Project Evaluation Report

Subject : National Broadband Network (NBN) Project

Proponent : Department of Transportation and Communications (DOTC)

Date : 29 March 2007

Background

1. The quality of telecommunications infrastructure that serves as the backbone for the application of a wide range of Information and Communications Technology (ICT) and multimedia services is seen as one of the drivers for socioeconomic growth and a key to finding the country's proper niche in the global knowledge economy.

2. Despite the substantial progress that has been made in terms of broader access to communications/information and increase in telephone density primarily through private sector expansion, the current status of the Philippine communications sector still reflects the wide disparity of digital infrastructure deployment between major urban centers and rural areas. While the country has the capacity in the domestic broadband network with international connectivity, the availability of broadband facility is concentrated in urban areas as driven by market forces. Hence, there is still a need for more access points, especially in the rural communities, to provide the population equitable access to information and communications services.

3. Meanwhile, the current telecommunications networks owned and operated by the government (i.e., National Telephone Program, Municipal Telephone Public Calling Office and Telepono sa Barangay) through the Department of Transportation and Communications Telecommunications Office (DOTC-TELOF) that provided alternative backbone transmission network to improve the public's access to telecommunications facilities and services, are near or past the end of their useful life. These networks are already outmoded and were primarily designed as a voice network allowing for very limited data with no internet capability.

4. At present, various government bodies are also maintaining individual telecommunications infrastructure necessary for service delivery to the public. Also, the seemingly uncoordinated implementation of various telecommunications and ICT programs/projects has resulted to inefficiency and waste of valuable government resources. While various government agencies may have its own telecommunications system desired to fulfill each unique mandate, ultimately the interconnection of all government telecommunications infrastructure network is necessary to effectively maximize the use of these facilities for better coordinated and collaborated advocacy, information dissemination and knowledge transfer.

5. The National Broadband Network (NBN) project was conceptualized in view of the Cyber Corridor initiative highlighted by the President during her July 2006 State of the Nation Address, which will serve as the comprehensive solution for fast-tracking national ICT development as envisioned in the Cyber Corridor program, particularly for the provision of ICT and digital infrastructure to address the digital divide.

6. The NBN project was configured based on the results of study conducted by the Bids and Awards Committee (BAC) for ICT that was commissioned by DOTC, in response to the

President's instruction during the 13 February 2007 Joint NEDA-ICC and Cabinet meeting for DOTC to sort out possible overlaps of the proposed Cyber Education Project (CEP) of the Department of Education (DepED) with existing and proposed projects of similar nature. To wit, BAC-ICT (*per joint DOTC/CICT letter to NEDA dated 1 March 2007 conveying BAC-ICT Resolution*), primarily recommended the establishment of a single national broadband network subject to the following conditions:

a. The project should satisfy the network requirements of government agencies for VoIP, e-Government and e-Education;
b. The system should be designed implemented considering the demands in areas not covered by existing services. Corollary, the system shall take into account and utilize and integrate, if possible, the existing private and public telecommunications infrastructure; and
c. The funding shall fully cover all requirements of the project, including those for the initial operation and maintenance.

7. With the provision of a single platform broadband network, one of the substantial impacts of the NBN proposal is that the subsequent government ICT-based projects can now be easily implemented using the NBN infrastructure.

8. The project, as originally configured, was presented to the 26 March 2007 joint ICC-CC and ICC-TB and the 27 March 2007 meeting of the NEDA Board.

Sectoral Program Context

9. As provided in the Medium-Term Philippine Development Plan (MTPDP, 2004-2010) the NBN project is consistent with the government's thrust, among which:

a. Developing the country's digital infrastructure to provide more public access points for delivery of e-Government services;
b. Adoption of VoIP as alternative means of communications that could reduce cost of connectivity; and
c. Rationalization of existing government network infrastructure to enable sharing and interconnection of network resources among branches of the government to facilitate seamless transfer of knowledge within the government.

10. Moreover, the proposal is consistent with the 2 June 2006 NEDA INFRACOM-Cabinet Level suggestion/decision on the need for a single platform government broadband network with multiple applications in the delivery of government services.

11. The proposed project is included in recently updated Medium-Term Public Investment Program (MTPIP) and the Comprehensive and Integrated Infrastructure Program (CIIP) for 2006-2010.

