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Nortel

Digital Mobility Deployment Guide



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North American Regulatory Information

Safety

This equipment meets all applicable requirements of both the CSA C22.2 No.60950 and UL 60950.

The shock hazard symbol within an equilateral triangle is intended to alert personnel to electrical shock hazard or equipment damage. The following precautions should also be observed when installing telephone equipment.

- Never install telephone wiring during a lightning storm.
 - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
 - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
 - Use caution when working with telephone lines.
-

Danger: Risk of shock.

Read and follow installation instructions carefully.

Ensure the system and system expansion units are unplugged from the power socket and that any telephone or network cables are unplugged before opening the system or system expansion unit.

If installation of additional hardware and /or servicing is required, disconnect all telephone cable connections prior to unplugging the system equipment.

Ensure the system and system expansion units are plugged into the wall socket using a three-prong power cable before any telephone cables are connected.

Caution: Only qualified persons should service the system.

The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.

Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the system must be connected to an outlet with a third-wire ground. Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit.

Specifically, operations requiring the unit to be powered down must have the network connections (central office lines) removed first.

Enhanced 911 Configuration

Caution: Warning

Local, state and federal requirements for Emergency 911 services support by Customer Premises Equipment vary. Consult your telecommunication service provider regarding compliance with applicable laws and regulations.

Radio-frequency Interference

Warning: Equipment generates RF energy.

This equipment generates, uses, and can radiate radio-frequency energy. If not installed and used in accordance with the installation manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules and with ICES.003, CLASS A Canadian EMI Requirements. Operation of this equipment in a residential area is not permitted and is likely to cause interference.

Repairs to certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician.

Hearing Aid Compatibility

System telephones are hearing-aid compatible, as defined in Section 68.316 of Part 68 FCC Rules.

Repairs

In the event of equipment malfunction, all repairs to certified equipment will be performed by an authorized supplier.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important Safety Instructions

The following safety instructions cover the installation and use of the Product. Read carefully and retain for future reference.

Installation

Warning: To avoid electrical shock hazard to personnel or equipment damage observe the following precautions when installing telephone equipment:

- 1** Never install telephone wiring during a lightning storm.
- 2** Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- 3** Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- 4** Use caution when installing or modifying telephone lines. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.


This symbol on the product is used to identify the following important information: Use only with a CSA or UL certified CLASS 2 power supply, as specified in the user guide.

Use

When using your telephone equipment, basic safety precautions should always be followed to reduce risk of fire, electric shock and injury to persons, including the following:

- 1 Read and understand all instructions.
- 2 Follow the instructions marked on the product.
- 3 Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- 4 Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
- 5 Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
- 6 This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
- 7 Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- 8 Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
- 9 Never spill liquid of any kind on the product.
- 10 To reduce the risk of electric shock do not disassemble this product, but have it sent to a qualified service person when some service or repair work is required.
- 11 Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - a When the power supply cord or plug is damaged or frayed.
 - b If the product has been exposed to rain, water or liquid has been spilled on the product, disconnect and allow the product to dry out to see if it still operates; but do not open up the product.
 - c If the product housing has been damaged.
 - d If the product exhibits a distinct change in performance.
- 12 Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.
- 13 Do not use the telephone to report a gas leak in the vicinity of the leak.
- 14 **Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.
- 15 Save these instructions.

International Regulatory Information

	<p>The CE Marking on this equipment indicates compliance with the following: This device conforms to Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment as adopted by the European Parliament And Of The Council.</p>	
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This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Hereby, Nortel Networks declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the European Safety requirements EN 60950 and EMC requirements EN 55022 (Class A) and EN 55024. These EMC limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial and light industrial environment.

<p>WARNING</p>

<p>This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. The above warning is inserted for regulatory reasons. If any customer believes that they have an interference problem, either because their Nortel Networks product seems to cause interference or suffers from interference, they should contact their distributor immediately. The distributor will assist with a remedy for any problems and, if necessary, will have full support from Nortel Networks.</p>

Safety

WARNING!

Only qualified service personnel may install this equipment. The instructions in this manual are intended for use by qualified service personnel only.

Only qualified persons should service the system.

The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.

Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the system must be connected to an outlet with a third-wire Earth.

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (exchange lines) removed first.

Limited Warranty

Nortel Networks warrants this product against defects and malfunctions during a one (1) year period from the date of original purchase. If there is a defect or malfunction, Nortel Networks shall, at its option, and as the exclusive remedy, either repair or replace the telephone set at no charge, if returned within the warranty period.

If replacement parts are used in making repairs, these parts may be refurbished, or may contain refurbished materials. If it is necessary to replace the telephone set, it may be replaced with a refurbished telephone of the same design and color. If it should become necessary to repair or replace a defective or malfunctioning telephone set under this warranty, the provisions of this warranty shall apply to the repaired or replaced telephone set until the expiration of ninety (90) days from the date of pick up, or the date of shipment to you, of the repaired or replacement set, or until the end of the original warranty period, whichever is later. Proof of the original purchase date is to be provided with all telephone sets returned for warranty repairs.

Exclusions

Nortel Networks does not warrant its telephone equipment to be compatible with the equipment of any particular telephone company. This warranty does not extend to damage to products resulting from improper installation or operation, alteration, accident, neglect, abuse, misuse, fire or natural causes such as storms or floods, after the telephone is in your possession.

Nortel Networks shall not be liable for any incidental or consequential damages, including, but not limited to, loss, damage or expense directly or indirectly arising from the customers use of or inability to use this telephone, either separately or in combination with other equipment. This paragraph, however, shall not apply to consequential damages for injury to the person in the case of telephones used or bought for use primarily for personal, family or household purposes.

This warranty sets forth the entire liability and obligations of Nortel Networks with respect to breach of warranty, and the warranties set forth or limited herein are the sole warranties and are in lieu of all other warranties, expressed or implied, including warranties or fitness for particular purpose and merchantability.

Warranty Repair Services

Should the set fail during the warranty period:

In North America, please call 1-800-574-1611 for further information.

Outside North America, contact your sales representative for return instructions. You will be responsible for shipping charges, if any. When you return this telephone for warranty service, you must present proof of purchase.

After Warranty Service

Nortel Networks offers ongoing repair and support for this product. This service provides repair or replacement of your Nortel Networks product, at Nortel Networks option, for a fixed charge. You are responsible for all shipping charges. For further information and shipping instructions:

In North America, contact our service information number: 1-800-574-1611.

