

AFFORDABILITY REPORT 2014



WELCOME

Welcome to the Affordability Report – an in-depth annual research initiative produced by the Alliance for Affordable Internet, the world's broadest technology sector coalition. The report is part of our ongoing efforts to understand why some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly. A4Al's over 70 members believe that affordability remains the biggest barrier to universal access, and that reforming policy and regulation is critical to driving down the cost to connect and bring billions more online.

This year's study covers 51 developing and emerging countries. It also contains a roadmap for achieving affordable Internet, with more than 30 detailed policy recommendations for governments, businesses and not-for-profits. We believe it will prove an invaluable resource for all those working in this arena.

We also encourage you to check out our dedicated online portal at www.a4ai.org/affordabilityreport, where you'll find an interactive data explorer covering all 51 countries.

We hope this report proves valuable to your work, and helps to bring the life-changing benefit of affordable Internet access to billions more around the globe.

Sonia N Jorge

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EXECUTIVE SUMMARY

Most of those who are not connected simply cannot afford to be. While many studies note that access prices are falling around the world, we find that the cost of fixed broadband remains about 40% of an

average citizen's monthly income across the 51 countries covered in this study, while the price for an entry-level mobile broadband package hovers at just above 10% of monthly incomes. Other issues, such as lack of relevant content, and limited digital and language literacy, combine to entrench this divide even further.

The Alliance For Affordable Internet's 2014 Affordability Report is an effort to identify and quantify some of these challenges, and to identify what policy and regulatory drivers can lead to enhanced affordability. We aim to understand why some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly.

Emerging Economies	Developing Economies
Costa Rica	Rwanda
Colombia	Nigeria
Turkey	Morocco
Malaysia	Uganda
Peru	Kenya

At the heart of the report is the "Affordability Index". This unique composite Index scores each of the 51 countries included in the report on a scale of 0 -100, based on both current penetration and usage rates, and the policy and regulatory environment in

EXECUTIVE SUMMARY

place that could lead to further progress. A statistical analysis proves that high scores on the Affordability Index are strongly correlated with lower broadband prices. To help assess drivers in more detail, the overall Affordability Index is broken down into two sub-indices - (1) the infrastructure sub-index and (2) the access sub-index.

This year, Costa Rica tops the overall rankings, followed by Colombia, Turkey, Malaysia and Peru - all middle-income countries. Rwanda secures the top spot among developing countries, followed by Nigeria, Morocco, Uganda and Kenya.

In this year's report, we also note that certain groups are far less likely to be able to connect to the Internet affordably. Specifically, our research finds that:

- In the 51 countries that we surveyed, there are approximately two billion people earning less than \$2 a day (\$60 per month), according to World Bank data. Depending on the country in which they live, these individuals have to spend anywhere between 5.5% and 114.5% of their average monthly income in order to access an entry-level broadband package. At present, not a single emerging or developing country can claim to meet the affordability benchmark set by the United Nations (UN) Broadband Commission of broadband priced at less than 5% of monthly income for those potential users surviving on less than \$2 a day.
- Across the board, women are far less likely to be able to access the Internet affordably than men. Research has shown that women, on average, earn 30% - 50% less than men. This income disparity diminishes the ability of women to afford to access, adopt, and benefit from a broadband connection. The Internet access gender gap is apparent throughout the world, although the extent of the gap varies from region to region.
- Those living in rural areas are often unable to secure affordable access to the Internet. This is for two primary reasons: (1) incomes tend to be lower in rural areas, resulting in a higher real cost to connect; and (2) challenges associated with infrastructure deployment in rural areas result

These are:

partnerships.

A level playing field that encourages innovation and gives consumers a range of choices as to their service provider; a unified licencing framework is of particular value here.

III. Efficient spectrum allocation

IV. Infrastructure sharing models

costs.

V. Universal access to affordable Internet services

Development of shared services, available at community centres, schools, libraries and other anchor institutions; especially important in rural areas.

Given the transformative potential that affordable access to the Internet holds, we recommend that affordable access to broadband Internet is enshrined as a sustainable development goal (SDG) by the United Nations General Assembly when it meets later this year. Close collaboration between key players including government decision makers, international development partners, private sector, academia and civil society - on the five areas identified above will be essential to make this a reality.



in limited opportunities for access – particularly under current regulatory environments - or in access prices that are significantly more expensive than those in urban areas.

Using statistical tools, we have analysed the relationships between policies and regulations, and the affordability environment in each country. We have identified five common success factors.

I. Effective broadband strategies

Clear and comprehensive national broadband plans, which allow for increased private investment, remove barriers to infrastructure deployment, and encourage public-private

II. Enhanced competition

Spectrum allocated in a fair and competitive way, with innovative spectrum tools considered.

Laws and partnerships designed to embed open access methods and reduce sunk infrastructure



INTRODUCTION 1.1

In 2014, almost 60% of global households remained unconnected to the Internet. In developing countries, fewer than one in three people are online; in the world's 49 least developed countries, that figure plummets to just 5%.

There are also ominous signs that progress may be decelerating. According to a <u>recent study by McKinsey</u> <u>& Company</u>, the worldwide growth in Internet users has slowed from a three-year compound annual growth rate (CAGR) of 15.1% from 2005–2008, to 10.4% from 2009-2013.

Clearly, significant barriers to online access persist. The most pernicious is the high cost to connect. In 2011, the UN Broadband Commission set a target for entry-level mobile or fixed broadband to cost no more than 5% of average monthly incomes (Gross National Income (GNI) per capita), by 2015. We will fall woefully short of that target. According to the International Telecoms Union (ITU), at the end of 2013, the average price for an entry-level fixed broadband connection in the developing world represented more than a quarter of an average citizen's monthly income. Meanwhile, the price for an entry-level mobile broadband package hovers between 8% and 11.5% (depending on the plan chosen) in developing countries. By contrast, the cost to connect in many developed countries is near negligible. Citizens of rich nations pay on average just 1-2% of their monthly income to connect. Other issues, such as lack of relevant content, and limited digital and language literacy, further entrench this divide.

These access challenges are felt more acutely among certain populations as a result of geographic, economic, gender and socio-cultural factors, with marginalised or vulnerable groups often the hardest hit. Rural Internet users have reduced access when compared with their urban counterparts; low-income populations are disproportionately underrepresented online; and persistent income gaps, coupled with engrained social and cultural norms, keep women and other marginalised populations both from being able to afford Internet services and from being able to use the Internet freely.

BEYOND ACCESS: IMPROVING THE QUALITY OF AFFORDABLE BROADBAND

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The Internet has the potential to improve the quality of life – particularly for poor and marginalised communities – in myriad ways. By increasing access to information and making communication more efficient, we can observe beneficial economic and social impacts in areas like entrepreneurship, health, education, and more. There have been multiple studies looking at the benefits of enhanced access, but perhaps one recent statistic from the Copenhagen Consensus Centre is the most telling: increasing mobile broadband penetration levels threefold across the developing world would provide a return of \$17 for each dollar spent. This considers both the economic growth that would be stimulated by increased access, as well as the cost savings that governments could achieve as a result.

Access alone is not enough to reap the full extent of benefits that the Internet can bring. The broadband services available must also be of a high quality. There are several proposals for increasing access to broadband that is both high speed and affordable. For example, the ITU broadband "<u>Goal 20-20</u>" initiative sets a target of broadband Internet speeds of 20 megabits per second (Mbps) for \$20 a month, accessible to everyone in the world by 2020.

Developed countries have led the way in translating this vision into its Broadband Strategy, which sets out specific broadband targets for the European Union (EU) through 2020. The strategy sets out to achieve: (1) basic broadband (2 Mbps) for all EU citizens by 2013; (2) full EU coverage by broadband with speeds of at least 30 Mbps by 2020; broadband speeds of 100 Mbps, or higher, by 2020.

The United States has launched a similar initiative. The US National have download speeds of 50 Mbps and actual upload speeds of 20 Mbps. It also suggests "every American community should have as critical for innovation and growth – an issue often overlooked in the broadband access debate across many developing countries.

INTRODUCTION CONTINUED 1.1

The unprecedented potential of the Internet to empower marginalised groups and deliver social and economic benefit has not gone unnoticed by policy makers. Indeed, many are advocating that affordable access should be at the heart of the UN's forthcoming sustainable development goals (SDGs), which will set the global development agenda for the next fifteen years. At a country level, governments are stepping up efforts to improve access to and affordability of broadband Internet. Increasingly, governments are recognising that connecting the unconnected requires a well-rounded approach to address barriers to access, including investment in new technologies, policy and regulatory reforms that reduce industry

cost structures, and sustained efforts to bring affordable access to households, small enterprises, and communities. However, while technology advances at a breakneck pace, the process of updating policy and regulatory frameworks remains slow. All too often, innovative technologies with the power to reduce the cost to connect are held back by poor or out-dated policies. The policy development environment varies widely across countries, and often does not take advantage of the private sector's ability to create competitive and innovative edges, if given the right incentives.

ABOUT THE A4AI AFFORDABILITY REPORT 1.2

The Affordability Report represents an ongoing effort to understand why some countries have succeeded in making Internet access more affordable, accessible and universal, and what others can do to catch up quickly. The report assesses the policy and regulatory environments in 51 countries, and analyses the effectiveness of government programmes in addressing the divides and barriers that prevent affordable access to the Internet. At the heart of the report is the Affordability Index, a unique composite Index that assigns countries a score of between 0-100

based upon the drivers of affordability observed in the country.

This is the second edition of this annual study, which was first produced in 2013. This 2014 edition features five new countries (Myanmar, Mozambique, Dominican Republic, The Gambia and Haiti), and benefits from an improved research methodology, including streamlined and clearer survey questions based on feedback gathered last year.



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2.1 CALCULATING THE INDEX

To produce our country rankings, we blend secondary data, from reliable, established sources, with primary data and in-depth country research based on surveys conducted by country experts.

The Affordability Index is a composite index, composed of two sub-indices that measure the impact of two drivers critical to affordability: infrastructure and access.

