

Minutes of Meeting

5th Joint Coordination Committee (JCC) meeting of the Project for Optical Fiber Techniques in Telecommunications Engineering funded by JICA under TCP was held on the 20th of January 2017 at 10:30 AM in the Bhutan Telecom Conference hall. The following members attended the meeting:

JICA Bhutan Office:

1. Mr. Koji Yamada, Chief Representative
2. Mr. Takano Sho, Representative, JICA Bhutan Office
3. Ms. Tomoto Miyata, Project Formulation Adviser, JICA Bhutan Office
4. Mr. Krishna Subba, Program Officer, JICA Bhutan Office

JICA HQ, Tokyo:

1. Mr. Tomoyuki Naito, Team Leader
2. Mr. Keitaro Tanaka, Planning Coordinator

GNHC:

1. Ms. Kuenzang Lham Sangay, DCD, GNHC

DITT, MoIC:

1. Ms. Thaye Choden, ICT Officer

Bhutan Telecom (BT):

1. Mr. Tshewang Gyeltshen, Chief Executive Officer
2. Mr. Junya Yamaguchi, Chief Adviser, JICA Expert team
3. Mr. Chimmi Dorji, Director, Business
4. Mr. Jichen Thinley, General Manager, Corporate Planning & Strategy Division
5. Mr. Sangay Wangdi, General Manager, Finance & Accounts Division
6. Mr. Jambay Sither, General Manager, Operations Division
7. Mr. Penjore, General Manager, Marketing Division
5. Mr. Sonam Phuntsho, Project Manager
6. Mr. Karma Tshewang, Project Director

The Chief Executive Officer (CEO) of Bhutan Telecom welcomed all the members on behalf of Bhutan Telecom for the 5th JCC meeting. The CEO thanked JICA and the government of Japan for assisting Bhutan Telecom both in the past & present, and expressed high hopes that JICA will support Bhutan Telecom in future in the form of telecom infrastructure and capacity development. Despite some of the counterparts of the FTTX project leaving the company, the CEO assured that the sustainability of the FTTX project was not at stake in any manner or form.




This he said is due to the fact that BT now has similar FTTX networks deployed extensively throughout its network, the operation & maintenance of which are carried out by in-house resource.

The CEO reiterated the importance and positive impacts of the JICA grant aids for the development of digital domestic telecommunications during the 90's through which all Dzongkhags of Bhutan were connected both within the country and the outside world. He said that some of the items delivered through the grant aid in the 90's are still being used by BT which is a clear testimony of the long lasting benefits that JICA assistance have in general. Even for the current FTTX project, he said, the benefits from the trail network and the knowledge transfer, workmanship in particular, will have positive impacts as BT expands its FTTX networks to meet the high-speed broadband demand in the many years to come.

The CEO also expressed appreciations for the excellent support and inputs from Mr. Yamaguchi, both in the past and during his tenure as the Chief Advisor for the FTTX project.

The Chief Representative of JICA Bhutan Office thanked BT for arranging the 5th JCC meeting and congratulated BT and JICA Chief Advisor, FTTX Project for the successful completion of the project. The Chief, to put his opinion in context, cited a Japanese saying called 'SHUHARI', where SHU means following the tradition, HA means breaking the tradition and RI is coming up with new idea. He said BT seems to have now reached the RI realm. Having explained this, the Chief said that he has learnt many lessons from BT both as part of the current FTTX project and the ongoing request for grant for a 2nd mobile core, and he appreciated BT's giving him good lessons. He said that he would work on identification and implementation of future projects based on these lessons.

The Chief said that the main objective of JICA's investment through its TCP scheme is capacity development through knowledge transfers. In the context of BT's FTTX project for which he said the total investment was Nu. 100 million, he expressed concerns on some counterparts having already left the company even before the project was complete. With such attritions of the counterparts, he said, ensuring perpetual continuation of capacity development due to JICA engagements may become very difficult to attain.

On BT's request for JICA grant for 2nd Mobile Core, the Chief informed the meeting that JICA Bhutan Office has put in lots of efforts to convince the government of Japan based on which a preparatory survey team is already onsite. Having done that, he said, BT seems to be putting in place lots of new mobile infrastructure in and around Thimphu, which made him wonder if the JICA office has sent wrong information on the financial constraints BT has been facing.

In general, the Chief said, JICA expects high support and cooperation from the implementing agency in the recipient country for any JICA engagements. He said he has concerns on the kind of self-help efforts by BT based on information that his office has gathered. Specifically, he said that his office has received information that the IT workshop which took place on the 30th of November 2016 as part of the FTTX project had to be single handedly coordinated and organized by JICA Chief Advisor for the Project, Mr. Junya Yamaguchi.

Project Achievement update:

The project team updated the meeting on the various activities carried out during the project period and subsequent achievements as detailed below:

1. Project Progress and Activities: Mr. Sonam Phuntsho, Project Manager

The Project Manager highlighted on the key activities that were carried out to achieve the 3 main outputs of the project: i) Development of Technical manuals, ii) Development of O & M system for FTTX, and iii) implementation of trial work at Jakar. The meeting was informed that the development of manual, in particular, went through a series of versions the latest updates of which were made after the 2nd batch of training in Japan in April 2016. It was updated that the manuals were used as training materials during the in-house training in July 2016 and will be continued to do so in future in house trainings on the FTTX networks.

2. Project Activities by field staff: Mr. Rinzin Dorji

Mr. Rinzin Dorji presented in detail on the series of activities that the project team had carried out in achieving the 3 main outputs of the project. On the development of manual, it was highlighted that the team members started from ground zero and went through 6 different versions until the final copies were printed and distributed. The manual, he said, has guidelines on technical specifications of fiber cables, fiber network design and constructions, safety measures and management both during construction and operation & maintenance phases.

3. Activities carried out at the trial site, Jakar: Mr. Tandin Wangdi

Mr. Tandin's presentation covered various tasks that the project team had carried out while implementing the FTTX trial network at Jakar. Images of some of the fiber network components indicating status before and after the trial work were presented clearly demonstrating improvements in the 'after' images in terms of workmanship and safety.

As part of Mr. Tandin's presentation, the Chief Representative of JICA Bhutan Office asked him, amongst many improvements suggested by JICA experts, whether there were some that were initiated and suggested by the team members of BT. It was highlighted that majority of the improvements were suggested by JICA experts and BT team members implemented the suggestions in the field through which learning happened.




The team leader from JICA HQ, Tokyo suggested to devise some means to keep track of the perpetuity of the learning. BT welcomed the suggestion and said that one of the ways would be through in-house trainings on the FTTX network during which the manuals would be used as teaching material.

BT CEO requested JICA to look into possibilities of ways and means to monitor and keep track of the perpetuity of the learning and other impacts of JICA assisted projects. JICA CR left no comment.

4. Overall achievements of the project: Project Director

It was highlighted that the overall goals and objectives of the project were achieved without any major obstacles. The achievements of the project, the Project Director said, was well in line with JICA's standard process of reviewing the achievements using DAC's 5 evaluation criteria. He also touched upon the growth trend of FTTX subscriptions and service coverage with due reference to the status just before the start of the JICA FTTX project in 2014 and the current status. It was highlighted that when JICA FTTX project started, BT's FTTX coverage in terms of Dzonkhag was just about 20% as against the current coverage in excess of 80%. Given such pace of growth in FTTX deployment in BT's network, it was assured that operation & maintenance of trial network at Jakar is not a concern. Despite some counterparts leaving the company, it was reiterated that sustainability of this FTTX project is not at stake since BT will keep investing year on year on FTTX networks to meet the demand for high-speed broadband.

