Wireless for Communities

CONNECTING REMOTE COMMUNITIES

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INTRODUCTION

Some 50% of poor people and 60% of illiterates in the world live in South Asia. Over the last decade, countries in the sub-region have become increasingly confident that ICT interventions which aim to make citizens digitally literate and to provide them with high speed Internet connectivity can play a big role in bringing about inclusive development.

It is widely believed that the global information highway, by opening two-way information flows, can empower communities in remote rural areas. Connectivity can enable them to improve their livelihood, directly access a wide range of markets, seek new opportunities, learn new skill sets, get better quality health care, and become aware of their rights and entitlements. Various forms of online interpersonal communication such as e-mail, instant messaging, video conferencing and social media also help marginalised sections of society to come together and take joint positive action on the socio-economic and political issues which affect them. At the same time, widespread Internet connectivity can also boost governments' capacity to better deliver services to citizens.

Poor access to the Internet, however, is currently denying underserved people in India and other South Asian countries the benefits of the Information Age. Although India is now the third largest nation of Internet users by absolute numbers, Internet penetration in the country, at 19.19%, is still below the 40% global average. Internet usage in rural India, where 899 million people out of a

total population of 1.2 billion live, is even lower at 6.7% and is expected to rise only to 9% by 2015. The situation is replicated, often to a greater degree, in many countries in South Asia, specifically Bhutan where Internet penetration remains low at 27.7%, Sri Lanka where it stands at 19.9%, Nepal (12.3%), Pakistan (10.84%), and Bangladesh (6.9%)

The key hurdle to increasing Internet penetration in rural areas lies in last mile connectivity. The huge costs associated with rolling out wired infrastructure, in addition to the lack of commercial viability in localities with a low user base, have in many instances deterred governments and the private sector from prioritising rural connectivity in many parts of the region.


रोजगार के लिए अब न भटकना होगा
केवल नरेगा से काम माँगना होगा ॥
प्रखण्ड विरनी

DEMOCRATISING DEVELOPMENT

To help address the gap in last mile Internet connectivity for underserved communities, the Delhi-based NGO Digital Empowerment Foundation (DEF) and the Internet Society (ISOC) jointly launched the Wireless for Communities (W4C) initiative in October 2010.

The project involves deploying line-of-sight wireless technology and low-cost Wi-Fi equipment which utilise the unlicensed 2.4 GHz and 5.8 GHz spectrum bands to create community-owned and operated wireless networks. To further localise the initiative, the project strengthens grassroots expertise by training community members in basic wireless technology, enabling these 'barefoot engineers' not only to run and manage these networks but to pass on their skills to others. The Training of Trainers programme, which receives content development and technology support from DEF and ISOC as needed, has to date been conducted in 14 locations across India, Bhutan and Bangladesh, benefiting more than 100 wireless community enablers.

Alongside each network, information hubs known as Community Information Resource Centres are set up to provide digital literacy training to women and youth members, to enable them to utilise Internet connectivity for their own needs.

These centres also drive the W4C's developmental agenda, which can be summed up in a single word—AHEAD:

I. A for Awareness-building on social rights and services through online avenues like social media, and on laws and issues such as the Right to Information Act and women empowerment;
II. H for Health, such as telemedicine to connect primary health centres to district hospitals and enable local communities to access health-related information through the Internet;
III. E for Education, with the Doosra Dashak programme for school dropouts, and access to online tutorials, distant learning courses, and online learning materials as examples;
IV. A for Activating Entrepreneurship by enabling community members, particularly women, to set up e-commerce sites and businesses that offer online services like e-ticketing;
V. D for Delivery of Governance online, thus helping to facilitate greater coordination between local governments, expedite the delivery of public services and enhance state transparency and accountability.

In the last four years, the W4C initiative has successfully deployed wireless networks in 10 locations in India, bringing the benefits of Internet connectivity to more than 200,000 people.

It has succeeded in making more than 4,000 rural youth, children and women digitally literate. It has also provided telemedicine facilities to several communities that had no access to health care, linked together more than 50 panchayats, and connected 50 rural schools, several non-government organisations (NGOs) and a number of micro, small and medium enterprises to the Internet, thereby enhancing their operational efficiency and productivity.

In 2014, a new programme under the W4C project, Wireless Women for Entrepreneurship and Empowerment (W2E2) was launched and swiftly implemented in three sites – Chanderi in Madhya Pradesh, Tura in Meghalaya and Angara near Ranchi in Jharkhand. It aims to focus on:

1. Promoting Internet-based social enterprise and entrepreneurship among women to enable them to become agents of change in their own communities;
2. Using the Internet and ICT for gender inclusion and social and economic equality;
3. Boosting traditional skills in cluster-based environments and helping women-led businesses reach their market and become fully sustainable.

GLOBAL RECOGNITION

In December 2013, the Wireless for Communities (W4C) project received Public Affairs Asia's Yahoo Gold Standard "Internet for Good Award," an accolade for projects that have successfully used the Internet as an interactive engagement tool for public and community welfare. In the same year, it also won the International Telecommunication Union (ITU) and Malaysian Communications and Multimedia Commission's (MCMC) "Connecting at the Roots" contest in the "Broadband for Communities/Schools" category. The contest recognises programmes that utilise broadband connectivity to aid a nation's socio-economic development.

The positive impact of the W4C initiative on a multitude of local communities demonstrates that use of unlicensed spectrum, combined with cost-effective wireless technology, is one of the most effective ways of rapidly increasing rural Internet penetration.

It also presents a strong case for governments to further de-license spectrum bands and put in place policies to encourage the cultivation of rural Internet service providers (RISPs) to provide affordable connectivity in remote rural areas.

[1]Doosra Dashak is a programme on adolescent education and development developed by the Foundation for Education and Development (FED) in Rajasthan.


The
Award
SPECIAL
2011


चाँदोली
1 Km.
बिजोपुर
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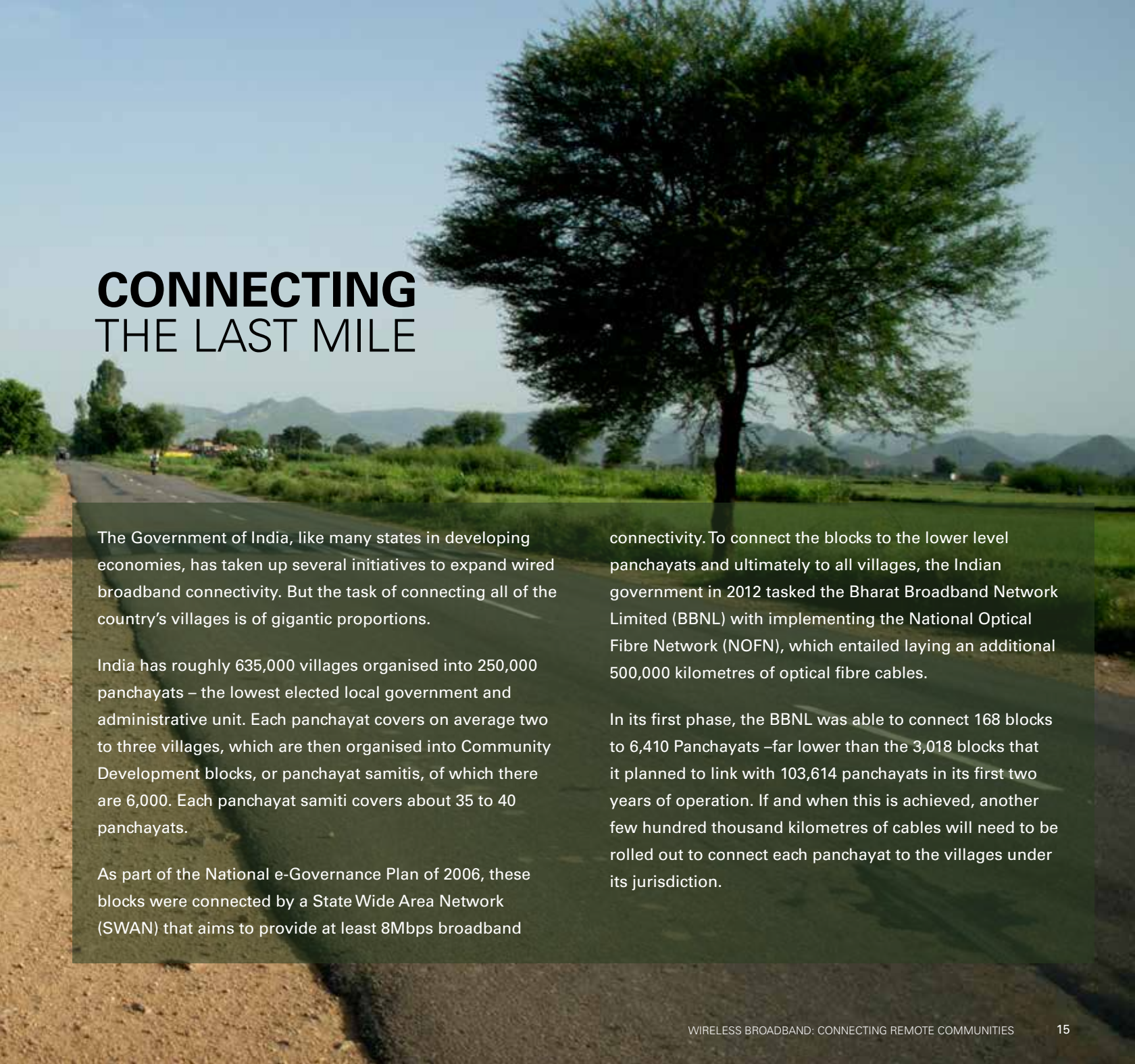

