

BASIC DESIGN STUDY REPORT
ON
THE PUBLIC EMERGENCY CALL CENTRE (COMMUNICATION SYSTEM)
MODERNIZATION PROJECT
IN
THE KINGDOM OF THAILAND

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JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

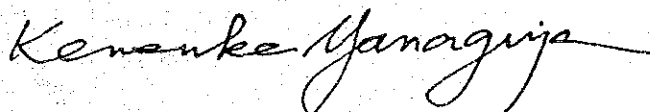
In response to the request of the Government of the Kingdom of Thailand, the Government of Japan has decided to conduct a basic design study on the Public Emergency Call Centre (Communication System) Modernization Project and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Thailand a study team headed by Mr. MASAOKI KATOH Director, Communications Technical Research Office, Communication Bureau, National Police Agency, from January 25 to February 13, 1988.

The team had discussions on the Project with the officials concerned of the Government of Thailand and conducted a field survey in the Bangkok Metropolitan area. After the team returned to Japan, further studies were made, a draft report was prepared and a mission to explain and discuss it was dispatched to Thailand from April 20 to April 27, 1988. As a result, the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Kingdom of Thailand for their close cooperation extended to the team.

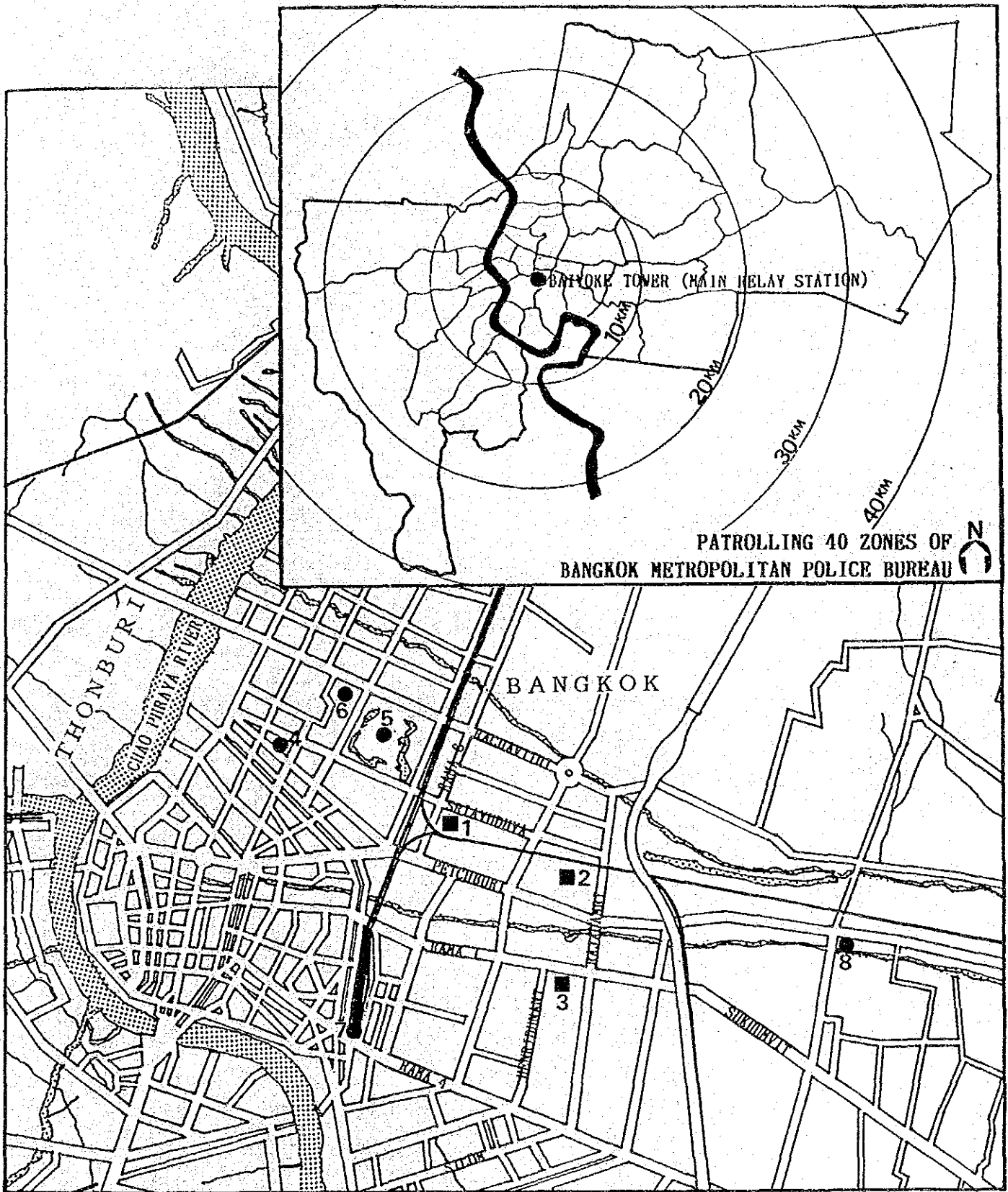
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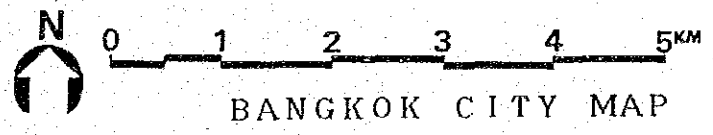
Kensuke Yanagiya

President

Japan International Cooperation Agency



1. METROPOLITAN POLICE BUREAU (191 CENTER)
2. BAIYOKE TOWER (MAIN RELAY STATION)
3. ROYAL THAI POLICE DEPARTMENT (SUB-RELAY STATION)
4. PARUSAKAWAN MAINTENANCE CENTER
5. CHITR LADA PALACE
6. NATIONAL ASSEMBLY
7. KRUNG THEP STATION
8. EMBASSY OF JAPAN



SUMMARY

SUMMARY

A multitude of local community residents have entered the Bangkok Metropolitan Area in search of job opportunities, since a wide variety of economic investments including those in commerce and industry have been concentrated in this area. As a result, such problems have arisen as shortages of housing and job opportunities, which has affected not only the maintenance of public peace and order but also protection and security of the lives and properties of the citizens. Under such circumstances, assurance of civil security has been adopted as one of the pillars of the 6th National Development Plan, together with improvement of basic services such as education, public health, water supply and housing.