Regional and Spatial Context

12. The proposed wireless communications network to be provided under the project will function as the universal network to which the existing government telecommunications facilities can be integrated. The network then will serve as the vital communication link to all agencies/government offices providing access to remote offices.

13. In doing so, a total of 300 base stations will be deployed in strategic sites/regional areas nationwide that will practically cover the entire country. These stations will serve as Regional Communication Centers (RCC).

14. Overall, the infrastructure for the NBN project is envisioned to serve 2,295 major government agency/offices including regional offices and 23,549 municipal/barangay offices nationwide.

(see Annex-A: Coverage Map)

Objectives

15. The proposed project aims to establish a nationwide wireless broadband network for the Government of the Philippines that will allow seamless connectivity among all national government agencies down to the barangay offices of the Local Government Units (LGUs) to enhance the delivery of various government services to the people.

16. Specifically, the proposed communications platform (intranet with internet gateway) that will host multiple ICT applications/services aims to facilitate government coordination and reduce transactions costs.

Description

17. The proposed project will build an Internet Protocol (IP)-based national broadband network (NBN), as a single platform infrastructure network for the implementation of ICT services such as data, voice, video/video conferencing, and Internet. This will entail upgrading of the existing government telecommunications facilities of TELOF into an IP-based network to provide more public access points and extend ICT services particularly to unserved/underserved areas.

18. As an option, the proposed project may also provide additional comprehensive and customized software applications such as Coalition Emergency Response System (CERS), and e-Government System as value-added full-featured applications that are readily available and can be easily implemented using the proposed network.

19. *Project Components*. The proposed project has two (2) main components namely the: (a) the NBN Infrastructure; and (b) Network Application Systems/Services (e-Government services), as follows:

    a. *NBN Infrastructure.* This will involve the design, site preparation, installation, commissioning for all the network technical subsystems of the NBN architecture. Training on the management, testing, operation and maintenance of the system will also be provided as well as an 18-month management assistance and technical support services.

    b. *Network Application Systems/Services.* Based on the NBN infrastructure, the project will primarily provide Voice over Internet Protocol (VoIP) service to all government offices, and Video Conferencing system to provide real time inter-office conferencing (for limited locations only). As an option, other value-added services may be offered such as CERS for disaster alerts; and e-Government System for integrated government internet portal and technology platform.

Project Cost and Financing

20. The total project cost is estimated at PhP16,474.06 million[1], no local components required. The breakdown of project cost by major activity/component is as follows:

Table 1. Project Cost (in million Pesos)

Activity/Component	Year 1	Year 2	Year 3	Total
	Loan (China)			
1. Machineries/Equipment *	**3,659.68**	**3,453.09**	**2,589.81**	**9,702.58**
2. Services	**2,079.02**	**2,056.56**	**1,567.23**	**5,702.81**
(a) Skilled Services	406.54	412.15	309.11	1,127.80
(b) Unskilled Labor Cost	235.98	231.77	173.83	641.59
(c) Local Outsourced Services	1,337.25	1,313.38	985.04	
3. Managed Service & Link Charges		**453.72**	**614.95**	**1,068.68**
TOTAL	**5,738.70**	**5,963.36**	**4,772.00**	**16,474.06**

**Machineries/Equipment costs are inclusive of CIF Manila, without taxes.*

(see Annex-B: Project Cost Annual Breakdown, for full details of the estimated project cost)

21. The total project cost amounting to PhP16,474.06 million (US$329.48 million) is proposed to be financed through an Official Development Assistance (ODA) Loan from China (i.e., Concession Buyer's Credit of Chinese Government with a 15-year term including 5-year grace period and 10-year repayment period). The loan interest is assumed to be at a maximum of 3% p.a., and the principal amount of the loan will be repaid in 20 equal and consecutive semi-annual installments, the first one falling due 5.5 years after the first drawdown under the loan agreement.

22. The project management cost amounting to PhP298 million is included in the loan amount. Project management of PhP99.25 million per year for the 3-year implementation period will cover the personnel, office expenses, travel expenses, among others.

23. Managed Service & Link Charges include an 18-month technology transfer period covering the operations and management of the whole network and the link charges for the interim solution of using local service providers.