Outside North America, contact your sales representative.

Repairs to this product may be made only by the manufacturer and its authorized agents, or by others who are legally authorized. This restriction applies during and after the warranty period. Unauthorized repair will void the warranty.

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1.0 Introduction

The Nortel *Digital Mobility Deployment Tool* serves *two purposes* as a site deployment and a sales demonstration tool for the Nortel Digital Mobility Solution.

Using the tool for demonstration purposes the kit can be operated independently of any Nortel system in order to demonstrate the mobility capability, overall radio signal propagation of the base station and handset features.

When using the kit for deployment purpose the kit will allow a trained technician to determine the number and placement of Base stations and Repeaters.

Important! Performing a site survey and deployment is a specialist task that should only be attempted by a trained technician who has undergone the Nortel Digital Mobility Training Course.

1.1 General Information

The main objective when using the Digital Mobility Deployment Tool during site survey is to identify the best location for mounting Base Stations and Repeaters and planning for the cabling to the Base Stations.

Once a deployment survey is complete, the installing technician should have clear knowledge of the boundaries of the coverage provided by a Base Station or Repeater.

1.2 Contents of the Deployment Kit

Item	Quantity	Part No.
Deployment Base Station	1	N/A
Wall cord (for Rechargeable Battery connection)	1	N/A
Headset	1	N/A
Rechargeable Battery pack	1	N/A
7430 Handset	1	NT7B65KME6
7440 Handset	1	NT7B65KNE6
Handset User's Guide	2	N/A
Handset 7430/7440 Single Charger	2	NT7B80AK
Mains AC Power Adapter (for 7430/7440 Single Charger)	2	NT7B65LC
Mains AC Power Adapter (for Deployment Base Station)	1	N/A
Mains AC Power Adapter (for Rechargeable Battery Pack)	1	N/A
CD Player	1	N/A
Audio Cable	1	N/A

1.3 Scope

The scope of the Deployment Guide is to illustrate the dynamics involved within a standard deployment of the Digital Mobility Solution. While it is impossible to list all the possible variables that could be encountered during a deployment, this guide aims to familiarize an installing technician with the terms and procedures to provide a site survey.

At the completion of this guide the user should be comfortable with the following:

- Terms included herein
- Using a handset to measure and record Q & RSSI values (RF values).
- Selecting a proper mounting location for Base Stations and Repeaters
- Operating and configuring the Deployment Tool Base
- Operating the handset
- Documenting the Deployment

2.0 Hardware Identification

2.1 Deployment Base Station

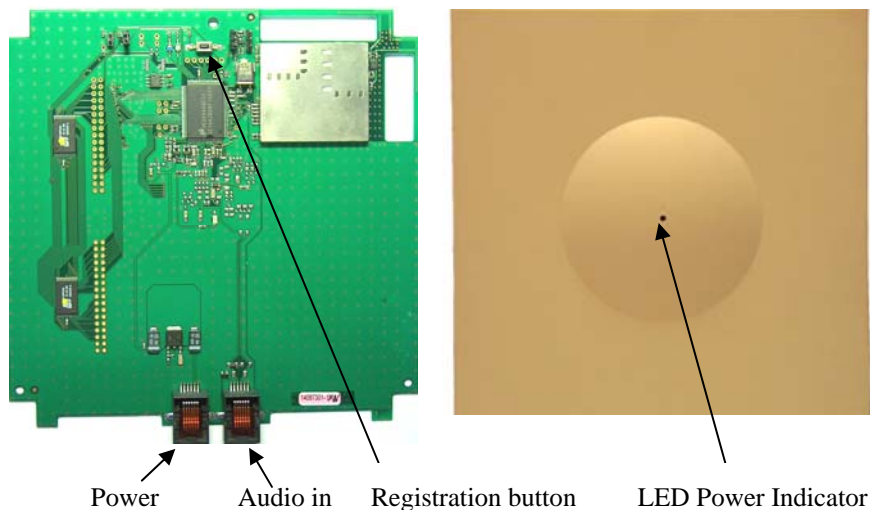
The Deployment Base Station is only for use of deploying the Nortel Digital Mobility Solutions. The Deployment Base Station provides 2 speech channels and supports a maximum of one handset-to-handset conversation.

In the event a technician wishes to perform a deployment alone, the Deployment Base Station supports the connection of an alternative audio source. When connected, the handset user has the ability to verify the sound quality from Deployment Base. The input level is 0dBm nominal.

Two Deployment Handsets are subscribed to the Deployment Base from the factory. The technician does have the ability to add and remove handsets when necessary without the need for special software.

The Deployment Base Station is not approved for connection to any public network and is intend only for use as a tool.

Illustrated below: 2.4 GHz Base Station



Dimensions	(6.5 x 6.5 x 2.09 inches)	(165 x 165 x 53mm)
Weight	10.65 ounce	(302g)

Power supply:

The base station is supplied by a 9V/300mA adaptor. Current consumption is max. 130mA. It is connected to the plug at the bottom of the base station (see fig. above).

Audio signal input:

The base station has an audio signal connection which can be used to connect an audio signal from e.g. a CD player or MP3 player. This base station forwards the audio signal to the handset when off-hook, allowing a single individual to perform a site survey.

Please note: You will need an audio cable with a 6 pole modular jack to connect the base station with an audio source. Such a cable is supplied with the kit.

Registration button:

The registration button is used to allow subscription of handset. The handsets are subscribed to the base station from the factory. If subscription of handset is required please follow the instructions in the user guide for the specific base station.

2.2 Rechargeable Base Station Battery Pack

A Rechargeable battery pack is included to supply power to the Deployment Base. For proper deployment, always fully charge the battery pack before use. It will approximately take 4 hours charge the battery pack. Allow 8 hrs for the first time battery pack is charged. Ensure the switch is set to "CHARGE" when charging the battery pack and set to "USE" when it is being used to power the Deployment Base Station. The light is red during the charging cycle and turns green when the battery pack is fully charged. A fully charged battery pack will last 3-4 hours depending on the usage.

Poor battery performance may affect the propagation of signal. In case the performance of a fully charged rechargeable battery decreases to an intolerable level, the rechargeable battery should be replaced.

