Broadband internet for everyone

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A researcher positions a WiBACK network antenna. Credit: Fraunhofer FOKUS

In the developing world, 96 percent of all households have no internet access. Even in Germany, many regions are still without broadband connectivity. But in future, a revolutionary new technology for wireless networks will allow the gaps in rural internet provision to be closed at significantly less cost.

John just loves playing soccer, and he's really looking forward to the weekend game, which he's agreed to organize. First, he needs to tell his teammates and friends about it, then he must rustle up an opposing team and find a referee – all of which will take him a considerable amount of time. In order to contact everyone, he'll have to send countless SMS messages; he'll have to make all the arrangements on his cell phone because he lives in a rural area in Zambia, and has no internet access.

But that's about to change, for John's village is set to acquire an eKiosk with a number of PCs, and its inhabitants will then have access to services such as email, chat, web browsing and internet telephony. This new internet connectivity is being made possible by WiBACK Wireless Backhaul Technology, which has been developed by the Fraunhofer Institute for Open Communication Systems FOKUS in Berlin. Researchers at the institute have succeeded in significantly reducing both the capital expenditure and the operating costs involved, meaning it is now possible to set up tailor-made IT infrastructures and communications networks away from the major towns and cities of developing and emerging countries and to connect even those in rural areas to the World Wide Web. WiBACK is a wireless network that uses existing technologies to build a far-reaching network of radio links using inexpensive WiBACK routers. Naturally, the system is designed to support all existing wireless technologies.

The demands that will be made on the WiBACK network in the developing world are huge. "Our technology has to be reasonably priced, low maintenance, auto-configuring and robust. It also has to bridge massive distances of several hundred kilometers. Should a router fail, data must divert automatically. And should an operating error occur, the system must be able to restore itself to normal operation. WiBACK fulfills all these requirements," says Prof. Karl Jonas, project leader at FOKUS. Routers are installed on water towers, purpose-built masts or other similar high-lying points. Since the equipment has GSM and UMTS interfaces, the network is also suitable for mobile communications. And this extremely energy-efficient technology is powered by solar cells. WiBACK wireless networks are due to be rolled out to several countries in sub-Saharan Africa in summer 2012. Jonas is happy to report that "even schools and hospitals in sparsely populated areas will then be able to access the internet." He and his team are assisted by ICT management consulting company Detecon, which is responsible for drawing up the business plan.

In the meantime, FOKUS researchers have already embarked upon their next project, to ensure that infrastructure-poor regions within Germany will also benefit from these inexpensive developments for wireless broadband internet. The first pilot network is currently being built on the fringes of the Westerwald and will be used to test just how reliable the network will be when it is in continuous operation. For example, what will happen when a network hub fails, perhaps because of a power cut? As Jonas points out, "We won't be installing solar cells in Germany, since the electricity network covers almost the entire country." Initially, he and his team are providing a remote farm in Hennef-Theishohn with mobile communications and broadband internet. To do this, they have set up a 21-kilometer radio link between the Fraun-hofer-Gesellschaft's existing fiber optic connection in Birlinghoven and the farm, using a local substation operated by energy supplier RWE as a relay point. WiBACK technology can also be employed during major events such as soccer games to increase the overall capacity of the mobile communications network for a set period of time.

In this connection, the researchers are keen to draw attention to the system's energy consumption: "WiBACK will automatically register if a soccer stadium is full to bursting and increase the number of available network hubs accordingly," says Jonas. He and his team will be demonstrating precisely how this works at CeBIT in Hannover from March 6-10, where they will be installing a WiBACK network incorporating several activate-on-demand routers on a simulated soccer pitch.

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