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This chapter describes how to choose appropriate locations for base stations and repeaters on different sites. The purpose of this chapter is to familiarize you with the procedures that are needed to carry out a site plan.

The following equipments are required for the deployment:

- Base Station
- Handset
- Repeater

## Deploying DECT IP Phone System

The following explains the procedures required to identify the quantity and position of the base stations at prospective customer sites.

### Note

The following figures do not consider building elements that may influence the signal strength.

## Deployment in a Single Floor Building

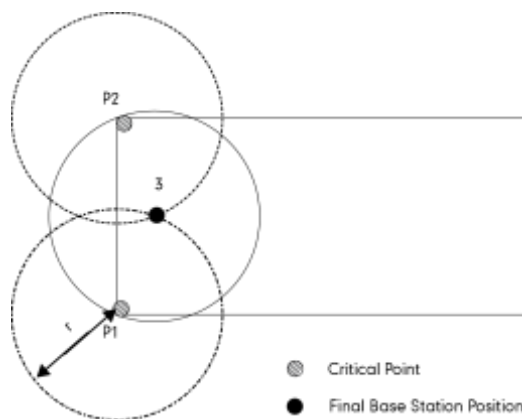
When deploying in a single floor building (the width of the building is less than 100 meters), the deployment process consists of the following steps:

- Identifying initial critical points on the floor plan

A critical point is a place that can be difficult for the radio signal to reach, such as a corner of a room, lifts and stairwells. Determine the critical points for placing the deployment base stations.

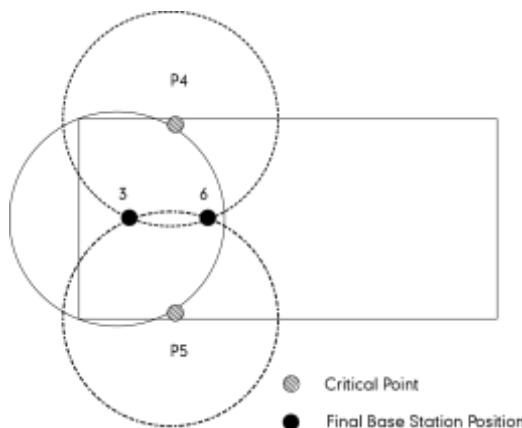
  1. Select the first critical point located in the corner furthest from the center areas of the premises. Name this point P1.
  2. Select a nearby critical point adjacent to the first one and name it P2.
- Locating the area center of the first base station
  1. Place the deployment base stations on the critical points.
  2. Set up communications between base stations and cordless handsets.
  3. Measure the radio coverage and determine the limit of the radio coverage of two critical points.
  4. Determine the intersection point of the boundary lines of different radio coverage cells. An intersection point will indicate the possible best location for mounting the permanent base station. The final position for the first base station is the intersection

point (position 3) of the two radio coverage cells.



- Locating the area center for the second base station
  1. Place the deployment base station at position 3.
  2. Repeat the measurement process to determine the limit of the radio coverage.
  3. Place the deployment base stations at position P4 and P5.
  4. Measure the radio coverage and determine the limit of the radio coverage of these two points.

The final position is again the intersection point of the radio coverage cells indicated by the broken lines, shown by position 6 in the following figure.



5. Follow the above steps to locate area centers for other base stations. Once identified, place the deployment base station at intersection points where each of the coverage cells crossed during deployment. Verify the coverage cells that reach all areas expected.

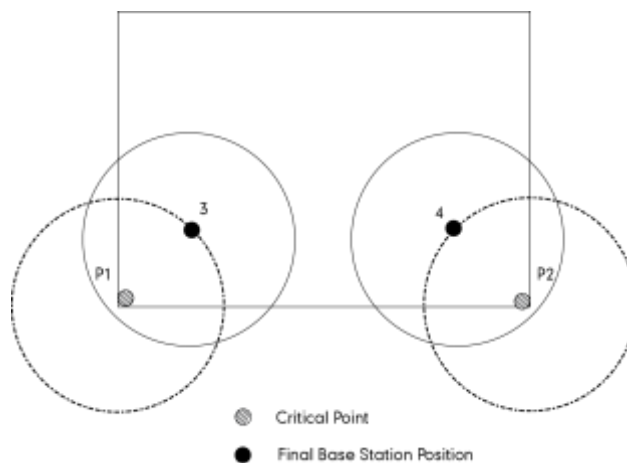
**Note**

Make sure the new critical points are placed well within the deployed radio coverage areas.  
 For regular mobility users, they can search for the best base station (signal strength is the strongest) from the four registered base stations before placing a call. For more information, refer to [Yealink phone-specific user guide](#).

