POLYCOM®

Polycom® KIRK® Deployment Guide

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Trademark Information

Patent Information

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Contents

Preface

This guide is intended for qualified technicians who will deploy a Polycom KIRK Wireless Server Solution. To qualify to deploy a Polycom KIRK Wireless Server Solution, you must have completed the technical training successfully. This guide covers both 1G8 and 1G9 deployment.

Scope

The Deployment Guide provides instructions and best practices for deployment of the following solutions:

- Polycom KIRK Wireless Server 8000 and 2500
- Polycom KIRK Wireless Server 6000 and 300

The purpose of this guide is to familiarize you with the procedures that are needed to carry out a site survey.

Note The document is created for KIRK Wireless Server 300, but it can be applied to all the product lines.

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

- Using the deployment handset to measure and record Q - and RSSI values (RF values)
- Selecting a proper mounting location for base stations and repeaters
- Operating and configuring the KIRK Wireless Server 300
- Operating the deployment handset
- Documenting the deployment

Before You Begin

This guide assumes the following:

- You have a working knowledge of deployment in general
- You have completed the technical training

Related Documentation

For information about Polycom KIRK Wireless Server Solutions not covered by this manual, refer to the following documentation.

Table -1 *Additional Documentation*

Subject	Documentation
Polycom KIRK Handsets	User Guides on http://support.polycom.com
Polycom KIRK Wireless Servers	User Guides on http://support.polycom.com
Polycom KIRK Technical News	Newsletter that describes software changes, bug fixes, outstanding issues, and hardware compatibility considerations for new software releases. To subscribe, go to www.polycom.com

Terminology and Acronyms

Table -2 refers to common terms and acronyms that are related to the KIRK DECT solutions that are found through this document.

Table -2 *Terminology and Acronyms*

Term	Definition
Charging cycle	The length of time necessary to recharge the handset's battery
Deployment	The act of locating the mounting location and installing base stations and repeaters
Handover	A process initiated by the handset in which the speech channel carrying an active conversation is passed from one base station to another.
KWS	KIRK Wireless Server
LED	Light Emitting Diode
Ni-MH	Nickel -Metal Hydride

Table -2 *Terminology and Acronyms*

Term	Definition
Q Value	Signal Quality Factor 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.
Repeater	Repeaters synchronize wirelessly to a programmed host base station and repeat voice channels to create a larger coverage area
RF	Radio Frequency
RSSI Value	Radio Signal Strength Indication value. A relative expression for the signal strength of a base station as measured by the handset at a given location.
Site survey	A site survey comprises the act of locating the mounting location and noting the cabling requirements for all base stations and repeaters.
Speech channel	A speech channel is used to carry communication between the handset and the base station or repeater.

1

Deployment Hardware

This section describes the hardware components found in the Polycom KIRK Deployment Guide.

You can use the Deployment Guide to determine the number of base stations and repeaters required for a Polycom KIRK Wireless Server Solution. Furthermore, using the deployment guide it is possible to identify the proper mounting locations for base stations and repeaters, and to plan for the cabling of the base stations.

Site surveys should only be carried out by technicians who have passed the Polycom KIRK Training course for either KIRK Wireless Server 6000, KIRK Wireless Server 300, KIRK Wireless Server 8000 or KIRK Wireless Server 2500.

Note For more information about the training courses, please contact a Polycom representative.

Equipment Required

Table 1-1 lists the equipment that is mentioned in the deployment guide.

Note Please note that the KIRK 4040 Handset can be replaced with any KIRK DECT handset.

Table 1-1 *Equipment required*

Item	Quantity
KIRK Wireless Server 300 1G8 (or 1G9)	1
KIRK 4040 Handset + charger/power supply	1
KIRK 1610 Handset 1G8 or 1G9 + charger/power supply	1
(*)Power over Ethernet for KIRK Wireless Server 300	1
Repeater (optional) - to increase the signal area coverage	1 to 3

Note (*) PoE power source - standard PoE adapter/PoE-enabled port on a switch adhering to PoE 802.3af.

Deployment Handset

The KIRK 1610 Handset has special software implemented and can be used as a diagnostic tool. In this guide it is referred to as a deployment handset. For more information about using the 1610 handset as a diagnostic tool, refer to the 1610 Handset User Guide on http://support.polycom.com.

When a deployment handset is subscribed to the deployment base station you hear an acoustic delay of 40 milliseconds in the handset when you talk in it. That is, your voice gets back to you as an echo. This is necessary in order to use the handset as a deployment handset.

Note You can distinguish the KIRK 1610 Handset from the KIRK 4040 Handset by the label on the back which says “Diagnostic Handset.”

Deployment Handset Power Supply and Charger

Must be purchased separately.

Chargers and Power Supplies

The following is a list of the different chargers and power supplies and their part numbers:

Table 1-2 Charger and Power Supply Part Numbers

Area	Item	Part Number
Worldwide	Deployment Handset Power Supply	84642602
Worldwide	Charger	84642462

2

Radio Coverage Properties

The deployment of base stations and repeaters is a central aspect of any Polycom KIRK Wireless Server Solution. For the Polycom KIRK Wireless Server installation to be successful, the deployment concepts explained in this guide must be followed.

A site survey must be performed to determine the optimal location and the total number of base stations required for a given installation.

Note Radio coverage depends on building construction materials, methods of construction, and the surrounding environment. Therefore, each installation is unique when in regard to the number and location of base stations.

Note The repeaters and base stations will have the same radio coverage; this is why KIRK Wireless Server 300 can be used for deployment and when additional coverage is needed, a repeater is added (which is similar to adding a base station on the multicell system).

Radio Coverage Planning

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 (Please also refer to the section Radio Signal Checking Procedure at the end of this chapter).

The repeaters have the same radio coverage as the base stations, that is why the KIRK Wireless Server 300 can be used to do deployment. When additional coverage is needed, a repeater should be added, which will be similar to adding a base station on the multicell system.

- The deployment base station provides a typical coverage radius similar to that of a regular base station and propagates in all directions. The exact coverage range depends on the building architecture, wall material and surroundings.

- Wireless handsets can move between the coverage areas of different base stations and repeaters while receiving continuous service and maintaining conversations in progress.
- For efficient handover of conversations between base stations, deploy multiple base stations or repeaters with sufficient overlap of coverage; that is, plan for some areas to be covered by more than one base station. Overlaps are necessary to allow a handset time to handover to a base station from which it receives a better signal quality.
- 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- 12 feet/1.8-3.6 meters in height on a wall or up to 30 feet/10 meters when suspended from a ceiling. If they are placed any lower, persons walking around could interfere with the radio signal. The coverage area can be adversely affected if the base stations is mounted improperly.
- Ensure that there is no extensive use of DECT headsets and avoid residential DECT systems in the same RF space as they could affect performance.

Radio Coverage Overlap

Radio coverage overlap is required between adjacent cells to allow for the handover of active conversations from base station to base station or repeater.

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/10-15 meters.

An overlap is required so that as the handset moves within the various coverage zones to have enough time to make handover.

If the overlap area is not enough - less than 30 – 45 feet/10-15 meters there is a risk of the connection being dropped 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 travelling speed for the handset of 3mph (5km/h) is allowed relative to the size of the overlap.

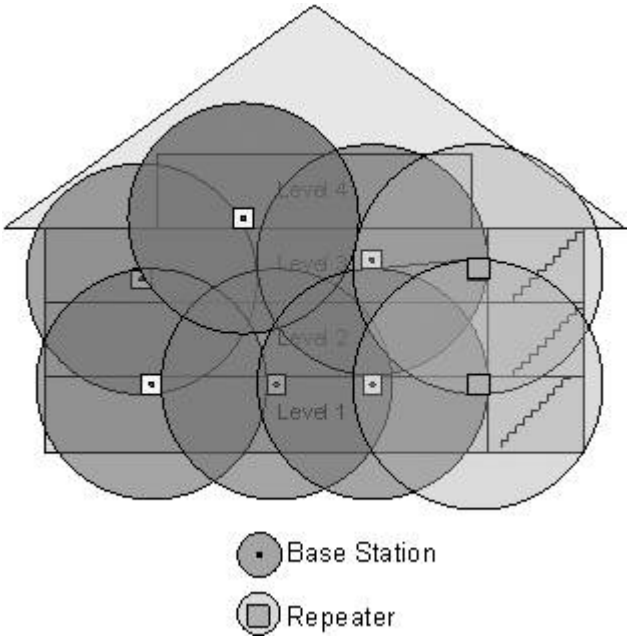
Horizontal and Vertical Overlap

Base stations are omni-directional, which means that the 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 Figure 2-1 multi-zone building installation, the coverage areas overlap horizontally, which allows the handset to roam the structure without interruption.

