Panasonic

Quick Installation Guide

DECT 8-Channel IP Cell Station Unit

Model No. KX-NCP0158

Thank you for purchasing a Panasonic DECT 8-Channel IP Cell Station Unit.
Please read this manual carefully before using this product and save this manual for future use.

Important Information

SAVE THESE INSTRUCTIONS

Safety Notices

Please observe the safety notices in this manual in order to avoid danger to users or other people, and prevent damage to property.
The notices are classified as follows, according to the severity of injury or damage:

⚠ **WARNING**	This notice means that misuse could result in death or serious injury.
⚠ **CAUTION**	This notice means that misuse could result in injury or damage to property.

⚠ WARNING

SAFETY REQUIREMENTS

- The product must only be installed and serviced by qualified service personnel. The product should be used as-is from the time of purchase; it should not be disassembled or modified. Disassembly or modification can cause a fire, electric shock, or damage to the product.
- Make sure that the wall that the unit will be attached to is strong enough to support the unit (approx. 400 g). If not, it is necessary for the wall to be reinforced.
- Only use the wall-mounting equipment (screws, washers) included with the unit.
- When this unit is no longer in use, make sure to detach it from the wall.
- Do not connect or disconnect the AC plug with wet hands.
- Disconnect the unit from the AC outlet, disconnect the LAN cable, and contact the dealer if:
  - The AC adaptor cord, AC cord, or AC plug becomes damaged or frayed.
  - The unit is exposed to rain, water, or any other liquid.
  - The unit is dropped or damaged.
  - Internal components are exposed due to damage.
  - The unit does not operate properly.
  - Performance deteriorates.
- Disconnect the unit from the AC outlet and disconnect the LAN cable if the unit emits smoke, an abnormal smell, or makes unusual noise. These conditions can cause fire or electric shock. Confirm that smoke has stopped and contact an authorised service centre.
- Clean the AC plug periodically with a soft, dry cloth to remove dust and other debris.
- Do not touch the unit, AC adaptor, AC adaptor cord, or AC cord during a lightning storm.
- If using an AC adaptor, use only the optional AC adaptor KX-A421 (PSLP1662).
- Do not allow anything to rest on the AC adaptor cord, AC cord, or LAN cable. Do not locate this unit where the AC adaptor cord, AC cord, or LAN cable may be stepped on or tripped on.
- When installing or testing a product with an external AC adaptor, the AC adaptor should be plugged into a wall outlet or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.
- Make sure that you do not short the battery or cables.
- Never attempt to insert wires, pins, etc. into the vents or other holes of the CS.

- Do not splash water on the AC adaptor or the power cord, nor get them wet. Doing so can result in fire, electric shock, or injury. If they do get wet, immediately disconnect the AC adaptor and power cord, and contact an authorised service centre.
- Do not touch the AC adaptor for extended periods of time. Doing so can lead to low-degree burns.
- Do not make power connections that exceed the ratings for the AC outlet or power equipment. If the power rating of a surge protector, etc. is exceeded, it can cause a fire due to heat buildup.
- Care should be taken so that objects do not fall onto, and liquids are not spilled into, the CS. Do not subject the CS to excessive smoke, dust, moisture, mechanical vibration, shock, or direct sunlight.
- Do not place heavy objects on top of the CS.
- Do not mount the CS in a manner other than that described in this manual.
- If damage to the CS exposes any internal parts, immediately disconnect the cable or cord. If the power is supplied from the network to the CS (Power-over-Ethernet), disconnect the Ethernet cables. Otherwise, disconnect the AC adaptor cord. Then return the CS to a service centre.
- The CS should only be connected to a power supply of the type shown on the label on the CS.
- Completely insert the AC adaptor/power plug into the AC outlet. Failure to do so may cause electric shock and/or excessive heat resulting in a fire.

⚠ CAUTION

SAFETY REQUIREMENTS

- The CS should be kept free of dust, moisture, high temperature (more than 40 °C), low temperature (less than 0 °C), and vibration, and should not be exposed to direct sunlight.
- The CS should not be placed outdoors (use indoors).
- The CS should not be placed near high-voltage equipment.
- The CS should not be placed on a metal object.
- The DC jack cover poses a choking hazard. Keep the DC jack cover out of reach of children.
- When driving the screws into the wall, be careful to avoid touching any metal laths, wire laths or metal plates in the wall.
- To prevent malfunction, deformity, overheating, rust, and discolouration, do not install or place equipment in the following types of locations:
  - Locations where air ventilation is poor.
  - Locations that may be exposed to sulphurous gas, such as near hot springs.
  - Near devices that emit heat, such as heaters.
  - Near devices that emit electromagnetic noise, such as radios or televisions.
  - Near devices that emit high-frequency noise, such as sewing machines or welders.
- Do not stretch or bend the cables. Also, do not allow anything to rest on the cables.
- Use cables that are fire-resistant or fireproof.
- The CS and the cables should never be placed near or over a radiator or other heat source.
- Do not bundle cables that are connected to the CS with the AC power cords of machines located nearby.
- Maintain the distances listed in "Required Distances between Equipment" between equipment in order to prevent noise, interference or the disconnection of a conversation. (The distance may vary depending on the environment.)
- Make sure the cables are securely fastened to the wall.
- The AC adaptor is used as the main disconnect device. Ensure that the AC adaptor is located near the unit and is easily accessible.
- Disconnect the AC adaptor cord and all cables from the unit before cleaning. Clean the unit with a soft, dry cloth. Do not use liquid, aerosol cleaners, abrasive powders, or chemical agents to clean the unit.
- When left unused for a long period of time, disconnect the unit from the AC outlet. When the unit receives power from a PoE power supply, disconnect the LAN cable.

- **Medical**—consult the manufacturer of any personal medical devices, such as pacemakers, to determine if they are adequately shielded from external RF (radio frequency) energy. (The unit operates in the frequency range of 1880 MHz to 1900 MHz, and the output peak power level is less than 0.25 W.) Do not use the unit in health care facilities if any regulations posted in the area instruct you not to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF (radio frequency) energy.

SECURITY REQUIREMENTS

Preventing Data Disclosure Over the Network

- To ensure the security of private conversations, only connect the unit to a secure network.
- To prevent unauthorised access, only connect the unit to a network that is properly managed.
- Make sure all personal computers that are connected to the unit employ up-to-date security measures.

Notice

SAFETY REQUIREMENTS

- Before connecting the unit, confirm that the unit supports the intended operating environment.
- If the unit does not operate properly, disconnect the AC adaptor cord and LAN cable, then connect again.
- The unit may not operate in the event of a power failure.
- Do not move the unit while it is in use.
- Satisfactory operation, interoperability, and compatibility cannot be guaranteed with all equipment connected to the unit, nor with all services provided by telecommunications providers over networks connected to the unit.

SECURITY REQUIREMENTS

- Privacy of communications may not be ensured when using the wireless systems.
- Keep a copy of all important data (such as your network information) before sending the machine for repair.
- This product can store your private/confidential information. To protect your privacy/confidentiality, we recommend that you initialise the product to erase all user data and restore the factory default settings before you dispose, transfer or return the product.

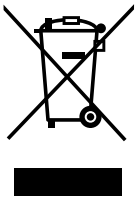
Note

In this manual, the suffix of each model number (e.g., KX-NCP0158**CE**) is omitted unless necessary.

Additional Information

For users in the European Union only

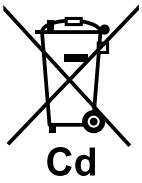
Information for Users on Collection and Disposal of Old Equipment and used Batteries



These symbols on the products, packaging, and/or accompanying documents mean that used electrical and electronic products and batteries should not be mixed with general household waste.
For proper treatment, recovery and recycling of old products and used batteries, please take them to applicable collection points, in accordance with your national legislation and the Directives 2002/96/EC and 2006/66/EC.
By disposing of these products and batteries correctly, you will help to save valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling.
For more information about collection and recycling of old products and batteries, please contact your local municipality, your waste disposal service or the point of sale where you purchased the items.
Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

For business users in the European Union
If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Information on Disposal in other Countries outside the European Union
These symbols are only valid in the European Union. If you wish to discard these items, please contact your local authorities or dealer and ask for the correct method of disposal.



Note for the battery symbol (bottom two symbol examples):
This symbol might be used in combination with a chemical symbol. In this case it complies with the requirement set by the Directive for the chemical involved.

Trademarks

- Microsoft, Windows and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- All other trademarks identified herein are the property of their respective owners.

Table of Contents

1 Overview

System Overview

The IP Cell Station Unit (IP-CS) can be connected to a PBX via a LAN. The IP-CS supports existing DECT Portable Stations (PSs) with the same features as using a traditional CS. The IP-CS allows for easy and cost-saving installation using an existing IP network infrastructure.

The IP-CS provides the following:

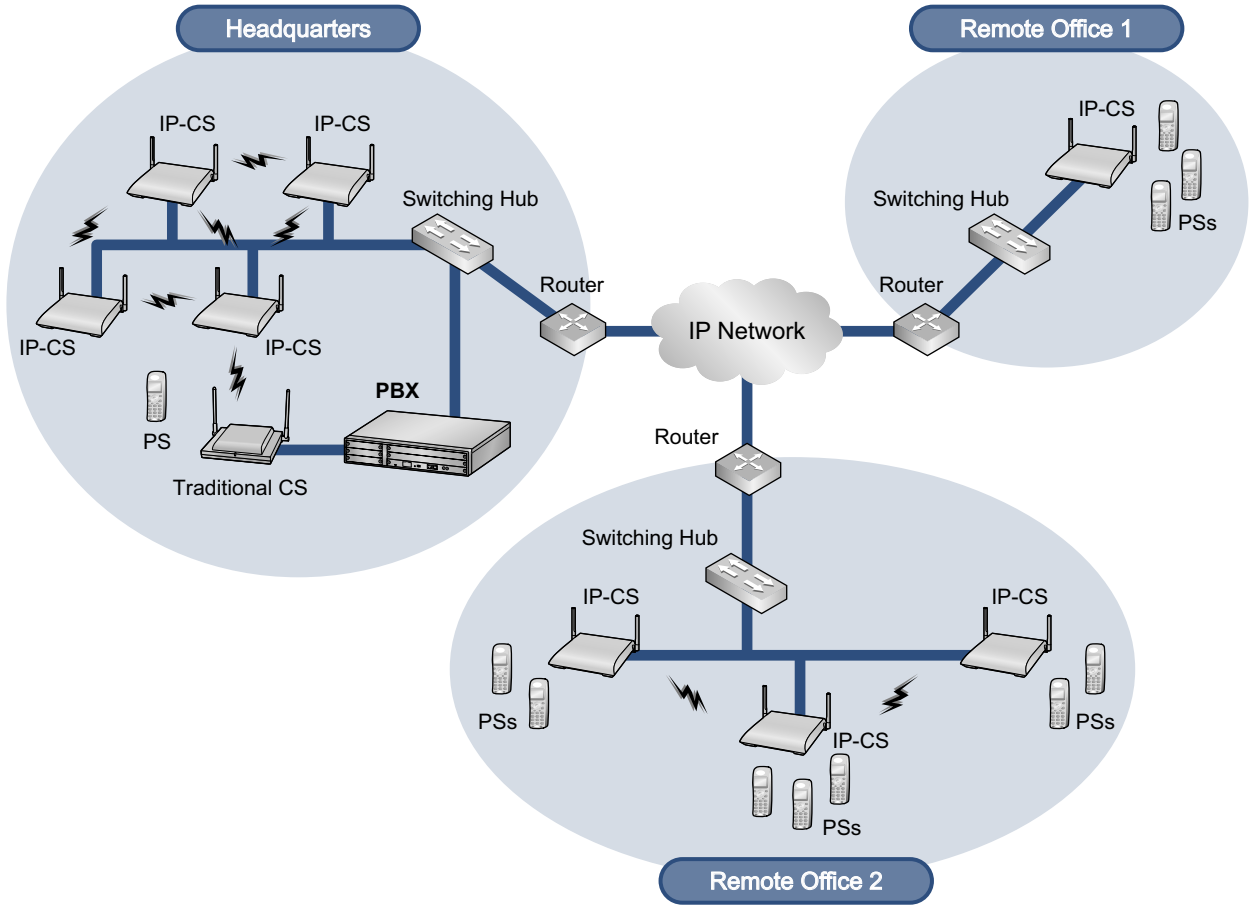
– Wireless systems using a converged voice and data network infrastructure.
– Wireless branch offices and wireless solutions by long distance installation on larger premises.
– Reliable wireless communication using DECT technology over an IP network.

Note

- In this manual, the illustrations of the PBX and screen shots of the Maintenance Console are based on the KX-NCP500.
- The KX-NS1000 PBX supports only IP-CSs directly.

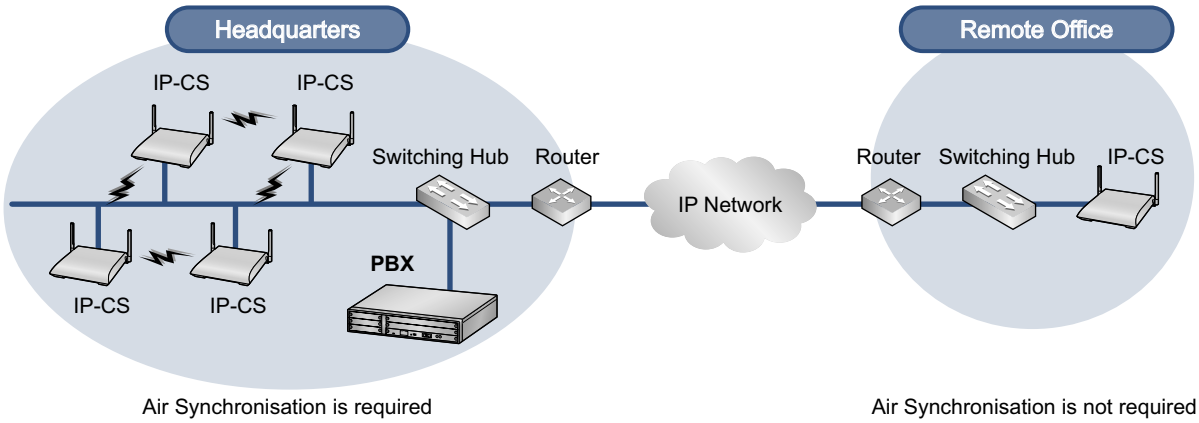
The following is an example of IP-CS installation using an IP network.

: Handover is working.



Air Synchronisation

It is necessary to establish synchronisation for stable operation and handover between IP-CSs and other CSs. As a method of synchronisation, air synchronisation is used.



CSs are classified into one of the following three classifications for implementing air synchronisation:

CS Class	Description
Master CS1 (synchronisation source clock)	Generates clock signal.
Master CS2 (backup for Master CS1)	Receives clock signal from Master CS1 (can also generate clock signal if Master CS1 malfunctions).
Slave CS	Receives clock signal from other CSs.

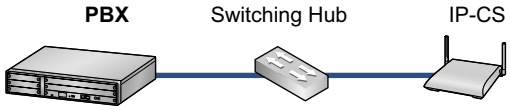
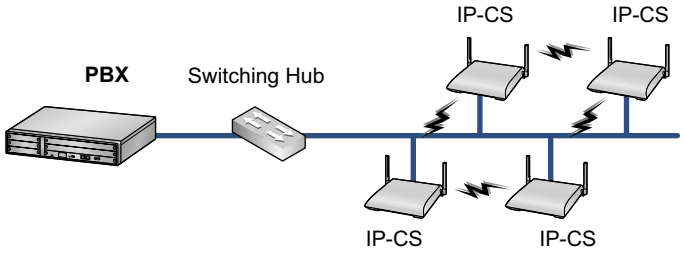
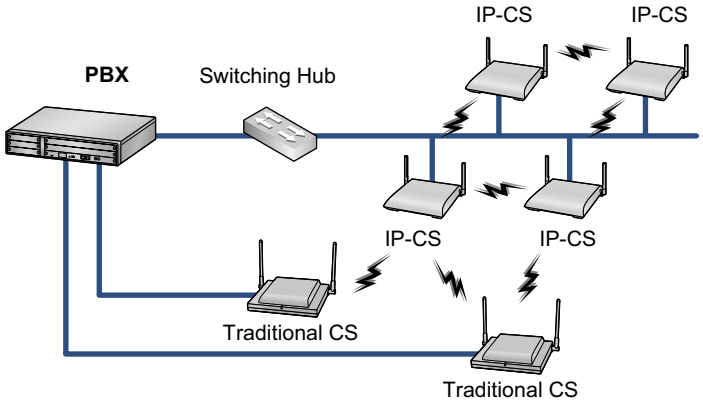
Air Synchronisation Group and Handover

IP-CSs and traditional CSs can be used in the same area by assigning them to an Air Synchronisation Group. Handover is supported between CSs within the same Air Synchronisation Group.

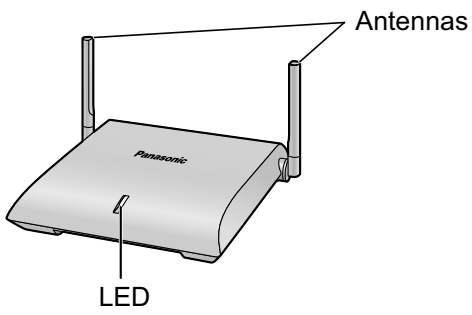
Note

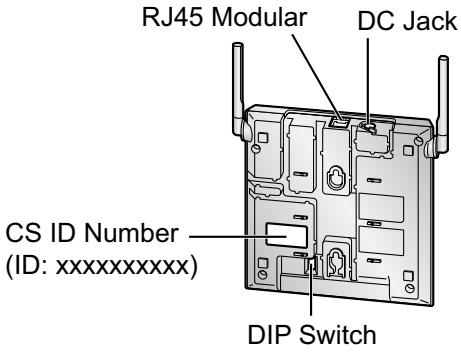
The KX-NS1000 PBX supports only IP-CSs directly.

System Connection Examples

Connection Example	Characteristics
Using one IP-CS only When installing only one IP-CS at a remote office. 	• No need to conduct site planning and site survey for air synchronisation.
Using multiple IP-CSs When creating a new wireless network. 	• Need to conduct site planning and site survey for air synchronisation.
Using multiple IP-CSs and traditional CSs (KX-NCP series/ KX-TDE series PBXs only) When adding IP-CSs to an existing wireless network. 	• Need to conduct site planning and site survey for air synchronisation. • Need to update the software version of traditional CSs to 5.000 or later.

Names and Locations





Unpacking

Unpack the box and check the items below:

Cell Station	1
Screws	2
Washers	2

LED Indications

Indication	Colour	Description
STATUS	Green/Red/ Amber	CS status indication • OFF: Power Off/CS Software downloading • Green ON: Stand-by (no active calls) • Slow Green Flashing: Talk (active calls) • Moderate Green Flashing: Busy[*1] • Red ON: Fault • Slow Red Flashing: Out of Service/Starting up (data link establishment → air synchronisation) • Moderate Red Flashing: Starting up (power on → data link establishment) • Amber ON: Stand-by (unstable synchronisation [no active calls]) • Slow Amber Flashing: Talk (unstable synchronisation [active calls]) • Moderate Amber Flashing: Busy[*1] (unstable synchronisation) CS status indication during the site survey • Red ON: The CS is connected to the AC adaptor. • Moderate Red Flashing: The CS is connected to a PoE device. CS status indication while restarting the CS • Moderate Red Flashing: The CS is restarting. **Note** LED flashing patterns are as follows: • Slow Flashing: 60 times per minute • Moderate Flashing: 120 times per minute

[*1] All 8 channels are occupied.

Compatible PBX

Cell Station	PBX	
	Model No.	MPR Software Version
KX-NCP0158	KX-NS1000	PCMPR Software File Version 001.00000 or later
	KX-NCP500	PBMPR Software File Version 2.0000 or later
	KX-NCP1000	
	KX-TDE100	PMMPR Software File Version 3.0000 or later
	KX-TDE200	
	KX-TDE600	PGMPR Software File Version 3.0000 or later

Maximum Number of Calls

Cell Station	Maximum Calls	Compatible Portable Station
KX-NCP0158	8	• KX-TCA155 • KX-TCA175 • KX-TCA256 • KX-TCA275 • KX-TCA355 • KX-TCA364 • KX-WT115

Note

For more details about the Portable Station (PS), refer to the Operating Instructions of the PS.

Maximum Number of CSs Supported by PBX

Notice

The CSs are for connection to specified Panasonic PBXs only.

The following number of CSs can be supported by each PBX.

PBX	Connected via	Maximum Number
		KX-NCP0158
KX-NS1000	LAN	64[*1][*2]
KX-NCP500/KX-NCP1000		8[*3]/16[*4]
KX-TDE100/KX-TDE200/KX-TDE600		16

[*1] When installing more than 16 CSs, you must create multiple Air Synchronisation Groups.

[*2] For a One-look network, the maximum number of CSs is 128. For details about One-look networks, refer to "One-look Networking" in the Feature Guide for your PBX.

[*3] PBMPR Software File Versions earlier than 4.1000.

[*4] PBMPR Software File Version 4.1000 or later.

Maximum Number of Air Synchronisation Groups

PBX	Maximum Number
KX-NS1000	16
KX-NCP500/KX-NCP1000	1
KX-TDE100/KX-TDE200/KX-TDE600	1

Required Distances between Equipment

CAUTION

Maintain the distances listed below between equipment in order to prevent noise, interference or the disconnection of a conversation. (The distance may vary depending on the environment.)

Equipment	Distance
CS and office equipment such as a computer, telex, fax machine, etc.	More than 2 m
PBX and CS	More than 2 m

Notice

If multiple CSs cover the same area, the phone connection may become noisy or the number of possible simultaneous calls with PSs may decrease due to interference between the CSs. For details, refer to "5 Site Survey Using the KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364—Testing the Radio Signal Strength".
The required distance between CSs may vary depending on the environment of the installation site and conditions in which the wireless system is used. Conduct a site survey to determine the appropriate distance.

RF Specification

Item	Description
Radio Access Method	MultiCarrier TDMA-TDD
Frequency Band	1880 MHz to 1900 MHz*1
Number of Carriers	10*2
Carrier Spacing	1728 kHz
Bit Rate	1152 kbps
Carrier Multiplex	TDMA, 24 (Tx12, Rx12) slots per frame
Frame Length	10 ms
Modulation Scheme	GFSK
	Roll-off factor=0.5 50 % roll-off in the transmitter
Data Coding for Modulator	Differential Coding
Voice Codec	32 kbps ADPCM (CCITT G.726)
Transmission Output	Peak 250 mW

*1 If the suffix of your PBX model is BX, TW, or XE, the value is 1880 MHz to 1895 MHz.
*2 If the suffix of your PBX model is BX, TW, or XE, the value is 8.

CAUTION

- The CS should be kept free of dust, moisture, high temperature (more than 40 °C), low temperature (less than 0 °C), and vibration, and should not be exposed to direct sunlight.
- The CS should not be placed outdoors (use indoors).
- The CS should not be placed near high-voltage equipment.
- The CS should not be placed on a metal object.

2 Procedure Overview

When connecting the wireless system, use extreme care in conducting the site survey. Site surveys can be conducted using a KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364 PS. An incorrectly performed site survey can result in poor service area, frequent noise, disconnection of calls, and synchronisation failure for CSs.

Notice

The required software versions are as follows:

– PS software version: 3.027 or later
– IP-CS software version: 6.002 or later

1. Investigate the installation site

Refer to "3 Site Planning".

a. Obtain a map of the CS installation site.
b. Identify the service area required by the user on the map.
c. Plan the location of each CS, taking account of distance, building materials, etc.

2. Prepare for site survey

Refer to "4 Before Site Survey".

a. Check and assign the CS ID number to the PS.
b. Assign a channel number to each CS by setting the DIP switches on the back of the CS.
c. Supply electricity to each CS using an AC adaptor or by connecting them to a PoE hub/PoE adaptor.
d. Install each CS temporarily as planned.