On the investment front, the CEO said that as a telecom service provider, it was crucial to keep the customers happy through constant expansions and upgrading of the mobile network. These activities and efforts to improve quality of service are very expensive but have to be done given the competitive market conditions, the CEO said. He informed the meeting that the company is meeting the fund required for such network expansions and enhancements through loans from commercial banks. For network activities planned to happen in 2017, the CEO said that BT is processing for bank loan in excess of Nu. 450 million.

To inject some clarity on the project counterparts who left the company, BT informed that there are stringent HR policies through which the company tries to bond and retain its employees. It was also further clarified that BT's Performance Management System (PMS) has many incentives and rewards for the good performers but yet, when employees decide to leave, they leave regardless of whatever measures the company tries to put in place. It was informed that the counterparts who left the company have started their own business except for one who went to Australia for further studies. Attrition of employees due to better opportunities else where, the Project Director said, has always been a challenge for many companies, still is and will remain to be so.

The meeting was informed that BT has arranged replacement staffs to ensure that there were minimal impacts on the project as soon as the counterparts left the company.

5. Suggestions/Recommendations by the Chief Advisor, FTTX Project

The Chief Advisor expressed his concerns on the possibilities of accidents that could happen while at work in the absence of standard safety process and discipline. He recommended BT to put in place standard safety process and make the field staff to practice them religiously and regularly.

He also explained to the meeting the basic difference between FTTC, FTTB and FTTH, and suggested that going for FTTH would be an ideal choice if the objective is to deliver high-speed broadband to users both in offices and homes.

6. Closing Remarks

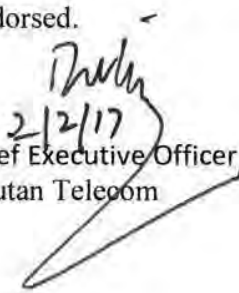
Ms. Kunzang Lham Sangay, GNHC congratulated BT and the Chief Advisor of the project for the successful completion of the FTTX project. She thanked JICA for the assistance granted through its TCP scheme and re-iterated the impacts that the achievements would have on the overall Key Result Areas (KRAs) of the Royal Government's ICT policy in its continued efforts to making the delivery of public service more efficient. As rightly pointed out by JICA, she said that, it was very important that the implementing agencies in the recipient country, rendered the utmost commitment not only in achieving the intended objectives of the assistance but also to be able to sustain and carry forward the impacts.

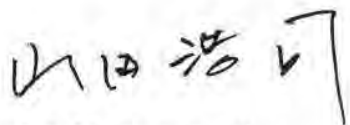
BT CEO thanked JICA for all the support in the past and for this particular FTTX project and assured his full commitment in ensuring the perpetuity of the outputs and learning. He expressed his special thanks to the Chief Advisor, Mr. Yamaguchi for all his support and guidance. The CEO said, Mr. Yamaguchi has been like a father to many of BT employees and his presence would be highly missed in BT after his return to Japan.

The Project Director thanked all the participants for taking out time to be present for the 5th and final JCC meeting of the FTTX project. He expressed his special thanks and appreciation to the officials from JICA HQ, Tokyo for making time to be present for the JCC meeting and wished them a safe journey back to Tokyo. The director concluded the meeting by re-iterating BT CEO's remarks 'What BT is today is all because of JICA and its grant aid in the 90s', and expressed sincere hopes for future support.

The meeting was adjourned at 1300 hours.

Endorsed.

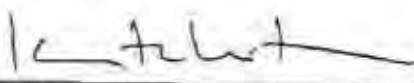

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Chief Executive Officer
Bhutan Telecom


Chief Representative
JICA Bhutan Office

RECORD OF DISCUSSIONS
ON
PROJECT FOR OPTICAL FIBER TECHNIQUES IN
TELECOMMUNICATIONS ENGINEERING
IN
KINGDOM OF BHUTAN
AGREED UPON BETWEEN
GROSS NATIONAL HAPPINESS COMMISSION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Thimphu, October 31, 2013


Ms. Yuriko Asakuma
Chief Representative
Bhutan Office
Japan International Cooperation Agency


Mr. Karma Tshiteem
Secretary
Gross National Happiness Commission







Based on the minutes of meetings on the Detail Planning Survey on the Project for Optical Fiber Techniques in Telecommunications Engineering (hereinafter referred to as "the Project") signed on September 27, 2013 between Gross National Happiness Commission (hereinafter referred to as "GNHC"), and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with Bhutan Telecom Limited (hereinafter referred to as "BT") and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and the main points discussed as described in the Appendix I and the Appendix II.

Both parties also agreed that BT, the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, will coordinate with other relevant organizations and will ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of Kingdom of Bhutan.

The Project will be implemented within the framework of the Note Verbal exchanged on February 08, 2013 between the Government of Japan (hereinafter referred to as "GOJ") and Government of Bhutan (hereinafter referred to as "GOB").

Appendix I: Project Description

Appendix II: Minutes of Meetings on September 27, 2013.



Appendix I

PROJECT DESCRIPTION

Both parties confirmed that there is no change from the minutes of meetings of Detail Planning Survey signed on September 27, 2013 (Appendix II).

I. BACKGROUND

The Domestic Long-distance Communications Transmission Network (City to City) has been completed by the Digital Microwave System initially through the grant aids by Government of Japan in the year 1991-1998. Despite the successful introduction of the system to BT, however at present, in the face of continuous technology developments, its Local/Access Network (intra city) remains to be the legacy facilities (metal cable), which are unable to meet the government policies and increasing customer demands. Taking into account of the situation, BT has started to introduce the Optical fiber cable (OPGW) links & NGN-SDH System, which now connects all the Dzongkhags (districts) in Bhutan. OPGW now functions as the backbone network of telecommunication system in Bhutan. Not only for backbone network, but also it can be utilized for long & short high-speed local area networks (LANs). However, such network has only reached each district, and therefore, the designing and planning, as well as implementing of the networks within each cities remain unattended. Considering the above and under such transition period of telecommunication systems, BT, as a main telecommunication services provider, is now in the position to realize the planning, designing and implementing fiber optic local area network (LAN), such as Fiber-to-The Cabinet, Fiber-to-The Building, Fiber-to-The Home (FTTC/FTTB/FTTH), to meet the demands of the general public and the government's policy of reaching ICT services to rural areas. However, despite BT's commitment for materializing these plans, the existing engineers are not exposed to such network and are facing difficulties in planning, designing & implementing fiber networks.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Annex I) and the tentative Plan of Operation (Annex II).

1. Title of the Project
Project for Optical Fiber Techniques in Telecommunications Engineering
2. Overall Goal
Unified ICT network is provided in Bhutan
3. Project Purpose
Capacity of BT's engineering in optical fiber access network design, construction, and maintenance will be developed.
4. Outputs

- (1) Three technical manuals (1. FTTX design/construction manual, 2. Quality inspection and FTTX specification, 3. Safety work management) are developed.
- (2) O&M system is developed.
- (3) Experiment work in trial sites (two areas) is completed.

5. Activities

5.1 Activities for Output (1):

- (1) To collect information regarding actual technical standards and design guidelines of optical fiber in Bhutan.
- (2) To develop solution guideline, clarifying problems in work procedure and identifying solutions for each problem.
- (3) To conduct experiment work according to the guideline.
- (4) To review and evaluate the experiment work.
- (5) To elaborate manuals reflecting the result of experiment work.

5.2 Activities for Output (2):

- (1) To verify existing equipment including GIS/GPS system and check their conditions of deterioration.
- (2) To identify problems in operation and maintenance system related to the fiber optical network in Bhutan.
- (3) To develop guideline of equipment substitution and calculate annual budget to keep good condition of it.
- (4) To conduct technical guidance through local training for engineers working at BT headquarters office and local telephone exchange station.

