

# Reaping the dividend



The Mawingu Project in Kenya uses TVWS technology to create Wi-Fi hotspots. It now covers around 50 locations throughout Nanyuki including five schools.

As Africa switches from analogue to digital broadcasting, will this create an opportunity to rollout low-cost wireless broadband, especially to remote users? DAVE HOWELL finds out.

**O**n 17 June, the ITU deadline for the switchover from analogue to digital terrestrial television broadcasting for 119 countries belonging to ITU Region-1 – which includes Africa – was reached (*see News, May-Jun 2015*). The transition creates the so-called ‘digital dividend’ as the UHF/VHF spectrum that was previously assigned to analogue broadcasting can now be re-used for other applications.

According to the ITU, digital dividend spectrum is located between 200MHz and 1GHz. It says these frequencies possess superior signal propagation characteristics compared to those at, for example, 2.4GHz. This means less infrastructure is required to provide wider mobile coverage, resulting in lower costs for communication services, especially in rural areas.

The union adds that the amount of spectrum to be released in the switchover depends on the geography and topography of a country, the degree of penetration of cable and/or satellite television services, requirements for regional or minority television services, and spectrum usage in neighbouring countries. The amount also depends on the digital television technology being implemented to replace analogue services.

So while individual nations are at liberty to re-use digital dividend spectrum as they see fit, some believe it can be best deployed for the cost-effective

rollout of wireless broadband, especially to remote and rural users. In Africa, many countries such as Egypt, Namibia, Nigeria, South Africa, amongst others, have government-led digital strategy plans in place. The question is whether these governments will take the opportunity provided by the digital dividend and use the freed spectrum to improve wireless connectivity.

In addition, last year’s ITU-hosted spectrum allocation conferences agreed that mobile services would adopt both the 700MHz and 800MHz bands.



**Prof. H. Sama Nwana,**  
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However, there are clear differentials across service providers in Africa when you consider the entire sub-1GHz band which therefore doesn’t offer the interoperability or an ecosystem of wireless services that the digital dividend could deliver.

Having said that, the continent became the first region to offer any kind of harmonisation plan after 47 sub-Saharan countries agreed to clear both 700MHz and 800MHz frequency bands for mobile telephony in 2013 (*see News, Sep-Oct 2013*). *Also see this month’s news on p5*).

## Could white space fill the void?

The push to deliver more services to an existing user base across Africa is continuing at pace. LTE is expanding, but it’s how operators and governments across the continent approach the expansion of mobile access that is now at a critical point.

The potential earnings, however, could be vast. Speaking at the Commonwealth Digital Broadcasting Switchover Forum 2015, Mortimer Hope, the GSMA’s director of spectrum for Africa, said that the digital dividend could deliver a USD49 billion contribution to GDP by 2020.

Africa has experienced the fastest growth in mobile broadband services, expanding by 800 per cent in the last five years. But penetration levels remain low at 17.4 people for every 100,000

consumers in the region. The digital dividend clearly has the potential to change that.

However, using the spectrum to deliver fast wireless broadband on the continent is further complicated by another broadcast technology: TV white space. This leverages the 'buffers' in the frequencies below 800MHz that were previously used to guard analogue TV channels against interference from one another.

Broadband signals delivered through TVWS technology can travel longer distances (around 10km), are able to penetrate obstacles such as trees and buildings, and are more robust compared to other wireless internet delivery methods. TVWS spectrum is unlicensed, but in

order to use it devices must communicate with a regulator database to obtain a list of currently available white space channels and ensure other users of the frequencies are protected.

Under its 4Afrika initiative, Microsoft has been championing TVWS technology across the continent for several years. It has worked with various project partners on trials in countries such as Botswana, Ghana, Namibia, South Africa and Tanzania.

A number of deployments have taken place in Kenya, most notably a project dubbed 'Mawingu' (the Kiswahili word for 'cloud') in Nanyuki, a market town in Laikipia County. It started three years ago in collaboration with the Global Broadband and Innovations Alliance, a partnership

between USAID and NetHope, and was the first time TVWS frequencies were combined with solar-powered base stations to deliver low-cost broadband to a rural area that lacks even basic electricity.