In the Kingdom of Thailand, there has not been any significant change in the number of crimes over the past few years. In the Bangkok Metropolitan Area, on the other hand, a wide variety of crimes including theft, robbery, burglary murder and narcotic addiction are being committed, although there has been no significant increase in the number of crimes. Moreover, these crimes are committed in various parts of the area. As a result, the arrest rate in 1985 in the area decreased by 3.6% as compared with the previous year.

The Bangkok Metropolitan Police Bureau has been operating a communications system in which the 191 Emergency

Call Centre (hereinafter referred to as "191 Centre" in this report) plays a pivotal role in protecting the lives of citizen from these types of crimes and in maintaining public order. This system is similar to Japan's 110 emergency call system. Since this system has not fully functioned in a systematic way, it is urgently required that the communications system should be modernized by reinforcing the 191 system and by improving the radio communications network linking the centre and patrol cars.

In an attempt to improve these circumstances, the Thai Government made a request for technical cooperation from the Japanese Government for improving the communication system. In response to it, experts in the field of communications in Japan carried out a communications system improvement survey twice, in fiscal 1985 and 1986. Based on the survey results, the Thai Government formulated a communications system improvement program and requested grant aid from the Japanese Government for improvement of the facilities and equipment. In reply to this, the Japanese Government dispatched through JICA a preliminary study team to Thailand from 3 to 9 November, 1987 to confirm the necessity and the contents of the project. After reviewing the report submitted by the study team, JICA dispatched a basic design study team to Thailand from January 25 to February 13, 1988.

The activities of the basic design study team included studying the present state of the communications system and

surveying the project site, in addition to confirming the contents of the request, studying appropriateness of implementation of the grant aid and reviewing the scope of cooperation requested.

The project aims at establishment of a communications system in a new Public Emergency Call Centre to be developed from the present 191 Emergency Call Centre by improving the operation of it. The system will assure closer contacts between the citizens and the police through an upgraded emergency communications and telephone system which is to operate on a 24-hour basis, thereby ensuring maximum protection of the lives and properties of the citizens.

The sites for this project include the Bangkok Metropolitan Police Bureau as the 191 Centre, the Baiyoke Tower as the Main Relay Station and the Royal Thai Police Department as the Back-up Relay Station, and the Metropolitan Police Divisions and police stations.

The systems and equipment required in this project are shown in the table below.

System	Equipment	Quantity
191 Emergency Call System	1) Map Display Processing Unit	1
	2) Character Display Processing Unit	1
	3) Emergency Call Receiving Console	7
	4) Radio Patrol Dispatching Console	3

	5) Supervisory Console	1
	6) Emergency Operaiton Control Console	1
	7) Fixed Radio Equipment	10
	8) Multi-Channel Logging Recorder	1
	9) Control and Monitor Equipment	1
	10) Emergency Power Supply	1
	11) Police Activity Operation Display	1
Radio Communica- tion System	Main Relay Station	
	1) Aerial Equipment	1
	2) Relay Equipment	5
	3) Control and Monitoring Equipment	1
	4) Emergency Power Supply	1
	5) Air Conditioner	1
	Back-up Relay Station	
	1) Aerial Equipment	1
	2) Relay Equipment	5
	3) Control and Monitoring Equipment	1
	4) Emergency Power Supply	1
	5) Air conditioner	1
	Fixed Radio Equipment	75
	Mobile Radio Equipment	250
	Hand-held Radio Equipment	220

Facsimile System	Facsimile	76
	Spare parts	1
	Measuring/test equipment	1

The construction works to be implemented at the Thai Government's expense are as follows:

- o Improvement of the rooms of the 191 Centre including removal of the partitions, electrical installations, and removal of the presently operated communications equipment, the air conditioners.
- o Construction work to install partitions in the machinery room and the power room of the Baiyoke Tower, and electrical installations.
- o Construction work to install electric facilities in the machinery room of the Criminal Records Division of the Royal Thai Police Department, and electrical installations.
- o Preparation and installation of necessary items such as electrical installations and lighting, before starting installation of the facilities and equipment.
- o Loading of radios, which are to be supplied under the project, onto vehicles.

The implementing agency of the project is the Communications Division of the Royal Thai Police Department. And this Department engages in control of improvement planning, designing, construction, maintenance

planning, personnel placement, and disturbance problems of the police communications facilities throughout the country, and a maintenance centre called "Parusakawan Centre" has been established to maintain the facilities and equipment. So it is considered that the adequate maintenance system is already established.

The project cost to be borne by the Thai Government is estimated at about 1,725,000 BT. (about 9 million Yen). According to the proposed implementation schedule of this project, it will take about four months, after conclusion of official Exchange of Notes between the both governments, to conclude the consultant contract, complete the detail design, tender documents, and finish the Tender, and it will take about twelve months to procure and install facilities and equipments. It is confirmed that the remodeling and implement interior works at the project sites would be finished by the Thai side before set up works are started.

It is expected that, as a result of completion of this project, the citizen rescue activities will be drastically improved since radio communications are assured between any combinations of the 191 Centre, police stations and patrol cars belonging to the Bangkok Metropolitan Police Bureau. Moreover, information from the citizens to the 191 Centre is so accurately received that more accurate and pertinent commands will be given to the police stations concerned and patrol cars, based on the contents of such information to

ensure early solution of the each case since patrol cars may rush to the scenes of accidents or incidents.

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BANGKOK CITY MAP

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CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

Under the direction of the Royal Thai Police Department, the Bangkok Metropolitan Police Bureau is engaged in management and operation of a comprehensive communications system centered around the 191 Centre, which operates an emergency call system (equivalent to Japan's 110 emergency call system) for the purpose of protecting the lives and properties of the citizens and ensuring civil security in the Bangkok Metropolitan Area. In this system, the 191 Centre receives emergency calls from the citizens and promptly directs patrol cars to rush to the scenes of accidents or incidents and handle them properly.

In recent years, a wide variety of economic investments, both commercial and industrial, have been concentrated in the Bangkok Metropolitan Area, so a multitude of local community residents have entered the area, thereby causing problems of housing shortage, expansion of slums and unemployment among them. As a result, there has been a marked increase in the number of such penal offenses as thievery, robbery, burglary, murder and narcotic addiction, which are rarely found in other areas of the country.

Despite the current state of these crimes the communications system which is operated by the Bangkok Metropolitan Police Bureau shows limited performance due to

the composition of the communications circuit and the standards of the equipment that has become rather obsolete. Since this system has not fully functioned in a systematic way, it constitutes an obstacle to the police action in general.

Under these circumstances, the Royal Thai Police Department requested the Japanese Government for improvement of the facilities and equipment to modernize the communications system in which the 191 Centre should be further reinforced.

