

GLOBAL INFORMATION SOCIETY WATCH 2008

Focus on access to infrastructure



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Editor

Alan Finlay

Assistant editor

Lori Nordstrom

Publication production

Karen Higgs

Graphic design

MONOCROMO
Myriam Bustos, Leticia da Fonte, Pablo Uribe
info@monocromo.com.uy
Phone: +598 (2) 400 1685

Cover illustration

Matias Bervejillo

Proofreading

Lori Nordstrom
Lisa Cyr

Website

www.GISWatch.org
Andrea Antelo
Ximena Pucciarelli
Monocromo

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Spectrum management

Ben Akoh

Open Society Initiative for West Africa (OSIWA)

www.osiwa.org

The “brick” – weighing down innovation in Ethiopia

In 1999, not so long after the Ethiopian Telecommunication Corporation (ETC) launched its mobile telephony service, Ethionet, it constrained users to a certain brand of Ericsson mobile phone commonly referred to as the “brick”. The twin-line, green, monochrome display, blue-coloured cover and heavy battery packs were a status symbol, and Ethionet’s de facto mobile communication device. Regulations restricted usage of other phone models irrespective of what advanced functionality they might have had. They were illegal. Although the country was far behind in the implementation of mobile communication compared to other African countries who were rapidly implementing mobile technology, the regime ensured it protected its cash cow from bleeding right from the onset. And it went on to lock access to all tiers of the industry. The internet, spectrum allocations, airwaves, value-added mobile services such as short message service (SMS), all, until recently, suffered under the heavy rule of the administration. Innovation was restricted and industry growth crippled.

In recent times, the global mobile telephony sector has seen an avalanche of innovation, with mobile manufacturers driving technology needs way ahead of network capabilities. It is not unusual to see highly advanced mobile devices, such as recently released third-generation (3G) phones, in use in lesser capable networks, say second-generation (2G) networks. The separation of control over access equipment, such as handsets, from transmission infrastructure, akin to the removal of control on wireline terminal equipment, has led to innovation in the mobile industry and across the entire spectrum of telecommunications. This has included remarkable growth and improvement in value-added services. SMS now contributes to a large percentage of the entire mobile revenue base, as do multimedia messaging service (MMS), general packet radio service (GPRS) and others.

African telecommunications have in recent times seen increasing growth driven by demand- and supply-side factors such as falling costs, regulatory reforms and technological innovations which have led to smaller, more efficient and affordable equipment (Gray, 2006). By 2004, Africa had added nearly 15 million mobile phone subscribers to its subscriber base, equivalent to the continent’s total overall telephone subscribers (mobile and fixed) in 1996. Gray

(2006) comments that mobile phone subscribers surpassed their fixed-line equivalent in 2004, with countries like Nigeria dramatically increasing their own telephone penetration rate from 0.5 to 8%.

Such penetration rates have raised certain arguments. For instance, some say that in the African context the mobile phone capitalises on the innate orality of African culture and society, perhaps explaining its rapid uptake. But, in the modern setting, it is an orality that has turned in on itself, because the cost of communication may have also eaten into the disposable income of the individual. A Europemedia report states that in 2003, global youth spending on mobile-related products and services stood at 13.5% of their disposable income, even affecting the sales of chocolate in the United Kingdom (UK) for the first time.¹ And the surge has continued amidst worldwide concerns over the economy.

A number of factors determine the cost of the mobile handset. These include design, high-tech appeal, quality, functionality and various consumer-specific requirements.² However, significant opportunity costs for manufacturers also contribute to handset costs; for example, where they consider an operational feature necessary, such as the need to incorporate extra frequency band in a handset for use in multiple and different network configurations (i.e., while roaming) (GSM Association, 2007). The increase in functionality from cramming things like multiband, Wi-Fi, GPRS, and wireless application protocol (WAP) into small form factors has a corresponding increase in the cost of a mobile device – and this translates into the need to stretch disposable income in order to afford devices.

A technical white paper released by the GSM Association (2007) concluded that there are significant economies of scale to be had in the production of terminals with internationally identified common frequency bands. It states that without the identification of common bands, handset costs could be set prohibitively high, and the effect will be a significant reduction in the uptake of mobile services. This would harm not only consumers and industry directly, but also the benefits that mobile offers to economies as a vital infrastructure. The white paper argues that chipset modification, handset integration and testing costs have multiplicative effects on the cost of mobile phone terminals, as manufacturers and operators squeeze multiple bands into “affordable” phones to make them network-ready across different networks, and sellable into different markets.

1 www.allbusiness.com

2 mic.iii.org.tw

Effectively, phones specifically manufactured for certain low-budget and heavily, negatively regulated spectrum markets may not be so economical. As the global mobile penetration rate increases, the supply of manufactured devices must increase to meet the associated demands, and so must operator services. Economies of scale should normally positively affect the cost of each unit, but certain policy issues may present hiccups to the downward price spiral of a mobile handset, or even the cost of services offered.

Why is spectrum a scarce resource?

