The Kingdom of Thailand
National Electronics and Computer Technology Center (NECTEC)

THE PROJECT OF HUMAN RESOURCE DEVELOPMENT THROUGH UTILIZING THE INFORMATION TECHNOLOGY FOR RURAL COMMUNITY VITALIZATION IN THE KINGDOM OF THAILAND

WORK COMPLETION REPORT

MARCH 2012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

JAPAN DEVELOPMENT SERVICE CO., LTD

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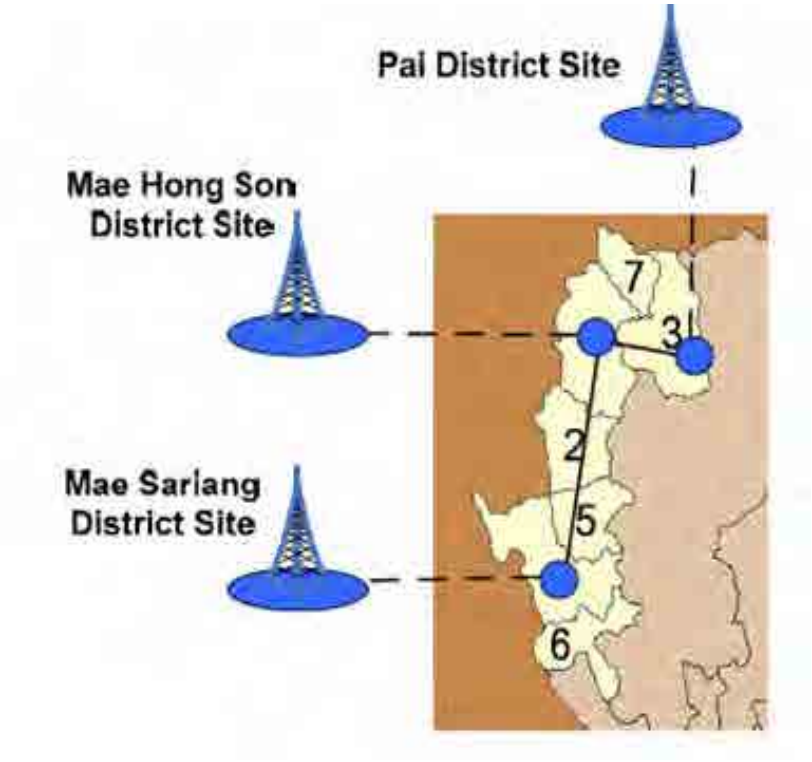
CONTENTS

MAP

Kingdom of Thailand

Source: Prepared based on http://www2m.biglobe.ne.jp/%257EZenTech/world/information/q035_map_thailand.htm

MAP



Mae Hong Son site

Source: Prepared by the Project Team

ABBREVIATIONS

Abbreviation	English
CAT	CAT Telecom Public Company Limited.
C/P	Counterpart
FAT	Final Acceptance Test
FTP	File Transfer Protocol
IC/R	Inception Report
ISP	Internet Services Provider
JCC	Joint Coordination Committee
JDS	Japan Development Service Co., Ltd.
LMS	Learning Management System
LVD	Low Voltage Disconnect
M/M	Minutes of Meetings
MHS	Mae Hong son
MOST	Ministry of Science and Technology
MSR	Mae Sariang
NBTC	National Broadcasting and Telecommunications Commission
NECTEC	National Electronics and Computer Technology Center
NSTDA	National Science and Technology Development Agency
NPU	Network Processing Unit
NTC	National Telecommunications Commission
PDM	Project Design Matrix
PO	Plan of Operation
R/D	Record of Discussion
RWCS	Rural Wireless Communication System
SC	Steering Committee
SIP	Session Initiation Protocol
S/O	System Operation
TICA	Thailand International Development Cooperation Agency
TOR	Terms of Reference
TOT	Telephone Organization of Thailand
TT&T	Thailand Telephone and Telecommunications
UPS	Uninterruptible Power Supply
UNINET	Universal Networking
VOIP	Voice over IP
WiMAX	Worldwide Interoperability for Microwave Access

1. Outline of the Work

1-1 Background of the Work

Thailand has continuously adopted an aggressive approach to creating an information-oriented society since the administration of former Prime Minister Thaksin, as may be gathered from its adoption of the 10th Socioeconomic Development Plan of the Kingdom of Thailand 2007-2011 (the superior level plan) and the National IT Policy Framework: IT2010 (2001-2010). Among these plans, aiming for the construction of a knowledge-based economy and society, emphasis has been placed on the utilization of basic information technology, development of IT human resources and construction of information and telecommunications infrastructure. This has led to Thailand becoming a medium-level IT nation in international terms. On the other hand, construction of the information and telecommunications infrastructure in provincial cities has been slow: rural areas still do not have access to telephones, the internet and other information and telecommunications infrastructure. As a result, this has led to the emergence of a so-called digital divide between urban and rural areas, and this is seen to be contributing especially to other disparities in terms of economy, education and quality of life in recent years. Rectification of the digital divide has thus become one of the priority development issues facing Thailand.

Against this background, the Government of Thailand in 2005 submitted a request to the Government of Japan for technical cooperation concerning model development and demonstration testing technology for a wireless communications system in provincial areas. Following this, the feasibility of receiving permission for allocation of frequency for the implementation of demonstration testing by the National Telecommunications Committee (NTC) was confirmed and preconditions for the full-scale implementation of cooperation were prepared. Consequently, work on the Project was implemented with the National Electronics and Computer Technology Center (NECTEC) as the Project implementing agency

1-2 Purpose of the Work

The work entails the implementation of wireless communications system demonstration testing in Mae Hong Son Province. Having said that, this is not a project aiming simply for the implementation of testing. Considering that one of the priority development issues facing Thailand is the rectification of the digital divide between urban and rural areas, it was anticipated that through implementing demonstration testing of the wireless communications system and moreover establishing, disseminating and refining the system for practical application in the target areas, this will contribute to the local vitalization of the areas and lead to further extension in other rural provinces. With this in mind, it was intended to give the NECTEC counterparts valuable experience through jointly implementing the demonstration test planning, needs survey, test implementation, verification, analysis and contents development, thereby improving their capacity to link the results of demonstration testing to practical application. Through doing this, it was hoped that the local

counterparts would become able to apply and disseminate the results of the demonstration testing to other areas in the country following the completion of Japan's cooperation. Also, through preparing IT curriculums and contents in a joint effort between the Japanese experts, NECTEC and local schools, it was anticipated that this would nurture the development capability of such agencies that will contribute to local vitalization, and that the Thailand side would acquire the capacity to develop curriculums and contents that are finely attuned to the needs that arise when extending the wireless communications system to other areas.

The ultimate objective of the work and the Project objective were set as follows.

<Ultimate objective>

- To realize the practical application of a local wireless communications system that will contribute to local vitalization

<Project objective>

- To strengthen the capacity of NECTEC to develop effective wireless communications systems in provincial areas

1-3 Target Areas

The National Electronics and Computer Technology Center (NECTEC) in Science Park, Pathum Thani Province, and the rural model pilot site in Mae Hong Son Province

1-4 Acceptance Setup, etc.

(1) Counterpart agencies

- Project supervising agency : National Science and Technology Development Agency (NSTDA)
- Project implementing agency : National Electronics and Computer Technology Center (NECTEC)

(2) Project related agencies

- Schools, local government and community schools in Mae Hong Son Province

(3) Other related agencies

- Ministry of Science and Technologies

(4) Beneficiaries

The direct beneficiaries will be the implementing agency, i.e. the National Electronics and Computer Technology Center (NECTEC), the NECTEC facilities inside the Science Park in Pathum Thani Province, and the schools, local residents and local government officials, etc. in

the target area.

Indirect beneficiaries will be the non-targeted schools, local residents and local government officials, etc. in Mae Hong Son Province

(5) Steering Committee (SC)

The Steering Committee members will be the NECTEC Project Director (chairperson), the NECTEC Project Manager, the WiFi/WiMAX technical team, the technical team representatives, the JICA experts and local staff.

(6) Related Government Ministry

Ministry of Science and Technology (MOST)

(7) Joint Coordination Committee (JCC)

The Joint Coordination Committee members will be the members of the Steering Committee as well as the National Broadcasting and Telecommunications Committee (NBTC) representative, Mae Hong Son Provincial government representative, Mae Hong Son Province schools representative, the Thai International Cooperation Agency, the JICA experts, the JICA Thai office representative and Embassy of Japan representative (observer)

(8) Counterparts

The list of counterparts as of February 2012 is as indicated below.

Name of C/P	Post / Field
Dr. Pansak Siriuchatapong	Executive Director of NECTEC/ Project Director
Dr. Kwan Sitathani	Vice Director of NECTEC/ Project Advisor
Dr. Siwaruk Siwamogsatham	Director of National Security Technology and Innovation Lab / Project Manager
Ms. Kullapraya Navanugraha	Director of Human Resource Development Department / Project Management Office
Dr. Kitti Wongthavarawat	Researcher/ Project Co-manager WiFi, WiMAX research
Mr. Kitiwat Limmongkol	Assistant researcher/ WiFi, WiMAX research
Mr. Jesada. Pholcharoen	Assistant researcher / WiFi, WiMAX research
Mr. Jedsada Thongkanluang	Engineer / WiFi, WiMAX research
Ms. Piranya Sathienpattanakul	Assistant researcher / WiFi, WiMAX research
Mr. Worawath Pattanachotgul	Engineer/ WiFi, WiMAX research
Dr. Supakorn Siddhichai	Researcher/ Application research
Mr. Pornchai Tummarattanaont	Researcher/ Application research
Ms. Methinee Sirikrai	Human Resource Development Department / Administration
Ms. Thansaya Promniyom	Human Resource Development Department/ Administration
Dr. Kasititorn Pooparadai	Social impact survey member
Dr. Chalee Vorakulpipat	Social impact survey member
Ms. Kasama Kongsmak	Social impact survey member
Ms. Jeeranund Doangkum	Social impact survey member

2. List of Project Outputs

2-1 Developed Outputs

The outputs that were developed in each year are as follows.

(1) Reports

- Inception Report
- Contents Development Plan
- Detailed Plan of Technology Transfer Activities
- Progress Reports (1~6)
- Work Completion Report (this report)
- Baseline Study, Technical Trend Survey, Report on Survey of the Request
- Case Study Report
- Practical Training Report
- Impact Study Report
- Flood Influence Investigation Report
- Demonstration Testing Assessment Report

Except for the Work Completion Report, all the above outputs are contained on CD-ROM.

(2) Other outputs

- RWCS Model Development Document

  This is attached to the end of this report.

2-2 Achievement Status of PDM Outputs

Achievement status for each PDM (Ver.3.0) output is given below.

(1) Output 1

"Rural wireless communication model has been developed by NECTEC"

1-1. Implementation of trend survey of wireless communication technologies at model sites

Technical trend survey was implemented on the model sites. The findings were compiled into the survey report, while characteristics in rural areas and caution points that are external factors have been reflected in the Project.

1-2. Knowledge and skills acquired by the trainees who participated in the technical training.

Thanks to the technology transfer conducted through OJT and technical training, etc., the C/Ps were able to acquire skills and techniques, and the manifestation of these outputs was verified in the level of C/P understanding and satisfaction as found in questionnaires and interviews.

1-3. The design of Rural Wireless Community System Model and its parameter identified.

Because the C/Ps independently completed the RWCS model development document, this may be viewed as a manifestation of the outputs of the technology transfer.

1-4. The discussions held about feasibility and its usefulness of applications among related organizations

Feasibility of the RWCS development model was discussed by the JCC members from the NBTC and other related agencies, and it was verified that it will be highly effective for development of the rural areas targeted by the NBTC in future.

(2) Output 2

"Curriculum aimed to vitalize the rural areas will be developed by NECTEC in collaboration with local organizations in the Kingdom of Thailand."

2-1. Number of curriculums developed by NECTEC in collaboration with local organizations

Approximately 120 curriculums were jointly developed by the C/Ps with the Project participants at 45 sites in Mae Hong Son, thus providing evidence of quantitative outputs.

2-2. Number of users who use e-Learning applications

The number of user access hits to e-learning applications including LMS that is used on 45 sites has been more than 4,500, thus providing evidence of quantitative outputs.

2-3. Number of contents developed by the users of curriculums

The number of contents developed on the 45 local sites has been more than 800, thus providing evidence of quantitative outputs.

2-3 Achievement Status of Technology Transfer

The achievement status of technology transfer has been as follows.

(1) RWCS model development

The experts transferred know-how and technology mainly concerning demonstration testing assuming RWCS model development to the C/Ps. Via OJT and seminars, the technology transfer was conducted with particular emphasis on the method of demonstration test planning, calculation of parameters for RWCS model development, CAPEX simulator development, parameter application, overall composition of RWCS model development and recommendations. Since the C/Ps were able to incorporate the resulting outputs into the RWCS model development document and complete the document, the outputs of development have been manifested.

(2) System operation and maintenance

Technology transfer was carried out for the C/Ps via seminars, system operation (S/O) caravan, S/O meetings and S/O capacity survey. In the S/O capacity survey that was conducted in February 2012 to wrap up the technology transfer, roughly 20 possible case sites or sites that have particular problems concerning use rate were visited and surveyed. The objective was to transfer techniques for the future collection, analysis and utilization of usage monitoring data, methodology for analyzing results according to each event and method for reflecting findings in future activities. Since the C/Ps are already able to independently conduct surveys of local operation and maintenance personnel, they are making use of the know-how and techniques that were transferred by the experts.

The following technology transfer concerning system operation was conducted:

1) Preparation of system operation guidelines

May 2010	ITIL framework and ISO/IEC 20000 translation to make a framework of for the guideline
July 2010	Seminar materials translation for making the guideline (WiMAX Network Operation and Maintenance (System Operation) Guideline for 3rd Tier Local Area R5)
October 2010	S/O guideline completion (Ver.1.0)
November 2010	S/O guideline revision (Ver.2.0) Added escalation form of each service and modified to be simpler
February 2012	S/O guideline revision (Ver.3.0) Added equipment list, vender list to maintain and modified to be clear about handover from NECTEC to MHS government

2) Seminars, workshops

July 2010	● SEM1_3 Seminar for system operation to combine S/O guideline ● 1st caravan: OJT for system operation by expert to NECTEC C/Ps and support for workshop (19th July 2010) to introduce the guideline to MHS local users (45sites)
October 2010	● SEM1_4 Seminar for S/O and IP Network to NECTEC C/Ps ● 2nd caravan: Support for workshop to S/O and IP Network to MSR local users (45sites)
November 2010	● 3rd caravan: Support for workshop to S/O and IP Network to PAI local users (45sites)
January 2011	● 4th caravan: Support for workshop to S/O and IP Network to MHS local users (45sites)

March 2011	● SEM1_6 Seminar for S/O, Radio System and Wireless Technology to NECTEC C/Ps
	● Review of S/O work shop to NECTEC C/Ps
May 2010	● 6th caravan: Support for workshop to S/O and Radio System to MSR local users (45sites)
July 2010	● 7th caravan: Support for workshop to S/O and Radio System to PAI local users (45sites)
September 2010	● 8th caravan: Support for workshop to S/O and Radio System to MHS local users (45sites)

3) System operation caravan (OJT)

- 1st caravan (December 6~24, 2010, January 16~20, 2011)

  Visited sites: Mae Hong Son, Mae Sariang, Pai

- 2nd caravan (June 5~8, 2011, June 20~24, 2011, August 15~19, 2011)

  Visited sites: Mae Hong Son, Mae Sariang, Pai

4) System operation conference

- 1st (November 29, 2010)
- 2nd (January 6, 2011)
- 3rd (February 20, 2011)
- 4th (March 18, 2011)
- 5th (May 31, 2011)
- 6th (June 10, 2011)
- 7th (August 26, 2011)
- 8th (October 6, 2011)
- 9th (December 16, 2011)
- 10th (January 23, 2012)
- 11th (February 14, 2012)

5) OJT concerning system operation

- Support for relocation of Jom Kitti base station due to landslide in Mae Sariang
- Support for reconstruction of Mae Ka Tone base station in relation to relocation of Mae Sariang base station (February 2012)
- Support for system operation capacity survey (February 2012)

(3) Development of e-learning contents

The local C/Ps were encouraged to conduct group discussions on methods for improving the existing contents and generating motivation and ideas, and they were able to take the initiative in devising methods for preparing new contents and reflecting those in subsequent workshops. The C/Ps apply the transferred technologies upon fully understanding the merits of contents preparation and merits of learning, and they also give consideration to the sustainability of such activities. Since these activities encourage the autonomous creation of contents by users, and the skills and techniques transferred by the experts are already being utilized, the goals of the technology transfer have been realized.