The contents of the request made by the Thai Government are as follows:

- o Improvement of the 191 call system which receives 191 emergency calls from the citizens and directs patrol cars to rush to the scenes of accidents or incidents.
- o Improvement of the radio communications between the 191 Centre and each Bangkok Metropolitan Police Division, police stations, patrol cars and policemen on patrol.
- o Improvement of the facsimile communications between the 191 Centre, the Bangkok Metropolitan Police Divisions and police stations.

In response to this request, the Japanese Government dispatched through JICA a preliminary study team to Thailand from 3 to 9 November, 1987 to confirm the background and the contents of the project as well as to investigate the present state of the system.

Based on the report of the preliminary study team, the Japanese Government dispatched through JICA a basic design study team (headed by Mr. MASAOKI KATO, DIRECTOR, COMMUNICATIONS TECHNICAL RESEARCH OFFICE, COMMUNICATIONS BUREAU, NATIONAL POLICE AGENCY) to Thailand from January 25 to February 13, 1988. The team discussed details of the contents of the request with the Thai side, investigate the current state of the communications system and proposed sites and collected relevant information, documents and survey data.

Those survey and study activities covered the following areas:

- o Emergency call traffic in the 191 Centre.
- o Electrical field intensity at the Baiyoke Tower received from mobile radio stations stationed in areas surrounding the City of Bangkok.
- o Reception state of adjacent frequency which is assigned for use.
- o Present state of each site, the 191 Centre, the Main Relay Station and the Back-up Relay Station.

The basic design study team put together the basic agreements reached through bilateral consultations in the form of the minutes of discussions which were signed and exchanged by the representatives of the Thai and Japan side on February 4, 1988. This report has been prepared based on the results of the basic design study, including field

survey, consultations with the Thai side and collected data and information, concerning the project to modernize the communications system of the Public Emergency Call Centre. The members of the study team, itinerary of the field survey, Thai institutions and personnel visited, and the minutes of discussions are shown in the annex at the end of this report.

CHAPTER 2 BACKGROUND OF THE PROJECT

CHAPTER 2 BACKGROUND OF THE PROJECT

2-1 Social situations and trends of crimes in the Kingdom of Thailand

(1) Social situations

About 69% of the total working population in the Kingdom of Thailand engage in agriculture, forestry, and fisheries (according to the labor force survey in 1983). Although the agriculture, forestry, and fisheries account for 17% of the gross domestic product (according to the survey in 1985), this ratio shows a decreasing tendency in the past years. The increase in population of primary and secondary industries, means, in other words, an increase in urban population.

On the other hand, Bangkok which has been extremely urbanized has a population of 5.36 million, equivalent to more than ten percent of the total population. Most of the citizens live a life with new cultural values under the influences of foreign cultures in an environment in which the pattern of life is subjected to rapid modification.

(2) Trends of crimes

Since a large variety of economic investments including those in commerce and industry have been concentrated in the Bangkok Metropolitan Area, a multitude of local inhabitants have entered this area in search of job opportunities, causing the population in this area to show a rapid increase. As a result, there have occurred problems of

housing shortage, expansion of slums, and unemployment, which has in turn resulted in more frequent occurrence of penal offenses.

According to the data of the International Crime Statistics (studied by ICPO) the number of crimes that occurred in the whole Thailand was 173,608 (not including minor ones). The number of crimes occurring in the Bangkok Metropolitan Area has stopped increasing, but the rate of arrest is decreased by 3.6% as compared with the previous year. The types of crimes are thievery, robbery, homicide, arson, violence, burglary, and narcotics. There are many types of crimes which are characteristic of this area, not found elsewhere in Thailand, and there has been a tendency that the crimes become more heinous and are committed in many districts. As a matter of information, the crime occurrence ratio per 100,000 population was 785 in the Bangkok Metropolitan Area while it was about 370 in other districts in 1985, the former being more than two times the latter.

One of the characteristics is that the ratio of penal offenses occurring in the Bangkok Metropolitan Area is traditionally increased in a year with poor crops.

2-2 Organization of the Royal Thai Police Department

(1) Administrative agency and Operations agency for the project

Outline of the Royal Thai Police Department is as follows.

The Royal Thai Police Department is one of 13 departments of the Ministry of the Interior and responsible for protecting the lives and properties of the citizens and ensuring civil security and service to the public.

The department is a national police agency and has about 150 thousand members under the Director General. The administrative service of the department consists of the Police Education Bureau, the Office of the Inspector General, the Office of the Surgeon General, the Police Communications Division and 13 other divisions. The operation service of the department consists of the Central Investigation Bureau, the Metropolitan Police Bureau, four Provincial Police Bureaus and the Border Patrol Police General Headquarters.

The Communications Division of the Royal Thai Police Department, the administrative agency for the project, consists of four sub-divisions and a maintenance centre.

The division has about 730 members including about 210 engineers and technicians (1987) and assumes all responsibilities for the police communications facilities all over the country, with arrangement planning, designing, construction, maintenance planning, disposition of the

necessary personnel, maintenance services and so on.

In particular, the Communication Division has a maintenance centre named "Parusakawan Maintenance Centre", which maintains the communications facilities of the Bangkok Metropolitan Police Bureau.