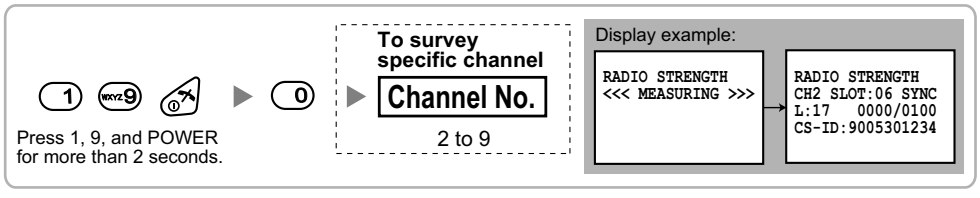
Note

- Install at least 2 m above the floor.
- Place the antennas so that they are pointing in directions that are 90 degrees apart (for antenna diversity).

3. Conduct the site survey

Refer to "5 Site Survey Using the KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364".

a. Test the radio signal strength using the PS.
Confirm that the radio signal strength level is "17" or "18" near the CS.



b. By walking away from the CS with the PS, check the radio signal strength. The radio signal strength weakens as you walk away from the CS.
c. Map the CS coverage area at radio signal strength levels "03" and "05".
d. Plan the location of the CS so that its clock signal source is within range of the CS where the radio signal strength level is "05".
e. Make sure that the radio signal strength level is greater than "03" at any location within the service area required by the user.

4. Finish the site survey

Refer to "6 After Site Survey".

a. Turn off the PS.

b. Stop supplying power, and return all DIP switches of each CS to the OFF position.

5. Connect the CS to the PBX

Refer to "7 Connecting IP Cell Stations".

a. Assign IP address information to the CS using the IP Terminal Maintenance Console.

b. Connect the CS to the PBX over a LAN.

6. Register the CS to the PBX

Refer to "8 Registering IP Cell Stations".

a. Register the CS to the PBX using the Maintenance Console.

b. Assign the Master CSs and set the synchronising CS search order using the Maintenance Console.

7. Confirm the status of Air Synchronisation for the CS

Refer to "9 Confirming the Status of Air Synchronisation for IP Cell Stations".

a. Check the status of air synchronisation for the CS using the Maintenance Console.

b. If the monitoring results are not satisfactory, relocate the CS or change the CS that it is currently synchronised with to another CS using the Maintenance Console.

8. Connect the PS to the PBX and test the operation

Refer to "10 Registering Portable Stations".

a. Register the PSs to the PBX.

b. Walk around the service area while having a conversation using a registered PS. If noise is frequent or conversations disconnect, relocate the CSs or install an additional CS.

9. Mount the CS on the wall

Refer to "12 Wall Mounting".

a. If there are no problems in testing, mount the CS on the wall.

3 Site Planning

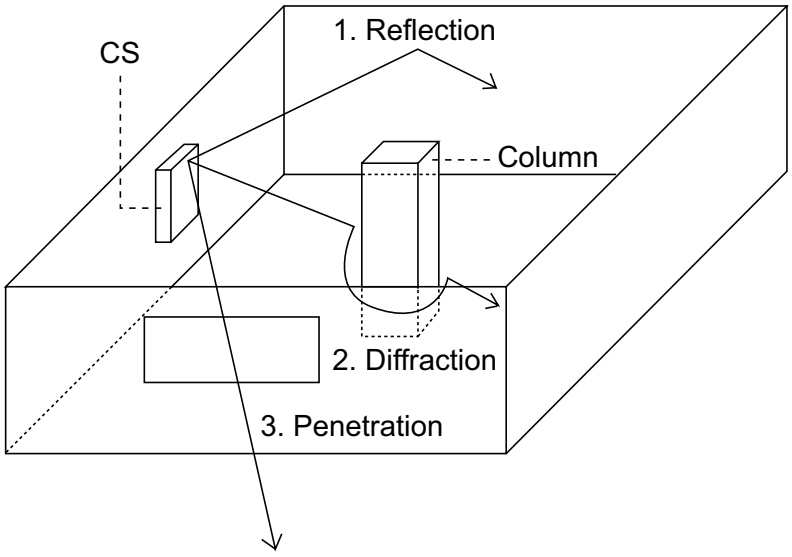
Choosing the best site for the CS requires careful planning and testing of essential areas. The best location may not always be convenient for installation. Read the following information before installing the unit.

Understanding Radio Waves

Characteristics of Radio Waves

The transmission of radio waves and the CS coverage area depend on the structure and materials of the building.
Office equipment, such as computers and fax machines, can interfere with radio waves. Such equipment may create noise or interfere with the performance of the PS.
The illustration below shows the special transmitting patterns of radio waves.

1. Radio waves are reflected by objects made of materials such as metal.
2. Radio waves are diffracted by objects such as metallic columns.
3. Radio waves penetrate objects made of materials such as glass.



Relationships Between Radio Waves and Building Structure and Materials

- The CS coverage area is affected more by the building materials and their thickness than the number of obstacles.
- Radio waves tend to be reflected or diffracted by conductive objects and rarely penetrate them.
- Radio waves tend to penetrate insulated objects and are rarely reflected by them.
- Radio waves penetrate thin objects more than thick objects.
- The table below shows the transmission tendency of radio waves when they reach objects made from various materials.

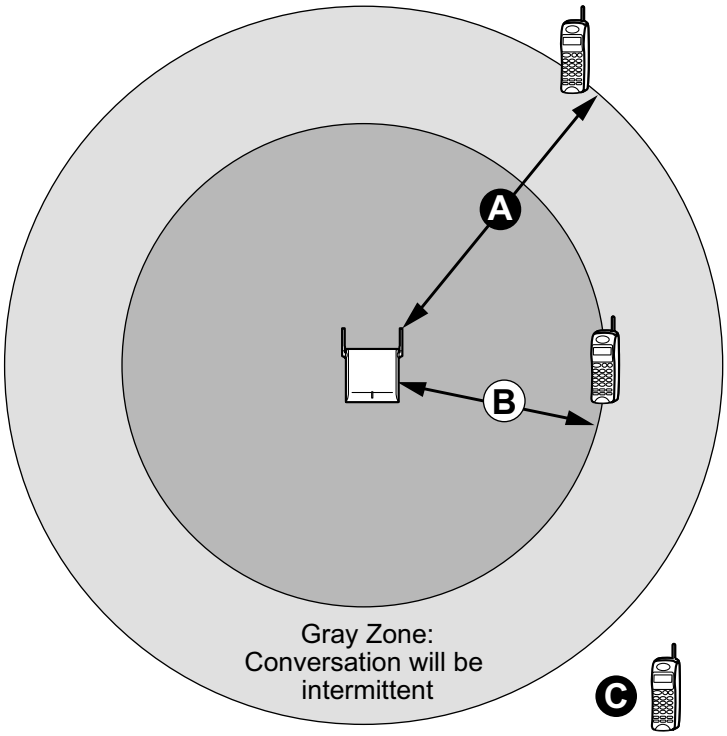
Object	Material	Transmission Tendency
Wall	Concrete	The thicker they are, the less radio waves penetrate them.
	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves are reflected.
Window	Glass	Radio waves usually penetrate them.
	Glass with wire net	Radio waves can penetrate them, but tend to be reflected.
	Glass covered with heat-resistant film	Radio waves are weakened considerably when they penetrate windows.
Floor	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves are reflected.
Partition	Steel	Radio waves are reflected and rarely penetrate them.
	Plywood, Glass	Radio waves usually penetrate them.
Column	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves tend to be reflected or diffracted.
	Metal	Radio waves tend to be reflected or diffracted.
Cabinet	Steel	Radio waves are usually reflected or diffracted, and rarely penetrate them.
	Wood	Radio waves can penetrate them, but they are weakened.

CS Coverage Area for Establishing Conversations Using PSs

The example below shows the size of the area where one CS can cover PSs, if it is installed in an area with no obstacles.

Note

Radio signal strength levels are measured during the site survey (refer to "5 Site Survey Using the KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364").



A Coverage Area
Radio signal strength level is greater than "03".
(About 50 m to 60 m)

B Good Coverage Area
Radio signal strength level is greater than "08".
(About 30 m to 40 m)
Good sound quality can be maintained.

C Out of Service:
Cannot make/receive calls.

Radio Signal Strength Levels

Level: 14 to 18	Better
Level: 08 to 13	Good
Level: 03 to 07	May receive noise
Level: 01 to 02	Receives noise easily or disconnects
Level: 00	Out of range

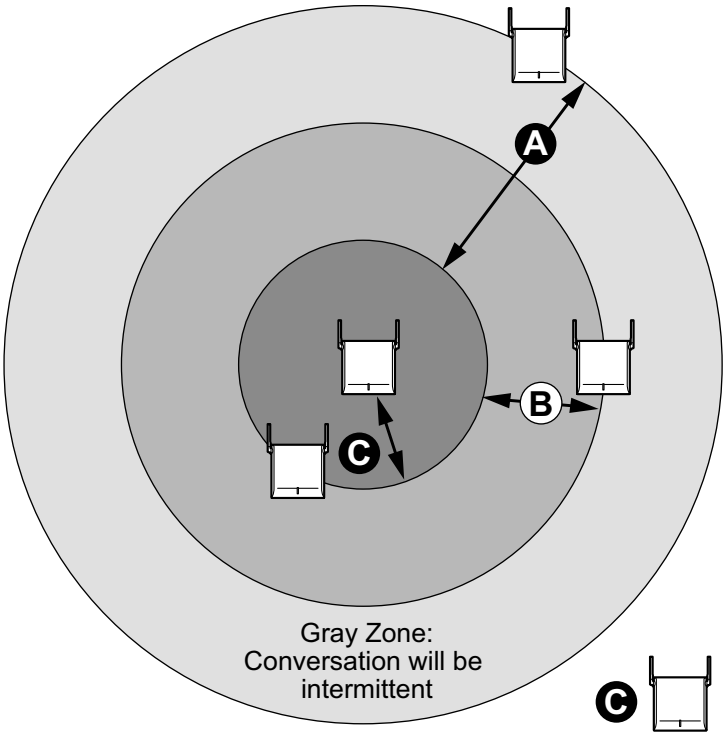
Implementing Air Synchronisation

CS Coverage Area for Air Synchronisation between CSs

The example below shows the size of the area where one CS can synchronise with other CSs, if it is installed in an area with no obstacles.

Note

Radio signal strength levels are measured during the site survey (refer to "5 Site Survey Using the KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364").



A Coverage Area
Radio signal strength level is between "03" (about 50 m to 60 m) and "14" (about 20 m to 30 m).

B Good Coverage Area
Radio signal strength level is between "05" (about 40 m to 50 m) and "14" (about 20 m to 30 m). Good synchronisation quality can be maintained.

C Out of Service:
0 m to 3 m or the radio signal strength level is "00 to 02". Cannot be synchronised.

Radio Signal Strength Levels

Level: 15 to 18	Up to 3 CSs: Good More than 3 CSs: May be reset due to synchronisation failure of CSs
Level: 08 to 14	Good
Level: 06 to 07	Better
Level: 05	Good
Level: 03 to 04	Air synchronisation is established. However, it is necessary to monitor the status of synchronisation using the Maintenance Console. This is necessary because IP-CSs may be reset due to synchronisation failure if the radio signal strength fluctuates depending on changes in the installation environment such as opening/closing doors.
Level: 00 to 02	May be reset due to synchronisation failure of CSs

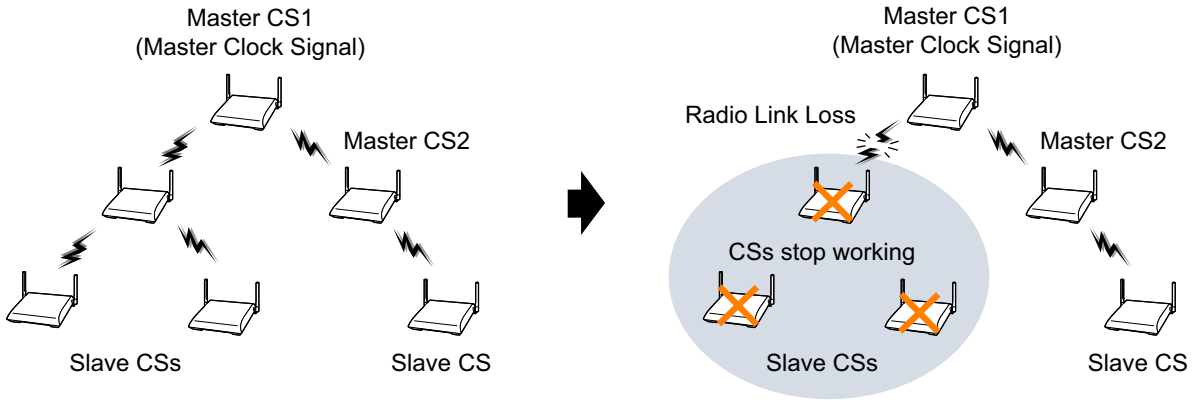
CS Classifications

CSs are assigned to any one of the following three classifications for implementing air synchronisation:

CS Class	Description
Master CS1 (synchronisation source clock)	Generates clock signal.
Master CS2 (backup for Master CS1)	Receives clock signal from Master CS1 (can also generate clock signal if Master CS1 malfunctions).
Slave CS	Receives clock signal from other CSs.

Synchronisation Hierarchy

Air synchronisation has a hierarchical structure with a Master CS1 at the top. Therefore, it is necessary to conduct the site survey with extreme care to ensure stable synchronisation since one disruption of the radio link could loss of service to a wide area.



Search Order (Primary/Secondary)

The search order used for synchronising CSs must be set. If the CS cannot synchronise with the Primary CS for some reason, it will try to synchronise with the Secondary CS.

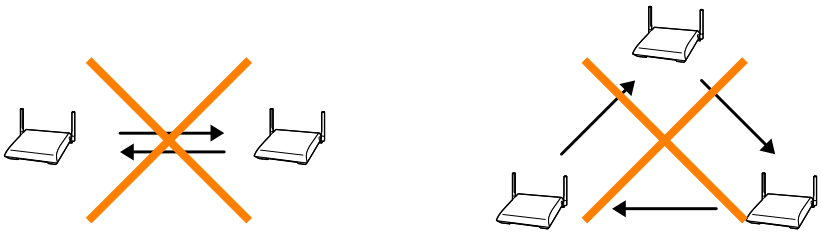
CS Class	Primary CS	Secondary CS
Master CS1	None	None
Master CS2	Master CS1	None
Slave CS	Master CS1, Master CS2, or Slave CS	Master CS1, Master CS2, Slave CS, or None

For example, if synchronisation is completely lost by malfunction of the Master CS etc., handover will not work and ongoing calls will be disconnected after a while. In addition, new calls cannot be made or received. Therefore, it is recommended to not only assign the Primary CS but also the Secondary CS as an alternative source for synchronising CSs.

Conditions for Configuring the Air Synchronisation

- Master CS2 must be within range of Master CS1.
- It is recommended that Master CSs be placed in the middle of the installation site.
- Both a Primary CS and Secondary CS should be assigned to Slave CSs.
- When using only two IP-CSs on the network (only two IP-CSs are connected to the PBX), make sure that you do not create a Master CS2.
- All traditional CSs are automatically assigned and fixed as Master CS1.
- When using IP-CSs and traditional CSs in the same area, make sure that you do not create a Master CS2.
- When synchronising CSs, do not create loops as in the examples below:

[Examples]



- It is recommended that the number of levels in the synchronisation hierarchy is minimised for stable air synchronisation. The maximum number of levels is 4.

Note

- The KX-NS1000 PBX supports only IP-CSs directly.
- For your convenience, IP-CSs are automatically classified according to the order of their registration to the PBX. Therefore, it is recommended to register the CS that you want to assign to Master CS1 first. For example, when using IP-CSs and traditional CSs in the same area, connect the traditional CSs to the PBX first.

Notice about Mutual Interference of Radio Waves

Mutual interference of radio waves may occur under the following conditions. This could lead to loss of air synchronisation.

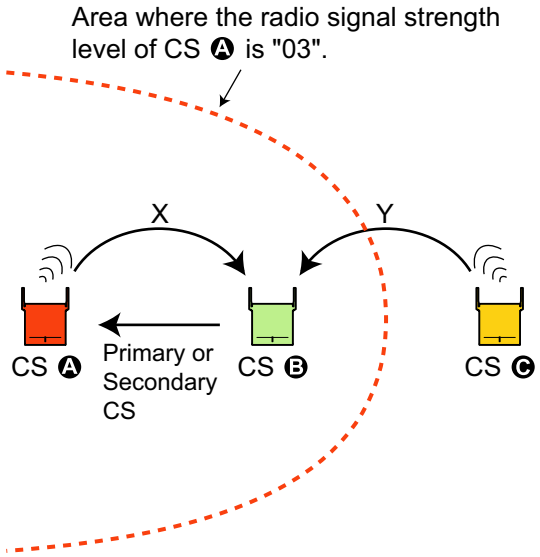
[Installation Environment]
As shown in the diagram below,

- CS Ⓑ is synchronised with CS Ⓐ.
- CS Ⓒ is outside the area where the radio signal strength level of CS Ⓐ is "03".
- CS Ⓑ is within the area where the radio signal strength level of CS Ⓒ is "03".

[Conditions]
X = radio signal strength level of CS Ⓐ, Y = radio signal strength level of CS Ⓒ

- Y is greater than X.
- X and Y are nearly equal.

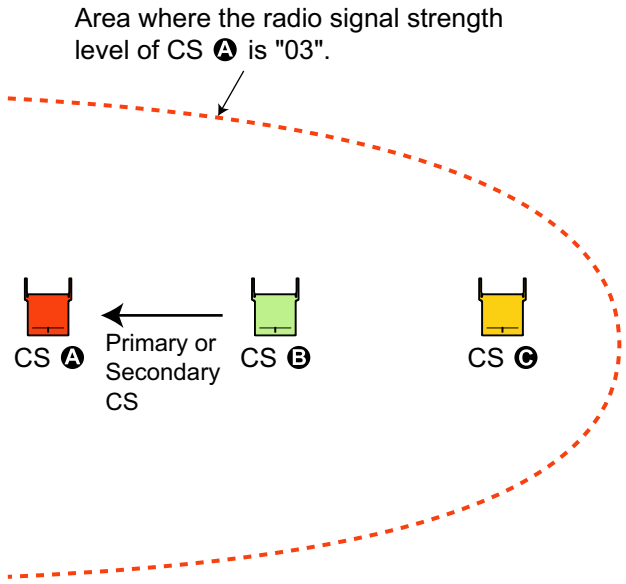
[Result]
CS Ⓑ loses air synchronisation since the radio waves of CS Ⓒ interfere with the radio waves of CS Ⓐ received by CS Ⓑ.



Solution

Move CS Ⓒ to within the area where the radio signal strength level of CS Ⓐ is "03".

[Result]
Radio wave interference will not occur since CS Ⓐ and CS Ⓒ will monitor each other's radio waves.



When Installing Additional CSs

Ensure that the following conditions are met when installing additional CSs.

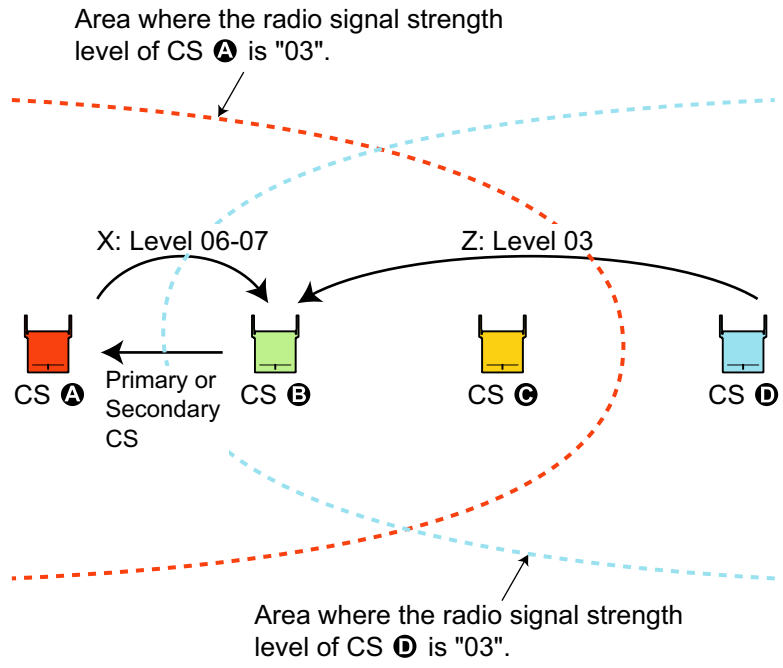
- Locate CS Ⓑ within the area where the radio signal strength level of CS Ⓐ is between "06" and "07".
- Locate CS Ⓑ within the area where the radio signal strength level of CS Ⓓ is "03".

[Result]

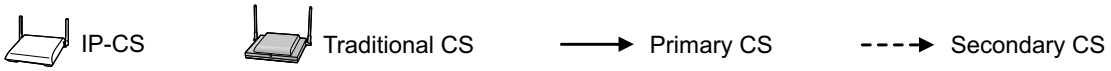
X = radio signal strength level of CS Ⓐ, Z = radio signal strength level of CS Ⓓ.

- X is much greater than Z.

The radio waves of CS Ⓓ are not a source of interference since the radio waves that CS Ⓑ receives from CS Ⓐ are stronger than those received from CS Ⓓ.



Recommended Configuration

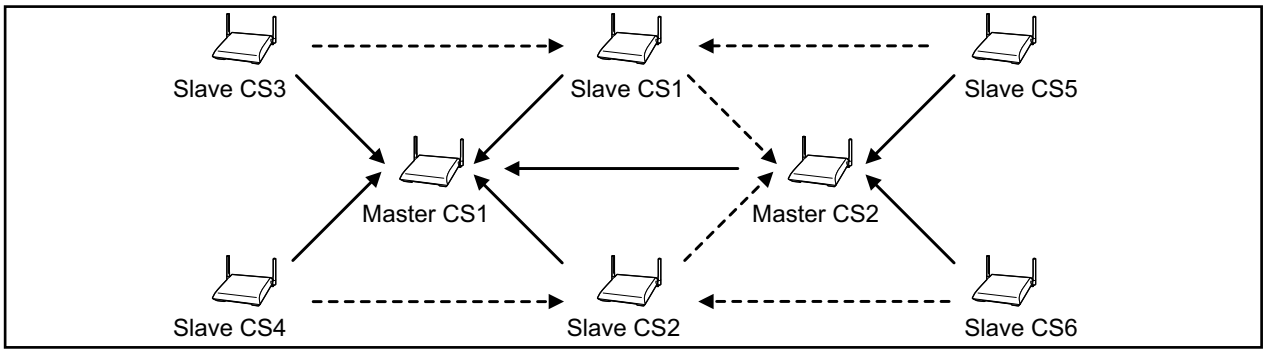


Note

The KX-NS1000 PBX supports only IP-CSs directly.