Institutional Arrangements

24. The proponent/implementing agency of the proposed project is DOTC through TELOF as the telecommunications operating arm of the government for providing such services in several localities in the country, particularly in areas where no such private sector services are available. The NBN will be operated and maintained by DOTC-TELOF.

25. In order to meet the critical aspects of the build-out plan of the project, a Project Management Office (PMO) will be formed by DOTC (from qualified TELOF personnel) who will be dedicated to the NBN and who will manage and coordinate all aspects of the construction phase together with the contractor's Project Management Team.

[1] with built-in contingency costs; exclusive of taxes for equipment; exchange rate of US$1.00 = PhP50.00

Implementation Schedule

26. The proposed project is estimated to be implemented over a period of three (3) years, with an estimated project life of 15 years. The infrastructure built for the NBN project has a sustainable lifespan of at least 15 years.

27. The first 18 months of the project will be devoted to the infrastructure buildup and development of major NBN subsystems. Meanwhile that the transmission infrastructure and IP backbone is being setup, and as early as the pre-operational phase of the project, several base stations will be deployed in areas not yet covered by the backbone so as to serve the urgent need for broadband network access. In this case, interconnection with the local commercial network (private operator) will be necessary, which can be implemented through Virtual Private Network (VPN)[2] technologies.

28. The Table below shows the number of targeted regional communication centers for infrastructure buildup, as well as the number of targeted national government agencies and municipal/barangay offices for the 3-year implementation period, as indicated in the proposal:

Table 2: Schedule of Sites Buildup and Coverage

	Year	1	2	3
Regional Communications Center (RCC) (WiMAX base stations)		100	200	300
Major Gov;t Agency Offices		800	1,500	2,295
LGUs: Municipalities & Barangays		10,000	18,000	23,549

Note: cumulative targets

29. As an integral part of the plan to ensure success of the project, an 18-month managed service provision will be contracted during the implementation period and infrastructure buildup for purposes of technology transfer to guarantee appropriate technology assimilation necessary for sustainability of operations.

Technical Evaluation

30. ***Overall NBN Architecture and Technical Subsystems***. The proposed NBN makes use of several flexible, configurable and advanced technical solutions designed to create an open standard network and an expandable platform for various ICT network applications/services.

    NBN Infrastructure. NBN involves the creation of a wireless communication infrastructure based on a two-level hierarchal network topology, formed through the integration of a Network Transmission Backbone and Regional WiMAX Network Clusters, with a central data center.

[2] **VPN** refers to a technology that establishes a private or secure network connection within a public network, such as the Internet. By using a tunneling protocol and security procedures, data sent across the Internet is encrypted, so the entire network is "virtually" private. The idea of VPN is to give the company the same capabilities at much lower cost by using the shared public infrastructure rather than a private one.

a. *Network Transmission Backbone*. This will serve as the main transmission facility which will build upon the existing microwave radio transmission network and facilities of TELOF,[3] providing necessary migration and equipment upgrading to convert the current network of TELOF into a nationwide broadband IP application oriented transmission backbone[4].

The topology of the existing microwave transmission will also be extended to more regions and areas to accommodate broadband coverage requirements for government communication requirements and ICT services. This will involve setting-up of about 75 new microwave relay stations and corresponding multiplexors[5] beyond the current TELOF topology.

The NBN will employ a hybrid-backbone solution. It uses the TELOF backbone where it is available since it is government-owned and no incremental cost is necessary. Commercial backbone may also be used where it is available and as required utilizing VPN technologies to integrate the network regardless of the carrier used while maintaining a single point of network administration.

b. *WiMAX Network Cluster*. This will serve as the last mile distribution based on the Worldwide Interoperability for Microwave Access (WiMAX) cluster technology which may be connected with local commercial networks (e.g., DSL Internet access provided by private telecom operators). Each cluster consists of a Regional Communication Center connected directly to the remote communication centers through a point-to-multipoint WiMAX fixed wireless connection. This will extend the transmission backbone network to remote sites by providing local wireless broadband network access from regional central sites to remote offices and LGU sites.

