Bringing Wireless Broadband to Underserved Kenya

Microsoft

Despite our increasingly interconnected world, many people are still unable to access the benefits provided by technology. In Kenya, only 2% of Kenyans subscribe to broadband services, as defined by the Communications Commissions Kenya. In many countries in Africa, even fewer are connected. This digital divide is perpetuated by business models, technologies, and regulatory frameworks not suited for delivering low-cost, high-quality broadband access.

To help address this challenge, Microsoft, as part of the Microsoft 4Afrika Initiative, initiated a project with the Kenyan Ministry of Information and Communications and industry partners Indigo, a Kenyan Internet Service Provider (ISP), and Adaptrum, a leader in wireless technologies. The project was launched on February 4th and is now delivering low-cost, high-speed wireless broadband access to locations previously unserved by even basic electricity.

The technology making the project possible is called *dynamic spectrum access*, which enables wireless devices to opportunistically tap into unused radio spectrum to establish broadband connections. The project in Kenya utilizes TV white spaces, the unused portions of wireless spectrum in the television frequency band, as well as solar-powered base stations. TV white spaces are particularly well-suited for a range of applications from better in-home networks to rural broadband, to hotspot access and mobile traffic offload to machine-to-machine applications. As television has begun to switch from analog to digital around the world, even more of this spectrum can be used to fulfill those needs.

Technology That Drives Social and Economic Opportunity

While other projects in Africa using TV white spaces have focused on the technical feasibility of the technology, this pilot network is the first deployment designed to increase economic opportunity in communities without access to broadband or electricity. The initial installation near Nanyuki, Kenya brings access to five locations – a healthcare clinic, a primary school, two secondary schools and a community center. The installation in Kalema, Kenya will start with a base station and a connection to the Government of Kenya's agricultural extension office. Long term, the goals call for adding fourteen additional locations to the network, serving up to 6,000 people.

Central to this project was the need to ensure that local public institutions are equipped with the technology and knowledge needed to take full advantage of the new access to broadband. Using the latest Windows 8 tablets, Windows 8 applications and Office 365, project partner Indigo is providing computer labs and offering instruction at each school. The agricultural extension office in Kalema will also receive the Office 365 suite of services to help accelerate economic development in this largely agrarian community. Finally, the project partners are also working with both community leaders and Kenyan content providers to identify the most-needed services and applications for each location and develop Windows 8 applications focused on education and agriculture.

TV White Spaces

TV white spaces technology isn't brand new; however its increased use and applications are. It was originally developed over 10 years ago, in part by Microsoft Research, and has been extensively tested in trials and pilots conducted by Microsoft and others in cooperation with governments including the United States, Canada, Finland, Japan, Korea, Singapore, the United Kingdom to name a few. As the evidence in favor of white spaces and dynamic spectrum access continues to accumulate, regulators are increasingly moving forward with policies that allow individuals, companies and communities to take advantage of these technologies.

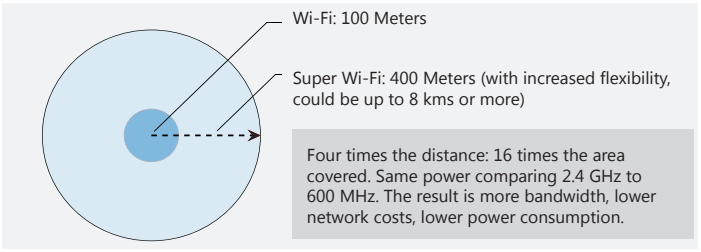
The most common implementation of TV white spaces networks will be accessed using smart, radio-enabled devices that report their location to an Internet database. The database will tell the device which TV white spaces channels, and at what power level, it is permitted to operate on in its current location. The database has a list of all protected TV stations and frequencies across the country, so the devices can avoid causing interference to TV broadcasts. This technology is truly dynamic – as different TV channels become available, devices that can opportunistically switch from one group of channels to another. This win-win translates to greater network capacity, allowing a greater number of users in a given area while, at the same time, protecting television reception from interference. All of this engineering will be invisible to the consumer, who will simply experience more ubiquitous broadband connectivity.

Benefits

Greater Distances

TV white spaces Wi-Fi networks work in much the same way as conventional Wi-Fi, but the signals travel over longer distances than the typical Wi-Fi signal. In typical applications, a strong Wi-Fi signal can cover 100 meters while a TV white spaces Wi-Fi signal at the same power level can easily travel 400 meters and with higher power can cover many kilometers. In Kenya, the project is achieving high bandwidth broadband connections at ranges of up to 10KM.

TV White Spaces Signals Travel Farther



Penetrates Common Obstructions

Conventional Wi-Fi is relatively weak when it comes to working in typical physical settings – bumping up against concrete obstructions and many types of walls. Most population centers have thousands of likely Wi-Fi impediments and almost any installation in a building with more than a few rooms will eventually hit limits. Likewise, many rural areas are difficult to serve using existing technologies due to heavy foliage or topographical challenges. TV white spaces Wi-Fi can overcome these limits. Just as your TV signal passes through walls (and many of them), the wireless signal for your Internet connection will as well.

Greater Efficiencies

Covering a longer and wider range with approximately the same power and computing requirements results in systems that will deliver more bandwidth and more consumer benefits at lower network costs and lower power consumption. In addition, consumers will be able to satisfy their ever increasing bandwidth appetites and Internet providers will be able to provide more throughput in more places to more consumers.