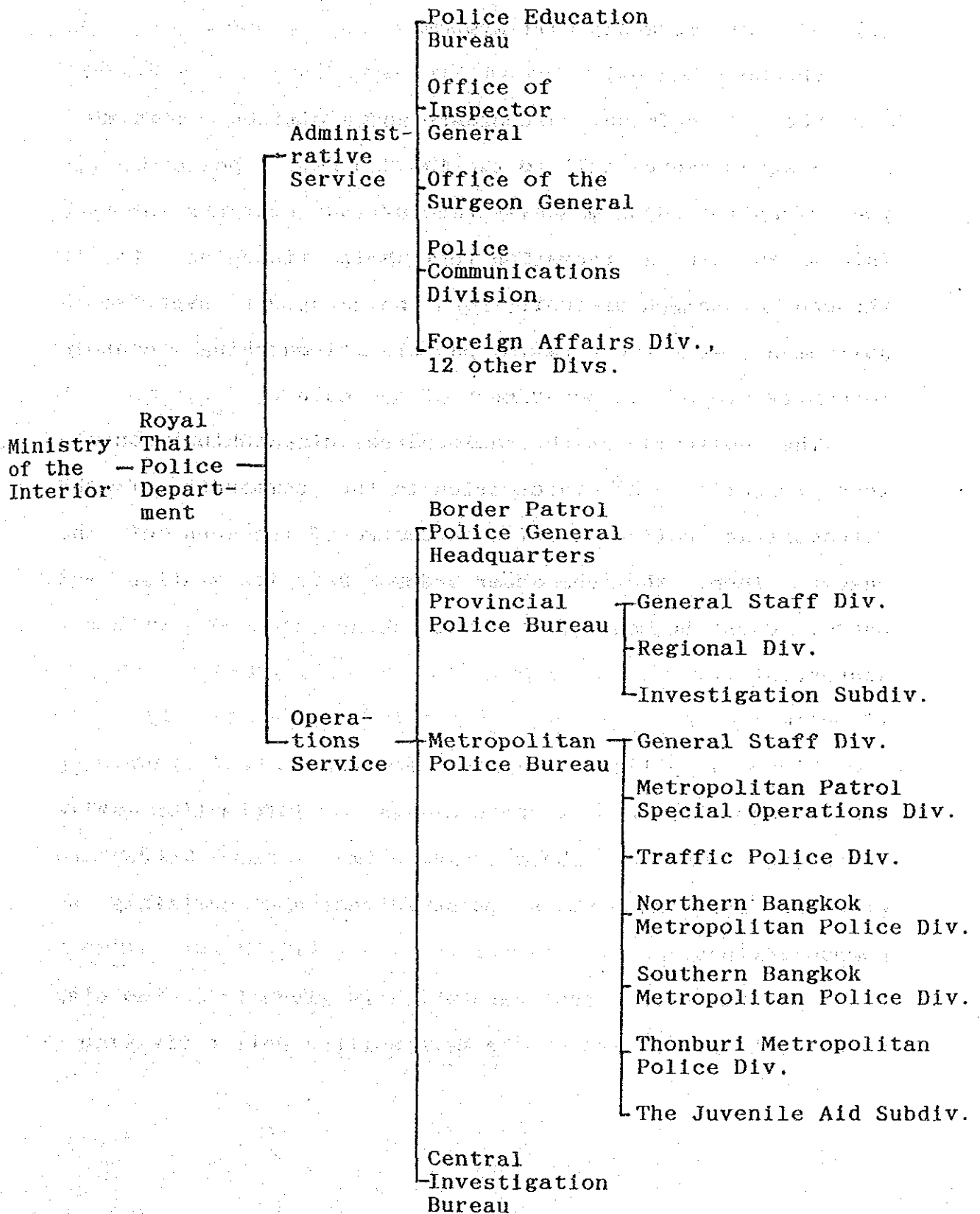
The Metropolitan Police Bureau which is made up of about 13,500 members (1987) of the police force is in charge of maintaining public peace in the metropolitan area of Bangkok. The area consists of Bangkok and Thonburi, a city on the other side of Bangkok.

The area is divided into 3 Divisions (Northern Bangkok, Southern Bangkok, and Thonburi). And there are 69 police stations in the area.

The Metropolitan Police Bureau is made up of 6 Divisions: The General Staff Division, the Metropolitan Patrol Special Operations Division, the Traffic Police Division, and the Northern Bangkok, Southern Bangkok and Thonburi Metropolitan Police Divisions. The 191 Centre is part of the Metropolitan Patrol Special Operations Division. The Metropolitan Police Bureau has 960 patrol cars (267 patrol cars are directly controlled by the 191 Centre.) and 2109 sets of hand-held radios.

The organization of the Royal Thai Police is as shown in Table 2-1.

Table 2-1 Organization Chart of Royal Thai Police Department



2-3 Present status and problems of the 191 Centre
Communications System in the Bangkok Metropolitan
Police Bureau

(1) NO. 191 Emergency Call System

(Present status)

When a criminal case occurs and a citizen (informer) gives an emergency call to the 191 Centre, a policeman at the reception desk manually records the contents of the information in a reception form while listening to it through a telephone unit, and he hands it over to a policeman at the radio patrol dispatching console to notify him of the occurrence of the case.

The policeman at the radio patrol dispatching console then transmits the information to the commander of the Metropolitan Police Division in charge of the scene of the case. Then, the commander orders a police station and patrol cars in charge of the scene to deal with it appropriately.

(Problems)

Since a policeman at the emergency call receiving console manually records the contents of information while listening to them, there is much time loss. There are problems left unsolved as to speediness and certainty of communications.

A command to patrol cars which is given in a two-step manner (the 191 Centre -> the Metropolitan Police Division ->

patrol cars) takes much time.

This means that there is much time loss in treatment of the information until a command is actually given, which in turn results in a loss in response time (This term signifies the time from the reception of emergency rescue information to the time a patrol car arrives at the scene. The same shall apply hereafter). This has been an obstacle in arresting a criminal and solving the case at an early stage. The command and dispatching system needs improvement. But in changing the system, due consideration must be given to the radio communications system which is set out in the following section.

(2) Radio communication system

(Present status)

The radio communications system in which patrol cars play a main role is composed of a circuit using one-wave simplex method (a press-to-talk communication using a single frequency used for radio communications).

Radio sets used in the 191 Centre, the Metropolitan Police Division, police stations, and patrol cars allow a set-to-set talking alone. So, the condition of communications between them is affected by the geography. The service area (in which communications can be effected) from the 191 Centre to patrol cars is restricted to an area with a radius of 20 km or less.

(Problems)

While crimes tend to be committed in a wider area, in a more heinous manner, with more speeds, criminal cases are not treated with full maneuverability which should be guaranteed by patrol cars equipped with radio set so that they may rush to any scenes with sufficient speediness in accordance with the commands from the Centre. Moreover, there are lots of obstacles in carrying out systematic operations to realize assistance and liaison among patrol cars, as they do not have enough service area.

Should a case occur outside the service area, no direct communications are available between the 191 Centre and patrol cars approaching scene. They have to rely upon the orally repeated messages of some police station, so the range of actions to be taken by the patrol cars is restricted to 1/3 of Bangkok City.

In daily patrolling, as they are using direct communication system, radio waves are affected by buildings and geographical features and no communications can be effected between patrol cars in most parts of the Bangkok Metropolitan Area.

(3) Facsimile system

(Present status)

Currently no facsimile system is in use.

(Problems)

Documents, drawings and so on are currently

transported by motorcycle etc. between the 191 Centre, the Metropolitan Police Division and police station, which is hindering police activities.

2-4 Contents of the request

Judging from the present state of crimes in the Bangkok Metropolitan Area, as mentioned in 2-1 the present conditions of the communication system, and the operating conditions of the rescue activities in response to emergency calls, the Government of the Kingdom of Thailand formulated a project to modernize the communications system in which priority is given to reinforcing the 191 emergency call system and improvement of radio communications line for patrol cars, and requested the Japanese Government for grant aid cooperation as to the below-mentioned facilities and equipment.

