Indonesia

Expansion of National Radio Frequency Monitoring Network (II)

Report Date: October 2002

Field Survey: July 2001

1. Project Profile and Japan's ODA Loan

Project Site

Antenna

VHF/UHF Mobile Monitoring Station

HF Monitoring Equipment

1.1 Background

Radio communication is an important and indispensable tool for the economy and society of an island nation like Indonesia. At the time of appraisal, however, while demand had increased, radio communication service was hindered by the illegal use of radio transmitting equipment and by radio jamming, caused by traffic disorders in the radio frequencies. This situation disrupted the security of the Indonesian people and their property, and undermined the healthy economic growth of the country. In addition, the illegal transmission and radio jamming also affected radio transmission from other countries, which became a problem in the international community. In response to this situation, the formation of a National Radio Frequency Monitoring Network was planned in 1984 for implementation, in 4 phases, by year 2000.

1.2 Objectives

To establish a National Radio Frequency Monitoring Network through the installation of equipment to record and analyze frequency, field strength, occupied bandwidth, position of emission, and content of transmission, and thereby expand radio station monitoring throughout Indonesia. In this project (Phase 2), the focal point is to establish VHF/UHF radio monitoring systems whereas, in the preceding phase (Phase 1), the focal objective was to establish HF radio monitoring system.

1.3 Project Scope

The project consists of introducing: 1) a VHF/UHF DF Station (1 system), 2) VHF/UHF Van-Type Mobile Monitoring Stations (22 systems), 3) HF Van-Type Mobile Monitoring Stations (7 systems), 4) HF Fixed Monitoring Station (1 system), and 5) a Frequency Management System, and providing consulting services for the supervision of the above-mentioned works. Japan's ODA Loan covers all expenses except the cost of tax, administration, and land acquisition.

1.4 Borrower/Executing Agency

The Government of the Republic of Indonesia / Directorate General of Posts and Telecommunications (POSTEL), Ministry of Tourism, Posts and Telecommunication.

1.5 Outline of Loan Agreement

Loan Amount	5,701 million yen
Loan Disbursed Amount	5,487 million yen
Date of Exchange of Notes	December 1987
Date of Loan Agreement	December 1987
Terms and Conditions	
Interest Rate	3 % p.a.
Repayment Period (Grace Period)	30 years (10 years)
Procurement	Partially Untied
Final Disbursement Date	December 1992

2. Results and Evaluation

2.1 Relevance

Radio communication is an important and indispensable tool for the economy and society of an island nation like Indonesia. Nevertheless, radio interruptions due to the illegal use of radios and radio jamming were a serious problem that worsened the quality of radio communication. This situation not only threatened the security of people and their property, it also hampered the economic and social development of the nation. In this respect, the establishment of a national radio frequency monitoring network was needed urgently, and the implementation of this project contributed to meeting this need. The project was implemented as part of the Long Term Plan for National Radio Frequency Monitoring Network, following the policies of POSTEL, which is the agency in charge of supervising frequency. It can be said that the project has been relevant and adequate for reaching the national goals.

The Number of Radio Licenses Issued for each year from 1993 to 2000 is shown in Table 1 below. The number of licenses has been decreasing since 1998. There are several reasons to be assumed for this decrease, such as the close of existing radio stations due to the deterioration of the Indonesian economy, the amendment of domestic regulations on operating charge of radio frequency, and the prevalence of mobile phone services. Consequently, the allocation of frequency bands has been concentrated among the remaining radio stations.

In Indonesia, licenses for LF and MF bands have not been issued in recent past years. Although they are used for long-distance communication and are important for international transmission, their use is not widespread domestically. HF band is more common. In this regard, the project was relevant in that it has successfully targeted HF band for radio frequency monitoring as a part of the objectives in the Phase 2.

At the same time, as the table below indicates, VHF/UHF are the most widely used frequency bands. The project, which focused mainly on establishing VHF/UHF radio monitoring systems, has thus been perfectly adequate to cope with actual demand.