The handset will not necessarily switch over to the base station from which the strongest signal is received. The handset will remain connected to a base station as long as the quality of the received signal is acceptable.

Figure 2-1 *Horizontal and Vertical Overlap*



High Density Traffic Coverage

The following contains information about high density traffic coverage in the following wireless servers:

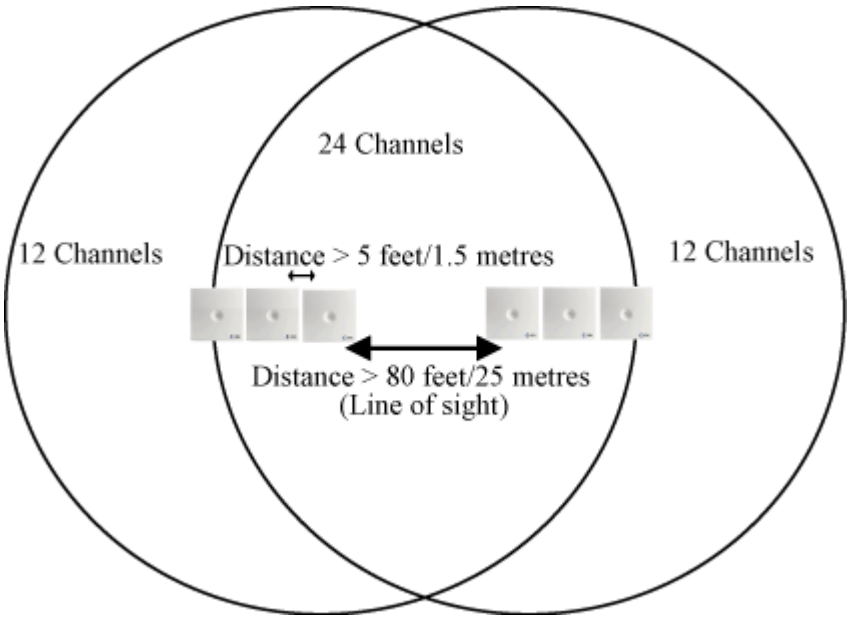
- KIRK Wireless Server 6000 - 1.8 GHz
- KIRK Wireless Server 6000 - 1.9 GHz
- KIRK Wireless Server 300 - 1.8 GHz
- KIRK Wireless Server 300 - 1.9 GHz
- KIRK Wireless Server 8000 - 1.8 GHz
- KIRK Wireless Server 8000 - 1.9 GHz
- KIRK Wireless Server 2500 - 1.8 GHz
- KIRK Wireless Server 2500 - 1.9 GHz

KIRK Wireless Server 8000 and KIRK Wireless Server 2500 - 1.8 GHz

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 three base stations can be placed in the same general area to provide extra traffic capability.

Up to three base stations (DECT technology limitation) can be mounted next to each other, with a recommended minimum distance of 5 feet / 1.5 meters. If more than 12 channels - similar to 3 base stations are needed in a particular area, i.e if a fourth base station is required in a high traffic area, it must be placed at least 80 feet/25 meters 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 three base stations equal to a signal loss of 15 – 20 dB.

Figure 2-2 *Example: 1.8 GHz*



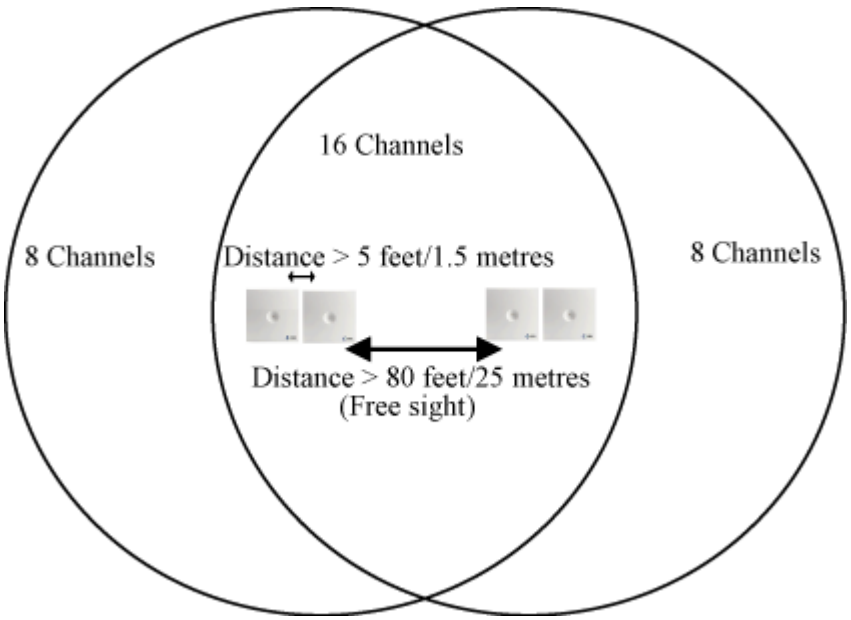
Note It is possible to mount 6 base stations in close proximity of each other (minimum 1,5 meters) provided that 3 of the bases are assigned even time slots and the remaining 3 base stations are assigned uneven time slots.

KIRK Wireless Server 8000 and KIRK Wireless Server 2500 - 1.9 GHz

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 two base stations can be placed in the same general area to provide extra traffic capability.

Up to two base stations (DECT technology limitation) can be mounted next to each other, with a recommended minimum distance of 5 feet / 1.5 meters. If more than 8 channels - similar to 2 base stations are needed in a particular area, i.e if a thirdbase station is required in a high traffic area, it must be placed at least 80 feet/25 meters away if a direct line of sight exists between the third base station and the group of two to prevent interference. Alternatively, the third base station must be moved away from the group of two base stations equal to a signal loss of 15 – 20 dB.

Figure 2-3 *Example: 1.9 GHz - USA*



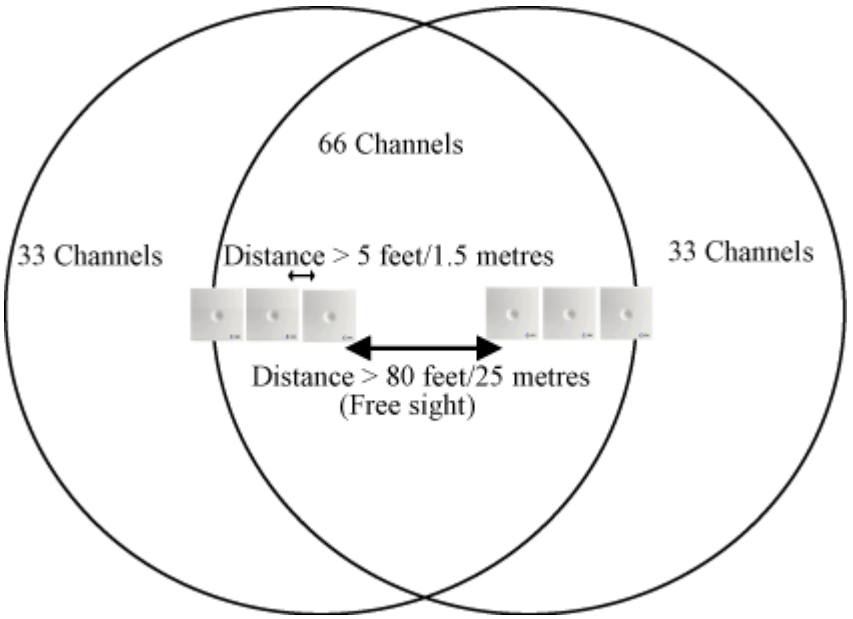
Note It is possible to mount 4 base stations in close proximity of each other (minimum 1,5 meters) provided that 2 of the bases are assigned even time slots and the remaining 2 base stations are assigned uneven time slots.

KIRK Wireless Server 6000 1.8 GHz

Each wireless server supports up to 11 simultaneous conversations. In some applications more channels are needed in a dense area. To support these installation requirements, up to three base stations can be placed in the same general area to provide extra traffic capability.

Up to three base stations can be mounted next to each other, with a recommended minimum distance of 5 feet / 1.5 meters. If a fourth base station is required in a high traffic area, it must be placed at least 80 feet/25 meters 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 three base stations equal to a signal loss of 15 – 20 dB.