The contents of the request are as stated below:

o 191 Emergency call system

At present, the 191 Centre operates with 20 telephones and a radio patrol dispatch desk. The requested system of the 191 Centre is to be equipped with an emergency call receiving console, a supervisory console (these two items are related with an emergency call reception), a radio patrol dispatching console, an emergency operation control console (they are related with radio patrol dispatch), a map display, a character display, a police activity operation display, (they are related with a back-up system)

and so on. The system will process written information on emergency telephone calls rapidly and accurately, and send out radio directions to patrol cars to rush to the scenes of accidents or incidents and handle them properly.

o Radio communications system

In the existing system, the 191 Centre, the Metropolitan Police Divisions, police stations, and patrol cars are each equipped with radio equipment, and keep communications with each other. But the communication range is limited.

In the requested system, the Baiyoke Tower is equipped with a main relay station, and the Police Criminal Records Division building will be equipped with a back-up relay station, the 191 Centre and the Metropolitan Police Divisions and the police stations each with fixed radio equipment, each patrol car with mobile radio equipment and each policeman on patrol with hand-held radio equipment so that the 191 Centre, the Metropolitan Police Divisions, the police stations, patrol cars and policemen on patrol can maintain communications with one another in the whole metropolitan area. The VHF band will be adopted for the system.

o Facsimile system

The 191 Centre, each Metropolitan Police Department and each police station are equipped with facsimile equipment so that the area's police service may be improved through

communication of documents, charts or orders between the 191 Centre and the police station.

The equipment composition of the requested systems is shown in Table 2-2.

Table 2-2 Contents of the request

System	Contents of the equipment	
	Equipment	Quantity
191 Emergency call system	1) Map display	11
	2) Character display	11
	3) Emergency call receiving console	6
	4) Radio patrol dispatching console	3
	5) Supervisory console	1
	6) Emergency operation control console	1
	7) Fixed radio equipment	5
	8) Multichannel logging recorder	1
	9) Emergency power supply	1
	10) Police activity operation display	1
Radio communica- tion system	Main Relay Station	
	1) Aerial equipment	1
	2) Relay equipment	5
	3) Control and monitor equipment	1
	4) Emergency power supply	1
	Back-up Relay Station	
	1) Aerial equipment	1
	2) Relay equipment	5
	3) control and monitor equipment	1
	4) Emergency power supply	1
	Fixed radio equipment	80
	Mobile radio equipment	250
	Hand-held radio equipment	220
Facsimile system	Facsimiles	76

CHAPTER 3 CONTENTS OF THE PROJECT

CHAPTER 3 CONTENTS OF THE PROJECT

3-1 Objective of the Project :

The Bangkok Metropolitan Police Bureau utilizes a 191 call system similar to the 110 call system in Japan and a radio communication system that issues orders to patrol cars, etc.

The present 191 emergency call system lacks speed and accuracy in its reception management of calls and at present radio communications between the 191 Centre and the patrol cars are unable to cover the entire metropolitan area of Bangkok.

As a result, this communications system hinders police activities because it does not function adequately.

This project has been introduced to meet the following objectives.

The operation of the existing 191 Centre is to be improved by establishing a new communications system in the 191 Centre and by maintaining close contact between the citizens and the police through a 24 hour emergency call system.

The objective of this project is to modernize the 191 Centre and to assure maximum protection of the lives and property of citizens through system improvements and the introduction of new equipment to the following three communications systems.

- o 191 Call System
- o Radio Communication System
- o Facsimile System

The Thai police have stated that they will use this system to handle receipt of 191 calls exclusively and will not use it for riot control operations. This was confirmed in the minutes of discussion dated on February 4, 1988.

The radio communications system in this project uses the VHF band and the radio communications system for riot control operations uses the UHF band. As a result, there is no interchangeability between the two systems and thus riot control by using this system is not even technically feasible.

3-2 Review of the Request

(1) Review of the Request

To review the appropriateness of the request, The Basic Design Studied Team studied the following matters which are essential for the project's operation and management.

1) The system and its components

The existing 191 Centre is considered to have the following problems:

- (a) The 191 calls from the public are received through ordinary telephone lines, a method which is not efficient in term of staff arrangement and prompt handling of emergency calls.
- (b) The 191 calls are reported via handwritten slips to

