

## **IMANI Telecom Series: Why you are paying so much for broadband Internet and what should be done about it.**

Ghana's largest revenue sources since independence has been from the export of natural resources such as Gold, Cocoa, Timber and until recently crude oil. These revenue sources are influenced by fluctuations in the global commodity market hence volatile, unpredictable and unsustainable in the long term. Crude oil price for instance fell from a peak of \$115 per barrel in June 2014 to under \$35 at the end of February 2016. This trend reflects the general decline in revenue accrued from cocoa, gold, timber and crude oil to Ghanaian economy. Earnings from cocoa beans in 2016 amounted to US\$1,923.3 million, a decrease of 2.4 per cent below the level recorded in 2015 while the value of crude oil exported in 2016 was estimated at US\$1,345.2 million compared to US\$1,931.3 million exported in 2015<sup>1</sup>

With the growing demand for infrastructure development, rising youth unemployment and other development challenges, Government needs among other things to create a favourable environment for new innovative business models in areas such as manufacturing and Information Communication Technology (ICT) to thrive for alternative revenue sources to meet these needs.

ICT enabled business such as Tisu ecommerce shop, mPharma, Scolah and many others require reliable and affordable Internet to grow and remain globally competitive. This still remains a pipe dream in Ghana.

Mobile data subscription has grown from 10.6 million in 2013 with six service providers to about 20 million in January 2017 with 9 service providers. Notwithstanding, consumer price for data is still not affordable for all income groups based on Alliance for Affordable Internet's target of 1GB of data for 2% of average income<sup>2</sup>.

In setting the consumer price for Internet data, Network Operators consider several factors such as spectrum fee, network investment requirement, power cost, marketing, administrative overheads among others. The most important cost driver is the spectrum fee. This is because spectrum is the fundamental requirement for the operation of mobile networks. As a result, the price tag placed on spectrum band affects how much consumers eventually pay for data.

Radio spectrum is a limited resource in telecommunication operations hence regulators all over the world place premium on it to ensure effective allocation and also to generate revenue for the state. The fees for spectrum is usually charged as upfront fees, annual charges or both and allocated through auctions. The global best practice in spectrum pricing policy is to set auction reserve prices below a conservative estimate of true market value to promote competitive bidding leading to a real price discovery<sup>3</sup>. Regulators that prioritise excessive revenue over efficiency

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<sup>1</sup> Bank of Ghana Annual Report (2017). Retrieved from Bank of Ghana's website <http://bit.ly/2xboVsw>

<sup>2</sup> Alliance for Affordable Internet (2017). Retrieved from <https://nca.org.gh/industry-data-2/market-share-statistics-2/data-3/>

<sup>3</sup> Friend, Graham.(2011). Best practice spectrum renewal and pricing: a review of international best practice and the lessons for the Government of Bangladesh. Washington DC ; World Bank Group. <http://documents.worldbank.org/curated/en/908691468210579972/Best-practice->

of spectrum allocation risk an award failure.

Allocation failures means blocks of spectrum bands remain unsold to network operators<sup>4</sup>. High spectrum prices also potentially create monopoly as only one or few operators can afford very high fees for spectrum. Hence the consumer benefits of lower prices as a result of healthy price competition among network operators are eroded.

### How affordable is broadband Internet in Ghana?

The alliance for affordable Internet, defines affordable Internet as 1 GB for less than 2% of average monthly income<sup>5</sup>. This target takes into account poverty and income inequality in most countries. It is also just enough data for regular use for health, education, and access to other valuable online tools and information sources.

In its 2017 Internet Affordability report, Ghanaians spend an average of 3.89% of income on 1 GB of data per month. This clearly shows Internet is still not affordable to all income groups.

Comparatively however, the consumer price of Internet in Ghana is moderate relative to other African countries. The affordability index of four lower middle-income countries has been compared in the table below.

Table: List of lower middle-income African countries' price of 1GB mobile prepaid data plan as a % of GNI per capita, by income level (2015)

Country	Price of 1GB mobile prepaid plan as a % of average monthly income	Market penetration (mobile broadband unique subscription as a % of population)
Tunisia	1.56%	19.72%
Morocco	2.05%	19.74%
Ghana	3.89%	15.84%
Nigeria	7.63%	11.93%
Kenya	9.72%	10.86%
Cameroon	12.27%	2.98%
Côte d'Ivoire	14.47%	16.39%
Zambia	14.94%	8.98%

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spectrum-renewal-and-pricing-a-review-of-international-best-practice-and-the-lessons-for-the-Government-of-Bangladesh

<sup>4</sup> Marsden R, Bruno S, Hans-Martin Ihle (2017). Effective spectrum pricing: supporting better quality and more affordable mobile services. Nera Economic Consulting. Retrieved from GSMA website: <http://bit.ly/2vV75sK>

<sup>5</sup> Ibid.3.

Source: Internet Affordability Report (2017).

The above notwithstanding, a lot more work needs to be done by the government if Ghana is to achieve the United Nations' sustainable development Goal 9 of universal, affordable Internet access by 2020<sup>6</sup>.