2.3 Deployment Handset

Provided in the Digital Mobility Deployment Kit are one (1) 7430 handset and one (1) 7440 handset, charger bases for each handset, and a power supply for each charger base. The handsets have been subscribed to the Deployment Base from the factory and are identified as handsets #1 and handset #2. Place a call between the handsets to establish determine the assigned handset number.


Handset batteries are included with each handset.




2.3.1 Handset Usage

A Handset User's Guide is included with each handset in the Digital Mobility Deployment Kit Please refer to the guide for specific information regarding the basic functions of the 7430/7440 Deployment Handset. It is strongly recommended to read this guide before continuing.

2.4 Chargers and Power Supplies

Included with the Digital Mobility Deployment Kit are a variety of chargers and power supplies

Quantity	Part Number	Description	Further Description/Picture
2		Single Charger for 7430/7440 handsets	

2		Power Supply for Single Charger (part)	 A black power supply unit with a standard AC power cord on the left and a single DC output cable on the right. The DC cable is coiled and ends in a small, tan-colored connector.
1		Power Supply for Rechargeable battery pack	 A black power supply unit with a standard AC power cord on the left and a DC output cable on the right. The DC cable is coiled and ends in a larger, cylindrical connector.
1		Power Supply for Base Station	 A black power supply unit with a standard AC power cord on the left and a DC output cable on the right. The DC cable is coiled and ends in a small, tan-colored connector, similar to the one in the first row.

3.0 Radio Coverage Properties

The deployment of Base Stations and Repeaters is a critical aspect of the Digital Mobility solution. If the Digital Mobility Controller installation is to be successful, the deployment concepts explained here must be followed.

To determine the permanent installation location of Base Stations within a given installation, a deployment survey must be taken to discover the optimal location and total quantity of Base Stations required for the installation.

It is extremely important to keep in mind that **radio coverage is dependent on construction materials, method of construction and environment**. These factors will always be involved in every installation. Therefore, it is not possible to relate one installation to another insofar as number of Base Stations or positioning of Base Stations. Each site is relatively unique.

While an extensive guide to effective RF coverage planning is outside the scope of this manual, the following points should be taken into consideration when planning the site, prior to installation.

- The Deployment Base Station provides a typical coverage radius similar to that of a regular Base Station and propagates in all directions.
- Wireless handsets can move between coverage areas of different Base Stations while receiving continuous service and maintaining conversations in progress.
- For efficient handover of conversations between Base Stations, deploy multiple Bases with sufficient overlap of coverage between them (i.e. plan for some areas to be covered by more than one Base). Overlaps are necessary to allow handsets the time necessary to handover to a Base from which a better signal quality is received.
- Avoid placing Base Stations near other electronic equipment, large machinery, metal constructions etc as the range can be severely affected.
- Base Stations should be placed between 6- 12feet/1.8-3.6m in height on a wall or up to 30 feet/10m when suspended from a ceiling. If they are placed any lower, persons walking around could interfere with the radio signal. Antennas should always be mounted in a vertical orientation utilizing the supplied mounting bracket. Coverage area can be adversely affected if the Base Stations is mounted improperly.

3.1 Radio Coverage Overlap

Other factors involved in a deployment relate to radio coverage overlap. A radio coverage overlap is required between adjacent cells to allow for the handover of active conversations from Base Station to Base Station or Repeater.

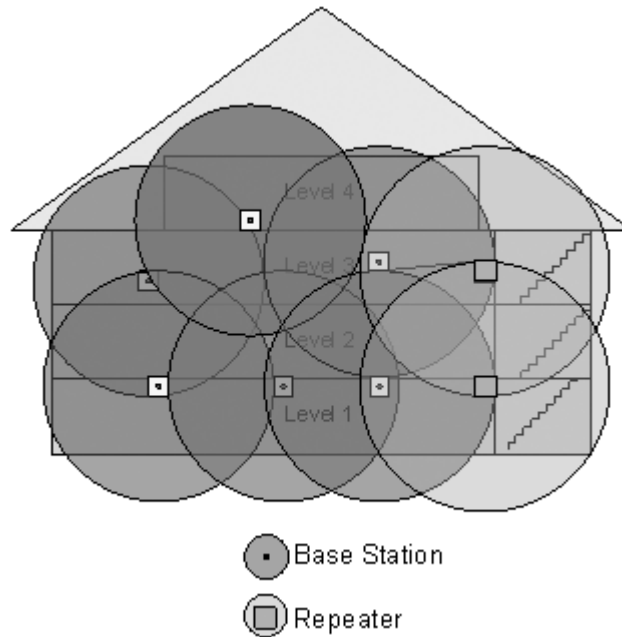
A coverage overlap occurs when the radio fields of multiple Base Stations overlap each other. **Base Stations must be placed in such a way that the radio coverage from one Base Station to another overlaps by 30 to 45 feet/10-15m**. An overlap is required so that as the handset moves about the various coverage zones Base Stations have time to hand the call off to another Base Station.

If the overlap area is not enough - less than 30 – 45 feet/10-15m there is a risk dropping the connection while moving from one coverage area to another. However, too much overlap results in a wasted coverage area.

In order to support the handover of calls from one base station to another, a maximum traveling speed for the handset of 3mph (5km/h) is allowed relative to the size of the overlap.

3.2 Horizontal and Vertical Overlap

Base Stations are omni-directional; meaning RF signal is propagated vertically and horizontally from the Base Stations and Repeaters. Depending on building materials the Base Station coverage area will typically extend to more than one floor of a structure. In the multi-zone building installation below, the coverage areas overlap horizontally, allowing the handset to roam the structure without interruption. The handsets will not necessarily switch over to the Base Station from which the strongest signal is received/measured. The handset will stay connected to a Base Station as long as the quality of the signal received from the actual Base station to which it is connected is good enough.