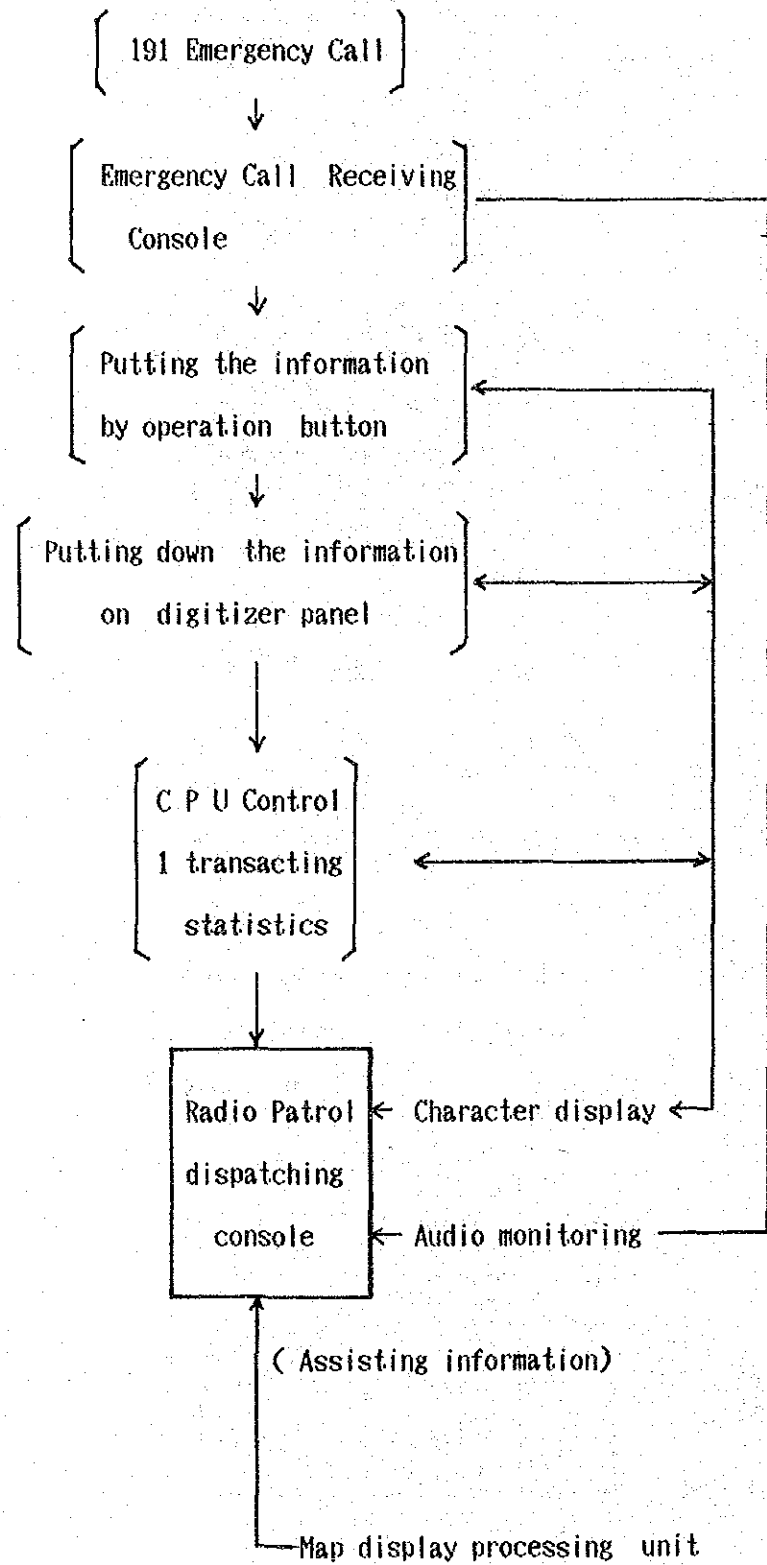
- the radio patrol dispatchers who accordingly give directions to the patrol cars. This impedes rapid and accurate forwarding of information.
- o The 191 Centre and patrol cars can communicate by radio-telephone in a very limited area within a radius of about 20 kilometers from the 191 Centre. Consequently, the capability of mobilization of patrol cars is confined within a limited area.
 - o It is difficult for the 191 Centre to transmit detailed information fully, because the 191 Centre has no means of prompt written communications with the Metropolitan Police Divisions and police stations.

In order to resolve these problems, it is necessary to replace the existing 191 emergency call system with a real time management system which makes use of up-to-date electronic information communications technology. Also, it is necessary to enlarge and to improve the service area of the radio communications system.

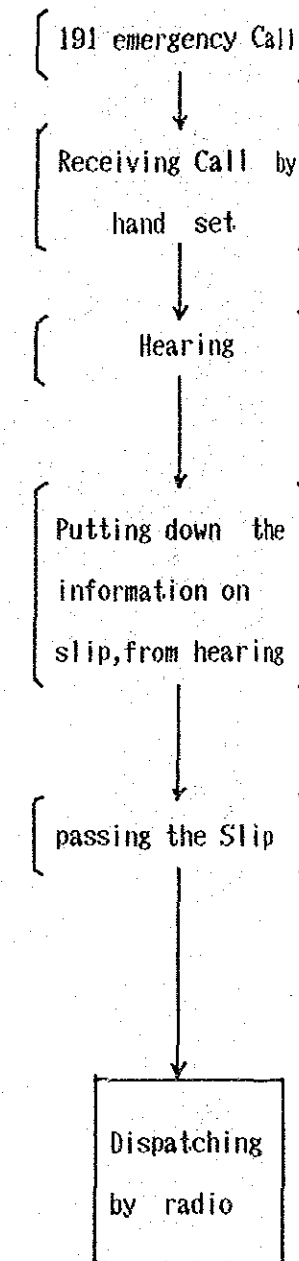
In addition to these, prompt written communications between the 191 Centre and the Metropolitan Police Divisions and police stations is very important in consideration of the complicated social circumstances.

The existing emergency call receiving process at the 191 Centre and the new system to be realized through this project are shown in Fig. 3-1, and the radio patrol dispatching process in the 191 Centre is shown in Fig. 3-2.

The System after the completion
of this Project



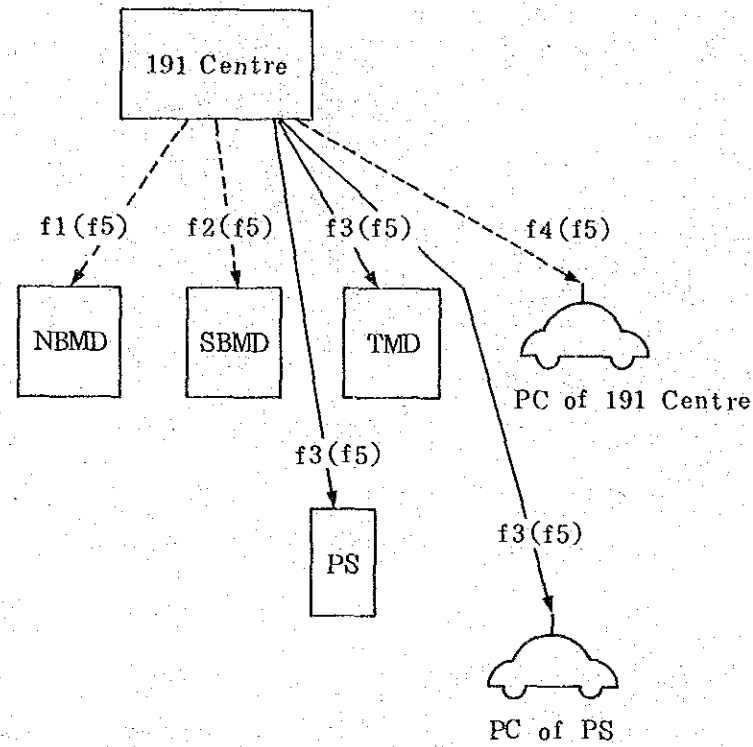
Present System



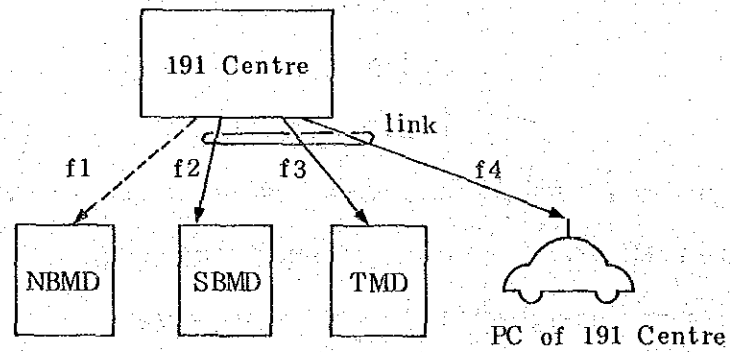
THE PROCESS OF EMERGENCY CALL RECEIVING IN 191 CENTRE Fig. 3 - 1
THE PUBLIC EMERGENCY CALL CENTRE (COMMUNICATION SYSTEM) MODERNIZATION PROJECT

