators Market HHI[4]	4903
Fixed Broadband Operator Market HHI[4]	2602

Taxation

Services	
VAT[5]	16%
Sector specific tax on internet services[5]	15%
ITA Participant[6]	No
ICT Equipment import duties[7]	0-20%
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	21.7M
Contributions as % of revenue	0.2%
Other public financing mechanisms?	Yes
Fully utilized currently?	No
Fully active in the last 5 years?	Tbc

Strength
Neutral
Limitation

Notes: 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
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 9) http://www.zim.gov.zw/index.php/en/news-room/latest-news/228-sectors/367-ict,-e-government-innovations 10) Kenya Basic Education Framework 2017

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KENYA

In partnership with the GoK, Giga has identified several activities to support the cost-effective connection of 23,300 schools

Use Project Connect mapping to identify need and refine business cases that size the investment opportunity and monitor real time connectivity

Refine school connectivity strategy based on benchmarks and set targets for connectivity

Help address policy, regulatory and tax barriers (particularly around USF, spectrum allocation, infrastructure sharing, child protection, intellectual property, data protection laws, and excise taxation) to boost competitiveness and protect consumers

Commission feasibility studies on the inclusion of school connectivity under KENET

Mobilize funding to connect 23,300 primary schools that currently lack connectivity

Prepare procurement lots with the Government for school connectivity

Provide support to develop local, regionally relevant digital solutions, especially digital public goods (DPGs) and support open data platforms for education and youth development

Support business model development and explore financing options to scale open data/content solutions, including local hosting

Facilitate connections with broader UNICEF expertise and other initiatives on scaling digital textbooks and content

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COUNTRY ANALYSES AND PLANS

Kyrgyzstan

giga

KYRGYZSTAN

With $206k of CapEx funding and $210k of annual OpEx funding, Kyrgyzstan will achieve universal school connectivity and continue to pay for high quality connectivity at 740 schools.

This will improve access for over **440,000 students and teachers** and connect **860,000 community members** who live locally, enabling up to 274M USD in GDP growth. The investment to connect the final 20 mountainous schools will close an emerging digital divide.

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

giga

KYRGYZSTAN

“Digital technologies are now widely used all over the world. The information and communication capabilities existing in the country must correspond to modern realities. The successful implementation of digitalization requires highly qualified IT specialists who need to be trained. Along with this, the digitalization of the sphere of providing services to the population should be continued. This is one of the main ways for the country's development.”

RAVSHANBEK SABIROV
Vice Prime Minister of Kyrgyz Republic

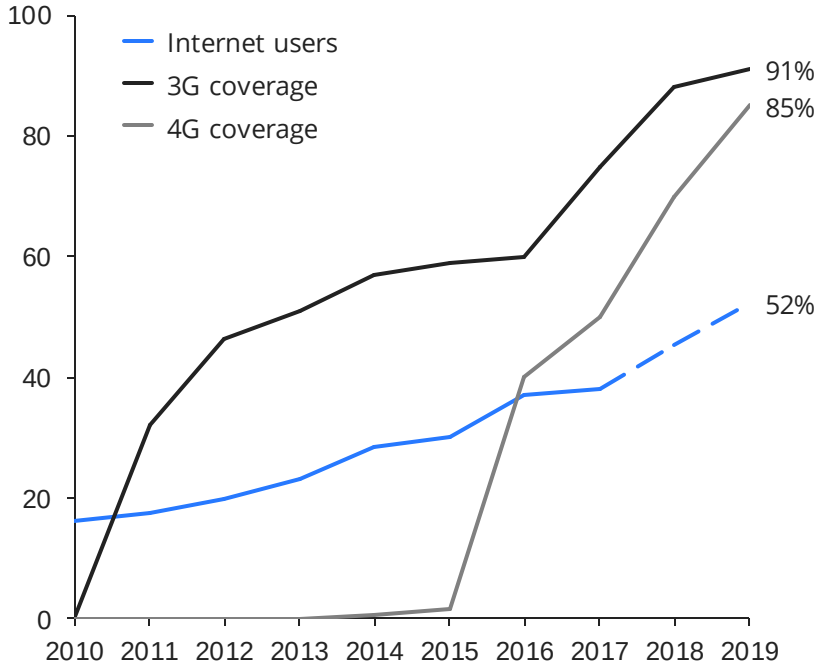
giga

KYRGYZSTAN

Kyrgyzstan has significantly expanded connectivity, with policies in place to promote usage beyond mobile

Mobile coverage has expanded rapidly, driving a steady increase in internet users

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



The Government of Kyrgyzstan aims to grow the digital economy and digital public services through universal broadband usage by 2023

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

- National Development Strategy 2040: Creation and development of digital ICT infrastructure, including broadband. A broadband network will be brought to each village. All social facilities (hospitals, ayil okmotu, post offices, etc.) will have high-speed Internet access
- Digital Kyrgyzstan 2019-2023: Among the six pillars of the national digital transformation strategy and roadmap is Digital Skills Development, including the introduction of ICT training at all levels of education and national digital content in local languages.
- Digital CASA – Smart Schools Program: Launched in 2016 and updated in 2020, the Ministry of Education and Science is developing digital skills in teachers and students, as well as creating domestic content and developing school ICT infrastructure.

Note: Internet users is based on a 2017 estimate by ITU. The annual growth rate in mobile subscriptions from 2018-19 was used as a proxy to estimate the growth in internet users since 2017
Source: Dalberg analysis; ITU (2020) World Telecommunication/ICT Indicators Database; National Development Strategy 2040, 2018; Digital Kyrgyzstan 2023 Smart Schools Program;

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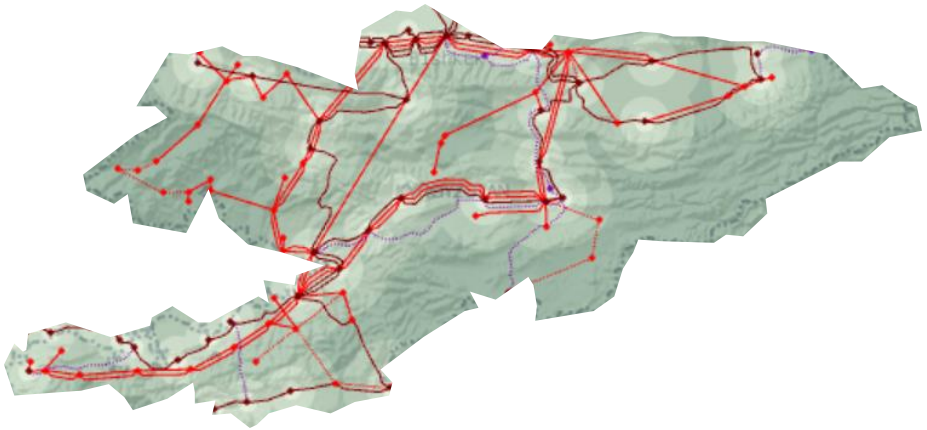
KYRGYZSTAN

Fiber networks and 4G coverage

Fiber optic cable – operational
Fiber optic cable – Under construction
Fiber optic cable – Planned
Microwave – Operational
Microwave – Planned



	Mobile	Fixed
Subscriptions per 100 inhabitants	123	4.2
5-year CAGR	+37%	+8%

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

The Goal: National Coverage and Connectivity

Kyrgyzstan's fiber backbone networks includes 5,418km of fiber optic cable. In addition, microwave backhaul is used extensively across the country. The government seeks to expand the network to enable broader uptake of fixed internet connections as well as expand the mobile network to the final unconnected areas in mountainous regions.

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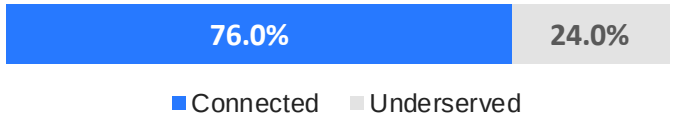
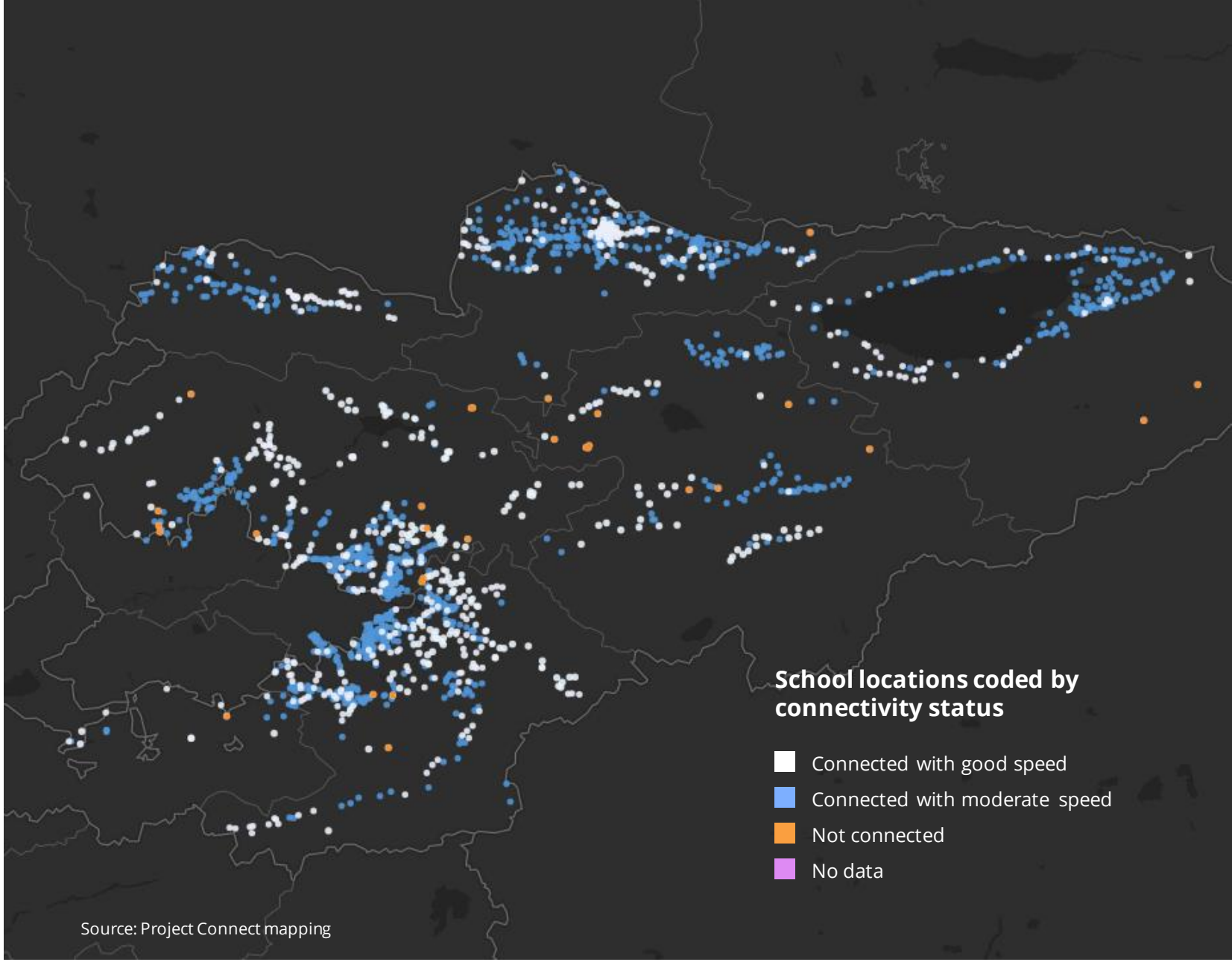
KYRGYZSTAN

School Coverage and Connectivity

Total schools: 2,150



With Giga support, Kyrgyzstan has provided basic broadband to 99% of its total 2150 schools, with only 31 mountainous schools that remain unconnected. However, the Ministry of Education and Science (MoES) has released a tender for connecting 11 of the unconnected mountainous schools as well as expanding the national connectivity program to the final 720 schools that are connected through means other than fiber. Many of these schools pay more for slower, less reliable coverage and some may be disconnected altogether.



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KYRGYZSTAN

58% Kyrgyz lack fixed broadband coverage. Computer access and quality of service are key barriers.

THE MOBILE INTERNET COVERAGE AND USAGE GAP

MOBILE BROADBAND CONNECTIVITY ACCESS		FIXED BROADBAND CONNECTIVITY ACCESS		NEEDS	GOALS
9.0%	COVERAGE GAP **No mobile broadband internet**	58.0%	COVERAGE GAP **No mobile broadband internet**	Increase coverage	580k Kyrgyz lack mobile coverage
12.4%	USAGE GAP **Covered by broadband but not connected**	36.4%	USAGE GAP **Covered by broadband but not connected**	Increase computer access Increase quality of service	+4.5M with computer access Increase speed by 7 Mbps (current ave. 16 Mbps)
78.6%	CONNECTED **Active broadband internet use**	5.6%	CONNECTED **Active broadband internet use**	Transform the digital economy	Increase investment in local technology companies and attract foreign partners

Notes: Broadband is defined as 3G, 4G and fixed internet subscriptions over 128kbps. Mobile internet penetration uses data from the State Communication Agency (2018). Fixed internet coverage is defined here as population within 10km of fiber transmission network. Sources: ITU (2020) World Telecommunication/ICT Indicators Database (1) ITU Broadband Transmission Indicators (2019); (2) UNICEF, MICS 2018, (3) Freedom House, Kyrgyzstan (2019); (4) EBRD, Kyrgyz Country Diagnostic 2019; National Digital Transformation Concept "Digital Kyrgyzstan"

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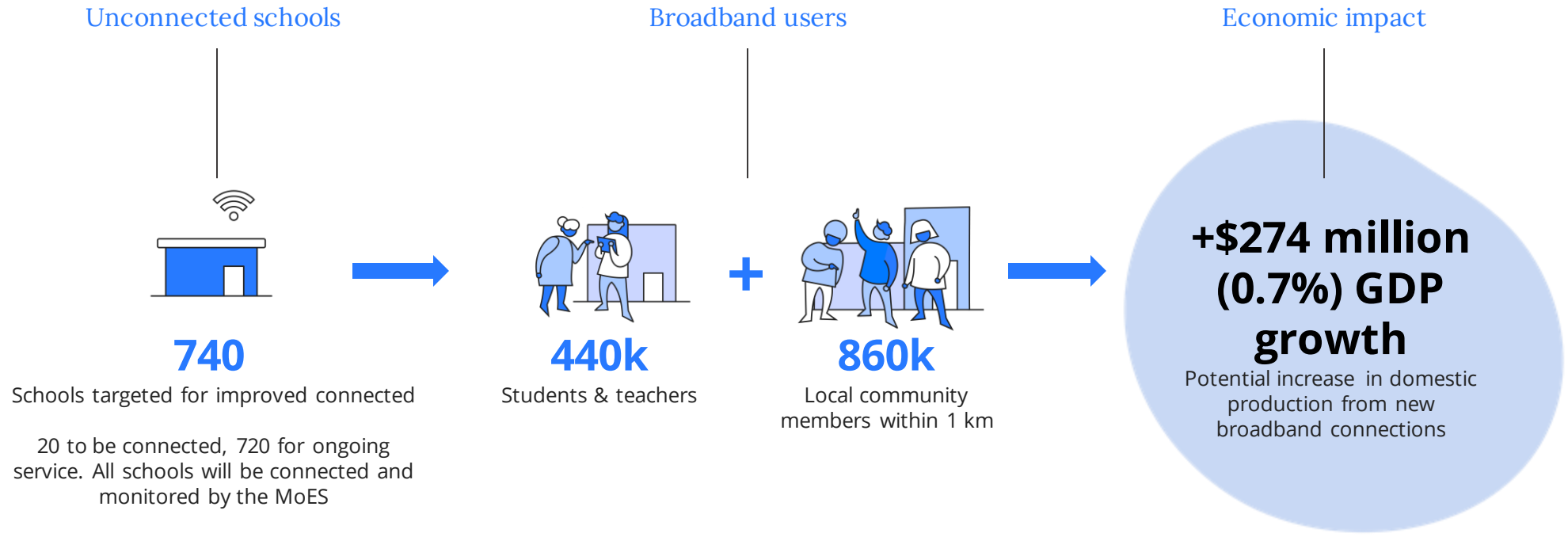
KYRGYZSTAN

Targeted financing for improving connectivity in 740 schools can create GDP growth of over $274 million

Connecting the remaining 20 mountainous schools and covering all 682 being currently connected under the Ministry of Education and Science will increase connectivity and quality of service



Note: The government plans to bring 689 schools that are currently connected but not through fibre, under the national program, to improve their service quality. The government plans to further connect 11 of the 31 currently unconnected mountainous schools. 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; Giga Project Connect 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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KYRGYZSTAN

School connectivity will require an estimated $206k of upfront capital expenditure and up to $210k 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 requiring ongoing service support: 740[1]

Schools to be connected: 20)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on MoES goals, estimates assume fiber will be used as the last-mile connection to all schools:

$206k Estimated total investment needed to connect the last 20 schools*

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

ONGOING ANNUAL FUNDING FOR REGULAR SERVICE FEES

Based on a current tender by the MoES:

$210k[a] Potential service fees for 740 schools (Current estimate)*

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

The Government of Kyrgyzstan is currently spending $600,000 annually on connectivity service for its 2119 connected schools.[b]

Notes: (1) Of these 689 schools have been brought under the national program for service quality improvement, and 11 mountain ous schools are currently being connected by Kyrgyztelecom. The remaining 20 schools that are unconnected are also included here for ongoing support once they are connected.
A) Based on MoES 2020 service tender for improved connectivity in 689 schools B) xxxx
Source: Dalberg Analysis based on data from MoES 2020 service tender

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KYRGYZSTAN

Giga has engaged significantly with the Kyrgyz Government

Key Stakeholders: Ministry of Education and Science, Prime Minister's Office, ICT Committee, State Agency of Communications, KyrgyzTelecom, Presidential Expert Council on Digital Transformation

Giga engagement to date

- Kyrgyzstan has already benefitted significantly from Giga support: connecting 99.4% of its schools, increasing speeds, and lowering the cost of service.
- Since 2018, UNICEF and the Ministry of Education and Science have been working closely to map and connect schools
- With the support of Project Connect, the government was able to identify 740 schools that lacked high quality internet
- Now, only 31 of the hardest to reach schools remain unconnected; of these, the government already plans to connect 11 over the next 6 months
- In addition, Giga worked alongside the Prime Minister's Office to negotiate ongoing services fees for school connection with service providers
- Due to this process, prices were lowered by almost half (from $50/month to $28.5/month) and speeds almost doubled (from 2Mbps to 4Mbps).
- The government has saved 40% of its annual education connectivity budget.