POSTEL has hired incremental number of staffs after the completion of Phase 1 (19 persons in 1985, 55 persons in 1986 as actual. And 87 persons were planned in 1987). In this regard, the installation of Frequency Management System, as a part of the scope of this project, was relevant in that it would help POSTEL, with a number of newly hired staffs, to implement the proposed monitoring and licensing activities effectively.

Table 1. Number of Radio Licenses Issued (Radio Frequency Assignment)

Frequency Band	1993	1994	1995	1996	1997	1998	1999	2000
LF (Low Frequency)	0	0	0	0	0	0	0	0
MF (Middle Frequency)	0	0	0	0	0	0	0	0
HF (High Frequency)	2,998	2,610	4,968	9,143	3,098	1,178	612	716
VHF (Very High Frequency)	4,474	5,008	10,211	19,800	7,089	4,139	2,495	2,059
UHF (Ultra High Frequency)	3,759	4,086	10,246	18,073	10,729	3,148	1,954	1,199
SHF (Super High Frequency)	10	0	81	145	1,354	612	104	323
Total	11,241	11,704	25,506	47,161	22,270	9,077	5,165	4,297

Source: POSTEL
Note: Data before 1992 was not available.

At present, radio transmission remains an essential communication tool and, consequently, National Radio Frequency Monitoring plays an important role. According to the Chief of the Planning Department at POSTEL, National Radio Frequency Monitoring is included in the guidelines of the current telecommunication policies. This shows that the project objective still fits with present demands.

2.2 Efficiency

2.2.1 Project Scope

The Project was implemented without major deviation from the plan adopted at appraisal.

2.2.2 Implementation Schedule

As this project was the second Phase of a project planned under the National Frequency Monitoring Network Master Plan, the equipment to be installed had to be compatible with the equipment installed in Phase 1. Therefore, the contractors used for Phase 1 were contracted again for Phase 2. Although supply procedures were simplified through this direct contracting, and it was expected that the project would be completed early, the work actually was finished at the scheduled time, since the civil work was delayed for 2 months.

2.2.3 Project Cost

The project consisted mainly of establishing mobile monitoring stations, and no land acquisition was necessary for the construction of the fixed monitoring station, in Medan. As a result, the total actual project cost in both foreign and local currencies ran under budget.

2.3 Effectiveness

Phase 2, the continuation of a project to construct a radio frequency monitoring network for MF and HF, focused mainly on establishing a radio frequency monitoring system for VHF and UHF. The following were installed through this project: 1) VHF/UHF DF Station (1 system), 2) VHF/UHF Van-Type Mobile Monitoring Stations (22 systems), 3) HF Van-Type Mobile Monitoring Stations (7 systems), 4) HF Fixed Monitoring Station, and 5) Frequency Management System (1 system). Unfortunately, at present nearly 60 % of the total equipment installed is not working. To overcome this situation, the remaining, functional equipment is being used to replace the units that are broken; for example, mobile radio monitoring stations complement the function of the fixed station. Currently, the radio frequency monitoring system is being maintained and operated in this manner.

2.3.1 Area Coverage

Table 2 shows the installation of Radio Frequency Monitoring Stations in Phases 1 and 2. While Phase 1 focused mainly on MF/HF monitoring stations, VHF/UHF monitoring stations were the main target in Phase 2. With the completion of Phase 2, the area covered by the frequency monitoring system expanded; now, almost all of the states in Indonesia are covered. Also, the administration of the most used frequency bands (VHF/UHF) was reinforced.

Table 2. Radio Frequency Monitoring Station

		MF / HF			VHF / UHF		
		Fix	Semi-Fix	Mobile	Fix	Mobile	DF
1	Medan	B	A			A B	
2	Banda Ache			B		B	
3	Padang			A		B	
4	Pakanbar					B	
5	Batam					B	
6	Jambi					B	
7	Palembamg			A		B	
8	B. Lumpung			B		B	
9	Semarang		A	B		A	
10	Yogyakarta					B	
11	Denpasar			A		B	
12	Kupang		A			B	
13	Dili			B			
14	Banjarmasin			A		B	
15	Pontianak			A		B	
16	Balikpapan					B	
17	Samarinda	A				B	
18	Menado			A		B	
19	Palu			B		B	
20	Ambon			A		B	
21	Merauke		A				
22	Bandung			B		B	
23	Surabaya		A			A	
24	Ujung Pandang			B		B	
25	Jayapura			A		B	
26	Jakarta	A		A	A	A	B
27	Palangkaraya					B	
28	Mataram						
No. of RMS Phase II		1	0	7	0	22	1

