

Spectralink DECT/IP-DECT Server 400/6500/2500/8000

Synchronization and Deployment Guide

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Introduction

| | |
|---------------------------------------|----------|
| Scope | 3 |
| About Synchronization | 3 |
| Types of Synchronization | 3 |
| Before You Begin | 4 |
| Related Documentation | 4 |
| Terminology and Acronyms | 4 |

Off-site planning, prior to visit

| | |
|---|----------|
| If the customer wants to replace existing DECT/IP-DECT system: | 6 |
| Is it an IP-DECT base station or a digital base station?: | 6 |
| Investigate site | 6 |
| “Conclusion” | 8 |

On-site Investigation

| | |
|---|----------|
| Aligning expectations with customers | 9 |
|---|----------|

On-site Deployment

| | |
|---|-----------|
| Deployment Tools | 11 |
| Important parameters | 13 |
| Deployment rules of thumb | 13 |
| IP Base Station using Synchronization Over The Air | 14 |
| Deployment procedure..... | 14 |
| Placement of base stations | 16 |
| Digital Base Stations and IP Base Stations using LAN Synchronization | 17 |
| Deployment procedure..... | 18 |
| Placement of base stations | 20 |

LAN Based Radio Synchronization

| | |
|---|-----------|
| Precision Time Protocol Background | 24 |
| Deployment of Base Stations | 25 |
| Network Requirements | 25 |
| Multicast | 26 |
| Timing and Jitter | 26 |
| Network topology | 27 |
| Traffic Load | 27 |
| Quality and Configuration of the Switches | 28 |
| Traffic Priority | 28 |

| | |
|---|-----------|
| Configuration and Administration | 28 |
| DECT/IP-DECT Server System Settings | 28 |
| Base Station Individual Settings | 29 |
| Base Station Synchronization Status..... | 29 |

Troubleshooting

| | |
|--|-----------|
| Troubleshooting - Deployment | 31 |
| Troubleshooting - Synchronization | 31 |

Chapter 1: Introduction

This guide is intended for qualified technicians who are looking to will deploy Spectralink DECT/IP-DECT Server Solutions. To qualify to deploy a DECT/IP-DECT Server Solution, you must have understood and completed the technical training successfully. This guide covers both 1G8 and 1G9 deployment.

Scope

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

- Spectralink DECT/IP-DECT Server 8000 and 2500
- Spectralink DECT/IP-DECT Server 6500 and 400

The purpose of this guide is to familiarize you with the procedures that are needed to carry out a site survey as well as understand the requirements to ensure synchronization is successfully implemented. At the completion of this guide you should be comfortable with the following:

- Using a handset to measure and record Q - and RSSI values (RF values) Selecting a
- proper mounting location for base stations and repeaters
- Making sure that the company LAN meets the LAN Synchronization requirement limits, and documenting the deployment.

About Synchronization

In a multi-cell DECT system the base station radios must be synchronized to each other in order to achieve the optimum handover experience, when handsets are moving around among base stations. Spectralink supports synchronization of digital base stations via the wire and IP base stations via the radio. Further, IP base stations can use corporate LAN for synchronization as well.

Types of Synchronization

- LAN Based Radio Synchronization (Server 400/6500/2500/8000)
- Air/Radio Based Synchronization (Server 400/6500/2500/8000)
- Digital Base Stations (Server 2500/8000)
 - Synchronization of digital base stations is controlled by the server and requires no configuration. Therefore, configuration of digital base stations will not be described further.

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 Spectralink DECT/IP-DECT Server Solutions not covered by this manual, refer to the following documentation.

Table 1

| Subject | Documentation |
|----------------------------------|--|
| Spectralink Handsets | User Guides on http://spectralink.com |
| Spectralink DECT/IP-DECT Servers | User Guides on http://spectralink.com |
| Spectralink Technical News | Newsletter that describes software changes, bug fixes, outstanding issues, and hardware compatibility considerations for new software releases. To subscribe, go to www.spectralink.com |

Terminology and Acronyms

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

Table 2 Terminology and Acronyms

| Term | Definition |
|------------|--|
| 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. |
| Erlang | The erlang is a <u>dimensionless unit</u> that is used in <u>telephony</u> as a measure of <u>offered load</u> or carried load on service-providing elements such as telephone circuits or telephone switching equipment. |
| LED | Light Emitting Diode |
| Ni-MH | Nickel -Metal Hydride |
| 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. |

Table 2 Terminology and Acronyms

| Term | Definition |
|------------------------------------|---|
| LAN synchronization | Method for synchronizing IP base stations over LAN |
| Synchronization Over the Air (OTA) | Method for synchronizing IP base stations over Air (radio) |
| 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. |

Chapter 2: Off-site planning, prior to visit

Below you will find a list of questions and considerations to take into account during the planning phase prior to visiting a site.