- The **infrastructure sub-index** measures the current extent of infrastructure deployment and operations, alongside the policy and regulatory frameworks in place to incentivise and enable cost-effective investment in future infrastructure expansion.
- The access sub-index measures current broadband adoption rates and the policy and regulatory frameworks in place to encourage growth and ensure provision of affordable and equitable access.

The Index scores each country on a scale of 0 to 100. Higher scores indicate higher current penetration levels, combined with strong policy and regulatory conditions for advancing Internet affordability now and in the future.

The Index deliberately does not directly measure prices and affordability in each country; there are numerous stand-alone surveys and reports which do this - most notably, the annual ITU publication "Measuring the Information Society". Instead, the Affordability Index measures progress toward increased broadband adoption, and the policy and regulatory environments that lead to affordability. We then analyse the Affordability Index scores against prices as measured by the ITU. In fact, our regression analysis proves that there is a strong, statistically significant causal relationship between Index scores and broadband prices. Strong scores on the Index

indicate better current levels of affordability and great potential for prices to fall further in the future. (See Section 4 for a detailed regression analysis.)

Why have we chosen to focus on both infrastructure and access measures? By combining these two broad components, the Affordability Index provides a measure of the impact that each of these drivers - both individually and combined - has on affordable access outcomes. Of course, there are some important areas (e.g., tax reduction) where it is currently impossible to source comparable indicators across countries. We continue to research these important areas and hope to include them in future reports.

Finally, in order to conduct fair comparisons among all 51 countries covered in the research, we have identified each nation as either an emerging or developing country - as defined by the World Bank and determined by income levels - and have provided a separate analysis for each group. Comparing countries with similar income levels allows us to analyse the timing and patterns of decision-making as they relate to the level of economic development of each country.

This year, to reflect the Alliance for Affordable Internet (A4AI) set of best practices, we asked our expert assessors in each country to pay close attention to five particular sub-areas:

- Overarching broadband policies and programmes;
- Policy and regulation for effective competition, including the level of transparency in, and effectiveness of, the licensing process;
- Spectrum policy and regulation;
- Infrastructure sharing and access to rights of way; and
- Government-led programmes to fund or subsidise universal Internet access.

A NOTE ON METHODOLOGICAL CHANGES

The 2013 Affordability Index included the ITU-published indicators measuring broadband prices as a

2.1 CALCULATING THE INDEX CONTINUED

EMERGING COUNTRIES	DE
Upper-middle income	Lo
(as defined by the World Bank).	<u>(as</u>

A4AI POLICY & REGULATORY BEST PRACTICES

.....

GUIDING PRINCIPLES

- of expression, assembly and association
- effective way to drive reduced delivery costs, affordable consumer pricing and

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EVELOPING COUNTRIES

w to lower-middle income countries defined by the World Bank)

RECOMMENDATIONS

- No luxury taxation or excessive customs/

2.1 CALCULATING THE INDEX

Figure 1. Affordability Index Structure

2014 Affordability Index Structure				
Infrastructure		Access		
Code	Secondary Indicator Name	Code	Secondary Indicator Name	
ITU G	% of population covered by mobile cellular network	ITU B	Broadband subscribers per 100 people	
ITU A	International bandwidth (Mbps) per Internet User	WI B	Number of mobile subscribers per 100 people	
ΙΤU Ο	Broadband Speeds (average Mbps)	WI C	Number of mobile broadband connections per 100 population	
ITU L	Investment per telecom subscriber	WEF B	Internet access in Schools	
WB A	Secure Internet servers per million people	ITU Eye	Cluster of ITU indicators (bundled) [1]	
IEAA	Electrification rate	ITU N	% of individuals using the Internet	
PCH	Number of IXPs	WI	Market concentration (Herfindahl–Hirschman Index)	
		ΙΤU Κ	Existence of National Broadband Plan	

2014 Affordability Index Structure

Code	Primary Indicator [2]	Code	Primary Indicator [2]
A1	To what extent are ICT licensing frameworks flexible, simple, and technology and service neutral?	A5	To what extent does the national broadband Internet plan (or in some cases the national ICT policy and plans) set clear, time-bound targets and interventions for reduc- ing broadband cost and increasing penetration?
A3	To what extent does the regulator and/or the competition commission enforce the country's ICT licensing requirements and regulations?	A11	To what extent have Universal Access/Service Funds (USFs) prioritised infrastructure investments that will reduce costs and increase access for under-served communities and market segments?
A6	To what extent are national-level policies or rules in place to facilitate efficient access to public rights of way and tower zoning permission?	A12	To what extent have USF funds been used to subsidise broadband access for end users in under-served and underprivileged populations?
A7	To what extent does the government facilitate resource sharing across telecommunications operators?	A2	To what extent does the government ICT regulator perform its functions according to published and transparent rules, with the ICT regulatory decisions influenced by public consultations?
A8	To what extent has the government defined specific, limited and well-justified guidelines for public infrastructure funding or subsidies in telecommunications?	A4	To what extent is ICT regulatory decision-making informed and influenced by adequate evidence?
A9	To what extent has government established an implementation plan with a time-bound target for making sufficient spectrum available for broadband within a reasonable period of time to meet the growing demand for high-speed data services?	A13	Are there specific policies to promote free or low-cost public Internet access, such as budget allocations for Internet access in public libraries, schools and community centres, or provisions for spectrum use by community WiFi options?
A10	To what extent are the government's plans for implementing more spectrum availability for broadband (both licensed and unlicensed) transparent, and are done through a competitive process via public auctions?		

2.1 CALCULATING THE INDEX CONTINUED

WHAT DO WE MEAN BY POLICY & REGULATION? AND HOW DO WE ASSESS EFFECTIVENESS?

POLICY

A policy framework provides a vision of the ICT sector with specific guidance for achieving that vision. Policies are established at the Ministeria level and generally establish principles and strategic objectives for the sector – for example opening market structure, accelerating rollout of broadband networks, developing relevant applications and content, and facilitating adoption and use. Guidance is then provided on how to achieve the strategic objectives – this may include increasing competition, improving sector governance, reorganising state-owned operators, and extending service to under-served areas.

REGULATION

Regulation involves the design and enforcement of legal instruments to establish the rules of the market and implement the strategic objectives established by the policy. For example, to ensure increased and effective competition, regulators need instruments that facilitate market entry (e.g., technology and service-neutral licensing regimes), as well as instruments that define

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a clear scope for intervention should anticompetitive behaviour be identified (e.g., regulations that require ongoing market analysis, and outline the regulatory intervention necessary if an operator is determined to have Significant Market Power).

EFFECTIVENESS

any countries adopt the right policies ad regulations, but fail to implement and afforce them in a strategic and planned anner. Others are still far from achieving a olicy and regulatory framework that is both rward-looking and coherent with the pace of evelopment in the sector. This is often due to sufficient oversight or regulatory development. or example, while many countries have eveloped broadband or ICT policy and rategies, the implementation of such policies ad plans has been slow at best. Our research tempts to assess not only the existence of the policies and plans, but also, and most aportantly, the implementation and impact such programmes.

2.2 2014 COUNTRY RANKINGS

Table 1. 2014 Affordability Index rankings

Rank	Country	Sub-index: Communica- tion Infrastructure	Sub-index: Access	Affordability Index: Overall Composite Score
1	Costa Rica	48.1	77.5	63.4
2	Colombia	58.8	66.4	63.1
3	Turkey	56.3	67.5	62.4
ļ	Malaysia	53.6	68.5	61.5
5	Peru	58.0	60.2	59.6
5	Brazil	57.4	56.9	57.6
7	Mauritius	49.7	63.8	57.2
3	Ecuador	44.6	59.4	52.3
)	Argentina	47.3	55.6	51.8
LO	Rwanda	49.0	53.6	51.6
1	Nigeria	45.3	56.6	51.2
L2	Morocco	41.1	60.0	50.8
13	Thailand	44.3	54.9	49.8
L4	Mexico	41.0	55.5	48.5
L5	Uganda	40.1	55.4	48.0
L 6	Jamaica	34.6	59.5	47.3
L 7	Tunisia	44.7	45.2	45.1
L8	Dominican Republic	39.3	49.1	44.3
L9	Kenya	37.7	50.0	44.0
20	South Africa	33.4	53.2	43.4
21	The Gambia	40.3	46.3	43.4
22	Vietnam	30.7	55.7	43.3
23	China	39.5	46.2	43.0
24	Botswana	38.1	47.0	42.7
25	Pakistan	42.6	42.3	42.6
26	Ghana	37.3	45.6	41.5
27	Indonesia	36.9	44.5	40.8
28	Tanzania	38.1	43.2	40.7
29	Philippines	36.1	43.1	39.7
30	India	40.8	37.4	39.1
31	Namibia	31.7	44.7	38.2
2	Føvnt	43.2	33.0	38.1
3	Bangladesh	42.5	31.8	37.1
84	Zambia	32.9	40.0	36.4
25	Kazakhstan	28.2	44 5	36.3
86	Myanmar	31.8	39.2	35.4
7	Venezuela	27.0	40.7	33.8
	lordan	21.0	45.4	22.5
29	Senegal	21.3	27 1	20.0
	Mali	21.3	34.7	21 /
	Benin	20.0	26.5	20.9
12	Mozambique	24.5	20.0	30.5
12	Cameroon	27.J 20.7	21.0	20. 4 25.6
г у И	Nonal	20.1		23.0
1 1 15	7imbabwe	23.U 17 0	21.1	24.1
tJ 16	Zimuduwe Burkina Faco	1/ 2	32.1 	24.1
17	Malawi	14.2	21.4	20.3
†1 10	IVIdIdWI	15.2	23.8	19.1
ŧð	Ethiopia Cierre Leera	0.0	21.9	13.4
+9 =0	Sierra Leone	11.0	10.5	13.2
)U - 1		12.1	14.5	12.8
1	remen	1.6	0.0	0.0

2.2.1 THE FRONT RUNNERS

2014 Affordability Index Top Five				
Rank	Country	Sub-index: Communication Infrastructure	Sub-index: Access	Affordability Index: Overall Composite Score
1	Costa Rica	48.1	77.5	63.4
2	Colombia	58.8	66.4	63.1
3	Turkey	56.3	67.5	62.4
4	Malaysia	53.6	68.5	61.5
5	Peru	58.0	60.2	59.6

So why is Costa Rica atop this year's Affordability Index rankings? The country has embraced broadband as a catalyst for economic growth and social inclusion and, as a result, has invested significant resources in improving infrastructure and expanding access and affordability. Costa Rica has a relatively modern telecommunications infrastructure. An <u>estimated</u> 88% of Costa Rica's population can already access the Internet and declining mobile broadband access prices will enable more of the population to come online. The government has created a National Telecommunications Fund (FONATEL), which has focused on providing broadband Internet to under-served schools, public healthcare institutions, and other public entities. The government has been using FONATEL to expand fibre optic Internet service to rural towns and to install cell towers where fibre cannot reach, in order to provide access to wireless broadband services. These efforts are reflected in Costa Rica's 8th place ranking (with a score of 48) on the infrastructure sub-index.