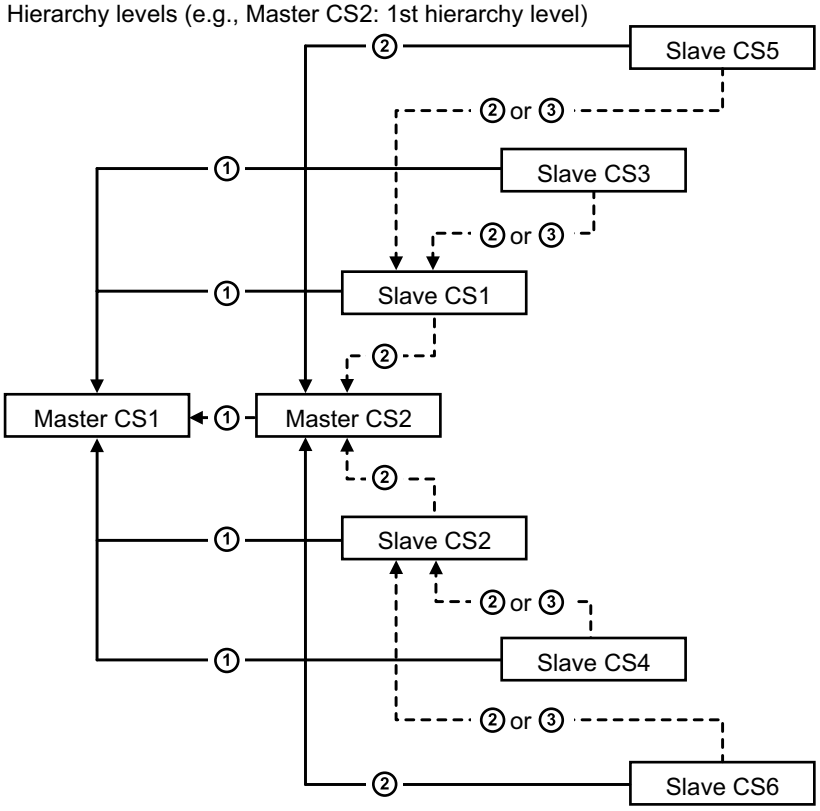
[Configuration Example 1]

Diagram



Air Synchronisation Tree

①–③: Hierarchy levels (e.g., Master CS2: 1st hierarchy level)



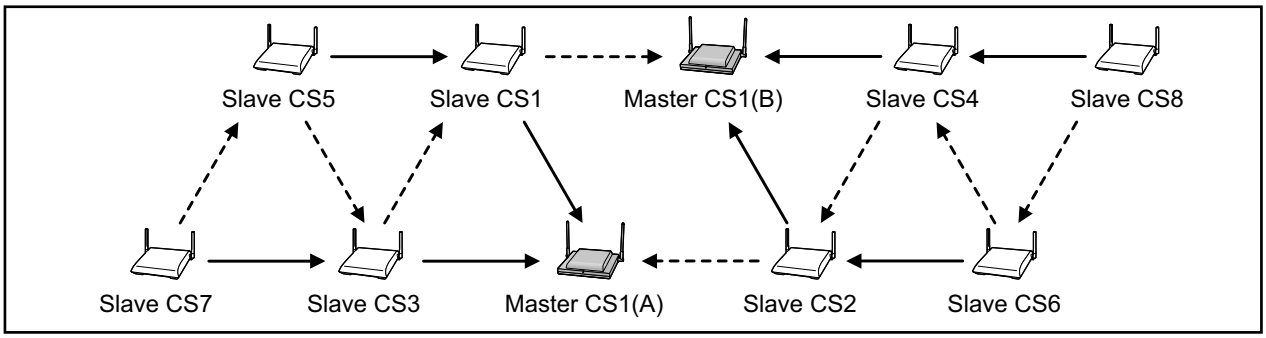
Note

Ensure that the Slave CSs in the first column are located within the area where the radio signal strength level of the respective CSs in the second column is "03".

Slave CS3 and Slave CS4	Master CS2
Slave CS5 and Slave CS6	Master CS1

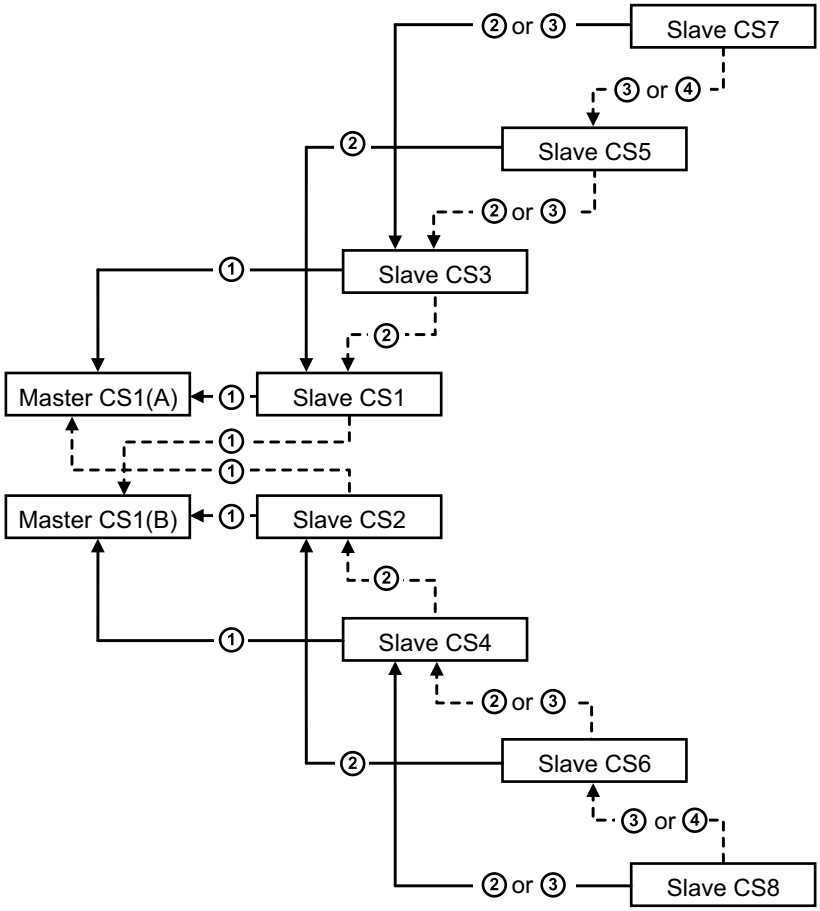
[Configuration Example 2]

Diagram



Air Synchronisation Tree

①–④ : Hierarchy levels (e.g., Slave CS1: 1st hierarchy level)



Note

Ensure that the Slave CSs in the first column are located within the area where the radio signal strength level of the respective CSs in the second column is "03".

Slave CS3	Master CS1(B)
Slave CS4	Master CS1(A)
Slave CS5	both Master CS1(A) and Master CS1(B)
Slave CS6	both Master CS1(A) and Master CS1(B)
Slave CS7	both Master CS1(A) and Slave CS1
Slave CS8	both Master CS1(B) and Slave CS2

Site Survey Preparation

1. Obtain a map and investigate the installation site.
   a. Check the obstacles (e.g., shelves, columns, and partitions).
   b. Check the materials of the structures (e.g., metal, concrete, and plywood).
   c. Check the layout and dimensions of the room, corridor, etc.
   d. Write down the above information on the map.
2. Examine the service area required by the user on the map.
   a. Examine the coverage area for air synchronisation.
      Draw the coverage area around a CS. Extend the coverage area about 30 m in each direction, depending on the materials of the building structures and obstacles in the installation site. Note that a CS cannot be installed outside a building.
   b. Examine the coverage area for establishing conversations using PSs.
      Draw the coverage area around a CS. Extend the coverage area about 50 m in each direction, depending on the materials of the building structures and obstacles in the installation site.
   c. If one CS cannot cover the entire service area, install additional CSs as required. Overlap the coverage areas of adjacent CSs.
      Where CS coverage areas overlap, the PS will start call handover to the next CS if the signal from one CS becomes weak. However, if a PS moves away from a CS and there are no CSs available for handover, the PS may go out of range and the call could be lost.

   Note

   The coverage area distances for air synchronisation and establishing conversations using PSs noted above are estimates. You can confirm the radio signal strength in the site survey for more accurate distances.
3. Keep a record of the air synchronisation tree for reference.

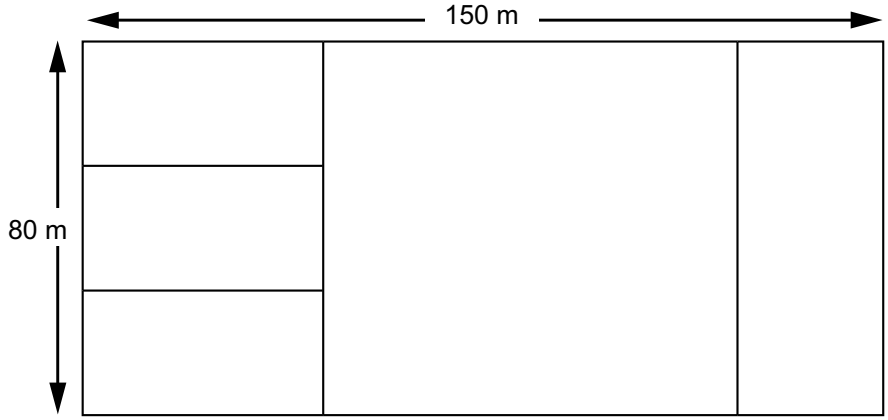
Example: Installing in a Room Separated by Interior Walls

Things to take note of:

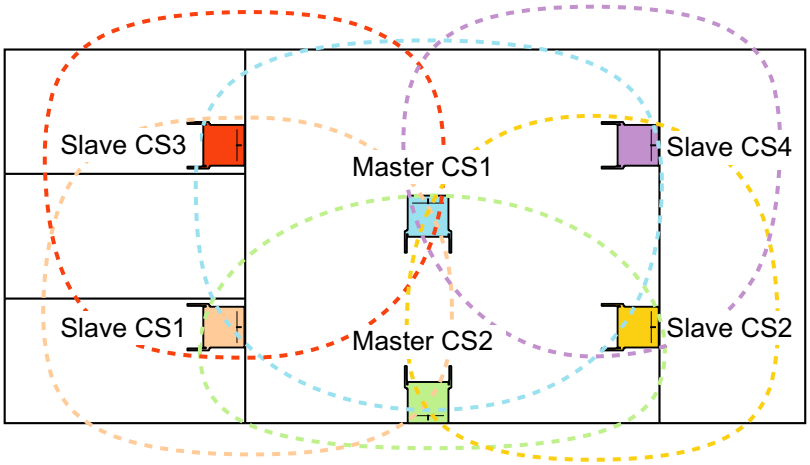
- The room is separated by interior walls.
- The room is surrounded by concrete walls.

CS installation plan:

- The coverage area of each CS will not extend as far as when there are no obstacles, because the radio signals will be weakened by separating walls. Therefore, you will need 6 CSs to cover the entire room.



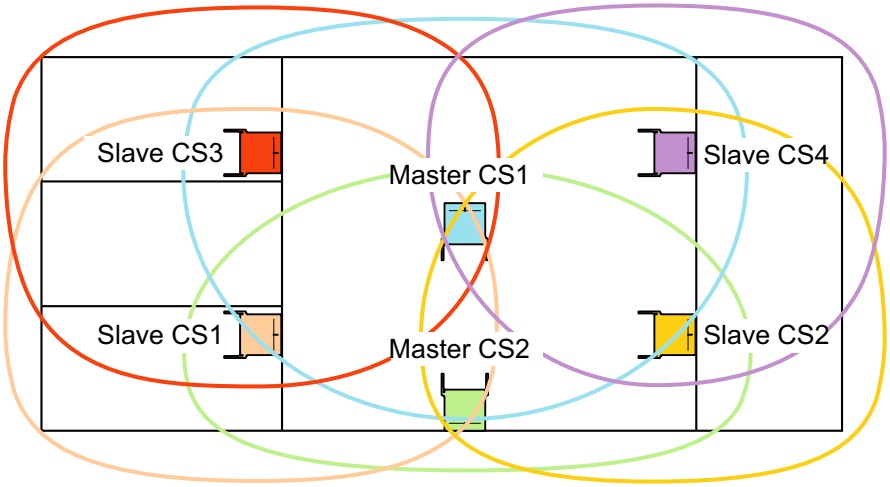
Area Coverage Example for Air Synchronisation



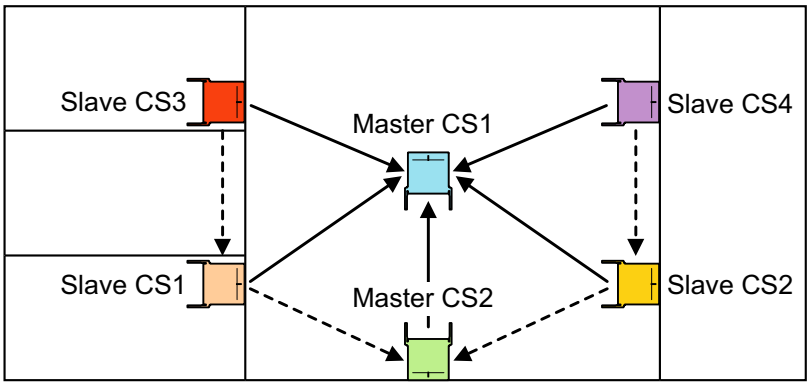
Note

Make sure that Master CS2 is within the area where the radio signal strength levels of Slave CS3 and Slave CS4 are "03".

Area Coverage Example for Establishing Conversations Using PSs



Primary CS
Secondary CS

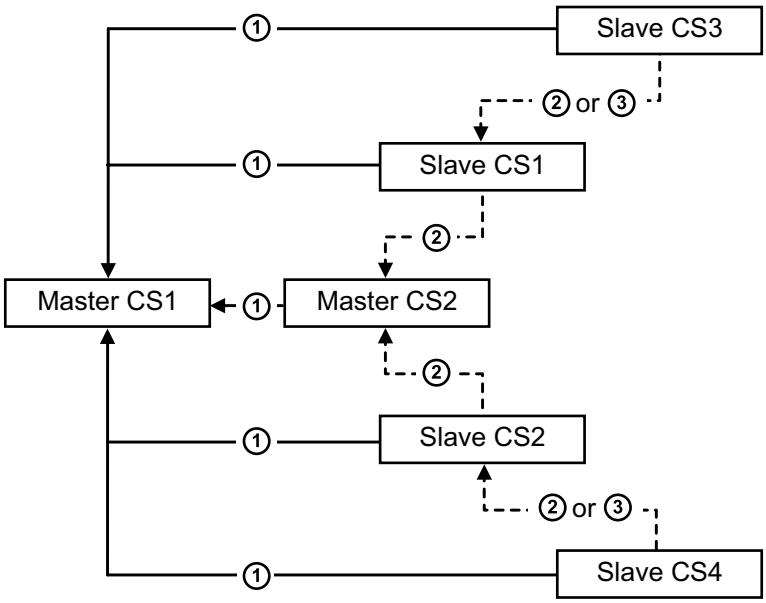


Air Synchronisation Tree

Primary CS

Secondary CS

①–③ Hierarchy levels (e.g., Master CS2: 1st hierarchy level)



4 Before Site Survey

Use a KX-TCA175/KX-TCA256/KX-TCA275/KX-TCA355/KX-TCA364 PS to conduct the site survey.

Notice

The required software versions are as follows:

– PS software version: 3.027 or later
– IP-CS software version: 6.002 or later

Note

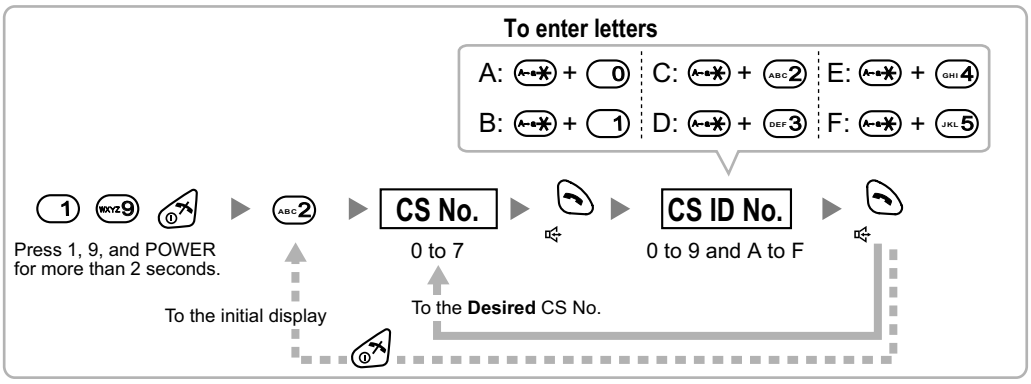
Display prompts for the site survey are only available in English.

Checking the CS ID Number

Check the CS ID number label attached to the CS. If the CS ID number label is not attached to the CS, check the CS ID number using the Maintenance Console.
For details, refer to the following:

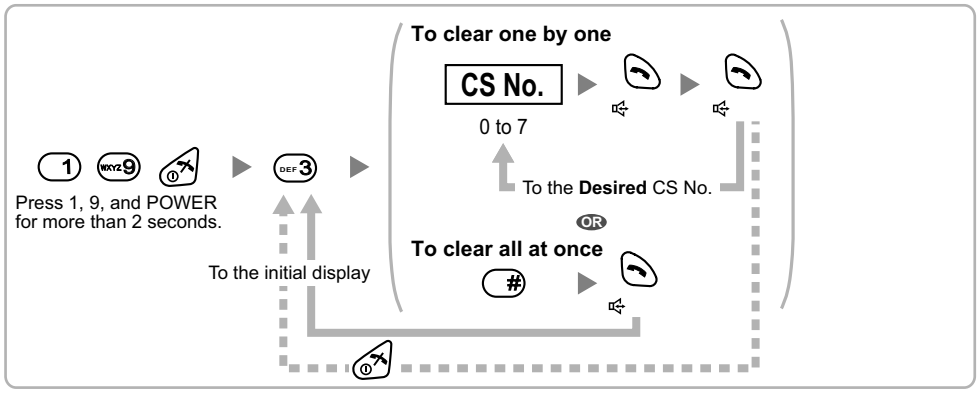
– KX-NS1000: "4.1.2 Status—Equipment Status—CS Information" in the PC Programming Manual for your PBX.
– KX-NCP series or KX-TDE series: "2.6.15 Utility—CS Information" in the PC Programming Manual or the On-line Help for your PBX.

Assigning the CS ID Number to the PS



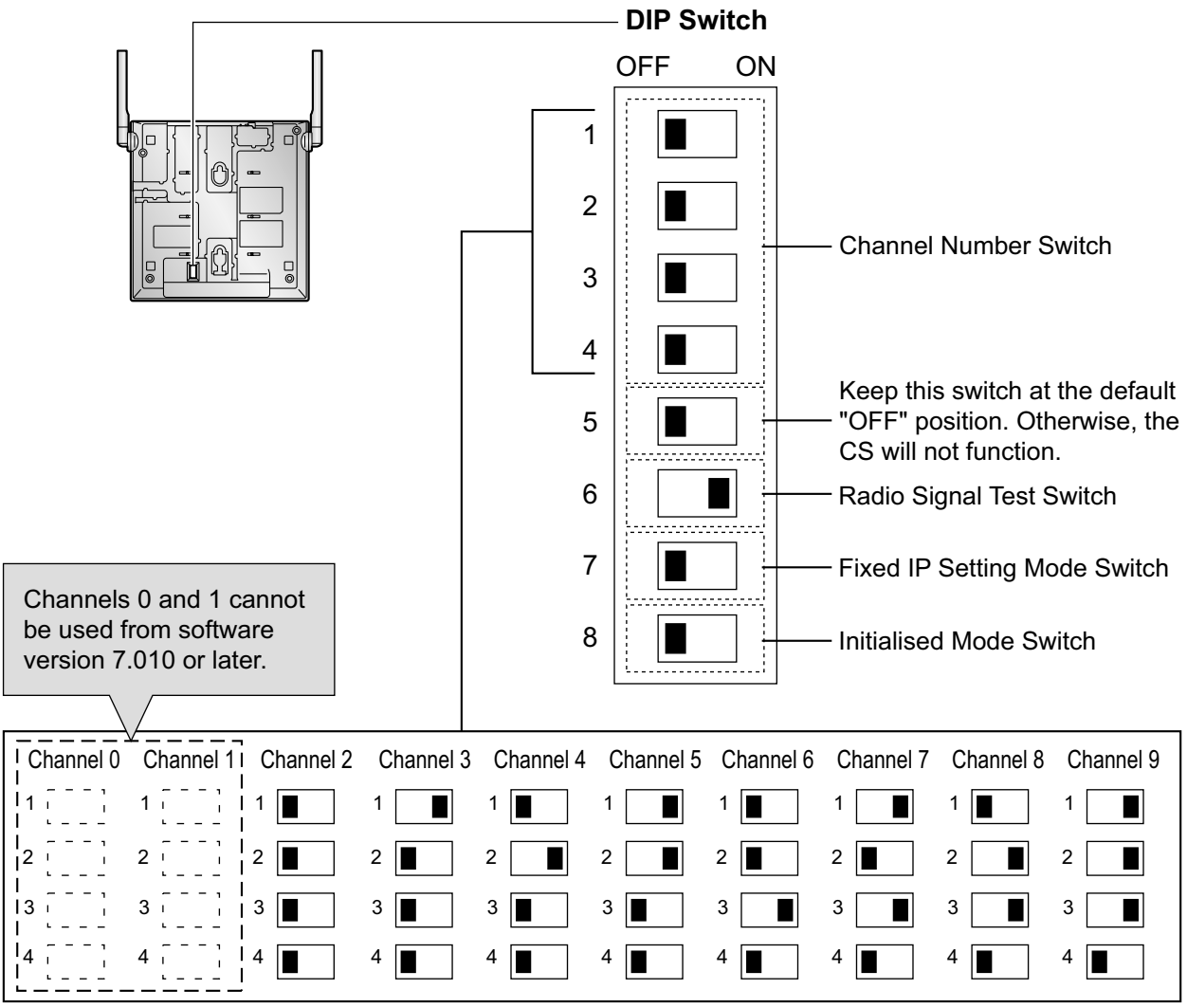
Note

To clear the CS ID number assigned to the PS, follow the procedure below:



Setting and Installing the CS Temporarily for Site Survey

1. Switch the Radio Signal Test switch from OFF to ON.
2. Set the channel number switches as desired.



Note

- If more than one CS is in Radio Signal Test mode, each CS must have a unique channel number.
- For details about the Initialised Mode Switch, refer to "14 Initialising the IP Cell Station".

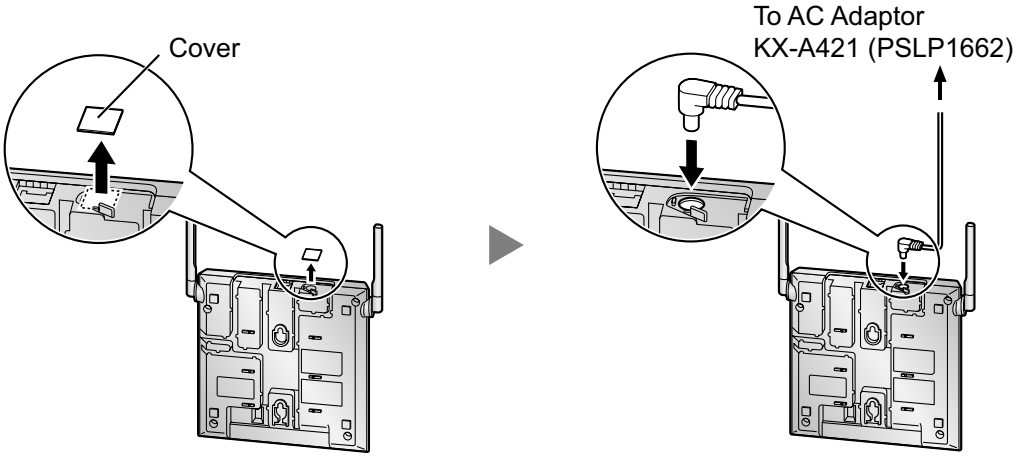
3. After setting the DIP switches, connect the CS to an AC adaptor, battery, PoE hub, or PoE adaptor.
[Connecting the AC Adaptor]

WARNING

When installing or testing a product with an external AC adaptor, the AC adaptor should be plugged into a wall outlet or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.

CAUTION

The DC jack cover poses a choking hazard. Keep the DC jack cover out of reach of children.



[Connecting the Battery]

WARNING

- **Make sure that you do not short the battery or cables.**
- **There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the battery manufacturer. Dispose of the used battery according to the manufacturer's instructions.**

CAUTION

- The DC jack cover poses a choking hazard. Keep the DC jack cover out of reach of children.
- Use only the specified battery and battery cable (PSJS02P57) for the CS.
- Make sure that the battery cable is securely fastened to both the battery and the CS.
- Make sure that the polarities of the battery and wiring are correct.