If the customer wants to replace existing DECT/IP-DECT system:

Is it an IP base station or a digital base station?

- IP base station:
 - consider PoE, Active equipment, Switch PoE.
 - Is this reusable for the new system?
 - Do LAN switches support LAN synchronization?
- Digital base station:
 - Can the cabling be reused? (yes/no/partly)

Investigate:

- » Is all cabling twisted pair end to end (recommended equal to CAT5e)?
- » Is cabling present where DECT coverage is needed?
- » Are all junction points of good quality?
- » From these investigations the costs to get cabling up to a satisfactory standard can be estimated.



Note

Today new systems can be a combination of wired and IP.

Investigate site

- What is the site?
 - Are there more buildings?
 - » If there are more buildings - consider the distance between the buildings, and whether it is possible to establish synchronization between base stations.

- Are there more sites (sub-sites)?
 - » If there are several sites - the remote site(s) (i.e. those where it will not be possible to establish synchronization) must be DECT/IP DECT system(s)
- Study blueprints of building
 - Consider the building materials
 - » More dense materials means less radio propagation and therefore more base stations
 - » Environment
 - » Moving interior (warehouse, production facility). Much equipment moving around will influence the propagation
 - » Metal can cause reflections which will influence propagation (i.e. metal blinds, metal beams, metal shelves, rebars, shielding foils)
 - » Where are fire doors/walls placed? These will influence propagation
- System usage
 - Where are people placed? (those that will use the DECT/IP-DECT system)?
 - Are there areas with (extra) high voice-traffic load like:
 - » Canteen
 - » Nurse office
 - » Etc.
- Rough estimation of equipment (if possible)

A rough/budgetary estimate of equipment/base stations can be calculated according to below:

- Open area (indoor)
- Office area
 - » DECT systems: $[\text{Size of area to cover in m}^2]/800 = \text{number of digital base stations}$
Necessity: approximately 25 m between the base stations and 15 m overlap to enable handover.
 - » IP-DECT systems (Synchronization Over The Air): $[\text{Size of area to cover in m}^2]/600 = \text{number of LAN base stations}$
Necessity: approximately 22 m between the base stations and overlap from base station to base station.
 - » IP-DECT system (LAN synchronization): $[\text{Size of area to cover in m}^2]/800 = \text{number of LAN base stations}$
Necessity: approximately 25 m between the base stations and 15 m overlap to enable handover.



Note

Be aware that this will not be an exact figure. A deployment of the site will be necessary to get a correct number.

“Conclusion”

Based on the above analysis the installer must be able to determine whether to install a Spectralink DECT server or Spectralink IP-DECT server or a combination.

- DECT/IP-DECT systems with IP base stations can benefit from synchronization over LAN
- Digital base stations have 4/8 channels whereas IP base stations have 11 channels
- Digital base stations, and IP base stations with LAN synchronization can have longer distance between base stations as opposed to IP base stations with synchronization Over The Air (OTA).

Synchronization is essential for handing over calls from one base station to another.

| Synchronization Over The Air | LAN Synchronization and Digital Base Stations |
|------------------------------|---|
| | |



Note

Before going on a site, remember to have confirmation from the customer regarding accessibility to all areas where the customer needs DECT/IP-DECT to make measurements for deployments.

Chapter 3: On-site Investigation

Below you will find considerations to take into account when investigating a site.

Aligning expectations with customers

- Start your on-site visit with meeting the customer and align expectations to coverage (areas) and dropped calls (expect 2-3-% dropped calls).
- Take a walk around the premises to create an overview and check that the information uncovered during the pre-planning phase is correct/valid.

Consider:

- internal structure material
- moving interior
- are there materials that affect/absorb propagation
- is the interior as expected?
- Create a rough overall plan for how to execute the deployment.
- If deploying IP base stations with Over The Air synchronization, create a blueprint with base station placement and synchronization chain.

Chapter 4: On-site Deployment

Below you will find a list of tools to bring on a site, and descriptions of how to deploy Spectralink IP-DECT 400/6500 Server and Spectralink DECT 2500/8000 Server.