At each interconnection point (TELOF backbone, or commercial), a WiMAX base station will be installed. The entire Philippines will be practically covered through the wide reach of WiMAX of about 30 km radius. A total number of 300 base stations (based on IEEE 802.16-2004 WiMAX-ready standard) will be setup including Customer Premise Equipment (CPE) that will be deployed to end-user sites (i.e., one CPE per site).

c. *Integrated Data Center (IDC)*. The real-time monitoring, operation, maintenance and control of the nationwide ICT infrastructure and applications will be centralized through the establishment of a national IDC that will provide centralized hosting of core network equipment, servers, and network management platform, among others.

d. *IP Core Network*. Based on the network transmission backbone and regional WiMAX network clusters, a nationwide IP Network will be set-up, building an advanced, reliable and scalable broadband IP network capable of supporting various services including voice, video, and Internet access, among others, that supports dual protocols

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[3] This will cover the existing TELOF facilities such as the National Telephone Program: NTPI-2 (Visayas backbone) and NTPI-3 (Mindanao backbone); Municipal Telephone Public Calling Office (MTPO); and Telepono sa Barangay (TSB). The utilization of TELOF resources will involve use of current facilities such as microwave towers, equipment rooms, power supplies and other systems as may be needed by the project.

[4] The existing Plesiochronous Digital Hierarchy (PDH, at 40Mbps) microwave links of TELOF will be overlaid by Synchronous Digital Hierarchy (SDH, at 155Mbps upgradeable to 622Mbps) microwave links, which will involve about 70 microwave relay stations, and about 70 transmission multiplexors.

[5] Multiplexor is a communications device that combines several signals for transmission over a single medium.

of IP version 4 and 6 (IPv4/v6). Based on the geographical characteristics and IP-based network service planning, a nationwide IP Virtual Private Network (VPN) network shall be set up with a total number of 30 nodes.

NBN Technical Subsystems. The following are the main technical subsystems of the NBN:

e. *Subsystems for Network Support and Management.* The NBN is designed to be a secure and reliable system using advanced technologies/techniques of network management as follows:

e.1. *Network Security Management.* This will involve a comprehensive network security system with firewalls, intrusion prevention system, security scanner, anti-virus, and email security gateway, among others. It also includes network access control system, unified user identity management, and endpoint security system.

e.2. *Centralized Monitoring and Surveillance.* The system enables real time centralized information monitoring of the network to include, UPS functional status, normal operation, air-conditioning, water detection, fire alarm, AC power, and temperature, among others. This will implement computerized supervision, control and management with four tele-functions (i.e., tele-metering, tele-signaling, tele-control and tele-vision) on the power equipment and environment of end offices to enhance safe guard and supervision.

e.3. *Unified Network Management System (UNMS).* This will allow for integrated network management capability with management functions as topology management, configuration management, fault management, performance management and system security management.

f. *Subsystems for e-Government Services.* The NBN infrastructure and IP network will have the capability for voice, video, data, Internet access and other application services that can be provided through the following systems/solutions:

f.1. *VoIP System.* The VoIP solution for the NBN is fully compliant with the industry standard layered Next Generation Network (NGN) architecture. A NGN core network will be setup to provide the hardware/software for the nationwide VoIP services. The system is capable of supporting the voice requirement for the targeted government offices and can also be applicable to be extended to rural telephone and intra-line for other government organization. Likewise, the system can interface with existing local telecom operator's Public Switched Telephone Network (PSTN) and mobile network by deploying VoIP gateways in the proposed sites.

f.2. *Video Conferencing System (VCS).* As a value-added service, the network can be designed to build a video conferencing network based on the national transmission backbone and IP network, that can support various types of conferences (e.g., from point-to-point conference to multiple multipoint conferences), but for limited locations only, that may cover 3-5 sites. As an option the VCS may be extended to cover other sites within the network.

* *Optional System Applications:*

f.3. *Coalition Emergency Response System (CERS).* As an option, this solution is intended to speed up response time for disaster alerts and alarm information regarding

fires, floods, traffic accident, disease, terrorist threats and attacks. It includes alarm receiving and handling system.

f.4. *E-Government System*. As an option, this solution will provide an integrated government information portal and document management system that includes e-Administration system, e-Library Solution and Inventory Management, etc.