Where Costa Rica really shines, however, is on measures of access and affordability. The country's score of 77.5 on the access sub-index is nearly 10 points higher than the next highest ranked country. This high score is underpinned by the nation's National Broadband Strategy, which was launched in 2012 and outlines a strategy for increasing broadband penetration through

Colombia (see box out) has also made concerted efforts to advance policy, regulatory and infrastructure development, with a focus on improving Internet access at the household level. Colombia not only comes out on top of the infrastructure sub-index, but also scores well on the access sub-index, placing fourth among all 51 countries covered. These scores reflect Colombia's combined efforts to push infrastructure investment to rural and under-served areas, and to increase ICT literacy and provide subsidies to households that cannot otherwise afford Internet access. This approach has resulted in substantial increases in Internet adoption, with about 51% of Colombians using the Internet. Strong government leadership,

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2016. Mobile broadband prices were about 1% of the

GDP in 2014 – one of the lowest in the Latin American region. In fact, the price of an entry-level monthly mobile broadband package halved over the past year, from US\$17.8 in 2013 to just US\$8.79 in 2014.

Despite all of this recent progress, the country is not resting on its laurels - the government is further committed to using connectivity as a catalyst for growth and development, and is focusing both on increasing broadband penetration and Internet access, and on narrowing the access, adoption and use divide among its entire population.

2.2.1 THE FRONT RUNNERS

comprehensive broadband policy and plans, increased competition, and shared infrastructure to lower costs have all proven to be key ingredients in Columbia's successful recipe for achieving affordable universal access.

With a relatively urban, young and technically literate population, **Turkey** has witnessed a dramatic increase in Internet users. <u>Almost half of</u> the Turkish population (46%) are currently Internet users. More recent initiatives – including the Prime Minister's National Broadband Vision, sector policies in education and e-government, and community ICT projects – have further extended access to broadband Internet. Mobile broadband is widely used by Turkey's Internet-savvy population and the country is emerging as a noticeable front-runner in the nascent mobile payments sector, supported by high rates of credit card adoption and use.

Turkey's mobile broadband prices are among the most affordable found in emerging countries – a 500MB prepaid handset-based mobile broadband plan costs the average citizen just over one percent of their annual income.

Despite this strong affordability environment, many have raised concerns about the Turkish government's propensity to use the Web for surveillance and censorship. The country ranked 52nd out of 86 countries on the "Free and Open" measure of the Web Foundation's 2014-15 Web Index, and Freedom House's 2014 "Freedom on the Net" Report noted the country's frequent violations of user rights.

Malaysia – which topped the Affordability Index in 2013 – remains the top performing Asian nation, and is continuing its efforts to bring affordable Internet access to under-served areas. Mobile broadband prices have decreased even further over the past year, falling to 1.39% of GNI per capita from 3.2% in 2013.

Malaysia continues to do well when it comes to promoting affordable Internet, pursuing many of the policies that earned the country the top spot on last year's Affordability Index. (Malaysia's lower score on this year's Index results primarily from the more recent nature of ICT sector investment and development in Colombia and Costa Rica, which allowed these two countries to score higher than Malaysia in the infrastructure sub-index.) Malaysia's government recognises the importance of broadband networks and has continued to improve access in under-served areas. The High Speed Broadband Network (HSBB1) project that launched in 2010 and connected 1.5 million users was upgraded in 2014, and is expected to connect 4.8 million broadband fibre subscribers – a development that would make the country's high-speed broadband connection rate one of the highest in Asia.

2.2.1 THE FRONT RUNNERS CONTINUED

Peru has also seen a steady increase in broadband penetration. Approximately 40% of the Peruvian population used the Internet in 2014 – a rate that is lower than those found in Colombia and Costa Rica, but one that is growing fast. Peru has adopted a progressive policy framework and has undertaken concerted initiatives to bridge the rural-urban Internet access gap. An ambitious National Broadband Plan, drafted in 2011, calls for an 11,000km open access fibre backbone network, delivered through public-private partnerships.

Peru has introduced a unified licensing regime for the provision of all telecom services - including fixed-line and mobile broadband, pay TV, and Internet - under one license. The single concession regime includes a national register of telecom services under which

A COMPREHENSIVE APPROACH TO INTERNET DEVELOPMENT IN COLOMBIA

role that government leadership and population using the Internet and about 25%

COMPETITION: The country's 2009 ICT law lowered the barriers for new broadband market both the voice and 3G/4G broadband spaces. DirecTV began offering mobile service in 2014, the end of 2010 as a mobile virtual network

of GNI per capita in 2013 to just 3.31% in 2014.

access to competitive, fair and open broadband spectrum. A <u>spectrum auction in June 2013</u>

BROADBAND PLAN: The national programme

price reductions.

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each operator must notify the regulator of each new service it intends to offer. Unified concessions are no longer area-specific, but automatically cover the whole country. This streamlined licensing regime enables a wide range of players, providing a variety of applications and services to users, to enter into the market, increasing competition and eventually enabling a reduction in the cost of access and usage. Peru's mobile broadband prices are stubbornly high but the government expects that recent policy and regulatory developments will result in further

PROMOTING ACCESS IN UNDER-SERVED **AREAS:** The government also promotes "*Vive* the Internet, access the Colombian State subsidies and financial assistance to families unable to afford ICT equipment or access to

2.2.1 THE FRONT RUNNERS

WHY IS LATIN AMERICA LEADING THE WAY? PLANS, FINANCING MODELS AND REGULATORY INTERVENTIONS

BROADBAND PLANS: Latin America has seen an

COVERAGE AND COST: These experiences point to

DEPLOYMENT MODELS: Deployment models for

2.2.2 THE FOOT OF THE TABLE

The five countries at the bottom of the table - Yemen, Ethiopia, Haiti, Sierra Leone, and Malawi – are all politically or economically fragile nations. Our analysis indicates that policy choices by these governments have acted as a primary contributor to their low ranking in the Affordability Index.

Yemen's ICT infrastructure is one of the poorest in the Arab region. While political, developmental, and domestic security challenges have contributed to the Internet's local under-development, the country's policy and regulatory environment is also hampering the growth of broadband. Yemen's mobile phone sector has been liberalised (i.e., new entrants are, in principle, allowed to enter the market), yet the government's continued control of the sector has prevented the positive effects of increased competition and deregulation that generally accompany sector liberalisation. Until recently, stateowned Yemen Mobile was the only operator allowed to provide mobile broadband services. Similarly, statecontrolled companies PTC and TeleYemen are the only providers of fixed Internet service in Yemen, and a significant portion of the subscriptions are still for dialup services. Yemen's Ministry of Telecommunications and Information Technology (MoTIT) acts as the de facto regulatory authority for the sector, responsible for the issuance of licenses, management of radio frequencies, and deployment and operations of telecommunications infrastructure. This has resulted in an unpredictable regulatory environment, with limited incentives for private investment.

As a consequence, Internet and mobile broadband prices in Yemen are some of the highest in the world and remain unaffordable for the vast majority of Yemen's 24.5 million people. This is particularly the case for the 38% of the population that lives under the \$2/day poverty line, who would have to spend 22-24% of their average monthly incomes to purchase entrylevel broadband Internet access.

Despite significant ICT sector investment in recent years, Ethiopia (see box out) remains far behind other countries in the region when it comes to providing its citizens with access to quality Internet services.

MONOPOLY A BLOCK TO AFFORDABLE **INTERNET IN ETHIOPIA**

<u>of just 1.5%</u>.

QUALITY OF SERVICE CHALLENGES: Ethiopia's

Sierra Leone faces considerable economic hardships. These hardships, combined with inadequate regulatory environments, have hampered the provision of affordable Internet. Sierra Leone's entrylevel mobile broadband price represents about 25% of GNI per capita, among the highest in West Africa.

The country has yet to introduce any competition in its ICT sector. The Ministry of Communication and Information Technology makes policy, regulates the sector, and owns the incumbent provider, Ethio Telecom. This means that both fixed and mobile telephone and Internet services are tightly controlled under a government monopoly.

month), it is clear that the majority of the population cannot

2.2.2 THE FOOT OF THE TABLE CONTINUED

Like Sierra Leone, Haiti has experienced political and economic difficulties. As a result, economic and social indicators remain far below the averages found in the other countries of Latin America and the Caribbean. Recent natural disasters and years of political and economic turmoil have stifled most sectors of Haiti's economy, including the telecom sector. Entry-level mobile broadband prices spiked from US\$23 in 2013 to US\$39 in 2014, making access unaffordable for many citizens – particularly for the 77% of the country's population earning less than \$2 a day, for whom entry-level mobile broadband represents about 38% of GNI per capita. Haiti's low score on the Affordability Index reflects the country's inadequate legal and regulatory environment, limited international connectivity, and the absence of an effectively regulated wholesale broadband regime.

