

# PHS MoU Group News

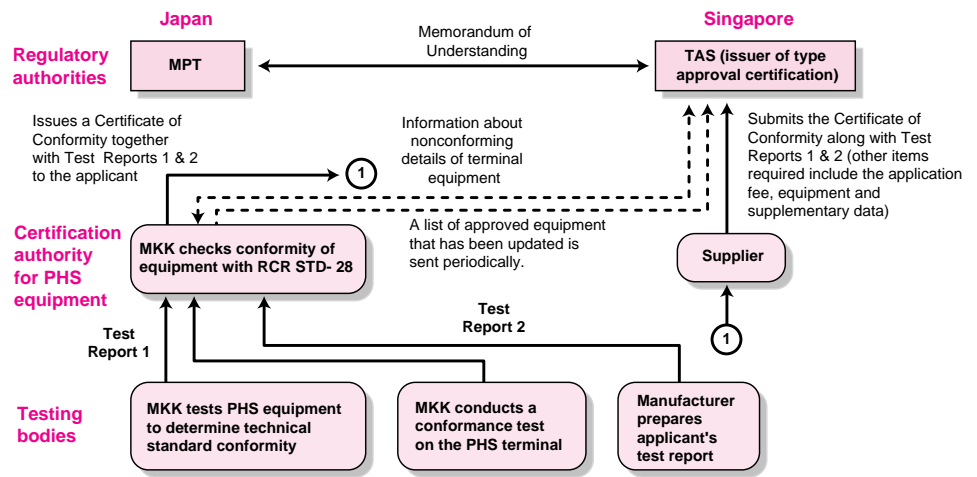
Vol. 1, No. 2 December 1995

## Introduction of PHS Equipment for Indoor Use in Singapore

Japan's Ministry of Posts and Telecommunications (MPT) and the Telecommunication Authority of Singapore (TAS) mutually confirmed the following details on October 20 in connection with the introduction of Personal Handy-phone System (PHS) equipment (wireless PBXs, cordless phones, etc.) for indoor use in Singapore.

1) The Radio Equipment Inspection and Certification Institute (MKK) of Japan will conduct the necessary testing for certification of PHS equipment for indoor use in Singapore and issue a Certificate of Conformity.

### Type Approval Process for PHS Equipment to Be Used in Singapore



- 2) An outline of the procedure under which MKK will conduct the testing and other tasks was confirmed.
- 3) It was agreed to promote exchanges of information about the standards certification system for indoor-use PHS equipment.

Testing pertaining to connection to the network, on the other hand, will be performed by TAS based on its own standards.

Two results of this mutual confirmation are that MPT has made a definite contribution to the international standards certification system and that MKK's activities have now become international in scope.

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As a result of this agreement by MPT and TAS, it is definite that PHS will be introduced in Singapore for indoor use. The task for the future is to introduce PHS as a public service. The conditions of the performance certification that MKK is to conduct for the indoor-use PHS equipment also include the provision of functions for supporting public service. This means there is a good possibility that PHS could be implemented in the

future as a public service in Singapore.

In early October, TAS notified parties involved in telecommunications in Singapore that it had approved the introduction of PHS equipment for indoor use.

Finally, attached for reference is a diagram showing the flow of the type approval process for PHS equipment intended for use in Singapore.

# MKK to Conduct Performance Certification for PHS for Use in Singapore

## 1. Overview

The Personal Handy-phone System (PHS) developed in Japan will be introduced in Singapore for use in the confined area of a building. Use of PHS equipment in Singapore will require type approval by the Telecommunication Authority of Singapore (TAS), which has jurisdiction over telecommunications in that country.

TAS has decided that applications for type approval must be accompanied by a Certificate of Conformity and a test report verifying the equipment's conformity with RCR STD-28, both of which are to be issued by the Radio Equipment Inspection and Certification Institute (MKK) of Japan. These conditions are based on a Memorandum of Understanding concluded between TAS and Japan's Ministry of Posts and Telecommunications (MPT).