(4) Training plan

The C/Ps completed the operation guidelines for the TV conferences and remote classes utilizing the Acu Conference system. The guidelines were prepared under the initiative of the C/Ps that received the seminars on e-learning contents development and instructional design. The guidelines were completed in light of past experience of remote classes and with consideration given to the network in Mae Hong Son Province, with a view to exploring by trial and error the approach to remote conference operation that is acceptable and understandable for the instructors and users of Mae Hong Son. Accordingly, the C/Ps are amply capable of utilizing the transferred technology, and this may be viewed as an output of the technology transfer activities conducted via the seminars and workshops for Mae Hong Son instructors.

Moreover, in all the training conducted by the C/Ps during the Project period, the work from preparation to actual management, comprising target setting, detailed planning and compilation of questionnaire findings, was soundly implemented using the “Event Report” proposed by the experts. On completion of the Project, the results of analysis over the entire training are compiled into the Training History and the C/Ps are able to independently prepare, management and renew the “Training Analysis” that states the results of analysis in each field. Moreover, because the C/Ps have started compiling follow-up training plans, etc. on Project completion, the goals of the technology transfer are deemed to have been achieved.

3. Schedule of Activities (Actual)

Year	2009									2010												2011												2012			
Counting month	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
Activities																																					
1. Activities for Output1.																																					
1-1. To carry out the survey of wireless communication technologies trend at model site.																																					
1-2. To design and implement the wireless communication system at the model site.																																					
1-3. To conduct/support WiMAX equipment procurement and to conduct the On the Job Training (OJT) for installation (e g. tower construction, construction supervision and acceptance).																																					
1-4. To conduct the “On the Job Training (OJT)” for NECTEC’s personnel in the field of site planning and system design of WiMAX (Worldwide Interoperability for Microwave Access) and other training courses in Japan.																																					
1-5. To conduct training to the targeted local users using sample equipment.																																					
1-6. To test and measure the performance of wireless communication system including applications running (e.g. internet access, voice over IP, video conferencing, e-Learning, and e-Community).																																					
1-7. To examine and analyze the results of testing of wireless communication system and propose an evaluation study report including impact survey about socio-economic status.																																					
1-8. To hold seminar to share the information about wireless communication system trial test with participants from relevant organizations, such as National Telecommunications Commission (hereinafter referred to as “NTC”), Universities, Institute, etc.																																					
1-9. To identify and recommend the technical regulations to relevant authorities to be applied for rural wireless communication system.																																					
1-10. To draft The Study Report of Rural Wireless Communication System Development ’.																																					
1-11. To propose the developed rural wireless communication system model to NTC.																																					
2. Activities for Output2.																																					
2-1. To discuss with local school teachers and local authorities (e g. governments, hospitals, police departments, libraries etc.) of Mae Hong Son Province to develop the curriculums.																																					
2-2. To collaborate with targeted local users for creating the sample contents for e-Learning.																																					
2-3. To conduct training for local instructors in Mae Hong Son Province.																																					
2-4. To facilitate training for local users by local instructors																																					
2-5. To conduct the impact survey about the use of contents of the said curriculum.																																					
2-6. To share the lessons learned from the Project with other related organizations, and promote the applications of the developed curriculums in other areas in the Kingdom of Thailand.																																					

To be conducted

4. Inputs

4-1 Expert Dispatches

Name	Areas of Guidance	From		To	
Mamoru Yasui	Chief Advisor / Test Planning	2009/4/26	Sun	2009/6/26	Fri
		2009/8/2	Sun	2009/12/12	Sat
		2010/1/17	Sun	2010/5/28	Sun
		2010/7/4	Sun	2010/8/7	Sat
		2010/9/26	Sun	2010/11/27	Sat
		2011/2/21	Mon	2011/3/26	Sat
		2011/5/8	Sun	2011/6/4	Sat
		2011/7/27	Wed	2011/9/10	Sat
		2011/12/4	Sun	2011/12/24	Sat
		2012/1/8	Sun	2012/3/10	Sat
Akira Kishimoto	WiMAX System Design	2009/5/10	Sun	2009/5/30	Sat
		2009/8/2	Sun	2009/9/2	Wed
		2009/10/4	Sun	2009/10/24	Sat
		2009/11/18	Wed	2009/12/12	Sat
		2010/1/7	Thu	2010/1/30	Sat
		2010/2/14	Sun	2010/4/3	Sat
		2010/4/18	Sun	2010/5/29	Sat
		2010/6/27	Sun	2010/7/29	Thu
		2010/9/12	Sun	2010/9/30	Thu
		2010/11/10	Wed	2010/11/27	Sat
		2011/1/9	Sun	2011/1/27	Thu
		2011/3/6	Sun	2011/3/26	Sat
		2011/5/8	Sun	2011/5/28	Sat
		2011/7/17	Sun	2011/8/6	Sat
		2011/8/25	Thu	2011/9/17	Sat
		2011/12/4	Sun	2011/12/24	Sat
		2012/1/8	Sun	2012/3/10	Sat
Yoji Murakami	Site Planning	2009/5/10	Sun	2009/5/30	Sat
		2009/8/16	Sun	2009/9/2	Wed
		2009/10/14	Wed	2009/12/12	Sat
		2010/1/7	Thu	2010/1/30	Sat
		2010/3/7	Sun	2010/5/29	Sat
		2010/7/4	Sun	2010/7/29	Thu
		2010/9/12	Sun	2010/9/30	Thu
		2010/11/7	Sun	2011/1/23	Sun
		2011/2/20	Sun	2011/3/10	Thu
		2011/5/25	Wed	2011/6/11	Sat
		2011/8/7	Sun	2011/8/27	Sat
		2011/12/7	Wed	2011/12/29	Thu
		2012/1/8	Sun	2012/1/14	Sat
		2012/1/21	Sat	2012/3/10	Sat
Yuko Shiraishi	e-learning Contents Development	2009/5/10	Sun	2009/6/6	Sat
		2009/10/11	Sun	2009/12/12	Sat
		2010/2/21	Sun	2010/4/10	Sat
		2010/8/1	Sun	2010/8/28	Sat
		2010/9/26	Sun	2010/11/27	Sat
		2011/3/6	Sun	2011/3/26	Sat
		2011/5/16	Mon	2011/6/18	Sat
		2011/10/16	Sun	2011/10/28	Fri
		2012/1/8	Sun	2012/02/23	Thu

Name	Areas of Guidance	From		To	
Mayuka Kobayashi	Training Planning / Work Coordination	2009/4/26	Sun	2009/5/23	Sat
		2009/5/27	Wed	2009/6/20	Sat
		2009/7/15	Wed	2009/9/2	Wed
		2009/10/18	Sun	2010/2/4	Thu
		2010/2/21	Sun	2010/4/3	Sat
		2010/4/21	Wed	2010/7/22	Thu
		2010/8/22	Sun	2011/2/26	Sat
		2011/5/29	Sun	2011/8/3	Wed
		2011/9/7	Wed	2011/10/28	Thu
		2011/12/11	Sun	2012/1/11	Wed
		2012/1/25	Wed	2012/3/10	Sat

4-2 Work Contents of Experts

The work contents of the experts were as indicated in the following table.

Contents of Work in Japan and Thailand of Each Expert

Name	Responsible Area / Work Field	Contents of Work
Mamoru Yasui	Chief Advisor / Test Planning	・ Supervision and instruction of the overall work ・ Discussions and coordination with JICA Tokyo headquarters, Thailand office, C/Ps and JCC ・ Gauging of C/P needs in Mae Hong Son Province ・ Support for the survey of technical trends concerning wireless communications technology on model sites ・ Support for implementation of demonstration testing of wireless communications systems on model sites ・ Preparation and implementation of workshops ・ Adjustment of the policy, method and schedule of technology transfer in each field ・ Monitoring concerning the effects of technology transfer ・ Support for verification and analysis of demonstration test results ・ Response to issues uncovered in the technical trend survey conducted in May ・ Safety management during the site work ・ Support for the impact survey ・ Preparation of the draft “Rural Wireless Communications Model Development Document” ・ Proposal of recommendations to the National Telecommunications Committee (NTC) concerning the rural wireless communications model ・ Compilation, explanation/discussion and securing of consent for reports (IC/R, Detailed Plan of Technology Transfer Activities, Progress Reports, Work Completion Report, etc.) ・ Formulation and implementation of the plan of training in Japan ・ Assessment of the results of activities and proposal of improvements ・ Flood influence investigation
Akira Kishimoto	WiMAX System Design	・ Support for the survey of technical trends concerning wireless communications technology on model sites ・ Support for implementation of demonstration testing of wireless communications systems on model sites ・ Technology transfer in system design (OJT) ・ Support for verification and analysis of demonstration test results ・ Technology transfer and monitoring in the responsible field ・ Equipment procurement and support for equipment procurement ・ Execution supervision and support for execution supervision concerning equipment installation

Name	Responsible Area / Work Field	Contents of Work
		・ Acceptance validation and support for acceptance validation following installation of equipment ・ Implementation of field trip to Cheng Lai ・ Support for impact survey ・ Preparation and implementation of workshops ・ Preparation of the draft “Rural Wireless Communications Model Development Document” ・ Proposal of recommendations to the National Telecommunications Committee (NTC) concerning the rural wireless communications model ・ Compilation, explanation/discussion and securing of consent for reports (IC/R, Detailed Plan of Technology Transfer Activities, Progress Reports, Work Completion Report, etc.) ・ Assessment of the results of activities and proposal of improvements ・ Flood influence investigation
Yoji Murakami	Site Planning	・ Support for the survey of technical trends concerning wireless communications technology on model sites ・ Support for implementation of demonstration testing of wireless communications systems on model sites ・ Technology transfer in site planning (OJT) ・ Support for verification and analysis of demonstration test results ・ Technology transfer and monitoring in the responsible field ・ Equipment procurement and support for equipment procurement ・ Execution supervision and support for execution supervision concerning equipment installation ・ Acceptance validation and support for acceptance validation following installation of equipment ・ Implementation of field trip to Cheng Lai ・ Implementation of C/P training using the sample equipment ・ Support for impact survey ・ Preparation and implementation of workshops ・ Preparation of the draft “Rural Wireless Communications Model Development Document” ・ Proposal of recommendations to the National Telecommunications Committee (NTC) concerning the rural wireless communications model ・ Compilation, explanation/discussion and securing of consent for reports (IC/R, Detailed Plan of Technology Transfer Activities, Progress Reports, Work Completion Report, etc.) ・ Assessment of the results of activities and proposal of improvements ・ Flood influence investigation
Yuko Shiroishi	e-learning Contents Development	・ Preparation of IT curriculum and contents development plan ・ IT curriculum survey ・ Support for preparation of e-contents prototypes with local school teachers ・ Support for instructor training of C/Ps in Mae Hong Son Province ・ Support for training of school teachers by C/Ps in Mae Hong Son Province ・ Support for the survey on effect of utilizing IT curriculum contents ・ Support for discussions with related agencies concerning the feasibility of utilizing developed IT curriculums and contents in other areas ・ Technology transfer and monitoring in the responsible field ・ Compilation, explanation/discussion and securing of consent for reports (IC/R, Detailed Plan of Technology Transfer Activities, Progress Reports, Work Completion Report, etc.) ・ Assessment of the results of activities and proposal of improvements

Name	Responsible Area / Work Field	Contents of Work
Mayuka Kobayashi	Training Planning / Work Coordination	・ Assistance of the overall supervision work ・ Assistance of discussions and coordination with JICA Tokyo headquarters, Thailand office, C/Ps and JCC ・ Logistical support for the work in general ・ Contract management support and procurement support in equipment procurement ・ Planning and operation of field trip to Cheng Lai ・ Support for planning and operation of the C/P training using the sample equipment, and support for C/Ps concerning management and operation of the supplied equipment and portable equipment ・ Technology transfer and monitoring in the responsible field ・ Implementation of teachers' training in Mae Hong Son Province ・ Preparation and implementation of workshops ・ Compilation, explanation/discussion and securing of consent for reports (IC/R, Detailed Plan of Technology Transfer Activities, Progress Reports, Work Completion Report, etc.) ・ Assessment of the results of activities and proposal of improvements ・ Flood influence investigation ・ Assistance of planning and implementation of training in Japan ・ Settlement work

4-3 Acceptance of Trainees for Training in Japan

The training in Japan was implemented from June 6 to June 15, 2010. The objectives of the training, names of the trainees from NECTEC and schedule of the training are as indicated below.

(1) Purpose of training

The training in Japan was implemented with the goal of acquiring advanced Japanese wireless communications technologies and knowledge useful for the compilation and technical verification of the information communications environment (wireless communications model) in private enterprises, universities and research agencies concerned with wireless communications in cities and rural areas, with a view to developing and introducing wireless communications systems in the future.

(2) Trainees

- Dr. Kitti Wongthavarawat : Project management
- Dr. Supakorn Siddhichai : Networks
- Mr. Kitiwat Limmongkol : WiMAX research
- Mr. Matanee Kitjaroen : Hardware development

(3) Schedule

Date		Start Time	Visit Destination	Objective	Overnight Stay
6/6	Sun		Bangkok→Narita		JICA Tokyo
6/7	Mon		Briefing		JICA Tokyo
			Program orientation		
6/8	Tue	10:00～	Yokosuka Research Park (YRP)	・ Introduction to YRP, tour of NTT Yokosuka, NTT Docomo	JICA Tokyo
6/9	Wed	10:00～	NTT Note	・ How to use NGN and actual experience of NGN	Ise City Hotel Annex
		13:30～	Kio University Shonan Fujisawa Campus (SFC)	・ Research activities of the open wireless platform laboratory (Murai Laboratory) ・ Contents of WiMAX utilization in SFC ・ Introduction of technical and local enlightenment activities focusing on the Fujisawa Signage Project	
			Transit→Mie		
6/10	Thu	10:00～	iTV Co.	・ Introduction to an example of a locally deployed WiMAX network ・ Lecture on network composition and services ・ Observation of local WiMAX facilities	Ise City Hotel Annex
6/11	Fri	10:00～			JICA Tokyo
			Transit→Tokyo		
6/12	Sat				JICA Tokyo
6/13	Sun				JICA Tokyo
6/14	Mon	10:00～	NEXCO East Japan	・ Construction of a network utilizing WiMAX ・ Concerning services ・ Tour of the WiMAX Tower and hands-on experience of services (Miyoshi PASAR)	JICA Tokyo
		18:00～	Closing ceremony, assessment meeting		
6/15	Tue		Narita→Bangkok		

Concerning the question about suitability of the set achievement goals and needs in the JICA questionnaire that was conducted on the final day of the training, two members responded with a 4 and two with a 5 out of the five-grade rating, indicating a high level of satisfaction and that the targets of the training were achieved.