Mawingu's TVWS internet signals are converted into ordinary Wi-Fi hotspots, and the plan was to cover 50 locations throughout 2014. The project now connects eight customer sites, five schools, the Laikipia County Assembly office, Laikipia District Community Library, Red Cross and the Burguret Dispensary healthcare clinic.

Despite the work Microsoft has been doing using TVWS, Steve Blythe, director for spectrum strategy at Orange, believes the technology has remained in the R&D phase for a number of years, and that there have so far not been any significant deployments.

"There are a number of reasons why this has been the case: issues around the development of the cognitive techniques used; concerns about the viability of data stored in the interference management databases; and the real-world experience that would be deployed. The first two points need further clarification before proceeding as ensuring that the primary licensee for the spectrum, within which sit the white spaces, is not affected in any way," he says.

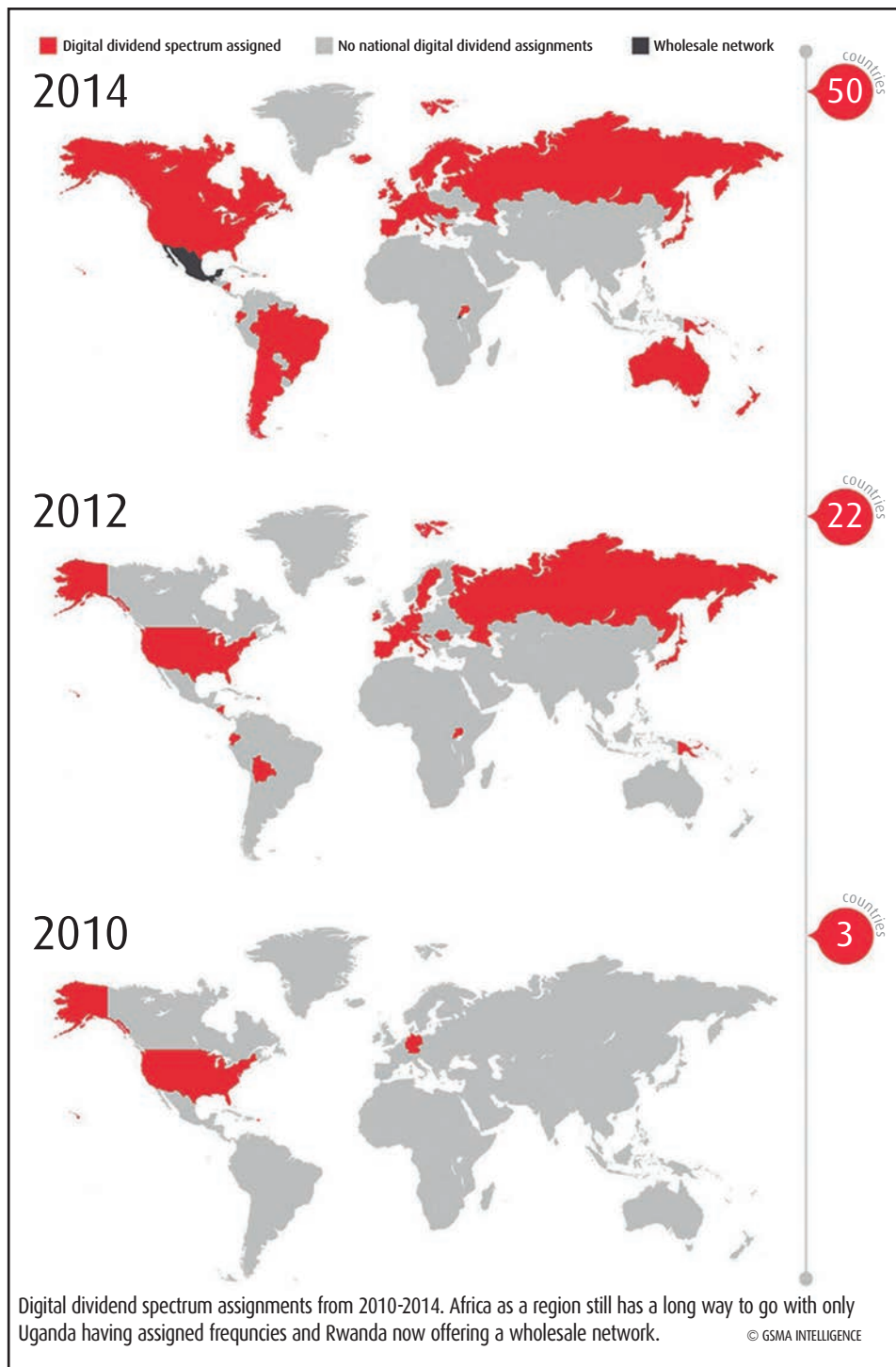
Adam Denton of Coleago Consulting supports this view. Despite the deadline for the analogue switchover in ITU Region-1 having come and gone, he says the reality is that in many African countries the transition to digital TV has yet to be completed. Denton also points out that the 800MHz spectrum identified for mobile at the World Radiocommunication Conference 2007 (WRC-07) has yet to be released.