The System after the completion
of this project

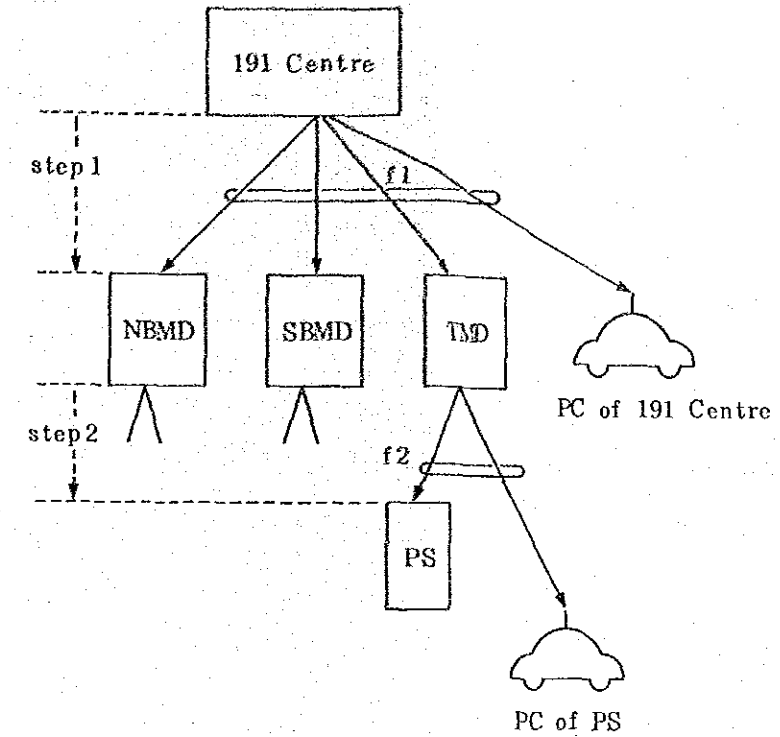
The case management example
in the Thonburi Metropolitan
Division (Normal case)



The case management example
in the Thonburi and Southern
Metropolitan Division (Wide range case)



Present System



PS..... Police Station
PC..... Patrol Car

f : Frequency

The result of the study on the adequate number of each type of equipemnt are as follows:

- o Emergency call receiv- Seven consoles are needed to
ing console: deal with emergency call traffic
and with the expected call
traffic in the future.
- o Radio patrol dispatch- Three consoles are needed for
ing console: operation of a five radio system
(one console includes two radio
systems)
- o Supervisory console: One console is needed to
supervise the other emergency
call receiving console.
- o Emergency operation One console is needed to
control console: supervise and direct the other
radio patrol dispatching console.
- o Fixed radio equipment: The site of installation are the
191 Centre, Metropolitan Police
Divisions, police stations, and
others.
(10 for 191 Centre)
(1 for each M.P.D.)
(1 for each P.S.)
- o Mobile radio equip- 112 sets are installed in the
ment patrol cars under the direct
control of the 191 Centre.

- o 138 sets of equipment are installed in the patrol cars of the police stations. (2 for each P.S.)
- o Hand-held radio: 220 sets of hand-held radio equipment are installed. (82 for the 191 Centre, and 2 for each P.S.)
- o Facsimile: 76 facsimiles are installed. (3 sets for 191 Centre) (1 for each M.P.D.) (1 for each P.S.)

2) Operation method of the system

As the operation method has an influence upon the function of the equipment, the system, specification, and standards should be matched with the operation method.

The Royal Thai Police Department is studying two steps to shorten the response time to emergency calls.

- o Shortening the managing time in the 191 Centre from receiving a 191 emergency call to radio dispatching.
- o Shortening the time interval from radio dispatching to arrival of the scene of the emergency.

The investigation of the content of the request and

measures to be taken in response to it came to the conclusion that achieve the first step a direct display system using electronic equipment to connect emergency call receiving consoles and radio patrol dispatching consoles should be used; for the second step, a police activity operation display and a map display processing unit should be introduced.

3) The capability of the Royal Thai Police Department concerning operation and management of this system.

The Communications Division of the Royal Thai Police Department, which is the administrative agency of this system, has 10 engineers, 200 technicians and 520 policemen. The technical level of its personnel is sufficiently high.

The Communications Division is responsible for the planning, design, construction and maintenance of police communications facilities in Thailand. It has so far introduced and maintained such police communications equipment as mobile radio telephones and satellite communication systems.

The Division is judged to be able to cope with the projected modernization of the Communications System at the Emergency Call Centre of the Bangkok Metropolitan Police Bureau.

The new system, however, includes wire telephone equipment and radio telephone equipment, which Royal

Thai Police Department has no experience in handling. It is therefore desired that, upon completion of the project and start of operation, adequate technical guidance be given for the proper management, operation and maintenance of the system.

4) The financial function

The Royal Thai Police Department belongs to the Ministry of Interior and its personnel expenses are defrayed from the national budget.

The Communications Division, which directly manages police communications facilities, has been allotted an appropriation in the national budget for the buying and maintaining of the equipment and facilities. Therefore the operation and maintenance budget for the new system will be ensured by the government. Hence there are no financial concerns regarding maintenance of this system.

(2) Study of the Requested Equipment

1) Map display equipment

This equipment selects the map of the scene of an emergency and its vicinity and shows it on a display stand on the concerned console. This equipment is indispensable for map information management to lead patrol cars to the scene of the emergency quickly.

As a result of the investigation, the map display is to be replaced with a map display processing unit that

selects the necessary maps beforehand according to the push button operation of consoles by using the unit which contains the map information.

The map display is to be included in the emergency call receiving console, radio patrol dispatching console, supervisory console and emergency operation control console.

The maps to be used for the map display processing unit are to be prepared by the Thai police side. The map are to be presented in the maximum scale of 1/4000 with 67 sheets.