4-4 Equipment Procurement

It was originally scheduled to start the installation of equipment around July 2009, however, the equipment delivery schedule was postponed due to revision of the procurement guidelines of JICA headquarters. Accordingly, it was originally planned to commence OJT for demonstration testing using the procured equipment from November 2009, however, because this wasn't possible, a revised contract was concluded between JICA and JDS, and the following activities were added as an alternative during the period with no equipment.

- Equipment procurement, execution supervision and acceptance validation by JDS and support for equipment procurement by the JICA local office
- Implementation of additional support for C/Ps
- Response to issues uncovered in the technical trend survey in May

Concerning the equipment procurement, it was basically decided to procure in Japan in line with the revision to the procurement schedule, and this was partly done by the JICA local office and partly by JDS. Moreover, JDS assisted with the portion procured by JICA.

The following tables summarize the equipment that underwent procurement, execution supervision and acceptance validation (with support from JDS) by the JICA local office, and the equipment that was handled by JDS.

Equipment procured by the JICA local office (with support from JDS)

1	**HW025: Weather Monitoring Device**
2	**SW003 Videoconference Server Software**
3	**SW004 Videoconference Client Software**
4	**SW005 Collaboration Software for Videoconference**
5	**Cabinet Cooling System**

Equipment procured by JDS (implemented by JDS)

1	**TOWER for WIMAX Antenna**
2	**Device cabinet with lock**

4-5 Local Work Costs

The local work costs are indicated below.

Unit JPY

Item	FY2009-2011
General work costs (apart from training and management)	6,740,000

5. Contrivances and Lessons in Project Operation

(1) Concerning the Project scheme

1) Lessons in equipment procurement

(a) Local procurement of equipment

In the system installation, operation and maintenance, the local support setup is important irrespective of whether equipment is procured in Japan or locally. In particular, it is necessary to secure the necessary time until the start of operation and maintenance services and adequate local support in communication and so on between the Project and vendors. Concerning installation too, since issues requiring adjustment and handling arise within the local support setup, it is important for the smooth installation and introduction of equipment to clearly define roles on the Project side and vendor side.

In the Project, due to the major delay in equipment procurement, the Project plan was shortened as much as possible, however, time was taken up in coordinating with vendors and supporting the vendor work. As a result, more project resources and time than expected had to be devoted to conducting system inspections and OJT geared to the development of human resources at the same time as construction, and this had a major impact on the Project activities.

2) Scope of R/D during Project formation

(a) Bearing of backbone costs corresponding to system composition at the time of Project formation in consideration of sustainability

In order to connect 45 sites in the Mae Hong Son area to the internet via WiMAX, a backbone network of 100 Mbps is required. Since the targeted rural areas in the Project are impoverished, it is essential to consider internet access and the backbone in order to ensure that the supplied equipment is utilized following transfer of the Project, and an important precondition for this is the bearing of operating costs by the local agencies. Concerning which agency should bear the cost of a backbone that can handle such traffic, we strongly feel that this should have been planned and agreed with the C/Ps at the time of Project formation.

(b) Clarification of the system operating entity and bearing of costs following transfer of the Project

Since the R/D at the start of the Project contained no mention of system operation, this had to be added to the TOR during the Project. However, when system operation was added to the TOR, because no additional expert was dispatched to manage new system

operation in the technology transfer to C/Ps, this had to be covered by the existing experts. Moreover, concerning the input of resources on the C/P side, system operating staff had to be additionally assigned during the Project, and the time spent on this impacted the stable operation of the system. NECTEC is a research facility and although it has researchers, it needs to make new recruitments and prepare human resources in advance in order to assign new operating staff. Although the work entailed demonstration testing only, the Project system constituted a major network covering 45 sites, four base stations and two core sites, and apart from charges consideration should have been given to the appropriate deployment of resources in the projected system similar to a commercial service. Agreements with the C/Ps should have been reached and specifically concluded on such issues.

(c) Securing and assignment of C/P resources for system operation and technology transfer within the C/P

Since the R/D contained no mention of system operation, C/Ps on the Thai side were not assigned at the start. It can be appreciated that no mention was given because this was a demonstration testing project, however, from the viewpoint of sustainability, the item on system operation should have been included. Since system operation staff are essential for project operation, the experts requested the C/P to assign personnel during the Project. However, due also to the fact that the scope of system operation in the R/D was vague, the assigned C/Ps quit during the work and handover on the C/P side was insufficient, the experts had to redo the technology transfer to new operating staff from the start. Overall system operation will be handed over to the local Mae Hong Son government from now on, however, the securing of local personnel expenses and resources for operation is a matter for concern and this is starting to have an impact on the Project transfer and sustainability.

(2) Concerning technology transfer in general

1) Lessons in technology transfer to C/Ps

The people who took part in the technology transfer seminars and OJT were not selected according to a medium and long-term human resources development process, but rather the participants were randomly chosen and sometimes ended up working in unrelated departments or leaving their posts despite receiving the Project technology transfer. As a result, it was often impossible to conduct the scheduled human resources development. Because technology transfer and handover (handover of materials by personnel leaving their positions and so on) were not carried out at all, the experts had to implement technology transfer from scratch for successors. In terms of the lessons learned, the experts should have devoted greater attention to the human resources development from the medium and long-term viewpoint, planning of

human resources development and follow-up of C/Ps after lectures.

2) Need for practical training

Concerning the skill level of help desk managers in Mae Hong Son[1], the lectures, seminars and workshops were implemented targeting the level that was grasped in the baseline survey. However, as it was found during the Project that the C/Ps could not acquire sufficient understanding from classroom training alone, it was subsequently decided to implement practical training in line with the workshops in order to enhance understanding.

(3) Lessons concerning project management and operation

1) Concerning project management and operation

(a) Project management and operation

Concerning project management, overall management on the side of the C/Ps was good, however, concerning the planning and securing of resources, placement of the right people in the right places and handling of personnel who left posts, a more efficient approach to project management could have been adopted.

(b) Information sharing

Concerning information sharing, since AR (Action Requests) were managed at weekly meetings by means of project management sheets (PM sheets), the C/Ps should be able to efficiently manage other projects providing that they can perform the planning and execution management of detailed activities by using the Gantt charts on the PM sheets.

(4) Lessons concerning demonstration testing

1) Lessons concerning RWCS model development

(a) Selection of applications suited to rural areas

The application targets were limited to educational items (e-learning, VoIP, TV conference) due to the supplied equipment, however, survey of wishes revealed that there is also large demand for e-health and e-tourism-related items. Another lesson from the Project was that not all demands for applications in rural areas could be responded to.

(b) Human resources development and onsite training in rural areas

Workshops and practical training were implemented for the local IT managers, however, skill levels and the degree of improvement varied between managers and there were disparities in system operation capacity.

1 In the Project, the operation setup was set as indicated in the “Help desk organization chart” on p. 21.

(c) Local services not dependent on operators in rural areas

It was found that the WiMAX system can be independently constructed, operated and used to provide services by local authorities without depending on services or operation by major operators, providing that the local authorities have the license, certain operating skill and budget. (Reference: “Operator Independent Service” described in the lessons in the model development document in Annex 5).

(5) Lessons concerning system construction and operation

1) Vendor management and process monitoring

In system construction, it could have been predicted that the works would be difficult because they entail new technology, and it was thus necessary to conduct careful prior discussions, arrangements and alignment of thinking. However, ample opportunities couldn’t be made for discussions and information sharing with the vendors and C/Ps in the design stage, and too much time was taken up in construction of the IP network that provides the foundation for installation. Even after installation, IP telephones couldn’t be used on some sites due to bugs in the SIP server software, and time was wasted in resolving the problem. Because it was also necessary to improve the FAT method jointly between the vendors and C/Ps, the experts proposed improvement measures to the C/Ps.

2) Local characteristics in rural areas in terms of system construction and system operation

Meteorological conditions were not fully grasped in selecting the base station location, and it was necessary to relocate the iron tower in Mae Sariang due to landslide. Also, in system construction, because there was no space for heavy machinery to enter, a lot of man-hours were spent on the foundation works. However, depending on the local elements, there are cases where personnel expenses are cheaper than the costs of heavy equipment. In any case, when it comes to system building in rural areas, in the logistical planning stage for delivery and installation of equipment, it is desirable to plan and implement work upon fully considering factors such as access road conditions and weather conditions and providing sufficient time.

3) Power supply environment and power interruptions

It was known from the technical trend survey that the power supply situation in Mae Hong Son Province isn’t good and this was also indicated as an external factor, however, it was not expected that the impact on equipment would be as bad as it turned out. The impact of power interruptions was manifested as NPU failure in the base station. This was caused by frequent repetition of power interruption and power supply, and it is felt that local support should have been more forcefully requested to the vendors. As a result, LVD device was procured from a secondary vendor in Japan, however, it is regretted that the problem wasn’t

revealed and responded to more promptly before the failure of four NPUs was allowed to occur.

Moreover, on local sites, there are numerous interruptions to power supply arising from the service life of UPS batteries; moreover, the impact of temperature increase in the server rooms meant that battery life was less than half the normal life on some sites. The power interruptions impacted the servers, leading to safety shutdown, rebooting and adverse impacts on the hard disc. Accordingly, it became necessary to reexamine backup methods, review the backup policy and organize thinking on safety shutdown and rebooting; in particular, concerning system operation in rural areas that are especially prone to power interruptions, it became clear that it will be essential to install generators in at least the base stations and core sites.

4) Backbone

There are three major information and telecommunications carriers (TOT, TT&T and CAT) in Thailand. In the Project, the backbone network was constructed based on a contract with CAT. This company also provides an international telephone service, however, it does not have a good reputation for high speed and stable operation in its services on local backbone networks. In order to deal with network instability, the C/Ps eventually decided to switch to TOT for the backbone network. In future, it is planned to connect the Ministry of Education operated Uninet to representative school sites in the target areas.

5) Internet connection

Concerning internet connection, the backbone capacity has a major impact. In order to connect 45 sites in the Mae Hong Son area to the internet via WiMAX, a backbone network with capacity of 100 Mbps is required. However, since NECTEC (later on the government of Mae Hong Son Province) has trouble covering all the operating expenses, it currently operates a 10 Mbps network. Accordingly, each site accesses the internet via the existing network, and users do not appear to be motivated to introduce WiMAX if there is no change in internet speed. It is expected that usage rates will increase if Uninet is adopted as the network.

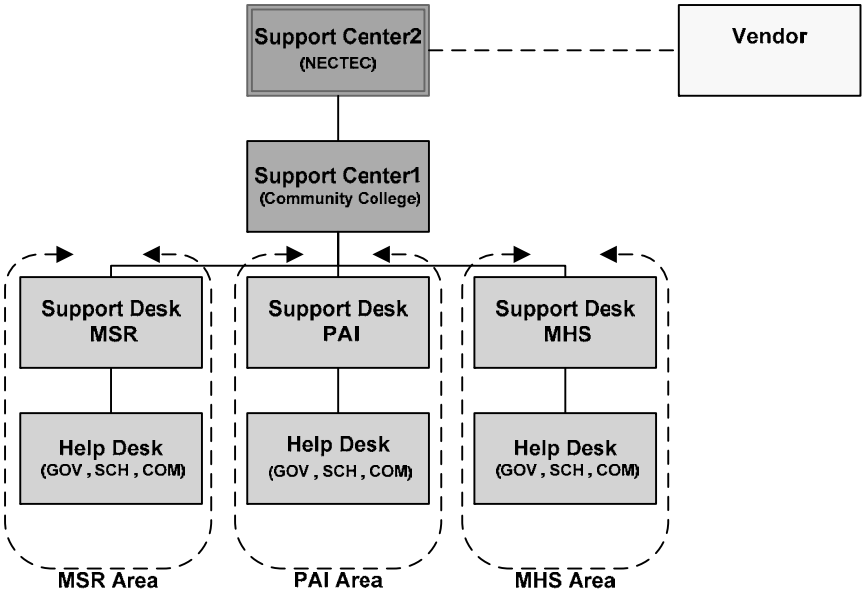
6) Server room environment

There are a number of sites fitted with air conditioning in each area and these belong to government agencies and some communities. In the Project, at almost all schools, classrooms were used as server rooms and hardly any air conditioning equipment was installed, and this caused the service life of UPS and additional batteries to be shortened. Also, some server rooms were extremely dirty and in some cases the server could only be launched after cleaning the main memory.

7) Local system operating personnel

In the Project, the operating setup was configured as shown in the following chart. Selection of support center managers and support desk managers was left to the C/Ps, however, the experts should have been involved. In the final system operation caravan, it was proposed that each manager (support center, support desks and help desks) including the help desks should implement a capacity survey and that personnel appointments should be proposed upon gauging skills and capacity, and this will be highly effective when it comes to considering future sustainability.

HELPDESK ORGANIZATION CHART



8) Disaster countermeasures

Concerning relocation of the Mae Hong Son base station due to landslide, although this was influenced by torrential rainfall, there is a lesson in that a greater sense of risk regarding geological and topographical conditions should have been adopted when selecting the candidate sites. When selecting the relocation site for the damaged base station, all items including past history and trends of flooding, geological conditions and landslides and so on were examined and selection was made according to the items that were transferred to the C/Ps in the OJT. As a result of evaluating three candidate sites, location conditions are better than at the previous site and OJT oriented to practical conditions was implemented.

Moreover, concerning the flooding that occurred around Bangkok in October 2011, countermeasures should have been taken to continue the work in terms of assigning personnel and making sure it was possible for staff members to commute and so on. As a result of recommending that a disaster recovery plan be prepared in order to maintain

operations, the C/Ps issued a request to JICA for support.

(6) Lessons concerning contents development

1) Application promotion activities

Due to delays in the procurement of equipment, construction of the LMS server and remote lesson server fell behind schedule. As a result, activities to promote application uses such as contents preparation, e-learning and the TV conference system and so on were extremely limited, however, applications were used to consider what e-learning is, stress its merits, conduct office work such as preparing development plans and perform drills on installing the LMS server and so on. Moreover, following the start of the demonstration testing, due to frequent power interruptions during the dry season and stoppages to the carrier backbone service, it was frequently difficult to develop and store contents and promote utilization. Some users who were not very positive about sharing information on the server commented that they stored and used contents locally due to the frequent interruptions to server operation. It is thus hard to recommend users to upload information to the servers or to make use of the server contents. In line with the demonstration testing, there was great difficulty in promoting the practical use of applications, and bottom-up countermeasures such as uploading the outputs that were completed in the workshops and resolving contents development troubles in visits and so on were taken. As site users gradually improved their understanding and cooperation, a change in awareness was observed in that comments shifted from asking “Why should we develop contents?” to stating that “We want to create contents if we have the time” and “We can’t develop them but we want to use them” and so on. Eventually, out of more than 800 contents stored on the LMS, even assuming that between 50~60 percent of them were stored on a trial basis in the workshops, the created number of contents was greater than expected. There are still schools that haven’t introduced e-learning because there are no contents that are suitable for lessons. The main objective here was to conduct contents development via the WiMAX system, however, if telecommunications operators can start stable access to LMS servers via general internet connections such as ADSL for sites that aren’t connected to WiMAX (ADSL sites outside of the WiMAX service area and homes of teachers and students not connected to WiMAX), it is possible that greater access and contents can be achieved.