Figure 2-4 Example: 1.8 GHz

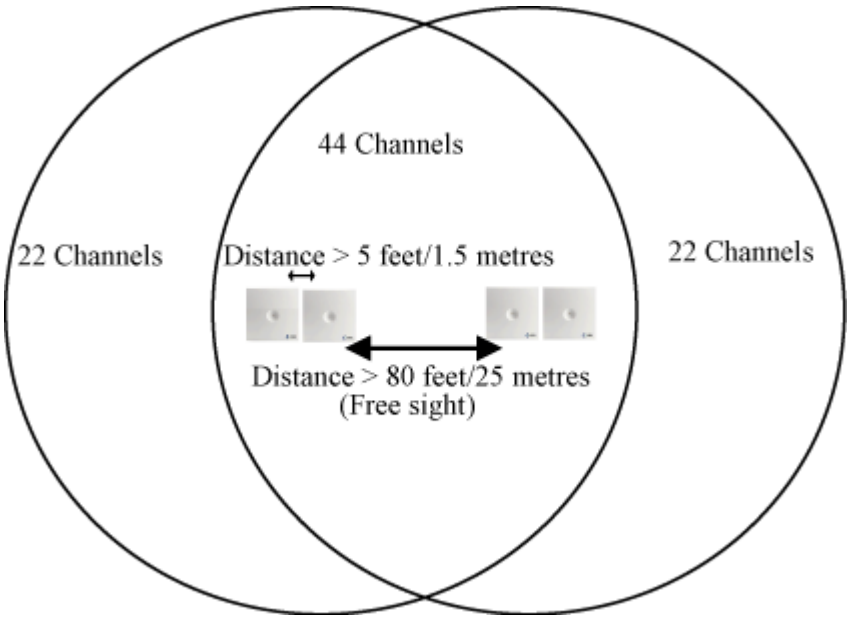


KIRK Wireless Server 6000 1.9 GHz

Each wireless server supports up to 11 simultaneous conversations. In some applications more channels are needed in a dense area. To support these installation requirements, up to two base stations can be placed in the same general area to provide extra traffic capability.

Up to two base stations can be mounted next to each other, with a recommended minimum distance of 5 feet / 1.5 meters. If a third base station is required in a high traffic area, it must be placed at least 80 feet/25 meters away if a direct line of sight exists between the third base station and the group of two to prevent interference. Alternatively, the third base station must be moved away from the group of two base stations equal to a signal loss of 15 – 20 dB.

Figure 2-5 Example: 1.9 GHz



KIRK Wireless Server 300 1.8/1.9 GHz

Each wireless server supports up to 4 simultaneous conversations. In some applications more channels are needed in a dense area. To support these installation requirements, up to three repeaters can be placed in the same general area to provide extra traffic capability.

Up to three repeaters can be mounted next to each other, with a recommended minimum distance of 5 feet / 1.5 meters. If a third repeater is required in a high traffic area, it must be placed at least 80 feet/25 meters away if a direct line of sight exists between the third repeter and the group of two to prevent interference. Alternatively, the third repeater must be moved away from the group of two repeaters equal to a signal loss of 15 – 20 dB.

Figure 2-6 *Single Slot Repeater Configuration*

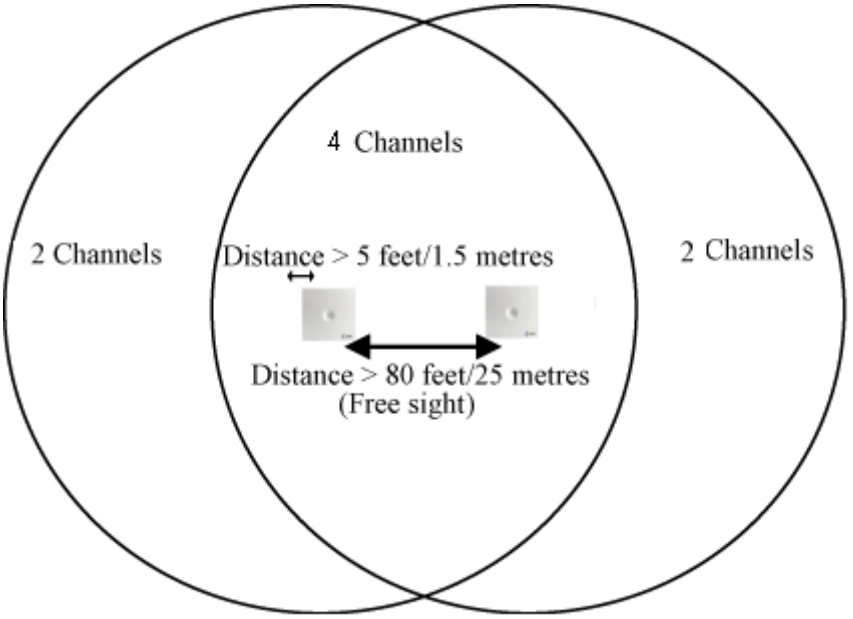
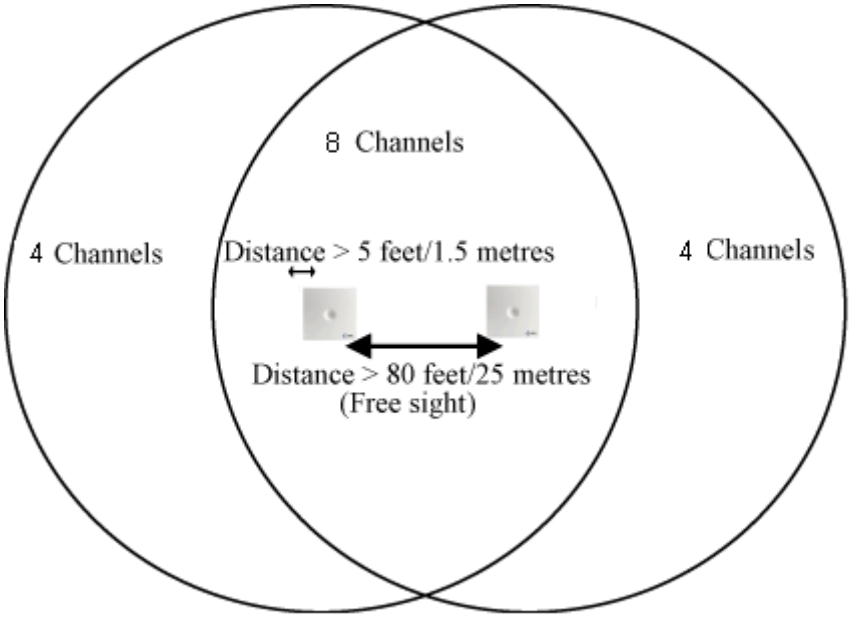


Figure 2-7 *Dual Slot Repeater Configuration*



Synchronization Overlap

Note This section is relevant to the Polycom KIRK Wireless Server 6000 and the KIRK Wireless Server 300.

Two types of overlap are present in a multi-cell configuration:

- The overlap created to be able to obtain synchronization between cells.
- The overlap created to establish handover when moving handset between cells.

Maximum loss (equal to distance) of signal between the cells is 25 dB.

To create handover between cells it is necessary to establish synchronization chains.

The procedure for establishing synchronization between radio units is the same way as for repeaters connected to a base station without external antenna connected. However, the following issues considered when you establish synchronization chains.

- The distance over which synchronization can take place is limited to a distance similar to a loss of max. 25dB. If the loss of signal is higher than 25dB, there is no guarantee that synchronization is stable. You can use the deployment handset to measure dB.
- We recommend that a KIRK Wireless Server 6000 or KIRK IP Base Station synchronizes with at least two other radio units, and that an alternative sync way is defined to ensure system redundancy. If the primary sync way is not working, the alternative sync way takes over and the synchronization chain is not broken.

Taking into consideration that the DECT radio interface is based on the Multi Carrier, Time Division Multiple Access radio access methodology, synchronization is needed to ensure that there is proper timing between base stations so that when you are roaming from one base to another the handover will be realized properly. To be able to create handover between cells it is necessary to establish synchronization chains.

Synchronization chains for the KIRK Wireless Server 6000 or KIRK IP Base Station can be made with Primary and Secondary Synchronization Chains. The synchronization chain must always overlap with the base station to sync on. No.0 is the Sync Master (can be numbered 0-255). Other radio units are connected to the Sync Master through the synchronization chain. It is recommended to place the Sync Master in the middle of the building and to make a site planner. Every base station must be numbered with Radio ID, Primary sync Radio ID, and Alternative sync Radio ID.

You can only configure a Polycom KIRK Repeater to synchronize on one radio ID, and it is therefore not possible to define alternative sync ways for IP Base Stations.

The KIRK IP Base Stations for the KIRK Wireless Server 6000 synchronize over the air. One base station is configured as Synchronization Master and is typically mounted in the center of the building. All other base stations are then mounted elsewhere in the building and must all listen to the Synchronization Master, either directly or via other base stations synchronizing on the Synchronization Master.