THE VALUE OF GIGA

"The pandemic has changed many things. We are excited for the potential of Giga to support the right content on platforms that meet the needs of our students."

DEPUTY MINISTER NURLAN OMUROV
Kyrgyzstan Ministry of Education and Science, lead on ICT in Education

KYRGYZSTAN

In partnership with the government, Giga has identified several activities to support improved, cost-effective connection of 740 schools

Use mapping technology to identify and monitor in real time internet service delivery at schools across the country

Provide government with transparent data service delivery, such as school-level internet pricing and quality (speed, reliability) to inform procurement practices

Support technological assessment and commission feasibility studies for connecting the remaining 20 schools in difficult to reach areas

Mobilize concessional financing for infrastructure buildout to reach remaining schools

Support sustainable financing opportunities for ongoing fees, especially around the additional budget needed to service the 720 schools being brought under the national program

Assist government in efficiently structuring procurement of internet services from private providers to improve pricing and quality of service based on mapping data

Adapt DPG resources to the Kyrgyz context, including integration services around health and finance

Connect with UNICEF Education experts to support the "Digital Content Center" and ensure that digital learning administrators and teachers are ICT trained and qualified

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KYRGYZSTAN

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?	No
Responsible agency?	No
Non-discriminatory inclusive use policy?	No
Data sharing:[2]	
Data protection policy?	Yes
Privacy and data protection laws	Tbc

ICT Regulatory Tracker[3]

Sector strategies:	
Generation of ICT Regulation	G3
Overall	75/100
C1: Regulatory Authority	16/20
C2: Regulatory Mandate	17/22
C3: Regulatory Regime	16/30
C4: Competition Framework	26/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	Yes
Regulatory autonomy from the government[10]	No
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?[10]	Yes
Wireless Operators Market HHI[4]	-
Fixed Broadband Operator Market HHI[4]	-

Taxation

Services	
VAT[5]	15%
Sector specific tax on internet services[6]	5%
ITA Participant[7]	Yes
ICT Equipment import duties[8]	0-10%
Ongoing regulatory/license fees[1]	Tbc

Universal Access

Services[9]	
Is school broadband a universal service?	No
Operational Universal Service Fund (USF)?	No
Total amount allocated/disbursed so far	N/A
Contributions as % of revenue	N/A
Other public financing mechanisms?	N/A
Fully utilized currently?	N/A
Fully active in the last 5 years?	N/A

Strength
Neutral
Limitation

Notes: 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) Digital Report, Обзор телеком рынка Кыргызстана: Фиксированная, мобильная и международная связь, June 2, 2017 6) ITU (2019) Taxation Survey Country 7) World Trade Organization (2020) Information Technology Agreement Website 8) WITS (2020) World Integrated Trade Solution – Tariff Database 9) Latest ITU Global Report (2020) and, where available, the country's Universal Service Fund website 10) Latest ITU ICTEye

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COUNTRY ANALYSES AND PLANS

Niger

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NIGER

$104M of CapEx funding and $96M of annual OpEx funding will enable Niger to connect over 19,000 schools

This investment will bring **3.5 million students and teachers online** and bring connectivity to **7.2 million community members** who live locally, potentially enabling over 525 million USD of GDP growth, a 1.8% increase.

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

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“The Giga initiative is a great project for us because it comes to complement the already existing efforts we had of last mile connectivity to different essential services like schools.”

IBRAHIMA GUIMBA-SAÏDOU
Director, ANSI & Minister | Special Advisor

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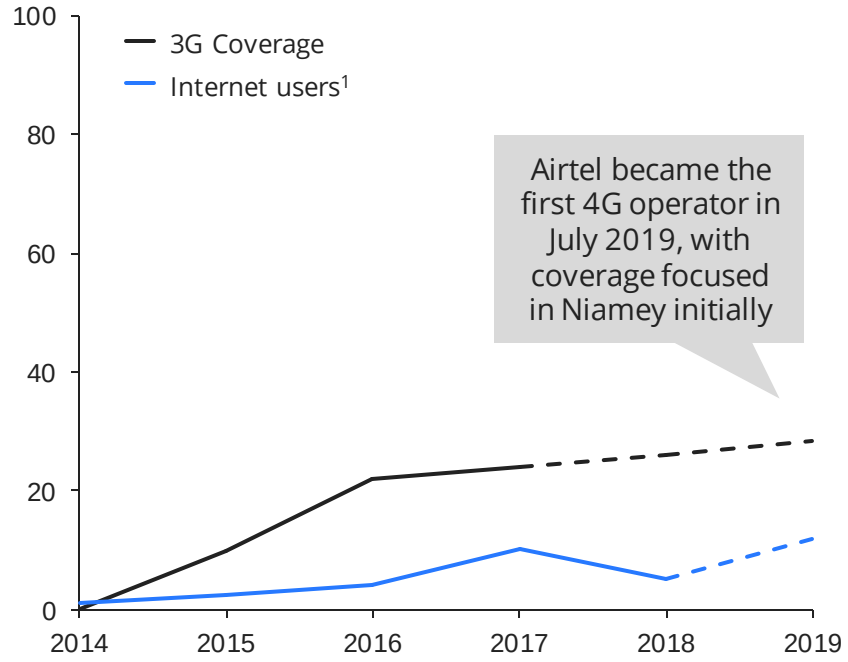
NIGER

Mobile coverage has steadily increased over the last 5 years, further connectivity is required to achieve rural development plans

In the last 5 years mobile broadband coverage has grown but internet use has lagged behind

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



The Government of Niger is aiming to drive economic growth through digitization with universal access to connectivity

Niger hopes to achieve this target through the following internet connectivity and education policies:

- Renaissance Act II Program: The President's 2016 reform program envisages an improvement in the quality of public services by improving digital communication within society. This led to the creation of National Agency for Information Systems (ANSI) and the strategic vision "NIGER 2.0"
- Niger 2.0 Strategic Plan: Under the supervision of the Presidency, ANSI 's work is anchored in four strategic areas: e-government, digital skills promotion, a smart villages program and creating an innovation and technology city
- Niger 2.0 Smart Villages: Launched in August 2018 by the Government of Niger and its partners (ITU, FAO, UNESCO, WHO, WB) the program aims to expand internet access to digitally enabled services in education and other sectors (health, agriculture, commerce etc.)
- Education Sector Plans: The Programme Sectoriel de l'Education et de la Formation 2014-24 (PSEF) & Transition Plan (2020-22) have limited reference to digital learning but EMIS has been identified as a strategic activity to improve school management and teacher training

Note: 1) ITU estimates that total internet users were approximately 5.2% of the population in 2018, this share has increased, varying by demographic/location and the government records level up to 52% in certain areas
Source: ITU (2020) World Telecommunication/ICT Indicators Database; ANSI (2019 Website; République du Niger (2013) Programme Sectoriel de l'Education et de la Formation (2014-2024); République du Niger (2019) Plan de Transition du secteur de l'education et de la formation; PTSEF (2020-2022) ; Republique Du Niger (2012) Ministere De La Communication Et Des Nouvelles Technologies De L'information (2012) Document De Politique Sectorielle Des Telecommunications Et Des Technologies De L'information Et De La Communication

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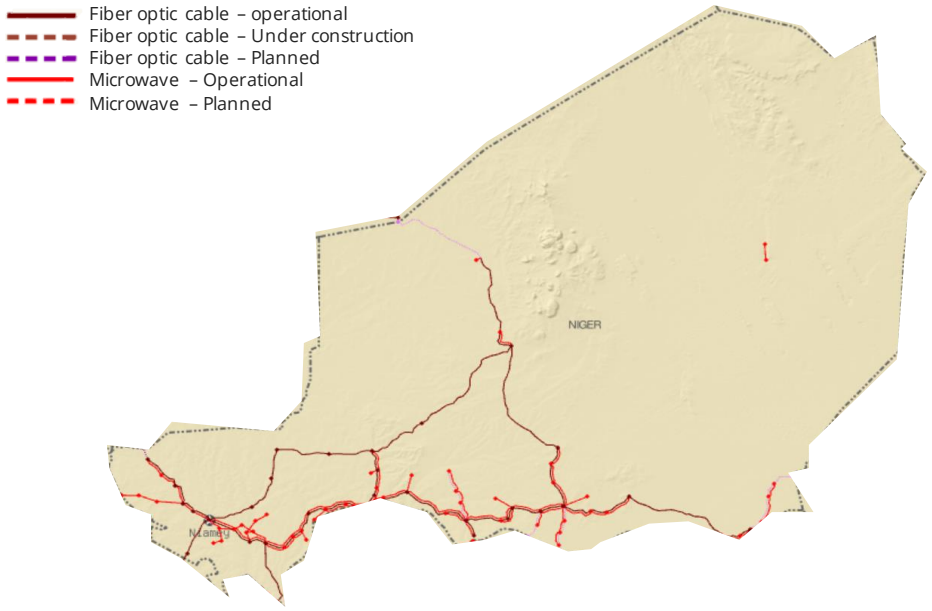
NIGER

Fiber networks and 4G coverage



	Mobile	Fixed
Subscriptions per 100 inhabitants	52**	<1
5-year CAGR	+95%	+4%

The Goal: National Coverage and Connectivity

Fiber networks are concentrated in populous southern areas, mobile internet coverage of 3G and over is limited throughout country, and the first 4G licensees became operational last year

Source: Map – ITU Broadband Map; Table – IITU (2020) World Telecommunication/ICT Indicators Database *latest data from 2017, Mobile penetration rate was 4 in 2017 according to ITU records, government recently confirmed penetration is 52% of adults

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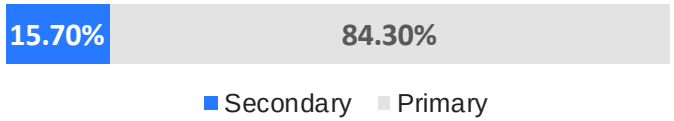
NIGER

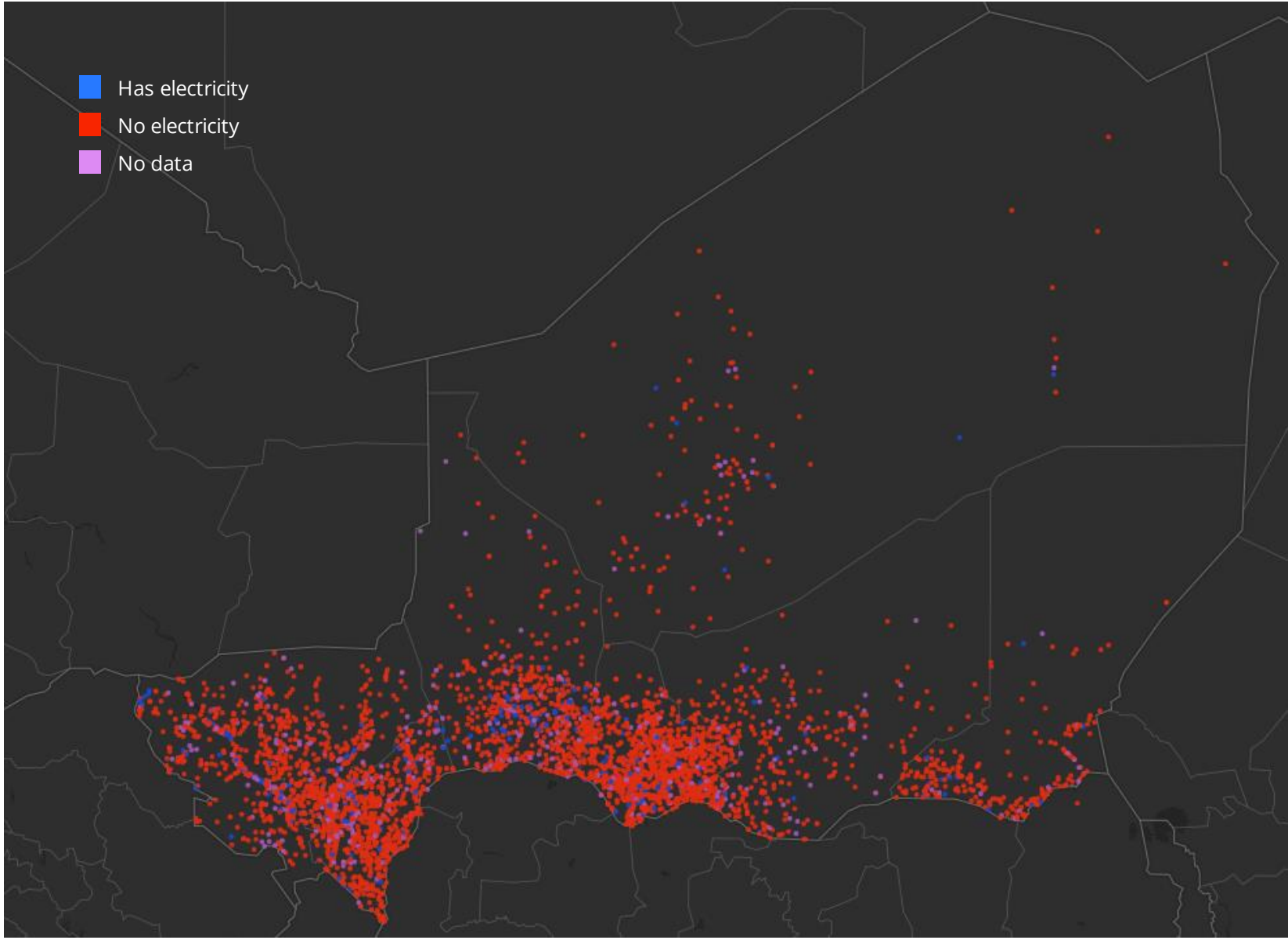
School Coverage and Connectivity

Total schools: 19,435



89% of Primary schools are rural
92% of Primary schools have no electricity

Few Nigerien schools (80) are connected to the internet. There is limited information on both school location and internet coverage status. Estimates suggest over 8,500 schools are within 10km of 3G, 4G or fixed broadband.



Giga is currently working with the Government of Niger on collecting data on school location and connectivity status given the limited availability of this information. This map uses population density and village geolocation as proxies for school location and maps the availability of electricity for these locations.