"Given the complexity of managing the digital TV transition, it is probably unrealistic to simultaneously deploy white space solutions in the UHF band. As a result, it is likely to be quicker and easier to release the 800MHz spectrum for mobile than to setup the spectrum databases, the policy frameworks and the interference management regime needed to manage white space solutions."

The GSMA's Hope also believes that a number of uncertainties remain in terms of the deployment of TVWS technology. He adds: "TVWS should not disrupt international harmonisation efforts that have gone into identifying spectrum for mobile services – particularly in regards to digital dividend spectrum. Right now, the focus should be on preparing for WRC-15 this November in Geneva."

### Connection challenges

There is no doubt that the digital dividend could transform how mobile broadband is delivered to a mass audience across Africa. The harmonisation of projects and decisions about where investments should be made is hampering the rollout of faster wireless connection services. Kenya and Rwanda for instance are looking closely at more wholesale usage of LTE.



Prof. H. Sama Nwana, executive director at the Dynamic Spectrum Alliance, says ensuring the digital switchover across Africa in order to release the digital dividend will be a good start. But he adds that this needs political will, funding and a good telecommunications, media and technology (TMT) strategy.

“Secondly, inane public officials in control of TMT policy at ministries and regulators must truly realise what a brake they are on our African countries. There is usually neither urgency, strategy, funding or competence with these officials. This sort of culture must go and new competencies developed.”

Nwana goes on to say that what Africa needs are visionary ministers, regulators and TMT leaders who have the commitment and management skills to execute projects of national importance such as DSO, fibre, 3G/4G – and all whilst addressing affordability and accessibility concerns.

“Thirdly, political will and funding is required. The business case is simple: for every 10 per cent growth in broadband subscriber numbers, there is a 1.3 to 1.4 per cent growth in GDP in sub-Saharan markets (World Bank); for every doubling of mobile data use, there is a GDP increase of 0.33 to 0.6 per cent. So it makes simple sense to build these 4G and Wi-Fi networks, and keep doubling the speeds.”

While there are also practical challenges such as power and electricity sources to consider, delivering new services across Africa will clearly require more bandwidth.

“Low frequency spectrum (sub-1GHz) is an essential element to providing cost-efficient mobile coverage as a direct result of its propagation advantage,” says Orange’s Blythe. “This benefit is true in all regions, but especially so in Africa where many countries are geographically large with significant areas of low density populations. This makes the delivery of mobile services in a cost-efficient manner a challenge.”

Blythe believes that this is why the digital dividend is essential; it is sub-1GHz spectrum and has been fully standardised for use by LTE.

“The deployment of 4G networks across Africa has been limited to date and is well behind other regions. There are a number of reasons for this but a key factor has been the limitations on the use of spectrum, i.e. the lack of availability of spectrum bands that would facilitate a cost-efficient deployment.

“700MHz as well as 800MHz spectrum will be a key enabler that facilitates the delivery of 4G. These deployments will then enable the delivery of high-speed mobile broadband in areas that are currently without internet services due to the lack of fixed networks and the cost of satellite.”