CONNECTING THE LAST MILE

The Government of India, like many states in developing economies, has taken up several initiatives to expand wired broadband connectivity. But the task of connecting all of the country's villages is of gigantic proportions.

India has roughly 635,000 villages organised into 250,000 panchayats – the lowest elected local government and administrative unit. Each panchayat covers on average two to three villages, which are then organised into Community Development blocks, or panchayat samitis, of which there are 6,000. Each panchayat samiti covers about 35 to 40 panchayats.

As part of the National e-Governance Plan of 2006, these blocks were connected by a State Wide Area Network (SWAN) that aims to provide at least 8Mbps broadband connectivity. To connect the blocks to the lower level panchayats and ultimately to all villages, the Indian government in 2012 tasked the Bharat Broadband Network Limited (BBNL) with implementing the National Optical Fibre Network (NOFN), which entailed laying an additional 500,000 kilometres of optical fibre cables.

In its first phase, the BBNL was able to connect 168 blocks to 6,410 Panchayats –far lower than the 3,018 blocks that it planned to link with 103,614 panchayats in its first two years of operation. If and when this is achieved, another few hundred thousand kilometres of cables will need to be rolled out to connect each panchayat to the villages under its jurisdiction.

TRANSFORMING COMMUNITIES THROUGH CONNECTIVITY

Chanderi, a small municipality in the Ashoknagar district of Madhya Pradesh, was the first location to benefit from W4C wireless connectivity. World-famous Chanderi sarees and apparel generate revenue of about Rs 1.5 billion every year. Yet the 3,500 weaver families who produce these handloom products, many of which are based on 13th century designs and techniques, have until four years ago been earning on average less than Rs 2,000 a month, primarily due to rampant exploitation by middle-men. The craft itself was endangered as younger generations became hesitant to learn and to continue with the same profession. None of the community members were digitally literate, and the area had very poor health facilities and no public computers.

Today average household incomes have more than doubled, mainly as a result of various ICT interventions. There is at least one digitally literate person in each weaver household, and a variety of ICT-enabled programmes have allowed community members to gain new vocational skills, which have in turn helped them establish their own enterprises. The town's assets, from historical monuments to medicinal herbs and plants, have been digitally documented. All of its 13 schools have been equipped with computer labs and these, along with some 50 households, can now connect to the Internet wirelessly. Moreover, a telemedicine facility links its Wi-Fi enabled health centre with the Ashoknagar district hospital some 50 kilometers away, enabling patients to consult with doctors at specific times.

CHANGE AT CHANDERI

STATISTICAL DEMOGRAPHY

Centre location: Ashok Nagar, Chanderi

Total population of Chanderi: 32,300

No. of households at Chanderi: 5900

No of users accessing wireless network: 1563

Mobile phone users: 15,000

No. of households with computers: 225

No of nodes: 35

GAINS FROM DIGITALISATION

In 2010, the Chanderi Weavers' ICT Resource Centre (CWIRC), which DEF had set up the year prior, was connected to the Internet under the W4C project. Over the next two years, weavers were trained to use ICT tools to create new and more accurate designs inspired by both traditional and modern patterns. These innovations have led to a reduction in weavers' idle time (baithak) and a sharp increase in their productivity.

The process of handloom weaving is rather complex. It involves creating a design that can be weaved, then fixing the loom and yarns on it so as to reproduce it faithfully on the textile. At least 12 sarees of about 6.5 metres long are woven over a period of six to eight weeks before the loom is prepared for a new design. More intricate designs, which are woven using a Jacquard loom, involved the manual and meticulous punching of several hundred cardboards. These boards would be fitted to the Jacquard head to control the yarn sequence to be used for the weft (breadth of the saree) which needs to be interwoven into the warp (the length of the material being woven). The entire process took at least a week.

A hand-drawn design takes roughly seven days to complete. Before it was digitised, less than five out of more than 3,500 weavers developed these designs, resulting in a lot of idle time as weavers waited for new designs to be completed. The textile design software at the CWIRC facility allows weavers to create a new design in less than two hours, making them much less dependent on traditional specialists. It also allowed Jacquard loom card punching to be automated, with the sequence guided by the design software.

In 2011, the e-commerce website, www.chanderiyaan.net, was launched to allow weavers to directly sell their products—which have now expanded to dupattas, stoles, and table cloths—online in India and abroad. A number of weavers have also begun to independently sell their products using the Internet and social networking sites, further augmenting their income.

For more information visit http://chanderiyarn.org and http://chanderiheritage.in

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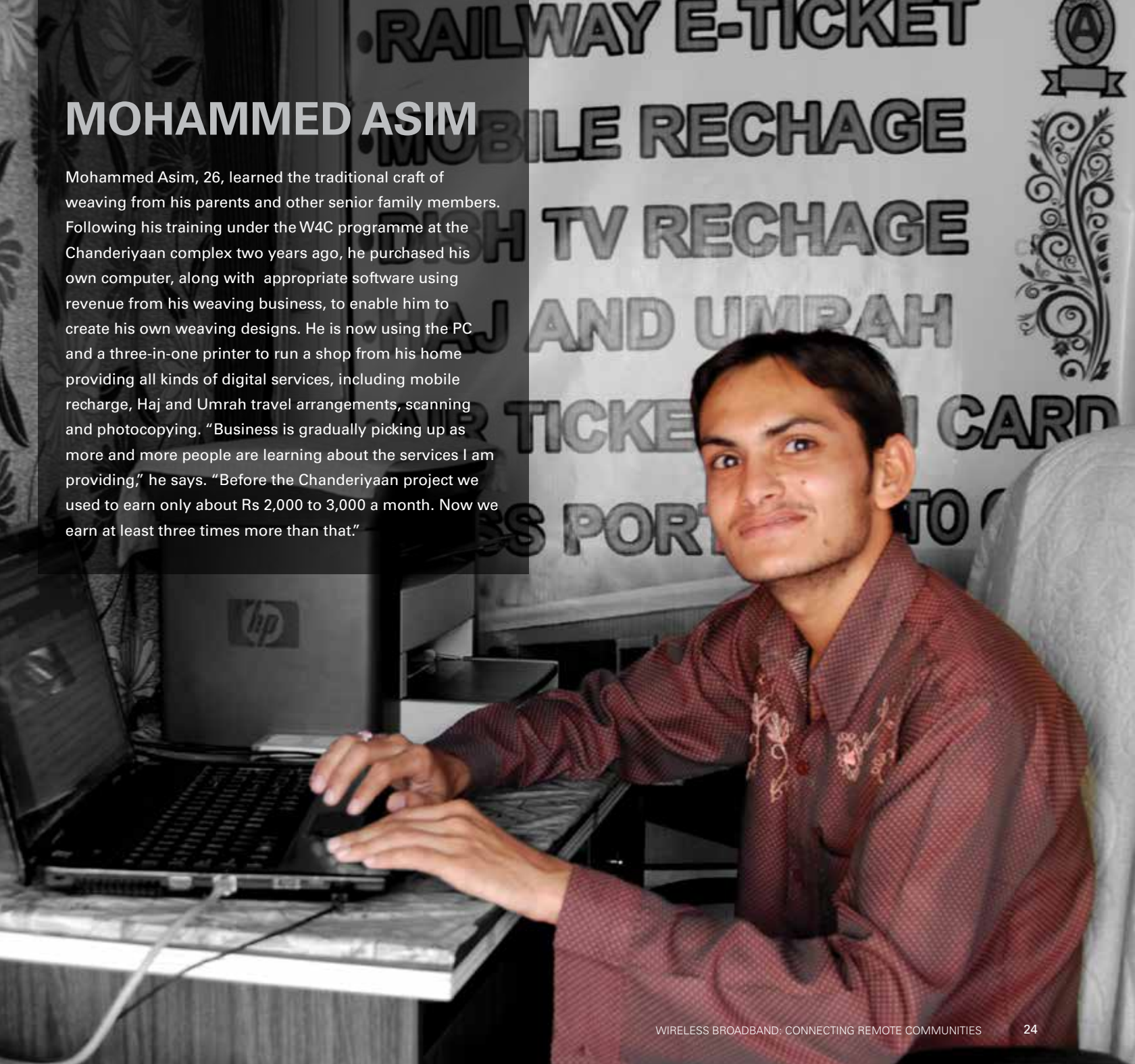
SAIYADDA KOSHAR ANSARI