The following is an outline of the performance certi-

fication procedure under which MKK will issue the relevant certificate and test report.

## 2. PHS Certification System in Japan

Commercial PHS service was launched in Japan July 1995. MKK is responsible for verifying the technical performance of cell stations and PHS terminals used as indoor digital cordless phones as well as that of the cell stations and terminals served as the public network. This is done on the basis of Technical Standard Conformity Certification and Conformance Tests.

The principal purpose of Technical Standard Conformity Certification is to confirm that the radio equipment does not interfere with the operation of other radio stations. Table 1 lists the test items for this certification. The purpose of a Conformance Test is to confirm the air interface between the cell stations and ter-

**Table 1. Items to Be Tested for the Certificate of Conformity with the Technical Standard**

1. Transmission characteristics
  - Frequency deviation
  - Occupied bandwidth
  - Strength of spurious emission
  - Antenna power deviation
  - Adjacent channel leakage power
  - Leakage power when carrier wave is off
  - Transmission speed of modulation signals
2. Reception characteristics
  - Limit of collateral radiation, etc.
3. Others
  - Call-name memory device and identification device

**Table 2. Additional Items to Be Tested by the Applicant**

1. Transmission characteristics
  - Burst transmission transient response characteristics
  - Modulation accuracy
  - Housing radiation
2. Reception characteristics
  - Reception sensitivity
  - Adjacent channel selectivity
  - Intermodulation characteristics
  - Spurious sensitivity
  - Housing radiation
  - Reception-level detectivity
  - Bit-error-rate floor characteristics
3. Antenna characteristic

minals of the PHS system.

### 3. Performance Certification of PHS Equipment for Use in Singapore

Performance Certification conducted by MKK for PHS equipment to be used in Singapore will make maximum use of the data confirmed in Technical Standard Conformity Certification and Conformance Tests. When the PHS equipment in an application is the same type as equipment previously certified, MKK will verify its performance on the basis of test data collected by MKK in the past. Besides those test items, TAS has established additional test items that must also be confirmed by TAS. Table 2 lists the additional test items.

Moreover, tests must be conducted to verify the control channel, as the control channels for use by PHS equipment differ between Japan and Singapore.

Once all of these test items have been confirmed, MKK will issue a Certificate of Conformity. It will also issue a test report that combines the test data of Table 1 items MKK has collected with the test data of Table 2 items MKK endorsed for the applicant.

The Conformance Test result is designed to provide an advance technical guarantee that the PHS equipment, which is intended for indoor use in the confined area of a building, can also be operated in the future as a terminal of the public network.

## Overview of a Digital Wireless PBX System Using PHS Technology

### 1. Switch from Analog to Digital

In 1988, NTT released its ACTY wireless PBX system which was based on analog cordless telephone technology. That development helped to open up a new field for wireless PBXs targeted at business applications. Japanese communications equipment manufacturers subsequently brought out many such systems. However, analog systems have certain drawbacks with respect to speech quality, security, traffic capacity and extendability to data communications, among other aspects. Work has been under way to switch to digital technology in order to overcome those limitations.

The Technical Standard for Personal Handy-phone System (RCR STD-28) was issued in December 1993.

NTT Mobile Communications Network Inc. (NTT DoCoMo) moved quickly to incorporate this technology into its PASSAGE digital wireless PBX system that was put on the market in April 1994.