The Project targets 45 sites including schools from elementary to senior high schools, communities and government agencies. When promoting the applications, needs were constantly grasped through questionnaires and interviews, however, workshops and contents development activities suited to the needs of participants were not easy mainly for the following reasons:

- The needs of users are diverse.

- There are disparities between users in terms of IT technical ability.
- The activities were divided into three areas.

Due to concern that target users will be limited and the number of participants will be reduced if preconditions such as technical level and so on are fixed for group training in workshops and the like, it was necessary to adopt general purpose contents, however, it was still not possible to attract more participants to workshops from far afield. On the other hand, activities geared to different individual needs, for example, separate visits and mini-workshops for smaller groups from each area, were more effective. Future possible needs include a TV conference system for libraries, contents development for book referencing, patient management in hospitals, and creation of contents for elementary school teachers. In particular, since there are few contents for elementary schools and there are teachers who are hesitant about introducing e-learning, one effective means for promoting the utilization of applications is to develop contents or introduce existing private sector contents for elementary schools.

2) Introduction of LMS server

From the start of the Project, the learning management system (LMS) was introduced to enable the intensive management of e-learning contents. The merits of using this are as follows:

a) Intensive management of contents,
b) Sharing of contents, and
c) Statistical analysis of content, curriculums and number of access hits.

In particular, c) is a merit for the Project sites.

On the other hand, demerits are as follows:

- Contents cannot be stored or used when the LMS server isn't operating.
- Since contents are uploaded and downloaded via the network, it is necessary to have a sufficient network bandwidth when handling large file size contents such as video images.
- Because the system is intensively managed, troubles such as server failure, network failure or loss of contents can have a wide ranging impact.
- System maintenance activities such as server maintenance and complicated server redundancy is required.

Even taking such demerits into account, introduction of LMS as an intensive server is deemed to be appropriate for promotion of e-learning and applications. Even though this isn't an essential system for e-learning, it is possible to grasp and monitor conditions of use from the number of access hits and number of contents created by intensive management,

and it is easier to confirm the outputs and impacts of activities during the Project period and make decisions concerning policy revisions.

6. PDM Transitions

PDM transitions related to the extended period are outlined below. These PDMs are indicated in Annex 4. PDM (Ver. 1.0, 2.0, 3.0).

PDM revision (PDM 2.0) as a result of JCC discussions on July 16, 2010

Mainly the following revisions were made to Version 1.0.

- The term "IT curriculum" in the Project outputs, activities and indicators was revised to "curriculum" because not all the developed contents and curriculums are IT-related.
- The term "school(s)" in the Project outputs, activities and indicators was revised to "targeted local users" because not all 45 project sites are schools.
- Vague expressions in the PDM were modified.
- The contents of "Indicators" and "Means for obtaining indicators" were corrected to better reflect reality.
- The Project period was extended in line with delays to the WiMAX equipment procurement schedule.

PDM revision (PDM 3.0) as a result of the notice to JCC members in January

Mainly the following revisions were made to Version 2.0.

- The Project period was extended due to the schedule delay brought about by the flooding in Thailand.

7. Record of Joint Coordinating Committee Meetings

The following table shows the record of the Joint Coordinating Committee meetings staged in the Project. Moreover, the minutes of JCC meetings are indicated in Annex 3: Minutes of Meetings of 1^{st}~4^{th} JCC.

Record of Joint Coordinating Committee and Member List

1st JCC

Date & Place	17th June , 2009
Thai side participants	· Dr.Pansak Siriruchatapong (Executive Director, NECTEC) *Chairperson · Mr.Peerachaid Pete Pongsiri, Senior Officer, Universal Service Bureau, NTC · Mrs.Chittimas Kongpolprom , Director , Countries Partnership Branch, TICA · Mrs.Somsuan Howe , Program Officer, Countries Partnership Branch, TICA · Ms.Patthanan Chagansin, Personnel Analyst Officer, HRD Division, Maehongson Governor's Office · Mr.Suraphan Suebphuk, Director (Acting), Maehongson Educational Service Area Office 1 · Mr.Tuanthong Srisawat, Director (Acting), Maehongson Educational Service Area Office 2 · Dr.Kwan Sitathani, Deputy Director, NECTEC · Ms. Kullaprapa Navanugraha, Senior Director, IT Human Capital Development Division, NECTEC · Dr. Siwaruk Siwamogsatham, Project Manager/ Director of Wireless Innovation and Security Laboratory, NECTEC · Dr.Kitti Wongthavarawat, Project Coordinator/ Researcher, NECTEC · Dr.Supakorn Siddhichai, Researcher, NECTEC · Mr.Kitiwat Limmongkol, Project administrator/Assistant Researcher, NECTEC
Japanese side participants	· Mr. Akihisa Tanaka, Senior Representative, JICA · Mr. Katsuya Miyoshi, Project Formulation Adviser, JICA · Mr. Mamoru Yasui, Chief Advisor/ Test planning, Japanese Expert · Ms. Mayuka Kobayashi, Training planning/Project coordinator, Japanese Expert · Mr.Tomoyuki Sakairi, First Secretary, Embassy of Japan (Observer) · Ms. Supaporn Langao, JICA (Observer) · Mr. Witit Sujjapong, Director, Wise Com Net (Observer)
Agenda	· Welcome words · Background of the Project · Project Overview · Project schedule and activities · Technology transfer plan · Open discussion and Closing remark

2nd JCC

Date & Place	25th Feb, 2010
Thai side participants	· Dr.Pansak Siriruchatapong (Executive Director, NECTEC) *Chairperson · Ms.Charintip Sethasan, Countries Partnership Branch, TICA · Ms.Pantila Saengchun, Countries Partnership Branch, TICA · Ms.Patthanan Chagansin, Personnel Analyst Officer, HRD Division, Maehongson Governor's Office · Mr. Yothin Boonchaloey, Deputy Director, NECTEC · Dr.Kwan Sitathani, Deputy Director, NECTEC · Ms. Kullaprapa Navanugraha, Senior Director, IT Human Capital Development Division, NECTEC · Dr. Siwaruk Siwamogsatham, Project Manager/ Director of Wireless Innovation and Security Laboratory, NECTEC · Dr.Kitti Wongthavarawat, Project Coordinator/ Researcher, NECTEC · Dr.Supakorn Siddhichai, Researcher, NECTEC · Mr.Kitiwat Limmongkol, Project administrator/Assistant Researcher, NECTEC · Mr.Atthagorn Sirisuwan, Head of Public Relation Office, NECTEC (Observer) · Mr.Songrit Srilasak, Assistant researcher, NECTEC (Observer) · Mr.Jedsada Thongkanluang, Assistant researcher, NECTEC (Observer) · Mr.Montri Wongree, System Administrator, Community College MHS (Observer) · Mrs.Monthakarn Tipbudtri, Representative from Chief executive of the Provincial Administrative Organization, MHS Provincial Administrative Organization (Observer)

Date & Place	25th Feb, 2010
Japanese side participants	· Mr. Akihisa Tanaka, Senior Representative, JICA · Mr. Katsuya Miyoshi, Project Formulation Adviser, JICA · Mr. Mamoru Yasui, Chief Advisor/ Test planning, Japanese Expert · Mr. Akira Kishimoto, WiMAX System Design, Japanese Expert · Ms. Yuko Shiiraishi, e-learning Contents Development, Japanese Expert · Ms. Mayuka Kobayashi, Training planning/Project coordinator, Japanese Expert
Agenda	· Confirmation of 1st JCC Meeting Minute · Project Progress Report · Project schedule and upcoming activities · Opening ceremony · WiMAX soft demonstration · Open discussion and Closing remark

3rd JCC

Date & Place	16th July, 2010
Thai side participants	· Dr.Pansak Siriruchatapong (Executive Director, NECTEC) *Chairperson · Ms.Charintip Sethasan, Development Cooperation Officer, Countries Partnership Branch, TICA · Ms.Pantila Saengchun, Development Cooperation Officer, Countries Partnership Branch, TICA · Mr. Peerachaid Pongsiri, Senior Officer, NTC · Mr. Raphat Sethavorakul, Personnel Analyst Officer, HRD Division, Mae hong son Governor's Office · Mr.Chukiat Dantanasap, Director, Mae hong son Educational Service Area 2 · Dr.Kitti Wongthavarawat, Project Coordinator/ Researcher, NECTEC · Dr.Supakorn Siddhichai, Researcher, NECTEC · Mr.Kitiwat Limmongkol, Project administrator/Assistant Researcher, NECTEC · Mr.Atthagorn Sirisuwan, Head of Public Relation Office, NECTEC (Observer) · Mr.Songrit Srilasak, Assistant researcher, NECTEC (Observer) · Mr.Jedsada Thongkanluang, Assistant researcher, NECTEC (Observer) · Mr.Montri Wongree, System Administrator, Community College MHS (Observer) · Mrs.Monthakarn Tipbudtri, Representative from Chief executive of the Provincial Administrative Organization, MHS Provincial Administrative Organization (Observer)
Japanese side participants	· Mr. Hiromi Motomura, Consultation Team Leader, JICA Headquarters · Mr. Yuichi Ichikawa, Consultation Team / Study Planning, JICA Headquarters · Mr. Akihisa Tanaka, Senior Representative, JICA Thailand Office · Mr. Katsuya Miyoshi, Project Formulation Adviser, JICA Thailand Office · Ms.Chayanun Artakul, Program officer, JICA Thailand Office · Mr. Mamoru Yasui, Chief Advisor/ Test planning, Japanese Expert · Mr. Akira Kishimoto, WiMAX System Design, Japanese Expert · Mr. Youji Murakami, Site Planning, Japanese Expert · Ms. Mayuka Kobayashi, Training planning/Project coordinator, Japanese Expert
Agenda	· Confirmation of 2nd JCC Meeting Minute · Project Progress Report - Past project activities - WiMAX installation · Project schedule and upcoming activities · Confirmation of Project term extension and PDM revision · Conclusion of M/M between NECTEC and JICA (Ceremony)

4th JCC

Date & Place	16th July, 2010
Thai side participants	· Dr.Pansak Siriruchatapong (Executive Director, NECTEC) *Chairperson · Ms.Somsuan Howe, Development Cooperation Officer, Countries Partnership Branch, TICA · Ms.Malaiwan Lertkhumsup, Development Cooperation Officer, Countries Partnership Branch, TICA · Mr. Peerachaid Pongsiri, Division Director Universal service Bureau, NBTC · Mr. Sutha Saiwanich, Vice Governor, Mae hong son Governor's Office · Dr.Kitti Wongthavarawat, Project Co-Manager/ Senior Researcher, NECTEC · Dr.Supakorn Siddhichai, Senior Researcher, NECTEC · Ms. Kasama Kongsmak, Researcher, NECTEC · Mr.Kitiwat Limmongkol, Project administrator/Assistant Researcher, NECTEC · Mr.Atthagorn Sirisuwan, Head of Public Relation Office, NECTEC (Observer) · Mr.Jedsada Thongkanluang, Assistant researcher, NECTEC (Observer) · Ms. Piranya Sathienpattanakul, Assistant researcher, NECTEC (Observer) · Mr. Worawath Pattanachotgul, Engineer, NECTEC (Observer) · Mr. Bundhit Ninudomsak, MHS IT valley (Observer)
Japanese side participants	· Mr. Tomonari Takeuchi, Consultation Team Leader/ Study Planning, JICA Headquarters · Mr. Sunao Sato, Consultation Team/ Evaluation Analysis, JICA Headquarters · Mr. Tomoyuki Kawabata, Senior Representative, JICA Thailand Office · Mr. Katsuya Miyoshi, Project Formulation Adviser, JICA Thailand Office · Mr. Mamoru Yasui, Chief Advisor/ Test planning, Japanese Expert · Mr. Akira Kishimoto, WiMAX System Design, Japanese Expert · Mr. Yoji Murakami, Site Planning, Japanese Expert · Ms. Mayuka Kobayashi, Training planning/Project coordinator, Japanese Expert
Agenda	· Announcement of Project extension and PDM revision · Project Final Report - Completion of the JICA Technology Transfer Activities - Completion of Field Trial Testing and the Deliverable: RWCS development model - Project achievement and lessons learned - Impact survey results - Sustainability Plan and further cooperation requested after the Project transitions · Joint terminal evaluation results · Discussion and Q&A · Ceremony - RWCS Document submission to NBTC - Conclusion of M/M between NECTEC and JICA

8. Recommendations

(1) Concerning the Project scheme

1) Recommendations concerning equipment procurement

(a) Local procurement rather than procurement from Japan

It is recommended that equipment in future be procured in the country where it is intended to be supplied.

i) Considering local support, handling and technical backup, local procurement is desirable.

ii) Delivery and work lead-times can be shortened through carrying out local procurement.

2) Scope of the R/D during Project formation

(a) Bearing of backbone costs corresponding to system composition at the time of Project formation taking sustainability into account

In future information and telecommunications projects, unless prior consideration is given to access and operating costs in the communications field (not simply operating costs), it will be difficult to achieve sustainable transfer.

(b) Clarification of the system operating entity and cost burden

i) In projects such as this where it is necessary to conduct system operation based on the provision of services, the operating entities and bearers of operating costs should be clearly stated in the R/D in advance.

ii) Considering sustainability not only during the Project but following its completion too, the operating entities and bearers of operating costs following transfer after Project completion should also be clearly stated in the R/D.

(c) Securing and allocation of C/P resources for system operation, and technology transfer within the C/P

The system could have been operated more smoothly if personnel and finance had been prepared from the beginning. From the viewpoint of sustainability too, it is recommended that system operation items be stated in the R/D even for demonstration testing.

(2) Concerning technology transfer in general

1) Recommendations concerning technology transfer to C/Ps

Various circumstances exist when it comes to job separation by C/Ps, however, for responsible staff on the C/P side, it is important that such an attractive project retroactively spreads in both individual and organizational terms. For this purpose, it is hoped that the number of personnel who leave their posts can be reduced to allow better assessment of each C/P officer (linkage with personnel evaluation and incentives connected to promotions and wages) and improvement of status of NECTEC with the Thai government.

(3) Recommendations concerning Project management and operation

1) Project management and operation

(a) Project management and operation

It is recommended that the duty of superiors to give instructions and the duty of subordinates to give reports be thoroughly enforced, with a view to improving

management capacity. It is also recommended that the C/Ps take the initiative in continuing the style of meeting operation that has been established in the Project so far until the time for transfer.

(b) Information sharing

In terms of information sharing this was managed under the Project FTP, however, because NSTDA didn't permit external access from the viewpoint of information security, it is necessary to examine a method for safely accessing information via the internet even from home.

(c) Ideas for maintaining the motivation of Project members

In the Project, many C/Ps left their posts or job while the Project was still in progress. When it comes to implementing similar projects in future, it is proposed that project participation and contribution are linked to employee evaluations within C/P agencies with a view to preventing job separation and sustaining motivation.

(4) Recommendations concerning demonstration testing

1) Lessons concerning RWCS model development

(a) Selection of applications suited to rural areas

- Before deciding on the specifications for supplying applications, desires and needs should be surveyed onsite and de facto standard application systems that are suited to rural areas, can be easily spread and are likely to have an effect should be selected and proposed.
- Applications that are more suited to utilization and demand in rural areas can be proposed through implementing survey of wishes and needs in the Project formation stage.

(b) Human resources development and onsite training in rural areas

In cases where disparities arise in terms of skill and system operating capacity between onsite IT managers following implementation of workshops and practical training, the contents of workshops and practical training should be divided according to skill level and operating capacity to ensure that such disparities are circumvented.