Saiyadda Koshar Ansari, 33 is a highly skilled Chanderi weaver with more than 12 years of experience under her belt. Having never seen nor operated a computer, Saiyadda was keen to participate in the W4C's W2E2 programme, and became one of the first women in Chanderi to enroll in its basic computer skills course. In less than three months, she has not only become adept in navigating through spreadsheet and word processing applications but has also learnt how to use the Internet for e-ticketing, mobile recharge, and banking transactions. "I think it is good to learn computers as it empowers us womenfolk," she says. She aspires to become a designer of Chanderi sarees and to further develop the traditional art form using computer-aided design and the Internet as a learning, research and marketing tool. "I am not so bothered about making money, I am more interested in teaching children from my community the skills I have learnt. Computer training is essential," she says. Saiyadda has been chosen as one of the trainers under a Google-backed DEF programme called Helping Women Go Online. At the moment she is mulling over how she can best use her newly acquired skills to launch her own business, but she seems decided about one thing: she must open a centre to teach computer skills to children and young people in her community.

KRISHNA KOLI

Krishna Koli, 28, comes from a weaver's family but has opted to become a radio jockey at the local community radio called Chanderi Ki Awaz after completing her studies seven years ago. "I had some previous training in computers but had no idea how to use the Internet. This was a weakness in my work as I personally could not use the Internet to do background research for various programmes I was planning as a radio reporter and programme host. I am very thankful to Chanderiyaan for giving me this opportunity to learn how to use the Internet. Now not only can I do research and collect background material but also connect with other radio stations, and communicate with people using e-mail and other channels," she says. Krishna is also looking at various ventures that can be launched using her skills. "I am now learning about how to start a business and run it so I have not decided yet. Let me learn a bit more and then I will decide," she says. After uploading her resume on Naukri.com, Krishna recently received a job offer as an audio editor, but she says she prefers to instead continue her training under the W2E2.



MOHAMMED ASIM

Mohammed Asim, 26, learned the traditional craft of weaving from his parents and other senior family members. Following his training under the W4C programme at the Chanderiyaan complex two years ago, he purchased his own computer, along with appropriate software using revenue from his weaving business, to enable him to create his own weaving designs. He is now using the PC and a three-in-one printer to run a shop from his home providing all kinds of digital services, including mobile recharge, Haj and Umrah travel arrangements, scanning and photocopying. "Business is gradually picking up as more and more people are learning about the services I am providing," he says. "Before the Chanderiyaan project we used to earn only about Rs 2,000 to 3,000 a month. Now we earn at least three times more than that."

BARAN: BREAKING THROUGH BEASTLY BONDAGE

STATISTICAL DEMOGRAPHY

Centre location: 7 Centres located in Baran

Total population: 4235

Total no. of households: 868

No of users accessing wireless network: 1475

Total no. of internet users: 500

Total No. of ICT trainees: 200

No of nodes: 10

To understand the impact that digital literacy and Internet connectivity has had on the district of Baran, it is necessary to take a brief look at the recent history of the communities living in the area.

Baran has 1,235 villages represented by 214 panchayats. The district has a large population of Sahariyas – a highly exploited tribal community who reside mainly in the two blocks of Shahabad and Kishengunj.

The plight of the Sahariyas stems from big land owners in the area subjecting the tribal community to feudal practices such as bonded labour, taking advantage of their poor literacy and lack of awareness of their rights and entitlements. The district administration has yet to acknowledge the existence of bonded labourers in the district and local authorities have yet to take serious action against the abuse and atrocities being inflicted on the Sahariyas and other tribal people.

Following a famine which killed 47 Sahariya members in 2002, women in the village, with help from activists and local organisations, set up Jagrut Mahila Sangathan, which began to work on five major demands: (1) wheat at Rs 2 per kilogram as promised by the government; (2) right to work; (3) right to information; (4) inclusion of Kishenganj and Shahabad as Scheduled Areas (Adivasi areas) under the Panchayat Act of 1996 and; (5) recognition of the Kherua community as a scheduled tribe[3] . The group's demands were gradually met by the state, and in 2013 members of the Sahariya and Kherua communities in Baran were guaranteed 200 days of work, double the number of guaranteed work days elsewhere in the country.

[3]The Scheduled Castes (SCs) and Scheduled Tribes (STs) are official designations given to various groups of historically disadvantaged people. Both are recognised in the Constitution of India and are entitled to various advantages under Central and State government policies.

The W4C programme has given a big boost to the activities of the Jagrut Mahila Sangathan. After the W4C project equipped seven Community Information Resource Centers (CIRC) with Internet connectivity, the Sangathan have been able to further increase their membership and immediately address the issues affecting women and bonded labourers. At the same time, it also allowed Sahariya and Kherua community members to easily voice their grievances and concerns without having to travel or take time off work. Cases are documented through video conferencing and forwarded to the block and district levels for remedial action. As a result, more than 35 bonded labourer households have been freed since 2010, and every year three to four new families come forward with evidence of abuse. More than 600 bighas of land have likewise been recovered from errant landlords.

Internet connectivity also aids the initiatives of Sankalp Samaj Seva Sanstha, a local NGO which set up the Dusra Dashak project to help school dropouts, especially girls, continue their education. Many students who underwent the four-month residential course in preparation for Class X and Class XII open school examinations found living away from their families difficult and tended to abandon their studies to go back home. These days, video conferencing allows them to communicate with their parents while completing the programme.

Similar online facilities are used for e-health. The Bhanwargarh CIRC has a telemedicine kit that is connected to a health centre in Kota where specialist doctors of government hospitals provide consultation services to local patients. As well, community members who have received digital literacy training are becoming trainers themselves and operating new CIRCs.

GYARSHI DEVI

Gyarshi Devi, 49, a founding member and key leader of Jagrut Mahila Sangathan, testifies to the changes brought by the W4C to her community. "We have benefited a great deal from the connectivity. Our membership has grown mainly because women now find it much easier to come together and discuss their problems through video conferencing. They don't have to go far to attend meetings or inform the organisation of their problems. All they need do is to go to their nearest centre and get in touch with us," she says. "In 2002 we started with only about 250 women. But since 2011 we have grown our membership to more than 1,500 women. Connectivity has enabled us to communicate with people easily and spread our message. We have also become much more empowered as we can get information on our entitlements under various government schemes as well as other relevant information much more easily."

PRITAM

A resident of Paraniya village in the Bhanwargarh block, Pritam is a 22-year-old who has shown great enthusiasm in learning about computers and getting general education under the Dushra Dashak programme. "I have learnt Microsoft Office applications such as Excel and can do data entry. I don't yet know the work of networking but right now I am learning it from the W4C programme and also applying whatever I am learning in practice. Before I joined this programme I was a labourer. All of my family members are labourers. There are four members in my family and together we used to earn Rs 200 per day. Now I alone earn more than that daily. I teach Hindi and English typing and data entry to students for a fee. I can also use Gmail as well as Facebook, and share documents related to MNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) using Google docs," he says.