Getting more citizens online brings enormous socio-economic benefits to the country. It opens up a huge market for businesses with Internet backed models. A boom in the digital economy would create more sustainable jobs; increase incomes and equitable access to government goods and services.

### **Does spectrum price impact broadband cost?**

Several academic and experimental studies support the thesis that spectrum prices impact how much customers eventually pay for broadband Internet. Offerman and Potters (2006) used experimental market corresponding to a symmetric price-setting duopoly, with product differentiation to examine whether the auctioning of entry licenses lead to an increase of market price. The research experiment revealed that high spectrum fees produced high short-term prices for consumers in markets with few participants. It was also observed that the average price customers paid for services remained high even after the upfront entry fee was paid off<sup>7</sup>.

In a recent report for Global System for Mobile Communication Association (GSMA), Marsden et. al. (2017) further supported the argument with new evidence that high spectrum price suppresses incentives for price competition and influences consumer data price. Using a cross-country data set, the researchers tested the relationship between spectrum prices and downstream prices for mobile data by comparing the spectrum costs (on a per MHz Pop basis), and observed prices in September 2016 for wireless data for each country in the study sample. The sample was divided into three groupings, based on GDP per capita, so as to avoid the results being distorted by the relationship between price levels and ability to pay in countries with very different income levels. The findings showed that for higher, middle-income and some low-income countries, there was a significant statistical link between higher spectrum prices and higher consumer prices for data<sup>8</sup>.

Without establishing the direction of causality, these studies provide some insights into the possibility of consumers paying high prices for Internet/data services given that spectrum prices will be higher than established market prices.

### **The reason you are paying so much for 4G Internet services**

The 4G era began in 2008. Most countries sold spectrum license in the frequency range of bands, including 700 MHz, 800 MHz, AWS-3 and 2600 MHz, as well as liberalised spectrum in existing mobile bands, such as 900 MHz, 1800 MHz and 2100 MHz for 4G services.

The reserve auction prices as well as the final price outcomes of the spectrums sales

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<sup>6</sup> United Nations Sustainable Development Goals.. Retrieved from the UN website <http://www.un.org/sustainabledevelopment/infrastructure-industrialization/>

<sup>7</sup> Offerman T, Potters J. (2006). Does Auctioning of Entry Licenses Induce Collusion? An Experimental Study. Retrieved <https://pure.uvt.nl/ws/files/771610/does01.pdf>

<sup>8</sup> Marsden R, Bruno S, Hans-Martin Ihle (2017). Effective spectrum pricing: supporting better quality and more affordable mobile services. Nera Economic Consulting. Retrieved from GSMA website: <http://bit.ly/2vV75sK>

have been observed to be rising across most countries<sup>9</sup>.

In Ghana, the National Communication Authority (NCA) first auctioned the 2500-2600MHz bands in 2013 for 4G services. The auction was restricted to only local companies with the NCA's objective of spurring the growth of the local technology industry, excluding existing mobile network operators<sup>10</sup>.

Four years after the sale of the spectrum, only 3 of the companies that won the bid are operational, all providing 4G services to only 105, 257 customers out of about 20 million mobile data subscribers in the country<sup>11</sup>.

By December 2015, after a series of advocacy for existing Mobile Network Operators (MNO) to be given 4G licenses, NCA proposed to auction two 2x10 MHz lots of 800 MHz. The objectives for the auction included; (i) to provide valuable spectrum for the mobile industry, (ii) generate revenues for the government, and (iii) foster growth in the existing mobile Internet.

The reserve price however was set at \$67.5 million per lot (\$0.13 per MHz per pop)<sup>12</sup>, which was high as compared to similar spectrum prices in neighbouring African countries. The table below illustrates the price of spectrum per the population of some African countries and their auction outcomes.

Country	Spectrum auctioned	Minimum reserve prices	Spectrum price/pop	Status of auction
Mozambique	800 MHz	USD 30 million per block	\$0.12 per MHz per pop	All six-block available unsold as at 2016
Ghana	800 MHz	USD 67.5 million per lot	\$0.13 per MHz per pop	One block of out of the 2 sold

<sup>9</sup> Ibid.

<sup>10</sup> NCA issues three new mobile broadband licenses. (2013) Retrieved from biztechafrica website: <http://bit.ly/2wbfo2h>

<sup>11</sup> Telecom Data Subscription (2017) Retrieved from the National Telecommunication Authority website: <https://nca.org.gh/industry-data-2/market-share-statistics-2/data-3/>

<sup>12</sup> Generally spectrum license prices are measured in \$/MHz-POP where the numerator is the total value of a license and the denominator is the product of spectrum bandwidth measured in millions of cycles per second and the population living in the covered areas

Morocco	60 MHz each at 800 MHz and 1800 MHz, and 120 MHz at 2500 MHz	US\$77m	\$0.06	All sold
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Source: Effective spectrum pricing report (2017).