(c) Local services not dependent on local operators in rural areas

In rural areas where telecommunications operators are withholding the deployment of broadband services from the viewpoint of operating balance, the RWCS model based on WiMAX that has good cost performance, is easy to build and operate and is

carrier-independent, is deemed to be the easiest type of business model to introduce to local authorities and NBTC.

(5) Recommendations concerning system construction and operation

1) Vendor management and process monitoring

Because the Project entails new technologies and difficulties in terms of system construction and operation, the following items are recommended concerning the Project vendors.

- Thinking and items should be exchanged and confirmed with vendors in writing before the system is constructed.
- It should be ensured that the vendors thoroughly conduct process management, problem solving and test processes, etc. on a daily basis, and effort should be made to build the system while maintaining good communications with secondary and tertiary contractors.
- Concerning unified testing and FAT, confirmation should be made in consideration of system operation too.

2) Local characteristics concerning system construction in rural areas

Considering that system construction represented introduction of new technology in rural areas and the necessary equipment was procured in Japan, the following items are recommended:

- When constructing systems in rural areas, a comfortable plan should be compiled and process management conducted upon carefully considering logistical and weather factors.
- Thoroughly formalize and standardize the outputs that are to be submitted by works contractors (daily reports and information necessary for grasping progress and problems and conducting the works).
- OJT for C/Ps in system construction including grasping of problems and works test findings and so on should be conducted jointly with the works contractors.
- FAT should implement not only the items proposed by works contractors but items that can be tested for all functions (not all pieces of equipment but all required items in the introduced system, for example, VOIP call test, power interruption test, automatic shutdown, reboot function, etc.).

3) Power supply environment and power interruptions

Concerning the power supply situation, it is proposed that the following countermeasures are implemented.

- If there are items proposed concerning external factors, countermeasures should be taken before failure is allowed to occur. (An example in the Project is LVD installation).
- Concerning the items proposed concerning external factors, countermeasures should be implemented in consideration of the worst case scenario. In particular, concerning automatic shutdown, reboot and backup, these matters should always be covered by FAT when the vendor makes delivery.

4) Backbone and internet connection

The following recommendations are made concerning selection of the backbone network company, backbone capacity and internet access.

- Concerning selection of telecommunications carrier and ISP, the C/Ps should be consulted and the experts should also be involved before deciding on the contract.
- Backbone capacity corresponding to the system size should be secured.
- In demonstration testing, although internet access was obtained through WiMAX due to its convenience in measuring effect, in future Uninet connection should be realized in order to promote application and network utilization, while internet access via the WiMAX network should be disclosed to users.

5) Server room environment

There is difficulty such as budget considerations and so on in improving server rooms on local sites, however, it is important to gain knowledge on how temperature control (air conditioning, etc.) and dust countermeasures can be effective for the operation and maintenance of precision instruments and equipment. Not going so far as a recommendation, this is stated as a suggestion.

6) Concerning local system operating staff

When examining important personnel and operating staff measures geared to securing the personnel for operating the system locally, it is recommended that the C/Ps take an active involvement and advance work with local destinations.

- When transferring systems from C/Ps to local sites in future, the C/Ps should be involved in the selection of support center managers and support desk managers rather than leaving such personnel issues up to the local sites.
- It is recommended that the C/Ps take the initiative in surveying the capacity of important staff candidates at an early stage and act on the findings. It is deemed effective from the viewpoint of sustainability to grasp the capacity of candidates and

reconfigure the staff composition before recruitment.

- In Thai culture, preparation of handover documents and oral handovers are not conducted regularly, although there is awareness of the importance of handover documents. Through compiling and thoroughly enforcing rules for such handover documents, it will be possible to conduct technology transfer within the C/P. This is also indicated as a suggestion rather than a recommendation.

(6) Recommendations concerning contents development

1) LMS server sustainability

When the WiMAX system is transferred from NECTEC to Mae Hong Son, the following countermeasures are proposed to enhance the LMS server maintenance and availability upon considering sustainability.

a) LMS server redundancy

Securing LMS server redundancy entails building a backup server so that this can be switched to when the main server or network experiences trouble. This is a means of enhancing the server operating rate. However, it is necessary to synchronize the main server and backup server, and although this is technically feasible, maintenance is difficult.

b) LMS server decentralization

This measure entails dispersing the server over the three areas of Mae Hong Son, Mae Sariang and Pai and conducting maintenance in each one. In terms of merits, because contents are managed within areas, the scope of impact at times of trouble is limited, and troubles can be rapidly discovered and treated because the system maintenance is carried out by the e-learning users themselves. A demerit is that overall contents sharing cannot be conducted between areas.

c) Utilization of commercial services

During the demonstration testing, internet connections were not permitted under the operating policy, however, following the demonstration testing, as soon as the appropriate backbone capacity is secured, it is scheduled to permit internet connections from the WiMAX system in order to further enhance the usage rate of the system and applications. In future, if commercial services such as cloud and free hosting are utilized, the C/Ps will be liberated from maintaining server hardware; moreover, because cloud vendors guarantee high operating rates, (Google and Amazon are 99.99%), the likelihood of troubles such as server failures and data loss can be greatly reduced. In this case, the connection route will be: CPE site→WiMAX→Intranet→

Internet (ADSL or UNINET)→Cloud service (LMS server).

Even if the system is under NECTEC management, considering the past record of server failures and loss of contents, following transfer of the WiMAX system to Mae Hong Son, it is recommended that complicated system maintenance should be avoided and that a simple system composition be adopted. System decentralization (b) above) or commercial service utilization (c)) is not realistic.

2) Sustainability of e-learning

Concerning the sustainability of e-learning and contents development following completion of the Project, since representative schools in each area possess sufficient IT technology and have a high interest in e-learning, it is forecast that they will continue to conduct activities. In Mae Sariang, since the local side indicated a desire to introduce an independent server, increase contents and promote local activities, it is anticipated that local vitalization utilizing autonomous e-learning will occur. Also, since many of the schools up to senior high school that have been positive towards e-learning workshops were targeted in the IT Valley[2] project, it would be effective in terms of sustainability to inherit activities from the IT Valley project. Fortunately, since some of the C/Ps also worked on the IT Valley project, it is anticipated that activities will be sustained in future. As for sustainability in education facilities that have only elementary schools, there is concern that special consideration will be required, for example, resolving troubles through staging workshops and events and conducting regular and irregular visits.

2 Remote education project being independently implemented by NECTEC for high school students in Mae Hong Son Province.

Annex

Annex 1. Photographs
Annex 2. List of Project Sites
Annex 3. Minutes of Meetings from the 1st through 4th JCC
Annex 4. PDM (Ver. 1.0, 2.0, 3.0)
Annex 5. RWCS Model Development Document

Supplements (CD-ROM only)

1. Inception Report
2. Contents Development Plan
3. Detailed Plan of Technology Transfer Activities
4. Progress Report (1~6)
5. Work Completion Report (this report)
6. Report on the Baseline Survey, Technical Trend Survey and Survey of Wishes and Needs
7. Case Study Report
8. Practical Training Report
9. Impact Survey Report
10. Flood Influence Investigation Report
11. Demonstration Testing Evaluation Report
12. System Operation Guidelines
13. TV Conference and Remote Class Management Guidelines
14. Development Contents List
15. Training History

ANNEX

Annex 1. Photographs

Mae Hong Son

Base line survey in Mae Hong Son

Mae Sariang Library

TV and radio interview in Mae Hong Son Province

Study tour for another NBTC WiMAX Project in Chiang Rai

Tower construction

Tower construction 2

Trial test OJT

Opening ceremony inviting Thai Princess

Trial test OJT 2

Seminar

Workshop

	
Remote class	1st JCC
	
2nd JCC	3rd JCC
	
4th JCC	PPO meeting
	
Final seminar 1	Final seminar 2

Annex 2. List of Project Sites

Mae Hong Son Site

No	Site Code	Name (Thai)	Name (Eng)	Installation Model	GPS	Distance from Site to Base Station	Connection Type	Number of PC	Network Link	Service Provider	Pole / Antenna Location	Approx. Distance from CPE antenna to equipment site	Approx. Height of CPE antenna pole	BL Question Distributed
1	A-SCH-01	โรงเรียนห้องสอนศึกษา	Hong Son Suksa School	SCH Type 1	N19 18.762 E97 57.934	1.61 km	WiMAX CPE	40 PCs	ADSL 1 Mbps	TT&T	Terrace of the building	<30m	<1 m	Interviewed
2	A-SCH-02	โรงเรียนอนุบาลแม่ฮ่องสอน	Anuban MHS School	SCH Type 1	N19 18.622 E97 57.856	1.32 km	WiMAX CPE	55 PCs	ADSL 2 Mbps	TOT	Terrace of the building	<30m	<5 m	
3	A-SCH-03	โรงเรียนบ้านสบป่อง	Baan Sop Pong School	SCH Type 1	N19 17.398 E97 56.441	2.19 km	WiMAX CPE	6 PCs (no LAN)	ADSL 1 Mbps	TOT	Pole at the front of computer building	<20m	<2 m	
4	A-SCH-04	โรงเรียนบ้านใหม่	Baan Mai School	SCH Type 1	N19 18.062 E97 59.104	2.75 km	WiMAX CPE	10 PCs	ADSL 256 kbps	TOT	Water tank tower	<50m	10m (already available)	
5	A-SCH-05	โรงเรียนองค์การบริหารส่วนจังหวัดบ้านจองคำ	Baan Jorng Kum Provincial Administration Organization School	SCH Type 1	N19 18.523 E97 57.778	1.10 km	WiMAX CPE	20 PCs at Op. building, 20 PCs at 4-story building	ADSL 512 kbps at Op. building	TOT	Side of 4-story building	<20m	1 m	
6	A-SCH-06	โรงเรียนเทศบาลเมืองแม่ฮ่องสอน	Muang MHS Municipal School	SCH Type 1	N19 17.744 E97 57.747	0.56 km	WiMAX CPE	100 PCs	ADSL 1 Mpbs (2 lines)	TOT	Terrace of building 4	<30m	<1 m	Interviewed
7	A-SCH-07	วิทยาลัยการอาชีพนวมินทราชินีแม่ฮ่องสอน	Nawamin Vocational College	SCH Type 1	19.29508N, 097.96435E	0.77 km	WiMAX CPE	N/A	ADSL 2 Mbps	N/A	Balcony of Server Room	<30m	Install on the wall	
8	A-SCH-08	โรงเรียนศึกษาสงเคราะห์แม่ฮ่องสอน	Suksa Song Kro School	SCH Type 2	N19 21.895 E97 58.185	N/A	ADSL	N/A	N/A	N/A	N/A	No WiMAX CPE, Use ADSL instead	N/A	Interviewed
9	A-SCH-09	โรงเรียนขุนยวมวิทยา	Khun Gyuam Vitaya school	SCH Type 2	18.83663N, 097.94099E	N/A	ADSL	N/A	ADSL 1 Mbps	N/A	N/A	No WiMAX CPE, Use ADSL instead	N/A	Interviewed
10	A-GOV-01	ศาลากลางจังหวัดแม่ฮ่องสอน	Mae Hong Son Provincial Governor's Office	GOV Type 1	N19 17.313 E97 57.902	1.37 km	WiMAX CPE	100 PCs	Lease line fiber 50Mbps	CAT	Pole near Communication station building	<50m	40 m (already available)	
11	A-GOV-02	สำนักงานสาธารณสุข จังหวัดแม่ฮ่องสอน	Provincial Public Health Office	GOV Type 1	N19 17.201 E97 57.755	1.47 km	WiMAX CPE	50 PCs	Lease line 256kbps, Lease line 128kbps	TOT	Pole near public health building	<40m	30 m (already available)	
12	A-GOV-03	โรงพยาบาลศรีสังวาลย์	Srisungwan Hospital	GOV Type 1	N19 17.963 E97 58.289	1.31 km	WiMAX CPE	150 PCs	ADSL 1 Mbps 2 lines, ADSL 4 Mbps 2 lines, Lease fiber 1 Mbps	CAT	Terrace of operation building	<40m	<5 m	
13	A-GOV-04	สำนักงานป้องกันและบรรเทาสาธารณภัยแม่ฮ่องสอน	Disaster Prevention and Mitigation Office	GOV Type 1	N19 16.291 E97 57.827	3.14 km	WiMAX CPE	7 PCs	ADSL 512 kbps	CAT	Pole at the top of building	<40m	5 m	
14	A-GOV-05	สำนักงานเขตพื้นที่การศึกษาเขต1	MHS Educational Service Area 1	GOV Type 1	N19 17.895 E97 57.875	0.61 km	WiMAX CPE	60 PCs	ADSL 2 Mbps	TOT	Building 1's terrace	<30m	<2 m	
15	A-GOV-06	สถานีตำรวจภูธรจังหวัดแม่ฮ่องสอน	MHS Provincial Police Station	GOV Type 1	N19 17.270 E97 57.778	1.35 km	WiMAX CPE	30 PCs	ADSL 4 Mbps	TT&T	Side of the building	<40m	<2 m	
16	A-GOV-07	ศูนย์บำบัดรักษายาเสพติด	MHS Drug Dependence Treatment Center	GOV Type 1	N19 18.855 E97 59.176	3.29 km	WiMAX CPE	18 PCs	ADSL 1 Mbps	TOT	Side of the building	<50m	<2 m	
17	A-GOV-08	เทศบาลเมืองแม่ฮ่องสอน	MHS Municipality	GOV Type 1	N19 18.060 E97 58.172	1.13 km	WiMAX CPE	20 PCs with 5 wireless access points	ADSL 1 Mbps	TOT	Terrace of building 2	<30m	<2 m	Interviewed
18	A-COM-01	ศูนย์ภาษาและสารสนเทศ(ชานกะเล)	Language and Information Community Center (LICT Chankalay)	COM Type 1	N19 18.059 E97 57.894	0.64 km	WiMAX CPE	N/A	N/A	N/A	Back of the building	<40m	<2m	Interviewed
19	A-COM-02	ห้องสมุดประชาชนแม่ฮ่องสอน	MHS Public library	COM Type 1	N19 17.920 E97 57.921	0.68 km	WiMAX CPE	1 PC	No internet connection	N/A	Behind the building	<30m	<5 m	
20	A-CORE-01	วิทยาลัยชุมชนแม่ฮ่องสอน	MHS Community College	CORE Type 1	N19 18.301 E97 58.410	1.64 km	WiMAX CPE	N/A	N/A	N/A	N/A	<40m	<5m	Interviewed
21	A-BS-01	ดอยพระธาตุกองมู	Doi Kong Mu Mountain	BS Type 1	N19 18.020 E97 57.641	N/A	BS	N/A	N/A	N/A	N/A	N/A	N/A	