5.3 Activities for Output (3):

- (1) To conduct site survey as a preparation for the experiment work.
- (2) To design and plan the experiment work including identification of necessary equipment and budget.
- (3) To carry out the first experiment work in Phuntsholing following the plan.
- (4) To review and evaluate the first experiment in order to plan the second experiment work.
- (5) To carry out the second experiment work in Mongar.
- (6) To review and evaluate the second experiment.

6. Input

(1) Input by JICA

(a) Dispatch of Experts

- Chief Advisor/FTTX Technology and Quality Control of material and safety work
- FTTX Design Expert
- FTTX Construction Expert
- GIS/GPS Operation Expert for Engineering
- FTTX R&D engineering Expert
- Advanced BB Application Expert
- Other Fields, If Necessary

(b) Training
Provision of training in Bhutan and in Japan

(c) Machinery and Equipment
Provision of machinery and equipment (Annex IV)

The machinery, equipment and other materials under II-6 (1) (c) above will become the property of the GOB. In case any machinery and equipment cannot be obtained in Bhutan, it will be delivered C.I.F. (cost, insurance and freight) to the Bhutan authorities concerned at the ports and/or airports of disembarkation. Bhutan side will bear the custom clearance and transportation costs.

(d) Cost for the experiment work in trial sites

(2) Input by BT

BT will take necessary measures to provide at its own expense:

- (a) Services of BT's counterpart personnel and administrative personnel as referred to in II-7;
- (b) Suitable office space with furniture including utility costs;
- (c) Use of equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
- (d) Assistance for obtaining medical service for Experts;
- (e) Available data (including maps and photographs) and information related to the Project.

7. Implementation Structure

The Project organization chart is given in the Annex III. The roles and assignments of relevant organizations are as follows:

(1) BT

(a) Project Director

General Manager of Operation Division, BT, as the Project Director will bear overall responsibility for the administration and implementation of the Project.

(b) Project Manager

Project Manager of Druknet Division, BT, as the Project Manager will be responsible for the managerial and technical matters of the Project.

(c) Counterpart

BT staffs, engineers will be the counterparts to Japanese Experts.

(2) JICA Experts

The JICA experts will give necessary technical guidance, advice and recommendations to BT on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee

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Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organisational coordination. JCC will be held at least once a year and whenever it deems necessary. JCC will approve an annual work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. A list of proposed members of JCC is shown in the Annex III.

8. Project Sites and Beneficiaries

- (1) Project sites: Thimphu, Phuntsholing and Mongar.
- (2) Beneficiaries: BT staff, Local Telephone Exchange Station of district assemblies, contractors and communities along the sites for field trials

9. Duration

3 years from the Project commencement (Assignment of first Japanese expert in Bhutan).

10. Reports to JCC

BT and JICA experts will jointly prepare the following reports in English:

- (1) Inception Report
- (2) Progress Report on annual basis until the project completion.
- (3) Project Completion Report at the time of project completion.

11. Safeguards including Environmental and Social Considerations

BT agreed to abide by National Environment Commission (NEC) of Bhutan and JICA Guidelines for Environmental and Social Considerations in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF BT

1. BT will take necessary measures to:

- (1) ensure that the technologies and knowledge acquired by the Bhutan nationals as a result of Japanese technical cooperation contributes to the economic and social development of Bhutan, and that the knowledge and experience acquired by the personnel of BT from technical training as well as the equipment provided by JICA will be utilised effectively in the implementation of the Project.
- (2) grant privileges, exemptions and benefits to the JICA experts referred to in II-6 (1) above and their families, which are no less favorable than those granted to experts of third countries performing similar missions in Bhutan under the Colombo Plan Technical Cooperation Scheme.

2. BT will take necessary measures to:

- (1) provide security-related information as well as measures to ensure the

- safety of the JICA experts,
- (2) permit the JICA experts to enter, leave and sojourn in Bhutan for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees.
 - (3) exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;
 - (4) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and
 - (5) meet taxes and any other charges on the equipment, machinery and other material, referred to in II-7 above, necessary for the implementation of the Project.
3. BT will bear claims, if any arises, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or wilful misconduct on the part of the JICA experts.

IV. EVALUATION

JICA, GNHC and BT will jointly conduct the following evaluations and reviews.

1. Mid-term review at the middle of the cooperation term
2. Terminal evaluation during the last six (6) months of the cooperation term

JICA will conduct the following evaluations and surveys to mainly verify sustainability and impact of the Project and draw lessons. The GNHC and BT are required to provide necessary support (e.g. Data relating to the Project, Interview of C/P) for them.

1. Ex-post evaluation three (3) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, BT will take appropriate measures to make the Project widely known to the people of Bhutan.

VI. MUTUAL CONSULTATION

JICA and BT will consult each other whenever any major issues arise in the course of Project implementation.

VII. AMENDMENTS

This record of discussions can be amended by minutes of meetings between

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JICA and BT.

The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussions.

- Annex I Logical Framework (Project Design Matrix: PDM)
- Annex II Tentative Plan of Operation
- Annex III Project Organization Chart
- Annex IV List of Equipment

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Project Design Matrix

Name of the Project: Technical Cooperation Project for Optical Fiber Techniques in Telecommunications Engineering

Implementing Agency in Bhutan: Bhutan Telecom Limited

The Duration of the Project: April 2014 to March 2017 (36months) (Tentative)

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption
Overall Goal Unified ICT network is provided in Bhutan.	By2019, extension rate of FTTX(Installed Dzongkhags/whole country)will be increased by Δ%. (This indicator will be discussed and decided by 1 st JCC meeting)	Report of GNHC or ITU report	Politics condition is stable There is no significant technological change in ICT sector
Project Purpose Capacity of BT's engineering in optical fiber access network design, construction, and maintenance will be developed.	BT's engineers are able to conduct expansion work of FTTX.	<ol style="list-style-type: none"> 1. Interview to C/P and experts 2. Work report prepared by the experts (i.e. monitoring of OJT on the experimental work) 3. Training Report on OJT 4. BT annual report 5. Other Means of Verification will be discussed and decided by 1st JCC meeting 	<p>There is no significant change for the activities of BT for expansion of FTTX in country.</p> <p>There is no significant change in BT's institutional arrangement for the expansion of FTTX in country.</p>
Output 1. Three technical manuals are developed. (1. FTTX design/construction manual, 2. Quality inspection and FTTX specification, 3. Safety work management). 2. O&M system is developed.	Technical manuals are ready to be used by BT's FTTX engineers.	<ol style="list-style-type: none"> 1. BT annual report 2. Other Means of Verification will be discussed and decided by 1st JCC meeting 	<ol style="list-style-type: none"> 1. There is no significant change in C/P's 2. Developed manuals are adopted by BT as its official rule or regulation.
1. Experiment work in trial sites (two areas) is completed.	<ol style="list-style-type: none"> 1. 3(three) GIS/GPS operation engineers are trained, 2. 20(twenty) O&M operator of regional staff are trained. FTTX is completed in trial sites.	<ol style="list-style-type: none"> 1. Evaluation of pre-test and post-training-test. 2. Other Means of Verification will be discussed and decided by 1st JCC meeting 	There is no significant change in C/P's
		<ol style="list-style-type: none"> 1. Evaluation of the experimental work. 2. Other Means of Verification will be discussed and decided by 1st JCC meeting 	There is no significant change in C/P's