### 2. System Overview

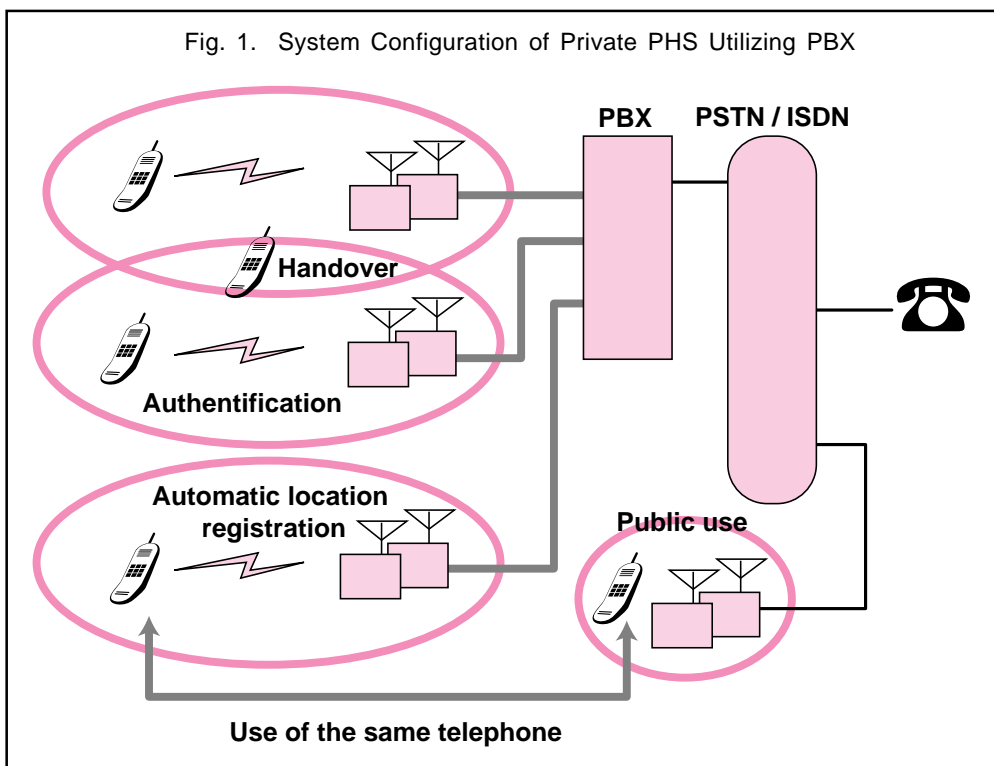
This digital wireless PBX system consists of a digital PBX, cell stations and PHS terminals, as shown in Fig. 1. It provides the same capabilities as a public PHS system, including automatic location registration, hand-over and authentication. In addition, it also allows the use of the many functions inherent in a PBX.

The system capacity depends on the capability of the PBX that is used. It can be adapted to a wide range of

## PHS Internet Access Forum

Personal Handy-phone System (PHS) service was launched in Japan on July 1, 1995. At present, PHS service is mainly being used for voice communications, but its inherent transmission capacity of 32 kbps makes it a promising future medium for data communications as well. The 32 kbps bearer communications function of PHS is scheduled to be standardized this year. There is also a need to proceed with the development of transmission systems for data communications.

Therefore, the Association of Radio Industries and Businesses (ARIB) has established the PHS Internet Access Forum to promote the development of transmission systems supporting access to the Internet via PHS and to foster the penetration of PHS service for multimedia communications. An inaugural meeting was held on October 18 to set up the Forum.



PBXs, from a small PBX supporting around 30 lines to a mammoth PBX capable of accommodating several thousand lines. Photo 1 shows the appearance of the cell station and PHS terminal.

### 3. Demand Trend

Target customers for the PASSAGE system can be inferred from the results of a market survey that was conducted before this product was released (Fig. 2). The types of businesses that are strongly interested in digital wireless PBXs include advanced offices as well as large places of business such as hospitals, department stores and wholesale markets, which have many

extension lines and where there is a need to contact directly specific individuals who are moving about in a relatively wide area.

The specific places where the system has been installed so are include factories, hospitals, hotels, theme parks and universities, among others.