Source: Ministry of Education (2019) School data; ITU (2019) Transmission and population density coverage data; République du Niger (2019) Plan de Transition du secteur de l'education et de la formation PTSEF (2020-2022);

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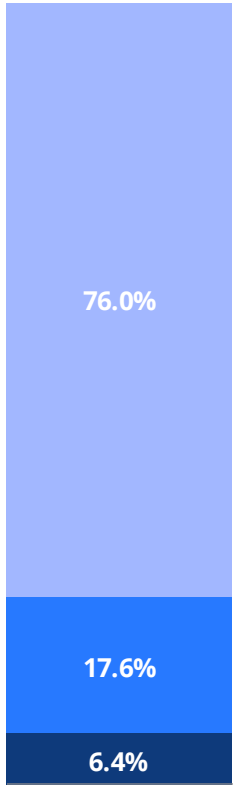
76% of Nigeriens lack coverage and 17% face affordability, electrification and other challenges

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
76.0%	COVERAGE GAP **No mobile internet**	Increase coverage	+17.7 million Nigeriens
17.6%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase digital literacy Increase electrification	-$4.17/GB (-87%) Transform learning to build digital skills Power 19 million off-grid users
6.4%	CONNECTED **Active mobile internet use**	Achieve digitally enabled growth for all	8.6M digital financial service users (+300%)

Notes: Notes: Prices based on ITU Data-only mobile broadband basket 1.5GB, pro-rated down to 1GB for comparison against the Broadband Commissions 2% target. Note that Individuals in remote locations will likely spend a higher proportion due to lower income levels. Source: ITU (2020) World Telecommunication/ICT Indicators Database; UNESCO (2019) Institute for Statistics

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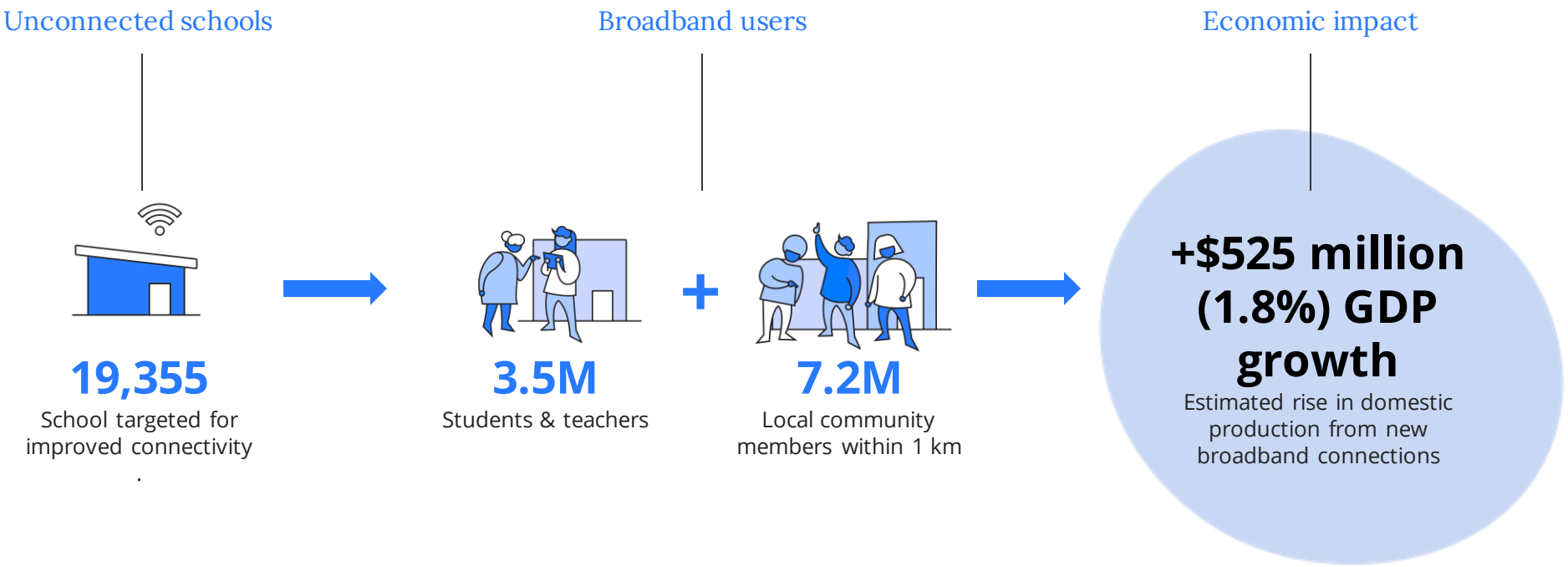
NIGER

Targeted financing for connecting 19,355 schools can create GDP growth of over $525 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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NIGER

School connectivity will require an estimated $104M of upfront capital expenditure and up to $96M 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: 19,355)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment (15% Fiber, 13% WISP, 17% 4G and 55% Satellite):

$104M Estimated total investment needed to reach 19,355 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 FEE (64%) and a maintenance and technical support fee (36%):

$96M[a] Potential service fees for 19,355 schools (Current estimate)*

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

The Universal Service Fund could potentially provide $13M for connecting schools, while the World Bank Smart Villages funding could contribute up to $5M.[b]

Notes: All investment costs are high level estimates only at a concept level stage. Further feasibility and technical studies will be required to refine budget needs prior to project/initiative/procurement stages.
A) Estimate of potential annual service fees is based on existing current school service fees pricing from Niger Telecoms (Per/Mbps) for either dedicated radio loop or fiber optic last mile connectivity
B)USF contribution based on US$ 147 million total tax burden for the ICT sector in 2015, 9% of which was USF. Assuming 25% is available to school's connectivity and aggregated over 4 years ($13M). Assumes that WB Smart Villages connects schools in its 2,111 villages (estimated at 1,000 schools by population size, average connection cost $5,347, Total = $5.5M).
Source: Giga and Dalberg Analysis (2020) based on Giga ACTUAL mapping and modelling input data; Niger Telecoms Data.

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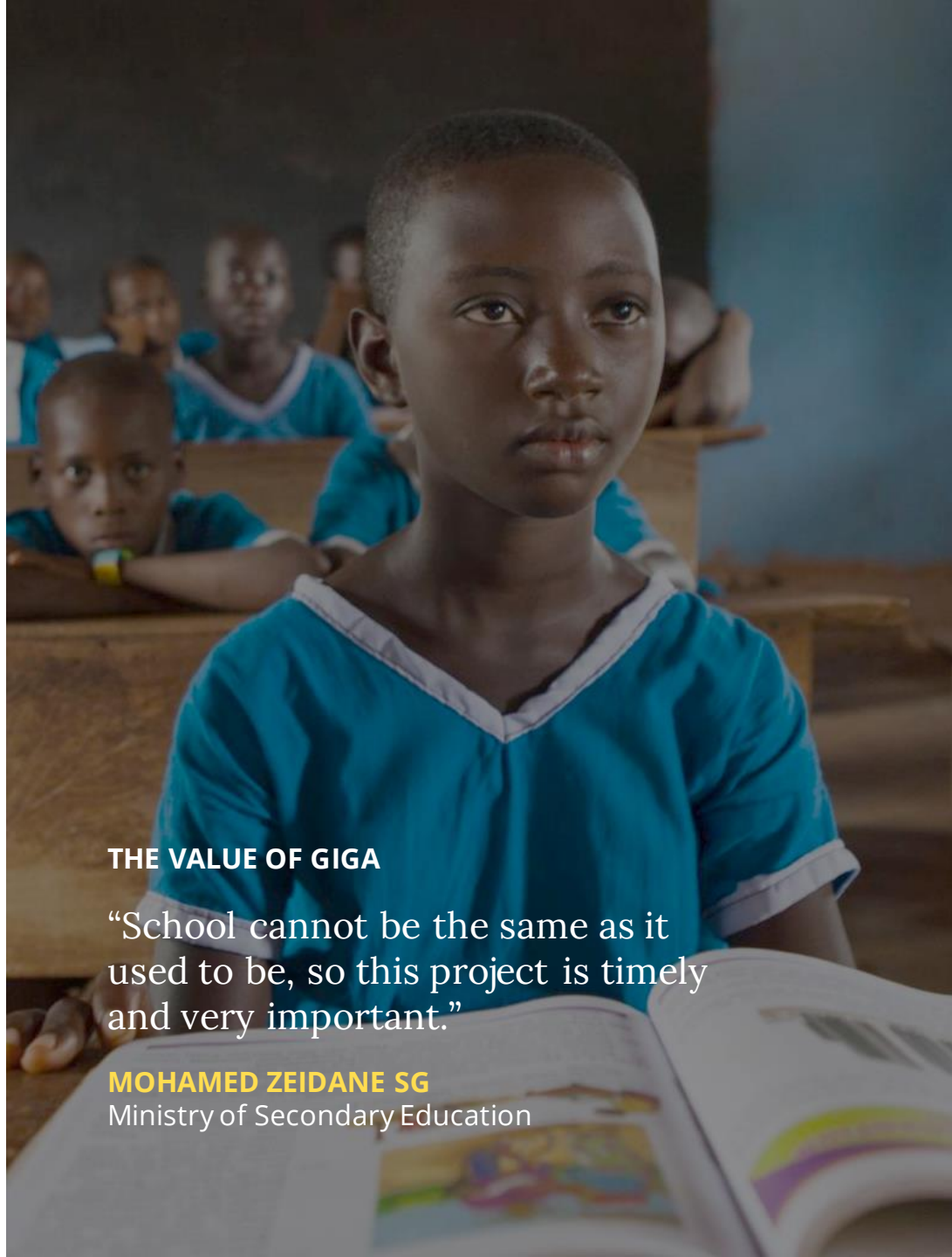
NIGER

Giga has engaged significantly with the Government of Niger (GoN)

Key Stakeholders: National Agency for the Information Society (ANSI), Six Ministries of Education, Ministry of Planning, Regulatory Authority for Electronic Communications and Post (ARCEP)

Giga engagement to date

- High level buy-in from Minister Ibrahima Guimba-Saïdou and established a focal point at National Agency for the Information Society (ANSI)
- Data sharing agreements and subsequent mapping analysis through project connect
- Completion of an upfront joint assessment to align on opportunities and constraint
- Co-creation workshop to identify priorities and next steps (see next page)



THE VALUE OF GIGA

"School cannot be the same as it used to be, so this project is timely and very important."

MOHAMED ZEIDANE SG
Ministry of Secondary Education

NIGER

In partnership with the GoN, Giga has identified several activities to support the cost-effective connection of 19,355 schools

Use mapping technology to more accurately deploy connectivity to create efficiencies in the roll out of Smart Villages

Build real-time monitoring platform for accountability of providers

Start a connectivity working group (alongside ANSI, the World Bank and Ministry of ICT) to share knowledge and coordinate school connectivity deployment across actors

Showcase GoN leadership on global stage through Smart Villages as global example, e.g. learning from Niger's bandwidth needs, financial models, etc.

Targeted investment in addition to the World Bank package – e.g. schools first opportunities; immediate opportunities for small scale pilots for different last-mile technologies

Develop innovative financing methods, e.g. digital bond in Honduras with the IDB – framework to aggregate demand across villages to bring down prices from satellite and telco ISPs

Onboard Niger as a Digital Public Goods Alliance Pathfinder, identify areas of public services that need open source solutions and mobilize resources together to build/scale chosen applications

Explore opportunities for local providers to engage in Smart Villages and support the local entrepreneurial ecosystem by scaling existing programs e.g. Code Local

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NIGER

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?	No
Responsible agency?	No
Non-discriminatory inclusive use policy?	No
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	74/100
C1: Regulatory Authority	15/20
C2: Regulatory Mandate	20/22
C3: Regulatory Regime	20/30
C4: Competition Framework	19/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	No
Regulatory autonomy from the government	Partial
Clear planning and licensing process?	Yes
Procurement or competition agency?	No

Competition

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

Taxation

Services	
VAT[5]	19%
Sector specific tax on internet services[5]	0%
ITA Participant[6]	No
ICT Equipment import duties[7]	10%
Ongoing regulatory/license fees[1]	Yes

Universal Access

Services[8]	
Is school broadband a universal service?	No
Operational Universal Service Fund (USF)?	Yes
Total amount allocated/disbursed so far	$87.5M
Contributions as % of revenue	2-4%
Other public financing mechanisms?	Yes
Fully utilized currently?	Yes
Fully active in the last 5 years?	No

Strength
Neutral
Limitation

Notes: 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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COUNTRY ANALYSES AND PLANS

Organisation of Eastern Caribbean States

Only including 9 OECS members: Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines

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OECS

Recent progress has led to widespread school internet connectivity across 9 OECS Member States. Annual Opex funding of $1.7M* will ensure continued quality connectivity of 460 schools.

Supporting a region-wide Giga initiative will bring more consistent and efficient internet service to 460 public and government-assisted schools. Improving learning outcomes for **120,000 students and 9,400 teachers** and reaching a further **250,000 underserved community members**.

Source: Progress on achieving internet and technology access in schools from OECS Education Sector Strategy 2026 and UNESCO UIS.Stat 2018
Note* – Preliminary estimate based on weighted average monthly service fees for schools in Antigua, Dominica, Grenada, Montserrat and St. Kitts & Nevis. Estimate will be updated as more accurate data is collected and analysed in the rest of the OECS member states.

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OECS

“ICT must not be viewed as merely peripheral to the ideals we want to accomplish, or something to be ‘added’ to the education curriculum. Technology impacts every aspect of our lives.”

DR. KEITH MITCHELL
Prime Minister and Minister for ICT, Grenada | CARICOM Quasi Cabinet Member responsible for Science and Technology

Source: PM Mitchell’s speech at CARICOM Heads of Government Meeting (July 2018)

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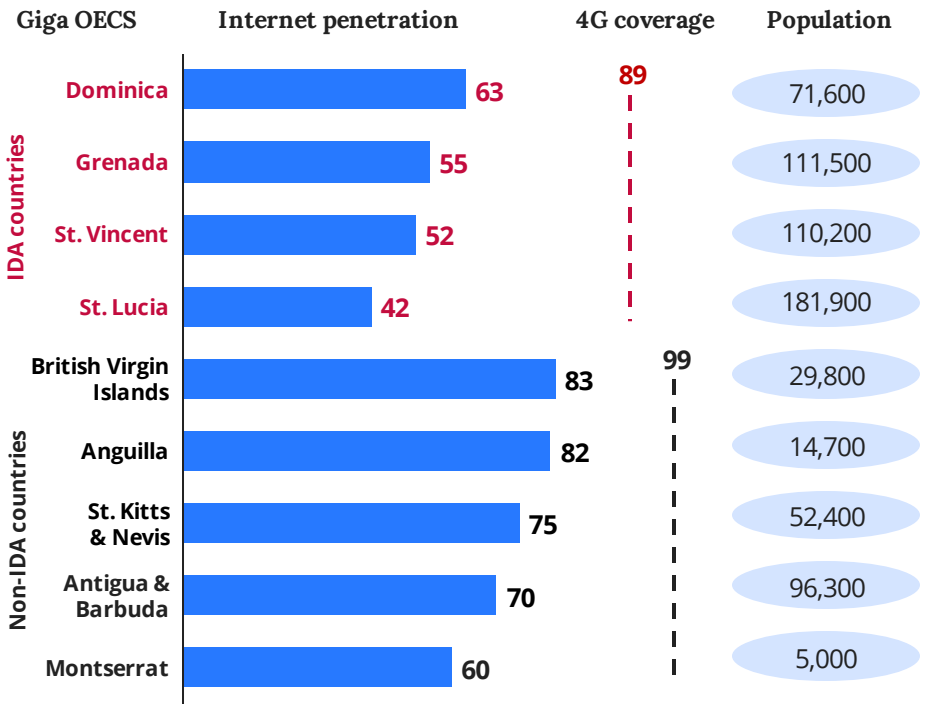
OECS countries have dramatically expanded coverage. However, uptake remains inconsistent across the region

Across the OECS region, uptake lags coverage, especially in IDA countries[1]

Broadband internet coverage and penetration (ITU, 2019)



Digital transformation is a regional priority, the OECS is encouraging harmonization with common strategies to connect all schools

OECS hopes to achieve this target through the following broadband connectivity policies, which are then backed up by national policies:

- Overarching strategies: UN Sustainable Development Goals (SDGs), CARICOM Human Resource Development 2030 Strategy, ECCB Strategic Plan 2017-2021
- OECS Growth and Development Strategy 2019-2028: Outlines strategic objectives leveraging ICT and connectivity for economic innovation and growth. The strategy highlights the need for regional progress along the ICT Development Index, as well as increased harmonization of telecommunication regulatory system via the Eastern Caribbean Telecommunications Authority (ECTEL) framework, including mobile services and issues of market dominance.
- OECS Education Sector Strategy 2012-2026 (OESS): Highlights the need for greater investment in ICT training and integration. The strategy acknowledges that most OECS schools are now connected to the internet, but few have leveraged it to change learning modalities. The strategy provides the framework of a regional approach, including a results-based monitoring and evaluation mechanism for ICT integration under Strategic Imperative 3.5.3 “Improve the quality of Teaching and Learning”.
- OECS Education Sector Response Strategy to COVID-19: Emphasized, among other priorities, the need for harmonizing Member State responses in education policy and transitioning all Member States to a digital education system.