Spectrum to the mobile or wireless operator could be likened to the race track to the race car driver – an essential resource for the transmission of data and voice from a transmitter to one or more receiving stations (Buigues & Ray, 2004). Certain factors determine the effective provisioning of services by the operator to consumers. A service provider must operate according to the requirements of and within the regulatory spectrum space (band) allocated to it, usually by its national regulatory agency who manages this resource (spectrum management). That space is finite and tends to become scarce as more operators “fit” their operations within the same spectrum band. Spectrum can be in short supply because there may be more potential users of particular frequencies than available spectrum. There is therefore a need for rationing its use and giving priority to more important applications.³

Spectrum is allocated to applications by several means, including a first-come, first-served basis, auctions, lotteries, discretionary decisions and beauty contests. Buigues and Rey (2004) very adequately explain these processes in their book *The Economics of Antitrust and Regulation in Telecommunications: Perspectives for the New European Regulatory Framework*. These methods have both their advantages and disadvantages and will not be discussed here. Most recently, the auction has become the preferred method for spectrum allocation because of its transparent nature, and, of course, because the bidding process tends to generate revenue for regulators.

Open or closed regimes: Market-based or commons approach?

In the United States (US), the Federal Communications Commission (FCC) has been managing and allocating spectrum since the 1920s. In 1993 it started spectrum auctions as a more efficient means to license – a recommendation favoured by economists such as Coase. Others argue in favour

of an “open access” or commons approach to spectrum management, calling for the removal of exclusive use.

Ian Munro (2000), in a presentation to the International Telecommunication Union (ITU) Radiocommunication Bureau, observed: “With telecommunications markets being deregulated and opened to competition, it is crucial that spectrum assignment mechanisms be efficient, objective, timely and fair. Auctions possess clear advantages compared to other assignment mechanisms.” Munro goes on to say that a large number of countries, including Australia, Germany, Canada and the UK, have gone on to implement advanced auctions (a market-based approach) following the success of the FCC.

Conversely, proponents of the commons approach tout innovation enjoyed in the unlicensed spectrum as the reason why a more liberal approach to spectrum management should be applied to current licensing regimes. The FCC’s “Part 15” rule allowed for the development of innovative systems for spread spectrum technology, leading to developments in cordless phones, short-range wireless local area networks (LANs), and home networks such as Wi-Fi. If these Part 15 rules led to innovation, they should improve the rather disappointing innovation seen so far in the licensed band.

However, there is also an argument that a fully fledged commons approach leads to the “tragedy of the commons” (Heller, 1998), a situation that occurs when many parties have property-like rights for small slivers of spectrum, so that a party wanting to use a block of spectrum may find it costly and complicated to negotiate with many separate holders of spectrum usage rights. In such a case, the spectrum may go unused (hoarded) and become a wasted resource. Heller suggests the importance of introducing a hybrid or combined approach that takes into consideration the various strategies for effective spectrum management.

Glitches in the wheel: Anti-competitive behavior

A market-based approach may have yielded the FCC billions of dollars, the UK’s Ofcom as much as 3% of gross domestic product (GDP),⁴ and, indeed, constitutes a major revenue-generation scheme for most regulators, but the situation has led to anti-competitive behaviour. For instance, spectrum hoarding is not only a “tragedy of the commons”. Here, a typical situation arises where “owners” of spectrum create scarcity of the valuable resource, making it difficult for potential buyers to access it. A recent case in point: in India, code division multiple access (CDMA) providers are alleged to be hoarding scarce underutilised spectrum, and thereby

3 For more information see the *infoDev/ITU ICT Regulation Toolkit*: www.ictregulationtoolkit.org.

4 www.ofcom.org.uk

keeping it from global system for mobile (GSM) operators.⁵ The gravity of the situation is highlighted when one considers that Indian operators are allocated far lower spectrum than global averages (a third of global averages at 7.35 MHz compared to 22 MHz globally). Operators are required to optimise these allocations in the face of ever-increasing customer demands, putting them under dire pressure to deliver quality services.

The FCC's supposed "good practices" also do not come without glitches. Teletruth,⁶ a group that claims to look after telecommunications customers' rights, filed a USD 8 billion complaint in June 2006, alleging anti-competitive practices by large companies such as Verizon, AT&T, Cingular (SBC, AT&T and BellSouth), T-Mobile and Sprint in spectrum auctions reserved for so-called "designated entities". These auctions allow individuals and businesses with limited assets and revenues to bid for licences.

In another example, Ofcom's recent announcement of the auctioning of its 2.6 GHz space has been met with criticism and, recently, litigation. This freed-up space, as a result of the switchover from analogue to digital (producing so-called "digital dividends"), sits in the ultra-high frequency band, and allows for the transmission of signals that effectively penetrate buildings and can be carried over large geographical spaces. It also supports ultra-fast wireless broadband, WiMAX, evolutions of 3G technology, mobile television, and additional digital terrestrial television channels. In criticising the auction announcement, analysts and WiMAX players have suggested that Ofcom should include "use or lose it" conditions and roll-out obligations to avoid spectrum hoarding by existing mobile operators who may want to restrict new WiMAX entrants.⁷ Ongoing litigations by operators T-Mobile and O2 may result in the postponement of the auction to 2009.