### 4. Future Developments

Over 200 PASSAGE systems are now in operation in Japan. Efforts are under way to improve and expand the system in various ways, such as by providing a roaming function between PBXs, increasing the data transmission capacity, allowing interworking with

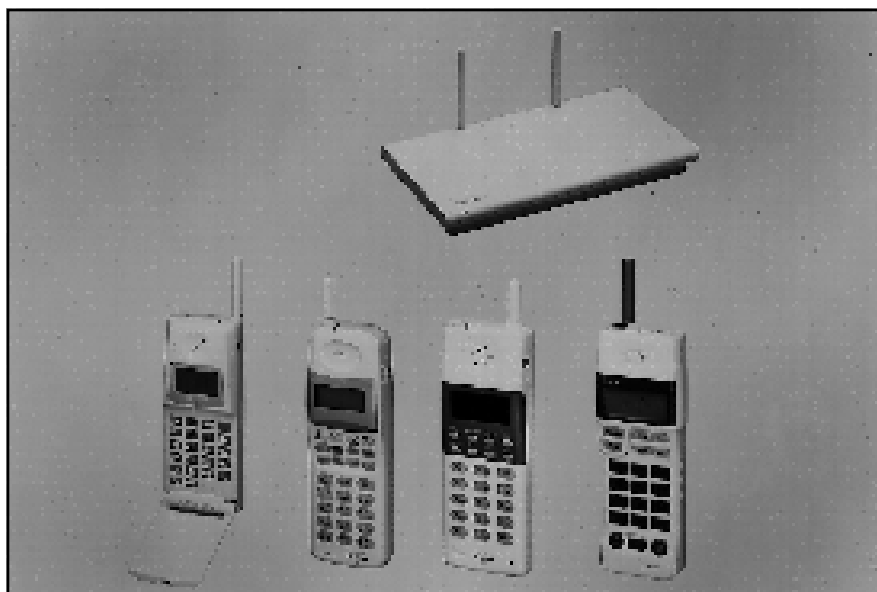
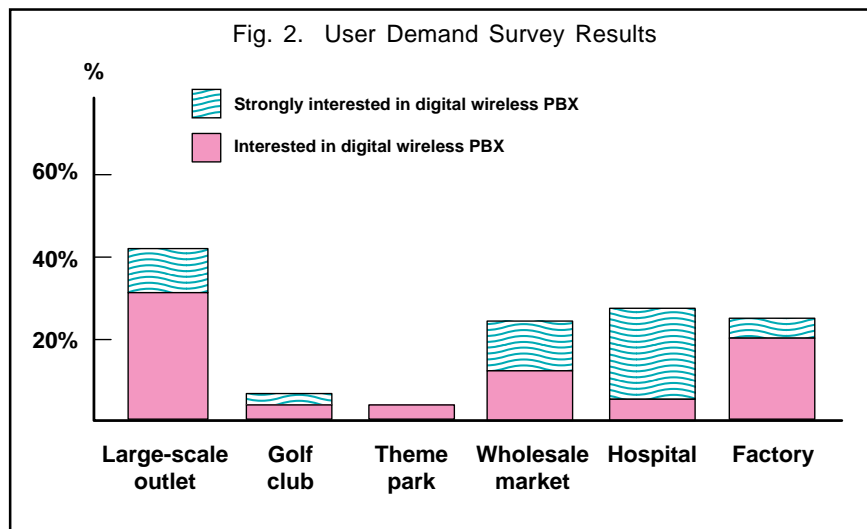


Photo 1. Terminals and a cell station



LANs and other multimedia systems and adopting key telephone system functions. It is expected that digital wireless PBX systems in Japan will continue to advance

on the platform provided by PHS technology.