Notes: (1) Giga is currently partnering with nine of the eleven OECS Member States; Guadeloupe and Martinique are departments of France and are excluded. OECS countries are grouped by status as IDA and non-IDA countries in the World Bank system. This serves two purposes: (a) IDA country categorization is a useful measure of overall development; however, it should be noted that the actual inequality and poverty levels among all countries is more complex and lacks recent data; (b) the World Bank’s CARCIP and CARDTP projects on digital transformation in the region have focused only on IDA countries. Sources: ; ITU (2020) World Telecommunication/ICT Indicators Database, World Bank, OECS, CARICOM; 1) Digital-Anguilla (2020) estimated internet penetration rate 2) IWS (2019) British Virgin Islands (BVI) internet penetration estimate 3) IWS (2019) Montserrat internet penetration estimate

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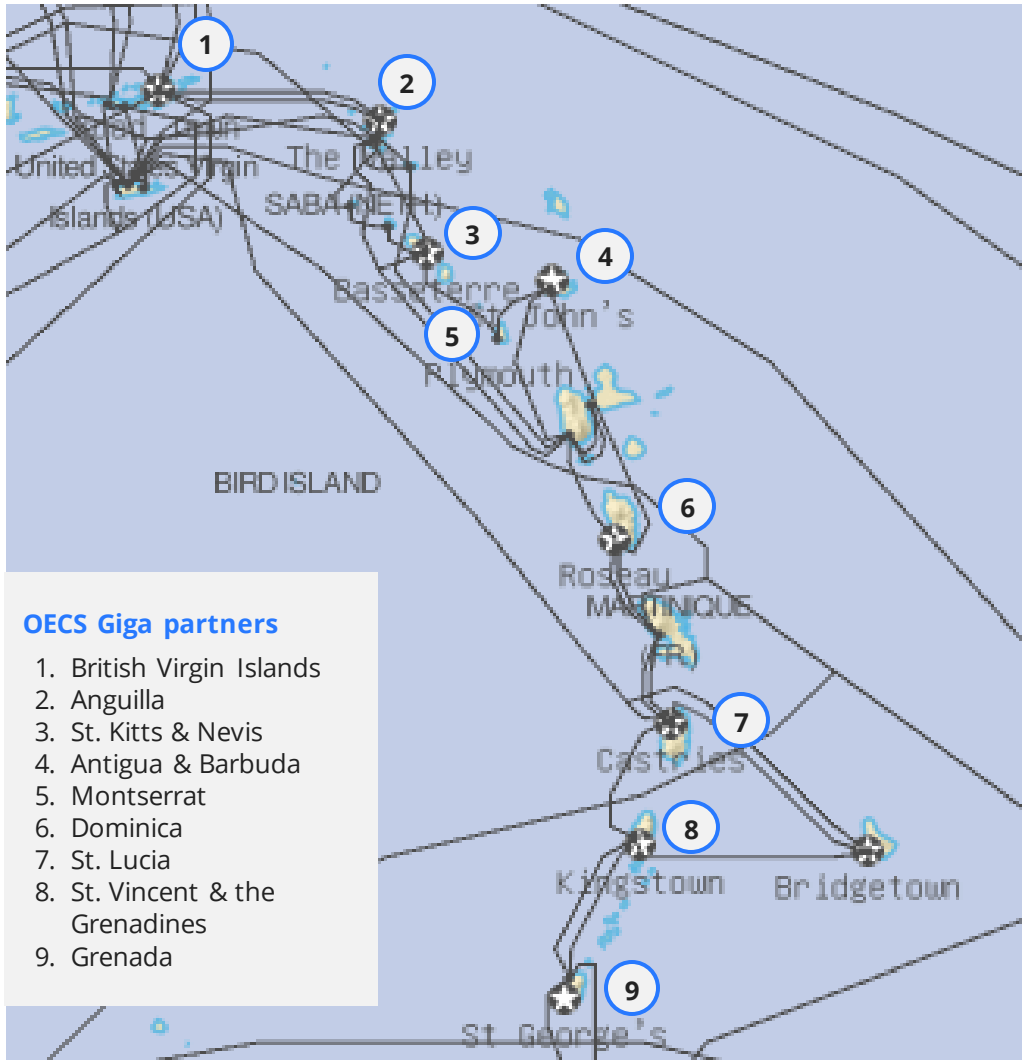
OECS

OECS undersea fiber networks



OECS Giga partners

1. British Virgin Islands
2. Anguilla
3. St. Kitts & Nevis
4. Antigua & Barbuda
5. Montserrat
6. Dominica
7. St. Lucia
8. St. Vincent & the Grenadines
9. Grenada

The Goal: Regional Coverage and Connectivity

Significant public and private efforts have expanded total connectivity coverage across the region, 89% live within 10km of fiber. The network leverages 685 km of fiber across the five largest countries, though some gaps remain in rural areas. However, slow speeds and unreliable connections are common and service costs are high.

Note: Population coverage figure is a population-weighted average of Antigua & Barbuda, St. Lucia, St. Vincent, Grenada, and Dominica. There is a wide range of coverage across the region, with the largest gaps in Antigua (62%) and St. Vincent (78%). Source: ITU Broadband Map; (1) Dalberg interviews, OECS reports, and media citations

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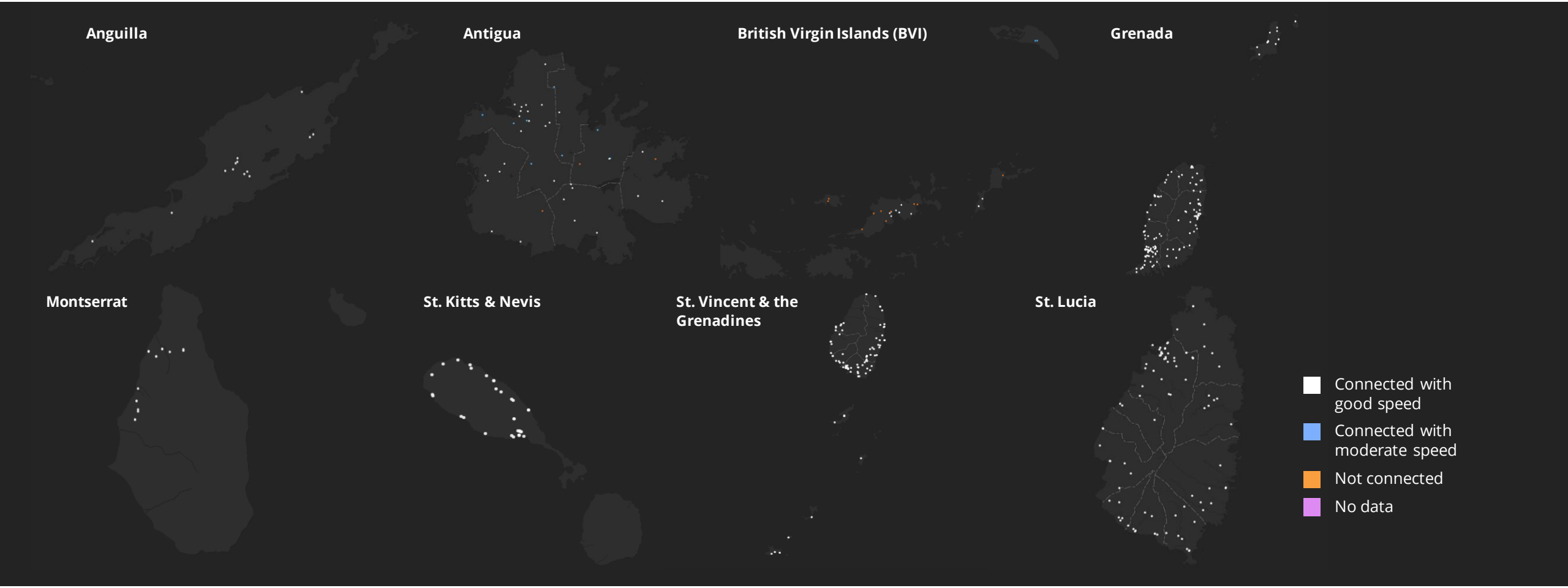
OECS

School Coverage and Connectivity

Giga is in the process of mapping connectivity across the region, with close to 90% of all 460 regional schools included.



Source: Dalberg analysis; Giga Project Connect mapping

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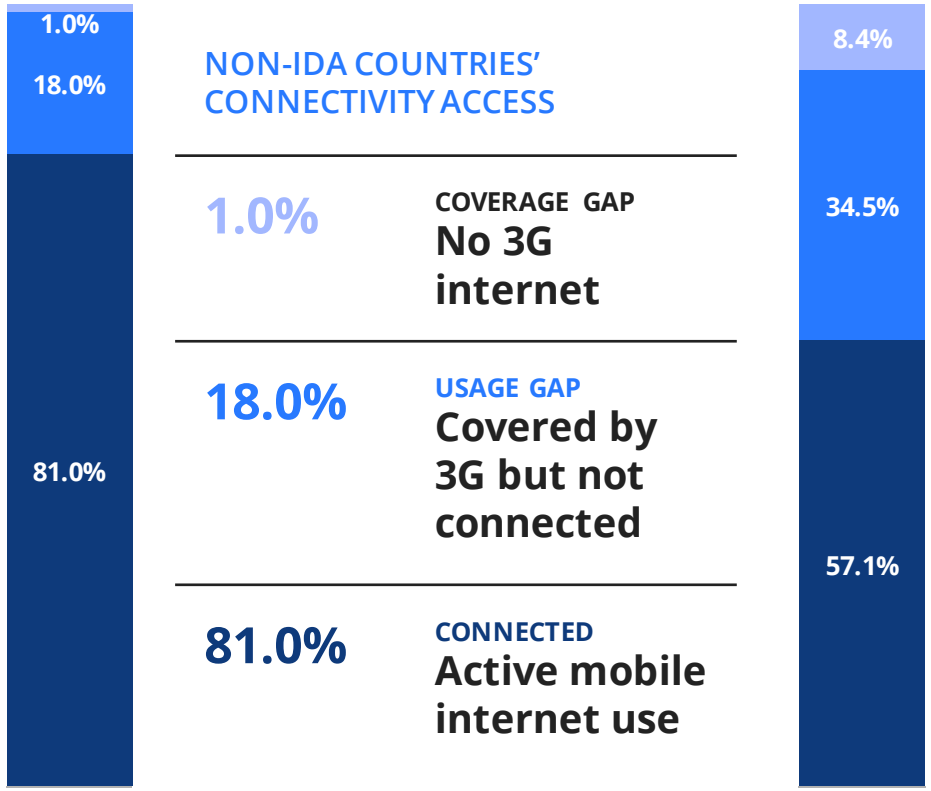
OECS

Across the 9 OECS states, affordability and service quality remain key barriers to internet use

THE MOBILE INTERNET COVERAGE AND USAGE GAP



NON-IDA COUNTRIES' CONNECTIVITY ACCESS		IDA COUNTRIES' CONNECTIVITY ACCESS		NEEDS	GOALS
1.0%	COVERAGE GAP **No 3G internet**	8.4%	COVERAGE GAP **No 3G internet**	Increase coverage	+40,000 with mobile broadband access
18.0%	USAGE GAP **Covered by 3G but not connected**	34.5%	USAGE GAP **Covered by 3G but not connected**	Increase quality of service Increase affordability Increase digital literacy	+25% speed Reduce data costs Integrate ICT skills into education
81.0%	CONNECTED **Active mobile internet use**	57.1%	CONNECTED **Active mobile internet use**	Close the digital divide	Raise employment for youth and disadvantaged groups

Notes: Averages are weighted by population. Connectivity data on the smaller non-IDA countries – BVI, Anguilla and Montserrat – with populations below 30,000 was inconsistent and excluded from averages where unavailable.
Sources: ITU (2020) World Telecommunication/ICT Indicators Database; broadband speed data from cable.co.uk; OECS Development Strategy 2019-2028

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OECS

Targeted financing for improving service across 460 schools can create GDP growth of over $270 million

Across the 9 OECS Member States[1], improving and tracking service quality across all 460 schools would be a major step to close gaps and then improving service for truly universal connectivity

Unconnected schools

460

Schools targeted for improved connectivity across 9 Member States

.

Broadband users

130k

Students & teachers

+

>250k

Local community members within 1 km

Economic impact

+$270 million (2.6%) GDP growth

Estimated rise in domestic production from new broadband connections

Note: Note: 1) English-speaking OECS countries. 2)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

giga

OECS

Giga has already begun to engage with OECS countries to design the partnership

Key Stakeholders: OECS Commission, OECS ICT Strategy Group, Eastern Caribbean Telecommunications Authority (ECTEL), Eastern Caribbean Central Bank (ECCB), Member State country government authorities and regulators

Giga engagement to date

- Project Connect officially launched at an OECS workshop in Antigua and Barbuda, November 2019, and included officials from the various Ministries of Education
- 90% of schools have been mapped by Giga in coordination with 21 ICT experts from across OECS Member States using Project Connect's open source mapping tools
- UNICEF and ITU established an OECS Giga Steering Committee to coordinate the implementation of Giga in the region. This Steering Committee will provide guidance to the implementation of the Caribbean Digital Education Vision, developed as part of Giga, and will guide implementation of the initiative's four pillars.

THE VALUE OF GIGA

"Schools are sometimes faced with unreliable internet access; this is an excellent initiative to fill that gap. Project Connect [and Giga] promote access to information and will strengthen efforts to enhance technology-driven instruction and administration."

SISERA SIMON
Head of OECS Education Development Management Unit

OECS

In partnership with OECS Member States, Giga has identified several activities to support improved service across 460 schools

Use Giga mapping to monitor in real time school level internet connectivity to improve quality, consistency and value for money of internet services

Integrate connectivity plans for other public services, such as health centres, to ensure efficiency of implementation

Harmonize and strengthen regulation and policy in line with 2028 Development Strategy, such as issues of market dominance and cost regulation frameworks

Identify regulatory and tax barriers to boost affordability, protect consumers, and encourage more competitive markets for local service providers

Mobilize investment to support deployment, expand, or improve connections to all schools

Seek funding and pricing discounts for targeted services and products, including support to educational systems, remote learning, delivery of health services

Strengthen the entrepreneurial ecosystem to build a pipeline of locally developed digital public services and goods, which can be linked to venture funding and specific DPG acceleration content

Extend the reach and use of digital applications and services to broaden access to the digital economy, including health related applications and financial services

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OECS

Rapid Regulatory Scan

Regulatory framework

Each OECS country has an entity responsible for telecommunications regulation. In Antigua and Barbuda, the regulatory function is vested in a government division, whilst the other eight territories have independent bodies.

The Eastern Caribbean Telecommunications Authority (ECTEL) is the regulatory body for five OECS countries – Dominica, Grenada, St. Kitts, St. Lucia, and St. Vincent. Each country has a National Telecommunications Regulatory Commission (NTRC), which acts as a national-level regulator.

ECTEL has a common regulatory framework comprising six areas.

1. Universal Service Fund
2. Spectrum Management
3. Price Regulation
4. Numbering
5. Licensing
6. Access and interconnection

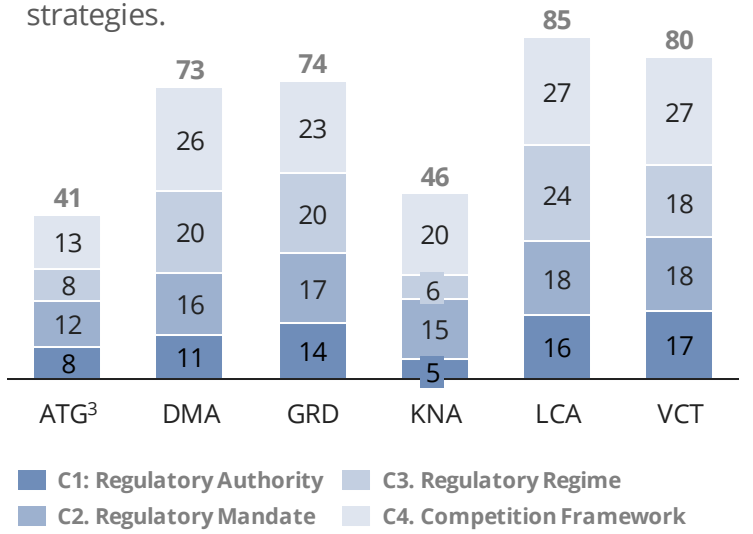
In addition, ECTEL recommends harmonised policies and legislation for its Member States. Although legislation and regulations are promulgated in each Member State at different times, however the legal instruments adopted maintain harmony.

Universal Access

Total amount allocated/disbursed so far[1]	
Dominica	$1.5M
Grenada	$2.9M
St. Lucia	$2.3M
St. Kitts & Nevis	$2.6M
St. Vincent & the Grenadines	$0.5M

Regulatory variance

ITU's ICT Regulatory Tracker shows significant variance between OECS Members States on regulatory systems.[2] OECS has prioritized harmonization across countries in its current strategies.