Notice

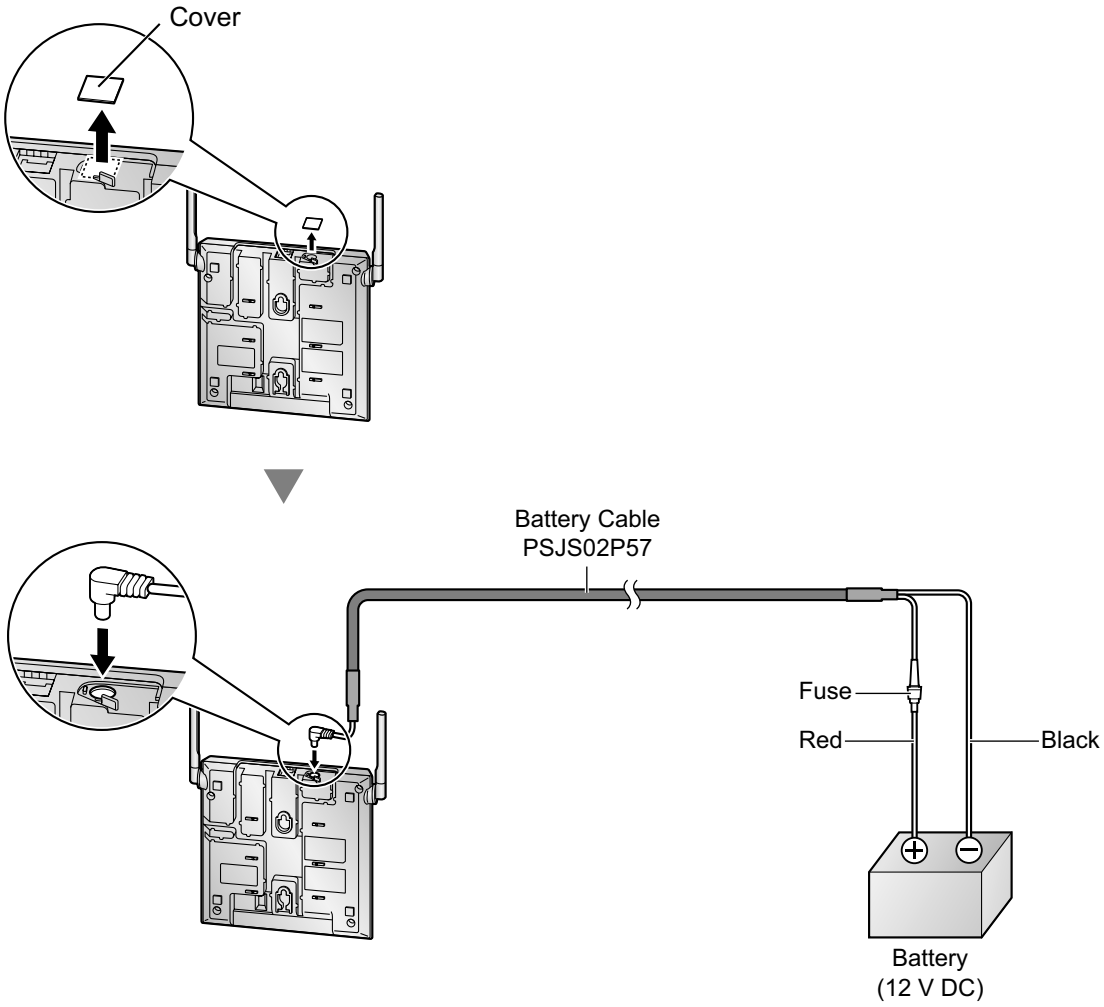
Be sure to comply with applicable local regulations (e.g., laws, guidelines).

Note

- The battery cable should not be exposed to direct sunlight. Keep the battery cable and the battery away from heating appliances and fire. Place the battery in a ventilated place.
- For details about the battery, refer to the manual for the battery.

User-supplied Items

- Battery: VRLA (Valve Regulated Lead Acid) 12 V DC × 1
- Battery cable: PSJS02P57



Power Supply Duration

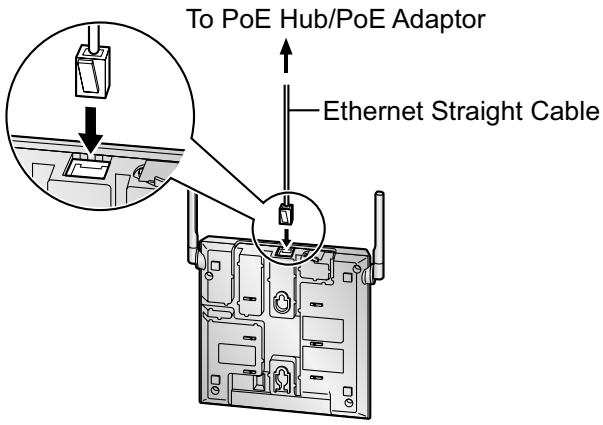
Battery Conditions: 12 V DC, 2.5 Ah to 28 Ah

Example

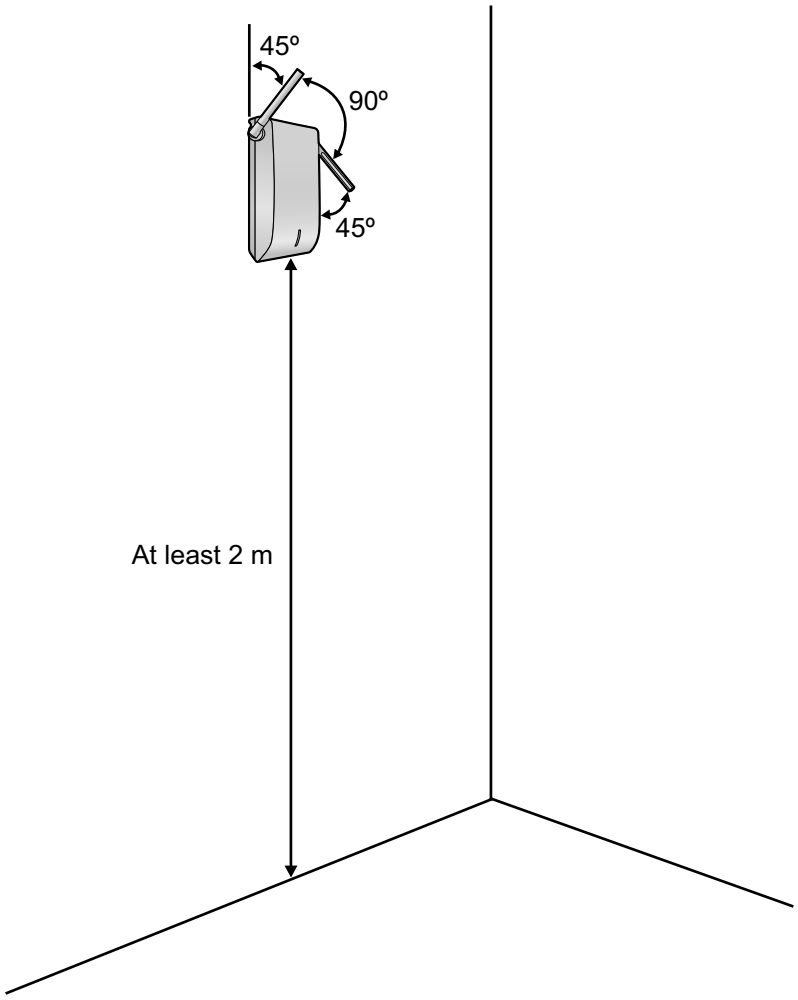
Battery Capacity	Power Supply Duration*1
4 Ah	10 hours (when conducting the site survey)

*1 The duration may vary depending on the conditions.

[Connecting the PoE Hub or PoE Adaptor]



4. Install the CS temporarily for the site survey. Install the CS at least 2 m above the floor, and place the antennas so that they are pointing in directions that are 90 degrees apart (for antenna diversity), as follows:



5 Site Survey Using the KX-TCA175/ KX-TCA256/KX-TCA275/KX-TCA355/ KX-TCA364

The PS has a Radio Signal Test mode that monitors the state of the radio link to the CS for site survey. In Radio Signal Test mode, the frame loss and signal strength of a synchronous slot, and the signal strength of the other slots can be measured when the PS is monitoring the CS. After installing the CSs temporarily as planned during site planning, set the PS to Radio Signal Test mode and locate each CS to measure its coverage area. Then, record the results on the map of the installation site.

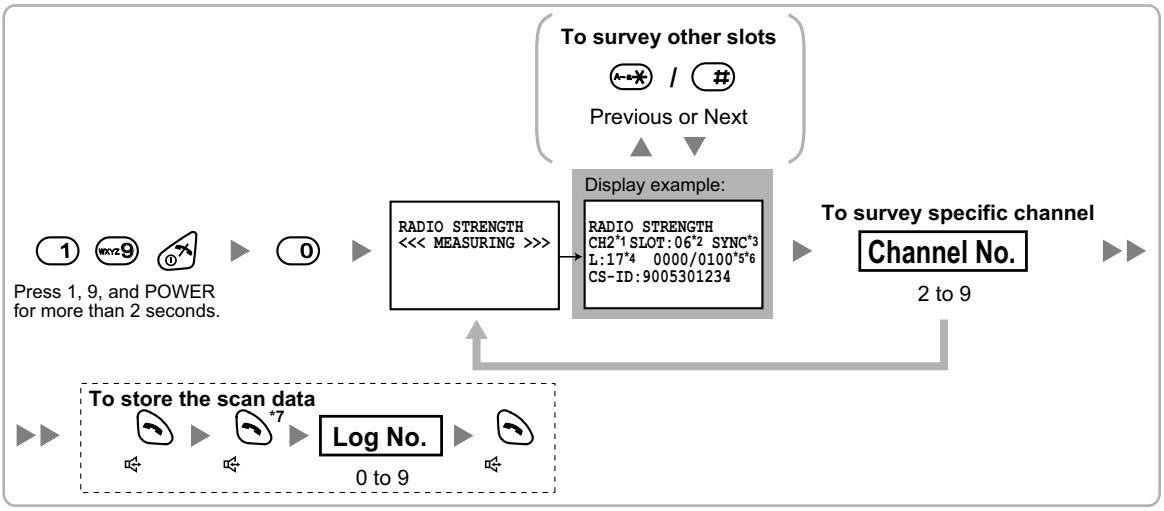
Notice

- The required software versions are as follows:
  - PS software version: 3.027 or later
  - IP-CS software version: 6.002 or later
- An incorrectly performed site survey may cause the CS to reset due to synchronisation failure of CSs. Therefore, it is necessary to conduct the site survey and plan the location of CSs with extreme care. Especially, when using multiple CSs in the same area, conduct the site survey starting with the highest hierarchy level in the air synchronisation tree (Master CS1 → Master CS2 → hierarchy level order of Slave CSs).

Testing the Radio Signal Strength

After locating the CS(s) temporarily, execute the Radio Signal Test using the PS. Directly after entering Radio Signal Test mode, the PS scans channel 2 for a CS that it can connect to. The channel to be scanned can be changed by pressing the appropriate keys 2 through 9.

1. Enter Radio Signal Test mode.



*1 Channel number
*2 Slot number
*3 When a slot is synchronised, "SYNC" is displayed.
*4 Radio signal strength level (18 to 00)
*5 Frame error (0000 to 9999)/Frame counter (0000 to 9999). Frame error indicates the number of errors out of 10 000 radio signal receptions. An increased number of frame errors indicates greater radio signal interference and more frequent noise during conversation. The ideal number of frame errors is "0000".
*6 Error rate (%) = Frame error (0000 to 9999) / Frame counter (0000 to 9999) × 100
*7 This operation is necessary only the first time you store scan data for a channel.

Note

- Storing the scan data will clear all phonebook data.
- The PS will not operate in normal mode if scan data is saved on it. For details on clearing scan data, refer to "Clearing the Stored Scan Data".

2. Measure the error rate and the radio signal strength by moving towards and away from the CS.

Note

- When the error rate is 2% or more, measure the error rate at the same location at least 5 times. You must disconnect the CS and then reconnect it to take each measurement. If the error rate is consistently 2% or more, there may be interference from external wireless equipment. In this case, the results below may happen regardless of the radio signal strength level.
  If the error rate is consistently 2% or more without interference from external wireless equipment, it is likely that metallic materials in the surrounding structures are causing interference. In this case, move the CS or increase the number of CSs in the area.

  Error Rate for Establishing Conversations Using PSs

Error Rate	Result
Approx. 2%	May receive noise
Approx. 10%	May fail to make/receive calls

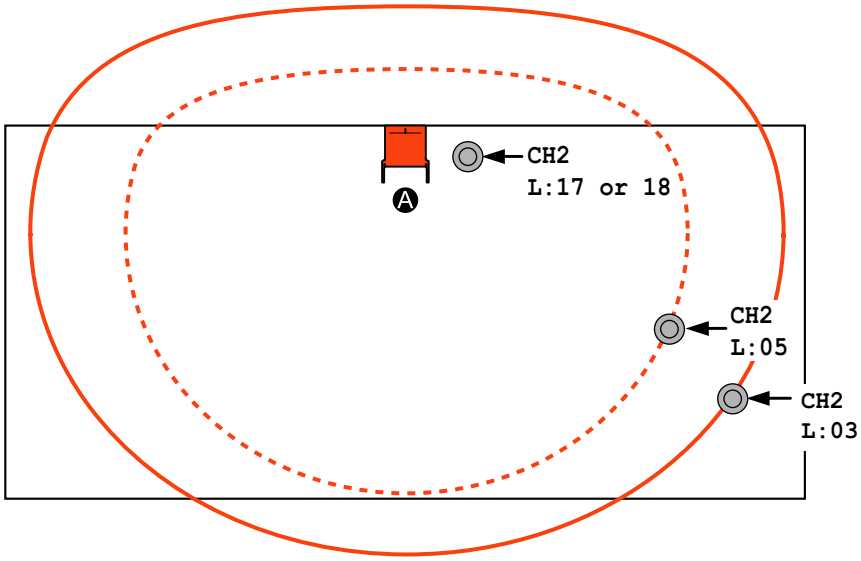
  Error Rate for Air Synchronisation between CSs

Error Rate	Result
Approx. 10%	May be reset due to synchronisation failure of CSs

  The above is a rough standard, and may vary depending on the environment.
- When deciding where to install the CS, priority should be given to an error rate rather than a radio signal strength level.
- After installing the CS according to the results of the survey, confirm that calls can be made and received, and conversations can be heard clearly.

a. Move to the CS until the radio signal strength level becomes "17" or "18".
b. Move away from the CS and identify the CS coverage area within which the radio signal strength level is greater than "05". Draw the area on the map.

c. Move away from the CS and identify the CS coverage area within which the radio signal strength level is greater than "03". Draw the area on the map.



Radio Signal Strength Levels

For Establishing Conversations Using PSs

Level: 14 to 18	Better
Level: 08 to 13	Good
Level: 03 to 07	May receive noise
Level: 01 to 02	Receives noise easily or disconnects
Level: 00	Out of range

For Air Synchronisation between CSs

Level: 15 to 18	Up to 3 CSs: Good More than 3 CSs: May be reset due to synchronisation failure of CSs
Level: 08 to 14	Good
Level: 06 to 07	Better
Level: 05	Good
Level: 03 to 04	Air synchronisation is established. However, it is necessary to monitor the status of synchronisation using the Maintenance Console. This is necessary because IP-CSs may be reset due to synchronisation failure if the radio signal strength fluctuates depending on changes in the installation environment such as opening/closing doors.
Level: 00 to 02	May be reset due to synchronisation failure of CSs

3. Repeat steps 1 and 2 for other CSs, and relocate the CSs when necessary.

a. Plan the location of the CS so that its clock signal source is within range of the CS where the radio signal strength level is "05".

Example

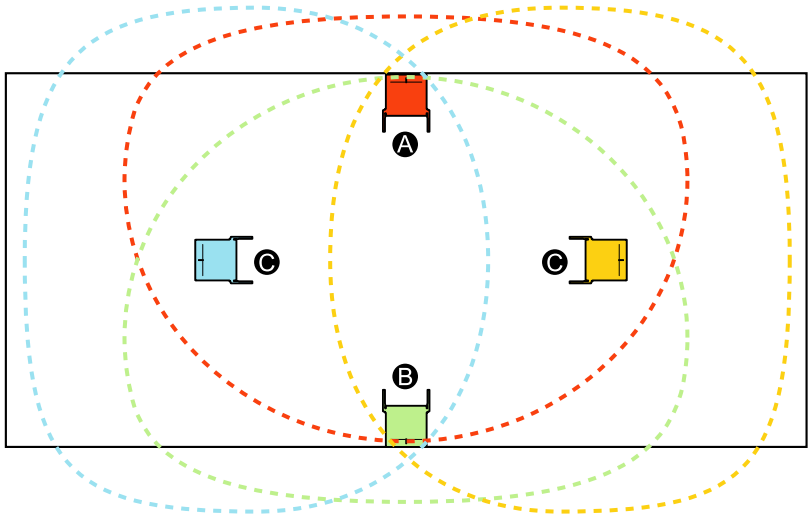
Ⓐ: Master CS1

Ⓑ: Master CS2

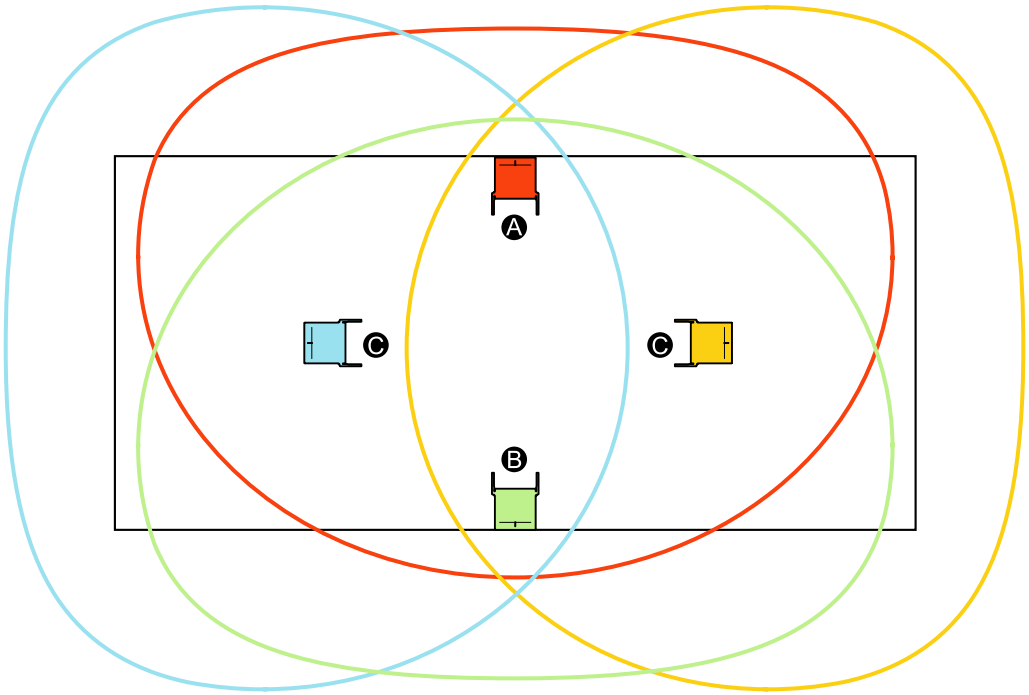
Ⓒ: Slave CSs (Primary CS: Master CS1, Secondary CS: Master CS2)

- When planning the location of CS Ⓑ, make sure that CS Ⓐ (clock signal source) is within the area where the radio signal strength level of CS Ⓑ is "05".

- When planning the location of CS Ⓒ, make sure that CSs Ⓐ and Ⓑ (clock signal sources) are within the area where the radio signal strength level of CS Ⓒ is "05".



b. Make sure that the radio signal strength level is greater than "03" at any location in the service area required by the user.



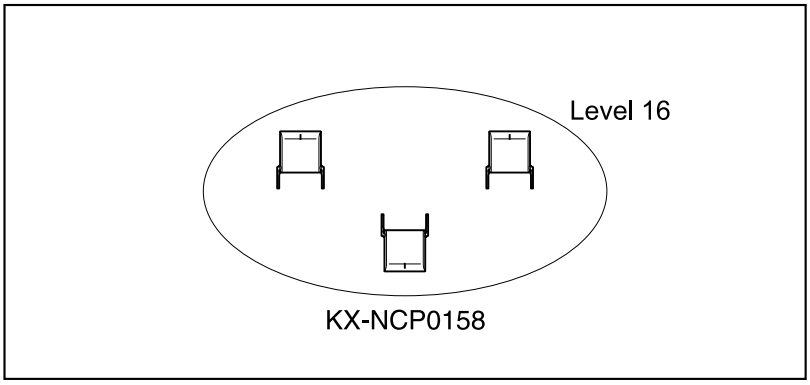
Note

- If a channel is set, the results of measurement for the 24 slots on the channel are saved each time. If the same channel is set, the new results override the previous ones. Therefore, a measurement of 8 channels × 24 slots in total can be made.
- If correct results cannot be obtained (e.g., there are many frame errors), change the location of the CS and repeat the site survey to select the best location.

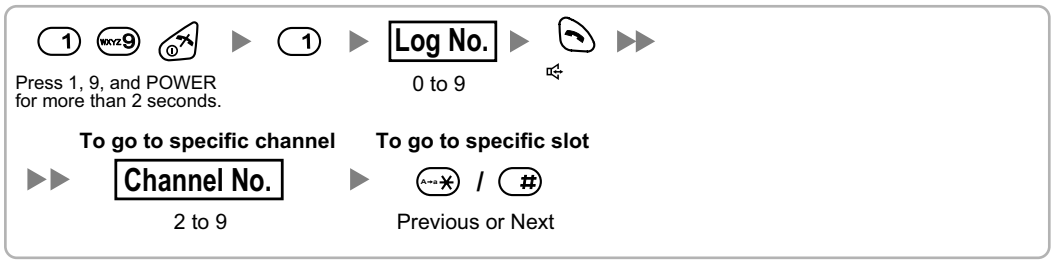
- If multiple CSs cover the same area, the phone connection may become noisy or the number of possible simultaneous calls with PSs may decrease. This is due to interference between the CSs or wireless network traffic conditions. As a guideline, the maximum number of CSs in an area with a radio signal strength of "16" is 3.

  Notice

  The required software versions are as follows:
  - PS software version: 3.027 or later
  - IP-CS software version: 6.002 or later



Referring to the Stored Scan Data



Clearing the Stored Scan Data

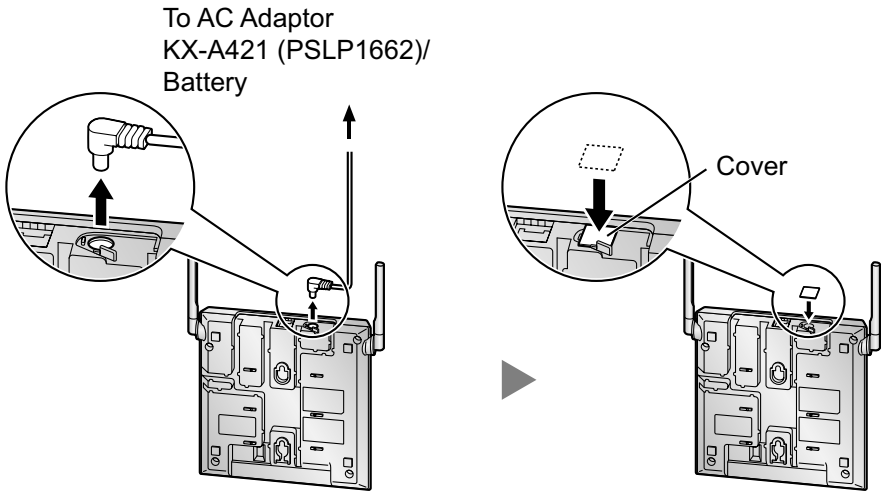
6 After Site Survey

After obtaining the proper measurement results, exit Radio Signal Test mode by following the procedure below, before registering the CS to the PBX.

