Final Report of APTJ3 Pilot Project for

Developing Village Internet Shops and Installing Trekkers Tracking System in Nepal

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Submitted by:

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Preface

Dear Readers,

This is the final report of APT J3 project titled "Pilot Project for the Establishment of Village Internet Shops Fully Powered by Solar Energy in Ten Villages of Rural Nepal to Provide Multiple ICT Services and For the Deployment of Wireless Tracking System for Trekkers on the Mountain Trails for Safety". It was implemented by E-Networking Research and Development in Nepal Wireless networks with the financial support of Asia Pacific Telecommunity (http://www.apt.int)

Nepal Wireless Networking Project was started with a dream in 1997. The dream was to connect just a small school named Himanchal High School of Nangi village Nepal to the Internet. The idea came when the village installed a 2 KW micro hydro power generator for the school and brought two 486 computers donated by a school in Australia. It was the time when no villager had absolutely any idea what an Internet was. Thinking about to bring Internet in a remote village of Nepal in 2002 was like a dream because not a single village in remote parts of Nepal had Internet and telephone. However, step-by-step we worked with a team of volunteers to achieve that goal. In 2002, we became able to make the first long range Internet connection using Wi-fi technology and connected Nangi village. That was the beginning of Nepal Wireless.

We have come a long ways since 2002. By connecting one village in 2002, now we are in 15 districts of Nepal and have connected 175 villages. Asia Pacific Telecommunity has been our great supporter since 2009 under APTJ2 and APT J3 project. The services that the project is providing include telemedicine, distance education, communication service, and e-commerce services. Now we are

Many thanks go to Asia Pacific Telecommunity for the financial support to develop a model of Internet shops for the villagers and to do pilot for installing trekkers tracking system. Developing trekkers tracking project was a challenging project to accomplish because there were lots of technical issues to be solved. With the hard work of our technical team and international volunteers, we became able to overcome most of the challenges. Even if we are trying to make the village Internet as beneficial as possible, we have not been able to bring all the services that we had planned to bring. However, E-Networking Research and Development will keep working on upgrading the services in village Internet shop and the technical issues of the tracking system .in future. We hope this report will help you to understand our project and see how it can lead to new forms of development in rural Nepal. We appreciate for your interest and welcome your involvement in similar projects in rural Nepal.

Mahabir Pun
Chairman
E-Networking Research and Development
http://enrd.org

Date: March 30, 2014

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Final Report of APTJ3 Project in Nepal

Submitted by: Mahabir Pun, Chairman E-Networking Research and Development

1. Introduction of E-Networking Research and Development and the APT J3 2012 Project

This is the final report from E-Networking Research and Development (ENRD) of the APT J3 2012 project started in Nepal with the financial support from Asia Pacific Telecommunity. The title of the project is "Pilot Project for the Establishment of Village Internet Shops Fully Powered by Solar Energy in Ten Villages of Rural Nepal to Provide Multiple ICT Services and For the Deployment of Wireless Tracking System for School Children and Trekkers on the Mountain Trails for Safety". Some photos of the installation, visit of Japanese experts to Nepal and the technical details of the project are included in the report.

E-Networking Research and Development (ENRD) is a NGO recognized by the government of Nepal and is the affiliate member of APT since 2009. As part of its mission, ENRD has been running Nepal Wireless Networking Project in the Himalayan villages to bring Internet. The project was informally started in 2002 from Himanchal High School of Myagdi district of Nepal at grassroots level. At the beginning it was started with the technical support of national and international volunteers. Still there are some volunteers to help but now ENRD has fulltime engineers and technicians working to build wireless networks and maintain them.

The initial goal of the project in 2002 was to build local communication system between the villages because there was no modern communication means in most of the remote rural areas of Nepal. Therefore the project was involved to build wireless networks in the rural areas and to connect the rural schools and village communication centers to the Internet for e-mail and for IP telephony. By connecting one village in 2002, the wireless network is being expanded continuously in many more villages in the mountainous region of Nepal. Now the project has built wireless network in fifteen out of seventy five districts of Nepal and has connected over 175 villages.

ENRD is also focused on wireless networking training as part of its capacity building program to produce rural wireless technicians. It provides training to the village technicians on wireless installation, computer lab networking and trouble shooting of the network. ENRD also provides training to the village technicians on installing solar and wind power. It is because Nepal Wireless has to depend upon solar power in the major relay stations.

The long-term goal of Nepal Wireless Networking Project is to become one of the biggest rural Internet Service Providers to help narrowing down the digital gap. Therefore Nepal Wireless specifically aims to achieve the following goals, divided into six main goal areas:

- Education: Increase and improve educational opportunities in rural communities by creating tele-teaching and tele-training programs, and by making e-learning materials in local languages available for students, teachers and villagers through e-libraries.
- Health: Connect rural health clinics and health workers to city hospitals in order to provide quality medical assistance through a tele-medicine program and make highly needed healthcare in rural communities available by virtually bringing medical doctors to villages.
- Communication: Increase communication facilities in rural areas by providing telephone services through Internet phone system (VoIP), make Internet available for email communication, and help villagers to discuss by using Nepali language bulletin boards for community discussion.
- Local e-commerce: Help villagers to buy and sell their products in the local market and international market through local intranet and Internet and also introduce e-banking, and remittance services in rural areas.
- Job creation: Create jobs in the rural areas for younger generation through ICT related services such as communication centers, VoIP phone services, remittance services, and virtual ATM services.
- Research and Field Testing: Help researchers of climate change monitoring projects collect data remotely using Internet and provide real time weather information about air routes in the Himalayan valleys during bad weather and the monsoon season for airlines. Moreover, provide technical support to the Ministry of Tourism for installing tracking system for the trekkers and to Department of National Park of Nepal to install surveillance system at the parks to monitor the movement of the poachers to save the endangered species in the park. Also we do research on finding ways to build cheaper medical equipment to help provide telemedicine service through rural clinics.