While infrastructure in Malawi has improved in recent years due to its access to submarine cables via Mozambique and Tanzania, prices remain very high. As of early 2013, the monthly price of fixedline Internet access was around US\$16.50, while a monthly mobile 3G data plan cost about US\$24 for 1.5GB of data. The ITU estimates that entry-level mobile broadband prices are equivalent to about 28% of GNI per capita, one of the highest prices found in southern Africa.

The high cost to connect in Malawi is also caused by the country's significant power crisis —costs associated with the need for mobile operators to power base stations are passed on to consumers and increase the cost for them to access the Internet. The country has one of the lowest electrification rates in the world, with only about 9% of the population having access to electricity. Half of the formal sector enterprises in Malawi have backup generators - twice the rate found in other low-income African countries. Malawi's experience further indicates the crucial importance of a stable and reliable electricity supply for increasing affordability of and access to the Internet.

2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES

The 2014 Affordability Index also ranks countries based on economic development levels Unsurprisingly, countries classified as "emerging economies" by the World Bank top the Index. Our analysis shows that the emerging economies that score higher in the Affordability Index have not only been pursuing policy and regulatory frameworks that promote

healthy and competitive markets for infrastructure expansion, but have also been creating incentives to stimulate the demand for broadband services for quite a long time (at least two to three decades). Developing economies, such as Rwanda and Nigeria, are following suit, but their efforts are more recent.

2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES CONTINUED

Top Emerging Economies					
Rank		Sub-index: Infrastructure	Sub-index: Access	Affordability Index: Overall Composite Score	Mobile broadband (pre-paid hand- set-based 500 MB) as % GNI (2013)
1	Costa Rica	48.1	77.5	63.4	1.1
2	Colombia	58.8	66.4	63.1	3.3
3	Turkey	56.3	67.5	62.4	1.1
4	Malaysia	53.6	68.5	61.5	1.4
5	Peru	58.0	60.2	59.6	2.8
		Top Develo	ping Econor	nies	
11	Rwanda	49.0	53.6	51.6	15.0
12	Nigeria	45.3	56.6	51.2	5.6
13	Morocco	41.1	60.0	50.8	4.7
16	Uganda	40.1	55.4	48.0	18.2
20	Kenya	37.7	50.0	44.0	7.5

Rwanda is the top-ranked developing country in the Affordability Index, reflecting the success of its progressive policies, which have been designed to leverage the ICT sector as an engine for economic and social development. The Rwanda ICT Policy and Master Plan – also called the National Information and Communication Infrastructure (NICI) Plan and lately referred to as the SMART Rwanda ICT Master Plan – is divided into five phases of five years each. Phase III of the NICI plan (2011-2015) saw the government roll out a national high-speed fibre optic backbone (2565 Km of four-ring cable) that is shared with the private sector. The Rwandan government exclusively owns the infrastructure and uses one of the four ducts; the remaining three are available for the private sector on open access terms.

The Rwandan government also plans to expand ICT infrastructure to rural and under-served areas where fibre cannot reach. In March 2013, the government announced an agreement with Korea Telecom Corporation, under which the latter will invest US\$140 million to deploy a Long-Term Evolution (LTE) access network over a period of three years. It is expected that this will lead to 95% of the population being within range of a high-speed mobile broadband network. However, many have expressed concern regarding this type of deployment model and the possibility that it may deter competition at the retail level. The longterm impact remains to be seen.

On the demand side, the Rwandan government has launched several ICT e-Government applications for services including e-immigration and e-health, and has also encouraged the use of mobile applications to deliver agricultural information. The new Smart Rwanda ICT Master Plan (2015-2018) aims to build on these gains.



Nigeria comes second in the Affordability Index's ranking of developing economies - scoring higher than other African developing economies like Kenya, Morocco and Uganda, and higher even than some emerging economies, including Mexico, South Africa, Thailand and Tunisia. The backbone infrastructure in Nigeria has improved significantly over the last decade, with multiple players, including Phase 3, Glo 1, Suburban Telecom, Multilink and MTN, building fibre networks that crisscross the country. Nigeria's regulator, the Nigerian Communication Commission, plans to award seven licenses to regional infrastructure companies to extend broadband infrastructure nationally. The first two of these were awarded in early 2015 to MainOne and IHS Communications to provide services in Lagos and North Central states, respectively. The government is also working to improve infrastructure sharing among these operators, who have traditionally built overlapping fibre networks.

The nascent "Smart States" initiative, which sees states committing to reduce the cost of broadband access by reducing taxation and simplifying regulation, is also a

2.2.3 EMERGING ECONOMIES AND DEVELOPING COUNTRIES CONTINUED

positive step. Nigeria's mobile broadband penetration rate stands at just 10% – despite the fact that close to 40% of Nigerians use the Internet – and the government has <u>put in place policies</u> to increase this penetration level to 30% by 2018. To increase the ability of mobile operators to serve more Nigerians, plans were recently announced to auction spectrum in the 2.6 GHz band.

Morocco – the third-highest ranked developing country overall – has the top score among all developing countries in the infrastructure sub-index. Ongoing reforms in the communications sector and growing investment in fibre optic national backbone networks have had a dramatic impact on prices. The price of a monthly entry-level mobile broadband package dropped fourfold from US\$49.4 in 2013 to US\$11.9 in 2014, and mobile broadband penetration currently stands at 15%, while fixed broadband penetration remains at 10%. According to the regulatory agency, <u>88% of the country's 8.5 million</u> mobile users are also mobile Internet subscribers, but the majority of Internet users are in urban areas.

Uganda has seen improvement in Internet access in recent years due to increased competition in the telecom sector, a reduction of international bandwidth prices, and the availability of wireless and mobile technologies, such as WiMAX, EV-DO, HSPA and LTE, throughout the country. Though high entry-level mobile prices (<u>18% of GNI per capita</u>) have caused the Internet penetration rate to remain at a low 8.6%for mobile broadband and 7.4% for fixed broadband, prices continue to drop due to fierce competition and

mobile market consolidation, which ultimately may result in increased access and adoption.

Uganda's ranking as one of the top five developing countries is a result of the nation's high score on the access sub-index. This score is due, in part, to the consistent support of Uganda's government in promoting universal access, including shared access to Internet in rural and under-served areas through its Rural Communications Development Fund (RCDF). The project connects rural counties by subsidising small commercial Internet services at the district level, and providing resources for Internet access at schools, post offices, hospitals, libraries, community centres and health facilities.

Kenya's ranking is driven by its vibrant ICT sector. The country has one of the fastest growing ICT markets in Africa, and the use of mobile services to access the Internet and complete financial transactions has grown significantly in recent years. Two-thirds of Kenya's 22 million Internet users have access to broadband wireless Internet. Kenya's mobile broadband prices have been falling in recent years - standing at around 7.5% of GNI per capita - due to competition between key players like Safaricom, Telekom (Orange), Essar (Yu) and Airtel.

Kenya has also seen a surge in Internet bandwidth due to enhanced access to undersea cable capacity, and an improved national backbone that has resulted in increased availability of high-speed broadband. The quality of broadband services is steadily improving, with speeds of over 10 Mbps now available to many citizens.

TAXATION



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3 WHO'S HIT THE HARDEST?

Duranalysis suggests that three groups are the least likely to be able to access affordable internet: THOSE LIVING IN EXTREME POVERTY WOMEN THOSE LIVING IN RURAL AREAS

3.1 THOSE LIVING IN POVERTY

It will come as no surprise that those living in poverty are the least likely to be able to access the Internet affordably. Yet the scale and scope of the challenge is staggering. In the 51 countries that we surveyed, there are approximately two billion people earning less than \$2 a day (\$60 per month), according to World Bank data. Depending on the country in which they live, these individuals have to spend anywhere between 5.5% and 114.5% of their average monthly income in order to access an entry-level broadband package.

The UN Broadband Commission has set a target of entry-level Internet access priced at less than 5% of GNI per capita. While 23 out of the 51 countries have met this target on an aggregate basis, **at present**, **not a single emerging or developing country can**

claim to meet this benchmark for those two billion potential users that survive on less than \$2 a day.

While many countries – including Botswana, China, Dominican Republic, Namibia and Zimbabwe – made headway in their efforts to reduce Internet access prices between 2013 and 2014, prices in many other countries remained relatively constant. Some countries – including India, Jamaica and Peru – even saw small increases in their broadband access costs. Clearly, policy and regulatory action is urgently needed if governments are serious about using ICT and access to the Internet as a vehicle for poverty reduction and delivery of government services.

3.1 THOSE LIVING IN POVERTY CONTINUED

Country	Poverty headcount ratio at \$2 a day (PPP) (% of popultion) (World Bank)	Total population living at less than \$2/day (monthly income \$61)	Cost of mobile broadband prepai handset-based (500MB)/income level \$2
Argentina	2.9	1,201,941.13	-
Bangladesh	76.54	119,857,783.91	-
Benin	74.27	7,667,244.14	-
Botswana	27.83	562,484.38	-
Brazil	6.79	13,604,574.71	-
Burkina Faso	72.44	12,267,597.37	-
Cameroon	53.15	11,827,979.21	83.0
China	18.61	252,608,418.00	75.1
Colombia	12	5,798,568.60	52.2
Costa Rica	3.11	151,524.36	40.4
Dominican Republic	8.76	911,369.46	38.4
Ecuador	8.44	1,328,276.90	37.8
Egypt	15.43	12,661,299.13	34.2
Ethiopia	72.2	67,940,745.83	32.8
Gambia, The	55.93	1,034,305.10	32.7
Ghana	51.84	13,428,943.60	32.5
Haiti	77.51	7,997,064.02	31.9
India	60.57	758,420,953.30	28.6
Indonesia	43.3	108,191,818.22	27.0
Jamaica	5.85	158,827.50	24.9
Jordan	1.17	75,570.30	24.3
Kazakhstan	0.8	136,300.06	23.6
Kenya	67.21	29,810,115.72	23.3
Malawi	88.14	14,421,966.55	22.6
Malaysia	2.27	674,575.11	22.1
Mali	78.78	12,054,639.87	21.1
Mauritius	1.85	23,981.61	19.8
Mexico	4.12	5,040,094.84	19.5
Morocco	14.22	4,693,758.93	19.3
Mozambique	82.49	21,310,262.02	18.6
Myanmar		-	17.1
Namibia	43.15	993,880.42	16.6
Nepal	55.95	15,552,677.19	16.4
Nigeria	82.2	142,711,813.59	15.6
Pakistan	50.67	92,291,652.38	15.0
Peru	7.99	2,427,010.68	14.4
Philippines	41.72	41,049,799.07	13.9
Rwanda	82.28	9,689,722.30	13.5
Senegal	60.31	8,523,781.17	12.8
Sierra Leone	82.51	5,026,571.08	12.8
South Africa	26.19	13,875,983.44	12.7
Tanzania	73	35,954,781.98	12.1
Thailand	3.5	2,345,367.57	11.9
Tunisia	4.46	485,537.90	10.7
Turkey	2.56	1,918,275.61	10.4
Uganda	64.65	24,294,743.33	9.5
Venezuela	12.91	3,925,312.22	7.9
Vietnam	12.45	11,168,758.05	5.5