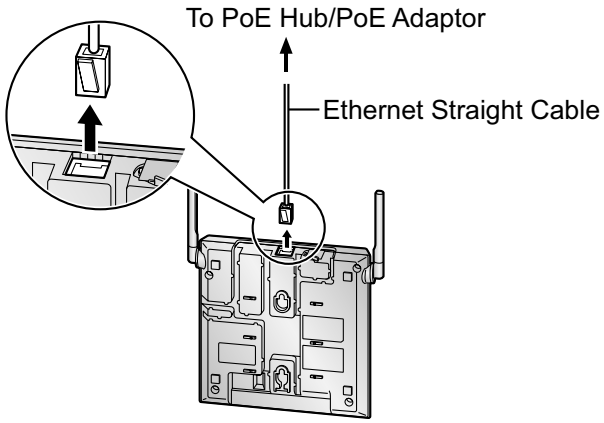
1. Hold down the POWER button on the PS until the PS is off.
2. Disconnect the CS from the AC adaptor, battery, PoE hub, or PoE adaptor to stop supplying electricity.
   [Disconnecting the AC Adaptor or Battery]

   Notice

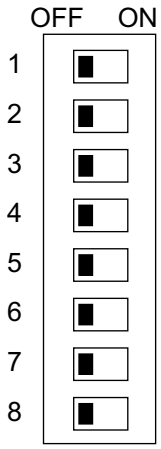
   Be sure to attach the cover to the DC jack after disconnecting the CS from the AC adaptor or battery.



[Disconnecting the PoE Hub or PoE Adaptor]



3. Switch all DIP switches on the CS from ON to OFF.



7 Connecting IP Cell Stations

Assigning IP Address Information

When the IP-CS is connected to the LAN for the first time, you must assign IP addressing information to the IP-CS. The IP addressing information for the IP-CS can be assigned automatically through a DHCP server or entered manually using the IP Terminal Maintenance Console.

Note

- Make sure to install the latest version of the KX-TDA/KX-TDE/KX-NCP Unified Maintenance Console on your PC first, irrelevant of which PBX you are using. For information about how to obtain the Unified Maintenance Console, contact your dealer. For information about how to install the Unified Maintenance Console, refer to "11 Installing the Unified Maintenance Console".
- The contents and design of the software are subject to change without notice.

Preparation

Assign the following IP address and subnet mask address to the PC:

- IP address: 192.168.2.xxx (xxx: 1–254 except 101)
- Subnet mask address: 255.255.255.0

1. Start the Unified Maintenance Console from the Start menu.
   "Information before programming" appears.
2. **a.** Carefully read this important additional information, which includes updates to this and other manuals.
   b. Click **OK** to close this window.
3. **a.** Enter the Installer Level Programmer Code (default: **INSTALLER**).

   CAUTION

   To avoid unauthorised access and possible abuse of the PBX, we strongly recommend:
   a. Keeping the password secret.
   b. Changing your password regularly.
   c. Selecting a complex, random password that cannot be easily guessed.

   b. Click **OK**.
   The programme launcher appears.

4. Click **IP Terminal**.
   The IP Terminal Maintenance Console appears.

5. Click **Next**.
6. To set the default IP address mode, set the DIP switch no.7 (Fixed IP Setting Mode Switch) of the IP-CS to the ON position.

   Note

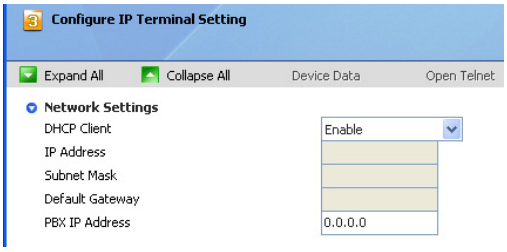
   For details about the DIP switches of the IP-CS, refer to "Setting and Installing the CS Temporarily for Site Survey".
7. Click **Next**.
8. Connect the IP-CS that you want to register to the PC using the switching hub, then supply electricity to the IP-CS using the AC adaptor, PoE hub, or PoE adaptor.
   The IP-CS starts with its default IP address (192.168.2.101).
9. Click **Next**.
10. Assign the IP addressing information automatically through a DHCP server or enter it manually.

    Note

    It is not necessary to configure the **PBX IP Address** setting regardless of whether or not you are using a DHCP server, because it is detected automatically. However, if the IP-CS and PBX belong to different subnets, it is necessary to configure the **PBX IP Address** setting.

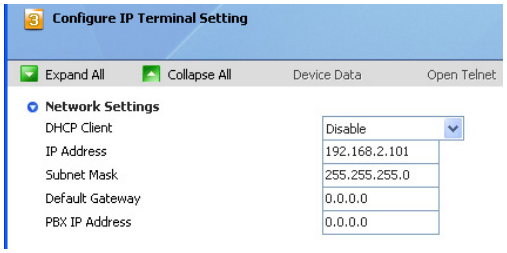
    When using a DHCP server:

    a. Select **Enable** for the **DHCP Client** setting.
    b. Click **Next**.
    A dialogue box will appear.



    When not using a DHCP server:

    a. Select **Disable** for the **DHCP Client** setting.
    b. In the **IP Address** box, type the IP address of the IP-CS.*1
    c. In the **Subnet Mask** box, type the subnet mask address of the network.*2
    d. In the **Default Gateway** box, type the IP address of the default gateway.*1
    e. Click **Next**.
    A dialogue box will appear.



11. Click **Yes**.
    If the assignment is successful, the dialogue box will show "Setup Successful!".
12. Click **Next Device** to assign the IP addressing information for other IP-CSs, or click **Main Screen** to return to the main screen.
13. Click **Exit**.
14. Disconnect the IP-CS from the AC adaptor, PoE hub, or PoE adaptor to stop supplying electricity.
15. Return the Fixed IP Setting Mode switch of the IP-CS to the OFF position.

*1 Valid IP address range: "1.0.0.0" to "223.255.255.255"
*2 Valid subnet mask address range: "0–255.0–255.0–255.0–255" (except 0.0.0.0 and 255.255.255.255)

Note

For information on other parameters, refer to "D Information about IP Terminal Maintenance Console".

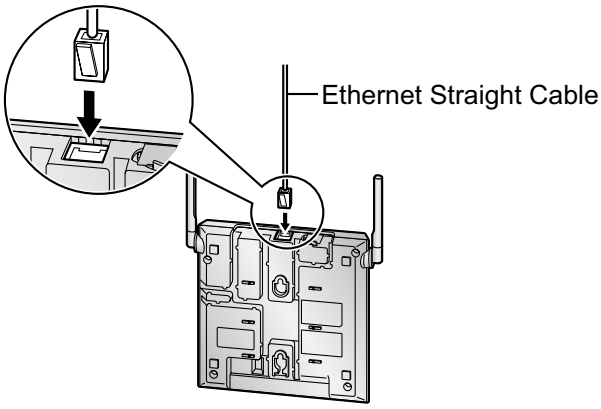
Connecting an IP-CS to a LAN

When connecting an IP-CS to the LAN, connect it to a switching hub.

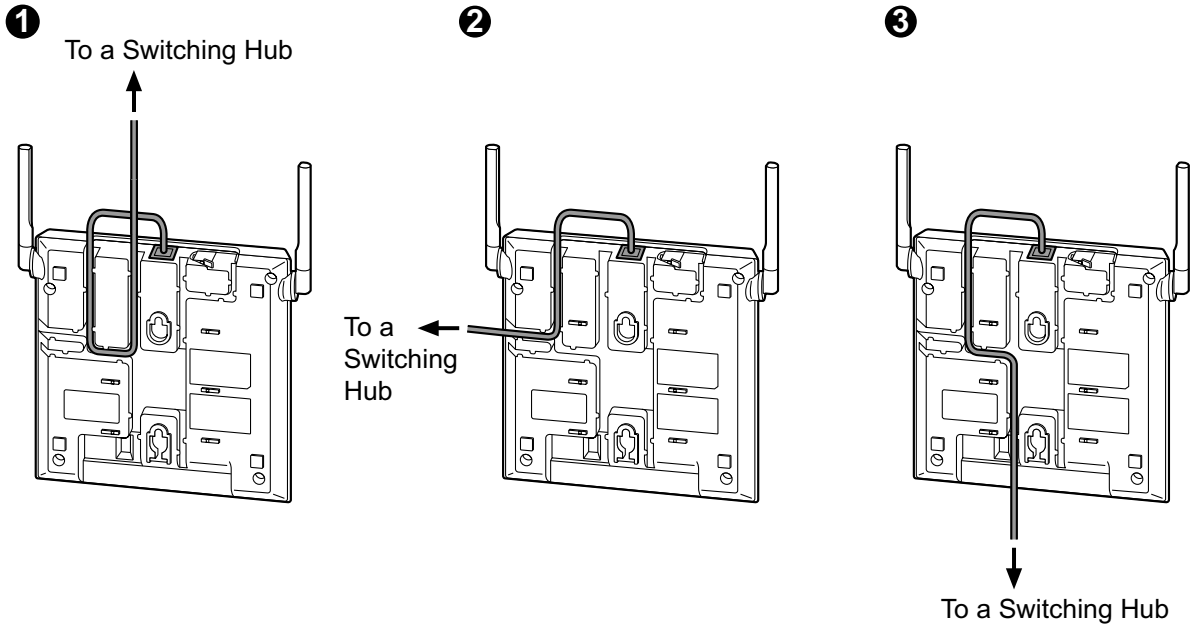
Note

- Use an Ethernet straight cable with an RJ45 connector to connect the IP-CS to a switching hub. The cable should be a 10BASE-T/100BASE-TX CAT 5 (Category 5) or higher cable, and the diameter of the cable must be 6.5 mm or less.
- It is possible to connect the IP-CS to the LAN while registering the IP-CS to the PBX. For details, refer to "8 Registering IP Cell Stations".

1. Connect the cable to the IP-CS.



2. Pass the cable through the groove of the IP-CS in one of the following three ways.



3. Connect the other end of the cable to the switching hub.

Connecting an AC Adaptor to an IP-CS

IP-CSs comply with the IEEE 802.3af Power-over-Ethernet (PoE) standard. If PoE is available on your network, these IP-CSs can receive the necessary power supply from the network through the network cable. In this case, no AC adaptor is needed for the IP-CSs.
However, if PoE is not available, you will need to connect an AC adaptor to the IP-CS.

WARNING

When installing or testing a product with an external AC adaptor, the AC adaptor should be plugged into a wall outlet or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.

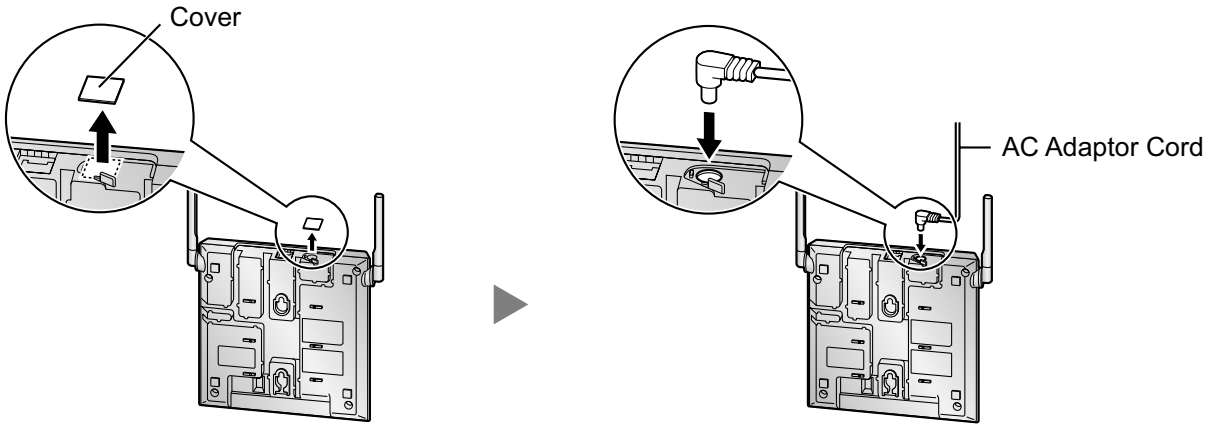
CAUTION

The DC jack cover poses a choking hazard. Keep the DC jack cover out of reach of children.

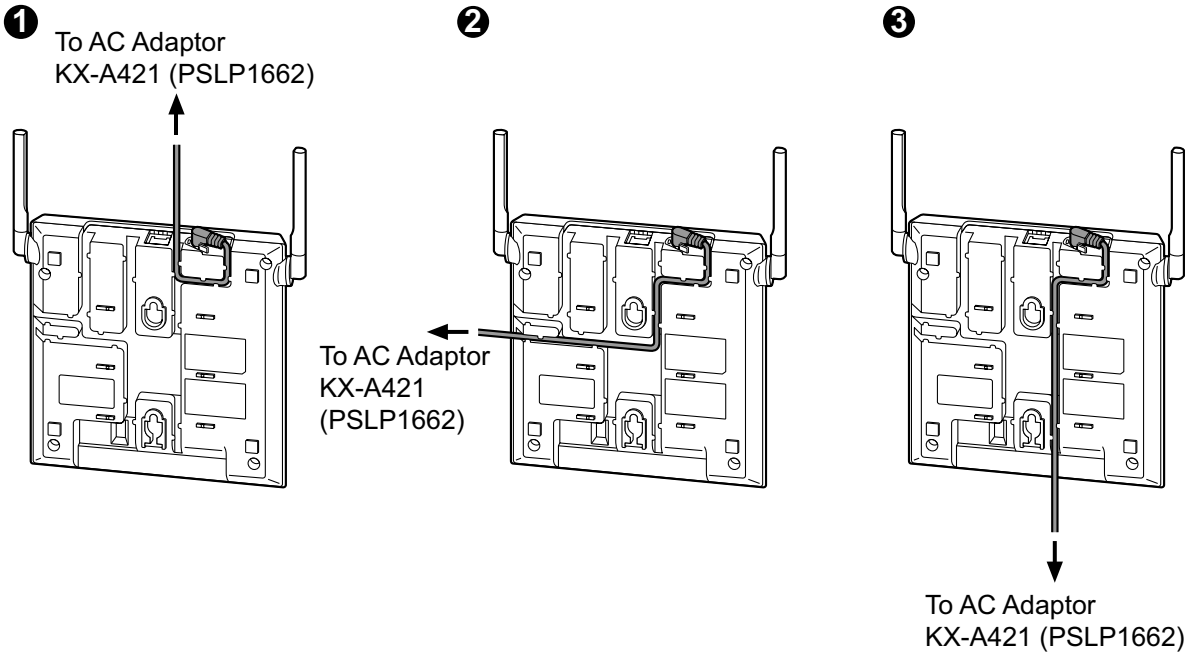
Note

Use only the optional AC adaptor KX-A421 (PSLP1662) for the IP-CS.

1. Remove the DC jack cover, and connect the AC adaptor cord to the IP-CS.



2. Pass the cord through the groove of the IP-CS in one of the following three ways.



3. Connect the AC cord to the AC adaptor, then connect the AC cord to an AC outlet.

8 Registering IP Cell Stations

8.1 Registering IP Cell Stations to a KX-NS1000 PBX

Registering the IP-CS

Note

The KX-NS1000 PBX supports only IP-CSs directly.

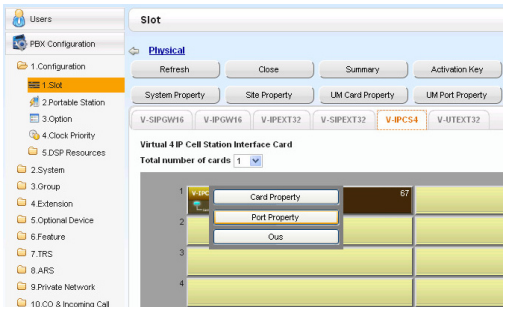
1. Connect the PC to the MNT port of the PBX with an Ethernet straight cable.
2. Launch your Web browser and in the address bar, enter the following address exactly as shown: **http://kx-ns1000.**

   Note

   Be sure to include the period at the end as shown.
3. Log in using the Installer level account name and password.
   – The login name for the Installer level account is "INSTALLER".
   – The default login password for the Installer level account is "1234".

   CAUTION

   To avoid unauthorised access and possible abuse of the PBX, we strongly recommend:
   a. Keeping the password secret.
   b. Changing your password regularly.
   c. Selecting a complex, random password that cannot be easily guessed.
4. **a.** Click **Setup** → **PBX Configuration** → **Configuration** → **Slot**.
   b. Move the mouse pointer over **Site Property** and click **Main**.
   c. Select **Manual** for **IP Terminal Registration Mode**.
   d. Click **OK**.
5. **a.** Click **Setup** → **PBX Configuration** → **Configuration** → **Slot**.
   b. Click **Virtual** → **V-IPCS4**.
   c. From the **Total number of cards** drop-down list, select the desired number of cards.
   d. Move the mouse pointer over a V-IPCS4 card that has been added. A menu will be shown under the mouse pointer.
   e. Click **Port Property**.



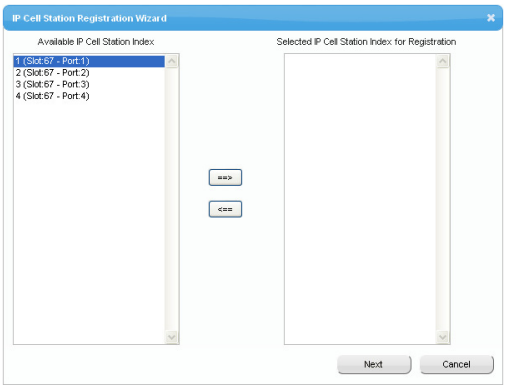
6. Click **Registration**.
   A dialogue box will appear. Non-registered (available) IP-CSs are displayed on the left.

7. **a.** Highlight IP-CSs and click the right arrow to select them for registration.
   b. Click **Next**. A screen will appear with information on the selected IP-CS for programming.

   Note

   - If the IP-CS has been connected to the LAN and power has been turned on, the IP address of the PBX will be assigned automatically.
   - If not, connect the IP-CS to the LAN and turn the power on within 15 minutes after this operation is done. For details, refer to "Connecting an IP-CS to a LAN". The IP address of the PBX will then be assigned automatically.

   c. If the registration is still in progress, the dialogue box will show "Registration Executing".
   If the registration is successful, the dialogue box will show "Registration Completed". Click **Close**.



8. Click a cell in the **Connection** column for the registered CS to open the **Command** window for the port. In the **Command** window, click **OUS** to change the status of the port to "OUS".
9. From the **Air Sync Group No.** drop-down list, select the desired Air Synchronisation Group number.
10. Click **Apply**.
11. Click the cell in the **Connection** column again, and click **INS** in the **Command** window to return the status of the port to "INS".

Once the IP-CS is successfully registered, the status of the IP-CS will update to show "Registered".

Note

When you need to change the Master CSs (Master CS1 and Master CS2) to different CSs, refer to "Assigning the Synchronising CSs".

Assigning the Synchronising CSs

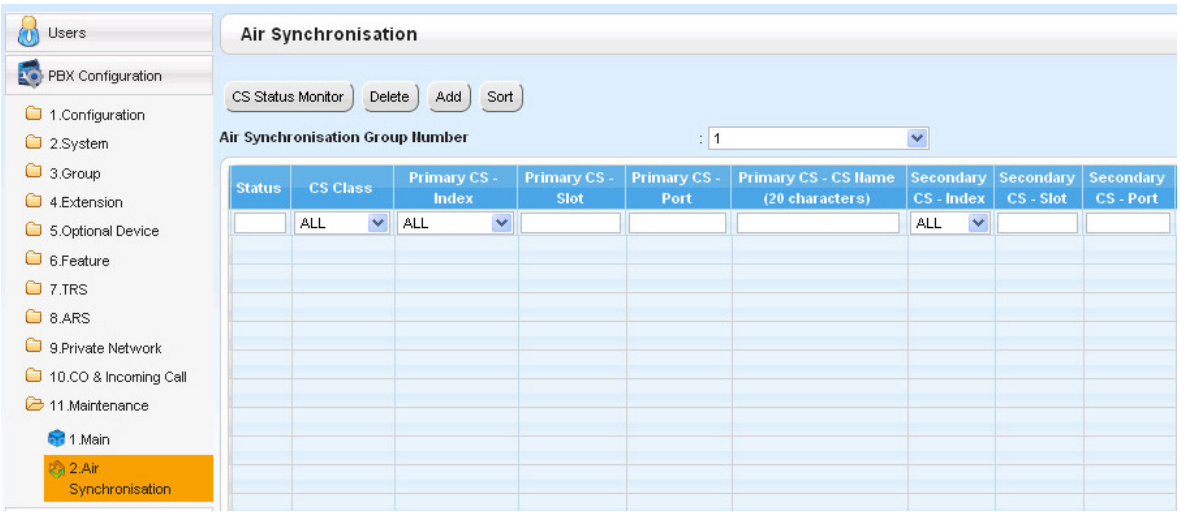
Assigning the Master CSs

Note

When using only one IP-CS at an installation site, assign it as Master CS1 so that it can generate the clock signal.

1. Click **Setup** → **PBX Configuration** → **Maintenance** → **Air Synchronisation**.
2. From the **Air Synchronisation Group Number** drop-down list, select the desired Air Synchronisation Group number.
3. Click a cell in the **Connection** column for the registered CS to open the **Command** window for the port. In the **Command** window, click **OUS** to change the status of the port to "OUS".

4. Select the desired classification for the CS in the **CS Class** column.



Note

For details about other parameters on this screen, refer to the PC Programming Manual for your PBX.

5. Click **Apply**.

Note

Please wait about one minute after clicking **Apply** to allow changes to take effect.

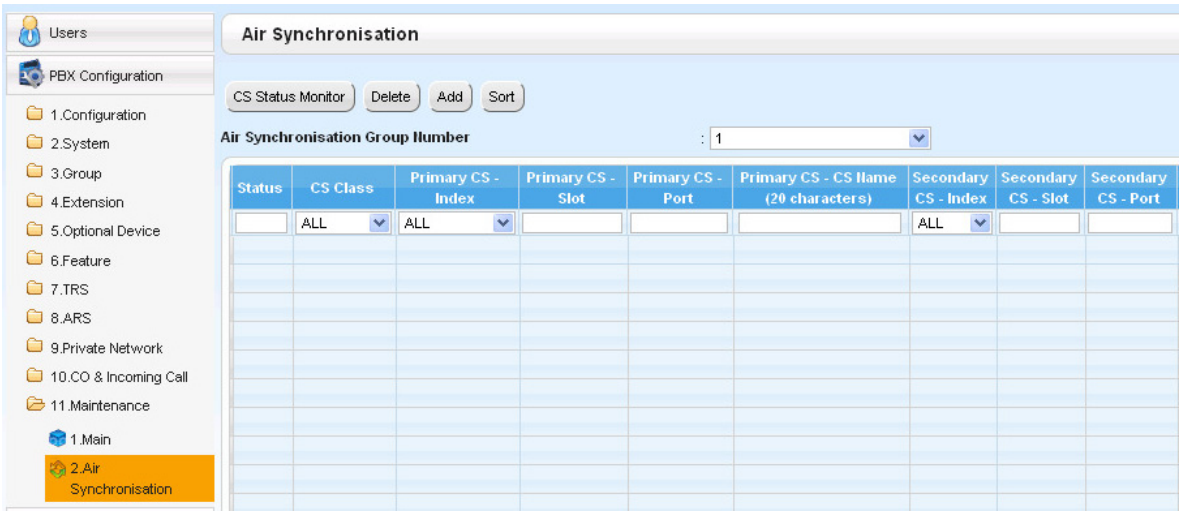
6. Click the cell in the **Connection** column again, and click **INS** in the **Command** window to return the status of the port to "INS".

Setting the Synchronising CS Search Order (Primary/Secondary)

The search order of each CS can be set by the following procedure:

1. Click **Setup** → **PBX Configuration** → **Maintenance** → **Air Synchronisation**.
2. From the **Air Synchronisation Group Number** drop-down list, select the desired Air Synchronisation Group number.
3. Click a cell in the **Connection** column for the registered CS to open the **Command** window for the port. In the **Command** window, click **OUS** to change the status of the port to "OUS".

4. Select the desired CS number in the **Primary CS - Index** and **Secondary CS - Index**.



Note

For details about other parameters on this screen, refer to the PC Programming Manual for your PBX.

5. Click **Apply**.

Note

Please wait about one minute after clicking **Apply** to allow changes to take effect.

6. Click the cell in the **Connection** column again, and click **INS** in the **Command** window to return the status of the port to "INS".