REENA SAHARIYA

Eighteen-year old Reena Sahariya passed her Class XII examinations in 2009. After joining a W4C digital literacy course in 2011, she acquired the skills needed to run the Mamoni CIRC's digital literacy programmes, and to teach children how to use computers. Reena is now going to participate in DEF's Helping Women Go Online programme. "I want to become a computer teacher as computers are a great learning tool," she says. At the Mamoni CIRC, Reena is being assisted by 18-year old Basanti Bheel another Dushra Dashak alum who passed her Class X examinations in 2013. "I teach as well as learn myself. Now I want to learn Photoshop and perhaps will be able to do photography and design work in future. But I too want to be a computer teacher," she says.

TURA: REACHING THE UNREACHED

STATISTICAL DEMOGRAPHY

Total population: 58,978

No of average literacy: 43054

No of trained youth using wireless network: 1000 plus

No of users accessing wireless network: 120

Total no. of ICT trainees: 450

No of nodes: 15

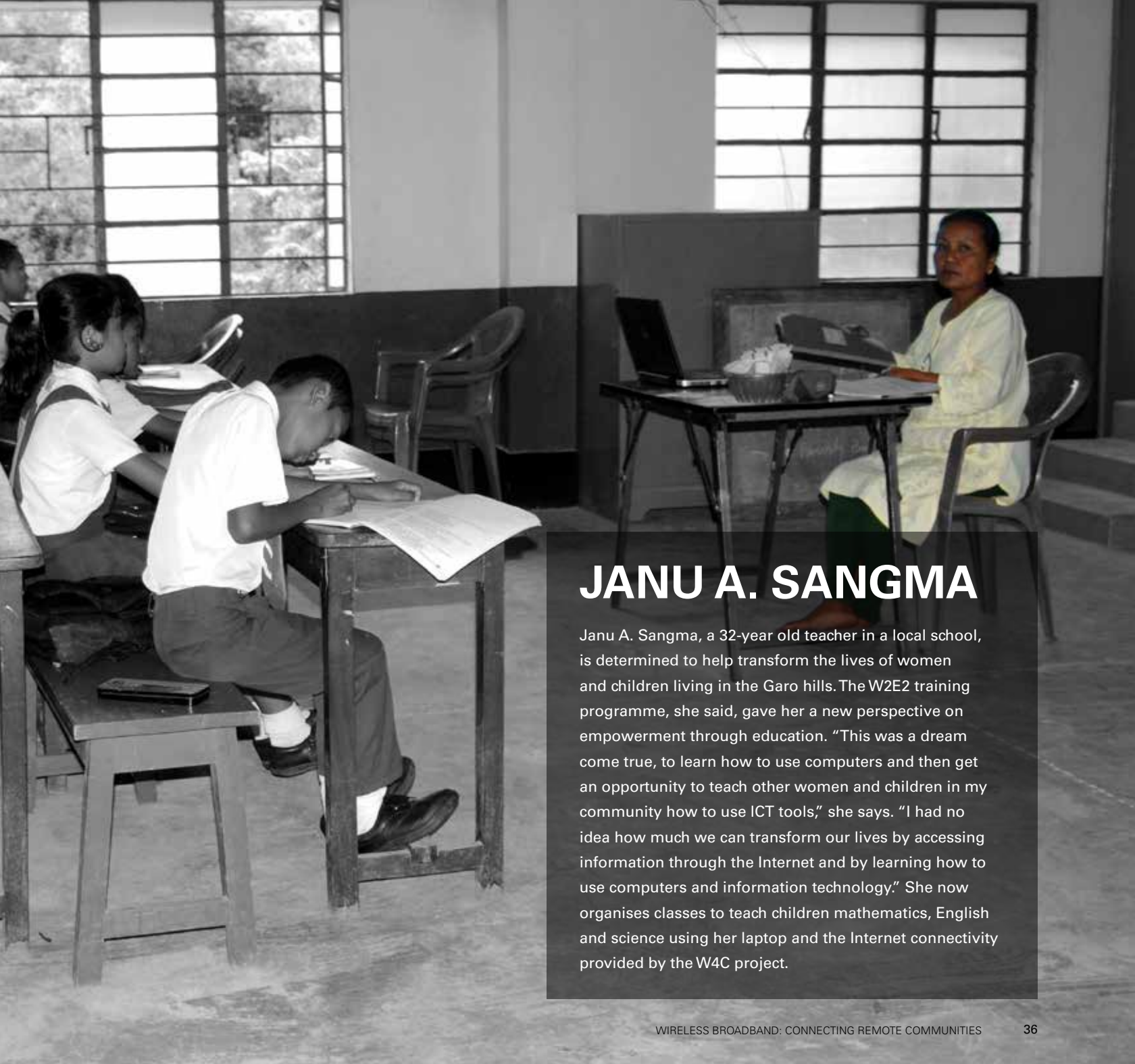
Tura is one of the largest municipalities in the Meghalaya state in north-east India. Located in a picturesque valley in the Western Garo Hills district, it is one of the few north-eastern towns that can boast of an average literacy rate of 73% –higher than the national average. It is also home to the famous Garo tribes, one of the few societies to practice a matrilineal system.

However, Tura lags in infrastructure development: rural teledensity and Internet penetration is negligible and there is not much data connectivity beyond 20 kilometers out of Tura town.

DEF along with National Internet Exchange of India (NIXI) and other supporting partners set up the Tura Internet and Services Centre (TISC) in 2012 and under the W4C project established wireless networks that cover an area of over 75 square kilometers. In the same year, three point-to-point nodes with a base station were set up in Tura on an experimental basis. The station now provides wireless connectivity within a five-kilometer radius, enabling schools and educational institutions, as well as various types of users—cybercafes, small businesses and 15 households--in the vicinity to connect to the Internet.

In line with the second objective of the W4C programme, more than 1,000 youth have received training in digital literacy and information technology. Distant learning and ICT capacity building courses were also made available to local NGOs, schools and village councils.

In 2014, the Tura centre launched the W2E2 programme and helped ten women entrepreneurs from different backgrounds to familiarise themselves with basic and advanced ICT tools. After the training, the selected women will be provided a laptop each to aid them in exploring business opportunities online. Entrepreneurs will be also equipped with high bandwidth Internet connectivity.



JANU A. SANGMA

Janu A. Sangma, a 32-year old teacher in a local school, is determined to help transform the lives of women and children living in the Garo hills. The W2E2 training programme, she said, gave her a new perspective on empowerment through education. “This was a dream come true, to learn how to use computers and then get an opportunity to teach other women and children in my community how to use ICT tools,” she says. “I had no idea how much we can transform our lives by accessing information through the Internet and by learning how to use computers and information technology.” She now organises classes to teach children mathematics, English and science using her laptop and the Internet connectivity provided by the W4C project.

SUCHITRA R.MARAK

Thirty-three year-old Suchitra R.Marak, who works as a secretary at a self-help group cluster in Tura, wants to make sure that she can provide effective leadership to the women with whom she works. The training she received from the W2E2 programme, she says, will enable her to manage her cluster's data online, learn about and share various government schemes with other women, and use online banking services to transact with self-help group members. In the longer run, she wants to use social networking sites such as Facebook for marketing her self-help group's products.

