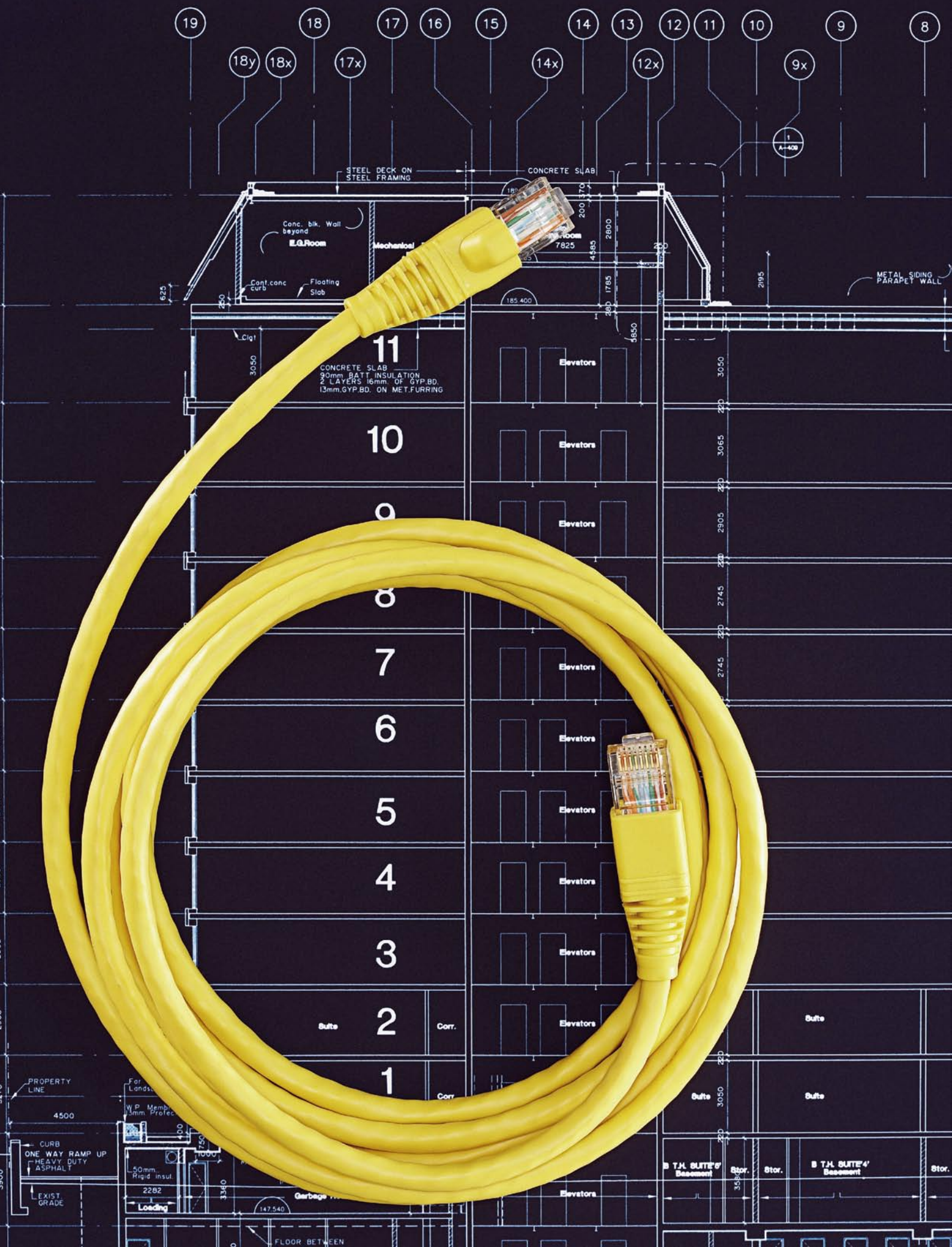
19
18y
18x
18
17x
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16
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14x
14
13
12x
12
11
10
9x
9
8
STEEL DECK ON STEEL FRAMING
CONCRETE SLAB
Conc. blk. Wall beyond
E.C.Room
Mechanical
Cont.conc curb
Floating Slab
METAL SIDING PARAPET WALL
11
CONCRETE SLAB
90mm BATT INSULATION
2 LAYERS 16mm. OF GYP.BD.
13mm.GYP.BD. ON MET.FURRING
10
Elevators
Suite
Corr.
PROPERTY LINE
CURB
ONE WAY RAMP UP
HEAVY DUTY ASPHALT
EXIST. GRADE
50mm. Rigid insul.
2282
Loading
Garbage
FLOOR BETWEEN

WIRELESS africa

THE CHALLENGE OF PROVIDING WIRELESS CONNECTIVITY ACROSS AFRICA IS ABOUT RESEARCHING THE WAYS AND MEANS TO DEVELOP SUSTAINABLE INFORMATION AND COMMUNICATIONS TECHNOLOGY IN DEVELOPING COUNTRIES. BY ROSS EDWARDS

A major factor in creating a wireless Africa is learning how to address the challenges of closing the digital divide that exists within and between developing

countries. Spearheading the research and development of this vital networking solution, South Africa's Council for Scientific and Industrial Research (CSIR) hosts the Meraka Institute, a unit specifically created to address the needs of a truly wireless Africa.

FIRST VERSUS SECOND ECONOMY

The Meraka Institute was created as a means of taking up the challenge issued by South African President Thabo Mbeki's 2002 state of the nation address as a national strategic initiative. A large-scale intervention in the ICT sector was called for to address challenges in both the first economy (well developed and integrated with the global economy) and the second economy (characterised by informal economic activity and poverty). As such, human and intellectual capital interventions are required that address both advanced technical research challenges (for wealth creation) and urgent developmental challenges (for quality of life).