Nepal Wireless has installed advanced wireless equipment as the backhauls using 5.8 GHz de-licensed band from Alvarion and Motorola. It utilizes Mikrotik, Cisco and HP switches and routers for separating network and for limiting broadcast. For last mile connectivity it uses cheaper wireless routers, access points and client radios available in the market. So far Nepal Wireless Networking Project has connected 175 villages in 15 districts of Nepal and it is expanding its wireless network to many more villages.

As part of its efforts to provide additional services for the benefit of rural people, ENRD had gotten grant from APT under J3 program in 2013 for doing pilot project with the following objectives.

1. To create 10 “Village Internet Shops” as one-stop ICT hub with low power consuming equipment that will be run fully by solar power in rural Nepal as a model ICT center. In Nepali language, the shop will be called “*Gaunle Internet Pasal*”. The model will be designed and developed by keeping in mind the need of rural Nepal and will be replicated in all of the rural areas in future. It is very important to use solar power because most of

the rural areas of Nepal have no electricity. The shops will provide multiple ICT services for the rural population. The services will include communication services, mobile banking, money transfer, credit card transaction through Internet, computer and electronic equipment sale and repair services, audio-video recording service, and e-health services.

2. To develop a wireless tracking system to track the trekkers travelling in the remote Himalayan trail. The tracking system will be developed in Japan by Japanese members and the software will be developed by Japanese and Nepali team members.

2. Purpose of APTJ3 Pilot Project

The development of information and communication technology is coming very fast. The mobile and Internet related services are reaching people living even in the rural areas as well. However, the farmers living in the rural areas of Nepal and in developing countries are not aware of what is going on in ICT sectors in the developed world. Therefore there is great need to provide awareness of ICT related services and to teach the rural population how to get benefit from it.

As a social venture, the Internet Shops will focus on delivering much needed basic and desired ICT services to the rural communities in Nepal. In collaboration with ENRD, the Internet Shop intends to assist the local communities in creating their own plans for sustainable community development, and to provide the ICT-related products and services which will improve the economic, health and educational conditions for the rural population. The pilot project will further the effort to develop a sustainable business model which can be replicated throughout Nepal in coming years – and later, in other developing nations.

The proposed pilot project has seven purposes as mentioned below.

a. To develop a model of fully solar powered internet centers called "Village Internet Shop" in 15 villages of Nepal as a pilot project in order to provide multiple ICT services for the rural population of all ages. Also the centers will work as Wi-Fi hotspots and the villagers will be able to use Wi-Fi in their mobile phones to get access to the Internet.
b. To use the Internet shops as the Access Points to track the school children in the rural and urban areas of Nepal for saving the children from getting lost or from being abducted. The wireless tracking system will be developed and deployed by ENRD and Japanese team members together. The technology will be developed in Japan. A central server called a control room will be set up to track the children in the rural and urban areas. The tracking system will be implement on large scale in future
c. To deploy the school children tracking system also for tracking the trekkers travelling in the remote mountainous and Himalayan region of Nepal. This will save the lives of trekkers during the time of emergency or it will be helpful to track them when they get lost. The tracking system will be tested and deployed in Annapurna region.
d. To create highly needed job and income opportunities in the rural areas for the marginalized and poor people through the shops. The Internet shop will also be a place, where villagers can buy computer parts, IT gadgets and solar accessories. The shop will also provide repair and maintenance services of mobile phones and IT gadgets.
e. To establish partnership with interested technical team from Japan to develop and deploy

the proposed APT J3 project in Nepal for mutual benefits.

f. To encourage installing similar Internet shops and tracking system in more rural areas of Nepal and in other countries around the world.
g. To develop a commercial service enterprise with public and private partners for the long term sustainability.

The Internet shop will be run by a group of social entrepreneurs, or cooperatives. In this way the project will establish a model rural Internet shops. The shops will be connected to the broadband wireless network built by Nepal Wireless Networking Project. These shops will be run as pilot project and will be replicated to more villages after its successful completion.

3. Partner Organizations/Institutions

The followings are the partner organizations of ENRD from Japan and Nepal, who were actively involved for the development and implementation of the APTJ3 project.

- Japan International ICT Association (JIIA), Japan for technical collaboration
- Thamel.com, Kathmandu for implementing money transfer, credit card transaction services and other potential e-commerce services
- Nomura Engineering Company Japan for hardware design of the trekker tracking system
- Nihon Software Engineering Co. Japan for software design of trekkers' tracking system
- Annapurna Area Conservation Project for collaboration and for testing tracker system.
- Sun Power Company Pvt. Limited for installing solar power system in the project sites

4. Team Members:

The following is the list of the team members, who formally contributed directly for the development and installation of Internet shops and trekkers tracking system. There are many more members and volunteers, who provided their valuable ideas and technical support for the installation of Internet shops in the villages and for the development and installation of trekker tracking system in the Annapurna region.

i. Mahabir Pun - Team leader for the APTJ3 project.
ii. Mr. Rajendra Prasad Poudel - Full time team member for system designing. He was responsible for leading the team of developers for the tracking system in Nepal.
iii. Mr. Girish Adhikari - ENRD Full time system administrator for the network
iv. Mr. Yasuhiko Kawasumi, Japan - Technical experts of the project, Japan
v. Mr. Kazuyuki Sakamoto - Expert in software development in Japan
vi. Mr. Toru Nomura – Expert in Radio Communication and hardware development
vii. Mr. Tetsulo Nampei – Japanese Expert on financial issues
viii. Mr. Haruo Kaneko – IT manager, Japan
ix. Mr. Surendra Maharjan – Technical expert Nepal
x. Mr. Bikramlal Shrestha- Software development consultant, Nepal