DABRI: CREATING CONNECTIVITY

STATISTICAL DEMOGRAPHY

Centre location: Dabri

Total population: 1400

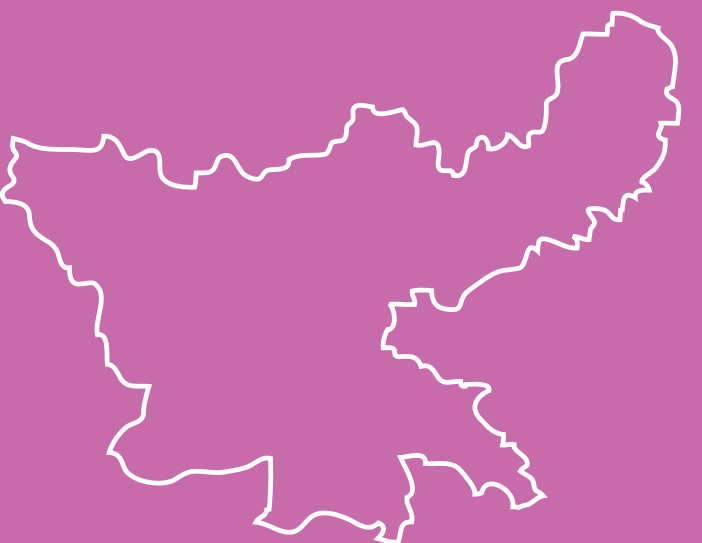
Total no. of households: 200

No of users accessing wireless network: 90

No. of households with computers: 65

Total No. of ICT trainees: 190

No of nodes: 10



Until 2011, the Dabri village on the outskirts of Birni, one of the 13 community development blocks of Giridih district in Jharkhand state, suffered from intermittent and often non-functional Internet connectivity. It was served by only one telecom provider, which was slow to respond to issues that arose in the network. To overcome this problem, the W4C programme stepped in to take

backhaul connectivity directly from the telecom's exchange at Birni. A wireless base tower was likewise set up on the roof of Dabri's Community Information Resource Center.

These days, as many as 10 users, including several local businesses, within a radius of five kilometres enjoy wireless Internet access. The Birni Block Development Office, the Block Education Office and the Block Resource Centre all use the same wireless connectivity, which officials say is much more reliable than the one provided by the telecom company.

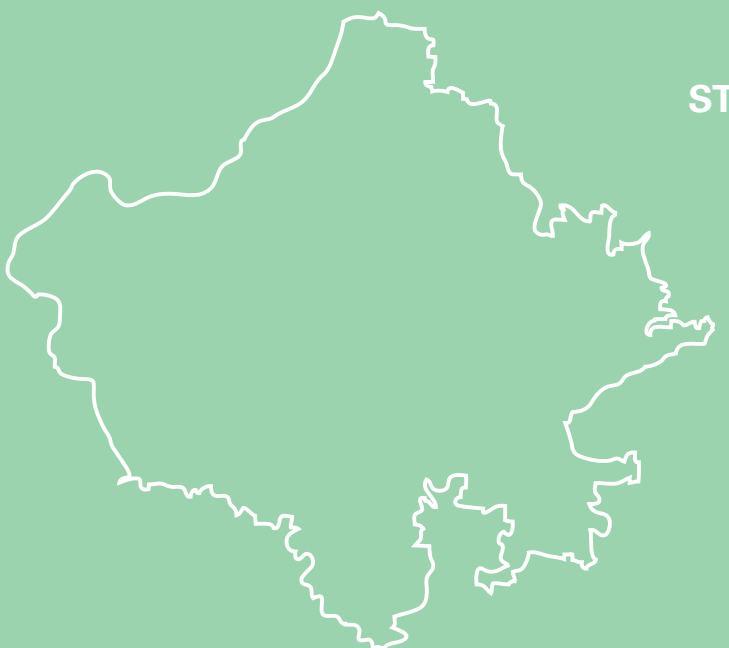
The entire network is being managed by local community members trained under the Training of Trainers programme, who in turn also help run digital literacy programmes for youth, including schoolchildren in the nearby public school. The Dabri village, which lies 50 kilometres from the district headquarters in Giridih and some 200 kilometres from the state headquarters in Ranchi demonstrates how a fairly remote area can benefit from broadband connectivity using the W4C wireless network.


मनरेगा
सूचना
केन्द्र

RAJENDRA VERMA

Businessman Rajendra Verma knew that becoming a cooking gas retail sales agent of a major Indian oil firm like Hindusthan Petroleum (HP) could be a very profitable business in a semi-urban area like Birni, the block headquarters of Jharkhand state's Giridih district. But for him to be granted an agent's permit, he needed Internet connectivity, a pre-requisite by oil companies which conduct many of their transactions online. Birni's connectivity, which at the time was provided by a state-owned as well as several private ISPs were either too slow or too costly. Rajendra needed to have at least a 512 kpbs connection speed, which he finally got through the W4C programme in 2013. Today his gas distributorship business is a roaring success. "Without this wireless connectivity I could not have carried on my business. And I get 512kbps connectivity for just Rs 500 a month," he says.

CHANDAULI: KNOWLEDGE FOR KIDS



STATISTICAL DEMOGRAPHY

Center location: Vijay Mandir Palace, Alwar

Total Population (Alwar): 3,674,179

Total population (Chanduali): 1952756

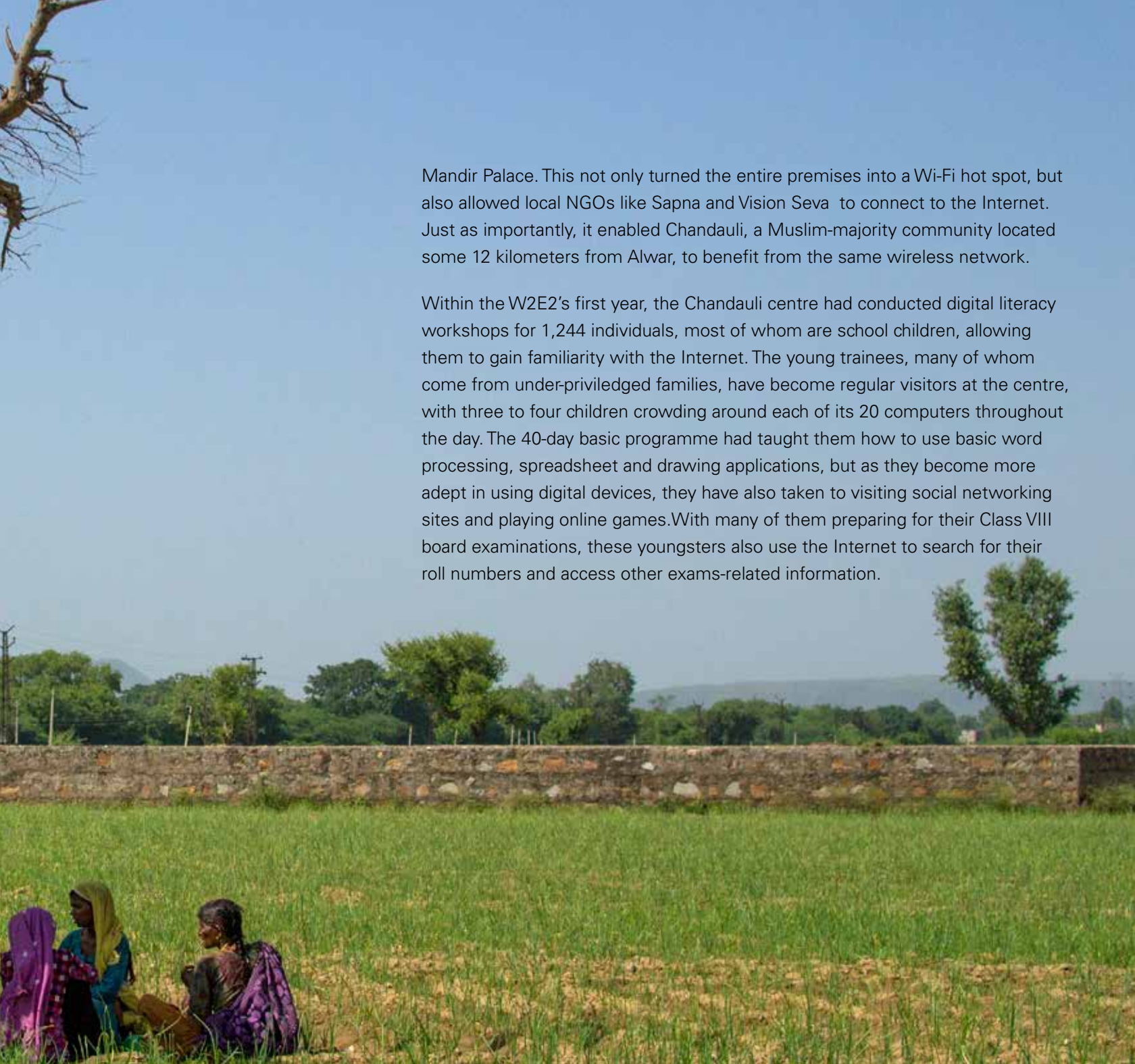
Total No of Minority (Muslim) Community: 1757480