Digital dividends: Creating space for access

On 5 May 2006, a public interest group, M2Z network,⁸ filed an application to the FCC to lease a spectrum band in order for it to offer free nationwide wireless broadband access on spectrum that had been lying fallow for seven years. M2Z intended to roll out broadband to 95% of the US population in ten years. It also offered to serve federal, state, municipal and public safety organisations, while filtering indecent content to protect children. In exchange, 5% of its gross revenues would go to the US Treasury.

Digital dividends are particularly useful for the rapid deployment of wireless technologies in otherwise unreachable areas, especially remote rural African communities. However, this may not become a reality in the immediate future, as only some countries have started planning for digital migration to meet the ITU's 2015 deadline. In Africa, Kenya, Nigeria and South Africa are amongst the few who may have commenced talks by setting up committees to steer the migrations, with the latter at the most advanced stages, seeking to migrate in 2009 ahead of the 2010 FIFA World Cup.

These migrations do not come without implications for both operators, who need to consider the cost of converting their equipment to support digital broadcast signals, and consumers, who will need to pay for intelligent devices to receive these signals. Consequently, though it frees up certain frequency bands, digital migration does not automatically translate into immediately available spectrum space. It will take some time after signals have been migrated for regulators, especially those in Africa, to harness and facilitate the liberation of associated bands for other uses.

The need for regional harmonisation

Available spectrum itself may not be the challenge in Africa, but rather restrictive access to available spectrum, as a result of prohibitive entry costs and policy issues. Some of these could be better managed if spectrum administration is looked at from a regional perspective, rather than nationally.

The US and the European Union (EU) seem to present better spectrum management regimes, as they engage in consultative fora involving economists, activists and engineers to discuss the best form of administering these scarce resources. In a recent media release, the EU parliament announced certain measures to coordinate and harmonise radio spectrum use across the EU.⁹ These measures propose the setup of a regional Body of European Regulators in Telecommunications (BERT), which will be composed of the 27 national regulatory authorities and involve a "co-regulation" procedure requiring national regulatory authorities to consult with BERT before regulatory decisions are taken – all in the interests of promoting investments in the next generation access networks. At the same time, the procedures would ensure that national regulators take measures requiring that a service supplied in a specific frequency band is justified by reference to general interest aims, such as ensuring safety of life, promoting social, regional or territorial cohesion, avoiding inefficient use of radio frequencies,

5 www.itvidya.com

6 www.teletruth.org

7 www.unstrung.com

8 www.m2znetworks.com

9 europa.eu/press_room

or promoting cultural and media aims such as cultural and linguistic diversity and media pluralism.

Similar measures may be required in Africa where there are already regional telecommunication regulatory assemblies. Discussions at these fora, especially with the West Africa Telecommunications Regulators Assembly (WATRA), have remained superficial, touching on the harmonisation of national telecommunication codes and affordable roaming services, but falling short of deeper issues such as regional spectrum management and administrative structures, and strategies for efficient harmonisation.

Conclusion

This report briefly touched on the intricacies of spectrum management, with a view to promoting better understanding and efficient administration of this seemingly “airborne” medium that defines important aspects of human existence and touches on day-to-day living. Telecommunications has evolved over the years, and has relevance to all aspects of development – from national security to individual empowerment; from regional or global governance structures to the local fish farmer.

While innovation may have pushed for the liberation of spectrum space, regulatory mechanisms may be slow in accelerating growth in the sector in developing regions. This is especially the case with the deployment of WiMAX and other potential services that could extend access to rural areas, and could possibly accelerate regional integration. Regulatory mechanisms must be instituted well ahead of innovation. The potential of WiMAX to reach largely unreachable places in Africa in the 2.5 GHz band should be encouraged, with licences awarded to service providers. Pro-people licensing regimes should be developed, such as unified licences with a specific focus on rural telephony, and mechanisms such as the FCC’s designated entities should be put in place to allow smaller players to compete.

Access for all should be a driving force behind most telecommunication improvements, including the efficient management of spectrum. Regulators, equipment manufacturers, operators, regional economic commissions and governance structures all have a role to play, including those in Ethiopia. ■

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GLOBAL INFORMATION SOCIETY WATCH 2008 is the second in a series of yearly reports critically covering the state of the information society from the perspectives of civil society organisations across the world.

GLOBAL INFORMATION SOCIETY WATCH or **GISWatch** has three interrelated goals:

- **Surveying** the state of information and communication technology (ICT) policy at the local and global levels
- **Encouraging** critical debate
- **Strengthening** networking and advocacy for a just, inclusive information society.

Each year the report focuses on a particular theme. **GISWatch 2008** *focuses on access to infrastructure* and includes several thematic reports dealing with key access issues, an analysis of where global institutions stand on the access debate, a report looking at the state of indicators and access, six regional reports and 38 country reports.

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2008 Report

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