Notes: (1) National Ministries of Telecommunications (2) Smaller Member State countries – BVI, Montserrat, and Anguilla – are not measured by the index taken from ITU (2019) ICT Regulatory Tracker ; (3) Antigua is not an ECTEL member. Sources: ECTEL

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COUNTRY ANALYSES AND PLANS

Rwanda

giga

RWANDA

$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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RWANDA

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

PRESIDENT PAUL KAGAME
Transform Africa Summit 2013

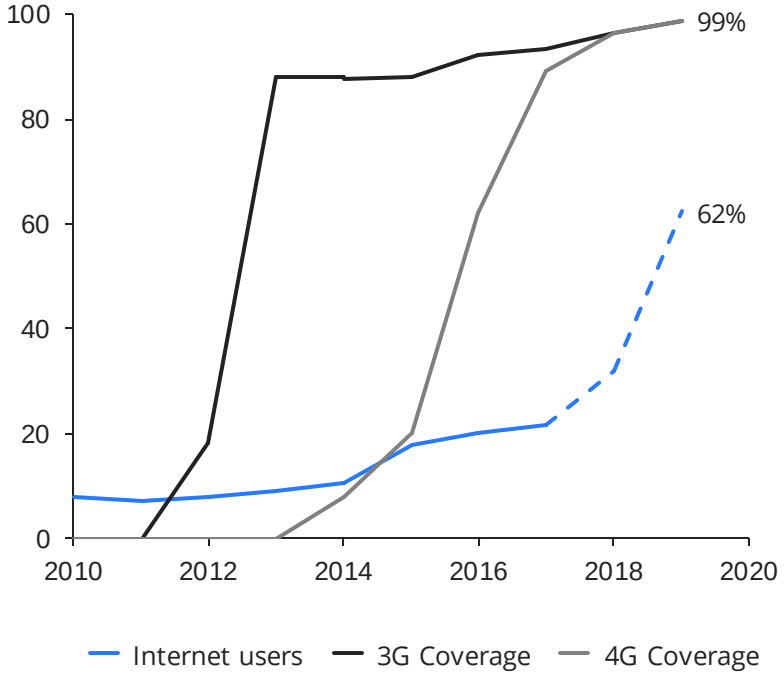
giga

RWANDA

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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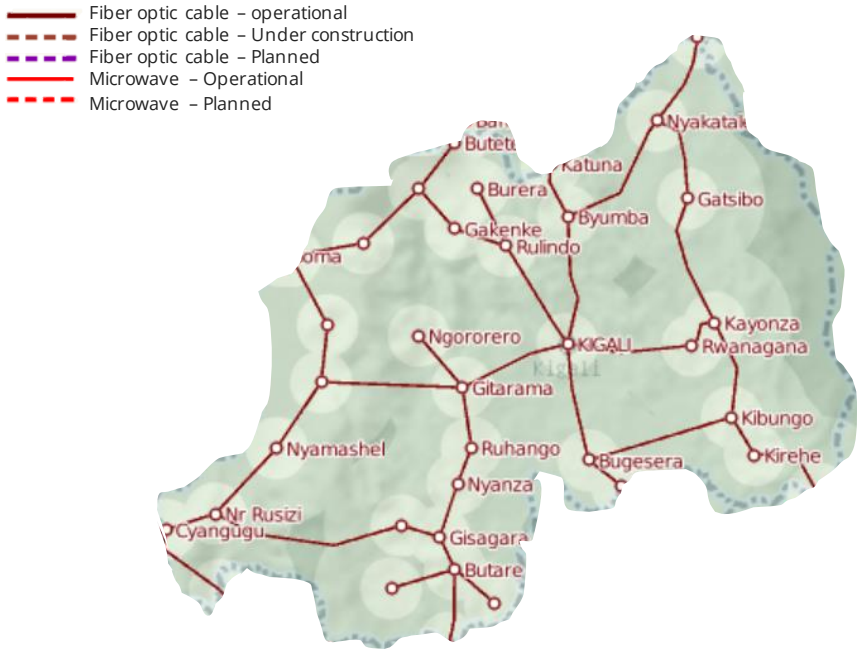
RWANDA

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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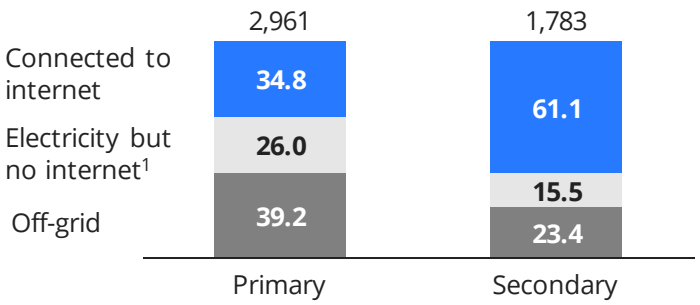
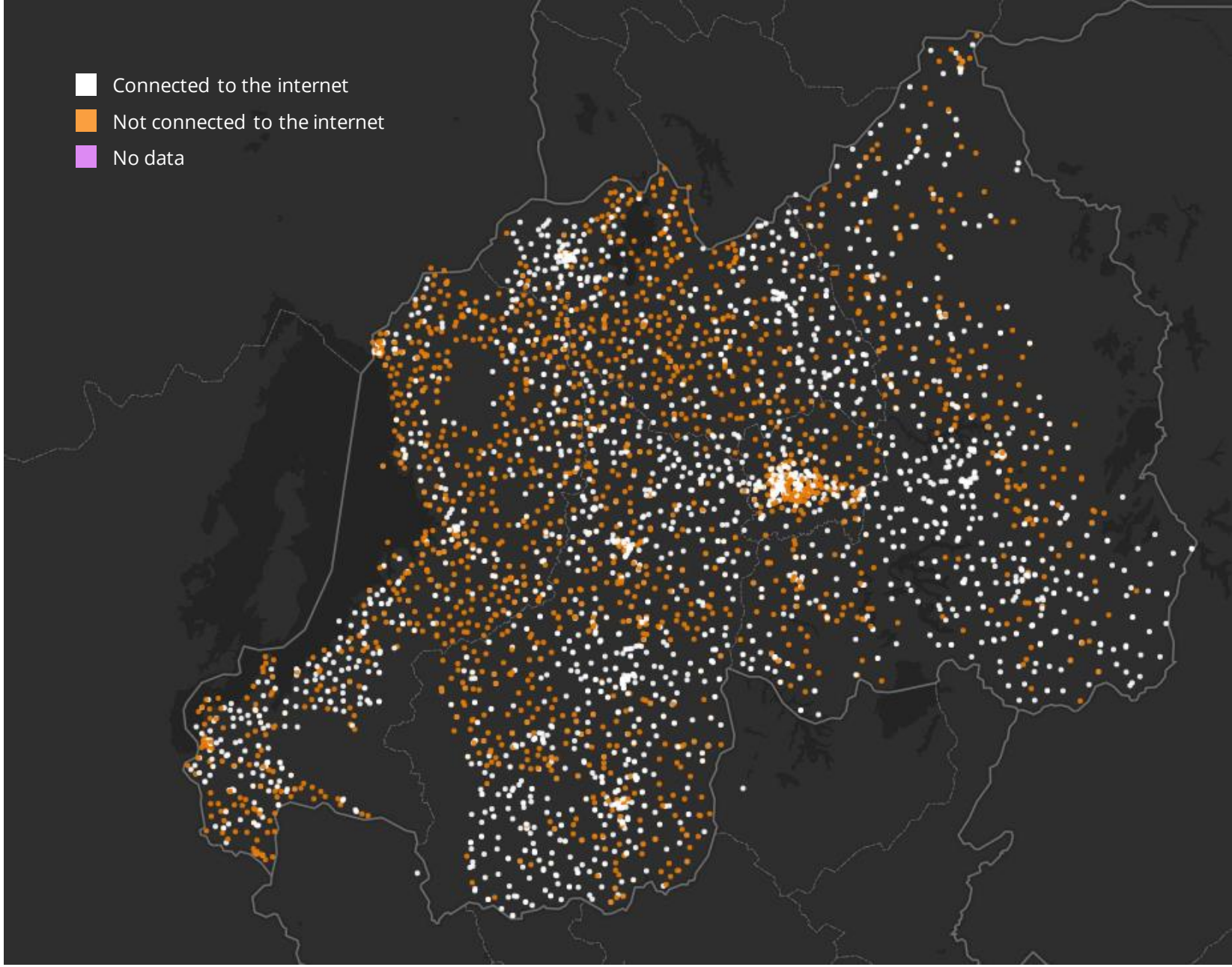
RWANDA

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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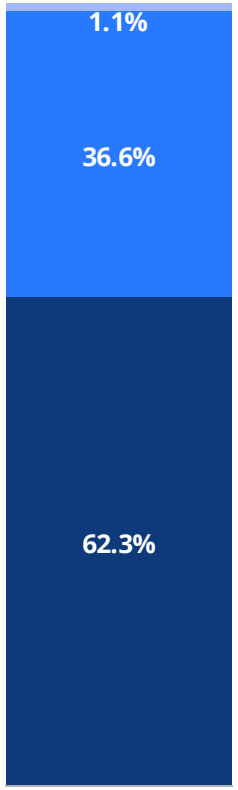
RWANDA

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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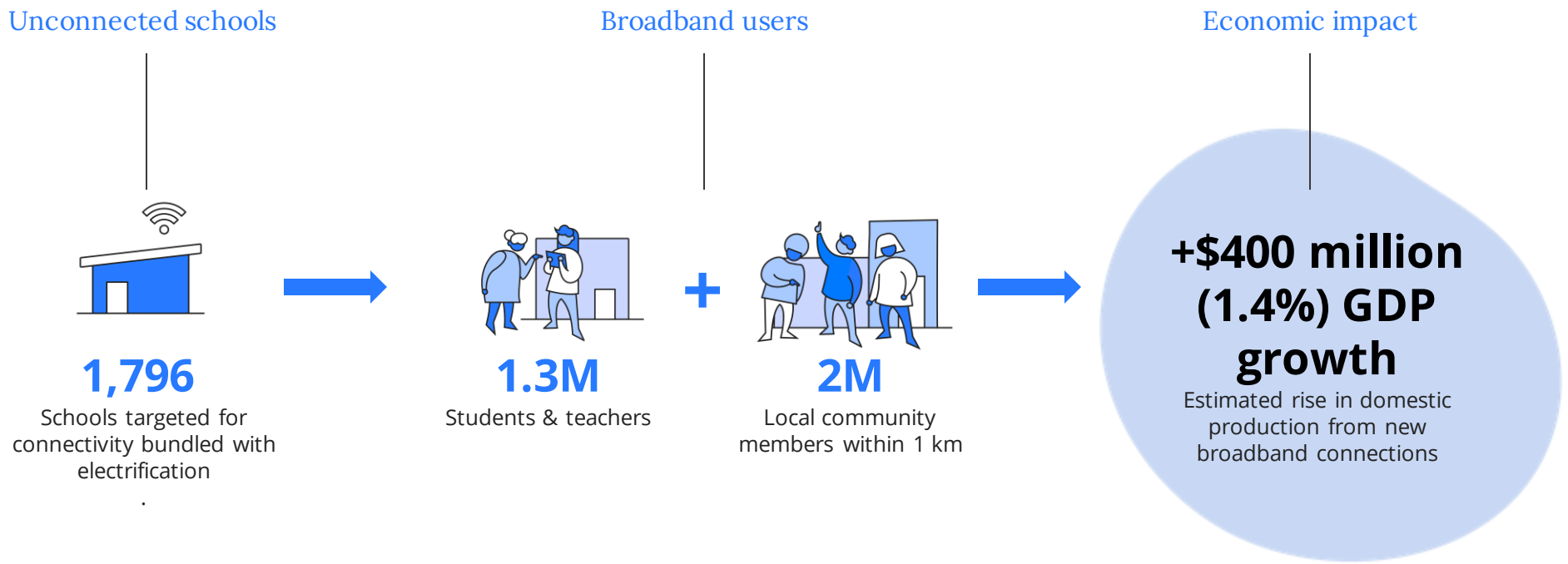
RWANDA

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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RWANDA

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

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

RWANDA

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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RWANDA

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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COUNTRY ANALYSES AND PLANS

Sierra Leone

SIERRA LEONE

$59M of upfront investment and $34M of ongoing annual service fee funding will enable Sierra Leone to connect 10,995 schools.

This investment will bring **2.1 million students and teachers** online and bring connectivity to **3 million community members** who live locally, potentially enabling $0.3 billion USD in GDP (2.2%) growth.

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

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SIERRA LEONE

“Access to connectivity, algorithms and open solutions are essential for driving our national vision of #DigitizationforAll and our principles of #MobileFirst.”

DAVID MOININA SENGEH
Minister of Education | Chief Innovation Officer

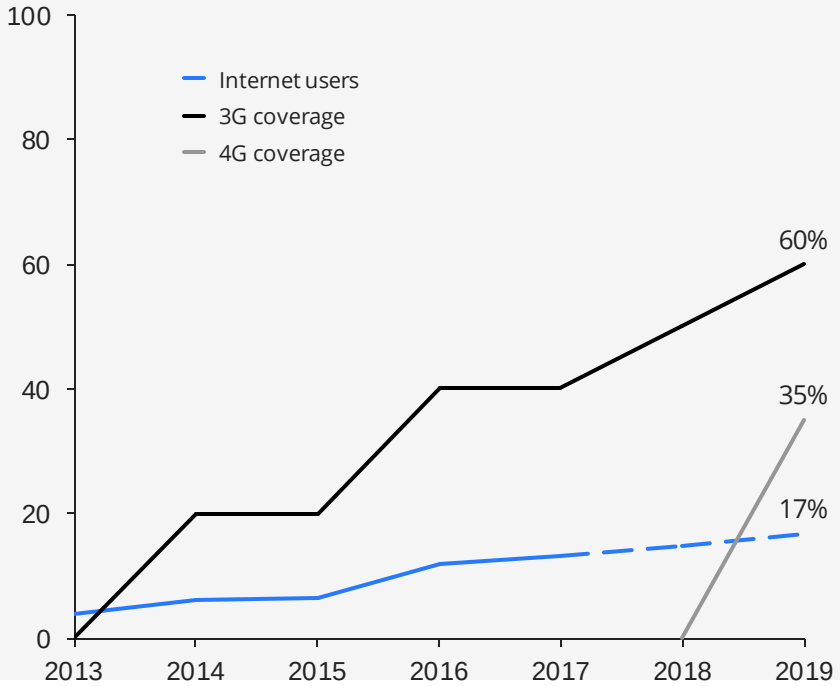
giga

SIERRA LEONE

Sierra Leone has a strong focus on mobile coverage and aims to expand the covered population from 56% to 80% by 2024

Mobile connectivity has expanded from 2013, however internet use remains low at 17%

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



The Government of Sierra Leone plans to expand broadband coverage to 30% of the population and mobile internet (at least 3G) to 80% by 2024 and create a digital economy[1]

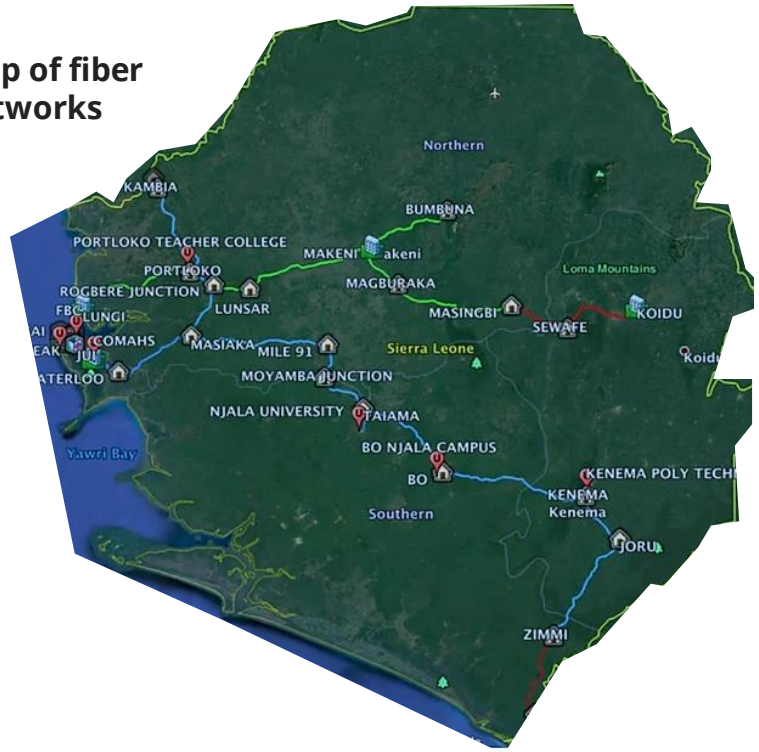
Sierra Leone hopes to achieve this target through new national development plans and digitization strategies:

- Medium term National Development Plan 2019-2023: addresses government plans to expand national broadband penetration and increase mobile coverage, with a focus on upgrading infrastructure and increasing coverage and affordability, particularly in rural areas
- DSTI – National Innovation & Digital Strategy 2019-2029: articulates the "Digitization for all" strategy that underpins DSTI's mandate to use science, technology and innovation to help the government deliver on its Medium Term National Development Plan (MTNDP) and to establish Sierra Leone as an 'Innovation Nation'. The strategy outlines the need for connectivity in schools and an ecosystem approach to address content provision, the local start-up ecosystem, and accessible and distributed energy (among others) that are necessary for full connectivity
- MBSSE National Curriculum Framework & Guidelines For Basic Education: aims to cultivate talents, nurturing a problem-solving, and includes technology and ICT literacy in basic education with a focus on empowering learners with foundational competencies and ICT skills that are applicable in various contexts such as business, engineering, and education