Three of the four major mobile network operators declined to participate in the bidding process. The CEO of Vodafone Ghana, Yolanda Cuba described the reserve price as exorbitant and unfair compared to what other African countries were paying for same spectrum<sup>13</sup>. MTN Ghana was the only operator that acquired the license<sup>14</sup>. The NCA by this policy option defeated its own objective of fostering healthy competition for mobile data growth as well as raising revenue for government since a block of spectrum is yet to be sold.

Though the methodology used by the NCA in setting its reserve price was not disclosed publicly, it is comfortable to infer that the prices of similar spectrum bands in other developed mobile markets was used as the benchmark price with some adjustments made to cater for average revenue per user (ARPU) in Ghana and other economic parameters.

This notwithstanding, the allocation failure is clear evidence Ghana's price spectrum reserve price was too high. The unsold spectrum is a loss of revenue to the government. The high reserve price has also indirectly created a big oligopoly operator in 4G services. This will negatively affect price competition among operators; robbing consumers of the benefits of reduced prices and improve quality service. The high fees also negatively affect investment decisions by operators in rolling out network infrastructure across all districts in the country to ensure quality service delivery.

It is obvious that Ghana did not learn from the policy blunders of other countries in their 3G and 4G migrations. For instance, France's 3G-spectrum auction in 2001 was a major policy disaster. The regulator Autorité de Régulation des Communications Électroniques et des Postes (ARCEP), overly priced its four 2x15 MHz licenses for \$4.5bn each, \$18bn in total, influenced by high spectrum auction outcomes in the UK and Germany a year prior. Only two out of the 3 incumbent operators applied for the license with no new entrants. It took 10 years after several failed attempts for ARCEP to sell of the 3G spectrums at reduced prices. The result of having idle spectrum and charging very high spectrum fees was mobile data prices in France being among the highest in Europe over the period<sup>15</sup>.

<sup>13</sup> Anita Arthur (2017, May 10) Telcos ditch 4G spectrum over high cost. Retrieved from CitiBusiness New website: <http://citifmonline.com/2017/05/10/telcos-ditch-4g-spectrum-over-high-cost/>

<sup>14</sup> <http://www.myjoyonline.com/business/2017/January-12th/4g-spectrum-pricing-politics-vs-industry-consumer-interest.php>

<sup>15</sup> ARCEP (2009). Results and summary of the award procedure for the fourth 3G license. Retrieved from <http://bit.ly/2wyh9Za>

Another policy blunder is Ghana's licensing regime, which is [stifling innovation](#). The service specific license is not technology neutral hence slows the adoption of new technologies within the same spectrum band. Furthermore, the National Communication Authority (NCA) does not have policy guidelines to support spectrum sharing among operators.

### **What should be done to bring the price of broad Internet down?**

Ghana has one lot of 2 x 10 MHz in the 800 MHz Band unsold spectrum band. The new government has indicated it will not reduce the price of the remaining slot. This implies that the entire spectrum allocation process may drag for several years as the other operators claim they cannot afford the high prices<sup>16</sup>.

Spectrum is a valuable resource whose value lost over the period cannot be recouped. Government needs the high revenue from the spectrum sale while network operators also need it at a moderate price to provide reliable and affordable Internet to their customers.

Here are few recommendations government should consider in this dilemma:

First, the Government should take the unpopular option to reduce the price of 800MHz spectrum to reflect the true market value. The market value of 4G spectrum can be estimated by modelling the business case of potential bidders and setting well defined auction rules for price discovery.

This path will efficiently allocate spectrum to other Mobile Network Operators (MNOs) to provide 4G services to their customers and still raise sufficient revenue for the government directly.

In the medium to long term, reliable and affordable 4G Internet will spur a digital boom in the country (more citizens coming online). New innovative business models will emerge, new digital jobs and improved efficiencies of businesses. Tax revenues that will be accrued from the digital economy growth will bolster the declining traditional cocoa and gold revenues. Improved data services will also support Government's new e-agenda that seeks to improve the delivery of public goods and service.

The question that will arise when reserve price of spectrum is reduced is how the current the 800MHz spectrum license holder may be compensated.

This could be done through direct reimbursement or in future spectrum allocations.

Secondly, the NCA needs to review its licensing regime (migrate to unified license which is technology neutral) and develop a clear policy guideline that would encourage spectrum sharing among telecommunication operators just like the case of infrastructure sharing to deliver quality and affordable services to customers. It should be feasible for MNOs to partner Broadband Wireless Access (BWA) license holders to roll out 4G Internet across the country faster.

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<sup>16</sup> Ibid.14.

Moving forward, NCA in planning future spectrum auctions should prioritise long-term benefits that would encourage investment and competition in the telecom sector rather than immediate revenue for government.

The mobile industry will transition to 5G by 2020 requiring rollout of new infrastructure and allocation of spectrum. Ghana should not repeat the mistake of restricting allocation of spectrum or over pricing spectrum.

***IMANI's Centre for Science, Technology and Innovation Policy produced this paper.  
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