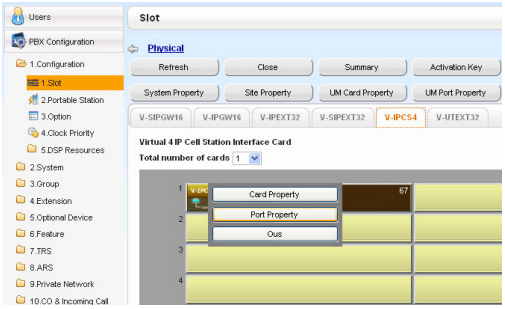
De-registering the IP-CS

When uninstalling an IP-CS that has been installed once, de-register the IP-CS.

Note

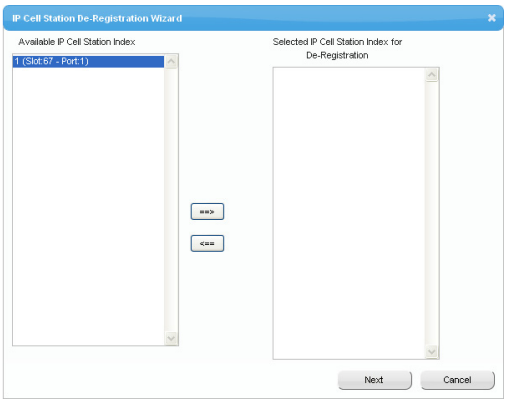
When uninstalling IP-CSs that are supplying the clock signal, air synchronisation is lost. If there is an IP-CS that is synchronised with the IP-CS that is being uninstalled, reconstruct the air synchronisation tree beforehand so that the uninstalled IP-CS is not supplying the clock signal to any IP-CSs.

1. **a.** Click **Setup** → **PBX Configuration** → **Configuration** → **Slot**.
   b. Click **Virtual** → **V-IPCS4**.
   c. Move the mouse pointer over the V-IPCS4 card. A menu will be shown under the mouse pointer.
   d. Click **Port Property**.



2. Click **De-registration**.
   A dialogue box will appear. Registered IP-CSs are displayed on the left.

3. **a.** Highlight IP-CSs and click the right arrow to select them for de-registration.
   b. Click **Next**.
   A dialogue box will appear.
   c. Click **Confirm**.
   If the de-registration is successful, the dialogue box will show "De-registration succeed!".
   d. Click **Close**.

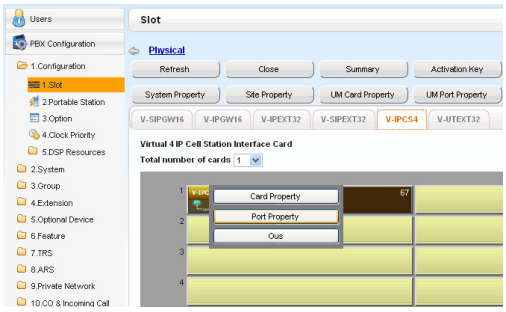


Once the IP-CS is successfully de-registered, the status of the IP-CS will update to show "None".

Forced De-registering the IP-CS

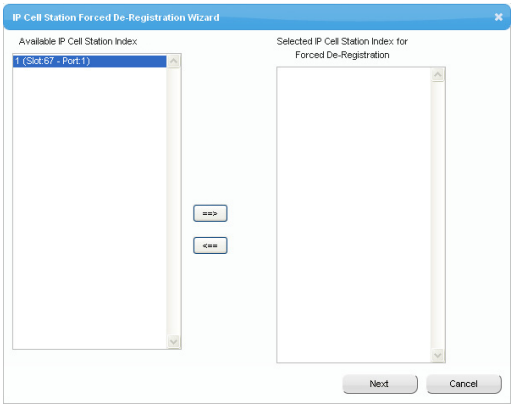
Follow the steps below to forcibly de-register an IP-CS when normal de-registration was unsuccessful.

1. **a.** Click **Setup** → **PBX Configuration** → **Configuration** → **Slot**.
   b. Click **Virtual** → **V-IPCS4**.
   c. Move the mouse pointer over the V-IPCS4 card. A menu will be shown under the mouse pointer.
   d. Click **Port Property**.



2. Click **Forced De-registration**.
   A dialogue box will appear. Registered IP-CSs are displayed on the left.

3. **a.** Highlight IP-CSs and click the right arrow to select them for de-registration.
   b. Click **Next**.
   A dialogue box will appear.
   c. Click **OK**.
   A dialogue box will appear.
   d. Click **Confirm**.
   If the de-registration is successful, the dialogue box will show "Forced de-registration succeed!".
   e. Click **Close**.



Once the IP-CS is successfully de-registered, the status of the IP-CS will update to show "None".

8.2 Registering IP Cell Stations to a KX-NCP Series or KX-TDE Series PBX

Registering the IP-CS

Note

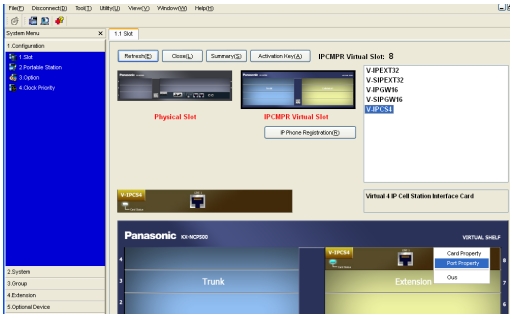
When using a traditional CS in the same area, connect it to the PBX first, as Master CS1, and then register IP-CSs.

1. Connect the PC to the PBX with an Ethernet straight cable or RS-232C cross cable.
2. Click **Connect** from the programme launcher.
3. **a.** Select your PBX model from **PBX Model**.
   b. Select the **LAN** or **RS-232C** tab, depending on the type of PC connection with the PBX.
   c. Specify the settings as required.
   d. Enter the system password for installer (default: **1234**).

   CAUTION

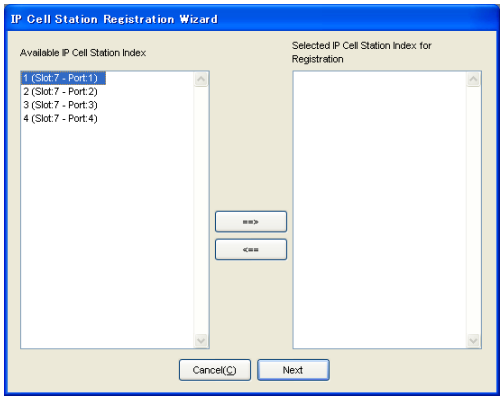
   To avoid unauthorised access and possible abuse of the PBX, we strongly recommend:
   a. Keeping the password secret.
   b. Changing your password regularly.
   c. Selecting a complex, random password that cannot be easily guessed.

   e. Click **Connect**.
4. **a.** Under **Configuration**, click **Slot**.
   b. For the KX-NCP500/KX-NCP1000, move the mouse pointer over the PBX image of **IPCMPR Virtual Slot** at the top of the screen, and click **Select Shelf**. For the KX-TDE100/KX-TDE200/KX-TDE600, move the mouse pointer over the white PBX image of **IPCMPR Virtual Slot** (for the KX-TDE100/KX-TDE200)/**IPCEMPR Virtual Slot** (for the KX-TDE600) at the bottom of the screen, and click **Select Shelf**. Move the mouse pointer over the V-IPCS4 card. A menu will be shown under the mouse pointer.
   c. Click **Port Property**.



5. Click **Registration**.
   A dialogue box will appear. Non-registered (available) IP-CSs are displayed on the left.

6. **a.** Highlight IP-CSs and click the right arrow to select them for registration.
   b. Click **Next**. A screen will appear with information on the selected IP-CS for programming.



Note

- If the IP-CS has been connected to the LAN and power has been turned on, the IP address of the PBX will be assigned automatically.
- If not, connect the IP-CS to the LAN and turn the power on within 15 minutes after this operation is done. For details, refer to "Connecting an IP-CS to a LAN". The IP address of the PBX will then be assigned automatically.

   c. If the registration is still in progress, the dialogue box will show "Registration Executing".
   If the registration is successful, the dialogue box will show "Registration Completed". Click **Close**.

Once the IP-CS is successfully registered, the status of the IP-CS will update to show "Registered".

Note

When you need to change the Master CSs (Master CS1 and Master CS2) to different CSs, refer to "Assigning the Synchronising CSs".

Assigning the Synchronising CSs

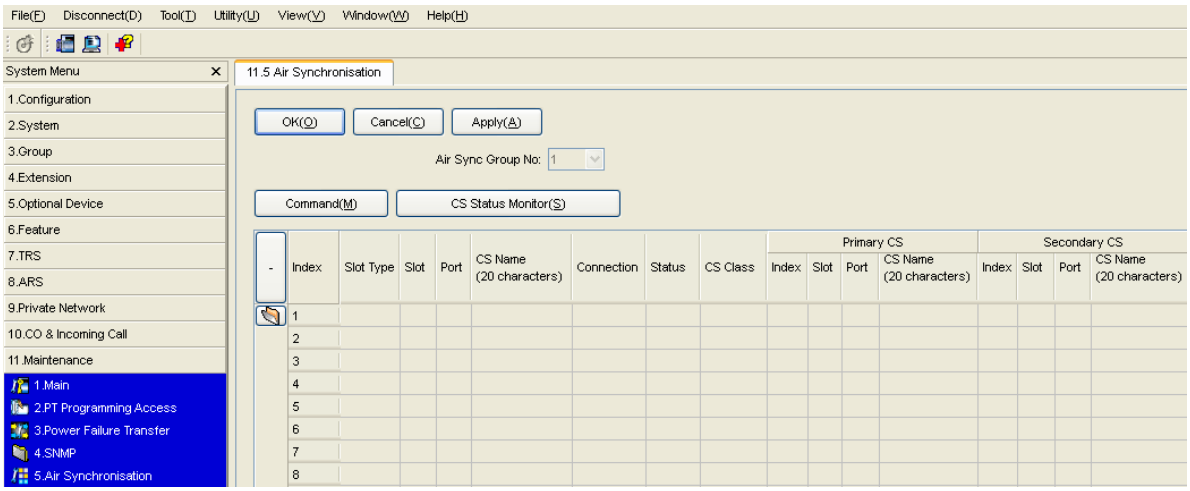
Assigning the Master CSs

Note

- When using IP-CSs and traditional CSs in the same area, the traditional CSs must be classified as Master CS1.
- When using IP-CSs and traditional CSs in the same area, make sure that you do not create a Master CS2.
- When using only one IP-CS at an installation site, assign it as Master CS1 so that it can generate the clock signal.

1. Under **Maintenance**, click **Air Synchronisation**.
2. Select the desired cell in the **Connection** column, and then click **Command** to change the status of the port to "OUS".

3. Select the desired classification for the CS in the **CS Class** column.



Note

For details about other parameters on this screen, refer to the PC Programming Manual or the On-line Help for your PBX.

4. Click **Apply**.

Note

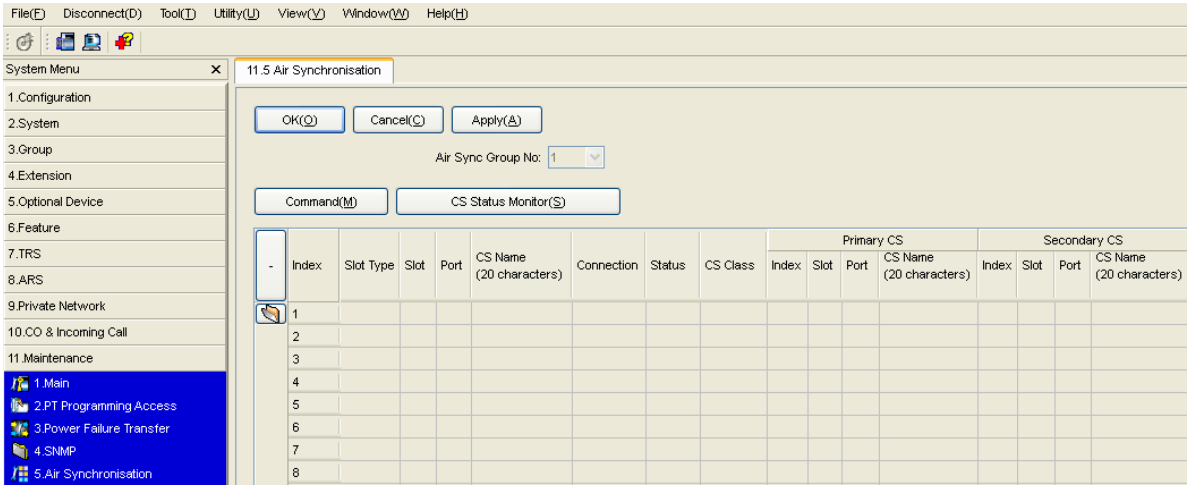
Please wait about one minute after clicking **Apply** to allow changes to take effect.

5. Click **Command** to return the status of the port to "INS".

Setting the Synchronising CS Search Order (Primary/Secondary)

The search order of each CS can be set by the following procedure:

1. Under **Maintenance**, click **Air Synchronisation**.
2. Select the desired cell in the **Connection** column, and then click **Command** to change the status of the port to "OUS".
3. Select the desired CS number in the **Index** column for each **Primary CS** and **Secondary CS**.



Note

For details about other parameters on this screen, refer to the PC Programming Manual or the On-line Help for your PBX.

4. Click **Apply**.

Note

Please wait about one minute after clicking **Apply** to allow changes to take effect.

5. Click **Command** to return the status of the port to "INS".

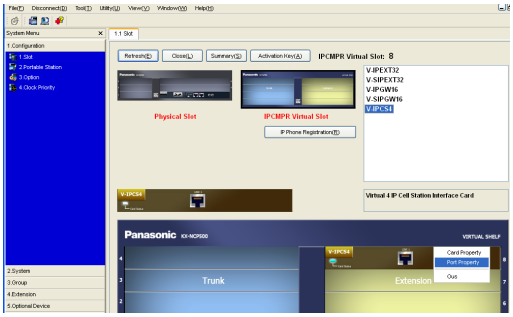
De-registering the IP-CS

When uninstalling an IP-CS that has been installed once, de-register the IP-CS.

Note

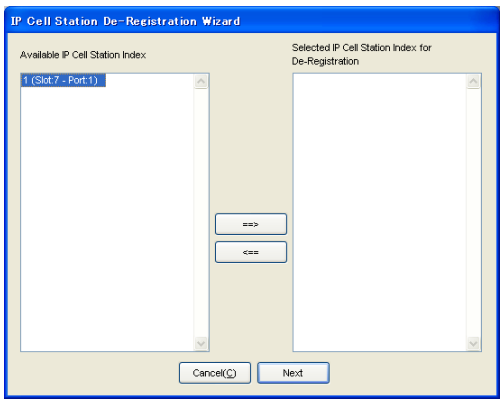
When uninstalling IP-CSs that are supplying the clock signal, air synchronisation is lost. If there is an IP-CS that is synchronised with the IP-CS that is being uninstalled, reconstruct the air synchronisation tree beforehand so that the uninstalled IP-CS is not supplying the clock signal to any IP-CSs.

1. **a.** Under **Configuration**, click **Slot**.
   b. For the KX-NCP500/KX-NCP1000, move the mouse pointer over the PBX image of **IPCMPR Virtual Slot** at the top of the screen, and click **Select Shelf**. For the KX-TDE100/KX-TDE200/KX-TDE600, move the mouse pointer over the white PBX image of **IPCMPR Virtual Slot** (for the KX-TDE100/KX-TDE200)/**IPCEMPR Virtual Slot** (for the KX-TDE600) at the bottom of the screen, and click **Select Shelf**. Move the mouse pointer over the V-IPCS4 card. A menu will be shown under the mouse pointer.
   c. Click **Port Property**.



2. Click **De-registration**.
   A dialogue box will appear. Registered IP-CSs are displayed on the left.

3. **a.** Highlight IP-CSs and click the right arrow to select them for de-registration.
   b. Click **Next**.
   A dialogue box will appear.
   c. Click **Confirm**.
   If the de-registration is successful, the dialogue box will show "De-registration succeed!".
   d. Click **Close**.

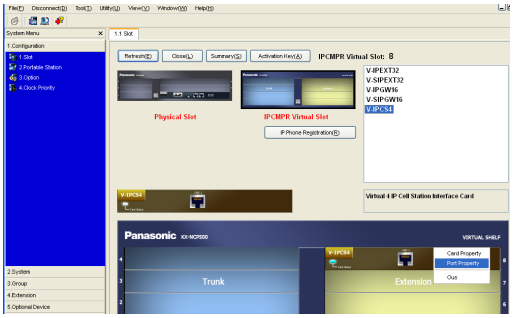


Once the IP-CS is successfully de-registered, the status of the IP-CS will update to show "None".

Forced De-registering the IP-CS

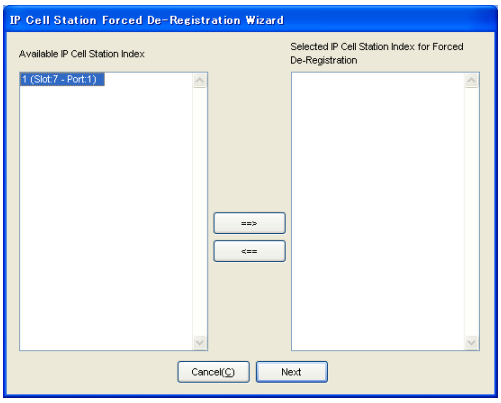
Follow the steps below to forcibly de-register an IP-CS when normal de-registration was unsuccessful.

1. **a.** Under **Configuration**, click **Slot**.
   b. For the KX-NCP500/KX-NCP1000, move the mouse pointer over the PBX image of **IPCMPR Virtual Slot** at the top of the screen, and click **Select Shelf**. For the KX-TDE100/KX-TDE200/KX-TDE600, move the mouse pointer over the white PBX image of **IPCMPR Virtual Slot** (for the KX-TDE100/KX-TDE200)/**IPCEMPR Virtual Slot** (for the KX-TDE600) at the bottom of the screen, and click **Select Shelf**. Move the mouse pointer over the V-IPCS4 card. A menu will be shown under the mouse pointer.
   c. Click **Port Property**.



2. Click **Forced De-registration**.
   A dialogue box will appear. Registered IP-CSs are displayed on the left.

3. **a.** Highlight IP-CSs and click the right arrow to select them for de-registration.
   b. Click **Next**.
   A dialogue box will appear.
   c. Click **OK**.
   A dialogue box will appear.
   d. Click **Confirm**.
   If the de-registration is successful, the dialogue box will show "Forced de-registration succeed!".
   e. Click **Close**.



Once the IP-CS is successfully de-registered, the status of the IP-CS will update to show "None".

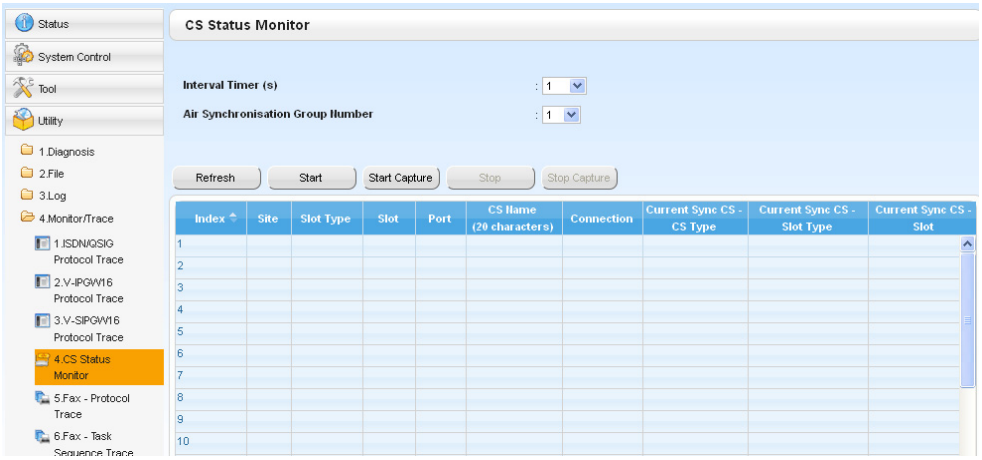
9 Confirming the Status of Air Synchronisation for IP Cell Stations

After registering the IP-CS to the PBX, it is necessary to monitor the status of air synchronisation for the IP-CS. If the monitoring results are not satisfactory, relocate the IP-CS or change the IP-CS that it is currently synchronised with to another CS using the Maintenance Console.

Monitoring Air Synchronisation (for KX-NS1000)

The status of air synchronisation for IP-CSs can be displayed and collected by the following procedure:

1. Click **Maintenance** → **Utility** → **Monitor/Trace** → **CS Status Monitor**.
2. From the **Air Synchronisation Group Number** drop-down list, select the desired Air Synchronisation Group number.
3. From the **Interval Timer (s)** drop-down list, select the desired interval time for monitoring.
4. Click **Start** to monitor the status of air synchronisation.



Note

For details about other parameters on this screen, refer to the PC Programming Manual for your PBX.

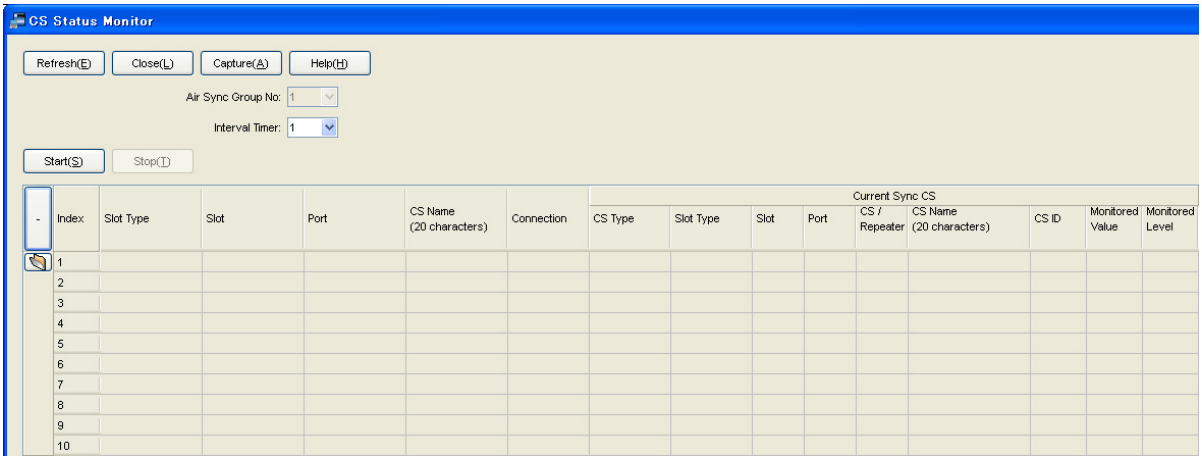
5. Confirm the value in the **Monitored Level** column.
   For details about the monitored level, refer to "Monitored Level".
6. Click **Stop** to stop monitoring the status of air synchronisation.
7. If you want to collect the monitored data, click **Start Capture**.
8. Click **Stop Capture** to finish and save the monitored data.
   A dialogue box will be displayed.
9. Navigate to the folder in which you want to save the file.
10. Enter a file name.
11. Click **Save**.
    The dialogue box will close.

Monitoring Air Synchronisation (for KX-NCP Series or KX-TDE Series)

The status of air synchronisation for IP-CSs can be displayed and collected by the following procedure:

1. From the **Utility** menu, select **CS Status Monitor**.
2. From the **Interval Timer** drop-down list, select the desired interval time for monitoring.

3. Click **Start** to monitor the status of air synchronisation.



Note

For details about other parameters on this screen, refer to the PC Programming Manual or the On-line Help for your PBX.

4. Confirm the value in the **Monitored Level** column.
   For details about the monitored level, refer to "Monitored Level".
5. If you want to collect the monitored data, click **Capture**.
   A dialogue box will be displayed.
6. Navigate to the folder in which you want to save the file.
7. Enter a file name.
8. Click **Save**.
9. Click **Start** to collect the monitoring data.
10. Click **Stop** to finish collecting the monitoring data.
11. Click **Close**.
    The dialogue box will close.