Source: 1) Medium term National Development Plan 2019-2023; ITU (2020) World Telecommunication/ICT Indicators database; NATOM Sector Statistics, Medium term National Development Plan 2019-2023, National Innovation & Digital Strategy 2019-2029, Universal Access Development Fund Strategy 2020-2024

SIERRA LEONE

Map of fiber networks



	Mobile	Fixed
Subscriptions per 100 inhabitants	15	<1
5-year CAGR	+5%	<1%

The Goal: National Coverage and Connectivity

Through SALCAB, Sierra Leone continues to invest in a national fiber network that primarily supports a growing user base of mobile based service provision

Sources: ITU (2020) World Telecommunication/ICT Indicators database; SALCAB (2020)

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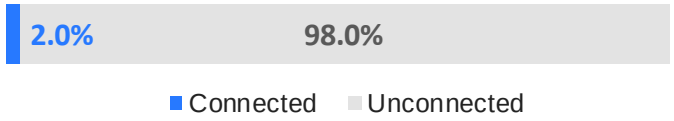
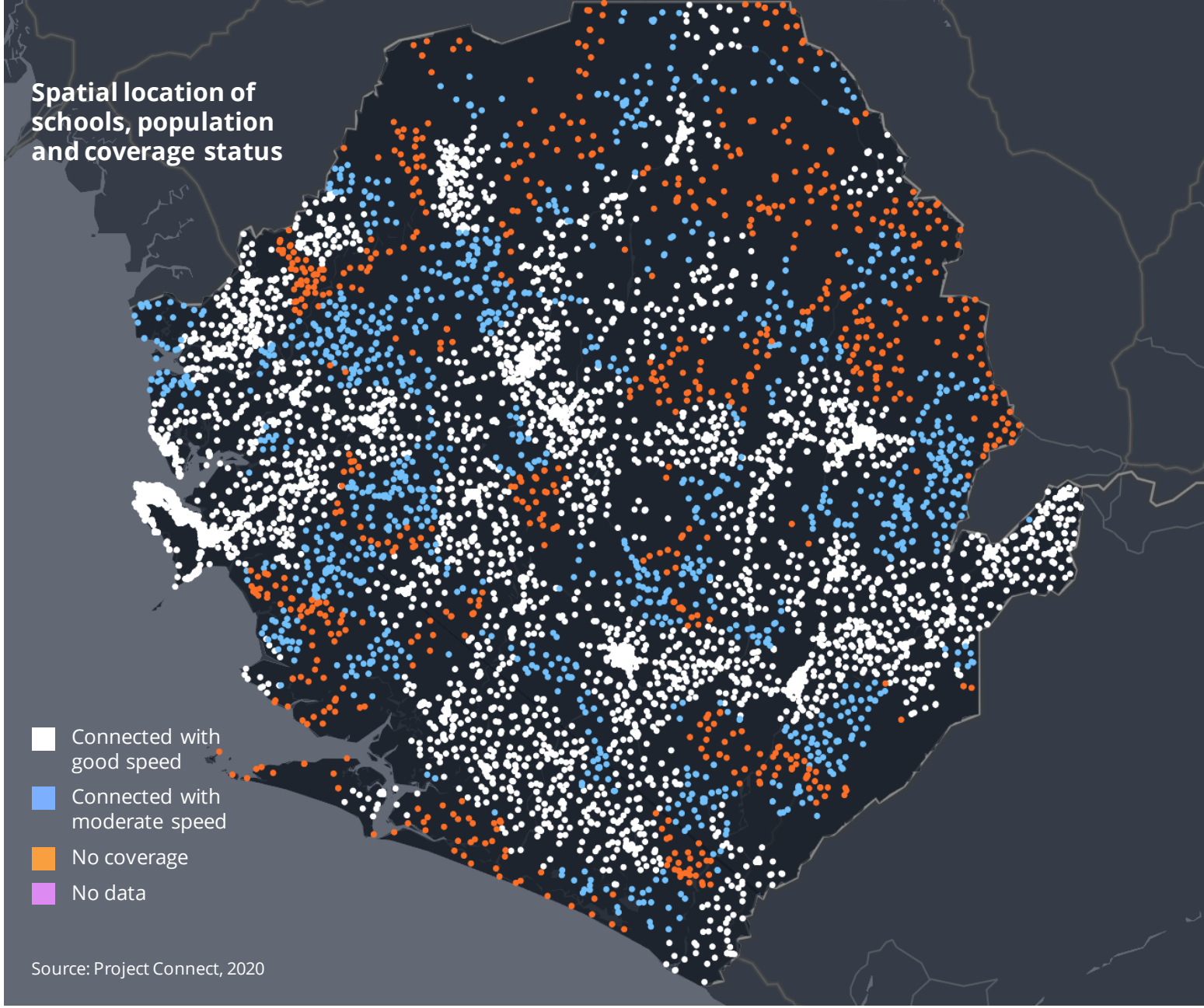
SIERRA LEONE

School Coverage and Connectivity

Total schools: 11,200



While 80% of Sierra Leone's 11,200 schools are within 3G or 4G coverage, only 205 schools are connected.



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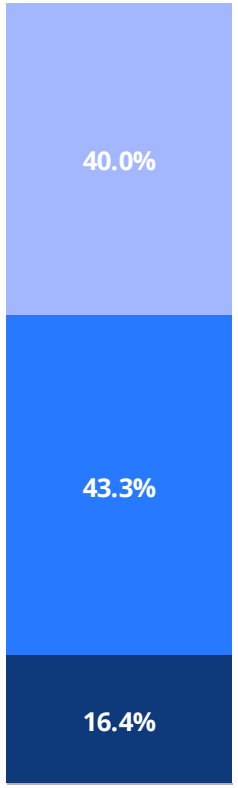
SIERRA LEONE

40% of Sierra Leoneans lack coverage and addressing the 43.3% usage gap is key to bridging the digital divide

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
40.0%	COVERAGE GAP **No mobile internet**	Increase coverage	+3.1 million Sierra Leoneans covered
43.3%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase digital literacy Increase electrification	-$3.79/GB (-82%) Increase number of schools teaching digital literacy 60% electrification rate
16.4%	CONNECTED **Active mobile internet use**	Bridge the digital divide	+9.7% annual growth of mobile subscriptions and +1.9% annual growth of internet users

Notes: Prices based on ITU Data-only mobile broadband basket 1.5GB, pro-rated down to 1GB for comparison against the Broadband Commissions 2% recommended target
Sources: 1) DSTI education data hub; Dalberg analysis; Medium term National Development Plan 2019-2023 ; GSMA, Hjort and Poulsen, Internet in Africa, 2019

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SIERRA LEONE

Targeted financing for connecting 10,995 schools can create GDP growth of over $0.3 billion

Universal expansion to all schools provides a gateway to community connectivity

Unconnected schools

10,995

Schools targeted for improved connectivity

.

Broadband users

2.1M

Students & teachers

3M

Local community members within 1 km

Economic impact

+$0.3 billion (2.2%) GDP growth

Estimated rise in domestic production from new broadband connections

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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SIERRA LEONE

School connectivity will require an estimated $59M of upfront capital expenditure and up to $34M 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: 10,995)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 13% Fiber, 22% WISP, 18% 4G and 30% Satellite

$59M Estimated total investment needed to reach 10,995 schools*

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

ONGONING ANNUAL FUNDING FOR REGULAR SERVICE FEES

Estimates based on an all-in service (72%), maintenance and technical support fee (28%):

$34M[a] Potential service fees for 10,995 schools (Giga estimate)*

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

These high-level estimates can be further refined as the workflow progresses and more mapping and specific cost data 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)

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

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SIERRA LEONE

Giga has already engaged significantly with the Government of Sierra Leone

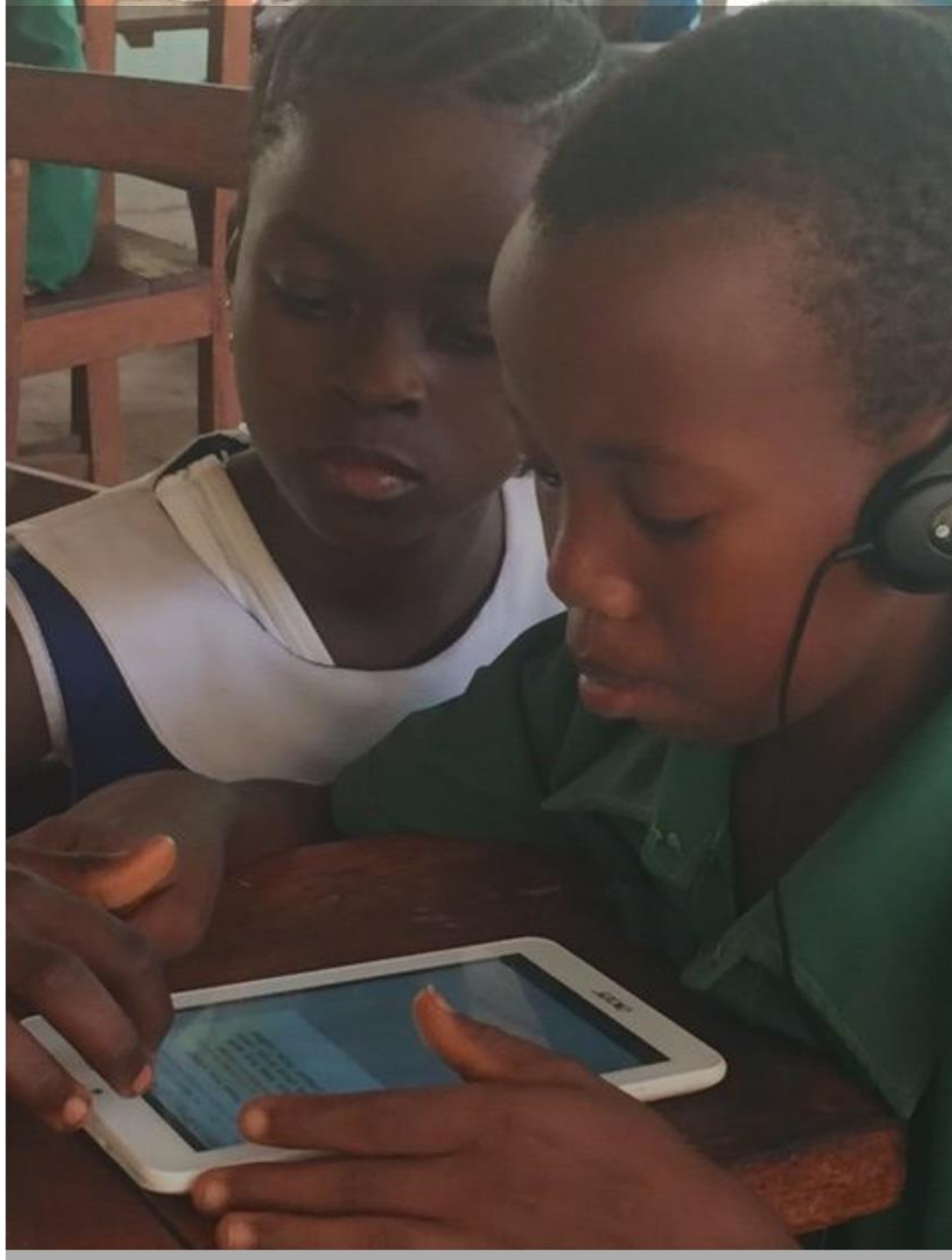
Key Stakeholders: Directorate of Science, Technology and Innovation, Ministry of Basic and Senior Secondary Education, Ministry of Finance

Giga engagement to date

- High level buy-in from the Directorate of Science, Technology and Innovation and a focal point established as Minister David Sengeh
- Sierra leone is one of the leading members of the Digital Public Goods Alliance
- Data sharing agreements and subsequent mapping analysis through Project Connect
- Completion of an upfront joint assessment to align on opportunities, constraints, priorities, and next steps

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
- Engaged with Sierra Leonean counterparts in the DPG Alliance to determine options for open source software across tele-education, tele-health, tele-work and financial services.



SIERRA LEONE

In partnership with the GoSL, Giga has identified several activities to support the cost-effective connection of 10,995 schools

Augment Project Connect mapping to identify connectivity vs coverage in order to articulate needs and refine business cases that size the investment opportunity

Use Project Connect mapping to monitor real time connectivity, electrification, and map vulnerability

Work with partners to take advantage of potential regulatory opportunities (particularly around child online protection, intellectual property and data protection laws) to boost competitiveness

Survey the landscape of implementation options – ISPs, MNOs, to identify appropriate and innovative technologies for middle- and last-mile connectivity cases

Mobilize funding to connect 10,995 schools that currently lack connectivity

Work with SALCAB to pilot Project One Access and extend implementation to 1,000 schools

Provide technical assistance to UADF Committee on best practices for efficient, cost-effective deployment of funds toward school connectivity

Work with existing accelerator programmes and ecosystem actors including DSTI to build capacity around DPGs

Leverage Sierra Leone's co-chair role on the DPG Alliance to elevate country as a regional DPG leader; strengthen capacity in DSTI as a best practice for other countries in the region

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SIERRA LEONE

Rapid Regulatory Scan

Policies

Sector strategies:[1]	
Digital transformation/broadband strategy	No
Planned e-government roll out	No
Digital education in strategy	No
Child Online Protection:[2]	
National strategy/policy?	Partial
Responsible agency?	No
Non-discriminatory inclusive use policy?	No
Data Sharing:[2]	
Data protection policy?	Partial
Privacy and data protection laws	No

ICT Regulatory Tracker[3]

Sector strategies:	
Generation of ICT Regulation	G2
Overall	56/100
C1: Regulatory Authority	16/20
C2: Regulatory Mandate	19/22
C3: Regulatory Regime	14/30
C4: Competition Framework	7/28

Regulation

Regulatory structure[1]	
Public/private sector consultation	No
Regulatory autonomy from the government	Partial
Clear planning and licensing process?	Partial
Procurement or competition agency?	No

Competition

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

Taxation

Services	
VAT[5]	15%
Sector specific tax on internet services[5]	0%
ITA Participant[6]	No
ICT Equipment import duties[7]	0-20%
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	1.3M
Contributions as % of revenue/flat fee	$160k
Other public financing mechanisms?	No
Fully utilized currently?	No
Fully active in the last 5 years?	No

Strength
Neutral
Limitation

Notes: 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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COUNTRY ANALYSES AND PLANS

Zimbabwe

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ZIMBABWE

$36M of CapEx funding and $40M of annual OpEx funding will enable Zimbabwe to connect a further 6,611 schools.

This investment will bring **2.6 million students and teachers** online and bring connectivity to **3.5 million community members** who live locally, potentially enabling up to $0.6 billion USD in GDP (1.4%) growth.

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

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ZIMBABWE

“It is envisaged that all sectors of the economy and society at large will harness the power of ICT for the development of our nation.”