<p>Activities [Activities for Output 1: "Three technical manuals are developed. (1. FTTX design/construction manual, 2 Quality inspection and FTIX specification, 3. Safety work management)."] 1. Collect information regarding actual technical standards and design guidelines of optical fiber in Bhutan, 2. Develop solution guideline, clarifying problems in work procedure and identifying solutions for each problem. 3. Conduct experiment work according to the guideline. 4. Review and evaluate the experiment work. 5. Elaborate manuals reflecting the result of experiment work.</p>	<p>Input from Bhutan side 1. C/Ps 2. Necessary Expenses (e.g. Salaries, local traveling costs and daily subsistence allowance (DSA) for the Bhutan counterpart personnel) 3. Assignment of C/P Office space, Furniture for Japanese experts(e.g. desks, etc.), and transportation vehicle to project sites 4. Maintenance for machinery and equipment provided by JICA 5. Means of communication at the head office (e.g. internet connection)</p>	
<p>[Activities for Output 2: "O&M system is developed."] 1. Verify existing equipment including GIS/GPS system and check their conditions of deterioration. 2. Identify problems in operation and maintenance system related to the fiber optical network in Bhutan. 3. Develop guideline of equipment substitution and calculate annual budget to keep good condition of it. 4. Conduct technical guidance through local training for engineers working at BT headquarters office and local telephone exchange station.</p>	<p>Input from Japan 1. Experts [Long term Expert] -Chief Advisor/FTIX Technology and Quality Control of material and safety work [Short term Experts] - FTIX Design Expert - FTIX Construction Expert - GIS/GPS Operation Expert for Engineering - FTIX R&D engineering Expert - Advanced BB Application Expert -Other fields, if necessary</p>	<p>Preconditions Bhutan side provides: 1. Ensure the site for experimental work (Phuntsholing and Mongar) 2. The importance of personnel training does not change in the Bhutan telecom.</p>
<p>[Activities for Output 3: "Experiment work in trial site (two areas) is completed."] 1. Conduct site survey as a preparation for the experiment work 2. Design and plan the experiment work including identification of necessary equipment and budget. 3. Carry out the first experiment work in Phuntsholing following the plan. 4. Review and evaluate the first experiment in order to plan the second experiment work 5. Carry out the second experiment work in Mongar. 6. Review and evaluate the second experiment.</p>	<p>2. Provision of machinery and equipment for Training and Field trial work 3. Training of counterpart personal in Bhutan and in Japan 4. Local expenses for the project activities Teaching materials for training //workshop/seminars</p>	

TENTATIVE PLAN OF OPERATION (P/O)

Activities	2014												2015												2016												2017																			
	Japanese Fiscal Year												Calendar Year												Japanese Fiscal Year												Calendar Year																			
	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	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
0 Preparation for start-up (Interviews with related department of HTL)	█																																																							
1-1 Lecture on outline of FTIX engineering works (for staff of BI HQ)	█																																																							
1-2 Developing guidelines on specifying FTIX materials / Quality inspection method (by C/P under supervision of Expert)	█																																																							
1-3-1 Developing FTIX technical standard manual (by C/P under supervision of Expert)	█												█																																											
1-3-2 Developing a manual for FTIX technical standard (by C/P)	█												█												█																															
1-4 Developing a manual on safety work and management (by C/P under supervision of Expert)	█												█												█																															
2-1 Site survey for 1st FTIX Field Trial	█																																																							
2-2 Instructing FTIX Design on the spot (by C/P under supervision of Expert)	█												█																																											
2-3-1 Conduct FTIX Engineering (Splicing/Distribution) (by C/P under supervision of Expert)	█												█																																											
2-3-2 Conduct FTIX Engineering (Splicing/Distribution) (by C/P)	█												█																																											
2-4 Assessing and Analyzing the 1st trial work	█												█																																											
2-5 Conduct 2nd FTIX Field Trial	█												█												█																															
2-6 Assessing and Analyzing 2nd trial work	█												█												█																															
3-1 Developing training materials (by C/P under supervision of Expert)	█												█												█																															
3-2 Developing training curricula	█												█												█																															
3-3 Implementing the 1st FTIX training (by C/P /Expert supervised)	█												█												█																															
3-4 Assessing 1st FTIX training	█												█												█																															
3-5 Implementing 2nd training (by C/P /Expert supervised)	█												█												█																															
3-6 Conduct training on FTIX facility management techniques by SIS / DPS	█												█												█																															
3-7 Conduct training on FTIX for 2nd regional office staff (Collect of requests for improvement / Solution of field constants)	█												█												█																															
3-8 Training in Japan	█												█												█																															
4-1 Convene the Workshop / IT seminar to share the experience, outcome, etc of the project	█												█												█																															
4-2 Monitor the project based on the plan / preparing the progress Report for the Project	█												█												█												█																			
4-3 Preparing the final Report for the Project	█												█												█												█																			

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ANNEX III: Organization Chart of the Project

	Bhutan side	Japanese side
Joint Coordinating Committee	<ul style="list-style-type: none"> • Chief ICT Officer, Ministry of Information and Communication (MoIC) • Chief Program Coordinator, Gross National Happiness Commission (GNHC) • CEO, Bhutan Telecom Limited (BT) 	<ul style="list-style-type: none"> • JICA Expert of the Project (Long Term Expert) • Representatives of JICA Bhutan Office • Director of Transportation and ICT Division 2, Economic Infrastructure Department of JICA HQ
Project Director	<ul style="list-style-type: none"> • General Manager of Operation Division, BT 	
Project Manager	<ul style="list-style-type: none"> • Project Manager of Druknet Division, BT 	
Counterparts	<ul style="list-style-type: none"> • Engineer, Fiber Access Network, DrukNet Division (FTTX Design) • Technician, Fiber Access Network, Druknet (FTTX Construction) • Engineer, Fiber Access Network, DrukNet Division (GIS/GPS Operation) • Manager, Corporate Office (FTTX R&D Engineering) • Engineer, IP services, Druknet Division (Advanced BB) 	<ul style="list-style-type: none"> • JICA Experts of the Project (Short Term Experts) • Project Formulation Adviser of JICA Bhutan Office • Program Officer of JICA Bhutan Office

List of Equipment (MATERIALS NEED FOR FIBER ACCESS NETWORK SECTION)

1. GPON Equipment (GPON system & Access Cabinets) as pilot project..... 2 sites
2. Splicing VAN ----- 1 No.
3. Splicing Machines 2 sets
4. OTDR 2 Sets
5. Power Meter 2 sets
6. Fault locator 2 sets
7. Tools kits 2 sets
8. FTTH passive Indoor materials: Outlets, patch cords, etc
9. Ducting Rods, 200 mtrs. 5 Nos.
10. UG drilling machine (If possible) 1 No.
11. Semira 10 pairs
12. Safety belts 10 Nos.
13. Wrench range 10 Nos.
14. Side cutter 20 Nos.
15. Cable web cutter 20 Nos
16. Water Pump 3 Nos.
17. Connector Punching tools20 Nos.
18. Cable ladder 5 Nos.
19. Soil remover 20 Nos.

