

# Wireless for Communities Nepal

*Status Report* May 2016

## I. Overview

In April and May 2015, Nepal was struck with twin—a 7.8 and then a 7.3 magnitude earthquakes, the worst natural disaster to hit the country in more than 80 years. The calamities, which left some 8,000 casualties and 23,000 injured victims, flattened entire villages and left local infrastructure in tatters. Among the worst affected were the districts of Gorkha, Lamjung and Sindhupalchowk, the tremors' epicentres, where up to 90% of houses were destroyed, according to reports by the UN Office for the Coordination of Humanitarian Affairs.

Recovery has begun but is proceeding at a slow pace. Aided heavily by international donors, Nepal, a mountainous and landlocked country in South Asia, has thus far focused its rehabilitation initiatives on providing basic needs mainly to accessible and highly populated urban centres, leaving more remote areas still in dire need of attention.

The Wireless for Communities (W4C) project in Nepal was conceived to help jumpstart and speed up the recuperation process in rural, lowincome areas that have suffered most from last year's catastrophes. Having provided support through its Nepal Chapter to restore Internet connectivity in the immediate aftermath of the earthquake, the Internet Society sought to work with the Nepal Wireless Networking Project (NWP) and assist local efforts to provide wireless communications facilities in Nepal's



hard-to-reach villages and enable disaster-stricken communities to rebuild their lives with the help of the Internet.

## II. Site Assessment

While international links remained largely intact during and after the earthquakes, the tremors had a much more destructive effect on last mile connectivity, impairing mobile and wireless facilities and disrupting communications systems in many parts of the country.

The Nepal Wireless Networking Project, one of the organisations leading the restoration of ICT systems in grassroots communities, travelled to devastated areas, at times by motorbike or on foot to survey rural towns, noting down the GPS coordinates of damaged schools, mobile towers, and other infrastructure. The data that the team collected was used to draft a preliminary implementation plan for wireless network rollout, in consultation with the management committees of the local villages, health centres and of schools.

## Site Preparation Team

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An accredited rural Internet service provider, NWP is licensed by the Nepal Telecommunication Authority to deploy wireless networks and provide Internet services to rural areas in the country. This contributed greatly to the speed by which it was able to carry out the first phase of W4C Nepal with minimal bureaucratic hurdles.

## II. Network deployment

The first phase of W4C Nepal entails building new networks in the districts of Gorkha, Lamjung, Bhaktapur and repairing the community networks previously set up by NWP in the district of Sindhupalchowk—four out of the 14 districts that suffered most from the earthquakes. Target villages, in particular, were also selected based on their proximity to road networks, which would facilitate the timely transport of equipment: Nine villages were connected to the main towns through unpaved roads and could be reached using four wheel drive vehicles, while two required an additional two-hour hike.



The relay station in Hamirkot

All of the sites chosen for W4C Nepal are remote villages, with the population deriving much of their income from subsistence farming. These communities have in recent decades suffered from an outflux of young people who migrate to cities or foreign countries in search of jobs, and have come to comprise the bulk of the country's economic migrants<sup>1</sup>. Cut off from the national power grid, some villages draw electricity from community-built micro hydro generators, while others have basic solar power systems. While increased mobile network coverage has made 2G and 3G Internet service available to urban and peri-urban areas—and WiMax to some rural communities—the villages chosen for W4C have not had access to broadband Internet prior to the project.

## A. Physical infrastructure

Initially pegged for completion on January 2016, the first phase of W4C Nepal encountered a two-month delay due to the ongoing <u>border blockade</u> between Nepal and India, which (until it was partially lifted in March) had prevented NWP from acquiring and shipping the back-up batteries needed to power the wireless networks' relay stations and hotspots.

To take Internet connectivity to the villages, point to point backhaul links were established from the base station in Gorkha Bazaar, in the district centre, to Satipipal using fibre cable, and on to the villages of Harmikot and Ajirkot some 23 kilometres away, through microwave radios that use the 5.8 GHz unlicensed spectrum band.

Microwave links were also employed for Sindhupalchowk, taking connectivity from the capital Kathmandu to another base station in the town of Nagarkot, and on to Kotdanda 37 kilometres away.

Once this was in place, unlicensed spectrum, this time in the 2.4 GHz band, was used to bring the Internet to the last mile, covering villages within a

## Network Deployment Technical Team

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Prabal Lama

<sup>&</sup>lt;sup>1</sup> Labour migration is on the rise in Nepal, with more than half a million Nepalese leaving each year to seek job opportunities in other countries, according to <u>figures</u> published by the Nepal Ministry of Labour and Employment

26-square kilometre (sqm) area in Gorkha, and two towns 13 kilometres apart in Sindhupachowk.

This setup provides an uplink and downlink speed of around 40Mbps from the base stations to the main relay stations in Harmikot, Ajirkot, Dudhpokhari and Barpak in the Gorkha district and to Kotdanda in Sindhupalchowk, along with a local link speed of roughly 5Mbps. Connected schools and health clinics get a minimum speed of 2Mbps, while individual users can get roughly 384kbps when accessing the Internet through one of the villages' Wi-Fi hotspots.



## Network diagram: W4C Nepal Phase I

Several partners also had a hand in the rollout. Internet service provider WorldLink Communications helped with installing the Wi-Fi hot spots, the network management server, and provided discounted Internet bandwidth, while another ISP, Lumbini Net, assisted in laying out the backhaul line in Gorkha. The local community, which owns an FM radio station in Satipipal, likewise lent its tower to the W4C project, allowing NWP to establish a base station on its premises free of charge.