5. Meeting with Stakeholders and Decision Made for Project Implementation

There were several stakeholders of the trekkers tracking system such as Nepal Tourism Board (NTB), Trekking Agents' Association of Nepal (TAAN), Himalaya Rescue Association (HRA), Nepal Association of Tours and Travel Agents (NATA) and National Trust for Nature Conservation (NTNC) etc. ENRD had three rounds of meeting at Nepal Tourism Board (NTB) with all the stakeholders to discuss about if there is need of the trekkers tracking system and how to implement it. Mr. Mahabir Pun gave presentation about the Trekkers Tracking System (TTS) to the representatives of the stakeholders and explained about its importance and its need for the security of trekkers in Nepal. All the technical aspects of the TTS project including how the system works were explained in the meetings. All the representatives agreed in principal to implement the TTS. It was also decided NTB to be the implementing partner and TAAN to be the users of the system.

However, TAAN later informed that some of their board members did not agree to implement the TTS. The reason they gave was that the tracking system would hurt their businesses. Their argument was that if the TTS is deployed, the trekkers would not come to the trekking agents to hire guides and porters to go for trekking. We explained them that the system does not give any path or trail information and that it just sends the information of the trekkers' position when they go through the relay stations. We also told that it is not necessary for the trekkers to take the TTS if they don't want. However, TAAN hesitated to implement it.

Without the involvement of TAAN, Nepal Tourism Board could not make decision to implement the TTS system. ENRD tried to convince TAAN and NTB to help implement TTS. However, they did not formally agree to implement it. Therefore ENRD talked to National Trust for Nature Conservation (NTNC) and they agreed to be implementing partner. NTNC decided to implement the system in Annapurna Conservation Area Project (ACAP) for the pilot project. ACAP decided to issue the tags to the trekkers when they issue park entry permits to them. Also the following sites were chosen to implement the TTS system.

i. Birethanti
ii. Deurali
iii. Ghorepani
iv. Chhomorong
v. Shikha
vi. Machhapuchhre Base Camp
vii. Pritam Deurali

(Note: The detail technical information of the trekkers tracking system is given in the Appendix 1)

6. License for the Radio Frequency Received from the Government

Trekker tracking system uses two radio frequencies – 315 MHz and 429 MHz for the tag and for the RRS. These are licensed frequencies in Nepal. Getting the license of radio frequencies is a lengthy process. Therefore ENRD applied for the license of 315 MHz and 429 MHz radio

frequencies to the Ministry of Information and Communication (MoIC) of Nepal Government. It took some time for ENRD to formally get the license for the 315 MHz and 429 MHz radio frequencies. MoIC provided temporary license for the pilot project for six months. After getting the license, it became possible to import the equipment required for trekkers tracking system. Japanese team members then shipped the equipment to Nepal through DHL and it arrived in time before the Japanese team arrived for the installation. Thus the installation of TTS became possible.

7. Project Works Completed

7.1. Installation of Internet Shops:

In order to do requirement analysis, a team of ENRD and the Chairman visited 17 villages in Myagdi, Kaski, Syangja and Parbat districts and did interaction program with the villagers to find the needs of the ICT services that could be useful for the villagers. The following criteria were set up for selecting the villages to establish Internet Shop. It was necessary for the long term sustainability and growth of the Internet Shop.

i. Availability of Internet from the nearest communication tower
ii. Population of the village with 800 to 2,000 people
iii. Approximate number of potential users
iv. Interest of the community members for setting up Internet shop
v. Contribution from the communities for maintaining and operating the shop
vi. Number of entrepreneurs interested to run an Internet shop in each village

After discussing with the stake holders in 17 villages, ENRD developed a model of Internet shop suitable for the villages. Under the APT J3 project, ENRD decided to set up Internet shops in 10 villages. The original plan was to build Internet shop in 9 villages. However, we added one more shop because some money from the estimated budget in head of the "Business Trip of Japanese Experts" was saved because the Japanese team members became able to get cheaper air ticket. ENRD asked APT if it could use the money to build one more Internet shop. APT provided permission to use the residual fund for building one more Internet shop. The followings are the name of the villages, where Internet shops have been set up.

i. Bandok
ii. Niskot
iii. Okhareni
iv. Khopra
v. Tolka
vi. Paudwar
vii. Tikot
viii. Lespar
ix. Aula
x. Nangi

The plan was to develop the Internet shop with as many services available as possible for

the villagers. The target services are given as follows.

i. SIP Telephone Service
ii. Village Cyber Café Service
iii. Computer and Internet Training Service
iv. Photocopy, Scanning, Digital Photo, Printing and Local E-commerce Service
v. Tele-medicine Service
vi. Internet Customer Service
vii. Money Transfer/Remittance Service
viii. Mobile Banking Service
ix. Credit Card Transaction Service
x. IT Equipment, Electronic Gadget and Solar Power Accessories Sale Service
xi. Computer, Mobile and Electronic Equipment Repair Service

Solar Panel Installation in Paudwar village

Solar panel Installation in Tikot village

Internet Center in Nangi

Internet Center in Tikot village

All of the Internet Shops are now providing several of the services as mentioned above such as SIP phone service, Internet service, secretarial services, and computer training to the rural people. Three Internet centers (Tikot, Nangi, and Aula) are providing telemedicine services. Four Internet centers (Okhareni, Tikot, Aula and Nangi) are

providing remittance service. The telemedicine and remittance services will be expanded to more centers of other villages in future, when the villagers will be ready to do that. The reason we could not set up telemedicine service in all the Internet centers is because there are no health worker available in every village. Most of the villages where ENRD has set up Internet center have no clinics. In some villages, the villagers have set up a small clinic in order to provide basic health services. Therefore it will take time to start e-health in other villages until a health worker is available.