You can build synchronization chains where you have an arbitrary number of Base Stations synchronizing on each other all the way from the Base Station farthest away to the Synchronization Master. You can also build branches going

out from a synchronization path. It is at all times recommended to have an alternative synchronization path to make the installation resilient to a broken synchronization chain. Be aware not to generate synchronization loops. Make sure the synchronization path always ends up at the Synchronization Master. If you have a long synchronization path and a short synchronization path, make sure there is no need for hand over between the two ends because they are not entirely in sync with each other. This could cause dropped calls.

Other Radio Coverage Effecting Factors

The following is a set of factors that may influence the voice quality of the handset.

Moving Speed

The time it takes a person to cross the common coverage area must be at least 10 seconds, because the handset needs time to scan for an alternative base station.

The Surrounding Environment

Different weather conditions can influence radio coverage. For example, a wet roof or wall can act as a shield. Also, new leaves on trees in the spring might affect the radio coverage of base stations and repeaters.

Metal Constructions

If the construction materials of the building contain metal, signal reflection may occur. When signal reflections occur, the signal may be affected even when the handset is very close to the base station. You should document these areas with the help of the customer.

Reflections can often be identified as unstable Q value in positions where the RSSI value is high. If the Q value is stable as long as the handsets is placed in a fixed position (not moving), but fluctuates significantly when moved it is probably caused by reflections from the surroundings.

If you are aware of metal in the building construction, you have to carry out a very thorough site survey.

In these situations, we recommend that you use a Polycom KIRK Wireless Server, and a minimum of four base stations to obtain proper knowledge of the radio signal propagation.

Signal Performance Measurement

Q Value

The Signal Quality Factor value (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 excellent speech quality should be provided.

Note The Q value is only valid in off hook mode - not in idle mode.

The Q value can be verified on any type of handset by entering the *99989* code for test display and setting the handset in off hook mode. The Q value represents the second value on the last row displayed on the handset (see page 30-31).

As the wireless handset roams the coverage area the Q value changes. When the wireless handset registers a Q value of 52 - equal to 12 bit failures measured -, the wireless handset requests a handover to an alternative base station or repeater, or eventually to another channel frequency or timeslot.

The information in the Signal Meter Display is only updated once per second, which means that the number of bit failure can be lower or higher than indicated in the display. It is therefore important to accept, that as soon as significant fluctuation of the Q value occurs, the end of the radio coverage has been reached.

RSSI

The Radio Signal Strength Indicator value (RSSI value) is a relative expression for the field strength of the signal from the base station. The RSSI value is used for selecting the alternative base station(s).

The handset chooses 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. When the “Best alternative base station” disappears, it is replaced by the next base station with the highest RSSI value.

The RSSI value can be verified on any type of handset by entering the *99989* code for test display and setting the handset in off hook mode. The RSSI value represents the third value on the last row displayed on the handset (see page 30-31).

Q Value and RSSI Value as They Relate to Voice Quality

There is always a relationship between the coverage of the base station and the quality of sound on 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 such as walls, plants, people, etc., also impact the quality of service.

Q Value

Because it is difficult to identify quality of signal by distance from the base station alone, 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 does not fluctuate significantly.

When there is no interference from other base stations, other equipment, or reflections from the surroundings, the relation between the Q value and the RSSI signal is as follows:

- High RSSI – high and stable Q value
- Low RSSI – low and/or unstable Q value

Note In some situations, a high RSSI value does not necessarily mean a high and stable Q value. This may occur in buildings with metal in the construction material.

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

RSSI Signal Quality

The quality of the RSSI signal falls within three groups.

Very Good

As a guideline, an RSSI signal where the loss of signal is not higher than 10 dB relative to the signal measured near to the base station is a very good signal where only some minor clicks will be heard.

Acceptable

An RSSI signal where the loss of signal is equal to a loss of 20 dB is an acceptable signal where some clicking and popping may occur.

Not acceptable

An RSSI signal where the loss of signal is higher than 30 dB relative to 100% near to the base station (longer distance from signal source) is not considered as acceptable signal strength.

Identifying Repeater Locations

When you identify 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 is normally not accepted when it is equal to or higher than a loss of 25 dB relative to the signal measured near to the base station.

A loss equal to 25 dB can be used as a guideline only. At the position where the repeater is mounted, the signal quality most be acceptable in terms of Q value.

At the repeater location, place a handset that is locked to the base station to which the repeater is connected. Press the off-hook key to view the Q value.

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 happens the bit failures measured in the link between the base station and the repeater are transferred to the connection between the repeater and the handset, which results in poor sound quality.

Signal Strength and Distance from Signal Source

The RSSI value reported by the handset is a relative expression of the signal strength, and cannot on its own be used as an indicator for the quality of the signal. The Q value must also be taken into consideration.

Example

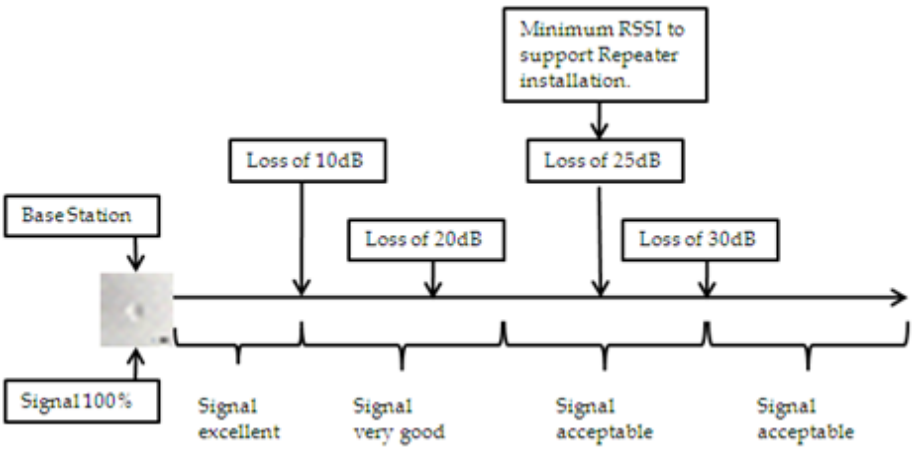
When the handset is placed right next to the base station, the signal is 100%. However, the RSSI value in the display may display only 95%.

When you move away from the base station, the RSSI value drops to 85% and you will experience a loss of 10 dB. If you move even further away, the RSSI value changes to 75% and the total loss is 20 dB.

Guideline

The values presented in Figure 2-8 are only to be used as guidelines in a situation where there are no reflections from the surroundings, and where there is no interference from other equipment.

Figure 2-8 *Relation between Signal Strength and Distance from Signal Source*



Repeater numbering

Base stations and repeaters both transmit a radio part number - an 8 bit number between 0-255.

The handset compares the RPN of the base/repeater to which it is currently connected to that of the RPN of the base station/repeater it wants to handover to.

The type of handover to use depends on the units involved in the handover.

Handovers

- Handovers between two base stations must take place as connection handovers.
- Handovers between a repeater and the base station with which the repeater is synchronized should preferably take place as a bearer handovers, as this is the fastest process.
- Handovers between a repeater and a base station with which the repeater is not synchronized must take place as connection handovers.

Handover Capabilities

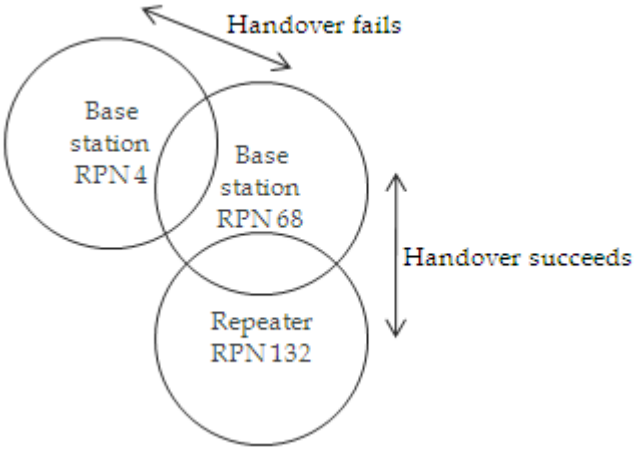
A handset cannot tell the difference between a base station and a repeater. Therefore, the RPN transmission pattern by default determines how the handover takes place. Assigning the recommended repeater RPN is therefore very important.

Polycom KIRK Base Stations transmit a pattern that determines whether to use a connection or a bearer handover.

By default the base stations are configured to perform a bearer handover if there is a difference of 64, 128 or 192 between the two RPNs.

In systems with more than 64 base stations you must be careful when you reuse RPNs. That is, base stations that are mounted in close proximity of each other can not have a difference in RPN of 64, 128, or 192. The handset will not be able to make a connection handover as shown in Figure 2-9.