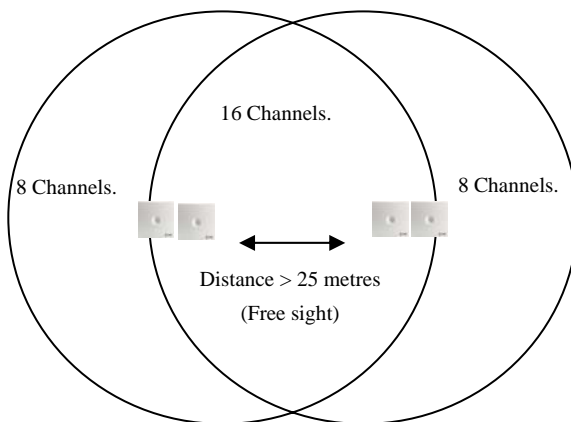


3.3 High Density Traffic Coverage

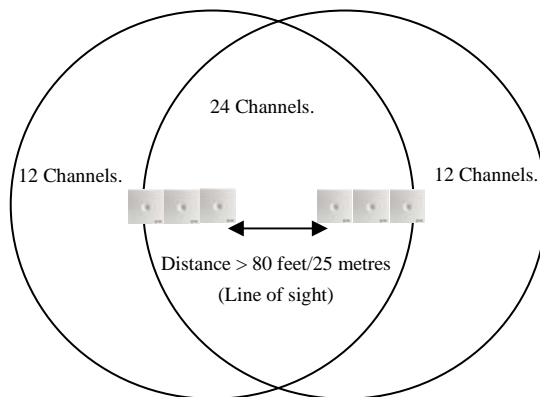
Each Base Station supports up to four simultaneous conversations. In some applications more channels are needed in a dense area. To support these installation requirements, up to 3 Base Stations can be placed in the same general area to provide extra traffic capability.

Up to 3 base stations can be mounted next to each other. There is no minimum distance between the 3 base stations. If a fourth Base Station is required in a high traffic area, it must be placed at least 80 feet/25m away if a direct line of sight exists between the fourth Base Station and the group of three to prevent interference. Alternatively the fourth base station must be moved away from the group of 3 Base Stations equal to a signal loss of 15 – 20 dB.

Example: 1.9 GHz - USA



Example: 2.4 GHz



3.4 Signal Performance Measurement

3.4.1 Q Value

The Q-value is an expression for the bit failure rate in the communication between the Base Stations and the handset. The highest possible Q-value is 64. At this value there is no bit failures measured and should provide excellent speech quality. As the wireless handset roams the coverage area the Q-value will change. When the wireless handset registers a Q-value of 52 equal to 12 bit failures measured, the wireless handset will request a handover to an alternative Base Station/Repeater or eventually to another channel - frequency/timeslot.

Be aware that the information in the display is only updated once per second, which means that the number of bit failure can be lower /higher than indicated in the display.

Therefore it is important to accept that as soon as significant fluctuation of the Q-value occurs the end of the radio coverage has been reached.

3.4.2 RSSI

The Radio Signal Strength Indicator value is a relative expression for the field strength of signal from the Base Station. The RSSI-value is used for the choice of the alternative Base Station(s). The wireless handsets will choose the Base Station from which the strongest RSSI signal is received as the first alternative Base Station. Alternative Base Stations are listed according to RSSI values. If the "Best alternative Base Station" disappears the next Base Station with the highest RSSI value will become the "Best alternative Base Station".

3.4.3 Q-value and RSSI value as they relate to voice quality

There is and always will be a relationship between the coverage of the Base Station and the quality of sound provided to the user through the handset. Sound quality is therefore, typically, directly proportionate to the distance from the handset to the radio signal source. The amount and density of any obstacles, walls, plants, people, etc. in between also impact the quality of service.

Because identifying quality of signal by distance from the base alone is difficult, the Q-value is used as an indicator for the quality of the signal. The RSSI signal is used as an indicator for the signal strength.

The user will have an excellent quality of signal as long as the Q-value is high (>52) and is not significant fluctuating.

Under circumstances where there is no interference from other bases, other equipment or reflections from surroundings there is a relation between the Q-value and the RSSI signal. High RSSI – high and stable Q-value. Low RSSI – low and/or unstable Q-value. Be aware that a situation can occur that a high RSSI value not necessarily means a high and stable Q-value.

Clicks, distortion, audio breaking up is to be seen as a result of bit failures in the communication between the handset and the Base Station.

As a guideline an RSSI signal where the loss of signal is not higher than 10dB relative to the signal measured near the Base Station is a very good signal where only some minor clicks will be heard. A RSSI signal where the loss of signal is equal to a loss of 20dB is an acceptable signal where some clicking and popping may occur. A RSSI signal where the loss of signal is higher than 30dB relative to 100% near the Base Station is not considered acceptable signal strength.

When locating mounting locations for Repeaters the signal quality must be equal to a signal where it is possible to obtain a good connection between a handset and a Base Station. The RSSI signal, at a location for a Repeater, should normally be no less than a loss of 25dB relative to the signal measured near to the Base Station.

Related to the position of repeaters a loss equal to 25dB can be used as a guideline only.

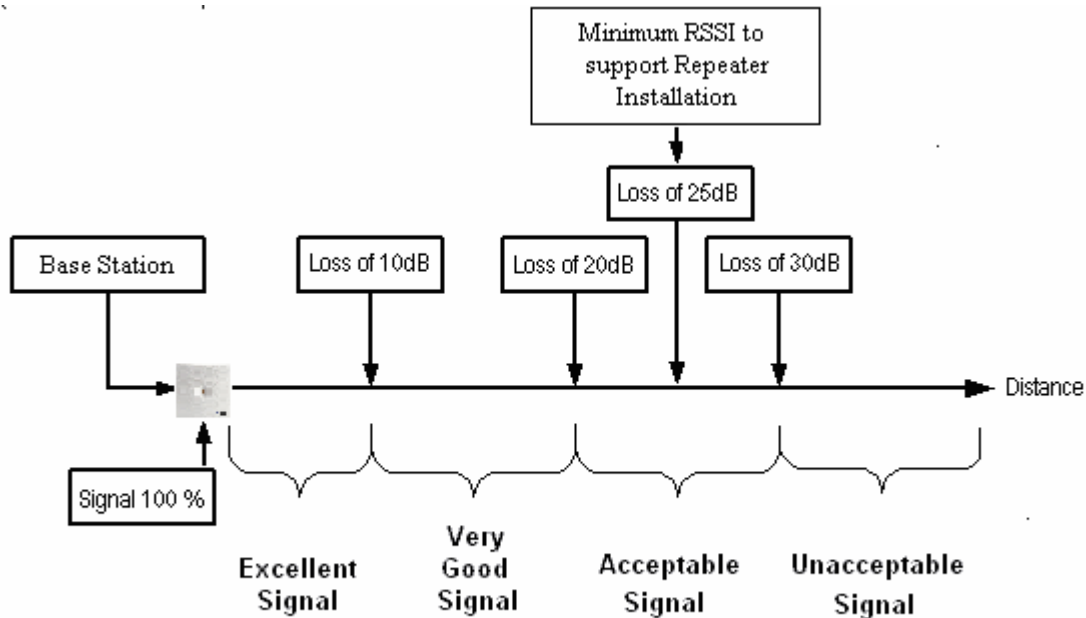
At the position where the Repeater is mounted the signal quality must be 'ok' with reference to the Q-value. Place a handset at the repeater position locked to the Base Station to which the repeater is connected. Go off-hook. Here the Q-value must be high and stable.