Solar panel installation in Aula village

Internet Center in Aula village

Out of the proposed eleven services ENRD has not been able to provide mobile banking, and credit card transaction services so far because we are still negotiating with the commercial banks to bring the services. They are saying that they have been doing some pilots of branchless banking service and it will take a while for them to implement it on full scale. Therefore it is going to take some more time to make that happen.

Solar Installation in OkhareniVillage

Internet Center in Okhareni village

Ten people were provided training for one month in the village to run Internet shop in the villages. They have been provided basic computer and networking training. Now the operator of the Internet center can troubleshoot the computer problem and network problem. They are now able to do some basic hardware maintenance of the computers. Also they can provide basic training to the villagers on how to use Internet to write emails

and make Skype call, how to read online Nepali newspapers, how to search reading materials from the e-library to read, how to use social medias like Facebook, Twitter and Google Chat etc. After operating the Internet shop for six months refresher training will be provided around October of 2014 for two weeks. Also the operators will be sent to Pokhara to take basic electronic and mobile repairing training for one month.

7.2. Establishment of Wireless Backbone Completed:

The technical team of ENRD built backbone of the wireless links to Annapurna Base Camp area, Niskot, Deurali and Okhareni. It was necessary to build wireless link to some of those places where we had planned to put TTS system and to set up Internet shop. At some places there was Internet already available.

Setting up wireless link in Machhapuchhre region and Darbang region

7.3. Equipment for the Trekkers Tracking System Developed in Japan:

Mr. Sakamoto, Mr. Toru Nomura and other Japanese team members designed the prototype of Gateway, RSS with solar and battery, and tags. Also the development of the software for the TTS was completed by Japanese and Nepali developers. The system was field tested in November 2013 in Shiojiri Japan. Then the products were shipped to Nepal at the end of November 2013 and were installed in the Annapurna region at the second week of December 2013.

Repeater Relay Station Powered by Solar

eTag for the Trekkers and the battery

7.4. Computer Training for the Internet Shop Managers Completed:

The first round of one month technical training for the Internet shop operators was completed in August. At the beginning it was planned to provide a three-month long training for one time. We changed the plan because the Internet shop operators requested to divide the training in three parts. Rather than having three-month long training, they suggested that it would be better to provide one month training before the start of the project. The second training for one month during the installation period of the Internet shop set up is also completed. The third round of training will be done after six months.

8. Business Visits of Japanese Team Members and APT Team to Nepal:

Japanese team members of APTJ3 project visited Nepal three times as follows.

i. Two team members (Mr. Yosuhiko Kawasumi and Mr. Kazuyuki Sakamoto) of the APT J3 project came to Kathmandu to attend a meeting of SATRC Workshop on Policy, Regulation and Services organized by APT in Kathmandu from July 29 to August 1.

Japanese and Nepali team members at ENRD, Kathmandu and ACAP Counter in Pokhara

After the conference was over, the Japanese Team Members and Nepali Team members had meeting in Kathmandu. The Japanese team members shared technical ideas with Nepali team members. They also tested the TTS equipment in Kathmandu.

RRS installed in Ghandruk

RRS installed in Chhomrong

ii. Second group of team members from Japan visited Nepal from December 13, 2013 to December 20 for the installation of TTS system. The name of the team members were Mr. Kazuyuki Sakamoto, Mr. Toru Nomura and Mr. Sunil Maharjan. Three Nepali technical team members of ENRD also joined the installation team. The names of Nepali technical team were Mr. Surya Adhikari, Mr, Narayan Poudel and Mr. Jiban Pun. The group of Japanese and Nepali team members visited Ghandruk, Chhomrong, Deurali, Landruk region of Nepal and installed the TTS system. Mr. Nomura and Mr. Sakamoto provided on-the-spot technical training to the Nepali team members on how to configure the Gateways and RRS and then connect it to routers.