No of users accessing wireless network: 100

Total No. of ICT trainees: 15

No of nodes: 2

In 2014, DEF set up a wireless base station at Alwar using backhaul connectivity which state-owned Bharat Sanchar Nigam Limited (BSNL) provides for the e-Mitra community service scheme. At the same time, it also built a wireless tower on the roof of the Community Information and Resource Center at Vijay

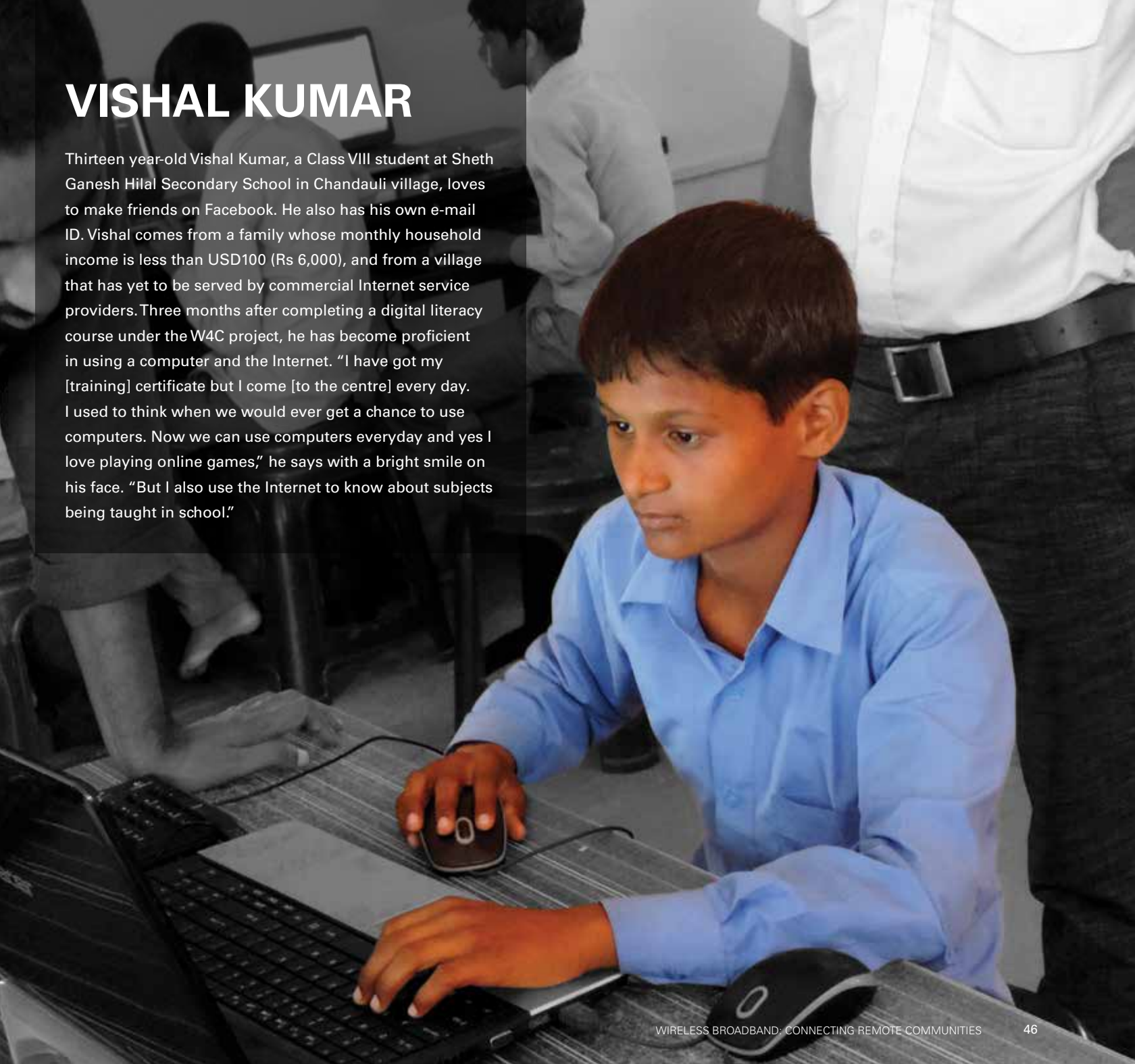


Mandir Palace. This not only turned the entire premises into a Wi-Fi hot spot, but also allowed local NGOs like Sapna and Vision Seva to connect to the Internet. Just as importantly, it enabled Chandauli, a Muslim-majority community located some 12 kilometers from Alwar, to benefit from the same wireless network.

Within the W2E2's first year, the Chandauli centre had conducted digital literacy workshops for 1,244 individuals, most of whom are school children, allowing them to gain familiarity with the Internet. The young trainees, many of whom come from under-priviledged families, have become regular visitors at the centre, with three to four children crowding around each of its 20 computers throughout the day. The 40-day basic programme had taught them how to use basic word processing, spreadsheet and drawing applications, but as they become more adept in using digital devices, they have also taken to visiting social networking sites and playing online games.With many of them preparing for their Class VIII board examinations, these youngsters also use the Internet to search for their roll numbers and access other exams-related information.

VISHAL KUMAR

Thirteen year-old Vishal Kumar, a Class VIII student at Sheth Ganesh Hilal Secondary School in Chandauli village, loves to make friends on Facebook. He also has his own e-mail ID. Vishal comes from a family whose monthly household income is less than USD100 (Rs 6,000), and from a village that has yet to be served by commercial Internet service providers. Three months after completing a digital literacy course under the W4C project, he has become proficient in using a computer and the Internet. "I have got my [training] certificate but I come [to the centre] every day. I used to think when we would ever get a chance to use computers. Now we can use computers everyday and yes I love playing online games," he says with a bright smile on his face. "But I also use the Internet to know about subjects being taught in school."