Figure 2-9 RPN and handovers



Also, a handset must never be able to detect two radio units (base stations or repeaters) with the same RPN at the same time. The handset will not be able to make a handover. If an RPN is reused, the units must be placed at a fair distance from each other.

Numbering pattern

The following table, Figure 2-1, lists the recommended numbering of repeaters in systems with up to 255 base stations.

.

Table 2-1 Base station and repeater numbering pattern

Base station	Repeater 1	Repeater 2	Repeater 3
0	64	128	192
1	65	129	193
2	66	130	194
3	67	131	195
4	68	132	196
5	69	133	197
6	70	134	198
7	71	135	199
8	72	136	200
9	73	137	201
10	74	138	202
11	75	139	203
12	76	140	204

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
13	77	141	205
14	78	142	206
15	79	143	207
16	80	144	208
17	81	145	209
18	82	146	210
19	83	147	211
20	84	148	212
21	85	149	213
22	86	150	214
23	87	151	215
24	88	152	216
25	89	153	217
26	90	154	218
27	91	155	219
28	92	156	220
29	93	157	221
30	94	158	222
31	95	159	223
32	96	160	224
33	97	161	225
34	98	162	226
35	99	163	227
36	100	164	228
37	101	165	229
38	102	166	230
39	103	167	231
40	104	168	232
41	105	169	233
42	106	170	234
43	107	171	235

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
44	108	172	236
45	109	173	237
46	110	174	238
47	111	175	239
48	112	176	240
49	113	177	241
50	114	178	242
51	115	179	243
52	116	180	244
53	117	181	245
54	118	182	246
55	119	183	247
56	120	184	248
57	121	185	249
58	122	186	250
59	123	187	251
60	124	188	252
61	125	189	253
62	126	190	254
63	127	191	255
64	128	192	0
65	129	193	1
66	130	194	2
67	131	195	3
68	132	196	4
69	133	197	5
70	134	198	6
71	135	199	7
72	136	200	8
73	137	201	9
74	138	202	10

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
75	139	203	11
76	140	204	12
77	141	205	13
78	142	206	14
79	143	207	15
80	144	208	16
81	145	209	17
82	146	210	18
83	147	211	19
84	148	212	20
85	149	213	21
86	150	214	22
87	151	215	23
88	152	216	24
89	153	217	25
90	154	218	26
91	155	219	27
92	156	220	28
93	157	221	29
94	158	222	30
95	159	223	31
96	160	224	32
97	161	225	33
98	162	226	34
99	163	227	35
100	164	228	36
101	165	229	37
102	166	230	38
103	167	231	39
104	168	232	40
105	169	233	41

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
106	170	234	42
107	171	235	43
108	172	236	44
109	173	237	45
110	174	238	46
111	175	239	47
112	176	240	48
113	177	241	49
114	178	242	50
115	179	243	51
116	180	244	52
117	181	245	53
118	182	246	54
119	183	247	55
120	184	248	56
121	185	249	57
122	186	250	58
123	187	251	59
124	188	252	60
125	189	253	61
126	190	254	62
127	191	255	63
128	192	0	64
129	193	1	65
130	194	2	66
131	195	3	67
132	196	4	68
133	197	5	69
134	198	6	70
135	199	7	71
136	200	8	72

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
137	201	9	73
138	202	10	74
139	203	11	75
140	204	12	76
141	205	13	77
142	206	14	78
143	207	15	79
144	208	16	80
145	209	17	81
146	210	18	82
147	211	19	83
148	212	20	84
149	213	21	85
150	214	22	86
151	215	23	87
152	216	24	88
153	217	25	89
154	218	26	90
155	219	27	91
156	220	28	92
157	221	29	93
158	222	30	94
159	223	31	95
160	224	32	96
161	225	33	97
162	226	34	98
163	227	35	99
164	228	36	100
165	229	37	101
166	230	38	102
167	231	39	103

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
168	232	40	104
169	233	41	105
170	234	42	106
171	235	43	107
172	236	44	108
173	237	45	109
174	238	46	110
175	239	47	111
176	240	48	112
177	241	49	113
178	242	50	114
179	243	51	115
180	244	52	116
181	245	53	117
182	246	54	118
183	247	55	119
184	248	56	120
185	249	57	121
186	250	58	122
187	251	59	123
188	252	60	124
189	253	61	125
190	254	62	126
191	255	63	127
192	0	64	128
193	1	65	129
194	2	66	130
195	3	67	131
196	4	68	132
197	5	69	133
198	6	70	134

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
199	7	71	135
200	8	72	136
201	9	73	137
202	10	74	138
203	11	75	139
204	12	76	140
205	13	77	141
206	14	78	142
207	15	79	143
208	16	80	144
209	17	81	145
210	18	82	146
211	19	83	147
212	20	84	148
213	21	85	149
214	22	86	150
215	23	87	151
216	24	88	152
217	25	89	153
218	26	90	154
219	27	91	155
220	28	92	156
221	29	93	157
222	30	94	158
223	31	95	159
224	32	96	160
225	33	97	161
226	34	98	162
227	35	99	163
228	36	100	164
229	37	101	165

Table 2-1 *Base station and repeater numbering pattern*

Base station	Repeater 1	Repeater 2	Repeater 3
230	38	102	166
231	39	103	167
232	40	104	168
233	41	105	169
234	42	106	170
235	43	107	171
236	44	108	172
237	45	109	173
238	46	110	174
239	47	111	175
240	48	112	176
241	49	113	177
242	50	114	178
243	51	115	179
244	52	116	180
245	53	117	181
246	54	118	182
247	55	119	183
248	56	120	184
249	57	121	185
250	58	122	186
251	59	123	187
252	60	124	188
253	61	125	189
254	62	126	190
255	63	127	191

Radio Signal Checking - Test Display

This section is a quick guide to checking radio signal strength and quality before starting the actual deployment procedure.

Radio Signal Checking Procedure

Power up the KIRK Wireless Server.

You will have to move around in the area with a handset in special testing mode to be covered when deploying as well as listening to the audio quality of the handset.

The handset (subscribed to the deployment base station) must be used for checking the received signal strength and quality to secure proper handover.

The values to be checked are the Q value and the RSSI value.

Perform the radio coverage measuring in the following way:

1 Dial ***99989***, press √ and go off-hook to activate the measuring mode.

Note The handset has to be subscribed to the system before starting deploying, and it must be in off-hook mode.

2 Ring up the handset from another handset and answer the call. Walk the site and take note of the values in the display whilst moving away from the base station and / or the repeater(s). (See fig. Figure 2-10 and Table 2-2).

3 To clear the display press < and hold for three seconds.

Note The RSSI value given in the display is not a calibrated indication, i.e. the RSSI value may vary from handset to handset.

Reading the Test Display Values

Figure 2-10 *Handset test display*

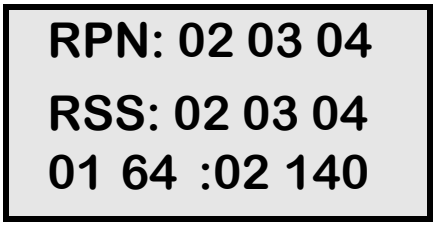


Table 2-2 *The values of the test display*

Value	Definition
RPN	The alternative repeater or the base station number in HEX, e.g. repeater / base station no. 02 or repeater / base station no. 03.
RSS	Signal strength (RSSI) from either the alternative repeater or the base station
01	The number of the base station or repeater that the handset has connected to. Note: the base station always has no. 01(Hex)

Value	Definition
64	Q Value: refers to the speech quality (BIT ERROR RATE) of the signal received from the base station or the repeater. Only the speech quality of the active connection is shown. Optimum level is 64 and it should not be less than 52. Note: This value has to be stable (not fluctuating).
:2	RSSI: refers to the signal strength from the nearest repeater or the base station to which the handset is connected. You will find the RSSI maximum level by standing close to the base station. Moving away from the base station, the value of the RSSI might drop up to 20-25 dB but still have a satisfactory audio quality. If the handset shows :X, it is not an error, but an indication of the RSSI level being = 100 or higher. The indication :X has been made this way because it is only possible to show two digits in the display.
140	Displays the frequency and the timeslot that the handset uses. Do not take these values into consideration during measurement of the radio coverage.