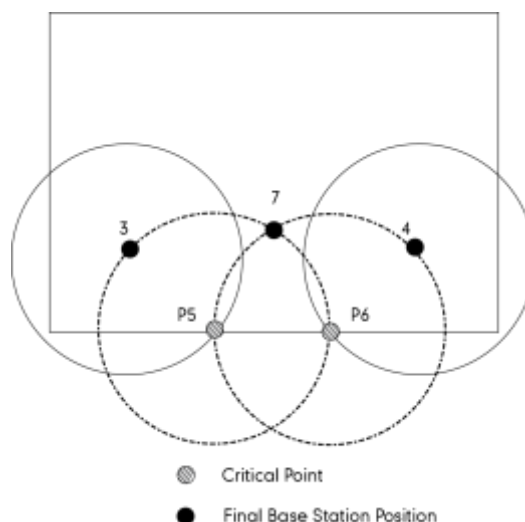
## Deployment in a Wider Single Floor Building

In some deployment, there is no overlap between the deployment base stations of critical points. To deploy in these environments:

- Mark the areas of the site to be deployed.
- Place the deployment base stations on the critical point P1.
- Set up a communication between the base station and cordless handset.
- Measure the radio coverage and determine the limit of the radio coverage of the critical point.
- Measure the signal in a 45 degree angle towards the center of the area.
- Proceed to the critical point P2 and perform the same procedures.
- The area centers are the final positions for base stations, shown by position 3 and 4 in the following figure.



- Determine the limits of the coverage areas from cell centers (position 3 and 4).
- Place the deployment base stations at cell centers to determine the final position (position 7) for the third base station.



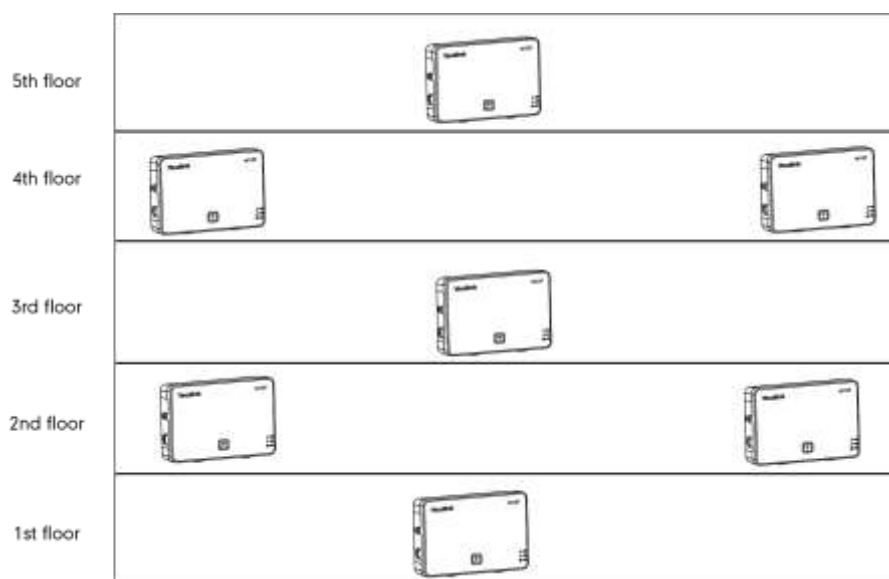
## Deployment in a Multi-Floor Building

The deployment procedure varies according to:

- Radio transmission and reception through the floors
- Similarities and differences between floors

The study of transmission and reception through the floors determines whether several floors will be included in a same coverage area. There are two approaches in deploying a multiple storey building:

- If the degree of attenuation of the building construction materials (e.g., wood) of the building is low, deploy the base stations as follows:
  1. Place the base station on an intermediate floor on the site.
  2. Without moving the base station, go to the floor above, then measure the horizontal coverage at this location.
  3. Without moving the base station, go to the floor directly below and measure the horizontal coverage at this location.
  4. Arrange the base stations with one base station in the centre and the others surrounding it, as shown in the following diagram.