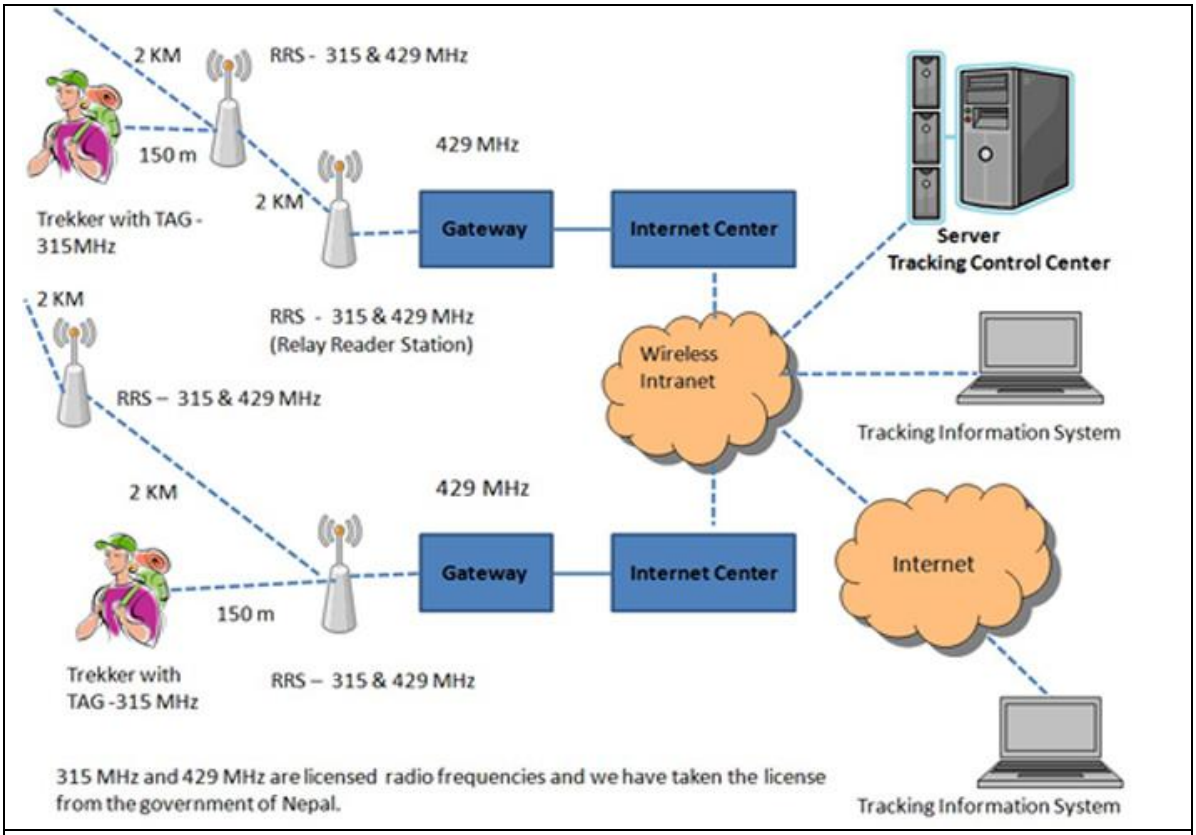
iii. The third group of Japanese team members of APT J3 project visited Nepal on January 6, 2014. They were Mr. Yasuhiko Kawasumi and Mr. Tetsuo Nampei. They visited some of sites where the trekker trekking system and Internet shops were installed. They travelled the sites with the team from APT. ENRD and Japanese members discussed about future collaboration during this visit.

iv. A team from Asia Pacific Telecommunity formally visited Nepal on January 6 to monitor the projects run with the financial support of APT in Nepal. The names of the APT members were Mr. Takashi Michikata and Mr. Pornchai Leelapornchai. APT team also visited telemedicine center and ENRD office in Kathmandu. After that they flew to Pokhara and visited the Annapurna Conservation Project counter, wireless base station, and server room of wireless networking project in Pokhara. Then the team travelled for three days by jeep and visited Ghandruk, Okhareni, Nangi, and Tikot villages and observed the trekkers tracking system, Internet centers, school computer labs and wireless networks in those villages.

APT and Japanese Team Members with villagers in Tikot village of Nepal

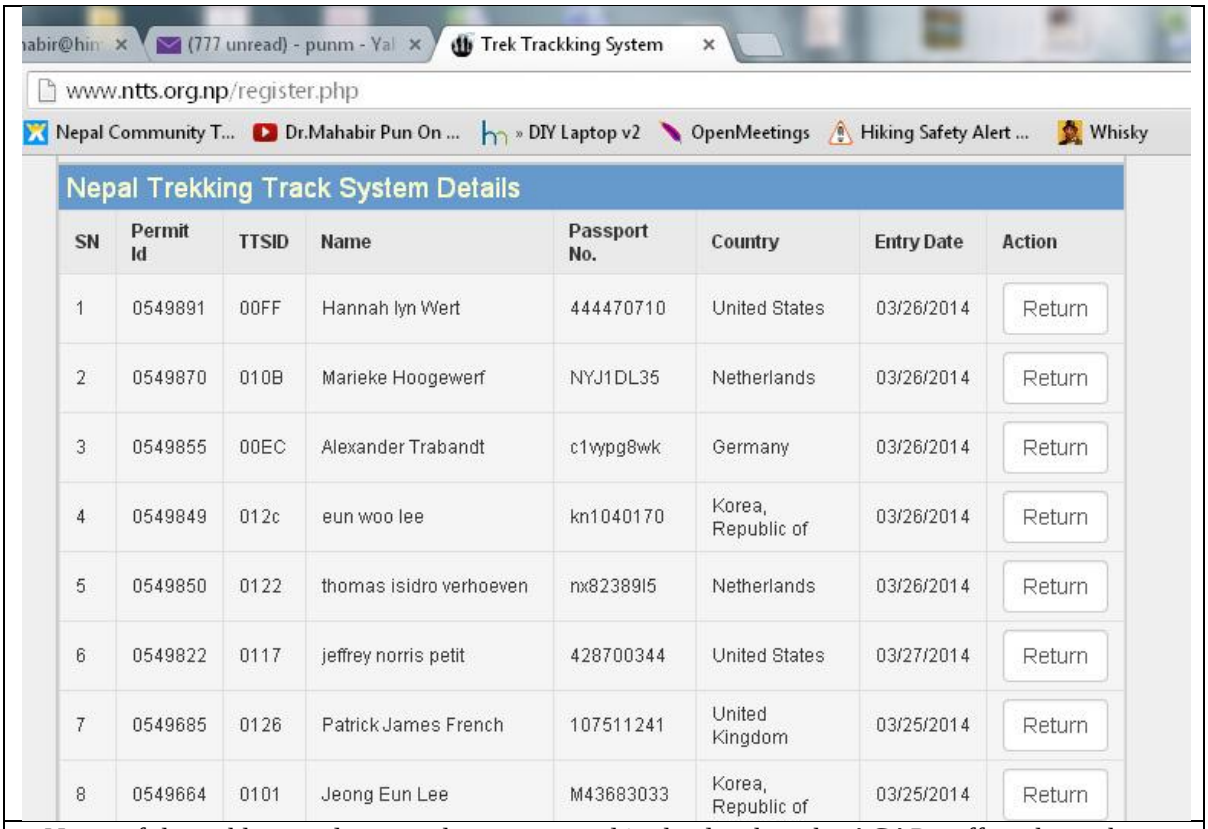
9. Installation of Trekker Tracking System:

Japanese and Nepali technical team members installed the TTS from December 13 to December 20 in seven villages of Annapurna region. This is one of the most famous trekking destinations in the world for national and international trekkers. Every year more than 100,000 trekkers visit the area for trekking. The destinations for the trekkers are Dhampus, Annapurna Base Camp, Ghorepani, and Khopra to have a close look of the beautiful Himalayan ranges. Also the trekkers are interested to visit the traditional villages such as Ghandruk, Landruk and Chhomrong. However, most of the trails go through big natural forests and the trekkers get lost easily. Moreover, there are some huge landslides and avalanches on the trail to Annapurna Base Camp making the trail more dangerous.



This is the schematic diagram showing how the trekker tracking system works.

After the installation of TTS, the team provided some training to ACAP staff of working at the counter in Pokhara where ACAP issues trekking permits to the trekkers. ACAP staffs were trained on how to insert data of the trekkers in the webpage and how to monitor the location of the trekkers along the trekking route. Also ACAP has printed brochures of the tracking system in four languages – Japanese, Korean, Chinese and English. In this way, it has been easier for the trekkers to learn about the TTS. When ACAP issues the tags to the trekkers along with trekking permits, they take NRs.1,000 (approx. US$10) as deposit and give receipt to the trekkers. Trekkers are given the NRs.1,000 back when they return the tag and receipt to the ACAP counter in any of the exit points. The exit points where the trekkers can return the tags and get their money back are Birethanti, Pathana, and Shikha.



Nepal Trekking Track System Details

SN	Permit Id	TTSID	Name	Passport No.	Country	Entry Date	Action
1	0549891	00FF	Hannah Iyn Wert	444470710	United States	03/26/2014	Return
2	0549870	010B	Marieke Hoogewerf	NYJ1DL35	Netherlands	03/26/2014	Return
3	0549855	00EC	Alexander Trabandt	c1wypg8wk	Germany	03/26/2014	Return
4	0549849	012c	eun woo lee	kn1040170	Korea, Republic of	03/26/2014	Return
5	0549850	0122	thomas isidro verhoeven	nx82389l5	Netherlands	03/26/2014	Return
6	0549822	0117	jeffrey norris petit	428700344	United States	03/27/2014	Return
7	0549685	0126	Patrick James French	107511241	United Kingdom	03/25/2014	Return
8	0549664	0101	Jeong Eun Lee	M43683033	Korea, Republic of	03/25/2014	Return

Name of the trekkers and tag number are entered in the data base by ACAP staff as shown here.

ENRD has developed a website for the trekkers tracking system in order to tell people how it works. The website is http://www.ntts.org.np. Anybody can see the position of the trekkers walking along the trail by clicking on "Trekkers Info" and then "Log" buttons. The data coming from the tags carried by the trekkers are hosted in separate website.

Mr. Nomura, Mr. Sakamoto and Mr. Sunil monitored the system continuously from Japan and suggested for some improvement. Mr. Nomura did some modification in the software to make the Gateway work even if there is power fluctuation. Also Mr. Sakamoto upgraded the "Log" screen page making it show the name of the trekker along with Tag ID and the name of the location of the RRS. They sent the upgraded version of the software to us and our field staff upgraded it in the Gateways.

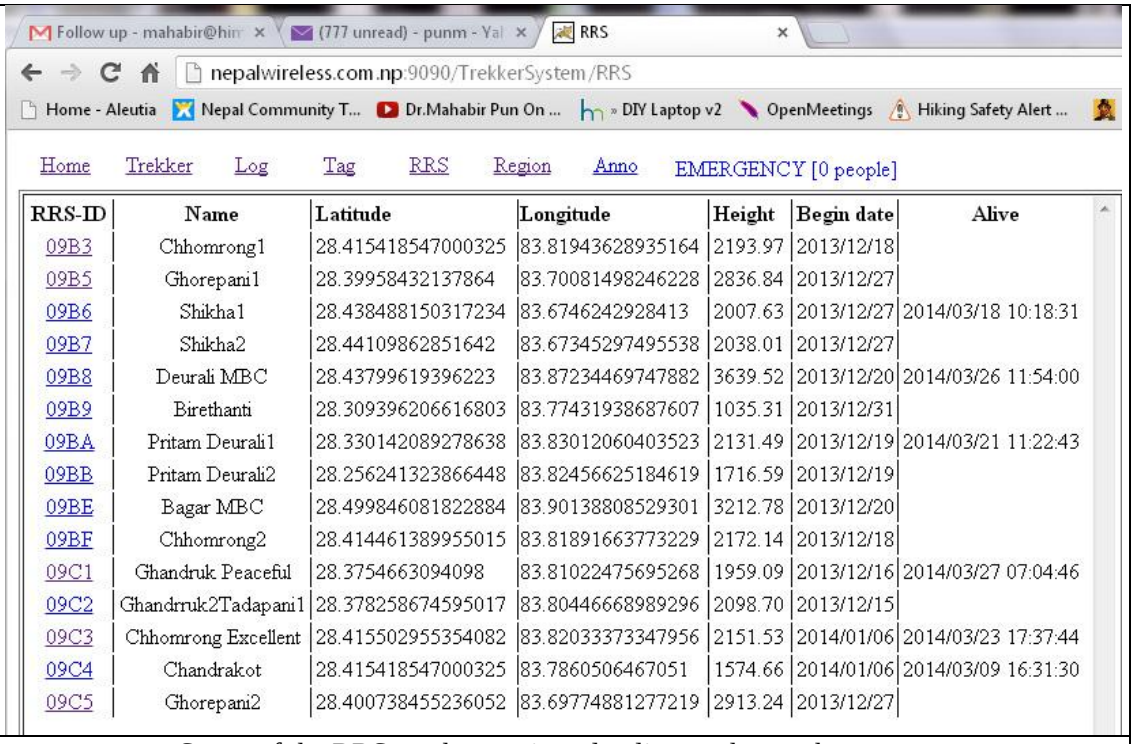
The main problem we faced at the beginning was that of power cut and power fluctuation in the Gateway. Because of the power cut and power fluctuation in the Gateways in Chhomrong, Ghorepani and Chandrakot, we had to put UPS with batteries for backup power. After we put the backup power system, the data of the trekkers started coming smoothly.