3

Deployment Procedure

Begin the site survey by interviewing the customer representative familiar with the full expectation of coverage and performance of the Polycom KIRK Wireless Server Solution. During this conversation, collect the following documents and information:

- View site blueprints / maps
- Identify any special conditions such as large metal surfaces, heavy machinery etc., that may affect the signals and mark this on the blueprints.
- Identify WLAN infrastructure
- Verify with the customer where coverage is required
- Determine the number of handsets to be deployed and possible growth
- Determine traffic expectations
- Discuss restricted areas where radio coverage is not required
- Locate the expected installation point of the Polycom KIRK Wireless Server and document any additional hardware that may be necessary for the site.

Note Always, properly judge special requirements for each site.

Preparing the Hardware

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

- Charge the batteries for the deployment handsets.
- Turn on the deployment base station and verify the power LED is lit.
- Turn on the deployment handsets and verify the handsets are subscribed to the deployment base station.
- Establish a test call between handsets and verify sound quality.

Note The KIRK Wireless Server supports DECT to DECT calling, so handsets do not need in this case to be registered on an IP-PBX (optional use).

Documenting Radio Requirements and Results

The following information must be documented:

- If an agreement is made with the customer to accept areas where radio coverage is less then acceptable, this should be documented and agreed upon with the customer.
- Note the results of the site 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 station is located.
- Include wiring considerations and special installation instructions in the documentation.

Deployment Steps

This section contains information about:

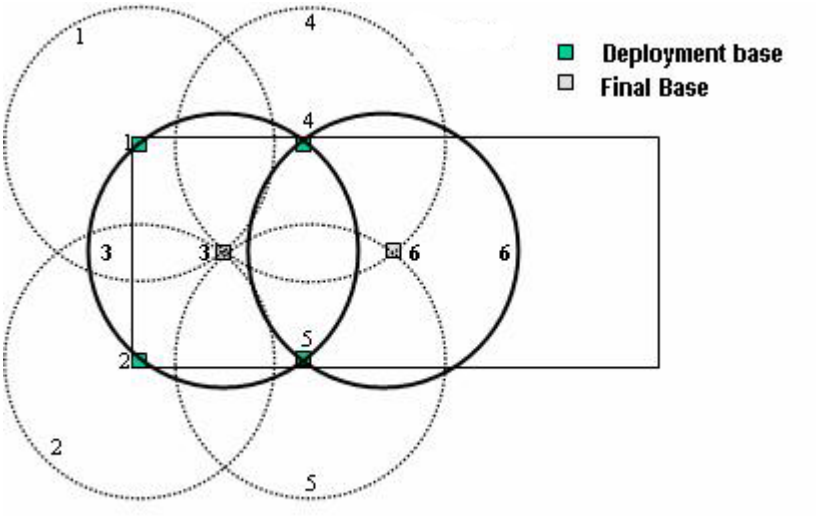
- "Deployment of a Single Floor Building" on page 34
- "Deployment of a Wider Single Floor Building" on page 35
- "Deployment of a Multi Floor Area" on page 36

Note When you perform a site survey, always ensure that all doors, including fire doors, are closed.

Deployment of a Single Floor Building

- Determine the outer points of the building for placing the deployment base station. (points 1, 2 on figure A/Figure 3-1).
- Place the deployment base station near point 1 at a height of 6-8 feet/1,8-2,50 meters and begin the measurement of the radio signal. Proceed at approximately a 45 degree angle away from the deployment base station. Mark on the map the boundary of the radio coverage cell.
- Move the deployment base station to point 2 at a height of 6-8 feet/1,8-2,5 meters and in the same technique measure the signal. Mark on the map the boundary of the radio coverage.
- 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.
- Once identified, place the deployment base station 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.

Figure 3-1 *Determining Outer Points of the Building*



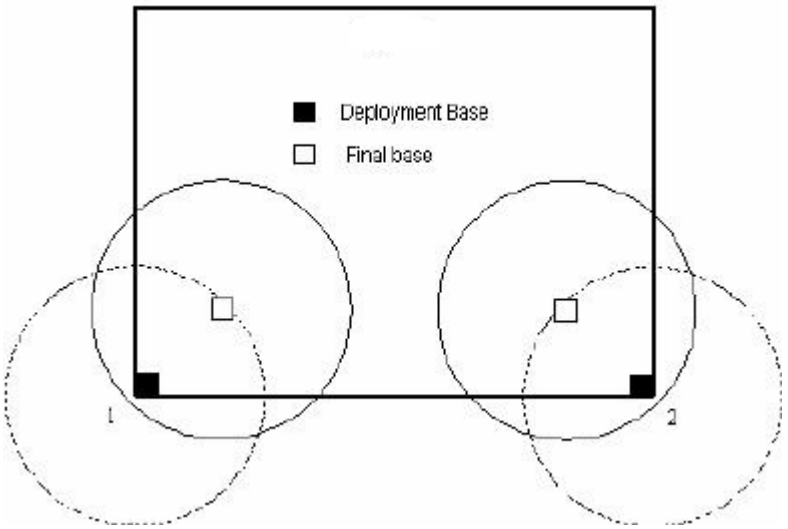
Note Figure 3-1 does not consider building elements that may influence the signal strength.

Deployment of a Wider Single Floor Building

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:

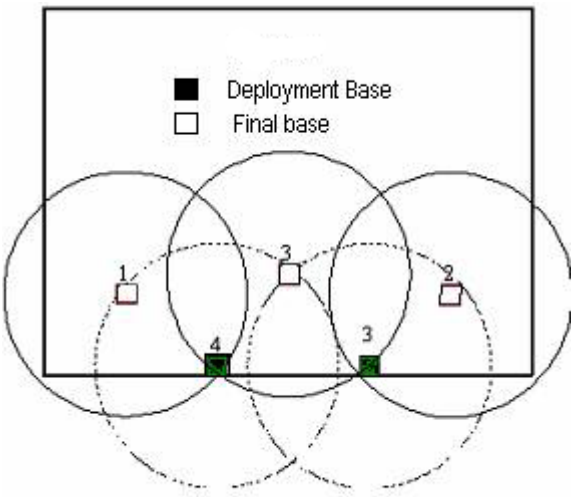
- Mark the corners of the area to be deployed. (Position 1 and 2 on figure B/Figure 3-2).
- Place the deployment base station in position 1 at a height of 6-8 feet/1,8-2,5 meters.
- Measure the signal in a 45 degree angle towards the center of the area. Document the boundary of the signal.
- Proceed to point 2 and perform the same test. Document the boundary of the signal.
- 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.

Figure 3-2 Deployment Points 1 and 2



- Mark where the boundaries of the permanent base station 1 and 2 intersect with the wall being used as the base point.
- 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.

Figure 3-3 Deployment Points 3 and 4



Deployment of a Multi Floor Area

There are two approaches in surveying a multiple story building:

- Survey each floor as individual parts.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.
- Place the deployment base station on one floor and continue the measurement of coverage on adjacent floors. 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.
- When deploying KIRK Wireless Server 6000 systems, make sure to build 2 Sync Chains (primary and secondary) and place the Sync Master (SM) in the center of the building.

Recommended Placement of Base Stations and Repeaters

Note Base stations and repeaters (both wall mounted) must be placed in the right position – hanging on the wall – NEVER on the ceiling. If they are placed upside-down the coverage will decrease 40%-50%.

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

4

Configuration

This section provides information about how to install the KIRK Wireless Server 300, and how to subscribe handsets to the KIRK Wireless Server 300. Note that the KIRK Wireless Server is powered by Power over Ethernet (PoE).

Installation Flow

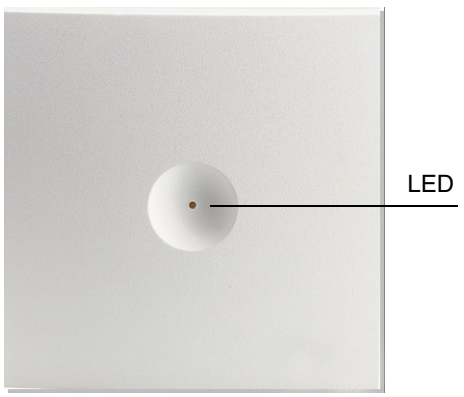
The following lists the main steps in installing the KIRK Wireless Server 300.

1. Connect the Power Injector to KIRK Wireless Server 300.
2. Go to the KIRK Wireless Server 300 administration web page.
3. Enter the IP deployment settings for the KIRK Wireless Server 300.
4. Subscribe the DECT handsets.

KIRK Wireless Server 300 Overview

Status indicating LED on the front.