H.E. PRESIDENT EMMERSON MNANGAGWA
President of the Republic of Zimbabwe

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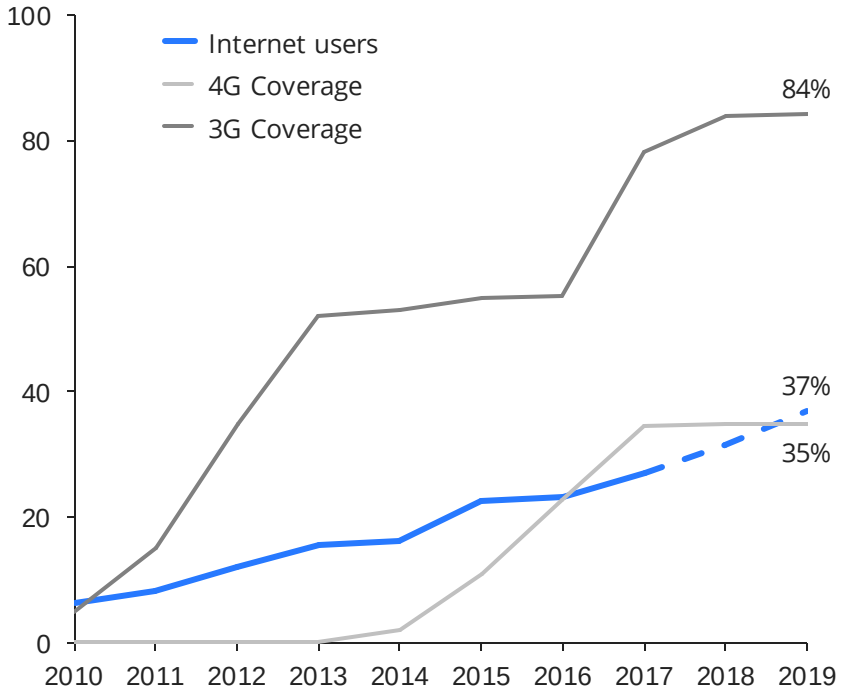
ZIMBABWE

Over the last 10 years significant progress has been made to reach the government's 2020 universal access target

In the last 10 years mobile connectivity has expanded, use has steadily increased

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



The Government of Zimbabwe is aiming to drive economic growth through digitization, with universal access to connectivity in 2020

Zimbabwe hopes to achieve this target through the following internet connectivity and education policies:

- Zimbabwe National Policy for ICT 2016: Set the country on a path to become a knowledge-based society targeting ubiquitous connectivity by 2020. Strategic focus included: closing the digital divide through rural coverage, improved electricity access, ICT skills development and policy streamlining. The policy also includes a target that 30% of applications used by government are developed locally. ICT usage in primary and secondary schools is flagged as a policy priority
- Education Sector Strategic Plan (2016-2020): Concurrently a major pillar of the education sector plan put ICT at the center of the curriculum and placed an emphasis on the provision of specialist equipment/rooms. The plan also emphasizes the importance of ICT to improve institutional management and administration

Note: Figure refers to 4G and broadband networks.
Source: ITU (2020) World Telecommunication/ICT Indicators Database; Ministry of Information, Communication, Technology, Postal and Courier Services of Zimbabwe (2016) Zimbabwe National Policy for Information and Communications Technology (ICT); Ministry Of Primary And Secondary Education (2015) Education Sector Strategic Plan 2016 – 2020

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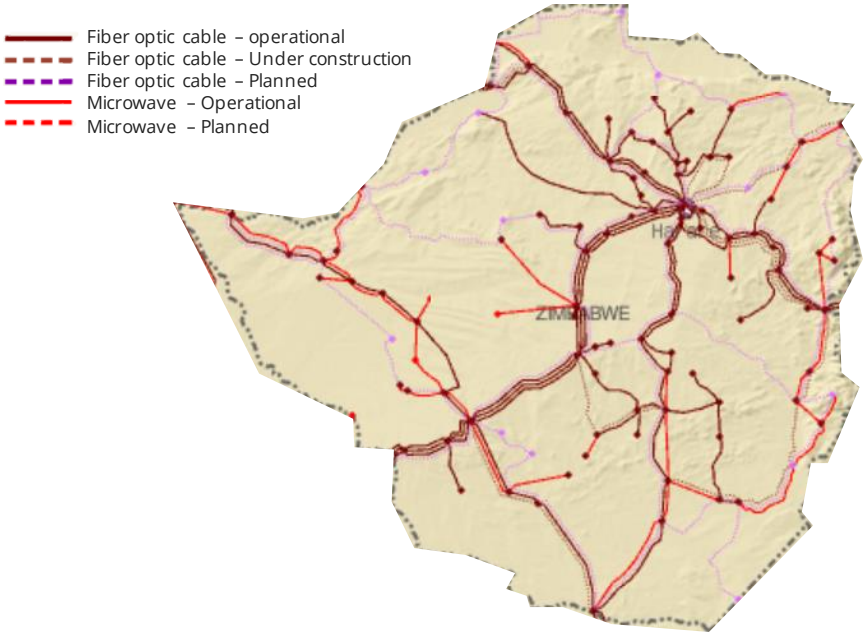
National fiber network



	Mobile	Fixed
Subscriptions per 100 inhabitants	52	1.4
5-year CAGR	+4%	+4%

Current status: National Coverage and Connectivity

The country's National Broadband Backbone (NBB) has three international connections. The transmission network has over 9,500km of fiber interconnecting major cities and towns across the country

Sources: ITU (2020) World Telecommunication/ICT Indicators Database; ITU (2020) Broadband Transmission Mapping; Potraz (2020) National Broadband Backbone Description – Website

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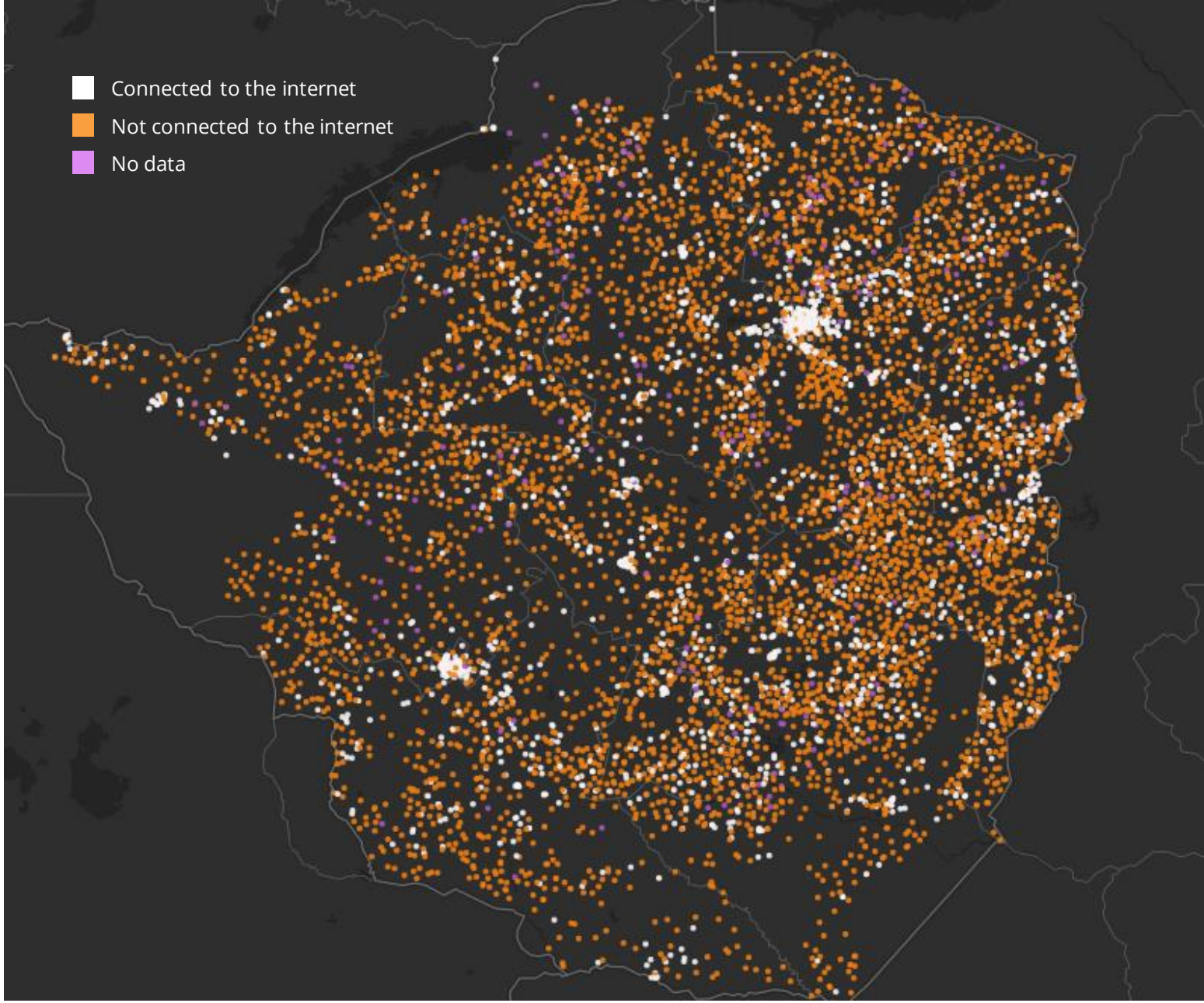
School Coverage and Connectivity

School type	Total	With	Without
Primary	6,671	1,751	4,920
Secondary	2,954	1,263	1,691
Total	**9,625**	**3,014**	**6,611**

Approximately 31% of Zimbabwe's primary and secondary schools have internet access. In rural areas the vast majority are connected by ADSL or VSAT. Primary schools form the bulk (75%) of the country's 6,611 unconnected schools.



Note: From the 2017 Census to the more recent education statistics report school without internet connectivity actually increased for both primary schools (4683 to 4920) and secondary schools (1499 to 1691)
Source: Ministry Of Primary And Secondary Education (2020) 2019 Primary And Secondary Education Statistics Report; Information And Communication Technology (ICT) Census (2017) – Access And Use By Education Institutions Report

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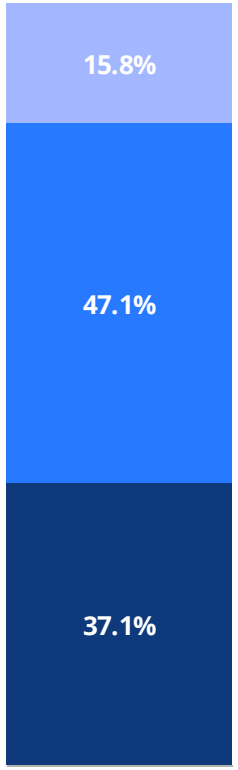
ZIMBABWE

Almost 16% of Zimbabweans lack coverage and 47% face affordability and electrification challenges

THE MOBILE INTERNET COVERAGE AND USAGE GAP



CONNECTIVITY ACCESS		NEEDS	GOALS
15.8%	COVERAGE GAP **No mobile internet**	Increase coverage	+1 million Zimbabweans
47.1%	USAGE GAP **Covered by 3G/4G but not connected**	Increase affordability Increase electrification	-$12/GB (-81%) Power 8.6 million off-grid users
37.1%	CONNECTED **Active mobile internet use**	Achieve digitally enabled growth for all	80% Internet geographical coverage

Notes: *Mobile internet prices have fluctuated within the last 12 months, in part due to price increase by POTRAZ but also du e to unstable domestic currency. Some sources quote much higher prices, up to $75 (Cable, 2019). 2% GNI per capita is the Broadband Commission's global recommendation. Note that Individuals in remote locations will likely spend a higher proportion due to lower income levels.
Source:ITU (2020) World Telecommunication/ICT Indicators Database

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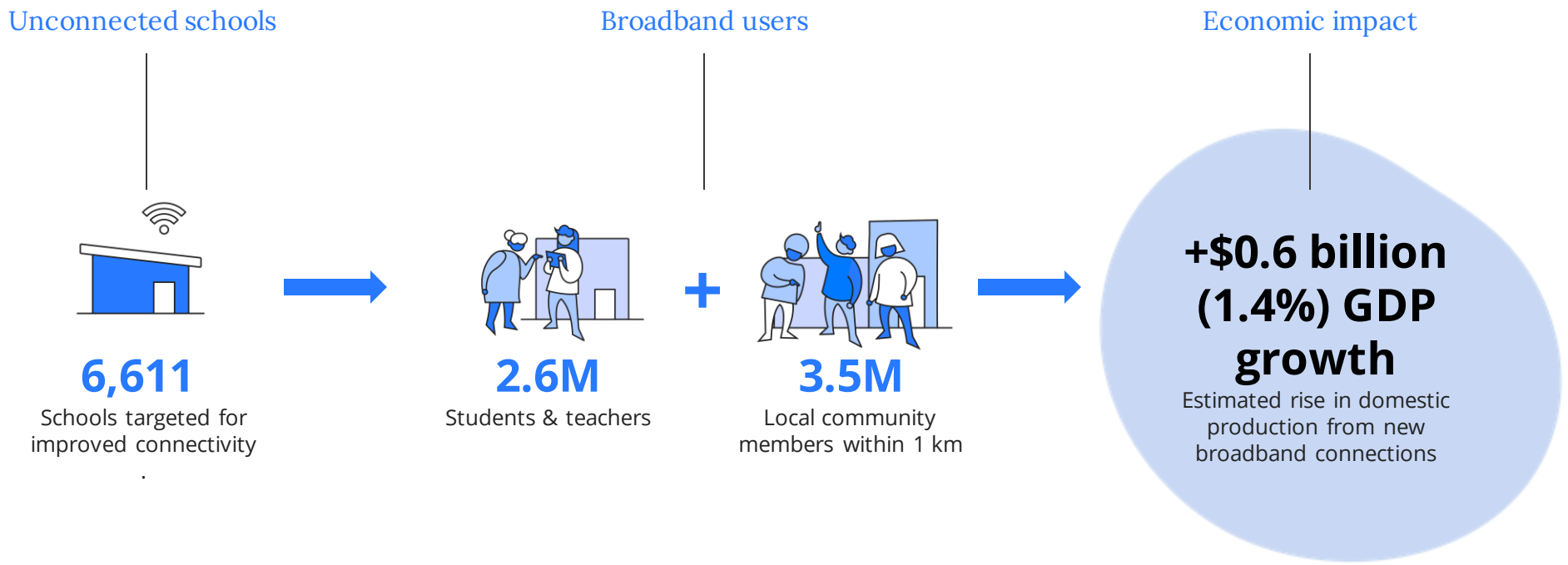
ZIMBABWE

Targeted financing for connecting 6,611 schools can create GDP growth of over $0.6 billion

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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ZIMBABWE

School connectivity will require an estimated $36M of upfront capital expenditure and up to $40M 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: 6,611)

UPFRONT LAST-MILE INFRASTRUCTURE CAPITAL

Based on an initial technology assessment: 28% Fiber, 33% WISP, 18% 4G and 21% Satellite

$36M

Estimated total capital expenditure needed to reach 6,611 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 FEE (64%) and a maintenance and technical support fee (36%):

$40.8M [a]

Potential service fees for 6,611 schools (Current estimate)*

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

The Government of Zimbabwe has invested $xxM in connecting schools since xxxx year. [b]

Notes: These high-level estimates can be further refined as the workflow progresses and more mapping and specific cost date is established. A) Based on a 2017 ICT in schools census, approximately $10.8M was spent on internet charges and connection fees across 1,752 educational institutions, averaging 6,147 per school, this is used to establish the baseline service level in Zimbabwe. B) Source: Ministry of ICT and Ministry of Education
Source: Giga and Dalberg Analysis (2020) based on Giga ACTUAL mapping and modelling input data

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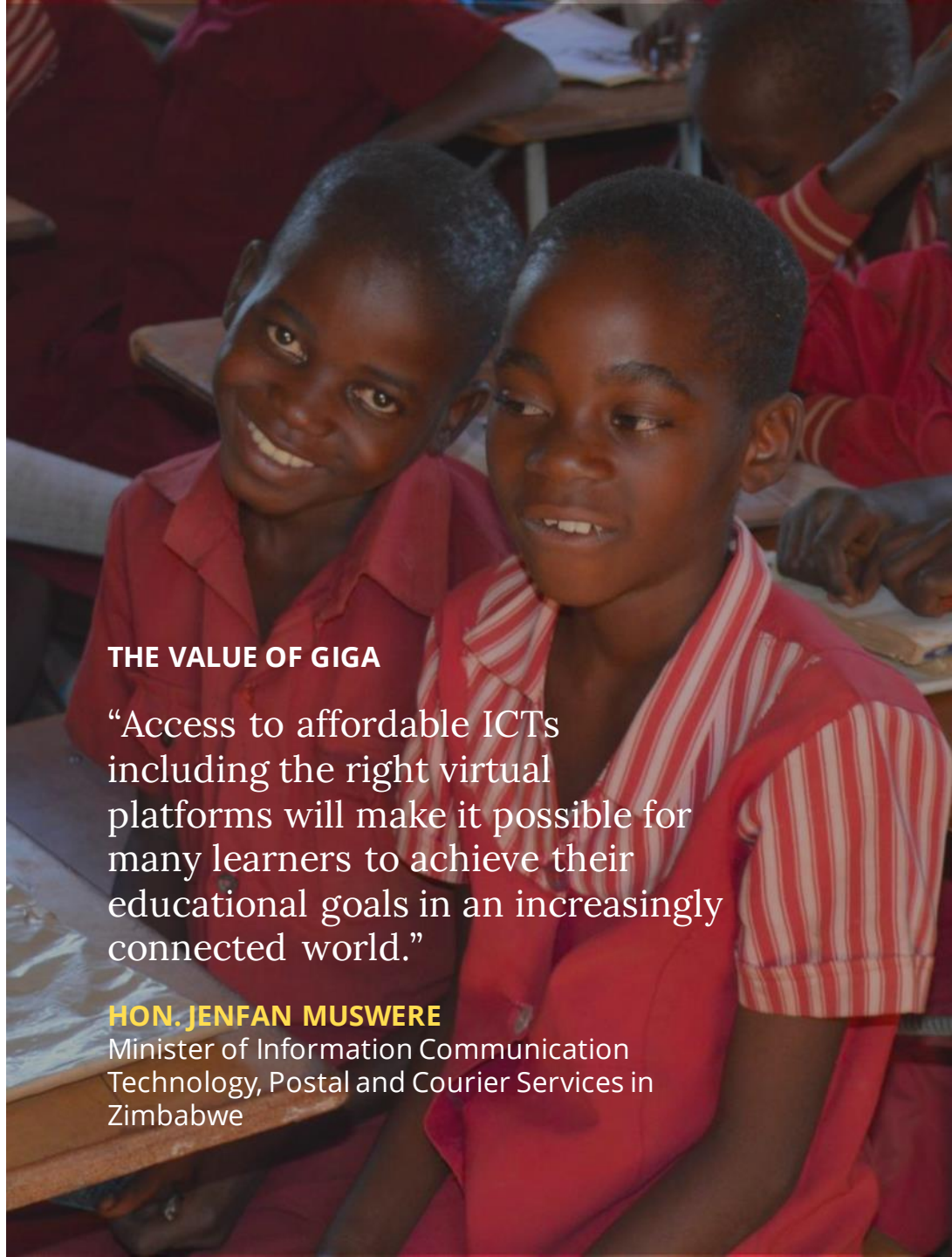
ZIMBABWE

Giga has started to engage with the Government of Zimbabwe (GoZ)

Key Stakeholders: The Government of Zimbabwe; Ministry of Information Communication Technology, Postal and Courier Services; Ministry of Primary and Secondary Education; Ministry of Finance and Economic Development; Information Communication Technology, Postal and Courier Services regulators and service providers

Giga engagement to date

- High level support from His Excellency President Emmerson Mnangagwa and line Ministers
- A focal point established at the Ministry of Information Technology and Courier Services
- School mapping data shared with Project Connect Team
- Completion of an upfront assessment to identify priorities, opportunities and initiatives to leverage



THE VALUE OF GIGA

"Access to affordable ICTs including the right virtual platforms will make it possible for many learners to achieve their educational goals in an increasingly connected world."