## Private PHS Digital Cordless Phone Systems Adopted at Yebisu Garden Place

### 1. Yebisu Garden Place

Yebisu Garden Place, located in downtown Tokyo, has welcomed 16 million visitors in a year since it's opening in October 1994. Covering an area of about 800,000 square meters, it includes a department store and a hotel, as well as offices and apartment complexes. Yebisu Garden Place comprises a huge business, cultural and residential area, much like a self-contained city. Yebisu Garden Place Co., Ltd. is responsible for overall administration and operation of the facilities, including management of the greenery on the expansive grounds, cleaning operations and events held on the premises. It operates and maintains the electrical equipment, air-conditioning systems, and water, sewage and other sanitation facilities, in addition to providing for security services, all on a 24-hour basis.

### 2. Adoption

Yebisu Garden Place Co., Ltd. decided to adopt PHS digital cordless private phone systems at Yebisu Garden Place for the following reasons.

- (1) The systems support two-way communications.
- (2) The cost of installing the systems would not differ significantly from paging systems.

Moreover, the systems would allow the use of nearly

all advanced features of a digital PBX, including the provision of better speech quality and protection of privacy compared with analog business cordless phone systems, while also supporting data transmission and paging.

### 3. Outline of the Systems

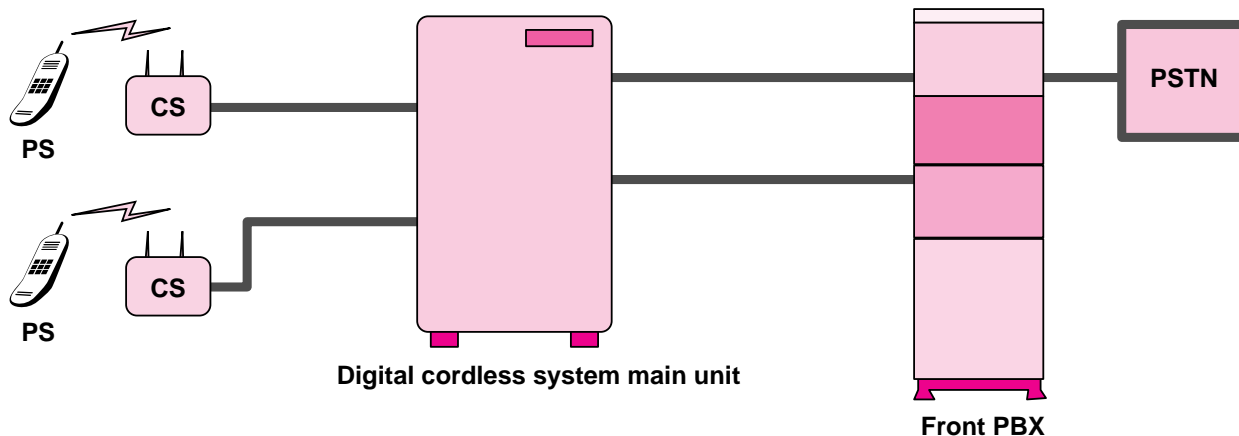
As shown in the Fig. 3, two systems have been installed at Yebisu Garden Place, each of which operates independently. One system covers the business, commercial and cultural facilities, including the rental offices and various management centers, and is controlled by a PBX unit installed in the Yebisu Garden Place Tower. The other system is used within the Westin Hotel.

- (1) The system installed in the Tower provides service in all outdoor areas of the premises and in 10 of the 13 wings, excluding the residential complexes. It supports the operation of 280 cell stations and 30 digital cordless phones on the premises.

The digital cordless phones are allocated to the facilities management group, security group, cleaning group, parking lot management group and the administration group. These phones are

Fig. 3. System Configuration

Site	Digital cordless system main unit		Front PBX		
	No. of PS	No. of cell stations	No. of extentions	No. of lines (INS 1500)	No. of lines (analog)
Yebisu Garden Place Tower	30	280	1,000	2	10
Westin Hotel Tokyo	100	100	1,600	4	30



always carried by personnel when patrolling the grounds or making inspections in order to facilitate communications during regular routine work and in emergencies. Thirty of these digital cordless phones provides sufficient coverage when personnel make the rounds or work somewhere on the premises.