FOR GIS/GPS:

1. GIS Software ArcGIS 10/10.1. Or Intergraph Software for Fiber Management(G-technology)
2. Hybrid Computer desktop (24") with High resolution Graphic card with CPU for digitizing the network infrastructure system.
3. High version Lap top for mapping of GIS system
4. Two in one Color Printer & scanner for printing of maps (A3 & A4 size paper)
5. Plotter for printing of Maps max A0 size paper
6. Digital Camera with external card
7. External Hard drive(terabyte) for GIS data backup

ANY OTHER EQUIPMENTS/TOOLS REQUIRED FOR THE EXPERIMENTAL PROJECT SITES AND TRAINING

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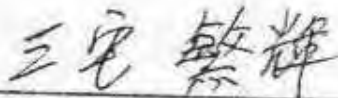
**MINUTES OF MEETINGS
BETWEEN
JAPANESE DETAIL PLANNING SURVEY TEAM
AND
GROSS NATIONAL HAPPINESS COMMISSION, ROYAL GOVERNMENT OF BHUTAN
ON
JAPANESE TECHNICAL COOPERATION
ON
PROJECT FOR OPTICAL FIBER TECHNIQUES IN TELECOMMUNICATIONS
ENGINEERING**

In response to the request from the Royal Government of Bhutan (hereinafter referred to as 'Bhutan'), the Detail Planning Survey Team (hereinafter referred to as 'the Team') organized by Japan International Cooperation Agency (hereinafter referred to as 'JICA') and headed by Shigeki MIYAKE, visited Bhutan from September 23 to October 1, 2013 for the purpose of working out the details of the technical cooperation concerning the "Project for Optical Fiber Techniques in Telecommunications Engineering".

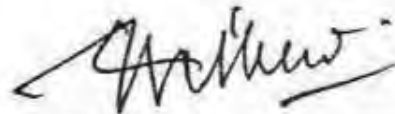
During its stay in Bhutan, the Team exchanged views and had a series of discussions with the Bhutan authorities concerned with respect to necessary measures to be taken by JICA and the Government of Bhutan represented by Gross National Happiness Commission (hereinafter referred to as "GNHC") and Bhutan Telecom Limited. (hereinafter referred to as "BT") for the successful implementation of the above mentioned project.

As a result of the discussions, both sides agreed to convey to their respective government the matters referred to in the documents attached hereto.

Thimphu, September 27, 2013



Mr. Shigeki Miyake
Leader
Detail Planning Survey Team
Japan International Cooperation Agency



Mr. Rinchen Wangdi
Chief Program Coordinator
Development Cooperation Division
Gross National Happiness Commission



Mr. Nidup Dorji
CEO
Bhutan Telecom Limited.

ATTACHED DOCUMENT

I. PROJECT TITLE

Both sides agreed that the project title is 'Project for Optical Fiber Techniques in Telecommunications Engineering' (hereinafter referred to as 'the Project').

II. PROJECT SITE

Project head office: Bhutan Telecom Limited., Thimphu.
Project Site: Thimphu, Phuntsholing and Mongar

III. SUMMARY OF THE PROJECT'S FRAMEWORK

Both sides jointly discussed and agreed the basic design of the Project. The Project Design Matrix (hereinafter referred to as 'PDM') version 0 is shown in ANNEX 1.

1. SUPERVISING MINISTRY

Ministry of Information and Communication (MoIC)

2. IMPLEMENTING AGENCY

Bhutan Telecom Limited. (BT)

3. COOPERATING AGENCY

Bhutan Telecom Limited. (BT)

4. DURATION OF THE PROJECT

3 years from the Project commencement. (Assignment of first Japanese expert in Bhutan)

5. SCOPE OF THE TECHNICAL COOPERATION

5.1 Overall goal

Unified ICT network is provided in Bhutan.

5.2 Project Purpose

Capacity of BT's engineering in optical fiber access network design, construction, and maintenance will be developed.

5.3 Outputs

5.3.1. Three technical manuals (1. FTTX design/construction manual, 2. Quality inspection and FTTX specification, 3. Safety work management) are developed.

5.3.2. O&M system is developed.

5.3.3. Experiment work in trial sites (two areas) is completed.

5.4 Project Activities

5.4.1 Activities for output 5.3.1


**MINUTES OF MEETING
BETWEEN
GROSS NATIONAL HAPPINESS COMMISSION
AND
JAPAN INTERNATIONAL COOPERATION AGENCY
ON
JAPANESE TECHNICAL COOPERATION PROJECT
FOR
PROJECT FOR OPTICAL FIBER TECHNIQUES
IN TELECOMMUNICATIONS ENGINEERING
IN KINGDOM OF BHUTAN**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") exchanged views and had a series of discussions with the concerned officials of Gross National Happiness Commission (hereinafter referred to as "GNHC") and Bhutan Telecom Limited (hereinafter referred to as "BT") with respect to desirable measures to be taken for the successful implementation of the Project for Optical Fiber Techniques in Telecommunications Engineering in Kingdom of Bhutan (hereinafter referred to as "the Project").

As a result of the discussions, GNHC on behalf of BT and JICA agreed upon the matters described in the documents attached hereto. This document is what revises the Record of Discussion on the Project signed on 31st October 2013.

Thimphu, July 17, 2014


Ms. Yumiko ASAKUMA
Chief Representative
JICA Bhutan Office
Japan International Cooperation Agency


Mr. Thinley Namgyel
Officiating Secretary
Gross National Happiness Commission

Witnessed by:


Mr. Nidup Dorji
CEO
Bhutan Telecom LTD.

THE ATTACHED DOCUMENT**I. Revision of Evaluation Method**

GNHC on behalf of BT and JICA agreed to revise evaluation method as follows.

- (1) "II. OUTLINE OF THE PROJECT, 5.3 Activities for Output (3), (3) and (5) shall be amended as follows;

- (3) To carry out the first experiment work in Paro following the plan.
 (5) To carry out the second experiment work in Jakar.

- (2) "II. OUTLINE OF THE PROJECT, 7. Implementation Structure, (3) Joint Coordinating Committee " of the Record of Discussion on the Project shall be amended as follows;

Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least once a year and whenever deems it necessary. JCC will approve an annual work plan, review overall progress, conduct evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. A list of proposed members of JCC is shown in the Annex III.

- (3) "II. OUTLINE OF THE PROJECT, 10. Report to JCC" of the Record of Discussion on the Project shall be amended as follows;

BT and JICA experts will jointly prepare the following reports in English:

- (1) Inception Report
 (2) Monitoring Sheet on biannual basis until the project completion
 (3) Project Completion Report at the time of project completion

- (4) "IV. EVALUATION" of the Record of Discussion on the Project shall be amended as follows;

JICA and BT will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets shall be reviewed every six (6) months.

Also, Project Completion Report shall be drawn up one (1) month before the termination of the Project.

2. Revision of the PDM

As per the original PDM (version 0) attached to the Record of Discussions, objectively verifiable indicator have been discussed and approved at the 1st JCC. The revised PDM is described in the Annex I and this will be utilized from now on for the monitoring of project progress.

3. Revision of the Participants of JCC

GNHC on behalf of BT and JICA agreed to strike "Director of Transportation and ICT

Division 2, Economic Infrastructure Department of JICA HQ" off the list as described in the Annex 2.

4. Revision of the Equipment

As GNHC and BT determined to change the system to GE-PON which they can procure themselves, several equipment which is input by JICA is revised. Details of revised list of equipment is described in Annex 3.