31. ***On Microwave Frequency***. For the transmission backbone, the project proposes to use the existing microwave frequencies used by TELOF, namely 6GHz and 7GHz band, among others. For the WiMAX frequency, the 3.5GHz band is proposed. The National Telecommunications Commission (NTC) has already re-allocated several frequency bands for broadband wireless access (*per NTC Memorandum Circular No 06-08-2005*), among which is the 3.4-3.6GHz band.

32. ***Network Performance Standard.*** The system is based on an open standard network with a platform for network and application transportability and compatibility, using advanced technologies that can interconnect with any telecommunication system and allow housing of existing and future government computerized applications, thereby saving on future infrastructure expense. With the high-performance, easy-to-extend structure of WiMAX technology, new remote centers can be added into the NBN system. The advantages of the solution to be provided by the network include standard-based system, modular design, high capacity and throughput, large coverage, and end-to-end solution.

33. ***New technology to be introduced***. The NBN leverages on flexible, configurable and advanced technical solutions, among which is the WiMAX technology that will be used to connect remote offices into the regional communications center in the proposed wireless communication infrastructure. WiMAX is a fast-emerging standards-based technology for Metropolitan Area Networks (MAN) based on the IEEE 802.16 family of standards that enables the delivery of last mile wireless broadband access as an alternative to cable-modem and DSL[6] service, among others. WiMAX is capable for high bandwidth with long-range transmission (typically 20-30 km range) making it applicable for remote and suburban last mile medium.

a. *Advantages of WiMAX vs. technical alternatives*. The key advantages of WiMAX include lower cost, wider coverage, higher capacity, ease of installation, and a standard for fixed and mobile wireless access. The prevalent problems with current broadband access are the high cost of service and limited areas of coverage. WiMAX is a wireless technology so it would be less expensive and easier to install and extend to the suburban and rural areas than wired solution such as cable or DSL, which often require laying cables, and ripping up buildings and streets. Also, unlike Wireless Fidelity (WiFi) access that only allows communications within relatively small area called WiFi hotspots (about 30 meter range), the WiMAX has wider a reach. While none of these advantages on its own would determine the success of WiMAX, their combination gives it an unprecendented flexibility that positions WiMAX to become a mass-market technology in the near future. Further, the VSAT-based transport network has its usefulness especially in areas where neither the commercial nor the TELOF backbone can reach. However, a pure VSAT solution for nationwide connectivity would entail high project cycle cost per site (i.e., recurring cost of transponder space lease). In addition, because of the high delay/latency (almost half a second on single direction travel, or a full second on a two-way

[6] DSL (Digital Subscriber Line) is a technology for bringing high-bandwidth information to homes and small businesses over ordinary copper telephone lines. A DSL line can carry both data and voice signals and the data part of the line is continuously connected.

conversation), the VSAT solution is not fit for interactive applications, though tolerable when no other alternative is available.

b. *Proposed WiMAX Solution*. The WiMAX solution is proposed to be outsourced through the services of Alvarion, a premier provider/supplier of integrated broadband wireless access (BWA) solutions to telecom carriers, service providers and enterprises globally. Nevertheless, it would be worthwhile to explore other alternative providers, such as the SR Telecom, among others, with due consideration on cost, capacity, performance, compatibility, user requirements, industry market, etc.

Environmental Impact

34. Although Administrative Order No. 42 issued by the Office of the President stipulates that only projects that pose potential significant impact on the environment shall be required to secure an Environmental Compliance Certificate (ECC), the proponent may need to secure an ECC from DENR-EMB considering that the project includes the extension of backbone network to complete a loop for link redundancy.

Economic Analysis

35. The economic cost estimates of the project include the (a) investment costs and (b) operating and maintenance costs. Shadow price factors of 1.2 and 0.6 were applied on all foreign exchange and unskilled labor costs, respectively.