Source: POSTEL

Note: A: Phase 1, B: Phase 2

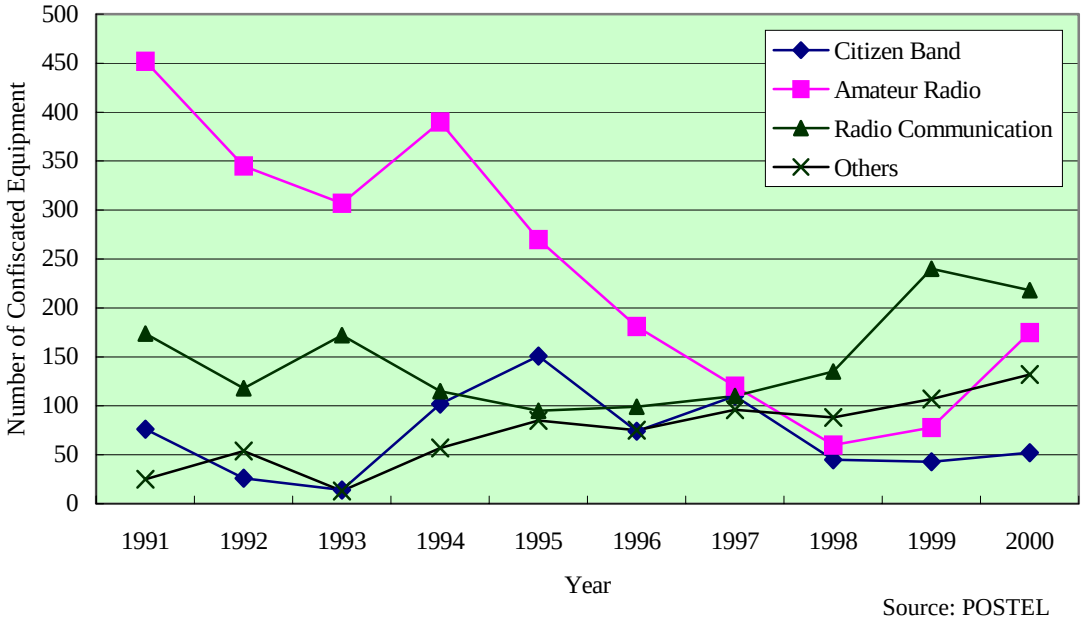
2.3.2 Equipment Confiscated for Illegal Use

Figure 1 shows that the quantity of equipment confiscated for illegal use increased between 1992 (year of completion of the project) and 1994, and declined after 1994. As already explained in 2.3.1. Area Coverage, the project focused mainly on the construction of radio frequency monitoring stations for VHF/ UHF, which allowed for supervision of a much wider radio frequency over a greater area. Thanks to this, the detection and identification of illegal radio use has become easier, helping reveal both non-licensed stations and the illegal acts of licensed stations. As a result, the number of disclosed stations increases temporarily, but decreases later due to proper guidance to those illegal radio users.

In addition, the project has helped measure the usage of each frequency band, and clarified the source of radio jamming. These observations have been useful for better usage of radio frequency by processing the records in the Frequency Management System.

It can be concluded that the project has been effective in strengthening the National Radio Frequency Monitoring System of Indonesia.

Figure1. Confiscated Equipment



Source: POSTEL

2.4 Impact

2.4.1 Decrease in Radio Jamming and Radio Interruption

The project has helped reinforce control over illegal use of radio, and consequently to decrease illegal and unlicensed radio use. As a result, maritime and air transmission, and communication for public security have become more stable and more reliable, which has contributed to the protection of people's lives, property and the social order. Also, the project has been useful for the international community in reducing radio jamming and radio interruption in neighboring countries that used to be caused by illegal radio transmission in Indonesia.