Annexes

1. Project Design Matrix
2. Project Organization Chart
3. List of Equipment
4. Record of Discussions

Project Design Matrix

Project Title : Technical Cooperation Project for Optical Fiber Techniques in Telecommunications Engineering

Implementing Agency : Bhutan Telecom Limited

Period of Project : May 2014 to January 2017 (33 months)


Project Site : Paro / Jakar

Model Site : Thimphu

Version 1

17th July 2014

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Unified ICT network is provided in Bhutan.	By 2019, Fiber Access Network services will cover 90% Dzongkhag in the country.	Annual Report of MoIC or BT	Politics condition is stable There is no significant technological change in ICT sector		
Project Purpose Capacity of BT's engineering in optical fiber access network design, construction, and maintenance will be developed.	BT's Fiber Access Network team can design, construct and maintain FTTX access network.	1. Interview/interaction to C/P and experts 2. Work report prepared by the experts (i.e. monitoring of OJT on the experimental work) 3. Training Report on OJT 4. Conduct exam/Test after training	There is no significant change for the activities of BT for expansion of FTTX in country. There is no significant change in BT's institutional arrangement for the expansion of FTTX in country.		
Output 1. Three technical manuals are developed [(i) FTTX design/construction manual, (ii) Quality inspection and FTTX specification, (iii) Safety work management]	Technical manuals are adopted, distributed to each exchange OSP/FAN section (30 copies)and utilized	1. Printed technical manuals 2. Report on usefulness of the manuals (Field staff will submit feedback to CHQ through Regional Managers)	1. There is no significant change in C/P's 2. Developed manuals are adopted by BT as its official rule or regulation.		
2. O&M system for FTTX is developed.	1. 2(two) GIS/GPS operation engineers are trained. 2. 20(twenty) O&M operator of regional staff are trained	1.1 Assessment result Pre and Post assignment of GIS expert. 1.2 BT Annual Reports 1.3 Training Report on OJT 2.1 Exams/Tests after each training	There is no significant change in C/P's		

<p>3. Experiment work in trial sites (two areas) is completed.</p>	<p>Trial sites completion report submitted.</p>	<p>1. Completion report of the experimental work 2. Acceptance test Check list for network parameter by Design Expert 3. Acceptance test report of physical Installation by C/A, BT(P/D,P/M).</p>	<p>There is no significant change in C/P's</p>		
Activities		Input		Pre-conditions	
<p>[Activities for Output 1: "Three technical manuals are developed (1. FTTX design/construction manual, 2. Quality inspection and FTTX specification, 3. Safety work management)."]</p> <p>1. Collect information regarding actual technical standards and design guidelines of optical fiber in Bhutan, 2. Develop solution guideline, clarifying problems in work procedure and identifying solutions for each problem 3. Conduct experiment work according to the guideline 4. Review and evaluate the experiment work. 5. Elaborate manuals reflecting the result of experiment work.</p>		<p>Japanese Side</p> <p>1. Experts [Long term Expert] -Chief Advisor/FTTX Technology and Quality Control of material and safety work [Short term Experts] -FTTX Design Expert -FTTX Construction Expert -GIS/GPS Operation Expert for Engineering -FTTX R&D engineering Expert -Advanced BB Application Expert -Other fields, if necessary 2. Provision of machinery and equipment for Training and Field trial work 3. Training of counterpart personal in Bhutan and in Japan 4. Local expenses for the project activities Teaching materials for training //workshop/seminars</p>		<p>Bhutan side</p> <p>1. C/Ps 2. Necessary Expenses (e.g. Salaries, local traveling costs and daily subsistence allowance (DSA) for the Bhutan counterpart personnel) 3. Assignment of C/P Office space, Furniture for Japanese experts(e.g. desks, etc.), and transportation vehicle to project sites 4. Maintenance for machinery and equipment provided by JICA</p> <p style="text-align: center;"></p> <p style="text-align: center;"><Issue and countermeasure></p>	
<p>[Activities for Output 2 "O&M system is developed "]</p> <p>1. Verify existing equipment including GIS/GPS system</p>					

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<p>and check their conditions of deterioration</p> <ol style="list-style-type: none"> 2. Identify problems in operation and maintenance system related to the fiber optical network in Bhutan. 3. Develop guideline of equipment substitution and calculate annual budget to keep good condition of it. 4. Conduct technical guidance through local training for engineers working at BT headquarters office and local telephone exchange station.
<p>【Activities for Output 3: "Experiment work in trial site (two areas) is completed."】</p> <ol style="list-style-type: none"> 1. Conduct site survey as a preparation for the experiment work. 2. Design and plan the experiment work including identification of necessary equipment and budget. 3. Carry out the first experiment work in Paro following the plan. 4. Review and evaluate the first experiment in order to plan the second experiment work. 5. Carry out the second experiment work in Jakar. 6. Review and evaluate the second experiment.

<p>Preconditions Bhutan side provides</p> <ol style="list-style-type: none"> 1. Ensure the site for experimental work (Paro and Jakar) 2. The importance of personnel training does not change in the Bhutan telecom.

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ANNEX III: Organization Chart of the Project

	Bhutan side	Japanese side
Joint Coordinating Committee	<ul style="list-style-type: none"> ● Chief ICT Officer, Ministry of Information and Communication (MoIC) ● Chief Program Coordinator, Gross National Happiness Commission(GNHC) ● CEO, Bhutan Telecom Limited(BT) 	<ul style="list-style-type: none"> ● JICA Expert of the Project(Long Term Expert) ● Representatives of JICA Bhutan Office
Project Director	<ul style="list-style-type: none"> ● General Manager of Operation Division, BT 	
Project Manager	<ul style="list-style-type: none"> ● Project Manager of Druknet Division, BT 	
Counterparts	<ul style="list-style-type: none"> ● Engineer, Fiber Access Network, DrukNet Division(FTTX Design) ● Technician, Fiber Access Network, Druknet(FTTX Construction) ● Engineer, Fiber Access Network, DrukNet Division(GIS/GPS Operation) ● Manager, Corporate Office(FTTX R&D Engineering) ● Engineer, IP services, Druknet Division(Advanced BB) 	<ul style="list-style-type: none"> ● JICA Experts of the Project(Short Term Experts) ● Project Formulation Adviser of JICA Bhutan Office ● Program Officer of JICA Bhutan Office

List of Equipment (MATERIALS NEED FOR FIBER ACCESS NETWORK SECTION)

1. Splicing VAN 1 No.
2. Splicing Machines 2 sets
3. Small Excavator (wheeled mini excavator) with attached: Mini bucket, Skid steer for trenching and soil clearance 1 set
4. OTDR 2 sets
5. Power Meter 2 sets
6. Fault locator 2 sets
7. Tools kits 1 sets
8. FTTH passive Indoor materials: Outlets, patch cords, etc
9. Ducting Rods, 200 mtrs. 3 Nos.
10. Shimelar..... 10 pairs
11. Safety belts 10 Nos.
12. Wrench range 10 Nos.
13. Side cutter 20 Nos.
14. Cable web cutter 20 Nos
15. Water Pump 3 Nos.
16. Connector Punching tools20 Nos.
17. Cable ladder 5 Nos.
18. Soil remover 10 Nos.
19. Air blower 3 Nos.
20. Gas detector 3 Nos.
21. Optical fiber cables, etc.

22. Leakage voltage detector 5 Nos.
23. Bitumin Road surface cutter (Hydraulic Power) with attached: Disc cutter(Concrete, metal & stone),Trash Pump, Hydraulic Power Pack-Beaver (Rock breaking, concrete & cement cutting and demolishing) 1 No.

FOR GIS/GPS:

1. Hybrid Computer desktop (24") with High resolution Graphic card with CPU for digitizing the network infrastructure system. 1 Set
2. High version Lap top for mapping of GIS system 1 Nos
3. Two in one Color Printer & scanner for printing of maps (A3 & A4 size paper) 1 Nos
4. Plotter for printing of Maps max A0 size paper 1 Nos
5. Tablet /pad..... 1Nos
6. External Hard drive(terabyte) for GIS data backup 1Nos
7. GPS Pathfinder office 1 No.

ANY OTHER EQUIPMENTS/TOOLS REQUIRED FOR THE EXPERIMENTAL PROJECT SITES AND TRAINING

- (1) Collect information regarding actual technical standards and design guidelines of optical fiber in Bhutan.
- (2) Develop solution guideline, clarifying problems in work procedure and identifying solutions for each problem.
- (3) Conduct trial work according to the guideline.
- (4) Review and evaluate the trial work.
- (5) Elaborate manuals reflected the result of trial work.