Monitored Level

The monitored level is indicated as follows:

Monitored Level	Description
15 to 18	Up to 3 CSs: Good More than 3 CSs: May be reset due to synchronisation failure of CSs
08 to 14	Good
06 to 07	Better
05	Good
03 to 04	Air synchronisation is established. It is necessary to monitor the status of synchronisation using the Maintenance Console. This is necessary because IP-CSs may be reset due to synchronisation failure if the radio signal strength fluctuates depending on changes in the installation environment such as opening/closing doors.

Monitored Level	Description
00 to 02	May be reset due to synchronisation failure of CSs. Relocate the IP-CS or manually change the IP-CS that the target IP-CS is currently synchronised with to a different CS.

Note

For details about the procedure for changing the synchronising CS, refer to "Assigning the Synchronising CSs".

10 Registering Portable Stations

Performing PBX System Programming

The PS must be registered to the PBX before it can be used. Programming of both the PS and PBX is required.

For KX-NS1000

PBX system programming must be performed via Web Maintenance Console. To start Web Maintenance Console, refer to steps 1 to 3 in "8.1 Registering IP Cell Stations to a KX-NS1000 PBX".

Note

For details about system programming using Web Maintenance Console, refer to "PC Programming" in the PC Programming Manual for your PBX.

For KX-NCP series or KX-TDE series

A Proprietary Telephone (PT) with multiline display (e.g., KX-DT346 6-line display) is required to perform the PBX system programming.

Note

For details about system programming using a PT, refer to "PT Programming" in the Feature Guide, and "PT Programming" in the PT Programming Manual for your PBX.

Entering the PBX System Programming Mode Using a PT

Administrator Level

Note

◆ means default value.

Setting the Personal Identification Number (PIN) for PS Registration

To prevent registering the PS to a wrong PBX, a PIN for PS registration can be set to the PBX. Before registering the PS to the PBX, enter the PIN set to the PBX into the PS. By doing so, the PS will only be registered to the PBX with the matching PIN.

CAUTION

To avoid unauthorised access and possible abuse of the PBX, we strongly recommend:

a. Keeping the password (PIN for PS registration) secret.
b. Not using the default password and changing the password regularly.
c. Selecting a complex, random password that cannot be easily guessed.

Note

The PIN for PS registration will only be used when registering the PS to the PBX. Therefore, during normal operation after registration, even if there is more than 1 PBX with the same PIN near the PS, the PS will not be inadvertently linked to a different PBX.

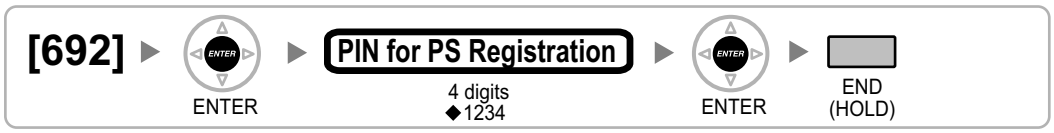
For KX-NS1000

Follow the steps below to set the PIN for PS registration.

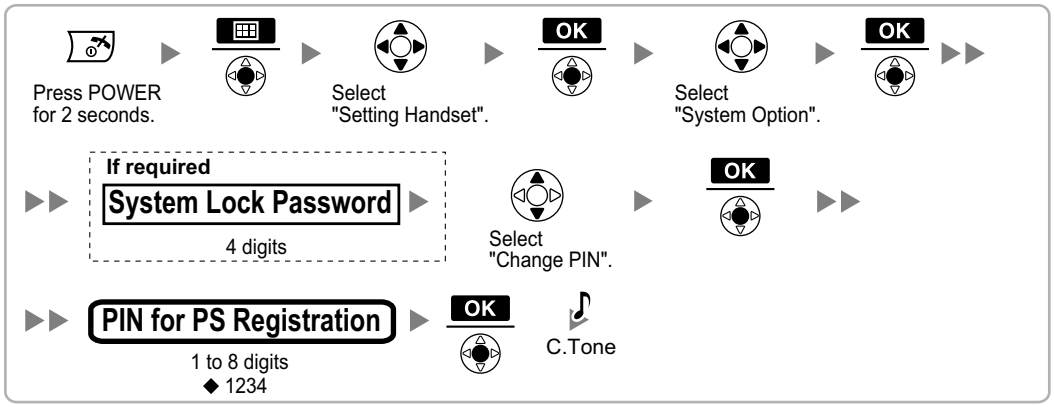
1. Click **Setup** → **PBX Configuration** → **Configuration** → **Portable Station**.

2. Enter 4 digits (default: 1234) for **Personal Identification Number**.

For KX-NCP series or KX-TDE series

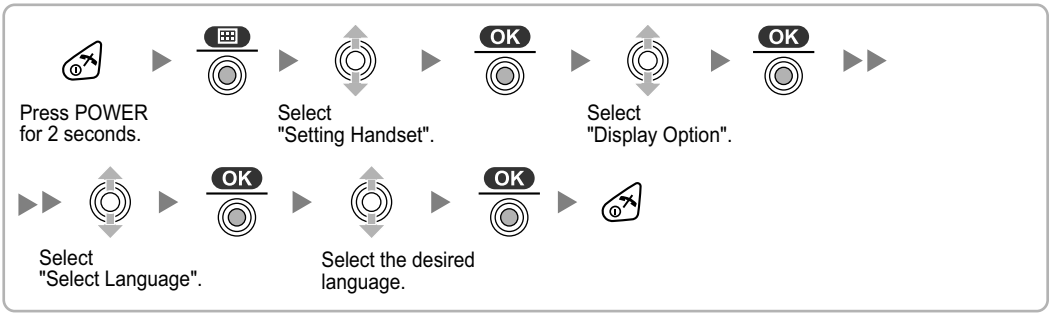


For PSs (KX-TCA175/KX-TCA275 only)



Changing the Display Language of the PS

- **Using the KX-WT115/KX-TCA175/KX-TCA275**
  Refer to "For PSs" in "PS Registration".
- **Using the KX-TCA155/KX-TCA256/KX-TCA355/KX-TCA364**



PS Registration

For KX-NS1000

Follow the steps below to register the PS.

1. Click **Setup** → **PBX Configuration** → **Configuration** → **Portable Station**.
2. In the **Extension No.** column, specify the extension number (max. 5 digits) of the PS.
3. Click **Apply**.
4. Click **Registration**.
   A dialogue box will appear. Non-registered (available) PSs are displayed on the left.
5. In **Portable Station Registration Wizard**,
   a. Highlight PSs and click the right arrow to select them for registration.
   b. Click **Next**.

c. Highlight PBXs of the KX-NS1000 One-look network, and click the right arrow to select them for registration.

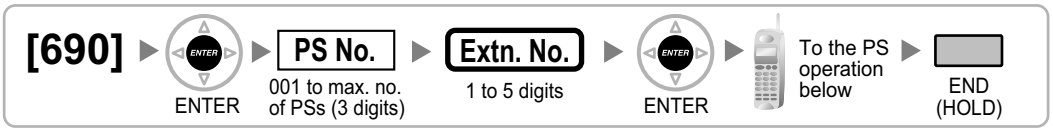
d. Click **Next**.
A screen will appear with information on the selected PS for programming.

6. Operate the PS as in "For PSs" below.

7. If the registration is still in progress, the dialogue box will show "Registration Executing".
If the registration is successful, the dialogue box will show "Registration Completed". Click **Close**.

Once the PS is successfully registered, the status of the PS will update to show "Registered".

For KX-NCP series or KX-TDE series



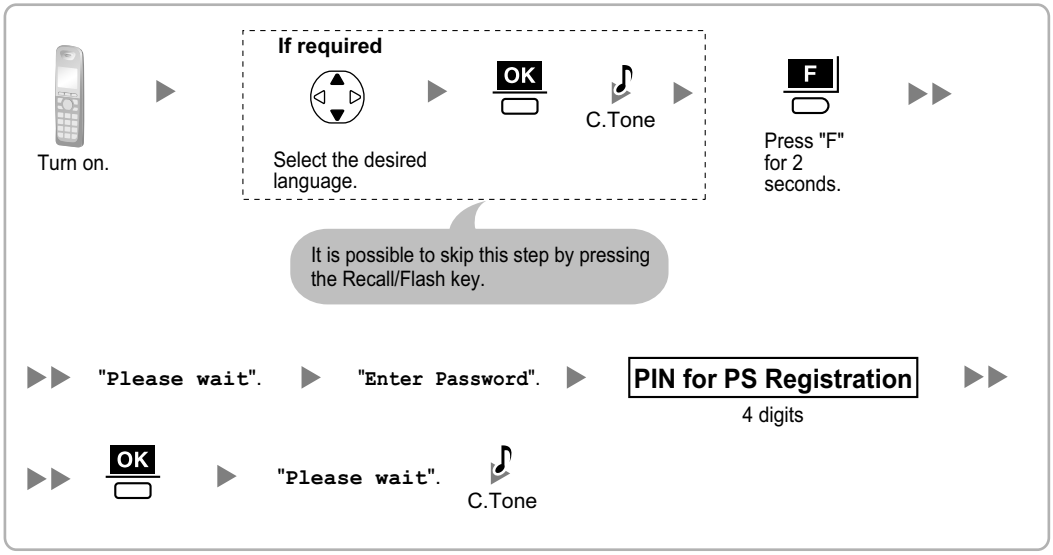
For PSs

- **Using the KX-WT115**

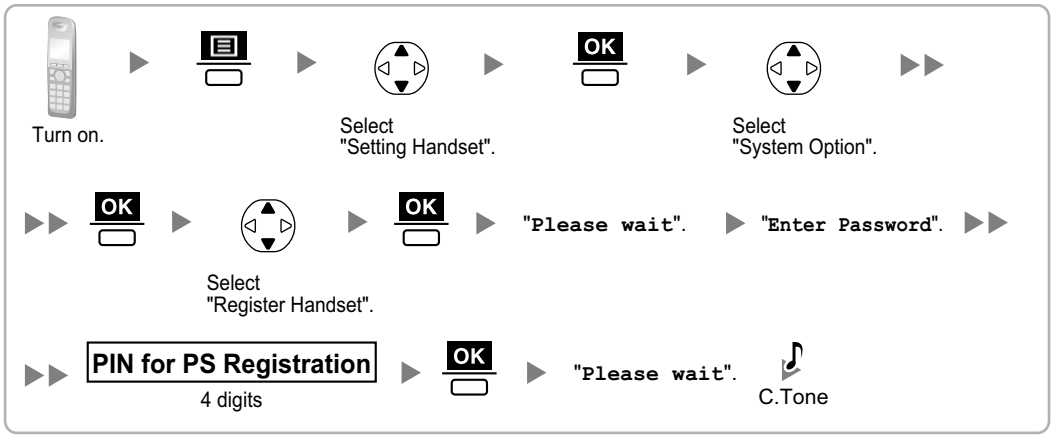
Note

After registration is complete, it may take up to 1 minute for the date and time to be displayed. If a trunk call is received during this period, the date and time of the call will not be recorded.

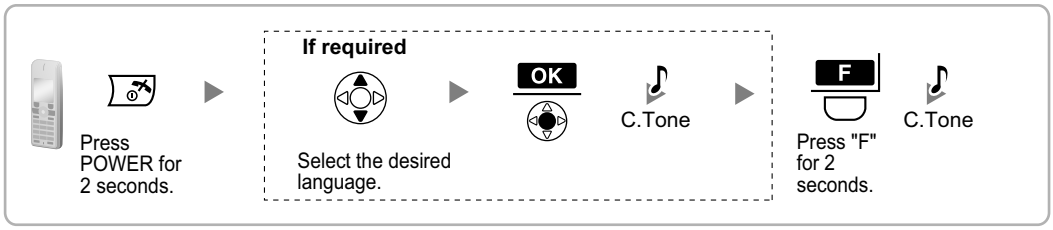
– **When the PS has not been registered yet**
When registering the PS for the first time, it is possible to select the desired language for the display. (You do not need to enter the PS system programming mode when registering for the first time.)



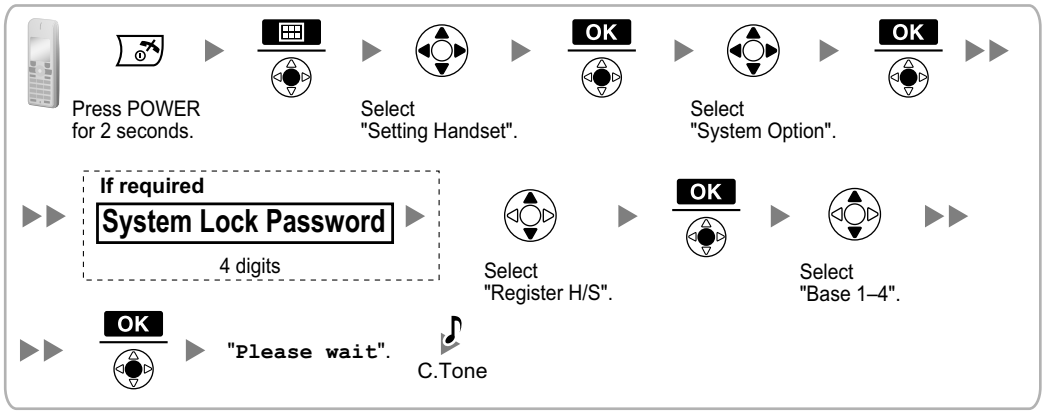
– **When the PS has already been registered once (re-registration)**



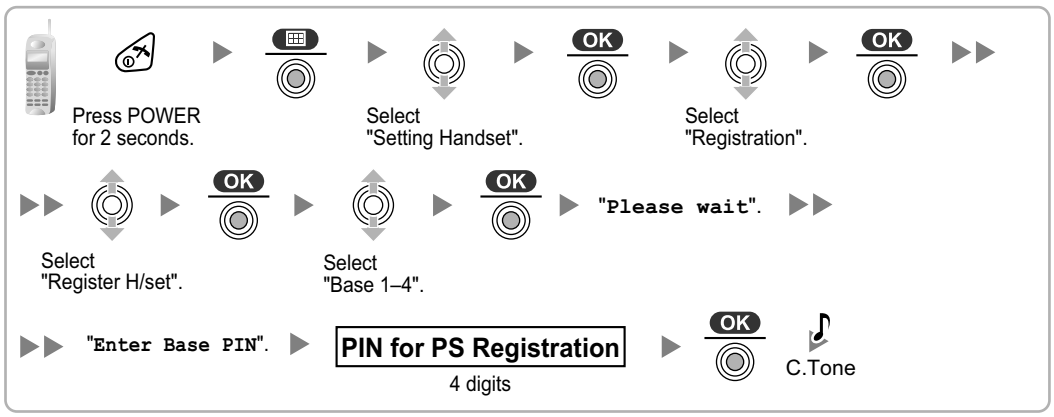
- **Using the KX-TCA175/KX-TCA275**
  – **When the PS has not been registered yet**
  When registering the PS for the first time, it is possible to select the desired language for the display. (You do not need to enter the PS system programming mode when registering for the first time.)



– **When the PS has already been registered to another PBX**
One PS can be registered to a maximum of 4 different PBXs.



- **Using the KX-TCA155/KX-TCA256/KX-TCA355/KX-TCA364**



PS Termination

Confirm the following before cancelling the PS registration:

- The PS is turned on.
- The PS is within range.

For KX-NS1000

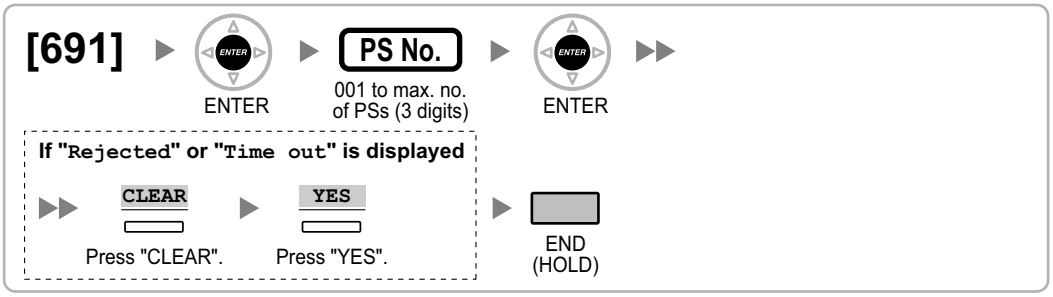
Follow the steps below to terminate the PS.

1. Click **Setup** → **PBX Configuration** → **Configuration** → **Portable Station**.
2. Click **De-registration**.
   A dialogue box will appear. Registered PSs are displayed on the left.
3. In **Portable Station De-Registration Wizard**,
   a. Highlight PSs and click the right arrow to select them for de-registration.
   b. Click **Next**.
   A dialogue box will appear.
   c. Click **Confirm**.
   If the de-registration is successful, the dialogue box will show "De-registration succeed!".
   d. Click **Close**.

Note

If "Rejected" or "Time out" is displayed on the PS, refer to "For PSs" below.

For KX-NCP series or KX-TDE series

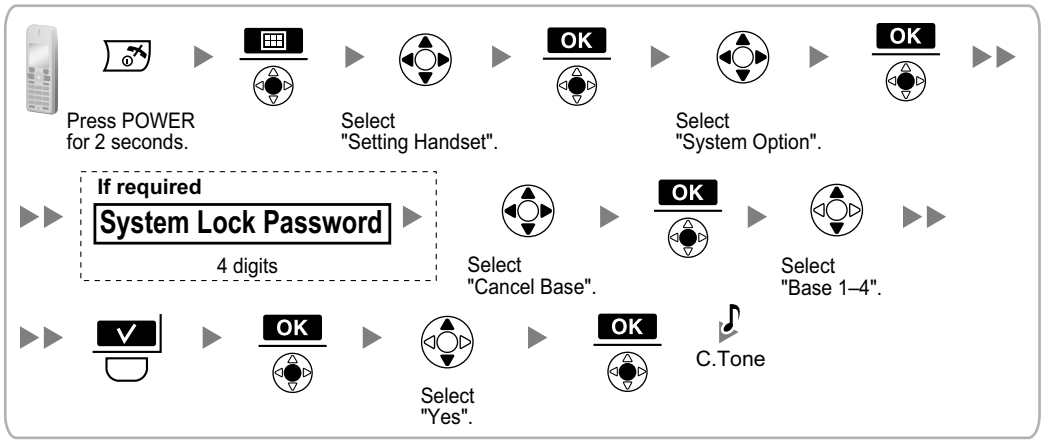


For PSs

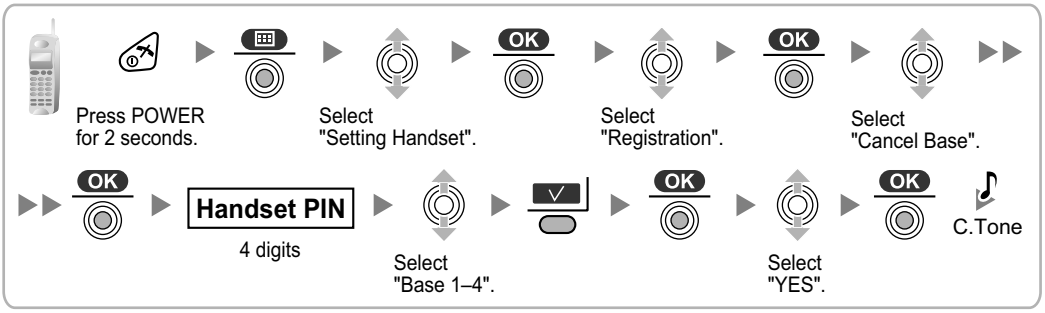
[If "Rejected" or "Time out" is displayed]

The registration information is still stored in the PS. For PSs other than the KX-WT115, you need to delete the registration information from the PS by following the procedure below. For the KX-WT115, you do not need to delete the registration information in order to re-register the PS.

- **Using the KX-TCA175/KX-TCA275**



- **Using the KX-TCA155/KX-TCA256/KX-TCA355/KX-TCA364**



Testing the Operation

Walk around the service area while having a conversation using a registered PS. If noise is frequent or conversations disconnect, relocate the CSs or install an additional CS.

11 Installing the Unified Maintenance Console

System Requirements

Required Operating System

- Microsoft® Windows® XP, Windows Vista® Business, or Windows 7 Professional operating system

Minimum Hardware Requirements

- HDD: 100 MB of available hard disk space
- The PC must fulfill the hardware requirements of the installed Microsoft Windows operating system.

Recommended Display Settings

- Screen resolution: XGA (1024 × 768)
- DPI setting: Normal size (96 DPI)

Installing the Maintenance Console

Note

- Make sure to install and use the latest version of the KX-TDA/KX-TDE/KX-NCP Unified Maintenance Console.
- To install or uninstall the software on a PC running Windows XP Professional, you must be logged in as a user in either the "Administrators" or "Power Users" group.
- To install or uninstall the software on a PC running Windows Vista Business or Windows 7 Professional, you must be logged in as a user in the "Administrators" group.

1. Copy the setup file of the Unified Maintenance Console to your PC.
2. Double-click the setup file to run the installer.
3. Follow the on-screen instructions provided by the installation wizard.

12 Wall Mounting

Mounting

WARNING

- **Make sure that the wall that the unit will be attached to is strong enough to support the unit (approx. 400 g). If not, it is necessary for the wall to be reinforced.**
- **Only use the wall-mounting equipment (screws, washers) included with the unit.**
- **When this unit is no longer in use, make sure to detach it from the wall.**

CAUTION

- When driving the screws into the wall, be careful to avoid touching any metal laths, wire laths or metal plates in the wall.
- Do not stretch or bend the cables. Also, do not allow anything to rest on the cables.
- Use cables that are fire-resistant or fireproof.
- The CS and the cables should never be placed near or over a radiator or other heat source.
- Do not bundle cables that are connected to the CS with the AC power cords of machines located nearby.
- Make sure the cables are securely fastened to the wall.

Notice

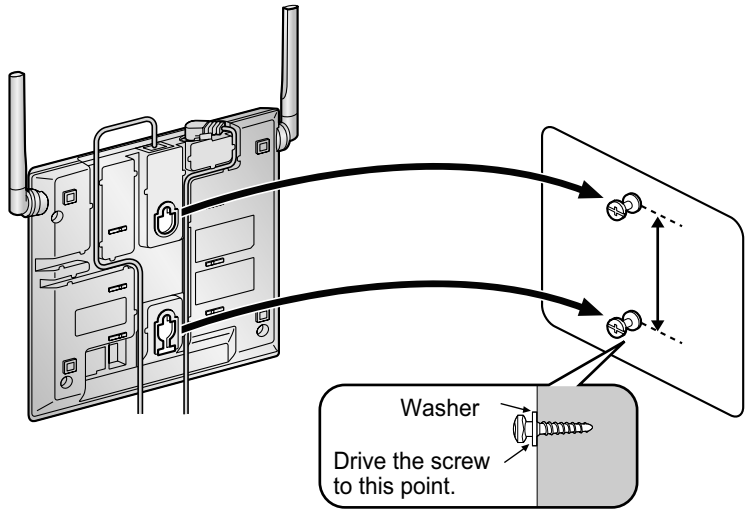
Panasonic assumes no responsibility for injuries or property damage resulting from failures arising out of improper installation or operation inconsistent with this documentation.

1. Place the reference for wall mounting on the wall to mark the 2 screw positions.
2. Install the 2 screws and washers (included) into the wall.

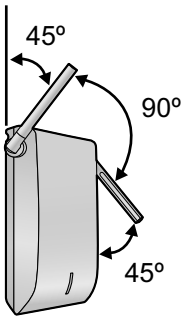
Note

- Make sure that the screw heads are at the same distance from the wall.
- Install the screws perpendicular to the wall.