RANCHI: LIFTING LIVELIHOODS

STATISTICAL DEMOGRAPHY

Center Location: Angara

Total Population (Ranchi): 2912022

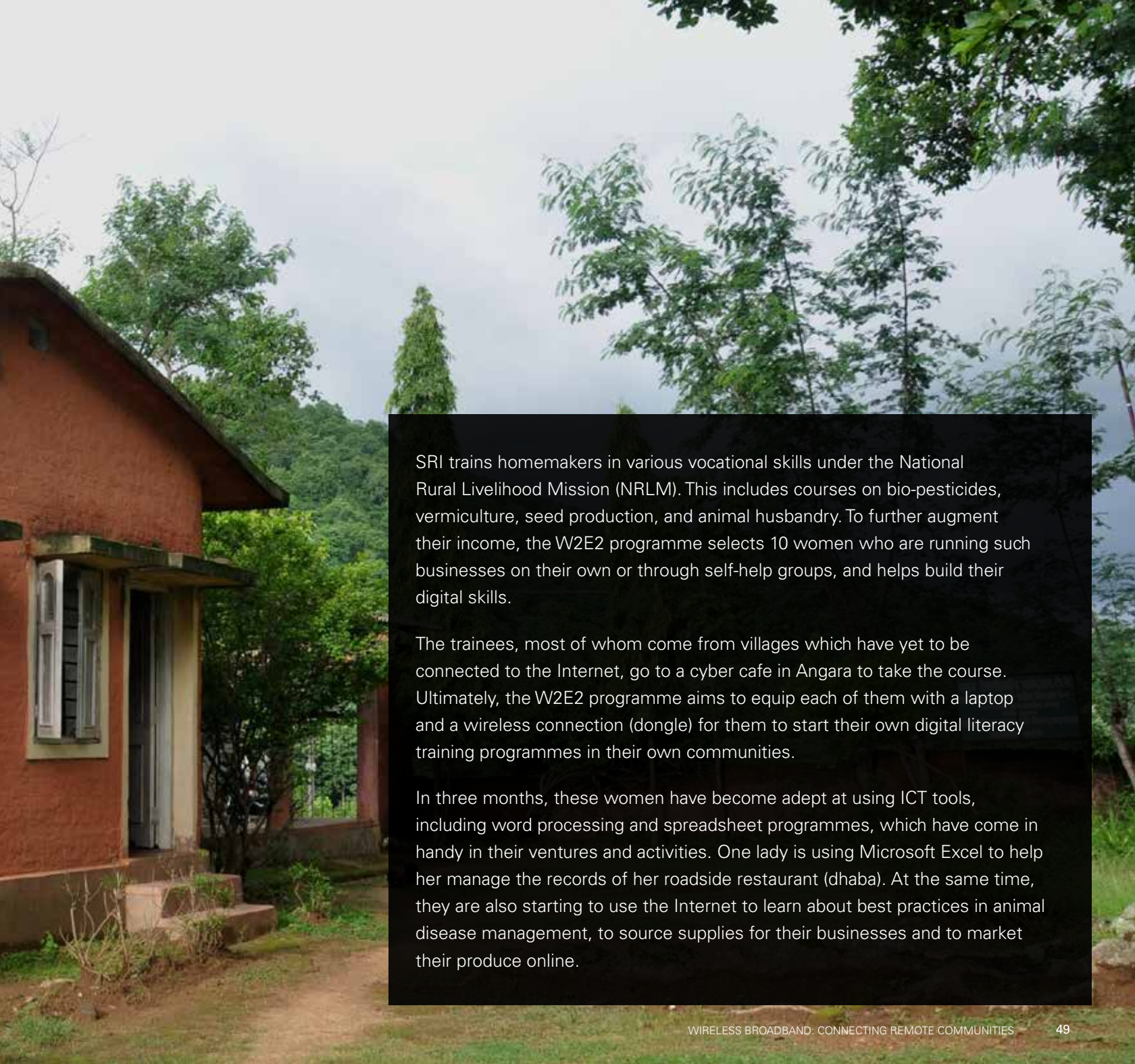
No of households: 112596

No of users accessing wireless network: 40

Total No. of ICT trainees: 10

No of nodes: 01

Some 40 kilometres from Ranchi, the capital of Jharkhand state, lies the semi-urban township of Angara. Another couple of kilometres away is Chamghati, a rural hamlet nestled in Chamghati hills. In March 2014, the W4C project partnered with local NGO Society for Rural Industrialisation (SRI) to launch the W2E2 programme for women in the village.



SRI trains homemakers in various vocational skills under the National Rural Livelihood Mission (NRLM). This includes courses on bio-pesticides, vermiculture, seed production, and animal husbandry. To further augment their income, the W2E2 programme selects 10 women who are running such businesses on their own or through self-help groups, and helps build their digital skills.

The trainees, most of whom come from villages which have yet to be connected to the Internet, go to a cyber cafe in Angara to take the course. Ultimately, the W2E2 programme aims to equip each of them with a laptop and a wireless connection (dongle) for them to start their own digital literacy training programmes in their own communities.

In three months, these women have become adept at using ICT tools, including word processing and spreadsheet programmes, which have come in handy in their ventures and activities. One lady is using Microsoft Excel to help her manage the records of her roadside restaurant (dhaba). At the same time, they are also starting to use the Internet to learn about best practices in animal disease management, to source supplies for their businesses and to market their produce online.

SUNITA MAHATO

Until early 2014, 22-year old Sunita Mahato, whose husband is a subsistence farmer, managed her home and the education of her two children with a household income of less than USD100 (Rs 6,000) a month. Empowered by new vocational skills, digital literacy and access to the Internet, she now leads five self-help groups (SHGs) working in such areas as piggery, poultry, and vermicompost and bio-pesticide production. She uses ICT tools to maintain the operational accounts of the SHGs she leads, and to keep track of their sales and inventories. Sunita, who had limited learning opportunities past secondary school, comes from a community that belongs to what the Indian government has termed Other Backward Castes (OBC). She lives in Rupru, a remote village on the hills some 50 kilometres away from Ranchi, the capital of one of India's least developed states Jharkhand. "I had never even dreamt of seeing a computer let alone touching it and using it. But now I use the computer in various ways," she says. She wants to become a master trainer so she could teach more women and children in her village how to use the computer and the Internet. "That will also help me earn some money because I will be charging a fee for the training," she adds.

FINDING OUR WAY TO SUCCESS

The DEF and ISOC have overcome various challenges while implementing the W4C project. Over the last four years, the ground-level experience gained from the deployment of wireless networks has helped both organisations to identify the following barriers to connectivity in remote rural areas:

A. BANDWIDTH ISSUES:

1. Availability. High infrastructure costs, combined with a low customer base, constrain mainstream Internet service providers, or Class A ISPs, from extending their operations to remote or rural regions. In most areas the only backend bandwidth available is from the block-level SWAN set-up of state-owned telecom company BSNL. The service quality is often poor, resulting in the wireless network suffering from periods of downtime.
2. Carriage. Several ISPs in urban areas provide bandwidth from their Base Transceiver Stations (BTSs) through a 20 to 30 metre Ethernet cable, yet they do not provide the required power (5 to 10 watts) for wireless equipment. They also do not share their towers for connecting user equipment and client devices.
3. Processing time. The process of obtaining a leased line from any ISP remains too time-consuming and overly arduous even after all required documents have been submitted. This is partly because of the further need for three-level coordination with all stakeholders who are providing the back-end bandwidth. This means that it takes at least three to four months to obtain the requested connection.
4. Cost. Taking broadband connection to the last mile level is four times higher than the cost of taking wireless connectivity to remotest region of the country.

B. LEGAL ISSUES:

1. Spectrum. Currently only two delicensed free bands, 2.4 GHz and 5.8 GHz, can be used by Wi-Fi community networks. The 2.4 GHz band has three non-overlapping channels which can to some extent connect with limited line of sight over short distances, but these tend to be fully utilised in urban areas, making it very difficult to get good signal quality due to data collision as a result of overlapping channels. More data can be carried using the 5.8 GHz frequency, but this needs clear line of sight.
2. Government permits. Towers which are higher than five metres require Standing Advisory Committee

on Radio Frequency Allocation (SACFA) clearance, along with other permits from the Department of Telecommunications (DoT), the Airport Authority of India (AAI) and the Wireless Planning Authority (WPC). Each one entails a lot of time and expenses. These are in addition to fulfilling online applications and other technical requirements for setting up a tower. Use of any wireless equipment also requires approval from the Telecom Engineering Centre (TEC).

3. Out-of-date regulation. Telecom Regulatory Authority of India (TRAI) regulations stipulate that those without class A, B or C ISP licenses cannot sell bandwidth to clients. Hence, a rural ISP using free unlicensed spectrum has to either become a franchisee of a licensed ISP to charge downstream clients, or share the unlicensed free spectrum resource with communities at its own risk.

C. INFRASTRUCTURE ISSUES:

1. Tower location: Finding an appropriate location for a tower to establish a point to point (PTP) link is often challenging as much of the land is owned by other entities, such as the government, or are not deemed suitable for infrastructure, in the case of forest land.
2. Power. With many villages lacking stable power supply, finding a power source at the required location remains a challenge--in several cases solar power was the only solution.
3. Protection from natural elements: Thunderstorms pose a major risk to wireless towers particularly during the rainy season. Consequently, extra equipment has to be maintained with system backup for network restoration should storms cause damage to them.
4. Device procurement: Spare parts for every device in the network have to be procured in advance and kept in stock as back-up should the primary equipment be stolen or damaged by natural calamities or by accident. This adds significantly to maintenance costs.

D. HUMAN RESOURCE ISSUES:

1. Local expertise: In both urban and rural areas away from big cities, it can be difficult to find technically qualified individuals who can set up wireless networks. Those with basic computer literacy need additional training for them to learn how to set up, operate and maintain such a network.