5.4.2 Activities for output 5.3.2

- (1) Verify existing equipment including GIS/GPS system and check their conditions of deterioration.
- (2) Identify problems in operation and maintenance system related to the fiber optical network in Bhutan.
- (3) Develop guideline of equipment substitution and calculate annual budget to keep good condition of it.
- (4) Conduct technical guidance through local training for engineers working at BT headquarters office and local telephone exchange station.

5.4.3 Activities for output 5.3.3

- (1) Decide two trial sites to conduct experiment work.
- (2) Conduct site survey as a preparation for the experiment work.
- (3) Design and plan the experiment work including identify necessary equipment and budget.
- (4) Carry out the first experiment work in Thimphu following the plan.
- (5) Review and evaluate the first experiment in order to plan the second experiment work.
- (6) Carry out the second experiment work.
- (7) Review and evaluate the second experiment.

IV. PLAN OF OPERATIONS

Both sides had jointly prepared and agreed Plan of Operations (PO) as shown in ANNEX II. The activities of the Project are subject to change when necessity arises in the course of implementation.

V. MEASURES TO BE TAKEN BY JICA

The following matters were confirmed in the discussion between the Bhutan and JICA sides:

1. Dispatch of JICA experts

JICA will dispatch experts from Japan and/or other countries with its own expenses for the following purposes:

- 1) JICA will dispatch appropriate numbers of Long-Term and/or Short-Term experts during the project period, to ensure the smooth implementation of the Project. The

number of these experts will be decided each year by JICA according to the limitation of its budget and availability of personnel. Followings are the fields of the experts:

[Long term Expert]

-Chief Advisor/FTTX Technology and Quality Control of material and safety work

[Short term Expert]

- FTTX Design Expert
- FTTX Construction Expert
- GIS/GPS Operation Expert for Engineering
- FTTX R&D engineering Expert
- Advanced BB Application Expert
- Other fields, if necessary,

2. Provision of Machinery and Equipment

JICA will provide the necessary machinery and equipment for the implementation of the Project effectively and efficiently. The items and quantity of the equipment shall be decided by JICA within its budget limitation.

3. Short-Term Training in Bhutan and in Japan.

The Counterparts Training will be conducted within the Project budget for acquiring the knowledge and skills in concerned fields.

4. Expenses for Experiment Work

The Experiment Works are planned to be conducted in the Project, and JICA will provide the expenses for the implementation of FTTX. The quantity shall be decided by JICA within its budget limitation.

VI. MEASURES TO BE TAKEN BY BHUTAN SIDE

The following matters were confirmed in the discussion between the Bhutan and JICA sides:

1. Necessary Expenses

In accordance with the laws and regulations which are in force in Bhutan, the Bhutan side takes following measures at its own expenses.

- 1) Salaries, local traveling costs and daily subsistence allowance (DSA) for the Bhutan counterpart personnel,
- 2) Expenses for the maintenance of office facilities.
- 3) Running costs of project offices, i.e. electricity, water etc., and
- 4) Others to be discussed by both sides, when necessary.

2. Assignment of Counterparts

The Bhutan side agreed to assign necessary counterparts during the duration of the Project period and the counterparts will collaborate with Japanese experts to make the Project fruitful, effective and viable. The list of Counterpart personnel is provided and shown in ANNEX III.

3. Office Space and Furniture

Both sides confirmed that the office space and furniture for implementation of the Project shall be provided by the Bhutan side prior to the commencement of the Project.

4. Maintenance for machinery and equipment provided by JICA

Machinery and equipment provided by JICA when made available for the Project become the property of Bhutan side. They shall be used solely for the Project during the duration of the experiment works. During the duration of the experiment works, all operational and maintenance cost shall be borne by JICA side. All running and maintenance costs shall be borne by Bhutan side after the Experiment works. Bhutan side may put the equipment and machinery to any other use thereafter.

VII. ADMINISTRATION OF THE PROJECT

1. Joint Coordinating Committee

For the effective and successful implementation of the Project, the Joint Coordinating Committee (JCC) will be established to fulfil the following functions:

- 1) To approve the annual work plan of the Project based on the Plan of Operation (PO) within the framework of the Record of Discussions,
- 2) To oversee the overall progress of the annual work plan and to evaluate the result of the Project, and
- 3) To review and exchange opinions of major issues arisen from the Project.

JCC will be held at least once a year. The prospective members of JCC are listed in ANNEX III.

2. Counterpart

Mr. Karma Tshewang, General Manager of Operation Division, BT, as the Project Director will bear an overall responsibility for the administration and implementation of the Project.

Mr. Sonam Rinchen, Project Manager of Druknet Division, BT, as the Project Manager will be responsible for the managerial and technical matters of the Project.

The other counterparts are listed in ANNEX III.

VIII. EVALUATION

JICA, GNHC, MoIC and BT will conduct jointly the following evaluations and reviews.

1. Mid-term review at the approximately the half the period of the duration of the Project
2. Terminal evaluation at six (6) months prior to the end of the duration of the Project.

JICA will conduct the following evaluations and surveys to draw lessons from the Project to verify mainly the sustainability and the impact. GNHC, MoIC and BT will be requested to

provide necessary support (e.g. data relating to the Project, interview of C/P) for the survey.

1. Ex-post evaluation carried out generally at three (3) years after the completion of the Project; and
2. Follow-up surveys whenever necessary.

IX. RECORD OF DISCUSSIONS

The Record of Discussions will be signed between JICA Bhutan Office and GNHC prior to the commencement of the Project to determine the framework of the Project. The Record of Discussions will include the contents of this Minutes of Meetings.

X. OTHERS

1. Equipment

The suggestion by the Team to utilize construction vehicles that have given through the Follow-up Cooperation of the Project for Development of the Domestic Telecommunication Network (Equipment Supply) in JFY2003 was accepted by Bhutan side.

2. Dispatch of Advanced BB Application Expert

BT suggested to consider the dispatching schedule of Advanced BB Application Expert earlier than mentioned in PO(annex II) and Team agreed it.

ANNEX

ANNEX I.	PROJECT DESIGN MATRIX (PDM), VERSION 0
ANNEX II.	PLAN OF OPERATIONS (PO), VERSION 0
ANNEX III.	ORGANIZATION CHART OF THE PROJECT
ANNEX IV.	LIST OF EQUIPMENT
ANNEX V.	RECORD OF DISCUSSIONS (DRAFT)