Figure 4-1 KIRK Wireless Server 300 Front View



LED Indicator Description

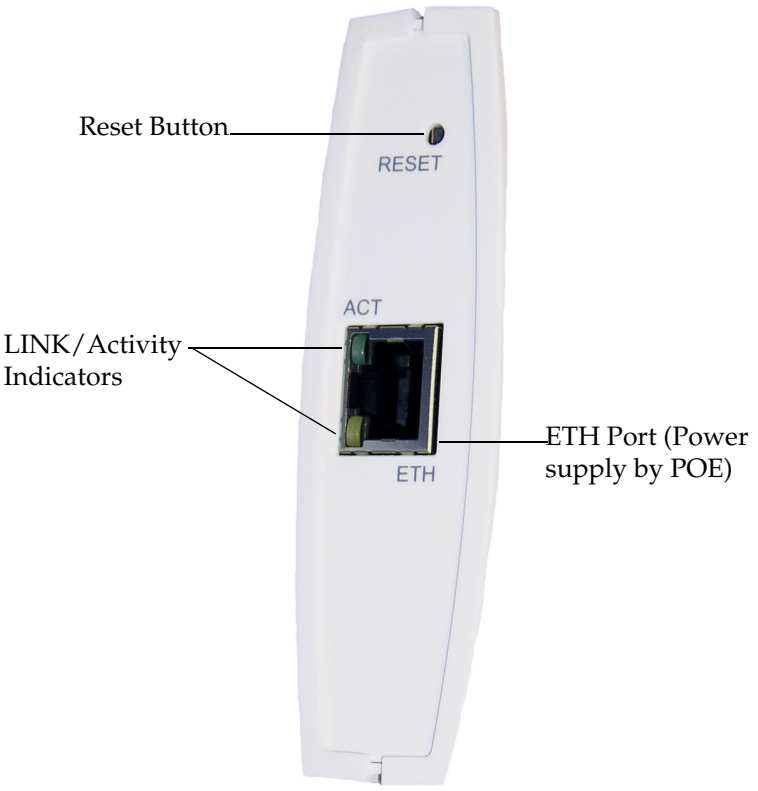
The LED indicator provides you with information about the status of the KIRK Wireless Server 300.

Table 4-1 LED Indicator

LED Indicator	Status
Steady green	OK and idle
Slow green flashing	OK and active voice call
Fast red flashing	Error
Steady red	Reset/shutdown in progress
Steady red for 5 seconds followed by red flashing	Reset to factory setting

KIRK Wireless Server 300 Faceplate

Figure 4-2 KIRK Wireless Server 300 Faceplate



LED Functionality

Table 4-2 LED functionality

LED Indicator	Meaning
LINK/Activity Indicator - green	Link layer software has established connection
LINK/Activity Indicator - green flashing	Activity

Reset Button

It is possible to restart or reset the KIRK Wireless Server 300 by pressing the Reset button on the faceplate of the KIRK Wireless Server 300.

Resetting the KIRK Wireless Server 300 Hardware

This section contains a description of the different actions that take place when pressing the Reset button.

Table 4-3 Reset Button Description

Press button	Action
Short press (2 to 5 sec.)	System restarts when button is released.
Long press (5 to 9 sec.) until front LED flashes red, then release button	Resets the system to factory default settings (original IP settings and empty user data base) and restarts the system. Firmware version is not affected.

Note When you long press, make sure to release the button right after the LED starts to flash. If you continue pressing the button, the KIRK Wireless Server 300 might not reset to default factory settings.

Pre-installation Steps

The following are steps that need to be completed before you can begin the actual installation.

Power

To power up, connect KIRK Wireless Server 300 to a PoE LAN Ethernet or use a power injector (not included on delivery).

Default Logon information

To enter the web based Administration Page you need the following information:

Table 4-4 System Access Information

Initial System Access KIRK Wireless Server 300	
Static IP Address	192.168.0.1
Network Mask	255.255.255.0
User Name	admin
Password	kws300

System Information

To set up and configure the solution, you need the following information.

- The ARI code, which is the same as the serial number for the KIRK Wireless Server 300. See label on the rear of the KIRK Wireless Server 300 unit (ARI code is the SN number Item.)
- AC codes (optional). The AC code is a customer-defined optional subscription pin code of a maximum of eight digits for the individual handset. The AC can be used when connecting the handset to the KIRK Wireless Server 300.
- The handset IPEI code, which is a unique code that identifies the handset. You can see the IPEI code on the handset label (the SN number), in the handset menu, or obtain it automatically from the KIRK Wireless Server 300 when the “autocreate users” box is checked.

In case Autoregistration is selected on the KIRK Wireless Server web Administration Page, the IPEI code of the handset is not needed as the handset is able to autoregister itself on the KIRK Wireless Server.

Activation

The following section describes the steps involved in configuring the KIRK Wireless Server 300 in deployment mode.

Enter Administration Page

You access the web based Administration Page through a standard web browser. To access the web page, you need the following information.

Table 4-5 Administration Page Access Information

Initial System Access KIRK Wireless Server 300	
Static IP Address	192.168.0.1
Network Mask	255.255.255.0
User Name	admin
Password	kws300

To Access the Administration Page

1. Open a web browser.
2. In the **Address** bar, type **http://192.168.0.1**, and then press **Enter**.
3. Type the **User Name** (admin) and **Password** (kws 300) in the dialog and then click the **OK** button. The KIRK Wireless Server 300 Administration Page appears.

Figure 4-3 Main page of the KIRK Wireless Server 300 Administration Page

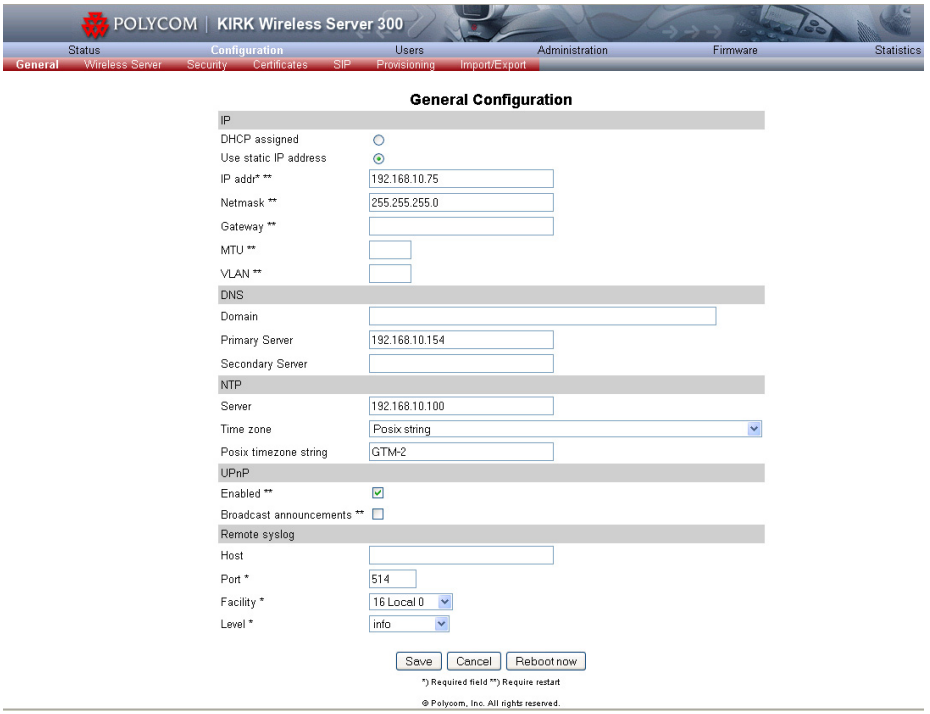
IP Setup (optional)

The IP setup is only required if you connect KIRK Wireless Server 300 to a LAN network where you cannot use the default 192.168.0.1 IP address.

To set up IP

1. For the IP settings, click **Configuration**, and then click the **General** tab.

Figure 4-4 General Configuration Page



2 Enter the IP settings in the corresponding fields. Please contact your IT-administrator if you do not have this information.