If the Q-value is not high and stable the link between the base station and Repeater is generating bit failures. If this happen the bit failures measured in the link between base station and repeater is transferred into the connection between the repeater and handset giving poor sound quality as result.

Please note that the RSSI value reported by the handset is a relative expression of the signal strength and can not be used alone as an indicator for the quality of the signal.

The Q-value must be taken into consideration. As an example: when the handset is placed right next to the base station the signal is 100%. However, the RSSI value in the display can be showing 95. When moving away from the base station the RSSI value drops to 85 you will have a db loss of 10 db. If moving further away the RSSI value changes to 75 the total db loss is 20 db.

Below given values are only to be used as a guideline in a situation where no reflections from surroundings are present and where there is no interference from other equipment.



3.4.4 Impact of Environmental Items on Radio Coverage

Different weather conditions can have an influence regarding radio coverage. For example, a wet roof or wall can act as a shield. Different seasons of the year can also have an influence regarding radio coverage. For example, the growth of leaves on trees in the spring that were not present when the system was installed in the winter might affect the radio coverage of Base Stations and Repeaters.

3.4.5 Metal Construction

In situations where there are additional metallic materials within the construction of the building, signal reflection may occur. In the case where reflections occur, signal may be affected even when the handset is very close to the base station. These areas should be documented by the technician and the customer. Reflections can often be identified as unstable Q-value in positions where the RSSI value is high. In a situation where the Q-value is stable as long as the handsets is placed in a fixed position (not moving) but fluctuating significant when moved the reason for this behavior is probably caused by reflections from surroundings.

When it is known there is a lot of metal in the site, a thorough survey is necessary. A more accurate survey may be better obtained in these circumstances using a Digital Mobility Controller and a minimum of four base stations to get proper knowledge of the radio signal propagation.


3.4.6 Signal Meter Display


During a Deployment Survey, the wireless handset is used as a tool for determining the optimal location for Base Stations and Repeaters. Radio coverage is measured by a combination of the Q-value and RSSI values. Handsets measure the signal of the active base station from which the handset is receiving signal while off hook and up to three additional alternate base stations. The handset must be subscribed and within range of the deployment base for this information to be displayed.

3.4.7 Accessing Signal Meter Mode

Before activating the Signal Meter Mode, be sure that the battery is charged.


3.4.7.1 Activating Signal Meter Mode

Turn the wireless handsets on. (Press the  key for 1 second)

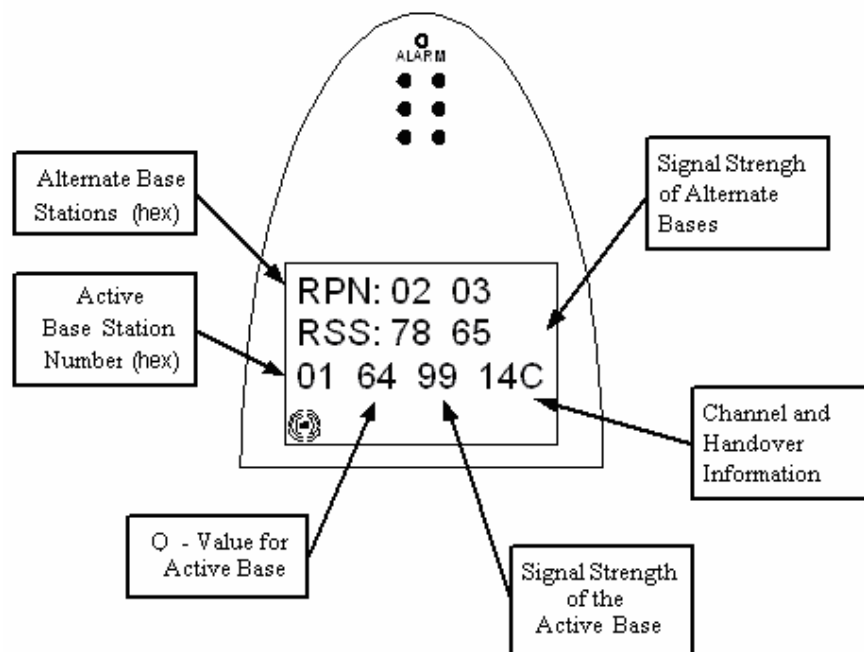
Dial  (make sure that the "key lock" is not active)

Press , the Signal Meter will appear.

Turning off the Signal Meter Display

To exit the Signal Meter mode, press and hold the  key for 2 seconds. The wireless handsets will return to the idle condition.

3.4.7.2 Signal Meter Display



4.0 Deployment Techniques

In the following section all aspects of the Deployment Survey are discussed from gathering the required information to documenting the results of the survey.

4.1 Required Information

Initial information gathering is a large part of a proper site survey. The following information is necessary prior to beginning a Deployment Site Survey.

4.1.1 Blueprints of the Facility

Blueprints of the facility are required to document the mounting locations and expected coverage from each Base Station and any special conditions.

4.1.2 Area to be covered

It is critical, from the beginning of the site survey to define the areas that will and areas that will *not* need coverage. Mark this information on the blueprints of the facility.

4.1.3 Number of Handsets to be deployed

Knowing the number of handsets is important during deployment to help identify the expected density of traffic in given areas and throughout the entire installation. It is also important to keep in account any expected growth.

4.1.4 Traffic information

Part of providing a complete site survey is to take into consideration areas where wireless traffic is expected to be high. In these dense traffic areas mounting locations for multiple bases in a small area may be required and extra cable runs planned.