POLICY HURDLES

A. Bandwidth Issues

1. Class A ISPs absent in remote areas
2. No power even when Class A ISPs are present: They provide a 10 to 30 metre Ethernet cable but do not share towers
3. Getting a leased line takes too much time
4. High cost of last mile connectivity

B. Legal Issues

1. Limited spectrum: Too much interference in 2.4 GHz especially in urban areas; 5.8 GHz requires clear line of sight
2. Clearance hurdles: Towers above 5 metres need SACFA clearance, which has a lengthy processing time; clearance needed at four levels – DOT, SACFA, WPC and AAI
3. Restrictive regulations by the Telecom Regulatory Authority of India: bandwidth can be sold only by franchisees of licensed ISPs or at one's own risk

C. Infrastructure Issues

1. Finding an appropriate tower location
2. Finding a stable power source
3. Providing security to tower and equipment
4. Protecting tower and equipment from thunderstorms
5. Procurement of spare parts

D. Human Resource Issues

1. Scarcity of technically qualified people in rural and urban areas

WHERE WIRELESS HAS THE EDGE

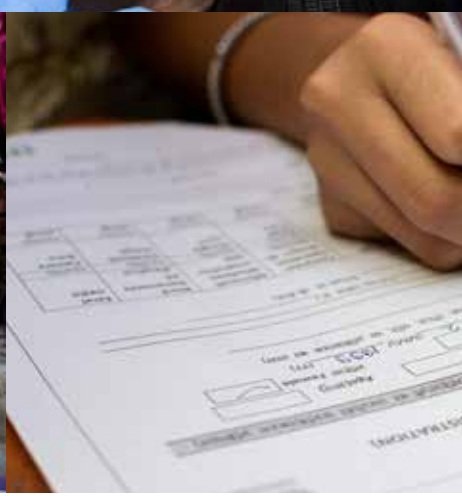
Notwithstanding these challenges, the wireless networks set up under the W4C initiative have remained operational and sustainable.

ADVANTAGES:

A. W4C networks are able to provide customised services according to user needs, thereby bringing down the cost of broadband services for rural users.
B. W4C centres provide not only Internet connectivity but also all kinds of information services to the community. Centres conduct digital literacy and skills-building programmes for a small fee to create an additional revenue stream.
C. Class A ISPs come with high staffing costs. The W4C project minimises expenses by identifying network enablers (engineers) within the community, which not only reduces the cost of employing network engineers but also helps the project become self-sustainable. As community members who themselves benefit from Internet access, barefoot engineers are constantly incentivised to keep the network up and running.
D. The W4C creates several access points which are equipped with computers, Internet connectivity and trainers so that villagers, especially those who belong to marginalised sectors, can access information and avail of online services when they need it.
E. The project enables a large number of users, including local tribes, to use wireless infrastructure and facilities for self- and community-development. The ICT and vocational training provided to underserved communities is also helping many people to become entrepreneurs and improve their livelihood.

All the CIRCs connected by the W4C project earn revenue in two ways: (a) By charging a small fee for providing connectivity to households, small institutes, NGOs, and small and micro businesses, and (b) As a community service centre, by charging customers a small fee for courses, Internet access and online services like e-ticketing and digital literacy programmes. The specific business model of each CIRC is determined by customer need and local purchasing power. This helps to keep the CIRCs sustainable while providing customers the services they want at a fee they are willing to pay.

In Chanderi, CIRCs also generate income by providing weavers digitally generated designs and Jacquard cards, and through an e-commerce site which sells weavers' products.








LEVERAGING UNLICENSED SPECTRUM VIA RURAL ISPS

The W4C project shows that using wireless technology together with unlicensed spectrum is a highly cost-effective way of providing last mile broadband connectivity to remote rural areas, and can be implemented far more rapidly than the traditional wired approach.

Existing mainstream Class A ISPs have been hesitant to offer broadband services to remote communities as many of these are commercially unviable. However, an appropriate policy can be developed to promote the emergence of rural ISPs (RISPs) that are focused on serving underserved communities, thus helping to further accelerate Internet penetration in rural India.

TOWARDS AN RISP POLICY: SOME RECOMMENDATIONS

Launched in 2011, the annual Wireless for Communities and Open Spectrum Summit, held as part of the W4C project, facilitates the exchange of ideas between field workers, network implementers and policy makers on how unlicensed spectrum can be used to provide broadband connectivity, spread digital literacy and empower communities.

The third Summit in December 2013 resulted in a number of recommendations on how government, private operators and civil society organisations can scale up the use of free unlicensed spectrum to set up wireless networks. The end goal is to increase Internet penetration in areas where it is now abysmally low and bring about holistic development using ICT tools and access to information as weapons of change.

1. It is vital for policy-makers to understand that technology and digital literacy can easily permeate rural areas. Such resources can play a key role not only in strengthening the democratic governance process and delivery of government services, but also in enabling citizens to improve their livelihood, obtain social benefits, and avail of better health care, education and skills development.
2. There is a great need for a harmonised and time-bound regulatory approval process for providing last mile connectivity, particularly in rural areas. This can be integrated with an appropriate policy and licensing mechanism for rural ISPs, similar to the highly successful cable TV retailer model in India, to

bring down deployment and access costs, thus making rural broadband services affordable to the target community. The policy framework should also look at business and sustainability models and take into account the importance of knowledge-sharing between communities and practitioners.

3. One of the strongest recommendations that emerged was that the Department of Telecom (DOT) and Telecom Regulatory Authority of India (TRAI) should look at the various policy aspects of unlicensed spectrum and how other bands could be delicensed to aid in accelerating Internet penetration. Both increased tele-density and Internet usage are vital for the country's economic development and spectrum, which has been recognised by the Supreme Court of India as a public resource, should be used as efficiently and inclusively as possible to serve the public interest. More spectrum resources should be delicensed and made freely available to civil society organisations with suitable policies to restrict and penalise their misuse or abuse.
4. It is crucial to introduce rules and regulations that make it mandatory for licensed Class A, B or C ISPs to share bandwidth with rural ISPs and provide them with backend connectivity under a revenue sharing arrangement. Doing so will help to solve issues related to substandard quality of ISP services. The business models for, as well as the implications of, licensed and unlicenced spectrum sharing on security and interference should also be considered. These can be the foundation for a policy framework that would make wireless telephony and broadband connectivity commercially viable for different types of players. This includes rural ISPs whose offerings and packages may offer limited services but can more easily meet local and specific rural needs.
5. There is a need to promote rural ISPs as a sustainable social enterprise which can generate strong demand for connectivity at prices that the poor can afford. It is thus necessary to understand all the underlying price factors to create an ecosystem that enables rural ISPs to offer broadband connectivity at the grassroots level.
6. RISPs in turn should be required not only to provide broadband connectivity in rural areas but also set up information hubs for spreading digital literacy and providing digital services to the community at a low cost. This will also allow RISPs develop a business

model and revenue streams which do not depend only on individual connections to households or businesses. The W4C project has demonstrated that such an approach can be sustainable and commercially viable.

7. Should the government think that rapid increase in Internet penetration in rural areas requires subsidy, it is the end-user of Internet services who should be subsidised rather than the Internet service provider.
8. Initially rural ISPs should be encouraged to set up wireless networks and develop information hubs in semi-urban areas and small towns as a testbed for developing sustainable models which can be replicated in more remote rural communities.
9. The W4C has shown that it is possible to bring technology and connectivity to the village level by being resourceful, despite various bureaucratic hurdles. Doing so will create a bottom-up demand for village-level connectivity which would balance current top-down approaches by national institutions.

THE ROAD AHEAD: NEED FOR A NEW POLICY

The W4C project provides proof that using unlicensed free spectrum and low cost Wi-Fi equipment to set up wireless networks is a viable, cost-effective way to connect remote rural areas in India to the global information highway. Sustainability can be achieved by training local community members to become network enablers or 'barefoot engineers' who can operate and maintain such networks within the community. Connectivity, when combined with Wi-Fi-enabled information hubs, can help to empower communities and bring about holistic development.

The W4C model itself presents various business opportunities for Internet service provision. Rural ISPs that adopt it can become sustainable and commercially viable entities that offer Internet connectivity, digital literacy and other digital services at prices that the bottom of the pyramid consumers can afford.

The project has shown that there is a strong case for government to introduce a new policy for promoting rural ISPs which focus on serving underserved communities. It has also brought to the forefront some areas where existing policies need to be amended to ensure the spread of broadband connectivity in India.

Globally, spectrum frequency bands in 2.4 GHz and 5.8 GHz have generally been allocated as "free or open spectrum" that can be used by anyone without taking a license. It is only slowly being realized that free spectrum allocations can be utilized to provide information and communication infrastructure for providing access to communities. To utilize the free spectrum and reach out to remote communities, the “Wireless for Communities” (W4C) program was started by the Internet Society (ISOC) and Digital Empowerment Foundation (DEF) in 2010. Since then, the programme has spread to scores of locations in India and benefited several thousand citizens – all of them in remote areas.

This book in your hand is an effort to share success stories of how Internet connectivity using wireless technologies and open spectrum can help bring about empowered communities, even in largely inaccessible locations in a developing country.