Deployment Tools

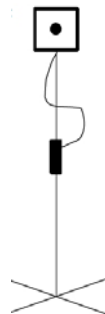
Bring the following tools for deployment:

- 1 Spectralink IP-DECT server 400
- 1 Battery pack min. 8V/max. 60V
- 1 Tripod (app 2m high)
- 1 Cable with RJ45 plug (pin 1 must be connected to pin 3, pin 2 must be connected to pin 6)

Preferably the tripod shall place the Spectralink IP-DECT server 400 at the height where you will place the server/base stations/repeaters in the final installation.

If 2 people perform the deployment at IP DECT sites you shall also bring:

- Minimum 1 Spectralink DECT repeater (the repeater must be set up to synchronize on the Spectralink IP-DECT server 400 used for the deployment).
- 9V Battery pack
- 1 Tripod (app 2m high)



- 1 Cable to connect battery pack and DECT repeater (with RJ11 plug in for the repeater) For a description of pin connections, see the information on the Power Adaptor.

Also bring:

- 2 handsets
- 1 Spectralink Standard handset (7622/7642/7722/7742).

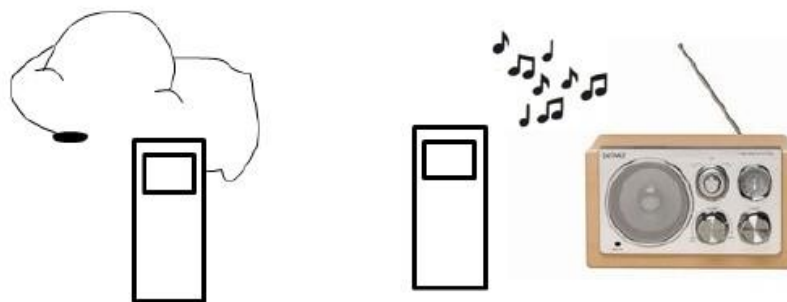


Note

The handset can only measure correctly when off hook.

When measuring, carry the handset with your hands covering the antennas to assimilate normal user conditions (heads or surroundings blocking the radio signals when holding the handset to the ear).

- A seconds Spectralink DECT handset (7622/7642/7722/7742).
Consider also to bring a device you can use to play sound in the handset.
-



- A good idea would be also to bring a laptop with network cable to connect with the Spectralink IP-DECT server 400.
- If you bring a repeater you should also bring power supply for the repeater, and repeater programming kit (Product ID: 02509210).
- When bringing a repeater, you must also bring a serial to USB converter to be able to connect the repeater to the laptop.
- It could also be beneficial to bring a power supply for the IP-DECT server 400.

Important parameters

When deploying there are 3 parameters which are equally important:

- RSSI-values: Value indicating signal strength
- Q-value: Value indicating the signal quality (preferably steady at min 64)
- Sound Quality: Measured by walking away from the base station with the handset and measure where the RSSI value drops below 75 and the Q-value stays constant at 64.

Below is an example of RPN values when pressing *99989* on a handset:

| | | | | |
|----|----|------|-----|----|
| N | 14 | 16 | 18 | 2C |
| S | 83 | 72 | 68 | 72 |
| 08 | 64 | S108 | 3BC | |

Descriptions of the values above:

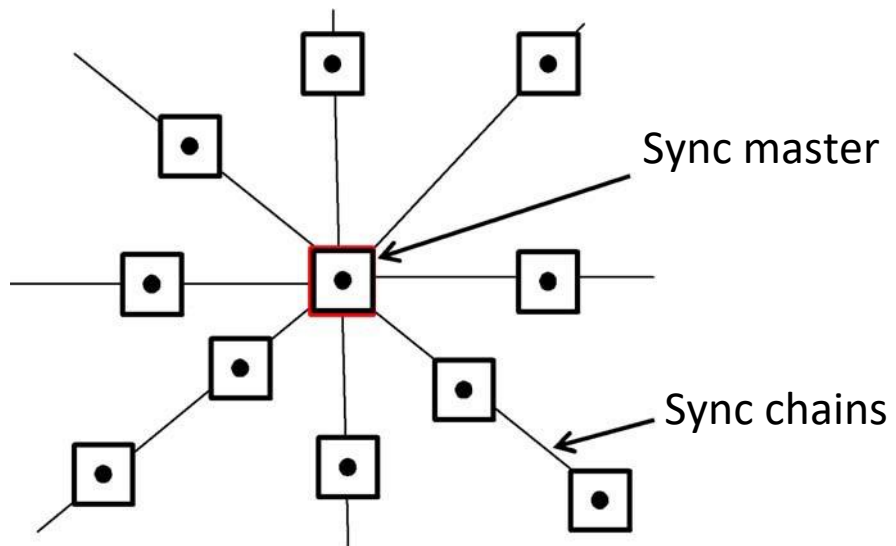
- The hexadecimal numeral system is used to describe RPN values and time slots.
- RPN values range from 00 to FF.
- Time slot values range from 0 to B (there are 12 time slots)
- Third line shows that the actual base station has RPN number 8, signal quality of connection is 64, signal strength (RSSI) 108, 3BC means third frequency, time slot B, and that the last handover was a connection handover (C).
- A signal quality of 64 is a connection without errors, this number will be reduced by one for each error (such as reflections or noise). Preferably this value should be steady at minimum 64.
- The value of signal strength range from 110 to 35. Counting down from 110.