When determining the number of handsets to be deployed, document the possible location of handset chargers and the expected patterns of the handset users. These patterns will be important when considering high density locations.

4.1.5 Knowledge of the installation location for the Digital Mobility Controller

Knowing the installation point of the Digital Mobility Controller will help when planning cable runs.

4.2 Handset Usage for Deployment

A Handset User's Guide is included with each handset in the Digital Mobility Deployment Kit. Please refer to the guide for specific information regarding the basic functions of the 7430/7440 Deployment Handset. It is strongly recommended to read this guide before continuing.

The deployment handsets provide a built-in signal meter with the ability to report to the handset display the bit-failure rate in the communication between the handset and deployment base station and the relative RSSI signal. While displaying this information, the handset can also be used to place a handset-to-handset call with one other handset subscribed to the deployment base. In the case where a technician is performing a solo site survey, an alternative audio source may be connected to the deployment base and sound quality may be monitored from the deployment handset.

During the survey process, a headset is required to allow the technician to listen to sound quality while monitoring the values provided in the handset display. A headset has been provided in the kit. Any standard 2.5mm headset will connect to the deployment handset.

While viewing the signal meter on the display of the handset and listening to the sound quality through a headset, it is also important to simulate the influence of the human body when using the handset. To simulate this, place your free hand around the back of the handset and cup the upper third of the handset with your palm.

4.3 Using the External Audio Source

The deployment base station is equipped with a connector to which can be connected a CD player or another audio source. This audio source can be used as a substitute for a second person to talk to/with.

4.4 General Deployment Concepts

The Digital Mobility Deployment Kit is built for use in both internal and external environments and with one or two persons. The three main factors involved in determining the boundaries are:

- Q-value
Indication of quality of the communication between the handset and the base station
- Sound quality.
The audible sound quality should be monitored at all times. Poor sound quality is equal to bit failures in the communication between the handset and the base station.
- RSSI value.
The RSSI value is an indicator for the signal strength from the base station.

4.5 Deployment Techniques and Radio Measurement Technique

An active call is a necessity for determining the boundaries of radio coverage. When performing a deployment involving two technicians, one should remain stationary next to the deployment Base Station to act as a constant while the other measures radio coverage. The sound quality should be monitored by both parties – transmitter and receiver.

When one technician is performing the deployment, then the use of an audio device, such as a CD player or a tape recorder is necessary to provide audio for monitoring of sound quality.

It is recommended to use a headset to assist with measuring radio signal strength. This allows the installer to listen to the quality of the voice while simultaneously viewing the signal values. Additionally, simulate the interference of the human body by using a free hand to cover the rear of the handset behind the display cup the upper third of the handset with your palm.

4.6 Performing Measurements

While performing the deployment, monitor the Q-value while moving away from the Base Station. When the Q-value reaches 52 or becomes unstable (significant fluctuating) the limit of the radio coverage has been reached.

During measurement of radio coverage it is important to simulate the influence of the human body. This can be done either by shielding the antenna by the hand or by turning the handset and the body in a way to achieve a “worst case” situation for reception of the radio signal from a given base station.

In both situations it is important that the Q-value is stable and not significant fluctuating.

During deployment, only the coverage area boundaries need be documented. It is not necessary to survey the complete area within the coverage cell. Special attention should be paid to staircases, elevator shafts, shielded rooms, etc.

Begin the deployment using the floor plans provided by the customer.

Once the Deployment Base has been placed in a testing position use the following steps:

1. Turn on the handset and activate the signal meter display in deployment mode.
2. Take a wireless handset off hook by pressing the **☎** key. (All measurements must be taken with the handset off hook.)
3. Dial the handset number (1 or 2) of the opposite handset to establish a call. If the technician is using the alternative audio source, the audio provided by this source should be audible after pressing the **☎** key.
4. Place your hand over the top of the handset to simulate actual usage.
5. Move away from the Deployment Base while continually monitoring the Q-value and sound quality. You have reached the coverage area border when:
 - a. The Q-value is lower than 52 and/or is significant fluctuating.
 - b. The sound quality begins to have mutes or heavy static.
6. Document the boundaries of the coverage area, move the Deployment Base to the next position and continue for the remaining Base Station locations.

4.7 Deployment Base Station Mounting Requirements

The Deployment Base Station is intended to perform as a mobile substitute for a mounted Base Station or Repeater. During deployment the technician will identify possible mounting locations. The Deployment Base should then be positioned to face the same direction and as elevated as close as possible to the same height as the intended mounting position.

The Deployment Base must be mounted vertically and right-side-up.

5.0 Deployment Procedure

Begin the deployment survey by interviewing the customer representative familiar with the full expectation of coverage and performance of the Digital Mobility solution. During this conversation, collect the following documents and information:

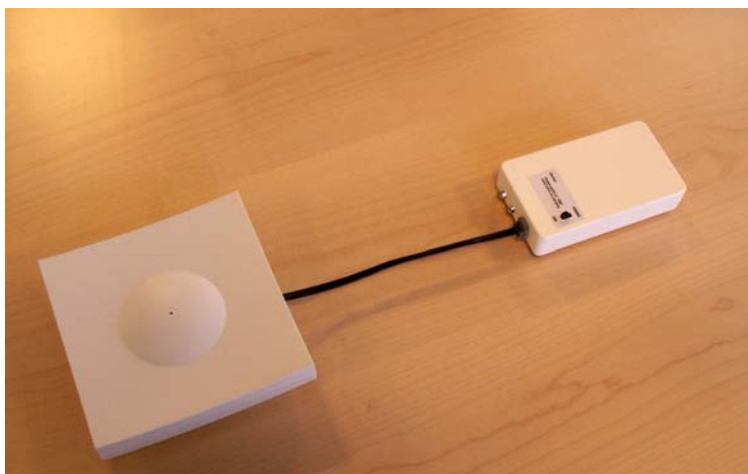
- Site blueprints / maps
- Identify any special condition as large metal surfaces, heavy machinery etc may affect the signals and mark this on the blueprints.
- Identify WLAN infrastructure
- Agreement with the customer on the entire area to where coverage is required
- The number of handsets to be deployed and possible growth
- Traffic expectations
- Discuss restricted areas where radio coverage is not required
- Locate the expected installation point of the Digital Mobility Controller and document any additional hardware that may be necessary for the site.