36. The proponent identified the following quantifiable direct economic benefits on various cost savings and/or avoided costs components to government accruing from the services and network applications to be provided by the broadband network:

- *Benefits to Government Offices*:

a. *Savings from O&M of old government communications network*. The current communications network of TELOF are near or past the end of their useful life, since most of them were implemented during the early 1990's. The network could not be properly maintained since most spare parts are getting difficult to source and are becoming too expensive. By overlaying a newer technology, maintenance and personnel expenses will be saved. Using the existing facilities, tower, and land and equipment room will also save the government by utilizing an asset that would be idle otherwise.

b. *Savings on communication expenses due to VoIP*. Based on the proposed VoIP government network, calls (including fax) to and from broadband network covered areas will become local calls thus saving on long distance calls (NDD) as well as the fixed cost of phone subscriptions. It is assumed that about 80% of total NDD (including fax and calls to mobile) expenses will be saved.

c. *Savings on Internet connection*. Corollary to all the NBN applications is an IP data network for all the offices connected to the NBN. This will provide Internet connection to the office at bandwidths much higher than any xDSL (sDSL, aDSL, DSL2 and DSL2+)[7]. It will afford a simpler implementation of office/enterprise security/firewall since it will not require a multiple DSL connection (separate DSL connection per section) that is prevalent nowadays.

[7] xDSL refers to different variations of DSL, such as ADSL, HDSL, iDSL and RADSL.

d. *Savings on centralized IDC*. NBN also includes a full-blown Integrated Data Center (IDC) that can host all government applications. Applications software and databases can be hosted in the central IDC and saves on individual and separate Data Centers or Computer Centers in various government departments, agencies and offices. It can free office space, data center power supplies, maintenance personnel tasked to backup databases, computer operators, technicians, etc. The government offices can just concentrate on the applications and database content without being bothered with the back office maintenance associated with Data Center operations. In addition, there will be savings on economies of scale.

- *Benefits to Local Government Units*:

e. *Savings from Avoided Travel*. Traditionally, folks from the province come to Manila or regional offices to follow up their retirement, medical and/or death benefits. They also need to follow land titles and other governmental services. Often times, they need to travel multiple times due to supporting documents requirement were not clear to them or the person they need to see is out of town, on leave or on training. By providing Internet access to Barangay centers, provincial folks can check supporting documentary requirements in the website before they make the trip.

f. *Savings on Internet Connection of LGUs*. Local government units (Barangay and Municipalities) are provided Internet connection. This savings represent the avoided expense from Internet subscription of each of the LGU offices.

g. *Savings from VoIP in Barangay and Municipal Halls*. LGUs may use VoIP phones to coordinate with other LGUs or any government office and agencies for their constituents. This savings represents the avoided cost of paying for the long distance calls.

37. Considering the abovementioned adjustments and assumptions, the results of the NPV and EIRR indicate that the project is economically viable. The NPV was calculated to be PhP11,056.77 million while the EIRR is 29.6% against a 15% hurdle rate. A Table for the economic evaluation is shown in Annex-C.

38. In addition, notwithstanding the socio-economic benefits of ICT in other various sectors other foreseen unquantifiable economic benefit that may be derived from the project includes potential savings from "paperless" transactions particularly for all government offices connected to the broadband network. However, cost estimates from this could not be accurately computed.

39. More importantly, using a single broadband network, subsequent government ICT-based projects can be easily implemented and utilize the NBN. It will do away with duplicating construction and operating cost for each and every ICT projects if projects continue to build or negotiate leases on their own.

40. Financial analysis of the project is not included since the subject project is not supposed to be revenue-generating. However, since the economic benefits are based on government savings, the foregoing economic analysis may be applicable as a proxy financial indicator.

Concerns/Issues

41. Considering the nature and scope of the project which will provide communication linkage to all national government agencies and LGUs, an Executive Order (EO) is necessary directing utilization of the NBN project to realize its potential benefits.

42. DOTC has yet to secure ECC from DENR for the project.

43. DOTC must ensure dedicated allotment of the proposed 3.5GHz band for the NBN network.

Action/Recommendation

44. The project may be favorably recommended in view of the following:

    a. Consistency of the project with the government's thrust of promoting digital infrastructure development for provision of ICT services across the county to address the digital divide;
    b. Rationalization of the government communications network in enhancing transactions for better delivery of government services to the people; and
    c. Robust economic viability of the project.