Deployment rules of thumb

- Be systematic
- Document
- Do not assume - Measure

IP Base Station using Synchronization Over The Air

It is recommended to deploy a system as a star system with the sync master placed in the middle.

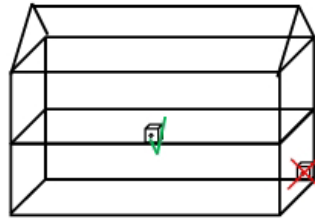


| Necessary overlap in sync chains | Necessary overlap between sync chains |
|----------------------------------|---------------------------------------|
| | |

Deployment procedure

Start by placing your tripod with the Spectralink IP-DECT server 400 (from your deployment tools) where you plan the first base station (the sync master) to be:

- Remember to consider that the first base station (sync master) shall be placed centrally in the installation so the rest of the system can spread from it (remember to consider all 3 dimensions).



- Take picture of the placement and note it on a blueprint of the building.
- Make a call between the two handsets. During the deployment there must always be an active call established. Note: Measurements are only valid on handsets in a connected call!
- Play music/talk into the handset without headset. Wear the headset and listen to the sound quality all the time.
- At the same time as listening to the sound quality use your deployment handset to measure how far the base station will cover sufficiently. This is done by walking away from the base station with the handset and measure where the RSSI value drops below 75 and the Q-value stays constant at 64. Do this in all directions from the base. For a description of the parameters and RPN values, see [“Important parameters” on page 13](#).
- To perform a site survey on the deployment handset find the Survey menu from the Main menu of the handset.
- To perform a site survey using an ordinary handset, press *99989* + Hook.
- It is important to measure all places where coverage is required.
 - Do not assume that there is coverage - it has to be measured!.
- Consider where to place the next base so that the handset gets opportunity to handover to the next base. Determine where to place the next bases.
- Move your tripod with the Spectralink IP-DECT server 400 to the next placement.
- Take picture of the placement and note it on a blueprint of the building.
- Continue until the whole site is deployed.



Note

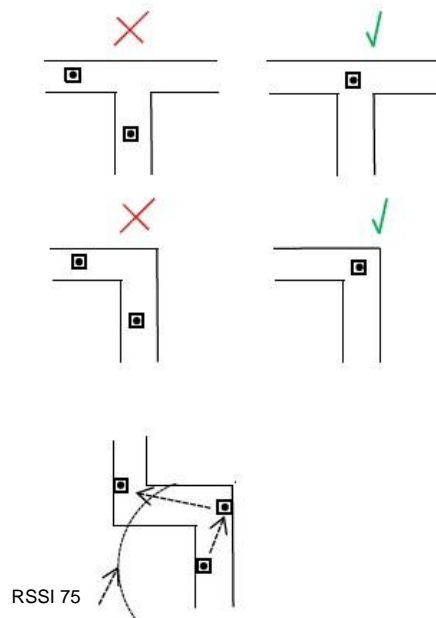
Remember to document each placement for base stations (incl. sync master).

- Take pictures of where exactly the base must be placed.
- Note it on a drawing of the premises.

Placement of base stations

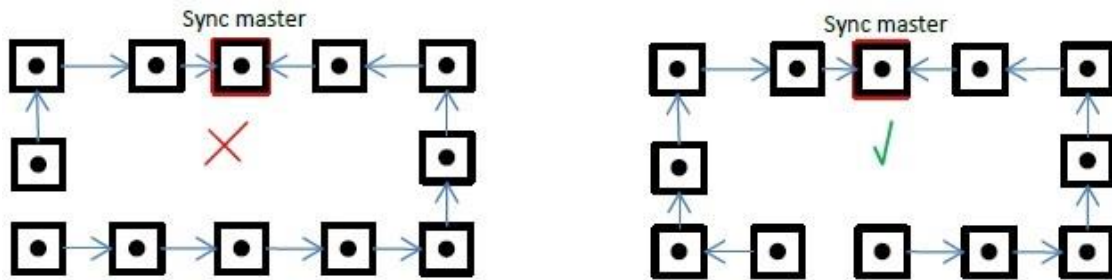
When determining where to place the bases following points have to be considered:

- To get maximum coverage from a base station the bases must be as visible as possible.
- A guideline can be to consider where a light bulb can be placed to light up the maximum area.