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Cost of mobile broadband postpaid computer-based (1GB)/income level \$2	Cost of fixed broadband/ income level \$2
33.0	59.8
14.5	7.7
49.8	86.9
97.6	93.9
51.6	29.2
33.2	76.4
••	100.8
26.5	38.0
26.2	30.7
22.6	25.9
30.3	38.2
34.9	33.1
5.5	12.5
26.6	38.9
114.5	-
16.8	70.5
37.8	78.4
26.6	9.8
8.6	36.4
40.9	47.9
23.1	30.7
10.7	21.6
19.0	55.2
-	78.9
25.0	35.4
24.9	82.0
10.7	20.0
32.0	28.9
19.3	20.0
32.7	95.9
-	-
25.3	112.6
13.8	13.1
37.0	63.9
23.1	23.8
35.8	29.5
38.4	37.5
••	177.2
••	62.5
•	••
42.3	46.1
17.6	31.3
22.8	33.9
	11.5
17.1	20.5
23.8	23.0
33.9	25.2
	19.3

Table 3. Cost of broadband for populations earning ess than \$2/day

3.2 WOMEN

Women are far less likely to be able to access the

Internet affordably than men. Research has shown that women on average earn 30% – 50% less than men – a disparity which diminishes the ability of women to afford, adopt, and benefit from broadband access. The Internet access gender gap is apparent throughout the world, although the extent of the gap varies from region to region - in parts of Europe and Central Asia, research has found that 30% fewer women than men access the Internet; in Sub-Saharan Africa, this figure jumps to 45%. The gap widens in rural areas – in some rural and remote areas of Asia, for example, it was found that men's access to

the Internet outnumbers women's access by 50%.

A simple analysis of the gender pay gap and its impact on women's ability to afford Internet services clearly illustrates that the price of entry-level mobile broadband service is significantly higher for women worldwide. For example, entry-level mobile broadband costs at least 8% of women's GNI per capita, compared with 5.6% for the average Nigerian. In Malawi, entry-level mobile broadband is at least 40% of women's GNI per capita, compared with 28% of the income of the average Malawian. (See table below for additional details.)

Mobile Broadband is far more expensive for women Mobile Broadband (prepaid handset based, 500 MB)				
Country	as % of GNI p.c.	as % of GNI p.c. adjusted for gender gap at 30% lower incomes		
Peru	2.8%	4.0%		
Colombia	3.3%	4.7%		
Morocco	4.7%	6.7%		
Nigeria	5.6%	8.0%		
Kenya	7.5%	10.7%		
Rwanda	15.1%	21.5%		
Uganda	18.2%	26.0%		
Sierra Leone	25.1%	35.8%		
Malawi	28.1%	40.2%		
Haiti	34.1%	48.8%		
Mozambique	40.5%	57.9%		
Senegal	56.8%	81.1%		
Niger	88.9%	126.9%		
Liberia	113.8%	162.5%		
S. Tomé&Principe	138.3%	197.5%		

A Research ICT Africa Network survey also found that women "generally have less access to ICTs than men and this increases as the technologies and services become more sophisticated and expensive, requiring greater levels of income and education to access and to operate."

The implications of women's limited ICT access are significant – both for women, as well as for society at large. Limiting women's access denies them the tools, resources and opportunities available through the Internet, which in turn slows economic growth and social development opportunities. More than 70 % of Internet users surveyed for Intel's 2013 Women and the Web study consider the Internet "liberating", and 85 % believe that it "provides more freedom". Access to the Internet has been shown to have personal, social and market benefits from improving education and digital literacy levels, to

increasing individual productivity and earning power, household resources and social capital.

Despite the fact that the United Nations has repeatedly underscored the Internet's transformative potential, only 21% of women and girls in developing countries have access to the Internet. The possibilities for women's empowerment via access to affordable Internet demonstrate the need for evidence-based research based on how women currently access and use the Internet. The Alliance for Affordable Internet is working closely with the World Wide Web Foundation's gender gap research programme to understand better the nature of the gender digital divide. We hope that next year's Affordability Report will shed more light on the extent of differential access to and use of the Internet by women and men.

3.3 RURAL DWELLERS

Those living in rural areas are often unable to secure affordable access to the Internet. This is for two primary reasons. First, incomes tend to be lower in rural areas, making the real cost to connect higher. Second, the challenges of infrastructure deployment in rural areas can result in access being impossible, or significantly more expensive than in urban areas.

A 2012 research study by Research ICT Africa covering

50

12 countries in Africa found that the urban and rural divide is quite significant among Internet users. Of the 23.8% of the population found to be Internet users (defined as individuals that had used the Internet at least once in the preceding 3 months) in Uganda, 17.3% were based in urban areas, compared with just 6.5% in rural areas. In Mozambique, only 3.2% of the rural population was found to use the Internet, compared to 26% in urban areas.



DEVICE COSTS

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Rural Urban 🔵

Figure 1. Internet Users Disparity between Rural and Urban areas in Selected Countries Source: Research ICT Africa Household Survey Data, 2012

Many companies are now focused on producing more affordable devices. According to the <u>GSMA</u>, the key price point for achieving widespread smartphone penetration in developing countries is between \$25 and \$50. There have been some notable successes, like the Intex Cloud FX Firefox



POLICIES, REGULATIONS & PROGRAMMES FOR STIMULATING AFFORDABLE ACCESS 4

As noted in Section 2, the Affordability Index does not directly measure cost, instead focusing on those areas broadly agreed to be the drivers of affordability. However, there is a strong relationship between Index scores and broadband affordability. A regression analysis (below)

shows that high scores on the Affordability Index are strongly correlated with lower broadband prices as a percentage of GNI per capita. Therefore, we can conclude that rising scores on the Affordability Index are associated with lower broadband costs in that particular country.

Figure 2. Affordability Index scores and Broadband Prices



Figure 2. Correlation between high Affordability dex scores and low broadband prices

So what factors are really driving higher scores on the Affordability Index, and therefore progress toward affordable Internet across the globe? While each country is different, we have been able to identify a number of common success factors.

- Effective broadband strategies;
- Healthy competition;
- Non-discriminatory access to spectrum;



• .

These factors are the mutually reinforcing pillars that drive affordability. As the figure below illustrates, these pillars need to work in harmony since they cannot support and nurture universal affordable access on their own.



Figure 3. Foundations of Internet Affordability

Sources: A4AI, ITU

Infrastructure sharing; and

Strategies to deliver universal access to

rural and under-served populations.

I. POLICIES, REGULATIONS & PROGRAMMES FOR STIMULATING AFFORDABLE ACCESS continued

All of the countries that top the Affordability Index have prioritised at least four of these five key drivers of affordability. Of course, these actions cannot take place in a vacuum and their efficacy is enhanced by progress made in other areas, such as regulatory capacity, regulatory independence and increasingly transparent policy-making processes.

A closer look at the scores (with 1 being the lowest and 10 the highest) received by the top five emerging and developing countries reveals that policymakers in Index-leading countries are indeed making concerted efforts to push forward the policy and regulatory areas that will have a significant impact on affordability outcomes (see table below). In addition to these specific policy areas, our experiences and observations across this year's Affordability Index research have reinforced the critically important role of strong political leadership to ensure that these affordability pillars work in harmony. Leadership is the foundation of affordability, essential to achieving the ultimate objective of reduced broadband connection prices and affordable access for all. The experiences of Costa Rica, Colombia, Malaysia, Rwanda and Nigeria all demonstrate the importance of leadership – it not only encourages the telecom sector to carve a path toward broadband expansion, adoption and use, but

Table 9. Primary research score (per thematic cluster) for top 5 emerging and developing countries

Top Emerging Economies					
Country	Effective Broadband Strategy	Healthy competition	Non- discriminatory access to spectrum	Infrastructure sharing	Strategies to deliver universal access torural & under-served populations
Costa Rica	7.2	6.2	6.7	4.8	7.2
Colombia	7.7	5.9	7.8	6.2	7.7
Turkey	6.7	7.0	5.7	7.5	6.3
Malaysia	7.5	4.7	6.2	7.5	7.4
Peru	7.5	7.2	6.3	6.7	4.5
		Top Devel	oping Economi	es	
Rwanda	7.5	5.8	4.7	6.3	6.5
Nigeria	6	6.2	6.5	5.2	5.8
Morocco	4.7	7.5	5.2	4.2	6.3
Uganda	6.3	5.9	4.7	4.8	7.5
Kenya	5.3	6.4	4.3	4.7	3.2

A NOTE ON SCORES IN FIGURE 5

These scores relate to primary data only. They are calculated by averaging individual question scores (provided by the expert researchers), combining these questions into themati clusters, and then averaging the scores again. In general, a score of five or above indicates a clear and favourable policy.

also provides certainty in the market by pushing for and supporting the forward-looking legal and regulatory systems that will support the vision of ICT and the Internet as engines for economic growth. It further promotes competition by supporting the development of incentives for new market entrants and, at the same time, clarifies the role of government and other players as partners working toward the same objectives.