Configuring SIP Settings

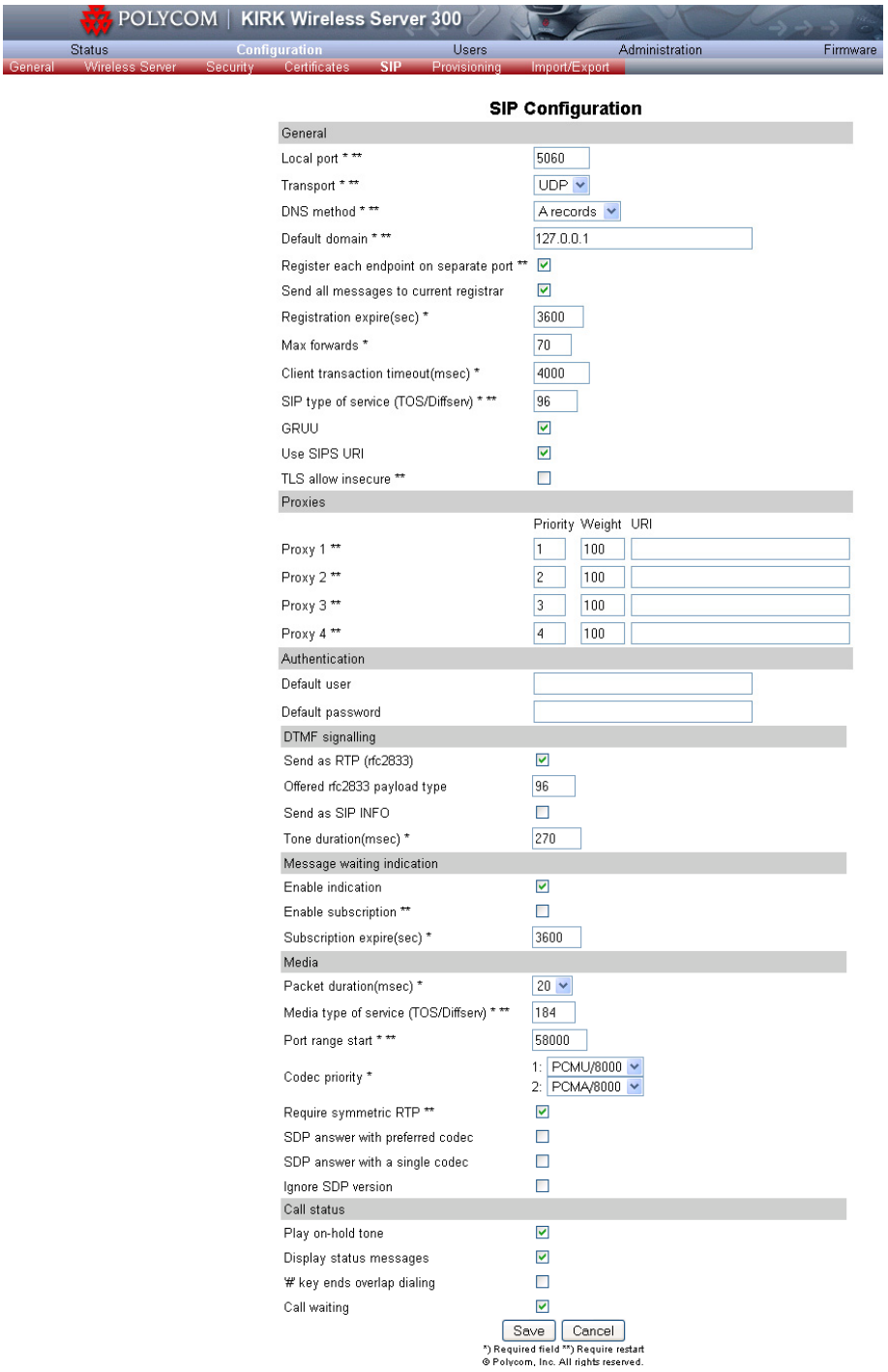
To Configure SIP Settings

1 To configure the KIRK Wireless Server 300 SIP settings, click **Configuration** and then click the **SIP** tab.

2 For internal switching (no use of PBX), set the default domain to the IP address 127.0.0.1 and click **Save**.

Note After saving the configuration, you must reboot the system.

Figure 4-5 *SIP Configuration Page*



Subscribing DECT handsets

To Subscribe Handsets

1 Get the ARI Code from the DECT system from the administration page. Click **Status**, and then **Wireless Server**. Write down the code, as you will need it later. In the following example, the ARI code is 000046554531.

Figure 4-6 *ARI Code Example*

2 Click **Configuration** and then click the **Wireless Server** tab. Check **Subscription allowed** and **Autocreate Users**.

Figure 4-7 *Wireless Server Configuration*

You can now subscribe the handsets.

Subscribing KIRK 40- Handset Series

The following is a list of Key button functions

- “MENU” - Go to menu structure or exit the menu structure.
- ” < ”, “REDIAL” - Menu: left, Cursor left
- ” > ”, “BOOK” - Menu: right, Cursor right
- “√”, “MUTE” - Confirmation (“YES”) or jump to next level in the menu.

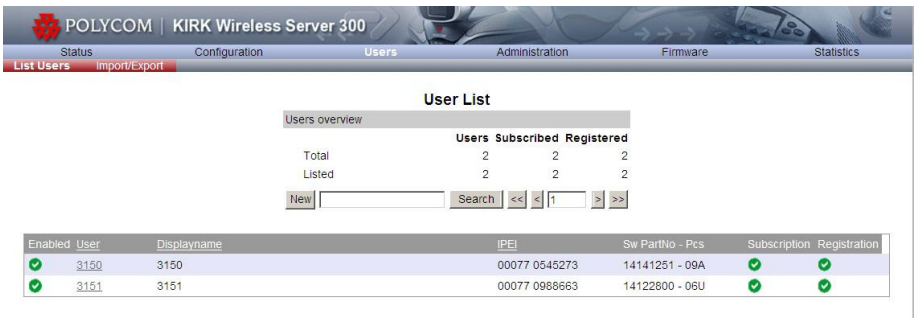
To create a subscription

.On the handset, press the following sequence.

Menu < < √ < < √

1. Press menu
2. Press left arrow twice
3. Press enter
4. Press left arrow twice
5. Press enter
6. Verify that the handset displays the following message: “SUBSCRIPTION SEARCH ID”.
7. If there’s more than one DECT system in range, a list of all DECT ARI codes is created. Select the correct ARI for your system (scroll with the arrow keys), and then press the “√” key.
   For more information about the handset, download the user guide from the Polycom web site:
   http://www.polycom.com/common/documents/support/setup_maintenance/products/voice/Kirk_4020_4040_English.pdf
8. To complete the subscription, go to the KIRK Wireless Server 300 web administration page and click the **Users** tab.

Figure 4-8 Users list page



The handset you just subscribed is listed with the corresponding 12 digit IPEI number.

Note If the user has been registered using the Autoregistration feature, then its IPEI will appear in the Username and Displayname fields; however it can be changed by entering the user page and assigning it a different name for each corresponding field.

9. Click a number in the User column, to access the individual handset administration page, and then enter the following information.

   DECT part information:

   — IPEI – Already filled in by KIRK Wireless Server 300. If you type this manually, it is the unique IPEI number of the handset.

— Standby text – OPTIONAL. Use the User name/extension number here, so you can easily identify the handset number.

SIP Part information (These parameters must be similar to corresponding settings for the account at the IP PBX):

— Username/Extension. Use the Extension number you want (for example, 100 for the first handset, 101 for the next handset, etc.)

— Domain. Leave this blank.

— Displayname. Display name used in the IP PBX. Use the extension number to easily identify the handset number.

— Authentication user. Leave this blank.

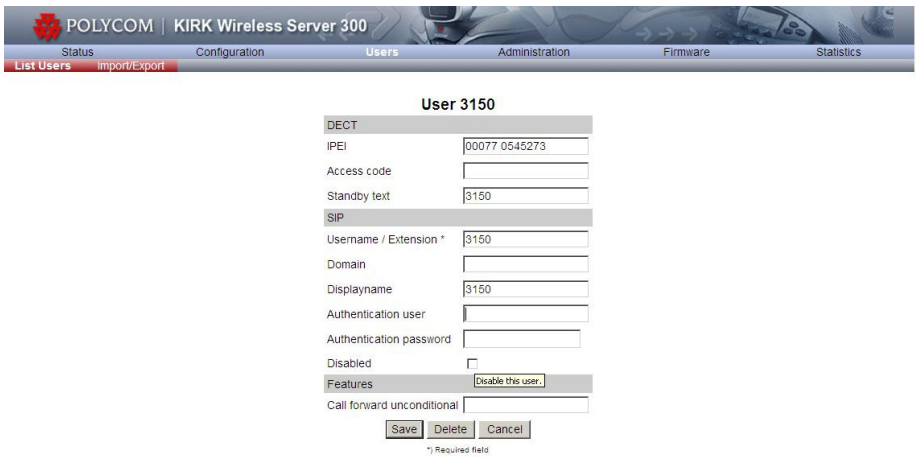
— Authentication password. Leave this blank.

Other settings

— Disabled checkbox.When checked, the handset is inactive (can not receive and/or transmit calls). Uncheck to activate the handset.

— Call forward unconditional. Leave this blank.

Figure 4-9 *Individual Handset Page Configuration Example*



Note Once the extension's name fields have been modified on the web Administration Page, notice the changes on the upper left corner of the DECT handset.

Beware that verifying the Q value, respectively the RSSI value will ensure the proper preconditions for performing calls to another phone.