2.4.2 Reinforcement of Management of Radio Frequency Spectrum

The reinforcement of Management of Radio Frequency Spectrum has made possible the efficient use of radio frequency bands. It has strengthened the control of radio licensing, and has consequently contributed to increase income from radio frequencies fee. Table 3 below shows the historical changes of the reception of radio frequencies fee, and the number of radio station licenses.

Table 3. Reception of Radio Frequencies Fee

Fiscal Year	Target (billion Rp.)	Reception of Radio Frequencies Fee (billion Rp.)	Total of Radio Station Licenses
1992/1993	12	14.4	37,030
1993/1994	18	23.5	117,589
1994/1995	24	30.4	139,809
1995/1996	30	34.4	174,466
1996/1997	33	48.8	198,114
1997/1998	47	65.8	211,458
1998/1999	93	108.0	226,527
1999/2000 [1)]	101	106.9	310,222

Source: Annual Report by POSTEL
Note: [1)] The income from 1 April 1999 to 1 March 2000

2.4.3 Impact on the Natural Environment or on Local Residents

According to POSTEL, no negative impact on the environment or on local residents as a result of this project has been identified.

2.5 Sustainability

2.5.1 Operation and Maintenance

The Regional Office for Radio Frequency Monitoring, which is under the Directorate General of Posts and Telecommunications (POSTEL), is in charge of the operation and maintenance of the project.

As of June 2000, the Directorate of Radio Frequency (headquarters) in Jakarta had a staff of 75, and staff at the regional offices for radio frequency monitoring totaled 384 .

The headquarters is responsible for keeping records of data on frequency bands and for business matters, while regional offices are in charge of issuing licenses to amateur radio users and monitoring radio use in their respective area. According to POSTEL, the number of monitoring staff is insufficient. In some local stations, there are only five people working as monitors. More staff is needed for adequate posting of personnel.

2.5.2 Technical Capacity

Technical education and on-the-job training in radio frequency monitoring are executed at headquarters in Jakarta; consequently, the technical level of the operators is satisfactory, and the number of operators is sufficient, according to POSTEL. However, there is a shortage both of technical engineers and of spare parts, both of which are indispensable for maintenance and repair. Under these circumstances, much of the equipment is either out of order or cannot be used. Unfortunately, no particular countermeasures have been taken to solve the problem. Adequate action should be taken to formulate enough engineers for operation and maintenance of the equipment.

2.5.3 Condition of Equipment

Currently, 10 years after completion, 15 of the equipment of the Radio Monitoring Facilities installed in Phases 1 and 2 are needed to be replaced and upgraded (See Table 4). The condition of the equipment of fixed monitoring stations are poor and they can no longer search for and identify illegal radio use. As a result, they are limiting their role to monitoring. Meanwhile, the mobile monitoring stations are taking over the job of searching for and identifying illegal radio. In general, the equipment at the mobile monitoring stations is in good condition; only some of them are not operational due to the lack

of spare parts. On the whole, the project is running well enough to reach its objectives, despite the condition of the equipment; mobile monitoring stations are successfully complementing fixed monitoring stations.

Table 4 Inventory of Radio Monitoring Facilities

	Radio Monitoring System I		Radio Monitoring System II		
	MF/HF	VHF/UHF	MF/HF	VHF/UHF	
			MS**	MS	DFS*
Good	6	2	2	16	3
Small Damage	8	1	3	2	9
Error	0	0	0	0	14
Malfunctioned etc.	2	2	3	4	4

Source: POSTEL

Note: Small Damage: to be repaired in the field, Error: to be adjusted manually, Malfunctioned: to be replaced or upgraded)

*In Phase 2, one system of DF Station was installed but one system consists of 30 components.

**Monitoring Stations (MS) for MF/HF include 1 Fixed Monitoring Station.

2.5.4 Financial Status

Detailed financial statements were not available for evaluation.