- Traffic – how many simultaneous calls can be expected in an area.
 - In an assembly area e.g. in a canteen there will probably be many simultaneous calls during lunch.
 - To get an estimate of the simultaneous calls Erlang can be calculated.

- Sync latency in sync chains.



- Propagation through building materials – dense materials influence propagation negatively.
- Base stations shall be placed away from reflecting materials like metal.
- Base stations shall be placed away from other DECT base stations.
- “When in doubt deploy”, i.e. to ensure a good coverage place one more rather than one less base station.
- A good documentation of the deployment is needed to build the synchronization chains.

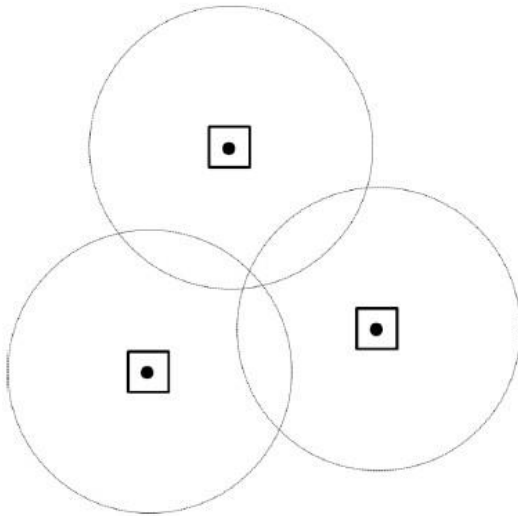
Digital Base Stations and IP Base Stations using LAN Synchronization

In DECT/IP-DECT systems it is important to ensure an overlap on the base stations at all times of 15 m to ensure a call can be handed over at normal walking speed.



Note

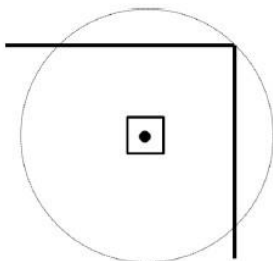
Synchronization between the digital base stations is not necessary in these systems, as synchronization between the base stations is handled automatically by the DECT servers.



Deployment procedure

Start by placing your tripod with the Spectralink DECT server 400/2500 from your deployment tools) where you plan the first base station to be:

- Place the first base station in a corner of the building so there is coverage in the corner.



- Take picture of the placement and note it on a blueprint of the building.

- Make a call between the two handsets. During the deployment there must always be an active call established. Note: Measurements are only valid on handsets in a connected call!
- Play music/talk into the handset without headset. Wear the headset and listen to the sound quality all the time.
- At the same time as listening to the sound quality use your deployment handset to measure how far the base station will cover sufficiently. This is done by walking away from the base station with the Site Survey Handset and measure where the RSSI value drops below 70 and the Q-value stays constant at 64. For a description of the parameters and RPN values, see [“Important parameters” on page 13](#).



Note

The handset can only measure correctly when off hook.

When measuring, carry the handset with your hands covering the antennas to assimilate normal user conditions (heads or surroundings blocking the radio signals when holding the handset to the ear).

- Do this in all directions from the base stations.
- To perform a site survey on the deployment handset find the Survey menu from the Main menu of the handset.
- Note how far the place is from the tripod with the Spectralink DECT sever 400/2500.
- Find the next place for the base station app 2 x the above distance from the first placement
- Consider where to place the next base so that the handset gets opportunity to handover to the next base station.
- Move your tripod with the Spectralink DECT server 400/2500 and measure whether this will give sufficient overlay (i.e. RSSI value min 70, Q-value stays constant at 64 and good sound quality) at the same place as measured at the previous placement.
- If necessary, move the base station to get sufficient overlay.
- It is important to measure all places where coverage is required.
 - Do not assume that there is coverage - it has to be measured!.
- When it is determined where to place the next base stations.
 - Take picture of the placement and note it on a blueprint of the building.

- Continue until the whole site is fully deployed.