45. For consideration/discussion.

RUBEN S. REINOSO, JR.
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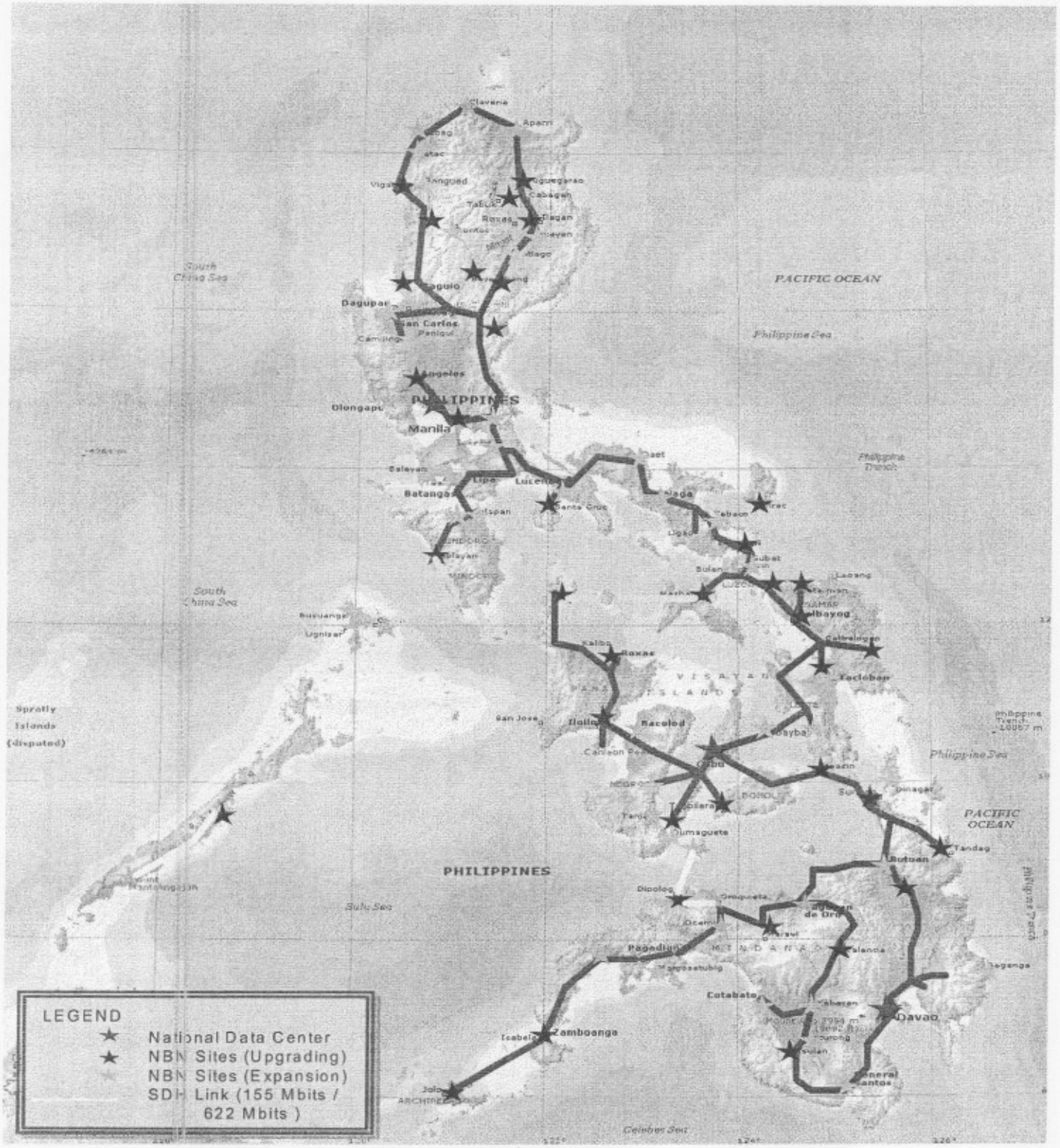
ANNEX-A
Coverage Map



ANNEX-B

Project: National Broadband Network Project
Proponent: DOTC

Project Cost Annual Breakdown
(in million Pesos)