Mae Sariang Site

No	Site Code	Name (Thai)	Name (Eng)	Installation Model	GPS	Distance from Site to Base Station	Connection Type	Number of PC	Network Link	Service Provider	Pole / Antenna Location	Approx. Distance from CPE antenna to equipment site	Approx. Height of CPE antenna pole	BL Question Distributed
1	B-SCH-01	โรงเรียนแม่สะเรียง (บริพัตรศึกษา)	Mae Sariang (Boripat Suksa) School	SCH Type 1	N18 10.825 E97 55.710	3.85 km (Jom Kitti) / 2.1 km (Doi Chang)	WiMAX CPE	200 PCs	ADSL 1 Mbps TOT 2 lines, CAT 3 Mbps 1 line, Lease line TOT 512 kbps	TOT,CAT	At the deck of computer building	<60 m	<10 m	Interviewed
2	B-SCH-02	โรงเรียนทองสวัสดิ์วิทยาคาร	Tongsawat Vittayakarn School	SCH Type 1	N18 09.461 E97 55.907	1.80 km (Jom Kitti) / 1.93 km (Doi Chang)	WiMAX CPE	80 PCs	ADSL 2 Mbps	CAT	Attach to side of the building (3 stories)	20 m	<1 m	Interviewed
3	B-SCH-03	โรงเรียนอนุบาลแม่สะเรียง (บ้านโป่ง)	Anuban Mae Sariang (Baan Pong) School	SCH Type 1	N18 10.087 E97 55.930	2.72 km (Jom Kitti) / 1.37 km (Doi Chang)	WiMAX CPE	40 PCs	ADSL 2 Mbps	TOT	Attach to side of the building (3 stories)	20 m	<1 m	
4	B-SCH-04	โรงเรียนบ้านจอมแจ้งมิตรภาพที่ 193	193th Baan Jom Jang Mittraparb School	SCH Type 1	N18 09.678 E97 56.410	2.72 km (Jom Kitti) / 1.06 km (Doi Chang)	WiMAX CPE	35 PCs	ADSL 1 Mbps	TOT	Attach to side of the building (Mittraparb building)	<30 m	<1 m	
5	B-SCH-05	โรงเรียนไทยรัฐวิทยา 33 (บ้านทุ่งพร้าว)	Thairath Vittaya 33 (Baan Tung Prao) School	SCH Type 1	N18 08.746 E97 56.389	2.19 km (Jom Kitti) / 2.70 km (Doi Chang)	WiMAX CPE	30 PCs	Lease line 512 Mbps	TOT	Attach to side of the building (Gov lotto building)	<30 m	<1 m	Interviewed
6	B-SCH-06	โรงเรียนบ้านไร่วิทยา	Baanrai Vittaya School	SCH Type 1	N18 07.463 E97 56.304	3.22 km (Jom Kitti) / 5.05 km (Doi Chang)	WiMAX CPE	5+30 PCs (coming early next year)	Ipstar	N/A	Attach to side of the building (2-story Miyazawa building)	<30 m	<1 m	
7	B-SCH-07	วิทยาลัยการอาชีพแม่สะเรียง	Mae Sariang Vocational School	SCH Type 1	N18 06.300 E97 56.305	5.08 km (Jom Kitti)	WiMAX CPE	100 PCs	Lease line 512 Mbps	TOT	terrace of the building (operating building)	<40 m	<1 m	
8	B-SCH-08	โรงเรียนบ้านห้วยทราย	Baan Huay Sai School	SCH Type 1	N18 05.194 E97 55.437	6.70 km (Jom Kitti)	WiMAX CPE	20 PCs	ADSL 1 Mbps	TOT	Attach to side of the building (building 2)	<40 m	<1 m	
9	B-SCH-09	โรงเรียนชุมชนบ้านน้ำดิบ	Baan Nam Dip Community School	SCH Type 1	N18 08.646 E97 55.502	0.70 km (Jom Kitti)	WiMAX CPE	13 PCs	ADSL 1 Mbps	TOT	At the side of computer room (Doi Chang) At the side of building (Jom Kitti)	<10m for Doi Chang BTS, <40m for Jom Kitti BTS	<1 m	
10	B-SCH-10	โรงเรียนบ้านศรีมูลเมือง	Baan Sri Moon Muang School	SCH Type 1	N18 09.991 E97 55.340	2.20 km (Jom Kitti) / 2.42 (Doi Chang)	WiMAX CPE	10 PCs	ADSL 2 Mbps	TOT	Attach to pole in front of computer room (building 1)	<20 m	<1 m	
11	B-SCH-11	โรงเรียนแม่ลาน้อยดรุณสิกข์	Maelanoi Daroonsik school	SCH Type 2	18.38380N, 097.94272E	N/A	ADSL	N/A	ADSL 1 Mbps	TOT	No WiMAX CPE, Use ADSL 1 Mbps instead	N/A	N/A	
12	B-SCH-12	โรงเรียนราชประชานุเคราะห์ 21	Rajaprajanukroh 21 school	SCH Type 2	18 20'14.61N, 97 55'20.91E	N/A	ADSL	N/A	N/A	N/A	No WiMAX CPE, Use ADSL 1 Mbps instead	N/A	N/A	
13	B-GOV-01	สำนักงานเขตพื้นที่การศึกษาแม่ฮ่องสอน เขต2	MHS Educational Service Area 2	GOV Type 1	N18 09.551 E97 55.941	1.98 km (Jom Kitti) / 1.78 km (Doi Chang)	WiMAX CPE	50 PCs	ADSL 2 Mbps	TOT	Pole located at the back of the building	20 m	30m (already available)	Interviewed
14	B-GOV-02	ที่ว่าการอำเภอแม่สะเรียง	Mae Sariang District Office	GOV Type 1	N18 09.563 E97 55.975	2.00 km (Jom Kitti) / 1.71 km (Doi Chang)	WiMAX CPE	20 PCs	ADSL 1 Mbps	TOT	Attach to side of the building (2 Stories)	20 m	<1 m	
15	B-GOV-03	โรงพยาบาลแม่สะเรียง	Mae Sariang Hospital	GOV Type 1	N18 09.742 E97 56.385	2.76 km (Jom Kitti) / 0.98 km (Doi Chang)	WiMAX CPE	80 PCs	Lease line 256 kbps	TOT	Pole at OPD building	<40 m	30 meter (already available)	
16	B-COM-01	ห้องสมุดประชาชนเฉลิมราชกุมาร	Mae Sariang Public Library	COM Type 1	N18 10.065 E97 55.948	2.70 km (Jom Kitti) / 1.34 km (Doi Chang)	WiMAX CPE	13 PCs	ADSL 4 Mbps	TOT	Attach to side of the building (2 stories)	20 m	<1 m	Interviewed
17	B-BS-01	ดอยช้าง	Doi Chang Mountain	BS Type 2	N18 10.187 E97 56.701	N/A	WiMAX CPE	N/A	N/A	N/A	N/A	N/A	N/A	
18	B-BS-02	ดอยพระธาตุจอมกิตติ	Jom Kitti Mountain	BS Type 3	N18 08.824 E97 55.151	N/A	WiMAX CPE	N/A	N/A	N/A	N/A	N/A	N/A	

Pai Site

No	Site Code	Name (Thai)	Name (Eng)	Installation Model	GPS	Distance from Site to Base Station	Connection Type	Number of PC	Network Link	Service Provider	Pole / Antenna Location	Approx. Distance from CPE antenna to equipment site	Approx. Height of CPE antenna pole	BL Question Distributed
1	C-SCH-01	โรงเรียนปายวิทยาคาร	Pai Vittayakarn School	SCH Type 1	N19 21.372 E98 26.505	1.50 km	WiMAX CPE	100 PCs	ADSL 1 Mbps, IPstar	TOT	Side of the building	<50m	<2 m	Interviewed
2	C-SCH-02	โรงเรียนอนุบาลปาย	Anuban Pai School	SCH Type 1	N19 21.667 E98 26.450	1.88 km	WiMAX CPE	20 PCs, 2 wireless access points	ADSL 1 Mpbs	TOT	Terrace of wooden building	<30m	<1 m	Interviewed
3	C-SCH-03	โรงเรียนชุมชนบ้านแม่ฮี้	Baan Mae Hee Community School	SCH Type 1	N19 20.800 E98 27.137	0.45 km	WiMAX CPE	10 PCs	ADSL 512 kbps	TOT	Terrace of the building	<40m	< 2 m	
4	C-SCH-04	โรงเรียนบ้านเวียงเหนือ	Baan Wiang Nua School	SCH Type 1	N19 22.585 E98 26.572	3.15 km	WiMAX CPE	10 PCs	ADSL 1 Mbps	TOT	Side of cultural center building	<90m	<2 m	
5	C-SCH-05	โรงเรียนราชประชานุเคราะห์ 22	Rajaprajanukroh 22 school	SCH Type 2	19 23'20.15N, 98 24'27.97E	N/A	ADSL	N/A	N/A	N/A	No WiMAX CPE, Use ADSL 1 Mbps instead	N/A	N/A	Interviewed
6	C-SCH-06	โรงเรียนราชประชานุเคราะห์ 34	Rajaprajanukroh 34 school	SCH Type 2	19 32'27.97N, 98 16'3.50E	N/A	ADSL	N/A	N/A	N/A	No WiMAX CPE, Use ADSL 1 Mbps instead	N/A	N/A	
7	C-GOV-01	ที่ว่าการอำเภอปาย	Pai District Office	GOV Type 1	N19 21.533 E98 26.407	1.79 km	WiMAX CPE	10 PCs	ADSL 512 kbps	TOT	Terrace of the building	<70m	<2 m	
8	C-GOV-02	โรงพยาบาลปาย	Pai Hospital	GOV Type 1	N19 17.703 E98 26.273	2.13 km	WiMAX CPE	50 PCs	ADSL 2 Mbps	TOT	Roof of the computer center building	<40m	<2 m	
9	C-GOV-03	เทศบาลอำเภอปาย	Pai Municipality	GOV Type 1	N19 21.571 E98 26.216	2.11 km	WiMAX CPE	50 PCs	ADSL 1 Mbps	TOT	Terrace of the building	<40 m	<2 m	
10	C-COM-01	หมู่บ้านแม่ฮี้-ศาลาอเนกประสงค์	Mae Yen Village - Multi-Purpose Pavilion	COM Type 1	N19 21.048 E98 27.050	0.39 km	WiMAX CPE	NONE	NONE	NONE	Radio pole at the building	<20m	<5 m	
11	C-BS-01	ดอยพระธาตุแม่เย็น	Mae Yen Mountain	BS Type 1	N19 21.009 E98 27.271	N/A	WiMAX CPE	N/A	N/A	N/A	N/A	N/A	N/A	

Formation of Counterpart for Technology Transfer from 2nd Tier (NECTEC) to 3rd tier (Model Site)

Item	Location	Organization	School Level	BL Question Distributed	BL Question Rev.2 Online Distributed	Position	Name	Categories				
								Administration	IT Training	Teacher Training	Content Development	Application Development
								Dr. Kitti Wongthavarawat	Ms. Methinee Sirikrai	Ms. Methinee Sirikrai	Dr. Supakorn Siddhichai	Mr. Pornchai Tummarattanaont
1	MHS	Hong Son Suksa School	7-12	Interviewed		Head	Mr. Aarttasage Susuk	*				
						IT Team	Mr. Prakit Phatijirachote		*	*	*	*
2		Anuban MHS School	kindergarten-6			Head	Mrs. Suvimol Supanan	*				
						IT Team	Ms. Pantipa Tipkanok		*	*	*	*
3		Baan Sop Pong School	kindergarten-6			Head	Mr. Prayoon Jareunphol	*				
						IT Team	Mrs. Sunisa Punjan (นนน)		*	*	*	*
4		Baan Mai School	kindergarten-6			Head	Mr. Somsak Kumpong	*				
						IT Team	Ms. Thitima Jumboonma		*	*	*	*
5		Baan Jorng Kum Provincial Administration Organization School	kindergarten-6		Interviewed	Head	Mrs. Supattra Chaiprom	*				
						IT Team	Mr. Pongphon Hortrakoon/ Ms.Waranya Aunnunkard		*	*	*	*
6		Muang MHS Municipal School	1-11	Interviewed		Head	Mr.Tongchai Sanguansit	*				
						IT Team	Mr.Tammanoon Saokaew		*	*	*	*
7		Nawamin Vocational College				Head	Mr. Pairat Vimara	*				
						IT Team	Mr. Wittaya/Mr.Somkiat		*	*	*	*
8		Suksa Song Kro School	1-12	Interviewed		Head	Mrs. Kanoksri Saisod (Vise-Director)	*				
						IT Team	Mrs. Wanida Tanuchit		*	*	*	*
9		Khun Gyuam Vitaya school	1-12	Interviewed		Head	Mr. Wittaya Aiumdurean	*				
						IT Team	Mr. Tanongsak Panya		*	*	*	*
10		Mae Hong Son Provincial Governor's Office				Contact	Ms. Pattanan Chakansin	*				
						IT Team	Mr. Sudkhet Fongvaree		*	*	*	*
11		Provincial Public Health Office				Contact	Dr. Suwat Kittidilokkul	*				
						IT Team	Mr. Nattagorn Juntarat/Mr.Supachai		*	*	*	*
12		Srisungwan Hospital				Contact	Mr. Vorachet Teacharak,	*				
						IT Team	Mr. Duangdee Chompoo/Mr. DhuraSak/Mr.Kraingsak		*	*	*	*
13		Disaster Prevention and Mitigation Office				Contact	Mr. Komsan Suwanaumpa	*				
						IT Team	Mr. Chalongchai Inchang		*	*	*	*
14		MHS Educational Service Area 1				Contact	Mr. Suraphan Suebphuk	*				
						IT Team	Mr. Anudhet Puranavit		*	*	*	*
15		MHS Provincial Police Station				Contact	Mr. Jirawat Luengsuppabul,	*				
						IT Team	Mr. Adisak Yotverapong		*	*	*	*
16		MHS Drug Dependence Treatment Center				Contact	Dr. Weerawat Ucaranun	*				
						IT Team	Mr. Athit Sukoam		*	*	*	*
17		MHS Municipality		Interviewed		Contact	Mr. Suthep Nuchsuang	*				
						IT Team	Mr. Nakaret Sritoe		*	*	*	*
18		Language and Information Community Center (LICT Chankalay)		Interviewed		Contact	Mr. Yothin Boonchaley	*				
						IT Team	Mr. Lersan Kaveewat		*	*	*	*
19		MHS Public library				Contact	Mr. Sutast Kantama	*				
						IT Team	Ms. Chonlada Ruenkaew		*	*	*	*
20		MHS Community College		Interviewed		Contact	Mr.Yothin Boonchaley	*				
						IT Team	Mr.Montri Wongri		*	*	*	*
21	Mae Sariang	Mae Sariang (Boripat Suksa) School	7-12	Interviewed		Head	Mr. Surin Yuree	*				
						IT Team	Mr. Anusit Piturat		*	*	*	*
22		Tongsawat Vittayakarn School	1-9	Interviewed		Head	Mr. Jumlong Srisawat	*				
						IT Team	Mrs. Thitiporn Pantisawat		*	*	*	*
23		Anuban Mae Sariang (Baan Pong) School	kindergarten-6	Interviewed		Head	Mr. Tongsuk Nilpa	*				
						IT Team	Mr. Chaiwat Meebun		*	*	*	*