- If the degree of attenuation of the building construction materials (e.g., metal) of the building is high, follow the above introduced steps (single floor) to deploy each floor as individual parts. For more information, refer to [Deployment in a Single Floor Building](#) on page 7.

### Note

The similarities between the floors do not exclude variations in the radio transmission and reception. You are advised to check the sound quality on each floor.

We recommend that you do not deploy base stations on the same vertical line.

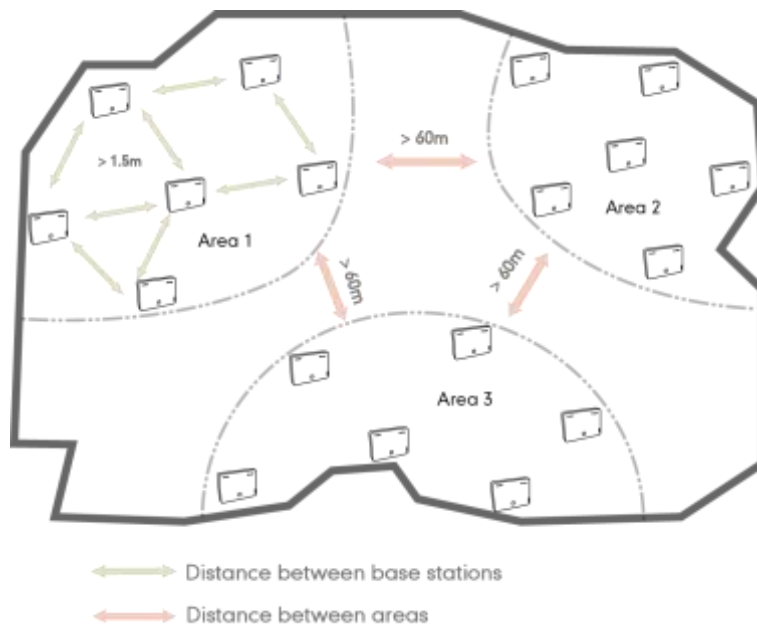
## Deployment in a User Dense Building

To ensure a higher-quality audio experience and avoid interferences, comply with rules introduced in the section “[Area Dimensions and Site Density](#)” when deploying multiple DECT systems in a more user dense site.

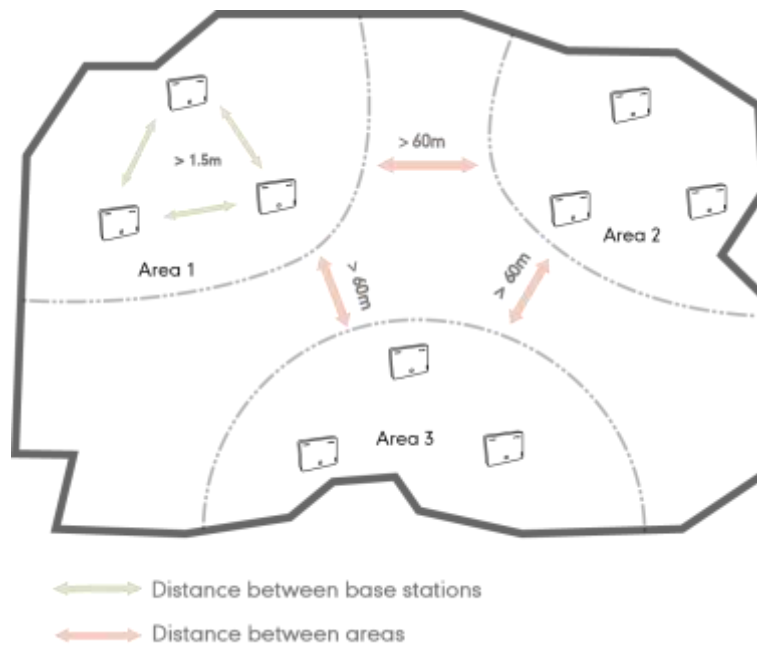
The deployment process consists of the following steps:

- Count the total number of users and associated traffic in the local site.
- Define the homogeneous traffic areas.
- Calculate the average traffic per homogeneous area.
- Determine the number of base stations necessary to support the level of traffic per homogeneous traffic area.
- Distribute base stations per homogeneous area.

### Example Deployment of European DECT System



### Example Deployment of North America DECT System



#### Note

To ensure correct operation of the DECT system, we recommend that the distance between base stations should be greater than 1.5m, and the distance between areas should be greater than 60m.

Ensure that no signal from other areas is detected in one area. For example, the handset in this area cannot search for a base station from other areas.

When adding a repeater in an area, the number of base stations should be reduced accordingly.

## Deploying DECT IP Phone System with Repeater

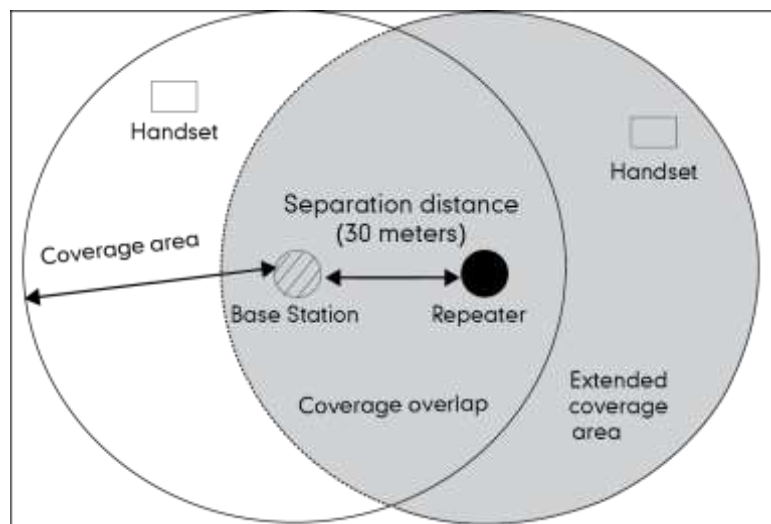
Repeater can be deployed to extend the radio coverage of the base station to cover areas where reception was previously not available. Handsets registered to the base station can work normally in the extended coverage area. Before the deployment, you need to learn the following:

- Up to 6 repeaters (RT10) or 5 repeaters (RT20/RT20U) can be registered to one base station to extend available reception range for all registered handsets.
- All repeaters must be installed within the base station coverage area.
- It is not possible to install the repeaters in series or "daisy-chain".
- Repeater has the same radio coverage (up to 300m in unobstructed outdoor areas and up to 50m inside buildings) as the base station.
- Repeater does not increase the quantity of call paths. It shares the call paths with the base station.
- Adding a repeater is similar to adding a base station on the multi-cell system.

The following gives two illustrative cases to assist in explaining how to identify the quantity and position of the repeaters at prospective customer sites.