Activity/Component	Year 1	Year 2	Year 3	Total
	Loan (China)			
1. Machineries/Equipment	**3,659.68**	**3,453.09**	**2,589.81**	**9,702.58**
(a) Supply of Equipment:				
Transmision Backbone	714.74	952.98	714.74	2,382.45
Regional WiMax System	1,231.16	1,641.55	1,231.16	4,103.88
IP Backbone Equipment	232.65	310.21	232.65	775.51
VoIP System	227.64	303.52	227.64	758.79
Data Center/NOC Equipment	448.89			448.89
Information Security System	337.15			337.15
Monitor & Environment Equipment	176.64			176.64
Uniform NMS	107.18			107.18
DC Power & Diesel Generator	172.58	230.10	172.58	575.26
(b) Seafreight and Transport Insurance Fees				
Seafreight	9.74	12.99	9.74	32.48
Insurance	1.30	1.74	1.30	4.34
2. Services	**2,079.02**	**2,056.56**	**1,567.23**	**5,702.81**
(a) Skilled Services				0.00
System Implementation & Engineering	309.11	412.15	309.11	1,030.37
Training	97.43			97.43
(b) Unskilled Labor Cost	235.98	231.77	173.83	641.59
(c) Local Outsourced Services	1,337.25	1,313.38	985.04	
*Outsourced Services:				
Site Preparation & Civil Works (Backbone & Base Stations)	728.57	971.42	728.57	2,428.55
Site Engineering for Remote Office Sites	430.30	573.74	430.30	1,434.34
Services for IDC Construction & Integration	414.36			414.36
Joint Project Management Office	99.25	99.25	99.25	297.75
3. Managed Service & Link Charges		**453.72**	**614.95**	**1,068.68**
(a) Managed Service		323.76	420.01	743.78
(b) Link Charges		129.96	194.94	324.90
TOTAL	**5,738.70**	**5,963.36**	**4,772.00**	**16,474.06**

ANNEX-C

Project: **National Broadband Network Project**
Proponent: DOTC

Economic Analysis
(in million Pesos)

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Benefit																
(a) Savings to Government																
O&M of Old Gov't Equipment			763.17	785.99	809.96	835.13	861.56	889.31	918.44	949.04	981.16	1,014.88	1,050.30	1,087.48	1,126.53	1,167.52
VoIP on Government Offices			537.22	1,057.64	1,699.11	1,784.06	1,873.26	1,966.93	2,065.27	2,168.54	2,276.96	2,390.81	2,510.35	2,635.87	2,767.66	2,906.05
Internt Access			288.08	513.14	745.85	708.56	673.13	639.47	607.50	577.12	548.27	520.85	494.81	470.07	446.57	424.24
Centralized IDC			137.28	171.60	157.30	214.18	308.98	308.98	308.98	308.98	308.98	308.98	308.98	308.98	308.98	308.98
(b) Savings to LGU's																
Avoided Travel			89.87	174.61	246.57	266.15	287.28	310.09	334.71	361.29	389.98	420.94	454.36	490.44	529.38	571.41
Internet Access			239.30	545.60	777.48	738.60	701.67	666.59	633.26	601.60	571.52	542.94	515.79	490.00	465.50	442.23
Barangay VoIP			382.50	688.50	900.75	900.75	900.75	900.75	900.75	900.75	900.75	900.75	900.75	900.75	900.75	900.75
Total Benefit			**2,437.41**	**3,937.08**	**5,337.01**	**5,447.43**	**5,606.63**	**5,682.11**	**5,768.91**	**5,867.31**	**5,977.60**	**6,100.16**	**6,235.34**	**6,383.59**	**6,545.37**	**6,721.18**
Cost																
(a) Economic Investment		6,213.60	6,012.62	4,469.54												
(b) O&M Cost			223.86	426.41	649.84	631.82	614.66	598.32	582.76	567.93	553.82	540.37	527.57	515.37	503.76	492.70
Total Cost		**6,213.60**	**6,236.48**	**4,895.94**	**649.84**	**631.82**	**614.66**	**598.32**	**582.76**	**567.93**	**553.82**	**540.37**	**527.57**	**515.37**	**503.76**	**492.70**
Net Benefit		(6,213.60)	(3,799.07)	(958.86)	4,687.17	4,815.60	4,991.97	5,083.79	5,186.16	5,299.37	5,423.79	5,559.78	5,707.78	5,868.22	6,041.61	6,228.48

NPV	**15%**	**11,056.77**
EIRR		**29.60%**