Note

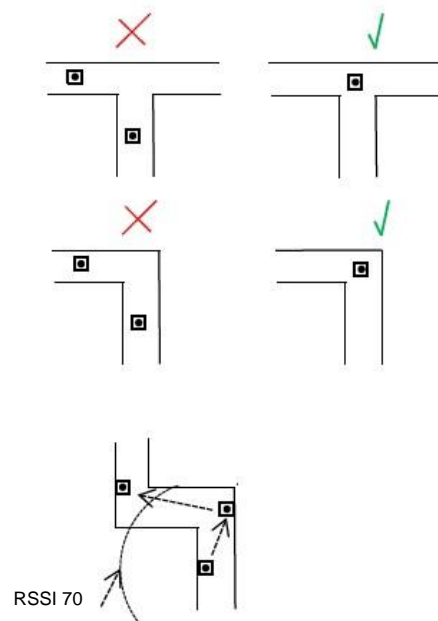
Remember to document each placement for base stations.

- Take pictures of where exactly the base station must be placed.
- Note it on a drawing of the premises.

Placement of base stations

When determining where to place the base stations following points have to be considered:

- To get maximum coverage from a base station the bases must be as visible as possible. A guideline can be to consider where a light bulb can be placed to light up the maximum area.



- Traffic – how many simultaneous calls can be expected in an area.
 - In an assembly area e.g. in a canteen there will probably be many simultaneous calls during lunch.
 - To get an estimate of the simultaneous calls Erlang can be calculated.

- Propagation through building materials – dense materials influence propagation negatively.
- Base stations shall be placed away from reflecting materials like metal.
- Base stations shall be placed away from other DECT base stations.
- “When in doubt deploy”, i.e. to ensure a good coverage place one more rather than one less base station.
- A good documentation of the deployment is advisable as it could be needed for future improvements, evaluations or troubleshooting.

Chapter 5: LAN Based Radio Synchronization

Below you will find a description of how LAN based radio synchronization works, and what must be considered when synchronizing.

The latest generation of Spectralink IP base stations support the use of corporate Local Area Network (LAN) for synchronization of the DECT radios when running software release PCS15C or later.

In a multi-cell DECT system the base station radios must be synchronized to each other in order to achieve the optimum handover experience, when handsets are moving around among base stations. Spectralink supports the synchronization of digital base stations via the wire and IP base stations via the radio. IP base stations can use the LAN for synchronization as well.

The LAN based synchronization has several advantages over synchronizing via the radio. The configuration is much simpler because no synchronization chains need to be configured and maintained. The synchronization is self-healing, because the system itself can handle if any base station is failing. Finally, the system can be deployed with fewer base stations, because the base stations are no longer required to be in range of each other.

It may however not be the ideal solution in all cases. LAN based synchronization requires that the base stations involved in a handover are on the same network segment and the network deployment (including LAN switches) meets a number of quality criteria.

Precision Time Protocol Background

Precision Time Protocol version 2 (PTPv2) is used to synchronize the radios of the IP base station via the LAN. PTPv2 is defined in the standard IEEE 1588-2008 and a brief introduction can be found here: http://en.wikipedia.org/wiki/Precision_Time_Protocol

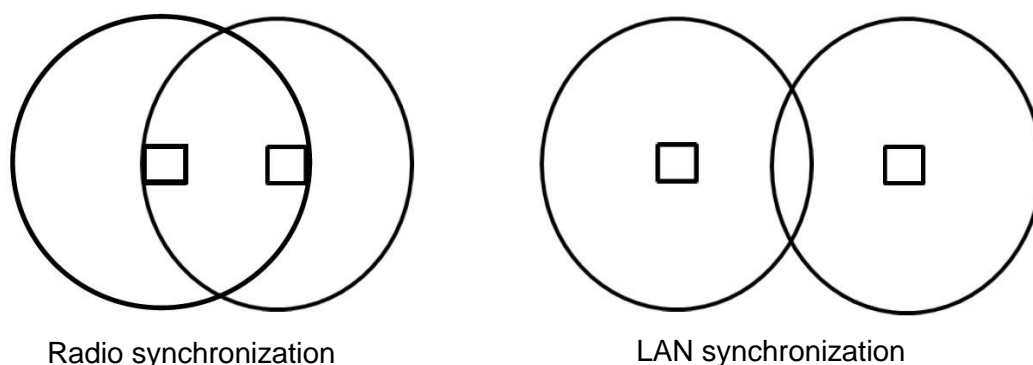
PTPv2 is based on a master-slave architecture, where the active master is automatically selected among the base stations. Each network segment will have one active master and the remaining base stations will be slaves. If the current master is failing a new one will be automatically selected without disrupting the current synchronization state.