Item	Location	Organization	School Level	BL Question Distributed	BL Question Rev.2 Online Distributed	Position	Name	Categories				
								Administration	IT Training	Teacher Training	Content Development	Application Development
								Dr. Kitti Wongthavarawat	Ms. Methinee Sirikrai	Ms. Methinee Sirikrai	Dr. Supakorn Siddhichai	Mr. Pornchai Tummarattanaont
24	Mae Sariang	193th Baan Jom Jang Mittraparb School	kindergarten-6	Interviewed		Head	Mrs. Somjai Intasit	*				
						IT Team	Mr. Dumrong Punwang		*	*	*	*
25		Thairath Vittaya 33 (Baan Tung Prao) School	kindergarten-9	Interviewed		Head	Mr. Kasem Aiyakorn	*				
						IT Team	Mr. Prayat Niramol		*	*	*	*
26		Baanrai Vittaya School	kindergarten-9	Interviewed		Head	Mr. Suriyan Jainoi	*				
						IT Team	Mrs. Pimprapai Viriyapad		*	*	*	*
27		Mae Sariang Vocational School	diploma	Interviewed		Head	Mr. Prapakorn Wachrakom	*				
						IT Team	Mr. Anuchit Sirirat		*	*	*	*
28		Baan Huay Sai School	kindergarten-12	Interviewed		Head	Mr. Prasert Aiyakorn	*				
						IT Team	Mr. Somkid Singsut		*	*	*	*
29		Baan Nam Dip Community School	kindergarten-9	Interviewed		Head	Mr. Panus Junkunchorn	*				
						IT Team	Mrs. Amolwan Jumpatong		*	*	*	*
30		Baan Sri Moon Muang School	kindergarten-6	Interviewed		Head	Mr. Songkran Tankum	*				
						IT Team	Mr. Songkran Tankum/Mr.Salathool Samasil		*	*	*	*
31		Maelanoi Daroonsik school	1-12			Head	Mr. Vichian Chukiat	*				
						IT Team	Mr. Sanaan Kongauyy		*	*	*	*
32		Rajaprajanukroh 21 school	1-12			Head	Mr. Inson Intawong	*				
						IT Team	Mr. Somchid Srithorn		*	*	*	*
33		MHS Educational Service Area 2		Interviewed		Contact	Mr. Tuantong Srisawat	*				
						IT Team	Mr. Jun Wangkanlaya		*	*	*	*
34		Mae Sariang District Office				Contact	Mr. Decha Satthaphol	*				
						IT Team	Mr. Thawach Kunong(หน้าห้อง)/Mr. Anun Joaduree (เสมียนตรา)		*	*	*	*
35		Mae Sariang Hospital				Contact	Dr. Termchai Temyingyong (Director)	*				
						IT Team	Mr. Chainarong Piturat		*	*	*	*
36		Mae Sariang Public Library		Interviewed		Contact	Mrs. Sudarat Kummuljai (Acting Director)	*				
						IT Team	Ms. Thira-da Anusit		*	*	*	*
37	PAI	Pai Vittayakarn School	7-12	Interviewed		Head	Mr. Pornthep Suparaporn	*				
						IT Team	Mr. Visuthichart Boonkum		*	*	*	*
38		Anuban Pai School	kindergarten-9	Interviewed		Head	Mr. Dumrong Pantawong	*				
						IT Team	Ms. Nutchada Pangjingta		*	*	*	*
39		Baan Mae Hee Community School	kindergarten-6			Head	Mr. Prayut Pantana	*				
						IT Team	Mrs. Thayatorn Sudjarijtam/Mr.Prajak Sithikeiw		*	*	*	*
40		Baan Wiang Nua School	kindergarten-6			Head	Mr. Somkiat Kittipoonpat	*				
						IT Team	Mr.Tavee Chaiwuth		*	*	*	*
41		Rajaprajanukroh 22 school	1-12	Interviewed		Head	Mr. Kajjuy Aumpan	*				
						IT Team	Mr. Preecha Lhoeje		*	*	*	*
42		Rajaprajanukroh 34 school	1-12			Head	Mr. Virojana Chaiyabul	*				
						IT Team	Ms. Jiraporn Wongpolawan		*	*	*	*
43		Pai District Office				Contact	Mr. Nivech Poonsawat	*				
						IT Team	Mr. Tasira Boonmavareesakun		*	*	*	*
44		Pai Hospital				Contact	Mr. Sarawute Supanpitak (ผอ.)/ Mrs.Pitsamai Rakvicha	*				
						IT Team	Mr.Tanaphat Malaville		*	*	*	*
45		Pai Municipality				Contact	Mr. Akaradet Taprab (นายกเทศมนตรี)	*				
						IT Team	Mr. Jatupol Yajom (หัวหน้ากองปลัด)		*	*	*	*
46		Mae Yen Village - Multi-Purpose Pavilion				Contact	Mr.Boontam Nuanja	*				
						IT Team	Ms.คำมูล (ลูกสาว)/Mr.กฤดพงษ์ (หลาน)		*	*	*	*

School government Community

Annex 3. Minutes of Meetings from the 1st through 4th JCC

Meeting Minutes of 1st JCC (17th June, 2009)

Meeting Minutes of 1st JCC

The Project of Human Resource Development through Utilizing the Information Technology for Rural Community Vitalization

Date	17th June , 2009		
Participant	Thailand side		
	Chairperson		
	NECTEC	Executive Director	Dr.Pansak Siriruchatapong
	Members		
	NTC	Senior Officer Universal Service Bureau	Mr.Peerachaid Pete Pongsiri
	TICA	Director Countries Partnership Branch	Mrs.Chittimas Kongpolprom
	TICA	Program Officer Countries Partnership Branch	Mrs.Somsuan Howe
	Maehongson Governor's Office	Personnel Analyst Officer HRD Division	Ms.Patthanan Chagansin
	Maehongson Educational Service Area Office 1	Director (Acting)	Mr.Suraphan Suebphuk
	Maehongson Educational Service Area Office 2	Director (Acting)	Mr.Tuanthong Srisawat
	NECTEC	Deputy Director	Dr.Kwan Sitathani
	NECTEC	Senior Director IT human capital development division	Ms. Kullaprapa Navanugraha
	NECTEC	Project Manager/ Director of Wireless Innovation and ecurity Laboratory	Dr. Siwaruk Siwamogsatham
	NECTEC	Project Coordinator/ Researcher	Dr.Kitti Wongthavarawat
	NECTEC	Researcher	Dr.Supakorn Siddhichai
	NECTEC	Project administrator /Assistant Researcher	Mr.Kitiwat Limmongkol

	Japan side Members		
	JICA	Senior Representative	Mr. Akihisa Tanaka
	JICA	Project Formulation Adviser	Mr. Katsuya Miyoshi
	Japanese Expert	Chief Advisor/ Test planning	Mr. Mamoru Yasui
	Japanese Expert	Training planning/Project coordinator	Ms. Mayuka Kobayashi
	Observers		
	Embassy of Japan	First Secretary	Mr.Tomoyuki Sakairi
	JICA		Ms. Supaporn Langao
	Wise Com Net	Director	Mr. Witit Sujjapong
M/M recorder	Mr. Kitiwat Limmongkol, Ms. Mayuka Kobayashi		
Signature	Thailand P.Siriruchatapong Pansak Siriruchatapong, D.Ing. (NECTEC)		Japan: Mr. Yasunori Onishi(JICA)

Minutes:

Agenda 1 Welcome speech

Welcome speech for the 1st JCC meeting was made by Dr.Pansak. Introduction of JCC members and participants, rules and responsibilities of JCC were presented by Dr.Kitti.

- Dr. Pansak introduced that NECTEC is an organization under NSTDA. NSTDA aims to build Thailand's Science & Technology capability through five centers: BIOTEC, MTEC, NECTEC, NANOTEC and TMC.

- Dr. Kitti introduced each member of JCC and described roles and responsibilities as following
  - To discuss and approve the Annual Work Plan (Annual Plan of Operation) of the Project based on the approved annual budget.
  - To review the overall progress and annual expenditure of the Project as well as the achievement of the Annual Work Plan mentioned above
  - To review and exchange views on major issues arising from or in connection with the Project

- Dr.Kwan, Dr.Supakorn briefed overview of IT valley project
  - IT valley's goal is to build a capacity of human resource in IT field in MHS.

- IT valley counterparts consist of entities from various sectors such as students, teachers in schools, private IT companies and government agencies.

Agenda 2 Background of the project

Dr.Kitti presented the history of the project and ODA scheme of JICA project.

- NECTEC submitted the request of ODA to Japan Government in 2005
- The first JICA feasibility study team was dispatched to NECTEC in Aug. 2007.
- This project was kicked off when Japanese experts were dispatched to NECTEC's office in Pathumthani in May 2009.

Agenda 3 Project Overview

Mr.Yasui and Dr.Kitti presented the project overview

- Key component of Inception report was shared within the committee as the initial project plan.
- Ultimate goal (Overall goal) of the project is to realize the practical application of a local wireless communications system that will contribute to local vitalization. Project purpose is to strengthen the capacity of NECTEC to develop the effective wireless communications systems in rural areas.
- The project objective is to strengthen the capacity of NECTEC to develop effective wireless communications systems in provincial areas.
- Expected outputs are as follows:

  1. A model system (proposal) for local wireless communications will be developed by NECTEC.

  2. IT curriculums that will contribute to local vitalization will be developed through the collaboration of NECTEC and schools in the model area.

- The purpose of outputs is not only the experimentation of network infrastructure, but also training local people and NECTEC staff to increase capacity in IT knowledge through the experimentations for local people to sustainably maintain and manage the system on their own.

Discussions and suggestions

Dr.Pansak

- Expanding development is expected in medical service and so on. This project will be a good prototype model for other rural areas.

Ms.Patthanan

- MHS people are confused by many IT related projects currently being implemented in the MHS area. Especially the relationship between the IT Valley project and this WiMAX project needs to be clarified. In order to overcome this situation, public advertisement and announcement of such seminars and project activities should be well communicated through the media.

- All project sites and NECTEC should facilitate an opportunity to well inform the local participants in regards to the project objectives, goals and activities as well as resource allocation necessary.

Dr.Pansak and Dr.Kwan

- NECTEC agrees to the suggestion to facilitate future public announcements for further clarifications, and facilitate the orientation opportunity in near future..

Mr.Peerachaid

- NTC is in cooperation with other counterparts on several other WiMAX related projects such as Mae Fah Luang telecommunication center project, Somdet Pra Yupparach Hospital telemedicine project and Mahasarakham University education project. NTC will share the information with the project team at any time.

Agenda 4 Project schedule and activities

Dr.Kitti presented project schedule and activities.

- Project duration is for 26 months starting from May 2009 to the end of May 2011.

- WiMAX base stations will be implemented in NECTEC headquarter and three other districts in MHS province.

- Expected deliverables are; - detailed plan of technology transfer activities, content development plan, progress reports, development model document and final report.

Discussions and suggestions

Dr.Pansak

- Project shall extend its target from teachers and students to government officers and the people from private sectors.

Ms.Patthanan

- Suggests NECTEC to establish a local office in the MHS area for better manage all IT related projects. This way, access and communication would be much more effective.

Dr.Pansak

- NECTEC agrees with the suggestions and actually has its plan to establishing a local office in MHS.

Dr.Kitti and Mr.Yasui

- Proposed that the next JCC meeting shall be held in MHS 2~3 weeks in prior to the opening ceremony (near King's Birthday, tentative) to discuss how to make the ceremony most effective.

Agenda 5 Technology transfer plan

- Technology transfer plan were presented by Mr.Yasui. Briefly described composition of counterparts, system design and site planning's objectives and transfer activities, experiment milestones and timeline.
- The transfer plan will be revised accordingly on demanded basis.

Agenda 6 Open discussion and Closing remark

Open discussion and Closing remark

Mr.Suraphan and Mr.Tuanthong

- This project is very beneficial to students in MHS by having an opportunity to learn how to use eLearning.

Mr.Tuanthong

- MHS educational service area2 schools have already prepared and assigned teachers for this project.

Dr.Siwaruk

- Expressed a concern in regards to the equipment maintenance, warranty and insurance in case of theft.

Ms.Patthanan

- Very rare chance foreseen for equipments to be stolen in MHS.

Mr.Yasui

- The terms and status of the warranty insurance are still under discussion within JICA's procurement team for the upcoming tender.

Ms.Patthanan

- Unstable electricity supply may be a major cause for equipment failure.

Dr.Siwaruk (question to NTC)

- If possible, the project would appreciate NTC's cooperation to request operators or service providers to support the project? Especially to bring down the cost of backbone network from the operators and service providers.

Mr.Peerachaid (NTC)

- Acknowledge on the request and will discuss for further cooperation.

Open Issues

- Public relation seminar for information sharing and advertisement about the project to project-site member. So every project-site members can share project's objectives, goals and activities mutually.
- Establishment of NECTEC's local office in Mae Hon Song

Next JCC meeting:

Early time in November 2009 (2-3 weeks) prior the opening ceremony.

Distributed materials:

- Agenda
- System Architecture and Equipment List(Feb 16,2009)
- 1st Joint Coordinating Committee Meeting power point
- JCC member list
- Experimentation milestones and timeline
- Inception Report by JDS(Apr, 2009)
- Detailed plan of technology transfer activities by JDS(May,2009)
- Magazine "Science in action"

Meeting Minutes of 2nd JCC

The Project of Human Resource Development through Utilizing the Information Technology for Rural Community Vitalization

Date	25th Feb, 2010		
Participant	Thailand side		
	Chairperson		
	NECTEC	Executive Director	Dr.Pansak Siriruchatapong
	Members		
	TICA	Countries Partnership Branch	Ms.Charintip Sethasan
	TICA	Countries Partnership Branch	Ms.Pantila Saengchun
	Maehongson Governor's Office	Personnel Analyst Officer HRD Division	Ms.Patthanan Chagansin
	Community College MHS	Deputy Director	Mr.Yothin Boonchaloey
	NECTEC	Deputy Director	Dr.Kwan Sitathani
	NECTEC	Senior Director IT human capital development division	Ms. Kullaprapa Navanugraha
	NECTEC	Project Manager/ Director of Wireless Innovation and ecurity Laboratory	Dr. Siwaruk Siwamogsatham
	NECTEC	Project Coordinator/ Researcher	Dr.Kitti Wongthavarawat
	NECTEC	Researcher	Dr.Supakorn Siddhichai
	NECTEC	Project administrator /Assistant Researcher	Mr.Kitiwat Limmongkol
	Japan side		
	Members		
	JICA	Senior Representative	Mr. Akihisa Tanaka
	JICA	Project Formulation Adviser	Mr. Katsuya Miyoshi
	JICA Expert	Chief Advisor/ Test planning	Mr. Mamoru Yasui
	JICA Expert	WiMAX system design	Mr. Akira Kishimoto
	JICA Expert	e-Learning contents development	Ms. Yuko Shiraishi

	JICA Expert and coordinator	Training planning/Project coordinator	Ms. Mayuka Kobayashi
	Observers		
	NECTEC	Head of Public Relation Office	Mr.Atthagorn Sirisuwan
	NECTEC	Assistant researcher	Mr.Songrit Srilasak
	NECTEC	Assistant researcher	Mr.Jedsada Thongkanluang
	Community college MHS	System Administrator	Mr.Montri Wongree
	MHS Provincial Administrative Organization	Representative from Chief executive of the Provincial Administrative Organization	Mrs.Monthakarn Tipbudtri
M/M recorder	Mr. Kitiwat Limmongkol, Ms. Mayuka Kobayashi		
Signature	Thailand P. Siriruchatapong Dr. Pansak Siriruchatapong(NECTEC)	Japan: for Mr. Yasunori Onishi(JICA)	

Minutes:

Dr.Pansak addresses the opening of the 2nd JCC meeting to JCC members and participants. Ms.Patthanan delivered apology message for MHS governor not being able to attend the meeting. She also welcomed all the participants to MHS province.

Agenda 1 Confirmation to 1st JCC Meeting Minute

- All project members agreed and confirmed the 1st JCC meeting minute.

Agenda 2 Project Progress Report

Mr.Yasui presented the project overview and the progress by timeline. Dr.Kitti presented major activities during June 2009 to January 2010.