Comprehensive broadband strategies that consider both the supply of and demand for broadband services, and that reflect a partnership-based approach to decisionmaking and implementation, are more likely be successful in increasing universal access to and use of affordable Internet. Notably, the mere presence of ICT infrastructure in a country does not guarantee affordability. environment, while scores of seven or above indicate that policies have started to be implemented successfully and vith significant positive impacts. All data is available for eview and reuse by researchers and analysts; the codebook or assigning scores is available online.

For example, though Argentina, Indonesia and South Africa all rank highly on the Internet infrastructure sub-index, their rankings on the overall Affordability Index are much lower as a result of stubborn obstacles to increased affordable access. These countries have recently attempted to develop new and comprehensive broadband plans, which, once implemented, could have the kind of impact that has been seen in higher scoring countries.

A regression analysis shows that there is a direct and significant relationship between the cost of fixed and mobile broadband access and the existence of government-led national broadband plans that provide guidance regarding best practices for the implementation of infrastructure expansion strategies. In other words, the extent to which national broadband Internet plans set clear, time-bound targets and interventions for

4.1 EFFECTIVE BROADBAND STRATEGIES



increasing penetration has significant implications for the reduction of fixed and mobile broadband costs. Currently, about 12 of the 51 countries covered in the study do not have any form of ICT or broadband plan or policy; many others have an plan in place, but one which has not been updated to reflect the broadband era.

The figure below shows, for example, the relationship between mobile broadband prices and the presence of a broadband plan or strategy.

For broadband plans to be truly effective, they must enhance supply, stimulate investment and create sustained user demand. Efficient broadband infrastructure is a necessary condition for access to affordable Internet, but it needs to be deployed within a framework where incentives to make investment cost effective are in place. Demand stimulation can be tackled by enhancing user awareness of the benefits of affordable Internet access, driving digital literacy programmes, supporting content developers as new entrepreneurs in the digital economy, and promoting the electronic provision of government services. When these factors work in combination, countries can develop a sustainable ecosystem rooted in affordable access.

Within this framework, it has also become clear that broadband expansion strategies must be coordinated with developments in the energy sector. In fact, several of the governments of the top Affordability Index countries are now collaborating with their respective energy ministries, and stakeholders within the energy sector, to coordinate infrastructure expansion plans with a view of reducing unnecessary costs and increasing shared infrastructure options across the sectors. Our analysis shows that electricity is an essential infrastructure variable in the path toward affordability - the lower the electrification rate, the higher mobile broadband prices are, and vice versa (see figure below). This is especially the case in sub-Saharan Africa, where operators are compelled to install independent generators that power base stations and other elements of the network. According to GSMA research, by 2012, there were around 165,000 base stations across sub-Saharan Africa lacking a reliable electricity supply and powered with diesel generators. This amounts to approximately 79% of all base stations in the sub-Saharan region. This situation is quite concerning and again, requires urgent collaboration between energy and communications ministries to coordinate infrastructure development policy and efforts that will lead to increased and reliable electricity supply across the countries.

Figure 5. Electrification Rates and Broadband Prices

100	
90	
80	
70	
60	
50	
40	
30	
20	
10	
0	

Figure 5. Primary research scores (pe emerging and developing countries www.a4ai.org



4.2 HEALTHY COMPETITION

It is well documented that a liberalised market with an open, competitive environment leads to better prices and service options for users. As seen in Ghana, Brazil, India and many other countries across the globe, competition has the power to fuel the growth of affordable mobile voice services. Competition also fuels the growth of affordable access to the Internet, but, as pointed out above, competition alone is not a sufficient condition to ensure affordable access. It is therefore necessary to have the right policy and regulatory framework in place to ensure that competition is indeed effective (i.e., results in better choices and lower prices for users), and that any anti-competitive behaviours or actions are addressed by regulators with the capacity to enforce clear and transparent rules, based on robust market analysis and established within the existing framework.

One of several elements that contributes to an effectively competitive market is the establishment of a licensing regime that provides clear rules for market entry while also allowing businesses the flexibility

to make the most appropriate and cost-effective decisions about the technology used and the type of services offered (i.e., allowing for technology and service-neutral licenses). Such licensing regimes are based on the concept of unified licensing frameworks (ULFs), which minimise the administrative and formal requirements to enter into the market, generally providing technology and service-neutral licenses as a way to encourage and enhance competition at all service levels.

Our primary research indicates that those countries that have adopted ULFs, and those that have independent regulators with the capacity to enforce rules, have made better progress toward market growth and affordability (e.g., Kenya and Turkey). By contrast, countries with vertical market structures, weak regulatory institutions, and anti-competitive environments tend to suffer from high prices and low connection rates, leading them to languish at the foot of the Affordability Index (e.g., Ethiopia and Yemen).

IMPLICATIONS OF A UNIFIED LICENSING REGIME FOR AFFORDABLE INTERNET ACCESS

4.3 SPECTRUM FOR AFFORDABLE INTERNET

There are 2.3 billion mobile broadband users around the globe - with only 21% of global mobile broadband subscriptions belonging to users in developing countries. As the demand for mobile and wireless broadband continues to rise, especially in developing countries, there is increasing competition for spectrum (especially in the digital dividend band of 700 MHz, the Advanced Wireless Services (AWS) band of 1710-1755/2110-2155 MHz, and the 2.5 G band (2500-2570/2620-2690 MHz)). TV White Spaces in the Ultra High Frequency (UHF) band have also been identified as an option to increase affordable access to broadband services, especially in rural areas.

Countries that top the Affordability Index have made spectrum available on a competitive and non-discriminatory basis (see case of Peru below). Radio frequency spectrum is fundamental to expand networks to last mile areas and to provide higher data throughputs for wireless broadband services. Making licensed spectrum available to operators on a competitive market basis will bring down the cost to access wireless networks, while offering more license-exempt spectrum bands to users will foster innovation.

Regulators in developing countries need to develop spectrum policies that are responsive to the high demand for mobile broadband spectrum. Not only should they focus on making the Digital Dividend bands (i.e., 700 MHz and 800 MHz bands) available as soon as possible, in addition to other possible options referred above, but they should commit to implementing transparent and non-discriminatory assignment procedures, while at the same time aiming to lower spectrum prices. Columbia and Peru provide useful experiences in this area.

There is emerging evidence to suggest that making mobile broadband spectrum available to operators and users will speed up universal, affordable access to the Internet, thereby boosting jobs, productivity, and sustainable growth. A <u>study</u> by the GSMA in Latin America indicates that licensing the Advanced Wireless Service (AWS) band in Argentina, Ecuador, El Salvador, Nicaragua, Guatemala, Panama and

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Paraguay will stimulate investment of about US\$30 billion in the ICT sector, and will indirectly contribute US \$23 billion across other industry sectors. The other major benefits of competitive allocation of the AWS spectrum include the creation of new jobs, increasing development-oriented mobile app and content. A similar study by the GSMA indicates that releasing the 700 MHz, 800 MHz and 2600 MHz bands in six countries in Africa (Ghana, Kenya, Nigeria, Senegal, South Africa and Tanzania) - in other words, the Digital Dividend and 2.6 GHz bands – would have a US\$ 33.6 billion impact on the GDP of these nations between 2015 and 2020 and would lead to the creation of 14.9 million jobs. Policy makers and regulators must urgently implement measures to ensure that their countries can reap the benefits of increased mobile broadband spectrum availability.

4.4 INFRASTRUCTURE SHARING FOR AFFORDABLE ACCESS

Infrastructure sharing mechanisms could cut broadband costs significantly – by up to 80% of current deployment costs, according to a forthcoming study by the <u>Association for Progressive Communications</u>. Infrastructure sharing reduces the capital costs of network deployment and therefore supports expansion and increased geographical coverage. It also reduces operating costs (e.g., tower maintenance and operation) by allowing operators to share these costs. If new market players can gain access to existing infrastructure at competitive rates, entry barriers will be minimised, promoting competition that can result in reduced prices.

Infrastructure sharing occurs at different levels – through opening up access to the existing copper network, through joint building and operation of shared backbone infrastructure, or through coordination among linear infrastructure providers, like power lines, gas pipelines, or roads. The participation of all market players in creating a special purpose vehicle for aggregating, building and marketing backbone networks under open access principles has been gaining momentum in Africa in recent years and, as evidenced by the case of Burundi, has had a positive impact on network expansion and affordability.

Our research shows that countries that have instituted shared infrastructure in the backbone market fare better than those with limited initiatives for cooperation between operators. Countries that have implemented infrastructure sharing mechanisms have generally seen improved access at affordable prices (e.g., Kenya, Malaysia, Ghana and Nigeria). It is therefore important to promote commercially driven sharing, based on open access principles, and encourage collaboration among linear infrastructures providers, like power, gas and railway firms, to coordinate the building of broadband networks and leverage their rights of way and other assets to reduce access costs.

THE IMPACT OF SHARED INFRASTRUCTURE ON NETWORK PRICES AND QUALITY IN BURUNDI

The Burundi Backbone System (BBS) is a partnership between different players with the intention to share a national backbone on an open access principle. It is a joint venture between the Government of Burundi, with initial financial support from the World Bank and four telecom operators (Ucom Burundi, Africell Tempo, Onatel and CBINET). The model separates the roles of the service provider and the network operator and provides services to operators on a fair and non-discriminatory basis.

The BBS is an independent infrastructure provider (Infraco) company that manages the Burundi backbone and ensures connection of the network to the landing stations of submarine fibre optic cables via Tanzania, through Rwanda, and onward to Kenya through Uganda. It operates and maintains the fibre optic communication network, and leases fibre optic connections to operators and companies, as well as to the government.

Based on interviews with BBS representatives, we learned that the completion of the backbone network and availability of relatively competitive access to international submarine cables has already reduced broadband prices from an average of US\$1200 per Mbps/month to about US\$300 per Mbps/month for end-users in Burundi. The government of Burundi is also one of the main beneficiaries of the initiative. It has negotiated a 10 year Indefeasible Right of Use (IRU) to deliver Internet connectivity for ministries and other government offices in the capital city of Bujumbura.