### Slow progress on faster networks

While few would dispute the benefits of using digital dividend frequencies to accelerate mobile broadband rollouts, many countries in Africa do not seem to be in any great rush to harness the

## THE OPERATOR’S VIEW

MTN is Africa’s biggest mobile operator. So what are its plans for the digital dividend? BERTUS EHMKE, the company’s senior manager for spectrum strategy, says internet connectivity is not the goal.

“MTN has already launched LTE in several countries in Africa. However, these networks operate mainly in re-farmed 1800MHz and 2600MHz spectrum. Coverage is challenging with these high frequencies. Also, the specific re-farmed 2600MHz bands are not always well supported on devices, leading to slow take-up.

“Since MTN’s radio networks throughout Africa are all modernised, the introduction of LTE in the digital dividend band will be a very quick, largely software-enabled, switch-on. This will drastically and rapidly extend coverage beyond the dense city centres currently covered.

“However for MTN, simple internet connectivity is not the goal. It serves as the enablement layer in order to deliver a digital lifestyle to the consumer. The goal is to engage the consumer in every avenue of his/her life, through entertainment, commerce and transactions, information and education.”

Does Ehmke (pictured below) believe the digital dividend is the chance Africa has been waiting for to rapidly develop wireless broadband services?

“It would be a little myopic to say that the digital dividend is the one and only key to providing rapidly developing wireless broadband services in Africa. However, it is a formidable building block.

“Realistically speaking, it really only delivers 30MHz of paired spectrum, which may deliver throughputs sufficient for today’s online engagements. However, at the pace that internet traffic grows, Africa will also need to look further ‘south’ for more capacity – regulators should also look lower in the band, specifically at ‘digital dividend 2’ (700MHz) and further bands becoming available.”

So does he also think that regulators are a stumbling block here? What is standing in the way



of using digital dividend spectrum that has been freed? “Analogue TV currently occupies the 800MHz band earmarked for LTE, and the analogue switch-off will enable the digital dividend, also known as LTE Band 20.

“However, one needs to understand that several African countries also run CDMA networks at 800MHz (Band 5). Some of these licenses have significant tenure left and it is possible that operators may want to keep running these networks for a few years still. Only then will the band be fully usable as Band 20 for LTE.”

How could TV white space (TVWS) technology fit into the development of wireless broadband across Africa?

“As a rule, terrestrial TV transmissions carry fewer channels in African countries than their European counterparts, implying that there is an opportunity to allocate more white space spectrum in between these channels.

“But for TVWS to function effectively, standardised technology as well as regulatory competence is needed. The technology is highly reliant on real-time databases which guide operators as well as equipment to which bands they should attempt to use. The upkeep and management of such a real-time database, is a highly specialised – and expensive – ongoing initiative. It is doubtful whether African

regulators and departments of communication will be able to allocate such generous resources to this, given all of their other responsibilities.

“This may easily see private entities rising to fulfil this function. But this is where clashing of interests may come into play – will private entities serve the aspirations of the country as a whole without being tempted into favouring themselves or third parties?”

spectrum. Indeed as said before, most countries on the continent have missed the deadline that was set for their digital switchover. Those such as Tanzania, Namibia and Mauritius are making progress and could show the way for others, but it’s clear that there isn’t the urgency that is necessary to push through tangible change on a regional basis.

And as Blythe has already pointed out, the deployment of 4G has been hampered by the availability of suitable spectrum. He adds that Africa is three times the size of Europe, but has only one and a half times the population. “So one of the key questions is how can wide area coverage be delivered to such a large landmass, where the population density is low, with good customer experience in an economically viable way?”

In its latest report into broadband provision, the GSMA states that national spectrum management policies also play a critical role

in realising the potential of mobile broadband: “Governments and regulators must do their part particularly by the timely releasing of spectrum to accelerate mobile broadband deployments, such as the digital dividend, that can play an important role in facilitating faster and efficient network deployments.”

The report adds that the 700MHz and 800MHz lower frequency bands in particular offer the broadest geographical coverage and are therefore more cost-effective for wider areas.

With fibre still having some way to go in connecting the continent, does Africa have a wireless broadband future? There are green shoots of success and a level of tangible progress, but more needs to be done and at an accelerated pace. How the region achieves this is as yet unclear. The digital dividend that is now available is slowly being exploited – but not quickly enough for many. ■