Time line

Month	Major Progress
July 2009	• Project orientation in MHS • Socio-economic baseline survey in MHS
August 2009	• 2nd SC meeting • Practical training in MHS • Case study trip to Chiangrai • Progress report Revision 1
September 2009	• Tower construction begin • Tender closure

	• Vendor determination • System procurement
October 2009	• Tower OJT • eLearning workshop
November 2009	• Tower final acceptance • IT valley fair • Tower construction complete
December 2009	• Import license • 1st batch equipment import • Tax exemption • Progress report Revision 2 (August-November)
January 2010	• Equipment PAT at NECTEC • System unified test • Equipment delivery to MHS • 1st batch installation • 1st batch OJT (PAT, WiMAX, Test run planning) • 1st batch FAT

- Practical training in MHS

  i. It was held during August 22-23, 2009 at Nawamin Vacational College.

  ii. Goal is for local counterparts to obtain basic knowledge of IP networking and wireless technology.

  iii. Both lecture and workshop about basic networking, network equipment, LinuxSIS and network drawing had been conducted during the training.

  iv. There were 55 participants and according to the questionnaire survey, satisfaction and understanding level is excellent.

  v. Practical training is planned 10 times for the entire project to increase the capacity of local administrators to support the sustainability of the project.

- Chiangrai Project visit

  i. Visiting period was during August 27-28, 2009 in Chiangrai

  ii. Project members visited pilot tele-center project for rural area education and development at Mae Fah Luang University and WiMAX e-health center at Chiangkhong Crown Prince Hospital.

  iii. Several conclusions were made from the visit such as trainings for HRD that is critical for the utilization of the WiMAX network infrastructure, Teachers workgroup to retain trainers locally is crucial to maintain the instructor resource and its knowledge. The stability of operation of the network is keen to the motivation of the users.

- e-Learning workshop (Learnsquare)

  i. It was held during October 28-20, 2009 in MHS

ii. Goal is to motivate the implementation of web online tests for 60% of school teacher who participated in workshop by the end of March 2010.

iii. There were 57 participants and according to the questionnaire survey, satisfaction and understanding level is excellent.

- Tower construction

  i. Construction period was October 25 to November 6, 2009.

  ii. Towers were constructed in Mae Sarieng and in Pai.

  iii. Cabinets were installed in three districts.

- The 1st Batch equipment implementation

  i. Installation took place during January 8-25, 2010 in MHS.

  ii. There are one base station installed at Doi Kong Mu and two CPE sites installed at Hong Son Suksa school and MHS provincial office.

  iii. Core center is located at MHS community college where application servers and WiMAX servers installed.

- 2nd Progress report

  1st practical training in MHS and case study trip of WiMAX projects by NTC in Chiang rai are reported and analyzed in the report.

Suggestion

Dr.Pansak

- Suggested all the participated project members to visit Doi Kong Mu for the finished base station of 1st batch implementation after 2nd JCC meeting.

Agenda 3 Project schedule and upcoming activities

Dr.Kitti presented the project schedule and upcoming activities.

- The 2nd batch equipment will be imported and delivered on the 1st week of March.
- Installation, unified test and FAT are starting from March 15 to May7, 2010.
- Installation in MSR is expected to be harder than others due to the number of BS and CPE sites.
- AcuLearn (Contend development software) vendor training is planned to be held during March 15-17, 2010.
- 2nd content development workshop will be held during March 18-20, 2010.
- Opening ceremony is scheduled on March 28, 2010 in MHS and NAC (NSTDA Annual Conference).

- The 2nd batch implementation
  i. Installation of four base stations (two BSs in MSR, one BS in Pai and one at NECTEC).
  ii. Installation of 43 client sites in three districts.
  iii. There are vender training and OJTs for NECTEC.

Discussions and suggestions

Mr.Miyoshi

- As expected concern on high turnover in government sector, he asked NECTEC to share the sustainability plan of the project between NECTEC and local sites.

Dr.Kitti and Mr.Yasui

- Based on the successful case of the Chiangrai project in term of sustainablity, the project plans to form a workgroup for internally self conduct training every 2-3 years.

Ms.Charintip

- Who are the targets of training and workshops in the project?

Dr.Kitti

- Target participants of the training and workshop in MHS are teachers, students and staff from the members of 45 sites at present.

Mr.Yasui

- The training scheme of the project will target to provide the technology transfer from Japanese experts to NECTEC project members and then NECTEC will transfer the gained knowledge further to local sites in MHS.

Agenda 4 Opening ceremony

Dr.Pansak informed the royal opening ceremony of the project will be held during NAC (NSTDA annual conference 2010). Princess Maha Chakri Sirindhorn will official open the project..

Dr.Kitti explained the detail opening ceremony plan.

- Opening ceremony is scheduled during 17:30-20:00 on March 28, 2010.
- Concurrent events are planned for two sites; NECTEC (NSTDA convention center) and Prachakom Hall in MHS. There is video link between two sites.
- Expected participants at project booth at NECTEC site are executive director of NECTEC, project manager, NECTEC staffs, Japanese ambassador, JICA personnel and JICA experts, and personnel from NTC and CAT Telecom.

- Expected participants at MHS site are MHS governor, NECTEC executive and staffs, participants from 45 sites project members.
- Opening ceremony steps
  i. Royal highness princess visits project booth (1min)
  ii. NECTEC introduces all participants of both sites (1min)
  iii. Dr.Pansak presents the project (3mins)
  iv. Short demo video (3mins)
  v. Refer to MHS
  vi. MHS governor reports the project (3mins)
  vii. Royal highness princess interacts with NECTEC, JICA and MHS (4mins)
  viii. Royal highness princess presses the button to open the project plate
  ix. Open the curtain of the project plate

Discussions and suggestions

(1)Venue preparation

Ms.Patthanan

- Warned of wildfire may cause electricity to shut down during the ceremony. To prevent this problem, MHS governor office will provide power generator as a backup system.

Mr.Sudkhet

- Responsible for preparation of public IPs. These IPs are used for Video link between two sites. The internet connection speed at MHS site is around 20Mbps which is more than enough for live video broadcast.

(2)Invitation

Ms.Patthanan

- Governor office will invite local participants and tribes to join the event.

Mr.Miyoshi

- Representatives from Japanese embassy will join the event at NECTEC.

Mr.Yasui

- United Nations plans to launch a multi-million USD project in MHS. For future collaboration, UN representations should be invited for the opening ceremony participation.

Dr.Kitti and Mr.Yasui

- Requested project members to facilitate public announcement for promotion of opening ceremony on media press

(3)Project plate

Ms.Patthanan

- Asked members' opinion on material of project plate.

Ms.Kullaprapa

- Suggested northern style project plate made from wood.
- Members should discuss further about what should be written and appeared on the project plate.

(4)Budget

Dr.Kwan

- All stakeholders should share the cost.

Dr.Kitti

- Recommended on doing budget plan and specify on the funding source of each item.

Mr.Yothin

- Recommended to request sponsorship from local government agencies since they have benefit from this project.

(5)Language

Dr.Siwarak

- Mentioned about which language would be used during the ceremony and JCC members recommended of Thai language.

Others

Mr.Miyoshi

- Mentioned about what type of questions would Royal Highness Princess usually ask?

Dr.Kwan

- Possible questions are how to utilize the network and how student can get benefit from the

Mr.Yasui

- Recommends emphasizing on project purpose that is to vitalize rural community not to promote the infrastructure.

Ms.Patthanan

- Royal Highness Princess has visited MHS area many times. Princess is very interested in distant learning and rural area development.

Dr.Pansak

- Suggested to launch some activities one or two days before the opening ceremony event such as software or application competition related to WiMAX technology.

Agenda 5 WiMAX soft demonstration

Dr.Kitti presented about themes needed to be focused on the scope of four major application areas which can best utilize WiMAX technology.

- The four major application areas are remote education (e-Learning), e-government, e-health and tourism.
- E-learning through WiMAX, WiMAX video stream and WiMAX video conference were lively demos to JCC participants. The demonstration went successfully.

Agenda 6 Open discussion and Closing remark

The agenda has been discussed during agend4 – opening ceremony.

Open Issues

- Establishment of NECTEC's local office in Mae Hon Song(continuation of 1st JCC)

Next JCC meeting:

Same time as mid-term evaluation survey by JICA during November 2010 to February 2011.

Distributed materials:

- Agenda
- 2nd Joint Coordinating Committee Meeting member list
- 2nd Joint Coordinating Committee Meeting power point
- 1st Joint Coordinating Committee Meeting minutes
- 2nd Progress report by JDS (Nov, 2009)

After JCC meeting

JCC members inspected installed WiMAX antenna and equipment at MHS base station site.

EOF

Meeting Minutes of 3rd JCC (16th Jul, 2010)

Meeting Minutes of 3rd JCC

The Project of Human Resource Development through Utilizing the Information Technology for Rural Community Vitalization

Date	16th Jul, 2010		
Participant	Thailand side		
	Chairperson		
	NECTEC	Executive Director	Dr.Pansak Siriruchatapong
	Members		
	TICA	Development Cooperation Officer	Mrs.Charinthip Yosthasan
	TICA	Development Cooperation Officer	Mrs.Pantila Seangchan
	NTC	Senior Officer Universal service Bureau	Mr. Peerachaid Pongsiri
	Mae hong son Governor's Office	Personnel Analyst Officer HRD Division	Ms. Raphat Sethavorakul
	Mae hong son Educational Service Area2	Director	Mr.Chukiat Dantanasap
	NECTEC	Project Coordinator/ Researcher	Dr.Kitti Wongthavarawat
	NECTEC	Researcher	Dr.Supakorn Siddhichai
	NECTEC	Project administrator /Assistant Researcher	Mr.Kitiwat Limmongkol
	Japan side		
	Members		
	JICA Head quarters	Consultation Team Leader	Mr. Hiromi Motomura
	JICA Head quarters	Consultation Team Study Planning	Mr. Yuichi Ichikawa
	JICA Thailand office	Senior Representative	Mr. Akihisa Tanaka
	JICA Thailand Office	Project Formulation Adviser	Mr. Katsuya Miyoshi
	JICA Thailand Office	Program officer	Ms.Chayanun Artakul
	JICA Expert	Chief Advisor/ Test planning	Mr. Mamoru Yasui
	JICA Expert	WiMAX system design	Mr. Akira Kishimoto
	JICA Expert	Site planning	Mr. Yoji Murakami
	JICA Expert and coordinator	Training planning/Project coordinator	Ms. Mayuka Kobayashi
M/M recorder	Ms. Mayuka Kobayashi, Mr. Kitiwat Limmongkol		
Signature	Thailand Dr. Pansak Siriruchatapong(NECTEC)	Japan: Mr. Yasunori Onishi(JICA)	

Minutes:

Dr.Pansak addresses the opening of the 3rd JCC meeting to JCC members and participants. Mr.Motomura also gave the opening speech to all participants.

Agenda 1 Confirmation to 2nd JCC Meeting Minute

- All project members agreed and confirmed the 2nd JCC meeting minute.

Agenda 2 Project Progress Report

- **Past project activities**

Mr.Yasui presented the project overview and the progress by timeline. Dr.Kitti and Dr.Supakorn presented the events and activities since 2nd JCC meeting (February to July 2010).

- Based on the PDM, the project activities have progressed. Planned activities schedule in Inception report have not completed because of equipment installation delay.
- Royal Opening Ceremony: HRH Princess Maha Chakri Sirindhron graciously opened the project on March 28, 2010 during NSTDA annual conference 2010 (NAC2010) at Thailand Science Park, Pathumthani. The ceremony took place concurrently between Pathumthani and Mae Hong Son through Video conference link. Mae Hong Son governor presented the project to HRH Princess Maha Chakri Sirindron from Mae Hong Son.
- Several training courses including OJT[1] have started parallel with WiMAX equipment installation. Following courses have been implemented:

1. The training courses targeting to NECTEC in the area of WiMAX Implementation
    a. OJT1_3 Installation PAT(Provisional acceptance test) and FAT(Final acceptance test)
    b. OJT1_4 Test run
    c. OJT1_5 Installation and Unified Test
    d. AcuLearn vender training
    e. WiMAX equipment vender training
    f. SEM[2]1_2 WiMAX system design
    g. SEM1_3 System operation plan
    h. Counterpart training in Japan
2. The training courses targeting to NECTEC in the area of content development
    a. SEM2_2 Contents development utilizing WiMAX
    b. AcuLearn vender training
    c. Counterpart training in Japan
3. The training courses targeting to local instructors of MHS

[1] OJT:On the job training/Conduct by JICA expert
[2] SEM: Seminar/Conduct by JICA expert

a. WS[3]2_2 Contents development2
b. miniWS[4]2_1 Learning management system
c. AcuLearn vender training

- Counterpart training in Japan for NECTEC's project staffs. The training covered four areas.
  1. Wireless & NGN Research (Yokosuka research park, case of NTT)
  2. University WiMAX and Research (Keio university)
  3. Regional WiMAX (iTV Co.,Ltd.)
  4. Nationwide WiMAX (NEXCO east Japan, case of UQ Communications)

  After the training, JICA expects NECTEC to share the knowledge and experience of training in Japan to others.

- **WiMAX installation**

  Dr.Kitti presented Installation progress, schedule and issues.

  - WiMAX installation is almost completed and service launch is set tentatively on 1st of August.
  - Several issues will be solved through continual discussion with CAT telecom, MHS governance and project members. Main issues are as follows.
    - Frequent power interruption during summer
      - Cause system: Server failure.
      - Solution: Additional power backup at base station and core center are recommended.
    - High temperature during summer
      - Cause: Base station shutdown by over temperature.
      - Solution: Air-conditioning scheduled to be installed at base stations. The air-conditioning procurement process is currently on progress by JICA Thailand
    - Wild Fire
      - Cause fiber link between districts was disconnected

- **Comment and discussion**

  - What is the plan for project sustainability? (Mr.Motomura)

    -For user site, project has planned on developing and enhancing project members' capacity though several trainings and workshops during project term. The goal is to enhance the capability of project members to be able to operate and maintain system operation in the long run. For infrastructure site, NECTEC will negotiate with local ISPs for continuing support after the project. (Dr.Kitti)

    -Also, Working Group (Technical WG and Application WG) will be established to promote the application usage, to share the knowledge and idea on system operation and common interest. The Working Group will provide the sustainability of the system usage after the project. The working group concept has been proved to be successful in NTC project in Chiangrai.(Mr.Yasui)

[3] WS:Workshop/Conduct by NECTEC
[4] miniWS:miniWorkshop/Conduct by NECTEC

- Project also plans to study on financial possibility to subsidy the project during and after the project (Dr. Kitti),

- There seems to be some problems in MHS such as expensive leased line network and a lack of the technical support staffs and local trainer. High temperature and blackouts are the common problems in MHS. (Ms.Raphat)

  -The project is working on the sustainable plan. Currently NECTEC hires local MHS people to handle coordination between MHS and NECTEC on the IT Valley project, WiMAX project and others. (Dr.Kitti)

- The temperature may go up to 43 degree Celsius and it is common that blackouts occur as many as 20 times per day during summer time in MHS. The maintenance of equipment is problem too. (Ms.Raphat)

  -For the solution for the high temperature, JICA will procure air-conditioner for 3 base stations. (Mr.Miyoshi)

  -To reduce the chance of the equipment damage caused by the blackout and to ensure continuity of service, NECTEC will procure extra backup batteries. (Dr.Kitti)

  -Some countermeasures for the equipment are expected. The Project has asked the support from MHS government. (Mr.Yasui)

- UN (United Nation) started project in MHS. (Ms.Raphat)

  - The project had attended the first steering committee UN meeting in MHS. The possibility of collaboration between UN project and WiMAX project was discussed. (Dr.Kitti)

  -The UN project consists of almost 10 different organizations of UN and just started now. In the future, the project still is open to the collaboration opportunity. (Mr.Yasui)