## B. Capacity-building

Fostering a sense of community ownership has been at the heart of every Wireless for Communities project by the Internet Society. For W4C Nepal, a series of on-the-spot technical and digital literacy workshops were held from the first day and throughout the network deployment period, lasting about a month in Gorkha and three weeks in Sindhupalchowk. Local trainees worked with NWP technicians for roughly eight hours each day. This will enable local community members to not only utilise Internet connectivity meaningfully, but to keep the wireless networks running smoothly without much need for external assistance.

The first batch of trainees, composed mainly of interested teachers and some local residents identified by the community, covered the basics of local wireless networking with a focus on troubleshooting simple software and hardware problems.

Conducted alongside the network rollouts in December and January, the programme also touched upon care and maintenance techniques for solar power systems. Four teachers, 1 health clinic technician, and 4 young persons from Gorkha, along with 2 teachers and 3 community members from Sindhupalchowk have benefited from the training programmes.



Students at a rural innovation lab

A parallel course provided guidance on how to connect computers to the local area network and how to get Internet on the computers. Thus far 12 teachers, 3 health workers and 4 villagers aged 25-30 years old have received basic training on running computer labs at schools, clinics and village hot spots.

#### III. Impact

Powered by solar panels<sup>2</sup>, the wireless networks have made Internet access available to 12 schools and three health clinics in 14 villages. The community clinics have been connected to the Kathmandu Model Hospital, which provides telemedicine services to rural areas. NWP estimates that some 50 users are now accessing the Internet through the six Wi-Fi hotspots build by the W4C project using their mobile devices—a number which it aims to increase to at least 500 users.

Shared devices were provided to some of these common access points to aid Internet adoption in the target communities—health clinics in Barpak and Bhichuk were furnished with a laptop each, while several newly connected schools were given six low-powered personal computers. The latter also function as servers on which NWP has installed Nepalese-language educational content for school children, as well as an e-library with some 7,000 books developed by Open Learning Exchange Nepal. Gorkha Foundation, a US-based non-profit run by Nepali expatriates from Gorkha has also pledged to donate 10 computers each to 25 schools in the district.<sup>3</sup>

<sup>&</sup>lt;sup>2</sup> All of the wireless networks set up by NWP in Nepal run on solar power—the country continues to suffer from periodic blackouts which sees electricity cut for more than 10 hours a day in urban and rural areas

<sup>&</sup>lt;sup>3</sup> Gorkha Foundtion is also helping to rebuild the schools damaged by the earthquake, and as of May 2016 is in the process of distributing the donated computers to schools

To encourage technical and scientific innovation among locals and youngsters, NWP set up Rural Innovation Labs in three of the villages connected by W4C Nepal. These provide mechanical and electronic tools, as well as the space in which community members can build and experiment with technology.



The Wi-Fi hotspot in Sangachok village

In the coming months, NWP will also work with villagers to help them diversify their Internet use to include remittance transfers, branchless banking, e-agriculture, and e-payments.



## IV. Sustainability and Expansion

As the licensed rural Internet provider in the area, NWP will oversee the networks' technical management. It will work with local entrepreneurs to run the Wi-Fi hotspots installed under the W4C project, and with the connected schools' computer teachers to solve technical issues that may arise on the ground.

A revenue-generating plan has been drawn up to aid the project's financial sustainability. In the present scheme, schools will charged a monthly fee of Rs.3,000 (~US\$30), health clinics Rs.1,500 (~US\$15) and individual users of Wi-Fi hot spots Rs.500 (~US\$5) for a trial period. The latter may also avail of Internet services on a per volume basis, allowing them, for instance, to pay Rs.50 (~0.50 US\$) for 1Gb of data. Approximately 15% of the service fee will be allocated to network repair and maintenance, and the rest will be used to cover the costs of the leased line provided by LumbiniNet.



In June this year, after the links have been tested thoroughly, NWP will commence further discussions with villagers to settle on package options that are most favourable to the communities' needs. It will also conduct personalised refresher courses on-site for a period of two months, with NWP staff helping trained villagers to solve networking issues as they encounter them.

NWP estimates that post-earthquake reconstruction in the villages will not be completed until 2017. Until then, the Internet service provided by W4C Nepal is not expected to be fully functional. Specifically, the health clinic in Barpak is still under construction and the power line for the village has yet to be restored, while the rural innovation lab in Sangachok is housed in a temporary building. In the interim, NWP is monitoring the wireless networks through follow-up site visits, by providing additional training and by helping communities set up computer labs in schools and village health posts.

## About the Wireless for Communities initiative

As the world's population increasingly goes online, we must ensure that Internet access is extended to underserved towns and villages, particularly to marginalised communities, which stand to benefit most from Internet-enabled tools for development.

Many of those who have yet to go online reside in remote and hard to reach areas, and are often more economically disadvantaged than the people who can connect to the Internet today. Getting the rest of the world's population online thus entails not only investments in infrastructure and locally relevant content, but also solutions that make access available at an affordable price, with a sustainable level of service.

The Wireless for Communities initiative started as an experiment by the Internet Society's Asia-Pacific Bureau in 2010 to explore how the use of WiFi based community networks could help with the socio-economic development of rural and underserved communities. The initiative focused on the holistic involvement of the local community in establishing and maintaining the community wireless network, imparting digital literacy skills and using the Internet to provide empowerment opportunities to minority and marginalised sectors of the community.

Working with local partners, the project started with a pilot project in Chanderi, India and since then has expanded to several dozen locations in rural India, Pakistan and Nepal. The project has also spawned and inspired many other projects (particularly in India) by presenting a model that can be replicated to suit local contexts and provide access and connectivity to the bottom of the pyramid. In late 2013, the project also won two international <u>awards</u> as recognition of the positive impact it has made on the communities.

For more information on the Wireless for Communities initiative, or to get involved, contact the Internet Society Asia-Pacific Team:

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