It is expected for the technician to properly judge special requirements provided by each unique site.

5.1 Preparation

Before beginning the physical deployment survey process, execute the following steps:

- Charge the batteries for the handsets and Deployment Base Station
- If using the Re-chargeable Battery pack to power the Deployment Base Station, connect the short cable between the power input on the Deployment Base and the Battery pack (See picture).
- Turn on the Deployment Base and verify the power LED is lit.
- Turn on the handsets and verify the handsets are subscribed to the Deployment Base.
- Establish a test call between handsets and verify sound quality.



5.2 Documenting Radio Requirements and Results

If an agreement is made with the customer to accept areas where radio coverage is less than acceptable, this should be documented and agreed upon with the customer.

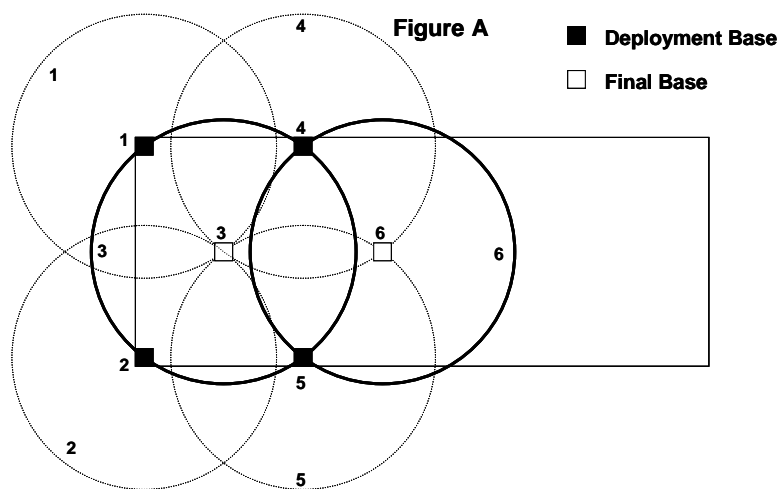
Note the results of the Deployment Survey on the relevant floor plan documents. Clearly document the location of the Deployment Base Station and the expected mounting location of the permanent Base Station or Repeater and the coverage area provided from this location. For multi-floor deployments, make sure to note the floor where the Deployment Base is located.

Include in the documentation wiring considerations and special installation instructions.

5.3 Deployment Steps

5.3.1 Deployment in a Single Story Building

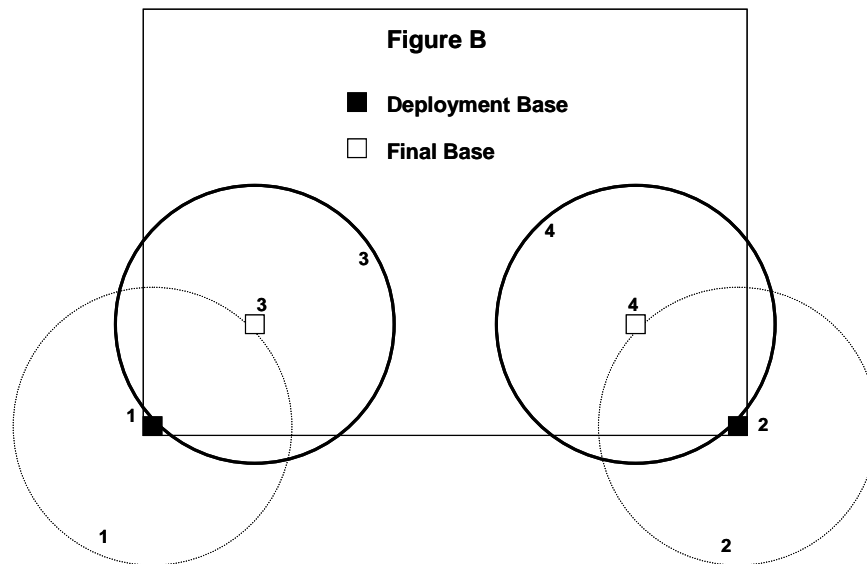
1. Determine the outer points of the building for placing the Deployment Base Station. (points 1, 2 on figure A)
2. Place the Deployment Base near point 1 at a height of 6-8 feet/1.8-2.5m and begin the measurement of the radio signal. Proceed at approximately a 45 degree angle away from the Deployment Base. Mark on the map the boundary of the radio coverage cell.
3. Move the Deployment Base Station to point 2 at a height of 6-8 feet/1.8-2.5m and in the same technique measure the signal. Mark on the map the boundary of the radio coverage.
4. Continue to measure and document the radio signal from each of the main points on the map. A center crossing point will indicate the possible best location for mounting the permanent Base Station.
5. Once identified, place the Deployment Base in the center of the area at the point where each of the coverage cells crossed during deployment. Verify the coverage of the cell reaches all areas expected.



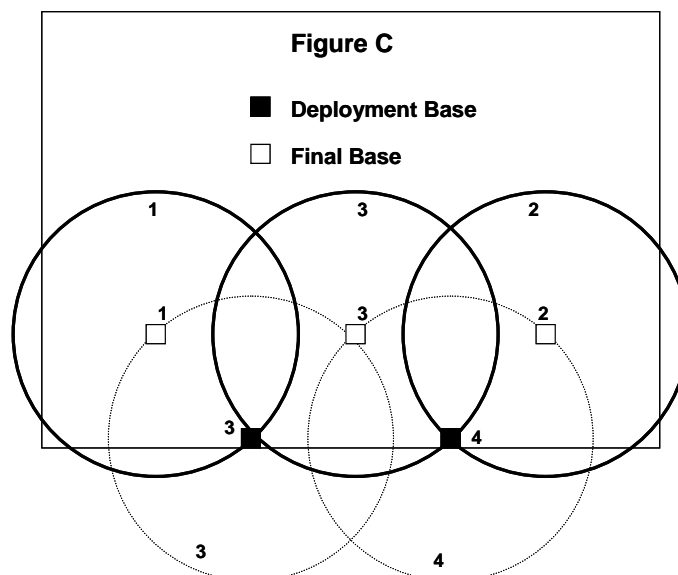
In some deployments it will be found that the placement of the deployment Base Station will not overlap with the Deployment Base Station as indicated on the map below. To deploy in these environments:

1. Mark the corners of the area to be deployed. (Position 1 and 2 on figure B)

2. Place the Deployment Base Station in position 1 at a height of 6 to 8 feet/1,8-2,5m.
3. Measure the signal in a 45 degree angle towards the center of the area. Document the boundary of the signal.
4. Proceed to point 2 and perform the same test. Document the boundary of the signal.
5. Placing the Deployment Base Station on the 2 boundary points will provide a good testing location for permanent Base Station 1 and 2. Place the Deployment Base Station in these locations; measure and document the boundaries of the coverage cell.