HON. JENFAN MUSWERE
Minister of Information Communication Technology, Postal and Courier Services in Zimbabwe

ZIMBABWE

Giga has identified several activities to support the cost-effective connection of 6,611 schools

Use Project Connect mapping to identify schools and refine the investment needs for unconnected schools

Augment existing service providers programming with real time monitoring to confirm service levels and report on ongoing internet service coverage

Work with ISPs and MNOs (to identify opportunities to reduce data costs for schools and students

Estimate capex and ongoing opex costs for connecting all schools

Support the design of policies and regulatory strategies for affordable last mile access technologies and connectivity options

Define a partnership and fund strategy to connect the 6,611 schools that currently lack connectivity

Co-develop sustainable models for improving affordability of connectivity along with potential incentives for successful public-private partnerships

Work with Ministries of Education and ICT to explore opportunities for DPGs to play a role alongside other emerging private e-learning platforms

Strengthen the entrepreneurial ecosystem to build a pipeline of locally developed digital public services and goods (e.g. link to venture funding and acceleration content for public goods creation)

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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[9]	Yes
Child online protection:[2]	
National strategy/policy?	Yes
Responsible agency?	Yes
Non-discriminatory inclusive use policy?	No
Data sharing:[2]	
Data protection policy?	Yes
Privacy and data protection laws	Yes

ICT Regulatory Tracker

Sector strategies:[3]	
Generation of ICT Regulation	G3
Overall	74/100
C1: Regulatory Authority	19/20
C2: Regulatory Mandate	14/22
C3: Regulatory Regime	14/30
C4: Competition Framework	26/28

Regulation

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

Competition

Regulatory structure[1]	
SMP in national anti-trust/competition law	No
Spectrum technology neutrality in place	No
No foreign investment restrictions?	Yes
Infrastructure sharing?	Yes
Wireless Operators Market HHI[4]	5398
Fixed Broadband Operators Market HHI[4]	6260

Taxation

Services	
VAT[5]	14.5%
Sector specific tax on internet services[5]	10%
ITA Participant[6]	No
ICT Equipment import duties[7]	5%
Ongoing regulatory/license fees[1]	Yes

Universal Access

Services[8]	
Is school broadband is universal service?	Yes
Operational Universal Service Fund (USF)?	Yes
Total amount allocated/disbursed so far	$44M
Contributions as % of revenue	1.5%
Other public financing mechanisms?	Yes
Fully utilized currently?	Limited
Fully active in the last 5 years?	Partial

Strength
Neutral
Limitation

Notes: 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 9) Zimbabwe Education Sector Strategic Plan (2016-2020)

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04

Annex

El Salvador

Map

A. Use Project Connect mapping to update the location and connectivity data provided by GoES and refine business case that sizes the investment opportunity
B. Refine school connectivity strategy based on benchmarks and set targets for connectivity
C. Real time monitoring for school connectivity, including to support project FOMILENIO II installation

Connect

A. Provide technical assistance to address spectrum allocation, infrastructure sharing and mobile sector taxation to boost competitiveness and improve affordability
B. Explore opportunities to re-establish the USF
C. Provide technical assistance to address child online protection, intellectual property and data protection laws to protect consumers
D. Survey the landscape of implementation options – ISPs, MNOs, to identify appropriate last mile connectivity cases for FOMILENIO II schools through COATL and for schools outside the FOMILENIO II catchment

Finance

A. Mobilize funding to connect schools outside of FOMILENIO II project scope that currently lack connectivity (3,146 schools)
B. Explore mechanisms to provide funding to the GoES PPP model, with COATL to possibly receive investments from development banks + other private funders
C. Work with the government prepare procurement lots for school connections

Empower

A. Provide support to develop local, regionally relevant digital solutions, especially digital public goods
B. Support open data platforms for education development
C. Support to develop, strengthen and contextualize digital public goods focused on youth development services
D. Across sectors, identify gaps where global DPGs can be combined with local solutions, adapted and scaled
E. Support business model development and explore financing options to scale open data/content solutions, including local hosting
F. Facilitate connections with broader UNICEF expertise on scaling digital textbooks and content

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Honduras

Map

A. Expand Project Connect mapping to identify connectivity vs coverage in order to articulate needs and refine the business case and investment opportunity
B. Use Project Connect mapping to monitor real time connectivity and ensure project sustainability and accountability

Connect

A. Work with Government to refine the government's school connectivity strategy based on benchmarks and set targets for connectivity in the coming years
B. Work with partners to take advantage of potential regulatory opportunities (particularly around child online protection, intellectual property and data protection laws) to safeguard users
C. Survey the landscape of implementation options to identify appropriate last mile connectivity cases for schools

Finance

A. Provide technical assistance on the development of performance contracts/results-based financing impact bond models for connectivity that can become best practices in the sector
B. Mobilize funding to connect 16,445 schools that currently lack connectivity
C. Work with the government prepare procurement lots for school connections to ISPs and MNOs
D. Provide technical assistance to USF committee on best practices for the efficient and cost-effective deployment of funds towards school connectivity

Empower

A. Support the Covid-19 response program and deploying existing DPGs and leveraging best practice from other countries
B. Identify Honduran DPG solutions to scale in other Giga countries particularly those in the region and vice versa
C. Strengthen the entrepreneurial ecosystem to build a pipeline of locally developed digital public services and goods
D. Work with existing accelerator programs (for example 'Honduras Startup') and ecosystem actors to build capacity around DPGs
E. Leverage and scale solutions that go beyond learning and skills building
F. Work with GOH to put in place processes to strengthen accountability and ensure good governance

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Kenya

Map

A. Use Project Connect mapping to identify need and refine business case that sizes the investment opportunity
B. Refine school connectivity strategy based on benchmarks and set targets for connectivity
C. Use Project Connect mapping to monitor real time connectivity, DPL and performance of the CBC

Connect

A. Provide technical assistance to address policy, regulatory and tax barriers (particularly around USF, spectrum allocation, infrastructure sharing, child protection, intellectual property, data protection laws and excise taxation) to boost competitiveness and protect consumers
B. Commission feasibility studies on the inclusion of school connectivity under KENET

Finance

A. Mobilize funding to connect 23,300 primary schools that currently lack connectivity
B. Work with the government to prepare procurement lots for school connections

Empower

A. Provide support to develop local regionally relevant digital solutions, especially digital public goods (DPGs)
B. Support open data platforms for education and youth development
C. Across sectors, identify gaps where global DPGs can be combined with local solutions, adapted and scaled
D. Support business model development and explore financing options to scale open data/content solutions, including local hosting
E. Facilitate connections with broader UNICEF expertise and other initiatives on scaling digital textbooks and content

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Kyrgyzstan

Map

A. Use Giga mapping to identify and monitor in real time internet service delivery at schools across the country
B. Provide national government with transparent data service delivery, such as school-level internet pricing and quality (speed, reliability) to inform procurement practices
C. Support technological assessment based on mapping for connecting remaining 20 schools that are in difficult to reach areas

Connect

A. Survey existing regulatory policy landscape and assess funding resources. This could involve supporting establishment of a Universal Service Fund, as well as supporting implementation of forthcoming child online protection
B. Further develop Open Data infrastructure, including public procurement policies, and raise awareness across public and private sector actors

Finance

A. Commission feasibility studies to connect remaining schools that are in difficult to reach areas
B. Mobilize concessional financing for infrastructure buildout to reach remaining schools, such as through conversations with IsDB
C. Support sustainable financing opportunities for ongoing fees, especially around the additional budget needed to service the 671 schools being brought under the national program
D. Assist the government to efficiently structure procurement of internet services from private providers to improve pricing and quality of service based on mapping data

Empower

A. Support MoES to optimize platforms and content for mobile
B. Adapt DPG resources to the Kyrgyz context, including integrated services around health and finance
C. Partner with local accelerators, such as Startup Kyrgyzstan, to enhance start-up landscape through funding opportunities and open source integration support
D. Connect with UNICEF education experts for support on (1) “Digital Content Center” for the ministry where teachers and IT specialists can collaborate on building content, and (2) ensure that digital learning administrators and teachers are ICT trained and qualified

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Niger

Map

A. Use mapping technology to more accurately deploy connectivity to create efficiencies in the roll out of Smart Villages
B. Build real-time monitoring platform for accountability of providers
C. Support municipal education authorities in their ongoing mapping efforts
D. Work with ANSI and MNOs to use mapping to inform and optimize 4G expansion plans to accommodate school coverage

Connect

A. Start a connectivity working group (alongside ANSI, the World Bank and Ministry of ICT) to share knowledge and coordinate school connectivity deployment across actors
B. Showcase GoN leadership on global stage through Smart Villages as global example, e.g. learning from Niger's bandwidth needs, financial models, etc.
C. Explore ways to build on regulatory reforms/activities to increase investment attractiveness

Finance

A. Targeted investment in addition to the World Bank package – e.g. schools first opportunities; immediate opportunities for small scale pilots for different last-mile technologies
B. Develop innovative financing methods, e.g. digital bond in Honduras with the IDB – framework to aggregate demand across villages to bring down prices from satellite and telco ISPs
C. Work with 4G licensees to provide tailored packages for school use

Empower

A. Onboard Niger as a Digital Public Goods Alliance Pathfinder, identify areas of public services that need open source solutions and mobilize resources together to build/scale chosen applications
B. Explore opportunities for local providers to engage in Smart Villages and support the local entrepreneurial ecosystem by scaling existing programs e.g. Code Local
C. Link with UNICEF Education to accelerate Smart Villages 'Education Quick Wins'
D. Identify approaches to fully engage women, girls and out of school youth in both school and community internet use

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Organisation of Eastern Caribbean States

Map

A. Use Giga mapping to monitor in real-time school level internet connectivity, This will improve quality, consistency and value for money of internet services
B. Refine school connectivity strategies based on benchmarks and set targets for connectivity.
C. Integrate connectivity plans for other public services, such as health centers, to ensure efficiency of implementation

Connect

A. Build capacity of OECS regional initiatives, such as ECTEL. Harmonizing and strengthening regulation and policy in line with 2028 Development Strategy, such as issues of market dominance and cost regulation frameworks
B. Identify regulatory and tax barriers to boost affordability, protect consumers, and encourage more competitive markets for local service providers
C. Survey the ecosystem of implementation options – ISPs, MNOs, NRENs – especially to scope opportunities for greater competition from smaller national players and associated investment

Finance

A. Mobilize investment to support deployment expand or improve connections to all schools
B. Explore mechanisms for OECS joint and regional procurement to aggregate the demand of connectivity of Member States. In IDA countries, this will be in alignment with CARCIP/ CARDTP
C. Seek funding and pricing discounts for targeted services and products. Including support to educational systems, remote learning, delivery of health services etc.
D. Work with Member States to allocate long-term funds to procure both bandwidth and devices
E. Identify local service providers who could receive investment to expand their operations

Empower

A. Support OECS Member States to adapt global DPG resources and scale up use of digital textbooks and content for remote learning, including content designed for inclusive access
B. Strengthen the entrepreneurial ecosystem to build a pipeline of locally developed digital public services and goods. Which can be linked to venture funding and specific DPG acceleration content)
C. Extend the reach and use of digital applications and services to broaden access to the digital economy, including health related applications and financial services

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Rwanda

Map

A. Use Giga mapping to identify school-level energy resources and internet connectivity needs and refine business cases for separate packages of investment
B. Refine the school connectivity strategy based on benchmarks and set associated targets for monitoring. Integrate connectivity plans for other public services, such as health centers, to ensure efficiency of implementation
C. Provide the government with ongoing transparent data on service delivery, such as internet pricing and quality (speed, reliability) to inform contracting decisions

Connect

A. Explore ways to build on regulatory reforms/activities to increase investment attractiveness and boost affordability and protect consumers
B. Explore adoption of Open Data practices among government and private actors
C. Survey the ecosystem of implementation options – ISPs, MNOs – and partnership to further develop NRENs as an alternative educational service provider
D. Exploring innovative and appropriate last-mile connectivity solutions

Finance

A. Structure procurement lots to bring broadband to SMART classrooms and targeted primary schools
B. Mobilize concessionary investment to deploy last-mile solutions and middle-mile networks to connect the remaining 1,796 schools, as well as lateral connections to healthcare centers, and public institutions
C. Support the development of sustainable business models for
D. Work with MINEDUC, MINICT and RISA to negotiate lower service fees from ISPs and the develop an NREN that also supports secondary and primary schools to lower data costs further

Empower

A. 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
B. Empower the local startup ecosystem to produce digital content and digital public goods for use across the region
C. 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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Sierra Leone

Map

A. Augment Project Connect mapping to identify connectivity vs coverage in order to articulate needs and refine business case that sizes the investment opportunity
B. Refine school connectivity strategy based on benchmarks and set targets for connectivity
C. Use Project Connect mapping to monitor real time connectivity, electrification, and map vulnerability

Connect

A. Work with partners to take advantage of potential regulatory opportunities (particularly around child online protection, intellectual property and data protection laws) to boost competitiveness
B. Survey the landscape of implementation options – ISPs, MNOs, to identify appropriate and innovative technologies for middle mile and last mile connectivity cases

Finance

A. Mobilize funding to connect 10,995 schools that currently lack connectivity
B. Work with SALCAB to pilot Project One Access and extend implementation to 1000 schools
C. Provide technical assistance to UADF committee on best practices for the efficient and cost-effective deployment of funds towards school connectivity

Empower

A. Identify Sierra Leonean DPG solutions to scale in other Giga countries
B. Work with existing accelerator programmes and ecosystem actors including DSTI to build capacity around DPGs
C. Leverage and scale solutions that go beyond learning and skills building
D. Leverage Sierra Leone's co-chair role on the DPG Alliance to elevate country as a regional DPG leader
E. Strengthen capacity in DSTI and promote DSTI as a best practice for other countries in the region

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Zimbabwe

Map

A. Use Project Connect mapping to identify schools and refine the investment needs for unconnected schools
B. Utilize ongoing school internet service monitoring and surveys to identify schools that could be well placed for improved connectivity
C. Augment existing service providers programing with real-time monitoring to confirm service levels and report on ongoing internet service coverage

Connect

A. Work with ISPs and MNOs to identify opportunities to reduce data costs for schools and students
B. Work with providers on developing models for improving speeds/quality of service for schools that are already connected
C. Estimate capex and ongoing opex costs for connecting all schools
D. Support the design of policies and regulatory strategies for affordable last mile access technologies & connectivity options, specifically those applied to school usage, including enabling licensing regime, effective and efficient spectrum management, infrastructure sharing and open access

Finance

A. Define a partnership and fund strategy and mobilize financing to connect the 6,611 schools that currently lack connectivity
B. Potential to learn lessons and expand on the ongoing school connectivity project and existing processes
C. Co-develop sustainable models for improving affordability of connectivity along with potential incentives for successful public-private partnerships

Empower

A. Work with the Ministries of Education and ICT to explore opportunities for DPGs to play a role alongside other emerging private e-learning platforms
B. Link with UNICEF digital education team on digital curricula, content and teacher training
C. Leverage the Digital Public Goods Alliance to adapt global DPG resources and scale up use
D. Strengthen the entrepreneurial ecosystem to build a pipeline of locally developed digital public services and goods (e.g. link to venture funding and acceleration content for public goods creation)

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For more information, contact us at **info@giga.partners** or through our website **www.gigaconnect.org.**

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