Research within the Wireless Africa project follows two specific approaches. The first component deals with social research – investigating how a number of projects in communities around South Africa, Angola and Mozambique are able to create community-owned and sustainable wireless infrastructure. This leg of the research uses a project management process known as outcomes mapping to closely monitor the progress made towards the goal of sustainable community-owned communications technology. Many of these projects are specifically looking at applications in health, education and related service delivery areas.

The second aspect of the Wireless Africa project examines ways in which technology barriers can be removed or minimised to enable the creation of wireless access infrastructure at the most basic or grassroots level. The group is specifically conducting research in mesh networking, low-cost voice-messaging devices, low-cost access points and antennas, as well as network security. Mesh networking research investigates the ways in which a community can grow a wireless network in an ad-hoc manner without the need for large capital investment and expensive radio masts. Experimental mesh networks have already been installed in two South African communities located in two provinces – Gauteng and Mpumalanga. These wireless communities are continually increasing in size as a hands-on means of understanding network issues such as scalability and quality of connection.

RESEARCH OBJECTIVES

The Meraka Institute has three main strategic goals:

- Human capital development – training and developing a broad stream of people with high level ICT skills, through the provision of bursaries, internships, and the availability of challenging employment opportunities in various research and system delivery projects. The Meraka Institute will complement and work with higher education institutions in its human capital development programme.
- Application innovation – contributing and facilitating the research, development and implementation of ICT applications that address digital divide related problems in southern Africa.
- Advanced technology research – world-class research in specified technology, in accordance with research and development. Co-operation with international research institutes and companies will also be pursued.

W3C OFFICE LAUNCHED

The World Wide Web Consortium (W3C) is the main international standards organisation for the World Wide Web (W3). The W3C is headed by Sir Tim Berners-Lee, the primary author of the internet's key components: URLs (uniform resource locators), HTTP (hypertext transfer protocol) and HTML (hypertext markup language). These are the principal technologies that form the basic building blocks of the world wide web. An official W3C member can either be involved with working groups to determine internet standardisation, or it can act as an office to promote the work of the W3C and encourage international participation. The W3C primarily pursues its mission through the creation of web standards and guidelines designed to ensure long-term growth for the internet.

In May 2007, the Meraka Institute officially launched the second Africa office of the W3C. The W3C office, at South Africa's Meraka Institute, serves as the office for SADC (Southern Africa Developing Countries). Morocco hosts the other official African office.

Internationally, the W3C is managed by three organisations on three continents: the Massachusetts Institute of Technology (MIT) in the US, the European Research Consortium for Informatics and Mathematics (ERCIM) in France, and the Keio University in Japan. It has a further 16 offices across the world. Kagiso Chikane, centre manager at the Meraka Institute says: 'The launch of the W3C office is showing that the Meraka Institute is stepping up as a leader in southern Africa and on the global ICT stage to become an active participant and custodian in the international world wide web market.'

CSIR researcher Dr Quentin Williams, notes: 'In Africa, there's been little awareness of W3C. Now that we have this office, we will use this platform to

promote standardisation and the role of the W3C in the southern region. This is an opportunity for us and the rest of our continent to put forward our agenda to the international community. This means that the Meraka Institute will bring to the W3C a valuable approach that includes the development of local language web content, reporting on region-specific web needs and adoption strategies and policies; but also giving a broader understanding of the demands of an ever increasing technological global world that includes the developing world.'

Addressing the impact of W3C, Williams points to the consortium's members: 'It brings together over 400 member organisations that include important global IT players like IBM, Microsoft, Nokia, Yahoo! and Google, as well as full-time staff.'

Perhaps the key role played by organisations seeking a truly wireless Africa is what the W3C explains on its website: 'The social value of the web is that it enables human communication, commerce, and opportunities to share knowledge. One of W3C's primary goals is to make these benefits available to all people, whatever their hardware, software, network infrastructure, native language, culture, geographical location, or physical or mental ability.' In other words, the internet is for everyone, and should be available from any device, whether simple or complex, or by any user, whether in the US or Africa.

Back to Basics

Two recent Wireless Africa projects illustrate existing solutions.

CANTENNA

In October 2006, the Meraka Institute announced that it had used a tin can to connect a rural home to the outside world. The so-called cantenna was successfully installed on the house of Agnes Mdluli, a health worker from Peebles Valley, near White River in Mpumalanga, South Africa. The cantenna is made from a tin can, such as a coffee tin, and a section of bicycle spoke soldered into a special connector which can connect to another point with a similar antenna up to five kilometres away. The Peebles Valley project is one of 10 sub-projects in the First Mile First Inch (FMFI) project funded by the International Development Research Centre (IDRC). These small, self-constructed antennas, made from locally available materials, are connected to a low-cost WiFi card plugged into a computer. A small wireless router is placed in a weatherproof casing on a pole to which several community members can connect and form a community mesh network. The mesh networking technology allows the wireless installations to automatically configure themselves and find the optimal routes through the network. Very little configuration is needed to set them up.

SOLAR-POWERED MESH NODE

In December 2006, the prototype of a fully self-contained solar powered mesh node was unveiled. This multi-antenna node uses a 45W solar panel to power the embedded computer and radio equipment. The mesh is built in the 5 GHz band using two radios which can be switched through a matrix of four antennas. The set of four panel antennas are placed at 90 degrees to each other within a weather proof cylinder and are used to locate and connect to other mesh nodes in the local wireless network. Switching happens as soon as network traffic needs to be routed between mesh nodes. A 2.4 GHz band radio is used to connect local users to the mesh node.

For more information on the work and research being done by the CSIR, visit the Meraka Institute at www.meraka.org.za and the Wireless Africa project at wirelessafrica.meraka.org.za

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