By visiting the website http://www.ntts.org.np, anybody can monitor real time location of the trekker along the trekking route. We can see the name of the trekkers, his/her Tag ID, location and the time the trekker arrived at specific village or point. The screenshot of the trekkers' data from the website has been given below.

DateTime	Tag-id/Trekker Name	RRS-id/RRS Name	Emergency	Low
2014/03/27 07:01:17	0111/liu dan	09B8/Deurali MBC	NORMAL	
2014/03/27 07:01:17	011D/SeungMin Shin	09B8/Deurali MBC	NORMAL	
2014/03/26 14:54:01	00DC/wan yuan zhou	09C5/Ghorepani2	NORMAL	
2014/03/26 14:53:28	00E5/CHANG HAN KIM	09C5/Ghorepani2	NORMAL	
2014/03/26 12:44:24	00E5/CHANG HAN KIM	09C5/Ghorepani2	NORMAL	
2014/03/26 10:45:49	00D0/Yesom Park	09C3/Chhomrong Excellent	NORMAL	
2014/03/26 10:45:49	011D/SeungMin Shin	09C3/Chhomrong Excellent	NORMAL	
2014/03/26 10:25:48	00D0/Yesom Park	09BF/Chhomrong2	NORMAL	
2014/03/26 10:25:48	011D/SeungMin Shin	09BF/Chhomrong2	NORMAL	
2014/03/26 09:07:58	0115/KATRINE BJERRING MEHL	09C2/Ghandrruk2Tadapani1	NORMAL	
2014/03/26 07:48:29	011D/SeungMin Shin	09BF/Chhomrong2	NORMAL	
2014/03/26 07:46:54	00E5/CHANG HAN KIM	09BF/Chhomrong2	NORMAL	
2014/03/26 07:45:18	011D/SeungMin Shin	09C3/Chhomrong Excellent	NORMAL	
2014/03/26 07:45:18	00CD/Hilde Koopmans	09C3/Chhomrong Excellent	NORMAL	
2014/03/25 12:10:13	011D/SeungMin Shin	09BE/Bagar MBC	NORMAL	

Live Log file can be seen with the "Date/Time, Tag ID/Trekker's Name and RRS ID/RRS Name as above.

The status of the RRS and Gateways can be monitored online. If it is not "Alive", we can send our field staff to the site and fix the problem. We had assigned one staff (Jiban Pun) for fulltime to monitor the status of the RRS and Gateways.



RRS-ID	Name	Latitude	Longitude	Height	Begin date	Alive
09B3	Chhomrong1	28.415418547000325	83.81943628935164	2193.97	2013/12/18	
09B5	Ghorepani1	28.39958432137864	83.70081498246228	2836.84	2013/12/27	
09B6	Shikha1	28.438488150317234	83.6746242928413	2007.63	2013/12/27	2014/03/18 10:18:31
09B7	Shikha2	28.44109862851642	83.67345297495538	2038.01	2013/12/27	
09B8	Deurali MBC	28.43799619396223	83.87234469747882	3639.52	2013/12/20	2014/03/26 11:54:00
09B9	Birethanti	28.309396206616803	83.77431938687607	1035.31	2013/12/31	
09BA	Pritam Deurali1	28.330142089278638	83.83012060403523	2131.49	2013/12/19	2014/03/21 11:22:43
09BB	Pritam Deurali2	28.256241323866448	83.82456625184619	1716.59	2013/12/19	
09BE	Bagar MBC	28.499846081822884	83.90138808529301	3212.78	2013/12/20	
09BF	Chhomrong2	28.414461389955015	83.81891663773229	2172.14	2013/12/18	
09C1	Ghandruk Peaceful	28.3754663094098	83.81022475695268	1959.09	2013/12/16	2014/03/27 07:04:46
09C2	Ghandrruk2Tadapani1	28.378258674595017	83.80446668989296	2098.70	2013/12/15	
09C3	Chhomrong Excellent	28.415502955354082	83.82033373347956	2151.53	2014/01/06	2014/03/23 17:37:44
09C4	Chandrakot	28.415418547000325	83.7860506467051	1574.66	2014/01/06	2014/03/09 16:31:30
09C5	Ghorepani2	28.400738455236052	83.69774881277219	2913.24	2013/12/27	

Status of the RRS can be monitored online as shown above.