6. Mark where the boundaries of the permanent Base Station 1 and 2 intersect with the wall being used as the base point.
7. Use these two locations (deployment points 3 and 4) as the points for placing the Deployment Base Station to determine the location of permanent Base Station 3.



5.4 Surveying a Multi-level Location

There are 2 ways to approach the survey of a multiple story site

1. Survey each floor as individual parts
2. Place the Deployment Base Station on one floor and continue the measurement of coverage on adjacent floors.

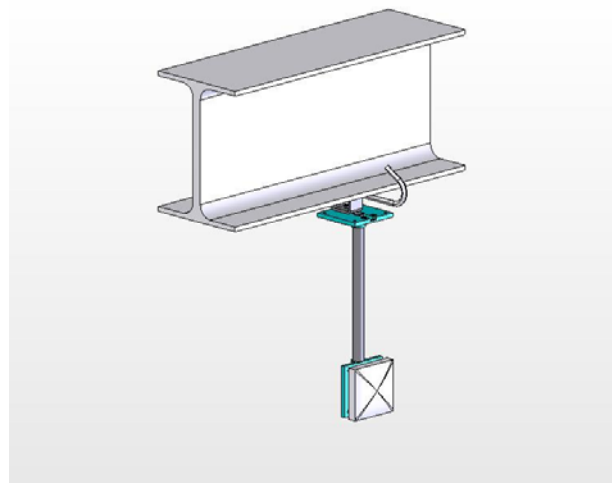
When surveying each floor as individual parts, the excess radio signal propagated between floors is considered used for high density traffic. This approach uses more Base Stations and provides better conditions for sound quality and simultaneous conversations.

When measuring signal across adjacent floors, placement of permanent Base Stations may be adjusted. This approach uses fewer more specific Base Station locations in sites where high density traffic is not typically necessary.

5.5 Deployment of Base Stations and Repeater

- > The Base Station and Repeaters must be placed in the right position – hanging on the wall – NEVER directly on the ceiling. The Base Station or Repeater can be suspended from ceiling I-beam but should then be at least 18 inches/ 0.45m from the I-beam and mounted in a vertical orientation (see Figure D).
1. Keep the Base Station away from steel constructions - at least 4 feet/1.20m
 2. Don't place Base Stations directly on metallic surfaces - at least 4 feet/1.20m
 3. Don't hide Base Stations behind furniture etc.
 4. Don't paint the Base Station as paint is containing metallic/carbon particles
 5. The Base Station must be placed where the signal is needed

Figure D




6.0 Kit Maintenance











6.1 Subscription


The handsets are subscribed to the base station from the factory. If the handsets are unsubscribed then a subscription is required. Once a handset is subscribed to the Deployment Base the registration information will be stored in the Deployment Base and the handset memory. In order to prepare the base station for handset subscription power up the base station and remove the base station cover.

6.2 Register the Handset

1. Power on the handset
2. Dial *99972*x, where x is equal to the position of the handset, 1 or 2.
3. Press the  key. A single beep will sound.

6.3 Subscribing Handsets

1. Press the MENU key one time.
2. Press the  key two times; "Menu Login" is displayed.
3. Press the  key one time; "Menu Select Login" is displayed.
4. Press the  key one time; "Subscription Create" is displayed.
5. Press the  key one time.
6. Allow subscription to the base station by pressing the 'registration button' for 3 seconds, the base station will now send out its system ID (park number) for 1 minute. In case there are other systems in the area use the  and  for scrolling between the systems ID (the base station ID is written on the label on the back of the base station).
7. Once the System I.D. is located, press the  key one time to accept the subscription.
8. AC code. Either enter the AC code (= the last four digits of the base station serial no) or select one of the four different subscription memories the handset may be subscribed to you using the  and  keys.
9. Press the  key one time.
10. "Subscription Wait" will appear in the display.
11. The handset is now attempting to subscribe to the Deployment Kit. This may take several minutes, do not be alarmed.

If successful, the handset will beep and return to the idle condition. The startup text will be replaced by the standby text and the radio icon  will appear in the lower left corner of the display. If a subscription was not successful, the handset will show "Subscription Failed" in the display.

Attention! A short press on the registration button of the base station will start a broadcast ringing on the handset connected to the base station, and the indicator LED will flash quickly.

7.0 Abbreviations and Terms

DMDT	Digital Mobility Deployment Tool
DMC	Digital Mobility Controller
Deployment	The act of locating the mounting location and installing Base Stations and Repeaters
RF	Radio Frequency
Deployment Tool Base	The Deployment Tool Base is included in the Digital Mobility Tool Kit and propagates the radio signal for deployment and demonstration purposes. One handset to handset call is supported.
Base Station	Base Stations propagate radio signal. Up to four simultaneous conversations are supported.
Repeater	Repeaters, wirelessly synchronize to a programmed host Base Station and Repeat voice channels to create a larger coverage area.
Site Survey	A site survey comprises the action of locating the mounting location and noting the cabling requirements for all Base Stations and Repeaters.
Charging cycle	The length of time necessary to recharge the Handset's battery.
Battery	
Rechargeable battery pack	A rechargeable battery pack is included in the Digital Mobility Deployment Tool Kit. This battery pack is used to operate the Deployment Base
Ni-MH	Nickel – Metal Hydride
LED	Light Emitting Diode
Speech Channel	A speech channel is used to carry communication between the Handset and the Base Station or Repeater.
Q-Value	An expression of the bit failure rate in the communication between the handset and a base station. The value has a max. of 64, equal to no bit errors measured.
RSSI Value	A relative expression for the signal strength of a Base Station as measured by the handset at a given location.
Handover	A process initiated by the handset in which the speech channel carrying an active conversation is passed from one Base Station to another.