The PTPv2 datagrams are sent as multicast and transported via UDP on IPv4 or IPv6 or as raw Ethernet packets without IP.

The LAN based radio synchronization is administrated centrally from the web GUI of the DECT/IP-DECT Server. The synchronization itself however is handled autonomously by the base stations, and the server is not involved and hence does not need to be on the same network segment.

Deployment of Base Stations

When the base station radios are synchronized via radio, the base stations that synchronize to each other must be within radio coverage of each other. This is not required when LAN based radio synchronization is used. Here the deployment requirements are the same as for the digital base stations and the coverage overlap is only required for the handsets to be able to perform handovers. The figure below illustrates the difference in coverage requirements for radio and LAN based synchronization.



It should be noted that depending on the deployment - Synchronization via LAN and radio can be combined in the same DECT installation. Even when a base station is configured to synchronize via LAN, it transmits the signal required for synchronization via radio. Therefore, base stations synchronizing via radio can retrieve their synchronization signal from a base station synchronizing via LAN. The other way around is not possible.

Network Requirements

For PTPv2 to work the requirements for the network are quite strict with regard to multicast and timing.



Note

LAN synchronization only works properly if multicast and timing requirements are met. As assessment of the corporate LAN network MUST be done to evaluate if the LAN network is suitable enough for LAN based synchronization.

Multicast

The PTPv2 multicast packets cannot traverse routers and consequently the IP base stations that needs to be synchronized must be on the same switched network segment.

Regardless of the transport selected, IPv4, IPv6 or Ethernet, the network switches must allow multicast traffic to and from all the LAN base stations. The multicast addresses used are listed below:

Table 3

| Protocol | Multicast address |
|----------|-------------------|
| IPv4 | 224.0.1.129 |
| IPv6 | FF02::181 |
| Ethernet | 01:1B:19:00:00:00 |

If IPv4 or IPv6 is used as transport and IGMP snooping (http://en.wikipedia.org/wiki/IGMP_snooping) is supported by the switch, the switch can utilize this to automatically configure on which ports the multicast packets should be sent. Note that this requires an IGMP querier to be present on the network segment (many IGMP snooping switches offers this functionality).

If multicast is not working properly on the network, the IP base stations will not be able to achieve LAN synchronization.

Timing and Jitter

For PTPv2 to be accurate enough to synchronize the DECT radios the network jitter must be low, that is the network packet delay must be close to constant.

The PTPv2 algorithms in the base stations have built-in filtering, which make them able to cope with some level of jitter. However, prolonged periods of large jitter can cause unstable or even loss of synchronization.

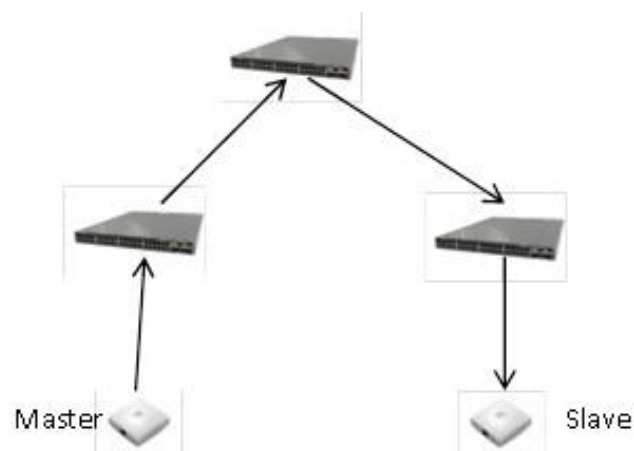
The corporate LAN must support the following specifications:

- **Maximum of 500 nanoseconds jitter of multicast Ethernet packets between all IP base stations being synchronized.**
- **Any single switch in the network cannot exceed 100nsec of jitter.**
- **PTPv2 event traffic must be given strict priority over all other network traffic.**
- **Multicast and the IGMP protocol (if used) must be configured per Spectralink requirements.**

- Network topology
- The traffic patterns on the network
- The quality and configuration of the switches

Network topology

Every time a PTPv2 packet passes through a switch - jitter is potentially added. Therefore, the number of switches between all base stations must be kept low. Because every individual base station can assume the role as PTPv2 master or slave regardless of its position in the network topology, a worst case position of master and slave must be considered when deploying the base stations in the network. The figure below illustrates this with a core switch with two access switches connected. Here the worst case path length is three switches.