- 2) Character display
A character display is needed in order to receive the 191 calls and record the contents of radio dispatching of patrol cars using a digitizer or a push buttons and to display the contents immediately on the console concerned. After further study, it was decided that the character display is to be changed to a character display processing unit, because this equipment must deal with and distribute the contents recorded in all the character displays and must be able to display the content on each display. The display is included in the emergency call receiving console, the radio patrol dispatching console, the supervisory console and emergency operation control console. Therefore a character display processing unit is included for each

console.

3) Emergency call receiving console

For rapid and accurate transmission of information about the emergency, from receiving the emergency call to radio dispatch, an input system using a digitizer (equipment with which handwritten letters and diagrams are immediately converted into electronic signals, and then transmitted to the character display at the suitable place) or push buttons is to be introduced. This console is indispensable for dispatching officers with a shorter response time. Also, this console has map display and a character display.

The result is that receiving consoles are needed, based upon the present number of 191 calls received at the 191 Centre, and taking into consideration the expected number of 191 calls in the future.

4) Radio Patrol Dispatching Consoles

Radio patrol dispatching consoles are needed in order to give rapid and accurate orders by effectively monitoring the emergency call receiving console, map display and character display. This type of console has a map display and character display.

Sufficient equipment is needed for five radio communication systems because there are five new radio communications systems operated by the 191 Centre. The systems are operated for the patrol cars under the

direct control of the 191 Centre, for the patrol cars of the Northern Bangkok Metropolitan Division, the Southern Bangkok Metropolitan Division, the Thonburi Metropolitan Division and for the common channel radio system.

Each dispatcher gives orders by using each radio communications system. Five radio patrol dispatching consoles are needed for the five radio communications systems.

5) Supervisory console

One Supervisory console is needed in order to control the operation of all the emergency call receiving consoles. The console is necessary for a supervisor to receive emergency calls and to manage matters when a serious case occurs.

This console is also a back-up in case all emergency call receiving consoles are occupied.

This equipment has a map display and a character display.

6) Emergency operation control console

One emergency operation control console is necessary in order to manage the operation of all the radio patrol dispatching consoles and for a supervisor to link proper plural radio communications systems and to use patrol cars systematically when a serious case occurs.

This console is necessary for the managing officer

himself to use the radio communications system to manage serious cases. This type of console has a map display and a character display.

7) Fixed radio equipment, mobile radio equipment, relay equipment and hand-held radio equipment

A radio relay station is set up at the Baiyoke Tower (130 meters above ground), a multistory building in Bangkok city, to make up the radio communications system between the 191 Centre and police stations and between patrol cars. Also, to back-up the Main Relay Station, a Back-up Relay Station is set up on the building of the Royal Thai Police Department.

Necessary quantities of the types of equipment are as follows:

Fixed radio equipment	Bangkok Metropolitan Police Bureau 10 Northern and Southern Bangkok, Thonburi Metropolitan Police Divisions 3 Patumwan 1 Parusakawan Maintenance Centre 2 Police Stations 69 (Total 85)
Mobile radio equipment	Bangkok Metropolitan Police Bureau 112 Police Stations 138 (Total 250) (2/ P.S.)

Relay equipment	Main Relay Station	10
	Back-up Relay Station	5(Total 15)
Hand-held radio equipment	Bangkok Metropolitan Police Bureau	82
	Police Stations	138(Total 220)
	(2/ P.S.)	

(8) Multi-channel logging recorder

A Multi-channel logging recorder is necessary to record the contents of emergency calls and radio patrol dispatches 24 hours a day and to collect and use any information for dealing with and studying the case later.

(9) Emergency Power Supply

An emergency power supply is needed in order to supply electric power during power failures and to prevent interruption of emergency calls and radio communications. Considering the importance of the system and so on, it should be set up at the 191 Centre, the Main Relay Station, and Back-Up Relay Station.

(10) Control and Monitoring Equipment

Control and monitoring equipment is needed in order to remote monitor how the repeater is runs and the intruder, fire etc., as these Stations are operated automatically. It is also needed in order to remote control the switching between normal and stand-by repeaters, and the sensitivity (squench) of the receiver.

Each Relay Station has the equipment to monitor their Station, and the 191 Centre and the Parusakawan Maintenance Centre have the remote control and monitoring equipment.

(11) Hand-held Radio Equipment

Hand-held radio equipment, carried by policemen is needed in order to communicate with the 191 Centre, police stations and so on during their patrols.

(12) Facsimile

The facsimile will be used to give orders and transmit information by papers and diagrams, etc. between the 191 Centre, the Metropolitan Police Divisions, and police stations, to improve the efficiency of the activities of the police.

The facsimiles are to be newly introduced as a part of the modernization of the Public Emergency Call Centre, and they will be distributed as follows.

Facsimile	Bangkok Metropolitan Police Bureau	3
	Northern, Southern Bangkok, Thonburi Metropolitan Division	3
	Police Station	69
	Patumwan	1 (total 76)

The results of the above mentioned study are shown in the table 3-1.

Table 3-1

Requested Equipment and the Results of the Study

System	Requested equipment		Results of Study	
	Equipment	Qty.	Equipment	Qty.
I 191 Emer- gency Call System	1. Map display	11 sets	1. Map display processing unit	1 set
	2. Character display	11	6. Character display	1
	3. Emergency call receiving console	6	2. Emergency call receiving console	7
	4. Radio patrol dispatching console	3	3. Radio patrol dispatching console	3
	5. Supervisory console	1	4. Supervisory console	1
	6. Emergency oper- ating control console	1	5. Emergency oper- ating control console	1
	7. Fixed radio equipment	5	7. Fixed radio equipment	10
	8. Multichannel logging recorder	1	8. Multichannel logging recorder	1
	9. Emergency power supply	1	9. Emergency power supply	1

	10. Police activity operation display	1	10. Police activity operation display	1
II	Main Relay Station		Main Relay Station	
Radio	1. Aerial equipment	1 set	1. Aerial equipment	1 set
communi-	2. Relay equipment	5	2. Relay equipment	5
cations	3. Control and monitoring equipment	1	3. Control and monitoring equipment	1
system	4. Emergency power supply	1	4. Emergency power supply	1
	Back-up Relay Station		Back-up Relay Station	
	1. Aerial equipment	1 set	1. Aerial equipment	1 set
	2. Relay equipment	5	2. Relay equipment	5
	3. Control and monitoring equipment	1	3. Control and monitoring equipment	1
	4. Emergency power supply	1	4. Emergency power supply	1
	Fixed radio equipment	80 sets	Fixed radio equipment	80 sets
	Mobile radio equipment	250 sets	Mobile radio equipment	250 sets
	Hand-held radio equipment	220 sets	Hand-held radio equipment	220 sets