11. **Summary of Financial Report:**

The summary of the income and expenses that incurred for the APTJ3 project in Nepal has been given in the following table. A separate financial report will be sent with original receipts and with details of expenses by mail to Asia Pacific Telecommunity, Bangkok.

Summary of Income and Expenditure of APTJ3 Project in Nepal Completed by E-Networking Research and Development from May 2013 to March 2014								
S.N.		**Approved Budget (USD)**		**Expense from 1st Installment**	**Expense from 2nd Installment**	**Subtotal USD**	**Total Expenditure USD**	**Variance**
1	**Planning and Investigation**		**1,000.00**	**963.66**			**963.66**	**36.34**
2	**Equipment**		**96,630.00**				**100,141.59**	**-3,911.59**
	Wireless & Accessories	21,420		10,064.82	12864.35	22,929.17		
	Power Source & Accessories	27,765		21,551.55	9,302.00	30,853.55		
	Computers & Accessories	17,955		1,217.23	16,062.84	17,280.07		
	Trekkers Tracking System	29,490		25,558.00	3,520.80	29,078.80		
3	**Shipping**		**1,500.00**	**0.00**	**2,760.27**		**2,760.27**	**-1,260.27**
4	**Business Trip of Japanese Experts**		**16,344.00**	**8,994.54**	**2,178.61**		**11,173.15**	**5,170.85**
5	**Miscellaneous**		**3,500.00**	**2,934.24**	**575.03**		**3,509.27**	**-9.27**
	Total		**118,974.00**	**70,320.38**	**47,663.90**		**118,5488.73**	**426.06**
	Total Grant Approved by APT		**118,974**					
	Grant received in the 1st installment (60%)		**71,384**					
	Grant Received in the 2nd installment (35%)		**41,640**					
	Total Amount Received from APT (95%)		**113,024**				.	
	Final installment of the grant to be received from APT		**5,524.73**					

The variances have been shown in the table above. For example, USD 5,170.85 was not used from the head of "Business Trip of Japanese Experts". The reason was that the Japanese experts became able to buy cheaper air ticket to come to Nepal. With the approval from APT, the money thus saved was used to set up one more Internet shop in a village. ENRD has spend some extra money to pay for the custom and duties of the equipment, local transportation cost and daily allowances for the local field staff and to provide training to the operators of Internet shop. Those extra cost paid by ENRD has not been included in this report. Thank you very much.

*****THE END*****

APPENDIX 1: Technical Information of the Radio Equipment Used in TTS

TTS Wireless Equipment Specification

Tag specifications

- Radio Wave Law - ARIB STD-T93 in Japan
- Frequency - 314.950MHz ±50kHz
- RF output power - 250μW (EIRP)
- Modulation - ASK
- Control switch - 1~4switchs, on and off equip with moving sensor
- ID - 16 bits (unique) control
- Service area 100m max in visible (service area can be selected on RRS dip switch roughly)
  Note: service area can be easily changed under various conditions.
- Current consumption - 3mA@TX、<1uA@standby
- Battery - 3V CR2032 lithium coin battery
- Battery life (reference) - > one year (transmit in every 5 seconds continuously)
- Low battery detect - low battery information is included in ID messages
- Data signals to be transmitted;
  Tag ID, low battery power warning signal, emergency signal from button(s)
- TAG operation ;
  TAG transmits 10 IDs in every 5~7 seconds with shaking. <- TBD
- Operating temperature - -20 ~ +70 °C
- Nntenna - on board print antenna
- Size - 55x32x6.5 (mm)
- Weight - about 15g

Reader Relay Station (RRS): Electrical characteristic

Receiver part for Tag

- Frequency - 314.950MHz ±50kHz
- Receiver Sensitivity - -119dBm @BER 0.01% (conductive)
- Diversity receiving - Two branches of demodulation output
- ID - 16 bits (unique)
- Antenna - Two whip antennas
- Service area - 100m max in visible (service area can be selected on RRS dip switch roughly)
  Note: service area is subject to changed under various conditions.

Relay Part

- Radio Wave Law - ARIB STD-T67 in Japan
- Frequency - 429.2500 ~ 429.7375 MHz
- RF output power - 10mW
- Receiver Sensitivity - -122dBm @BER 0.01% (conductive)
- Modulation - FSK

・ID - 16 bits (unique)
・Antenna - One whip antenna
・Service area - 5km max in visible
Note: service area can be easily changed under various conditions.

General

・Current Consumption - 25mA~35mA
・Operating temperature - -20 ~ +70 degree C
・Case - water resistant
・Size - 127*134*48 (mm) without solar and projection
・Weight - <1kg with solar and battery
Note Pole set is not included in tha standard package

Solar panels and battery

1） Solar module RRS (Reader and Relay Station) and RS (Relay Station)
Parts name: NME4.0V1194MA
Solar module: 4.7W (4.0V 1194mA)
Size: 240x173x4 (mm) with mounting hole φ3.2*4 cable length: 400mm
Operating temperature: -30 to 80 degree C weather resistant elastomer coating

2) Battery pack
Panasonic Eneloop HR-1UTG-1BP*2
2.4V, 5.7Ah (serial connection)
Life cycle: 2000
Operating temperature: -20 ~ 60 degree C

List of Attachments with the Report

a. Report of Business Trip to Nepal from Mr. Yasuhiko Kawasumi
b. Report of Business Trip to Nepal from Kazuyuki Sakamoto, and Mr. Toru Nomura
c. Operational Manual of Trekker Tracking System
d. Memorandum of Understanding between ENRD and Japan International ICT Association (JIIA) for the Development of Trekkers Tracking System