The PBX lines installed in the Tower are limited to extension telephone use for management of the premises facilities. Although the digital cordless phones have a function for making central office line calls, they are used only for the specific purpose of calling other extension lines on the premises.

- (2) The digital cordless phones of the system installed in the Westin Hotel are carried by bell-hops, housekeepers, room service personnel and the various managers in charge. This system has 100 digital cordless phones and 100 cell stations located throughout the hotel. It was installed to improve the information service provided to customers. Because the staff constantly carry a digital cordless phone with them, they can be deployed more efficiently, making it possible to give customers higher quality service.

4. Features and Consideration

The PHS digital cordless phone systems have been in operation since Yebisu Garden Place opened. The following describes some of the system features and

considerations made regarding equipment installation.

- a. Cell stations
  - (1) They are installed in the ceiling of hallways on the ordinary floors of the Garden Place Tower.
  - (2) In areas having a metal panel ceiling, such as the Tower lobby, only the antenna is exposed, while the main unit is mounted in the ceiling out of sight.
  - (3) In outdoor areas, some stations are installed on outer walls and others on independent outdoor lighting facilities.
  - (4) They are mounted directly to concrete walls that provide a common base in the case of exposed concrete surfaces.

These installation methods make the cell stations relatively inconspicuous to the visitors of Yebisu Garden Place. They offer the advantages of maintaining the overall aesthetic beauty and avoiding potential danger due to breakage. On the negative side, however, it is more difficult to find the base stations when maintenance work is done.
- b. The running cost is low, amounting to around ¥2.4 million annually.
- c. Speech quality is exceptionally good.
- d. In addition to voice communications, other ways of using the systems that take advantage of the digital lines will also be considered in the future.

# PHS Technology (1)

## System Overview and Features

PHS is one of the most advanced personal communications system that makes use of sophisticated wireless technology. It is founded upon digital cordless technology and a micro-cell architecture, and has a maximum capacity of up to several million subscribers in an urban setting. PHS has been quite successful in Japan since its commercial service was launched in July 1995. The total number of PHS subscribers in Japan had reached 482,000 by the end of November 1995.

PHS supports inter- and intra-cell handover functions, and achieves an economical yet advanced system compared with existing cellular systems. Customers are satisfied with its handover function, including its momentary interruptions. Moreover, commercial service has proven that PHS works in town centers at driving speed, 60 to 70 km/hour in most cases.

Key features behind the successful launch of PHS and its promising future are as follows.

First, PHS handsets are extremely small and lightweight, almost half the size and weight of cellular handsets, due to its system parameters such as the very small output power (at both average and peak). Meanwhile, the standby and talking times are far longer than those for cellulars. Many kinds of handsets are now on the market. Several types of "home stations" (cell stations for digital cordless use at homes) are also available. In addition, network services

such as call transfer and voice mail services are available.

Secondly, the 32 kb/s data transmission capability for PHS will enable the realization of multimedia applications such as high speed Internet access, picture and video transmission, database access and mobile computing.

Third, a multi-vendor environment has been established for PHS, which includes some overseas vendors such as AT&T and Motorola. Currently, the number of vendors for handsets, cell stations, PBX cordless systems, and home cordless phones are 15, 11, nine, and eight respectively.

Finally, PHS supports other attractive uses such as home cordless, PBX cordless, transceiver (walkie-talkie) and WLL (Wireless Local Loop) applications.

The table 3. shows the technical features of PHS.