3. Hook the CS on the screw heads.

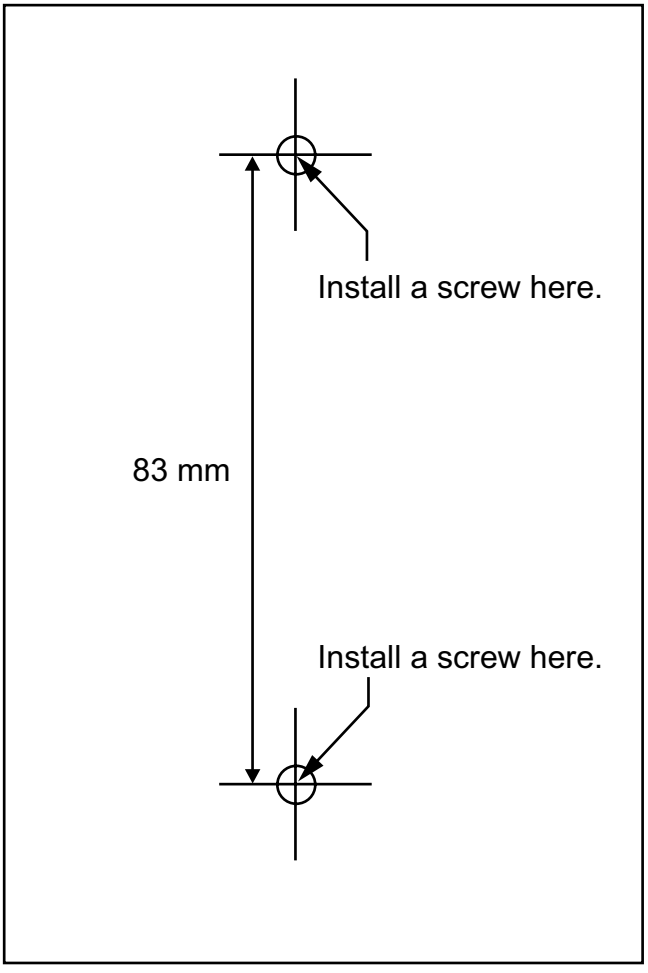


4. Place the antennas so that they are pointing in directions that are 90 degrees apart (for antenna diversity), as follows:



Reference for Wall Mounting

Please copy this page and use as a reference for wall mounting.



Note

Make sure to set the print size to correspond with the size of this page. If the dimension of the paper output still deviates slightly from the measurement indicated here, use the measurement indicated here.

13 Troubleshooting

PROBLEM	PROBABLE CAUSE	SOLUTION
• The LED of the CS does not change to Green ON.	• CS is not connected properly.	• Make sure that the cable is connected properly with correct pin assignments. Also, make sure that the cable does not make short circuits.
	• CS is not set for normal operation.	• Switch all DIP switches off.
	• The status of the port that the CS is connected to is Out of Service.	• Change the port status from Out of Service to In Service using the Maintenance Console.
• The LED of the CS stays Red ON during normal operation.	• CS malfunction	• Replace the CS.
	• Network failure	• Configure the network settings again using the IP Terminal Maintenance Console.
• "CLEAR SCAN DATA" is displayed on the PS's screen after turning on the PS.	• The PS cannot be used for normal operation when scan data is stored on the PS.	• Clear the scan data by following the procedure described in "Clearing the Stored Scan Data" in this guide.
• Cannot register the CS even when maximum number of CSs is not exceeded.	• The information of traditional CSs that are not currently used is left on the system (KX-NCP series/ KX-TDE series only).	• Change the **Air Synchronisation Group No.** to **None** using the Maintenance Console (refer to "3.24 [1-1] Slot—Port Property - Extension Port—DPT Type—Air Sync Group No" in the PC Programming Manual or the On-line Help for your PBX).
• Cannot register the PS.	• Wrong Personal Identification Number (PIN) is registered to the PS.	• Enter the PIN set to the PBX into the PS.
• PS becomes out of range. • Cannot make calls using the PS.	• Location of CS is not good. • Access system of the PS is not properly set.	• Locate the CS properly (refer to "5 Site Survey Using the KX-TCA175/ KX-TCA256/KX-TCA275/KX-TCA355/ KX-TCA364"). • Change the access system setting of the PS to the appropriate system or automatic.

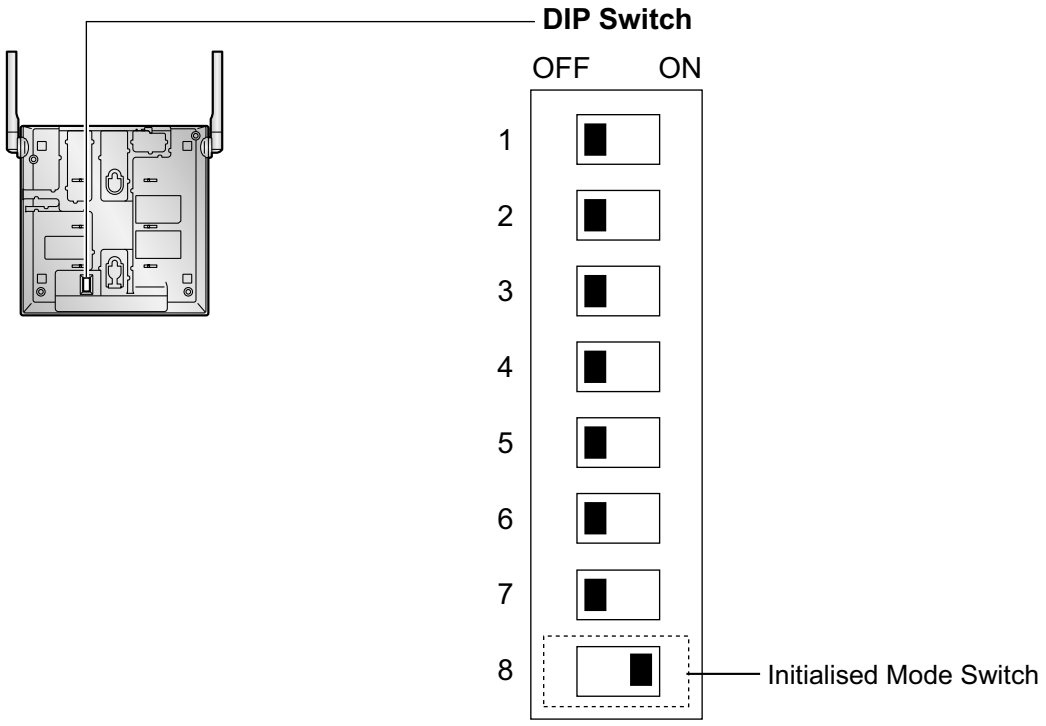
PROBLEM	PROBABLE CAUSE	SOLUTION
• Noise is frequent while using the PS. • Conversations disconnect while using the PS. • There is noise during a phone call. • Call handover is not working. • "NO SERVICE" is displayed on the PS's screen.	• The clock signal source CS is out of range for air synchronisation. • PS is out of CS coverage area.	• Locate the CS properly (refer to "5 Site Survey Using the KX-TCA175/ KX-TCA256/KX-TCA275/KX-TCA355/ KX-TCA364").
	• Air synchronisation between Master CS1 and Master CS2 has failed and each CS is generating its own clock signal.	• Confirm the error log from **Utility**—**Error Log**—**Minor** using the Maintenance Console. If "369 IP-CS Handover error" is displayed for the error log, restart Master CS1 and Master CS2.
	• Metallic materials in the surrounding structure are interfering with the signal received by the PS.	• Install an additional CS where the signal interference is worst. **Note** When the PS software version is 3.027 or later and the IP-CS software version is 6.002 or later, the maximum number of IP-CSs in an area with a radio signal strength of "16" is 3. Also, the maximum number of simultaneous calls using PSs may decrease due to wireless network traffic.
• The CS is not busy (i.e., the status of the LED is not Moderate Green Flashing [120 times per minute]), but calls cannot be made or received. • There is noise during a phone call.	• CSs are located too close together in the same area.	• Reduce the number of CSs in the area, or increase the distance between CSs (refer to "5 Site Survey Using the KX-TCA175/KX-TCA256/KX-TCA275/ KX-TCA355/KX-TCA364").
When traditional CSs are assigned as Master CSs: • IP-CSs reset frequently. • KX-TCA175/KX-TCA275 PSs do not operate properly.	• The software version of the traditional CSs is old.	• Update the traditional CSs to version 5.000 or later.
• PS stays out of service when the CS status is changed from Out of Service to In Service.	• It may take about 20 s for the CS to start up after the status has been changed to In Service.	• Wait until the CS starts up.
• IP-CSs are installed at a remote site after installing CSs at a local site, but the IP-CSs do not operate.	• IP-CSs are not properly synchronised with any CS.	• When using only one IP-CS at a remote site, assign the IP-CS as Master CS1. • When using multiple IP-CSs at a remote site, establish air synchronisation between IP-CSs.

PROBLEM	PROBABLE CAUSE	SOLUTION
• After uninstalling some CSs, other CSs do not operate.	• Master CS is uninstalled.	• Assign a Master CS again for air synchronisation (refer to "Assigning the Synchronising CSs").
• When performing **System Control**—**Program Update**—**Update Program File** (for KX-NS1000) or **Utility**—**File Transfer FTP to IP Equipment** (for KX-NCP series or KX-TDE series) using the Maintenance Console, the programmes stored in IP-CSs cannot be updated.	• The network is busy.	• Set the value of **Keep Alive Time-Out** to 40 seconds or more for **Slot**—**V-IPCS4**—**Card Property** (for KX-NS1000) or **Slot**—**Card Property - Virtual IPCS** (for KX-NCP series or KX-TDE series). **Notice** Be sure to change the value back to its previous value after the update is complete.

14 Initialising the IP Cell Station

If the IP-CS does not operate properly, initialise the IP-CS. Before initialising the IP-CS, try the system feature again to confirm whether there definitely is a problem or not.
The settings that are configured by using the IP Terminal Maintenance Console are changed back to their factory default by initialising the IP-CS. For more details, refer to "D Information about IP Terminal Maintenance Console".
While initialising the IP-CS, calls cannot be made or received and ongoing conversations will be disconnected.

1. Switch the Initialised Mode switch from OFF to ON.



2. Supply electricity to the IP-CS using an AC adaptor, PoE hub, or PoE adaptor (turn on the IP-CS).
3. While the LED indicator flashes red (Moderate Flashing: 120 times per minute), switch the Initialised Mode switch from ON to OFF.

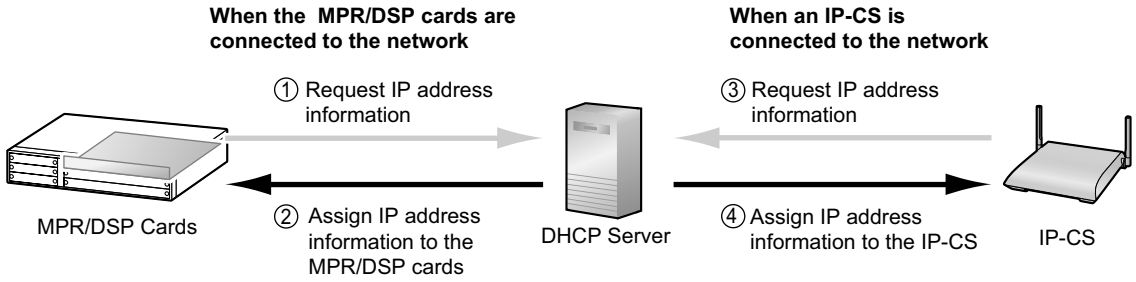
Note

When the LED turns off for a while then flashes red, initialisation is complete.

A Network Management

DHCP (Dynamic Host Configuration Protocol) Server

To establish communication over a VoIP network, IP addresses must be assigned to IP-CSs and the PBX to identify their locations on the network. While these addresses can be assigned manually, it is also possible to use a DHCP server to automatically assign IP address information. Using a DHCP server allows you to centrally manage and automate the assignment of IP addresses.



Note

- A KX-NCP series/KX-TDE series PBX is not able to act as a DHCP server. To use the DHCP client function of IP-CSs, a separate DHCP server is required on the network, as shown above.
- The KX-NS1000 PBX has a DHCP Server feature. Therefore, the PBX can act as a DHCP server or DHCP client depending on its settings. For details about the DHCP Server feature, refer to the Installation Manual for your PBX.
- An IP-CS cannot request IP addresses from a DHCP server on another LAN (connected through an IP network). They can only receive IP addresses from a DHCP server on the same LAN. Therefore, when IP-CSs are located on several LANs, a DHCP server is required on each LAN. If a DHCP server is not present on the LAN, IP addresses for IP-CSs on that LAN must be assigned manually.

B Packet Control Features

Jitter Buffer

When voice signals are packetised and transmitted, individual packets can take different paths through the network and arrive at the destination at varied timings. This is referred to as "jitter", and it can cause degradation in speech quality. To compensate for jitter problems, the "jitter buffer" accumulates the packets temporarily for processing.

To set the size of the jitter buffer, refer to the following:

– KX-NS1000: "9.5.1 PBX Configuration—Configuration—Slot—Site Property - Main—VoIP-DSP Options" in the PC Programming Manual for your PBX.
– KX-NCP series or KX-TDE series: "3.4 [1-1] Slot—Card Property - IPCMPR—VoIP-DSP Option" in the PC Programming Manual or the On-line Help for your PBX.

Voice Activity Detection (VAD)

The VAD conserves bandwidth by detecting silent periods during a call and suppressing the packets of silence from being sent to the network. This feature can be enabled or disabled for codec G.711.

To configure the VAD feature, refer to the following:

– KX-NS1000: "9.18 PBX Configuration—Configuration—Slot—V-IPCS4—Port Property—Option—Voice Activity Detection for G.711" in the PC Programming Manual for your PBX.
– KX-NCP series or KX-TDE series: "3.21 [1-1] Slot—Port Property - Virtual IPCS—Voice Activity Detection for G.711" in the PC Programming Manual or the On-line Help for your PBX.

Note

To use the VAD feature for a certain codec, be sure to enable it for that codec on both the local and remote gateway devices.

C Guidance for VoIP Installation

C.1 VoIP Requirements

Bandwidth Assessment

When using IP-CSs, you must ensure that the IP network in use has enough bandwidth to support VoIP communications. If the amount of bandwidth required for VoIP communications is more than the network can accommodate, speech quality will be compromised. In addition, there may be an adverse effect on the performance of other applications (e.g., email or web applications) that use the same network. Therefore, care must be taken when assessing bandwidth requirements.
Inform your network administrator of the required bandwidth, and make sure that the network can support VoIP communications even under conditions of maximum network traffic.

Required Bandwidth for a Call via an IP-CS
The required bandwidth depends on what combination of codecs and packet sending intervals is used. Keep in mind the following points about the type of codecs and packet sending intervals, in terms of speech quality:

- The speech quality of the codecs varies as follows: G.711 (High), G.729A (Low)[*1]
- The shorter the packet sending interval, the higher the speech quality.
- The higher the speech quality the IP-CSs provide, the more bandwidth the IP-CSs require.

[*1] When the preferred codec of each party differs, the call will be established using the lower codec. For example, if the caller prefers G.711 while the called party prefers G.729A, the call will be established using G.729A.

Codec	Packet Sending Interval			
	20 ms	30 ms	40 ms	60 ms
G.711	87.2 kbps	79.5 kbps	—	—
G.729A	31.2 kbps	23.5 kbps	19.6 kbps	15.7 kbps

Required Bandwidth for Each Virtual IP-CS Card
To allow all IP-CSs to handle calls simultaneously, it is necessary to keep available the bandwidth required by a virtual IP-CS card with the maximum number of IP-CSs connected.
Provided below is the formula to calculate the amount of bandwidth required for each virtual IP-CS card.

Required Bandwidth = (Bandwidth for a call via an IP-CS × 4)

Network Configuration

You must evaluate the structure of the existing network to see if a VoIP network can be implemented. Below are the points that should be evaluated.

Is the IP network a managed network?

A VoIP network should be implemented on a managed IP network such as Frame Relay, Leased Line, or IP-VPN (Virtual Private Network).
An unmanaged network, such as the Internet (including an Internet VPN), cannot be used to employ a VoIP network because delays and loss in data transmission can cause huge degradation in speech quality.

Is it possible to have static IP addressing?

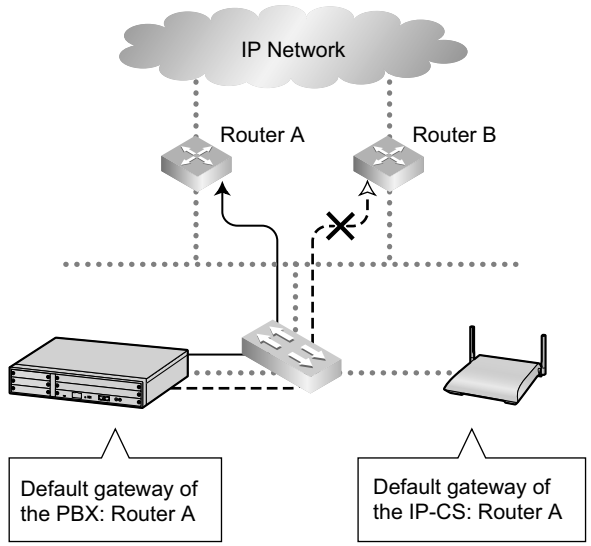
IP-CSs on the network always perform VoIP communications through the PBX. Therefore, the PBX must be assigned static IP addresses, which must be programmed to each IP-CS on the network.

Note

When a DHCP server (which automates IP addressing of devices on the network) is not used, static IP addressing must also be enabled for all IP-CSs.

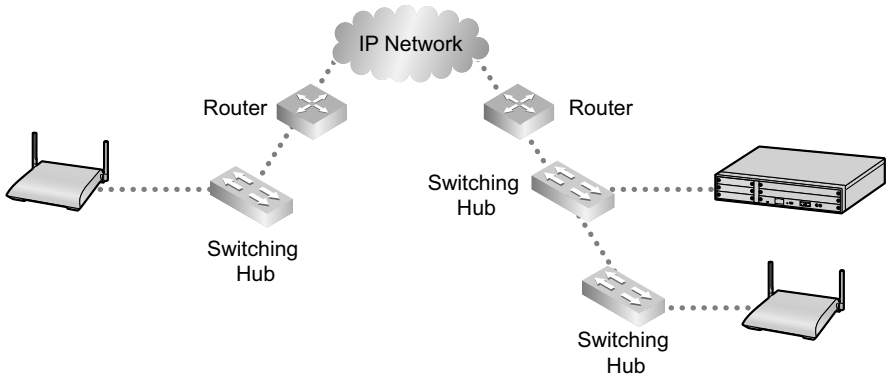
Does only a single router provide access to the IP network?

In a dual network, 2 routers provide access to the IP network as shown in the diagram below. However, only one router can be used as an access point to the network.
Therefore, in the diagram below, if router A, whose IP address is assigned as the default gateway IP address of the PBX and the IP-CSs, fails, VoIP communications are no longer possible; they are not able to switch their default gateway from router A to router B to access the IP network.



Are the network devices located appropriately for effective VoIP communications?

Transmission delays can cause pauses and loss in VoIP communications. The more network devices (e.g., routers and switching hubs) there are between the PBX and IP-CSs or the IP network interface, the longer the transmission delays. This is because a certain amount of delay is inevitable when packets go through each network device.
To prevent unnecessary delays, it is recommended to connect the PBX as close to the IP-CSs and the IP network interface as possible so that the number of the network devices is kept to a minimum.



Network Devices

You must evaluate the network devices that are used in the existing network to see if a VoIP network can be implemented. Below are the points that should be evaluated.

Can the firewall pass packets appropriately?

If the VoIP network contains a firewall, the firewall must be configured appropriately to allow VoIP packets, listed in the table below, to pass through the network without being blocked by filtering.
For more information, consult your network administrator.

[IP Packets from Mother Board/MPR Card and IP-CSs]

Protocol	Description	TCP/UDP	Default Port No.
RTP (IP-CS)	Real-time Transport Protocol. Used for voice data transmission.	UDP	12000 to 12255
Maintenance (Mother Board/MPR Card)	Panasonic proprietary protocol. Used for communication parameter negotiation with the PBX, download of country/area data, confirmation of connection with the PBX, and notification of error messages and statistical information to the PBX.	UDP	39300
Maintenance (IP-CS)		UDP	9301
MGCP (Mother Board/ MPR Card)	Media Gateway Control Protocol. Used for call control command data and LCD/LED data transmission.	UDP	32727
MGCP (IP-CS)		UDP	2427
DHCP (Mother Board/ MPR Card)	Dynamic Host Configuration Protocol. Used for receiving an IP address from a DHCP server.	UDP	67
DHCP (IP-CS)		UDP	68

Protocol	Description	TCP/UDP	Default Port No.
FTP (Port mode)	File Transfer Protocol. Used for receiving a data file from a FTP server to upgrade the firmware version.	TCP	21

Are layer 2 or higher switches used?

Use of repeater hubs can increase the network load, and therefore may result in degradation in speech quality. To ensure high speech quality, use only layer 2 or higher switches. Use of layer 2 or higher switches is also strongly recommended for connecting IP-CSs.

Note

Note that the port of the switching hub that connects to the mother board/MPR card should be set to operate under "Auto Negotiation" mode.

Are Category 5 (CAT 5) or higher cables used?

When connecting network devices, make sure to use CAT 5 or higher cables. If other types of cables are used, communications may not be carried out normally.

C.2 VoIP Requirements Checklist

Use the following checklists to see if you can implement a VoIP network. The answers identified in **underlined bold-face letters** are the required answers for the corresponding questions.

Bandwidth Assessment

No.	Question	Answer	Memo	Ref.
1	**Does the network have enough bandwidth to support VoIP communications?** Make sure that there is more bandwidth available for VoIP communications than the amount actually required.	☐ **Yes** ☐ No	• IP network bandwidth = kbps • Available bandwidth for VoIP = kbps • Required bandwidth for VoIP = kbps	p. 76

Network Configuration

No.	Question	Answer	Memo	Ref.
2-a	**Is the IP network a managed network?** Make sure to use a managed IP network such as Frame Relay, Leased Line, or IP-VPN (Virtual Private Network). The mother board/ MPR card is not intended for use on the Internet (including an Internet VPN).	☐ **Yes** ☐ No	Type of IP network:	p. 76
2-b	**Is it possible to have static IP addressing?**	☐ **Yes** ☐ No		p. 76
2-c	**Does only a single router provide access to the IP network?**	☐ **Yes** ☐ No		p. 77
2-d	**Are the network devices located appropriately for effective VoIP communications?** It is recommended to connect the PBX as close to IP-CSs and the IP network interface as possible.	☐ **Yes** ☐ No		p. 78

Network Devices

No.	Question	Answer	Memo	Ref.
3-a	**Can the firewall pass packets appropriately?** When a firewall is used, make sure to configure the firewall appropriately to allow VoIP packets to pass through the network without being blocked by filtering.	☐ **Yes** ☐ No	Model of firewall:	p. 78

No.	Question	Answer	Memo	Ref.
3-b	**Are layer 2 or higher switches used?** Do not use repeater hubs as they can increase the network load. Also note that the port of the switching hub that connects to the mother board/MPR card should be set to operate under "Auto Negotiation" mode.	☐ **Yes** ☐ No	Model of switch:	p. 79
3-c	**Are Category 5 (CAT 5) or higher cables used?**	☐ **Yes** ☐ No		p. 79

D Information about IP Terminal Maintenance Console

Parameters

Network Settings

Parameter	Value Range
DHCP Client	Disable, Enable
IP Address	1-223.0-255.0-255.0-255
Subnet Mask	0-255.0-255.0-255.0-255 (except 0.0.0.0 and 255.255.255.255)
Default Gateway	0-223.0-255.0-255.0-255
PBX IP Address	0-223.0-255.0-255.0-255

Port Settings

Parameter	Value Range
PTAP Server Port No.	1024-65535
PTAP Client Port No.	1024-65535
DHCP Server Port No.	67, 1024-65535
DHCP Client Port No.	68, 1024-65535
FTP Server Control Port No.	21, 1024-65535
FTP Client Control Port No.	0, 1024-65535
FTP Client Data Port No.	0, 1024-65535

Quality of Service

Parameter	Value Range
Diffserv	Disable, Enable
Diffserv DS Field	0-7.0-7

Version

Parameter	Value Range
MAC Address	00:00:00:00:00:00–FF:FF:FF:FF:FF:FF
LDR Version	Version number
BIND Version	Version number

Hereby, Panasonic Corporation declares that the radio equipment described in this manual is in compliance with Directive 2014/53/EU.
The full text of the EU declaration of conformity is available at the following internet address:

https://www.ptc.panasonic.eu/compliance-documents

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