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<p>Activities [Activities for Output 1: "Three technical manuals are developed. (1. FTTX design/construction manual, 2. Quality inspection and FTTX specification, 3. Safety work management)."] 1. Collect information regarding actual technical standards and design guidelines of optical fiber in Bhutan. 2. Develop solution guideline, clarifying problems in work procedure and identifying solutions for each problem. 3. Conduct experiment work according to the guideline. 4. Review and evaluate the experiment work. 5. Elaborate manuals reflecting the result of experiment work.</p>	<p>Input from Bhutan side 1. C/Ps 2. Necessary Expenses (e.g. Salaries, local traveling costs and daily subsistence allowance (DSA) for the Bhutan counterpart personnel) 3. Assignment of C/P Office space, Furniture for Japanese experts (e.g. desks, etc.), and transportation vehicle to project sites 4. Maintenance for machinery and equipment provided by JICA 5. Means of communication at the head office (e.g. Internet connection)</p>	
<p>[Activities for Output 2: "O&M system is developed."] 1. Verify existing equipment including GIS/GPS system and check their conditions of deterioration. 2. Identify problems in operation and maintenance system related to the fiber optical network in Bhutan. 3. Develop guideline of equipment substitution and calculate annual budget to keep good condition of it. 4. Conduct technical guidance through local training for engineers working at BT headquarters office and local telephone exchange station.</p>	<p>Input from Japan 1. Experts [Long term Expert] -Chief Advisor/FTTX Technology and Quality Control of material and safety work [Short term Experts] - FTTX Design Expert - FTTX Construction Expert - GIS/GPS Operation Expert for Engineering - FTTX R&D engineering Expert - Advanced BB Application Expert -Other fields, if necessary</p>	
<p>[Activities for Output 3: "Experiment work in trial site (two areas) is completed."] 1. Conduct site survey as a preparation for the experiment work. 2. Design and plan the experiment work including identification of necessary equipment and budget. 3. Carry out the first experiment work in Phuntsholing following the plan. 4. Review and evaluate the first experiment in order to plan the second experiment work. 5. Carry out the second experiment work in Mongar. 6. Review and evaluate the second experiment.</p>	<p>2. Provision of machinery and equipment for Training and Field trial work 3. Training of counterpart personal in Bhutan and in Japan 4. Local expenses for the project activities Teaching materials for training //workshop/seminars</p>	<p>Preconditions Bhutan side provides: 1. Ensure the site for experimental work (Phuntsholing and Mongar) 2. The importance of personnel training does not change in the Bhutan telecom.</p>

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INITIATIVE PLAN OF OPERATION (P/Q)

		2014												2015												2016												2017	
Calendar Year	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			
① Chief Advisor/FTTX Technology and Quality Control		[Timeline bar]																																					
② FTTX Design Expert		[Timeline bar]																																					
③ FTTX Construction Expert		[Timeline bar]																																					
④ GIS/GPS Operation Expert for Engineering		[Timeline bar]																																					
⑤ FTTX R&D engineering Expert		[Timeline bar]																																					
⑥ Advanced BB Application Expert		[Timeline bar]																																					
Japanese Fiscal Year		[Timeline bar]																																					
Calendar Year		[Timeline bar]																																					
Activities		[Timeline bar]																																					
0. Preparation for start-up (Interviews with related department of BTL)		[Timeline bar]																																					
1-1. Lecture on outline of FTTX engineering works (for staff of BT HQ)		[Timeline bar]																																					
1-2. Development of field trial operation manual (FTTX materials distribution inspection manual) (Business administration expert)		[Timeline bar]																																					
1-3-1. Review FTTX technical standards manual (by O/P under supervision of Expert)		[Timeline bar]																																					
1-3-2. Developing a manual for FTTX technical knowledge (C/P)		[Timeline bar]																																					
1-4. Developing a manual on safety work and management (by C/P under supervision of Expert)		[Timeline bar]																																					
2-1. Site survey for 1st FTTX Field Trial		[Timeline bar]																																					
2-2. Instructing FTTX Design on the spot (by C/P under supervision of Expert)		[Timeline bar]																																					
2-3-1. Conduct FTTX Engineering (Splicing&Distribution) (by C/P under supervision of Expert)		[Timeline bar]																																					
2-3-2. Conduct FTTX Engineering (Splicing&Distribution) (by C/P)		[Timeline bar]																																					
2-4. Assessing and Analyzing the 1st trial work		[Timeline bar]																																					
2-5. Conduct 2nd FTTX Field Trial		[Timeline bar]																																					
2-6. Assessing and Analyzing 2nd trial work		[Timeline bar]																																					
3-1. Developing training materials (by C/P under supervision of Expert)		[Timeline bar]																																					
3-2. Developing training curriculum		[Timeline bar]																																					
3-3. Implementing the 1st FTTX training (by C/P /Expert supervised)		[Timeline bar]																																					
3-4. Assessing 1st FTTX training		[Timeline bar]																																					
3-5. Implementing 2nd training (by C/P /Expert supervised)		[Timeline bar]																																					
3-6. Conduct training on FTTX facility management technique by GIS / GPS		[Timeline bar]																																					
3-7. Conduct training on FTTX for each regional office staff (Collect of requests for improvement , Solution of field maintenance)		[Timeline bar]																																					
3-8. Training in Japan		[Timeline bar]																																					
4-1. Convene the Workshop /IT seminar to share the experience outcome, etc of the project		[Timeline bar]																																					
4-2. Monitor the project based on the plans (Preparing the progress Report for the Project)		[Timeline bar]																																					

ANNEX III: Organization Chart of the Project

	Bhutan side	Japanese side
Joint Coordinating Committee	<ul style="list-style-type: none"> ● Mr. Karma Wangdi, Chief ICT Officer, Ministry of Information and Communication (MoIC) ● Mr. Lhendup Wangdi, Chief Project Coordinator, Gross National Happiness Commission (GNHC) ● Mr. Nidup Dorji, CEO, Bhutan Telecom Limited (BT) 	<ul style="list-style-type: none"> ● JICA Expert of the Project (Long Term Expert) ● Chief Representative of JICA Bhutan Office ● Director of Transportation and ICT Division 2, Economic Infrastructure Department of JICA HQ
Project Director	<ul style="list-style-type: none"> ● Mr. Karma Tshewang, General Manager of Operation Division, BT 	-
Project Manager	<ul style="list-style-type: none"> ● Mr. Sonam Rinchen, Project Manager of Druknet Division, BT 	-
Counterparts	<ul style="list-style-type: none"> ● Mr. Dorji Yeshe, Engineer, Fiber Access Network, DrukNet Division (FTTX Design) ● Mr. Rinzin Dorji and Mr. Nima Lotey, Technician, Fiber Access Network, Druknet (FTTX Construction) ● Mr. Ugyen Dorji, Engineer, Fiber Access Network, DrukNet Division (GIS/GPS Operation) ● Mr. Jambay Sither, Manager, Corporate Office (FTTX R&D Engineering) ● Mr. Sangay Wangchuk, Engineer, IP services, Druknet Division (Advanced BB) 	<ul style="list-style-type: none"> ● JICA Experts of the Project (Short Term Experts) ● Project Formulation Adviser of JICA Bhutan Office ● Program Officer of JICA Bhutan Office

List of Equipment (MATERIALS NEED FOR FIBER ACCESS NETWORK SECTION)

1. GPON Equipment (GPON system & Access Cabinets) as pilot project 2 sites
2. Splicing VAN ----- 1 No.
3. Splicing Machines 2 sets
4. OTDR 2 Sets
5. Power Meter 2 sets
6. Fault locator 2 sets
7. Tools kits 2 sets
8. FTTH passive Indoor materials: Outlets, patch cords, etc
9. Ducting Rods, 200 mtrs. 5 Nos.
10. UG drilling machines (if possible) 1 No.
11. Semira 10 pairs
12. Safety belts 10 Nos.
13. Wrench range 10 Nos.
14. Side cutter 20 Nos.
15. Cable web cutter 20 Nos
16. Water Pump 3 Nos.
17. Connector Punching tools 20 Nos.
18. Cable ladder 5 Nos.
19. Soil remover 20 Nos.

FOR GIS/GPS:

1. GIS Software ArcGIS 10/10.1. Or Intergraph Software for Fiber Management(G-technology)
2. Hybrid Computer desktop (24") with High resolution Graphic card with CPU for digitizing the network infrastructure system.
3. High version Lap top for mapping of GIS system
4. Two in one Color Printer & scanner for printing of maps (A3 & A4 size paper)
5. Plotter for printing of Maps max A0 size paper
6. Digital Camera with external card
7. External Hard drive (terabyte) for GIS data backup

ANY OTHER EQUIPMENTS/TOOLS REQUIRED FOR THE EXPERIMENTAL PROJECT SITES AND TRAINING