4.5 UNIVERSAL ACCESS TO AFFORDABLE AND QUALITY INTERNET

Successful experiences in Colombia, Malaysia, Pakistan and Nigeria demonstrate that governments in developing countries have a critical role in facilitating broadband infrastructure investment and Internet adoption in the digital age. These experiences further illustrate that universal access and service funds can be highly effective in expanding Internet access and use when they are updated and adapted to support national broadband strategies and targets. Our research shows that each of the top 15 countries has made a concerted effort to promote shared access at both the community and institutional level. They have carried out public investments to expand broadband networks (especially in rural areas), created

community broadband access centres, encouraged enterprises to provide services through cybercafés, and extended Internet access through government offices and community anchor institutions like schools, libraries and hospitals. Such steps are vital in order to extend broadband access to very poor or marginalised communities.

In Thailand, for example, the government established the Broadcasting and Telecommunications Research and Development Fund to support universal service for broadcasting and telecommunications and promote community services. The <u>f</u>und was used to create public WiFi networks in over 30,000 centres with a total of 150,000 access points. The government plans to increase broadband wireless coverage to 80% of the population by 2016. Peru provides <u>another example</u> of where a USF is being used to extend broadband networks to underserved communities. Peru's Fondo de Inversión en Telecomunicaciones (FITEL) is hailed as one of the most successful programmes to extend access to communication networks in rural areas using the competitive subsidy scheme. While the original plans focused on narrow band network and voice communications, FITEL has now begun promoting access to broadband by improving wireless broadband and the rollout of fibre networks in under-served areas of the country. Municipalities, educational institutions, and health centres have all been targeted, and communities in under-served areas are increasingly gaining access to broadband.

Mexico's Ministry of Communications and Transport (SCT) has launched a project dubbed "<u>Mexico</u> <u>Conectado</u>" ("Connected Mexico"), which seeks to boost broadband access across the country. The project covers the deployment of broadband lines in over 250,000 public spaces, including schools, government institutions, and hospitals, by 2018. The project has provided high-speed Internet access to over 11,000 schools and community centres and 9,000 public access spaces. The government plans to expand Internet penetration to 60% of the population by 2018.



A ROADMAP TO AFFORDABLE INTERNET 5

This report is being released six months before the UN General Assembly gathers to debate and agree the sustainable development goals (SDGs) that will guide the global development agenda for the next 15 years. Our research has clearly demonstrated both the beneficial developmental impact that affordable Internet can have, as well as the common, replicable success factors that can drive prices down.

Our key recommendation, therefore, is:

"To enshrine affordable access to broadband Internet in the sustainable development goals, and require all stakeholders to work toward achieving affordable, universal access in the coming years through a

blend of infrastructure investment and policy and regulatory reform."

In this final section, we present our key recommendations, grouped by the success factors we have identified and broken down into action points for governments, the private sector, and civil society.

5.1. DRIVE BROADBAND INFRASTRUCTURE EXPANSION THROUGH **INCREASED PRIVATE INVESTMENT AND REMOVAL OF BARRIERS**

If gaps in broadband infrastructure remain, the poor and those who live in remote areas will remain offline. In addition, as the demand for quality broadband increases, the need for robust in-country infrastructure and international connections surges. Addressing the

infrastructure gap demands clear understanding of the gaps, increased private investment, and the development of public-private partnerships - all tied together under a clear and holistic plan.

overnment	For countries with no current broadba implement comprehensive national b from all stakeholders.
	For countries with broadband plans in update plans at least every three years
	Plans must be time-bound and measu and public-private partnerships should
	Tackle electricity supply deficits in par networks.
rivate sector	Accelerate the deployment of broadba business models that promote open a includes embracing public-private par
	Commit to affordable Internet by cont and recognising the shared responsibi
vil society, ademia,	Serve as the voice of the disenfranchis public and private sectors to ensure th of under-served populations are taken measurement.
ganisations and undations	Add substance to the debate. Fund an and Internet deficits in order to facilita structure planning by policy makers an to create regional policy observatories
	•



Of course, this will not be a simple task. It requires a multi-pronged strategy - one that depends on close collaboration among key players, including governments, policymakers, private sector, academia and civil society. Crucially, policies and regulations should address both the demand and supply side of Internet development.

> and plan: Within two years, develop and roadband strategies and plans with input

place: Commit to measure progress and , with input from all stakeholders.

urable. Open access, infrastructure sharing, d be explicitly considered.

allel with the expansion of broadband

and infrastructure through sustainable access and infrastructure sharing. This tnerships.

ributing to universal access service funds ility to invest in rural or marginalised areas.

sed – engage constructively with both the nat the broadband infrastructure needs into consideration in both planning and

d/or participate in research on broadband te evidence-based policy-making and infrand the private sector. Come together s to share knowledge and track progress.

5.2. INTENSIFY COMPETITION AND LEVEL THE PLAYING FIELD TO IN CREASE ACCESS, REDUCE COSTS AND STIMULATE DEMAND

Many challenges can be addressed by intensifying competition, in particular through the adoption of a unified licensing regime. Access to resources such as spectrum and right of way must take place in a market-based, non-discriminatory and transparent

fashion. This also calls for enhancing the capacity of regulators and the adoption of evidence-based regulatory principles.

5.3. OPEN ACCESS & INFRASTRUCTURE SHARING

The Affordability Index data show few operators are sharing passive and active components of their networks or spectrum. Infrastructure sharing is an op-

Government	Adopt technology- and service-neutral unified licensing regula- tions that facilitate flexibility in market entry by operators.
	Increase transparency, fairness and evidence-based regulation so as to stimulate free competition, innovation, better service quality and low tariffs.
	Promote public consultation in order to increase the participa- tion of consumers and commercial special interest groups in access and cost regulatory issues.
Private sector	Commit to participate and embrace infrastructure sharing mechanisms with other players.
	Respect regulatory rulings, do not abuse market power and engage in effective competition.
Civil society, academia, international organisations	Help to monitor the market by assessing and researching competitive trends. Model and analyse the impact of current or possible policies and regulation on access and cost.
and ioundations	Make your voice heard by communicating research findings actively. Participate in consultations on the introduction of tech- nology- and service-neutral regulatory frameworks
	Build capacity – help to train and inform regulators and decision makers in their process of updating regulatory frameworks, laws and guidelines.

Government	Establish infrastructu incentives for comme
	Encourage public-pri fibre rollout, where a
	Promote synergies and between communica road companies duri of infrastructure.
	Lower the barriers as rights-of-way readily cost, simplifying the authorities can charg
Private sector	Commit to commerc
	Participate in public- building, operation a by all providers.
Civil society, academia, international organisations and foundations	Encourage the partic educational and rese and sharing of netwo

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portunity that can be tapped into to reduce the cost of Internet access; therefore, commercially driven sharing should be accelerated.

> ure sharing regulations that provide clear nercially driven infrastructure sharing.

rivate partnership models for broadband and when private investment is not feasible.

and mandate or require coordination ation, railway, pipeline, electricity and ing construction and maintenance

ssociated with rights-of-way costs, by making / available to network developers at a low legal process and limiting the fees that local ge for granting access to rights-of-way.

cially driven infrastructure sharing.

-private partnership models that facilitate and sharing of common infrastructure

cipation of high-demand users such as earch institutions in financing, operation orks.

5.4. ACCESS TO SPECTRUM

Wireless technologies provide cost effective means of Internet access in remote and rural areas, but their impact depends on the availability of spectrum on competitive, open and fair terms. In order to ensure their

availability, policy makers, regulators and industry should agree to abide by transparent spectrum plans.

Government	Develop spectrum management frameworks that respond to the high and increasing demand for broadband wireless services.	
	Permit and encourage the re-farming of bands in order to in- crease spectrum availability for broadband wireless networks.	
	Ensure sufficient broadband wireless spectrum is made available on competitive, open and fair terms.	
	Assign additional spectrum to allow for new and existing companies to provide bandwidth-intensive broadband wireless services.	
Private sector	Participate in spectrum review regimes in order to increase availability on competitive and transparent terms.	
	Innovate in the use of unlicensed spectrum.	
	Participate in spectrum sharing.	
Civil society, academia, international organisations	Participate in government efforts to review spectrum policies and plans.	
and foundations	Fund and research innovative spectrum uses – help to prove concepts that may be able to be rolled out more broadly.	

5.5. UNIVERSAL ACCESS TO QUALITY & AFFORDABLE INTERNET

Those users who cannot afford access to the Internet need targeted subsidies through universal access funds. These subsidies can be provided directly or through shared infrastructure. Demand-side initiatives, such as e-government services and national research and education networks, can have a significant impact

uptake of e-services.

Government	Use Universal Service • Expand rural infrast provision of free of and key public ins offices, hospitals. • Invest in locally rele making e-governa order to facilitate
	Work toward publicly at institutional, comr
	Be transparent in the detailed annual repo
Private sector	Provide special rates such as research and
	Actively participate ir expand access in rura including supporting and service funds.
Civil society, academia,	Support digital literat citizens to strategical
and foundations	Engage in and suppo

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on Internet usage. Governments need to commit resources to increase access at community centres and local public institution facilities, such as libraries and schools, and promote initiatives that stimulate the

e Funds to:

- tructure and shared access, including the or subsidised access at community centres nstitutions such as schools, libraries, post
- evant content and applications, including nment services available to communities in e the uptake of the Internet.
- agreed targets for broadband services munity and household levels.
- e financing and operation of USFs, with orts published in open data formats.
- s for high-demand public benefit users, d education networks.
- n shared investment initiatives that ral areas or to under-served communities, g and collaborating with universal access
- icy education programmes that empower Ily use ICTs for needs.
- ort community access programmes and connect schools, libraries and health centres.