Besides the radio frequency fees collected from radio stations, shown in Table 3, POSTEL's income consists of tax income, license fees from telecommunication carrier entities, and income from postal services. On the whole, financial resource for operation and maintenance is insufficient and there should be countermeasures to develop and stabilize financial resources in terms of sustainability.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Project Scope		
a) Radio Monitoring Station		
- VHF/UHF DF Station	1 system	As planned
- VHF/UHF Van-Type Mobile Monitoring Station	22 systems	As planned
- HF Van-Type Mobile Monitoring Station	7 systems	As planned
- HF Fixed Monitoring Station	1 system	As planned
- Frequency Management System	1 system	As planned
b) Consulting Service	Supervision of above	As Planned
(2) Implementation Schedule		
- Selection of Consultant	July 1987 to June 1988	January 1988 to September 1988
- Tender Document	July 1988 to January 1989	February 1989 to February 1989
- Tender	February 1989 to April 1989	April 1989 to May1989
- Evaluation & Contract	May 1989 to October 1989	May 1989 to November 1989
- Civil Work	October 1989 to May 1990	June 1989 to July 1990
- Manufacturing	October 1989 to August 1990	May 1990 to March 1991
- Transportation	April 1990 to October 1990	January 1991 to July 1991
- Installation	June 1990 to February 1991	October 1990 to May 1991
- Operations and Maintenance	March 1991 to February 1992	June 1991 to February 1992
- Training	March 1989 to May 1989	January 1990 to February 1992
- Completion	February 1992	February 1992
(3) Project Cost		
Foreign Currency	5,351 million Yen	Not available
Local Currency in Yen	658 million Yen	Not available
（in Rp.）	6,998 million Rp.	Not available
Total	6,009 million Yen	
ODA Loan Portion	5,701 million Yen	5,487 million Yen
Exchange Rate	1Rp.=0.0941Yen （February 1987）	

Independent Evaluator's Opinion
on Expansion of National Radio Frequency Monitoring Network (II)

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The project was relevant to the Indonesia's telecommunication development policy, be more specific, the Telecommunication Law No.36/99 which enacted that the national radio monitoring system was necessary for spectrum monitoring and controlling tasks of DG Postel. The project also met the priority of the Indonesia's government policy to grant a better coordination with neighboring countries in strategic matters.

As the use of radio transmission increases tremendously and becomes a very important media for telecommunication and broadcasting services nowadays, the need for a clean and reliable radio frequency environment becomes obvious. Therefore, the relevancy of the project's goal to the development program is even bigger at the present time.

The project was efficient and well managed as it maintained the completion within schedule and the cost within budget. The relevancy was also maintained owing to the scope consistency.

The Evaluator considers that the monitoring system was not effective in term of utilization rate and economic viability. The system also failed to maintain its economic lifetime due to maintenance budget constraint and equipment obsoleteness. However, Evaluator agrees that the system should be maintained and improved as it was necessary to provide the above needs.

The project provided direct impacts on reinforcing control over illegal use of radio station and decreasing illegal and unlicensed radio use. As the rule enforcement took place, the project consequently contributed indirect impacts on promoting reliable radio environment for public use, allowing communication clearance for public security and transport use, and reinforcing the management of RF spectrum. Other subsystem of the project, The Frequency Management System had also helped administering the efficient use of radio frequency spectrum and gave support to the frequency license approval process.

The sustainability of the project will depend on the DG Postel's capacities to maintain the system, improve the staff's skill and competencies and provide adequate fund for a proper operation and maintenance activities. On the other hand, the system idleness in some locations and rapid improvement of RF technology, which made the previous technology obsolete very shortly, created threats for a longer sustainability. As the monitoring system was not a profit-center entity, it still required routine budget allocation from government to bear all expenses and rehabilitation need. Any particular countermeasures should be taken to grant a proper use of POSTEL's revenue, especially revenue from frequency fee.

Overall, Evaluator agrees that the project has accomplished its intended goals. The project provides positive impacts to contribute significantly more to the objectives although it faced several threats to maintain its positive sustainability.