Table 3. Technical Features of PHS

CS Coverage (radius)	output power	20 mW	100 mW	500 mW
	typical	300m	500m	1 km
	in good condition	500m	800m	1.5 km
Connection to CS	Metallic cable or optical fiber cable			
Frequency	1.9 GHz band (23.1 MHz bandwidth currently in Japan)			
Radio access method	TDMA/TDD			
Radio transmission rate	384 kb/s			
Voice CODEC	32 kb/s ADPCM			
Mobility	Automobile speed in downtown (up to 60 ~ 70 km/h)			
Available mode	Public cordless / PBX cordless / Home cordless / Transceiver / WLL			
Frequency planning	Dynamic channel allocation			
Subscriber capacity	Millions			
Commercial personal station (handset)	Output power	10 mW (80 mW peak)		
	Talking time	5 hours		
	Standby waiting time	400 hours		
	Weight	95 g*		
	Volume	98 cc*		
Interface	Air interface	Specified in RCR STD-28		
	Cell station to network	Based on ISDN		
	Network to network**	CCS No. 7 ISUP CCS No. 7 TUP		

\* R&D has already accomplished prototype handset of 85 g, 60 cc.

\*\* Analog interface to be considered

# TELECOM '95

The TELECOM exhibition is held quadrennially in Geneva, and recent years have seen major telecommunications-related manufacturers and carriers from around the world putting up exhibits therein. This year's TELECOM '95 was held from Oct. 3 to 11, 1995, in Geneva, Switzerland, enabling the exhibition of telecommunications equipment from all over the world, as well as the holding of demonstrations and of seminars, under the theme of "Connect!"

The exhibits of 822 companies hailing from 46 coun-

tries covered all types of telecommunications equipment, but items such as PHS-related terminals and wireless PABX cordless phones showcased by a dozen or so companies were particularly conspicuous, with features like compact and lightweight terminals and easily-installed bases stations making these popular and highly regarded among the visitors as easy-to-use products.



## Members of the Preparatory Group for PHS MoU

(As of December 1, 1995)

- ArrayComm, Inc.
- ASTEL TOKYO CORPORATION
- AT&T Japan Ltd.
- Cable and Wireless Japan Ltd.
- DDI Tokyo Pocket Telephone. Inc.
- DSP Communications (JAPAN), INC.
- Fujitsu Limited
- Hitachi, Ltd.
- Ikegami Tsushinki Co., Ltd.
- Itochu Corporation
- Iwatsu Electric Co., Ltd.
- Japan Radio Co., Ltd.
- Japan Telecom Co., Ltd.
- Kanda Tsushin Kogyo Co., Ltd.
- Kenwood Corporation
- Kokusai Denshin Denwa Co., Ltd.
- Matsushita Communication Industrial Co., Ltd.
- Meisei Electric Co., Ltd.
- Mitsubishi Electric Corporation
- NEC Corporation
- Nippondenso Co., Ltd.
- Nippon Ericsson Co., Ltd.
- Nippon Motorola Ltd.
- Nippon Telegraph and Telephone Corporation
- Nitsuko Corporation

- Northern Telecom Japan Inc.
- NTT Central Personal Communications Network Inc.
- NTT Mobile Communications Network Inc.
- Oki Electric Industry Co., Ltd.
- PANTEC CO., LTD.
- Pioneer Electronic Corporation
- SANYO Electric Co., Ltd.
- Sharp Corporation
- Sony Corporation
- ST Telecommunications Pte Ltd.
- Sumitomo Electric Industries, Ltd.
- Teleway Japan Corp.
- Toshiba Corporation
- Tokyo Electric Power Company, Inc. (TEPCO)
- VICTOR COMPANY OF JAPAN, LTD.
- Yupiteru Industries Co., Ltd.

### Special Members

- Association of Radio Industries and Businesses
- Ministry of Posts and Telecommunications (Japan)
- Radio Equipment Inspection and Certification Institute
- The Telecommunication Technology Committee

#### Dear readers:

**The Editorial Committee of the Preparatory Group for PHS MoU is pleased to have published the second issue of the PHS MoU News. This newsletter includes PHS-related news and information. Your comments and opinions are welcomed. Please feel free to contact us.**

**We hope this newsletter will contribute to your business.**

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