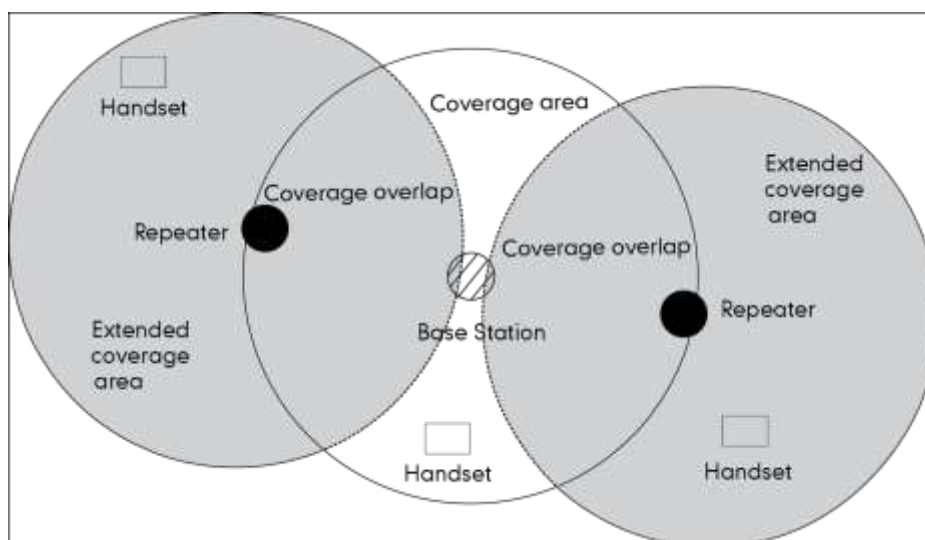
### Single Repeater Only

In this case, an extended coverage range (30m) is required. You can install a repeater within the base station coverage area. The separation distance between the base station and repeater is 30m. The base will hand over calls to the repeaters as the user moves from the base station coverage area into the extended coverage area. If you want to extend the coverage range, you can extend the separation distance between the base station and repeater.



### Multiple Repeaters Required

In this case, mobile handset users in the radio coverage cell require extended coverage areas in different directions.



## Traffic Measurements

Calculating the traffic per homogeneous area covers two aspects:

- The average level of the total duration of communications per user.
- The average mobility per user and per area on the site.

Up to 4 DECT handsets can simultaneously make or receive calls. This means 2 DECT users can place calls to 2 other DECT users or 4 DECT users can place calls to 4 other non-DECT users. When all 4 call paths are in use, no more calls can be made or received by other handsets within the radio coverage of the base station. If the customer has an area where more than 4 DECT users would need to make or receive calls simultaneously, then you must install extra base stations in the area.

A ringing handset will also reserve a call path. If no call path is available, the handset will not receive an incoming call and ring.

## Recommended Placement of Base Stations and Repeaters

For optimum range and performance from your handset, follow these recommendations:

- Keep the base station/repeater away from steel constructions - at least 4 feet/1.20 meters
- Do not place base station/repeater directly on metallic surfaces - at least 4 feet/1.20 meters
- Do not hide base station/repeater behind furniture etc.
- Do not paint the base station/repeater as paint is containing metallic/carbon particles
- The base station/repeater must be placed where the signal is needed

The following are some recommended base station and repeater placement strategies:

### **Around Corridors:**

Base stations and repeaters should be deployed vertically preferably at corridor intersections where propagation patterns follow the corridor patterns. In case there are high objects in the area, the base station/repeater should be installed above those objects.

### **Multi-Storey Buildings:**

Base stations and repeaters can be installed on opposite sides of the floors to take advantage of the floor-to-floor coverage. The coverage design cannot rely entirely on floor-to-floor propagation; each case must be verified due to variations in local attenuation patterns.

### **Large Halls:**

Base stations and repeaters can be deployed in large halls that contain a central open space area with windows to the other areas. This provides a good coverage for the rooms in the inner



circle on all floors (e.g. hotels). In large halls, base stations/repeater should be installed vertically in the middle of the space below the drop ceiling.

**Mounting Positions:**

When base stations and repeaters are mounted vertically on a wall, the radio coverage in front of these devices is twice as large as the coverage at the rear. The base stations should always be mounted higher than the obstructive objects in the area (e.g. minimum higher than 2m above floor). Repeaters should be installed in the middle of corridors or small rooms.

**Metallic Structures/Objects:**

Base stations and repeaters should not be deployed near large metallic objects.

**Reinforced Concrete Structures:**

These structures have a high attenuation factor inside the building. They reduce the radio coverage range of the base stations and repeaters and therefore require a higher number of base stations or repeaters in the building. Lighter types of construction materials require fewer base stations since attenuation figures are considerably lower.