ANNEXES

ANNEX A: ACKNOWLEDGEMENTS

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The A4AI Affordability Working Group – composed of member representatives from Alcatel-Lucent, the

ANNEX B: METHODOLOGY

The Affordability Index is a composite measure that summarises in a single (average) number an assessment of the drivers of Internet affordability in various countries. Benefiting from the research framework established by the <u>Web Index</u>, the Affordability Index covers 51 countries and focuses on two key aspects driving affordability:

Methodolog

Two types of data are used in the construction of the Index: existing data from other data providers ("secondary data"), and new data gathered via a multi-country expert researcher survey ("primary data"). The survey consists of a set of questions – scored on a scale of 0 – 10 – on issues regarding policy, regulation, and various other aspects around broadband and affordable access to the Internet. The questions were specifically designed by the Alliance for Affordable Internet, the Web Foundation, and its advisers. These primary data, based on and aligned with the <u>A4AI Best Practices</u>, attempt to assess the extent to which countries have achieved a policy and regulatory environment that reflects the best practice outcomes. Association for Progressive Communications, Cisco, DIRSI, Ericsson, Google, LIRNEasia, the Internet Society, Microsoft, Research ICT Africa, USAID and the Web Foundation –provided valuable inputs and advice during the Affordability Report review workshop that took place in Cape Town in November 2014 and on earlier drafts.

Finally, we are grateful for the support of A4AI's global sponsors – Google, the UK Department for nternational Development and USAID – and that of the Alliance's entire membership.

Survey questions were scored based on predetermined criteria by country experts. Three country experts were asked to provide evidence and justification that supports each score. The scores were checked and verified by a number of peer and regional reviewers.

Data sources and data providers

The sources of the secondary data that we use are highly credible organizations that produce consistent and valuable data in various fields. We are grateful to those organizations for allowing us to use and reproduce their data. A complete list of data sources and the individual indicators used from each is available on the A4AI website (www.a4ai.org).

Indicator inclusion criteria

We searched a very large number of international databases to find indicators that measure or proxy the dimensions under study.

Before an indicator is included in the Index, it needs to fulfil five basic criteria:

 Data providers have to be credible and reliable organisations, which are likely to continue to

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produce these data (e.g., theirs is not a one-off dataset being published).

- Data releases should be regular, with new data released at least every three years.
- There should be at least two data years for each indicator, so that basic statistical inference could be made.
- The latest data year should be no older than three years back from publication year.
- The data source should cover at least two-thirds of the sample of countries, so that possible bias – introduced by having a large number of indicators from one source that systematically does not cover one-third or more of the countries – is reduced.

Index Computation

There are several steps in the process of constructing a composite Index. Some of those involve deciding which statistical method to use in the normalisation and aggregation processes. In arriving at that decision, we took into account several factors, including the purpose of the Index, the number of dimensions we were aggregating, and the ease of disseminating and communicating it in an understandable replicable, and transparent way

The following seven steps summarise the computation process of the Index:

 Take the data for each indicator from the data source for the 88 countries covered by the Web Index for the 2007-2013 time period (or 2014, in the case of the expert assessment survey).
Impute missing data for every secondary indicator for the sample of 88 countries over the period 2007-2013.

Some indicators were not imputed, as it was not logical to do so. None of the primary data indicators were imputed. Hence, the 2014 Affordability Index is very different from the 2007-2013 Indexes that may be computed usir secondary data only. Broadly, the imputation of missing data was done using two methods,



n to extrapolation: country-mean on if the missing number is in the ear (e.g., have data for 2009 and 2011, or 2010), or taking arithmetic average tes on a year-by-year basis. For the s that did not cover a particular country the years, no imputation was done for try/indicator.

e the full (imputed) dataset using z=(x-mean)/standard deviation), ure that for all indicators, a high value is nd a low value is *"bad"*.

plicable, cluster some of the variables e scheme in the tree diagram), taking ge of the clustered indicators postation. For the clustered indicators, ered value is the one to be used in the tion of the Index components.

the two sub-index scores using c means, using the clustered values evant.

the min-max values for each z-score he sub-indices, as this is what will in the visualisation tool and other ons containing the sub-index values y, it is easier to understand a min-max n the range of 0 – 100 rather than a deviation-based number). The formula : [(x – min)/(max – min)]*100.

overall composite scores by averaging ndexes (at z-score level).

the min-max values (on a scale of each z-score value of the overall e scores, as this is what will be shown ualisation tool and other publications g the composite scores.

eights

en the feedback and advice from ts and the Working Group, we have al weights across all indicators xes.

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ANNEX C: AFFORDABILITY INDEX – EMERGING COUNTRIES

Rank	Country	Sub-index: Communica- tion Infrastructure	Sub-index: Access and affordability	Affordability Index: Overall Composite Score
1	Costa Rica	48.1	77.5	63.4
2	Colombia	58.8	66.4	63.1
3	Turkey	56.3	67.5	62.4
4	Malaysia	53.6	68.5	61.5
5	Peru	58.0	60.2	59.6
6	Brazil	57.4	56.9	57.6
7	Mauritius	49.7	63.8	57.2
8	Ecuador	44.6	59.4	52.3
9	Argentina	47.3	55.6	51.8
10	Thailand	44.3	54.9	49.8
11	Mexico	41.0	55.5	48.5
12	Jamaica	34.6	59.5	47.3
13	Tunisia	44.7	45.2	45.1
14	Dominican Rep.	39.3	49.1	44.3
15	South Africa	33.4	53.2	43.4
16	China	39.5	46.2	43.0
17	Botswana	38.1	47.0	42.7
18	Namibia	31.7	44.7	38.2
19	Kazakhstan	28.2	44.5	36.3
20	Venezuela	27.0	40.7	33.8
21	Jordan	21.9	45.4	33.5

ANNEX D: AFFORDABILITY INDEX – **Developing Countries**

Rank	Country	Sub-index: Communica- tion Infrastructure	Sub-index: Access and affordability	Affordability Index: Overall Composite Score
1	Rwanda	49.0	53.6	51.6
2	Nigeria	45.3	56.6	51.2
3	Morocco	41.1	60.0	50.8
4	Uganda	40.1	55.4	48.0
5	Kenya	37.7	50.0	44.0
6	Gambia	40.3	46.3	43.4
7	Vietnam	30.7	55.7	43.3
8	Pakistan	42.6	42.3	42.6
9	Ghana	37.3	45.6	41.5
10	Indonesia	36.9	44.5	40.8
11	Tanzania	38.1	43.2	40.7
12	Philippines	36.1	43.1	39.7
13	India	40.8	37.4	39.1
14	Egypt	43.2	33.0	38.1
15	Bangladesh	42.5	31.8	37.1
16	Zambia	32.9	40.0	36.4
17	Myanmar	31.8	39.2	35.4
18	Senegal	27.3	37.1	32.1
19	Mali	28.3	34.7	31.4
20	Benin	35.7	26.5	30.9
21	Mozambique	24.5	36.6	30.4
22	Cameroon	20.7	31.0	25.6
23	Nepal	23.0	27.1	24.7
24	Zimbabwe	17.8	32.1	24.7
25	Burkina Faso	14.2	27.4	20.5
26	Malawi	15.2	23.8	19.1
27	Ethiopia	0.0	27.9	13.4
28	Sierra Leone	11.0	16.5	13.2
29	Haiti	12.1	14.5	12.8
30	Yemen	1.6	0.0	0.0

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ANNEX E: PROGRESS TOWARD THE UN BROADBAND AFFORDABILITY TARGET

Rank	Country	Affordability Index	Mobile (prepa base
35	Kazakhstan	36.3	
27	Indonesia	40.8	
17	Tunisia	45.1	
3	Turkey	62.4	
1	Costa Rica	63.4	
25	Pakistan	42.6	
23	China	43.0	
4	Malaysia	61.5	
6	Brazil	57.6	
7	Mauritius	57.2	
37	Venezuela	33.8	
38	Jordan	33.5	
13	Thailand	49.8	
30	India	39.1	
20	South Africa	43.4	
32	Egypt	38.1	
5	Peru	59.6	
14	Mexico	48.5	
31	Namihia	38.2	
2	Colombia	63.1	
16	lamaica	47.3	
20	Philippines	39.7	
12	Morocco	50.8	
0	Ecuador	50.0	
0	Nigoria	52.5	
20	Chana	51.2	
20	Gridrid Deministere Demuklie	41.5	
18	Dominican Republic	44.3	
24	Bolswana	42.7	
19	Kenya	44.0	
44	Nepal	24.7	
33	Bangladesh	37.1	
51	Yemen	0.0	
28	lanzania	40.7	
10	Rwanda	51.6	
41	Benin	30.9	
34	Zambia	36.4	
40	Mali	31.4	
15	Uganda	48.0	
49	Sierra Leone	13.2	
46	Burkina Faso	20.5	
47	Malawi	19.1	
45	Zimbabwe	24.7	
50	Haiti	12.8	
42	Mozambique	30.4	
39	Senegal	32.1	
9	Argentina	51.8	
21	The Gambia	43.4	
22	Vietnam	43.3	
36	Myanmar	35 Δ	
40	Cameroon	25 A	
4 <		23.0	

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e broadband aid, handset ed, 500 MB)	Mobile broadband (postpaid, computer based, 1GB)
0.69	0.69
0.80	1.76
0.85	
1.09	1.15
1.10	1.73
1.28	12.26
1.32	2.95
1.39	4.11
1.41	3.23
1.47	0.84
1.90	1.98
2.05	3.41
2.33	3.11
2.58	12.39
2 75	4 30
2.76	1.27
2.78	1.76
2.10	2.70
2.05	2.55
2.30	3.17
3.31	2.34
4.01	5.73
4.31	8.60
4.71	4.66
5.36	4.63
5.60	9.80
5.60	7.00
6.80	3.95
7.12	9.24
7.49	14.98
7.92	13.87
9.82	11.78
12.18	-
14.88	20.47
15.07	-
15.37	46.12
15.78	23.17
17.04	27.19
18.18	34.09
25.05	-
27.19	36.25
28.11	_
29.27	65.85
34.13	34.13
40.54	40.54
56.75	_
_	_
_	164 28
_	-
	-
-	-
-	-
-	41.35

Table 2. Only 23 countries have achieved the UN 5% entry-level target (countries sorted by mobile broadband prices, ascending)





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