Note: In the lab, the IP base stations have successfully been synchronized with 5 enterprise LAN switches between master and slave.

Traffic Load

The traffic load on the switches will also affect the jitter. High traffic load and especially a large number of large packets will increase the jitter. For example, a 1500 bytes data packet introduces an immediate 120 usec delay on a 100 Mbps link.

It is recommended that the core network links provides higher bandwidth than the access links, i.e. if the access links are 100 Mbps, the uplink and core network should be at least 1 Gbps. This will alleviate the probability of traffic saturating the network path used for the base station synchronization.

If the traffic load causes problems for the base station synchronization, it may be necessary to separate the base stations from the data network. Be aware that separation via VLAN may not help as it is still using the same physical link.

Quality and Configuration of the Switches

The LAN based synchronization is highly dependent on the quality and configuration of the deployment network. The single most important property of the switches in the network is their ability to forward multicast Ethernet packets with low jitter, i.e. close to a constant delay. The total forwarding jitter added by switches on any path through the deployment network should be less than one microsecond and preferably less than 100 nanoseconds.

Unfortunately, it is usually difficult to find the forwarding jitter specified for a given switch. Lab tests indicates that enterprise level switches generally has adequately low forwarding jitter, whereas SOHO and unmanaged switches often do not meet the requirements and thus must not be used.

When configuring the deployment network, multicast setup is critical for LAN synchronization to work. Multicast is usually either blocked, forwarded as broadcast to all ports, forwarded according to static configuration or forwarded to selected ports learned by IGMP snooping. The simplest option is to forward as broadcast to all ports, but this might create unwanted traffic on unrelated network parts. When using static configuration, the relevant multicast addresses listed earlier must be forwarded to the ports forming the deployment network. Enabling IGMP snooping on the switches allow them to automatically configure which ports the multicast packet should be forwarded to, minimizing the network load caused by the LAN synchronization. In order to keep the multicast configuration updated, a IGMP querier must be present in the network – this functionality can be enabled in many enterprise class switches.

Traffic Priority:

All time critical PTPv2 packets sent by the LAN synchronization software is by default marked with either an Expedited Forwarding (EF) (46/0x2e) priority for IPv4 and IPV6 packets or a Class of Service value of 7 for VLAN encapsulated Ethernet packets. This is to allow the switches to give preference to the LAN synchronization packets.

Since the Expedited Forwarding priority on IP packets is shared with voice RTP packets, this is not sufficient to ensure strict priority over all other traffic for the PTPv2 events packets. There are two possible solutions to this:

- Give the highest priority to a custom IP priority and configure the server to apply this IP priority to PTPv2 traffic.
- Give the highest priority to multicast UDP packets on port 319 with the destination address 224.0.1.129 (IPv4) or FF02::181 (IPv6).

Configuration and Administration

A few configuration settings are used to control base station synchronization via LAN.

DECT/IP-DECT Server System Settings

The system wide settings for synchronization via LAN are located under Configuration -> Wireless Server -> Base stations:

| | |
|-----------------------------|---|
| Default sync type | <p>This setting controls the default synchronization type for new base stations. The following values can be selected:</p> <ul style="list-style-type: none"> • Free running • Radio (default) • LAN |
| LAN sync transport protocol | <p>This setting controls the protocol used as transport for the PTPv2 packets used for synchronization. The following values can be selected:</p> <ul style="list-style-type: none"> • Ethernet • IPv4 (default) • IPv6 <p>IPv4 is the default and recommended in most networks.</p> |

Base Station Individual Settings

| | |
|------|--|
| Type | <p>This setting controls the synchronization type for specific base station. The following values can be selected:</p> <ul style="list-style-type: none"> • Free running • Radio • LAN • Gateway |
|------|--|

Base Station Synchronization Status

The synchronization status is displayed on the Administration -> Base Stations page of the web GUI. The Sync column displays a green icon for base stations that are currently running as slaves and a blue one for the current master.

Base stations

Refresh Clear Loops

Show All entries

| No | Serial | Description | RPN | Cluster | Firmware | Status | Uptime | Sync | Sync Source | Lost | LAN delay / μs | LAN jitter / ns |
|----|---------|------------------------------|-----|---------------------|-------------|--------|------------|------|-------------|------|----------------|-----------------|
| 0 | 8391721 | Production v. basementstairs | 0 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | Radio: 5 | | | |
| 1 | 8453447 | NEW RFP IT department | 7 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 2 | 8471876 | NEW RFP Academy | 17 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 4 | 8391866 | Leif - Serial: 0008391866 | 4 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | Radio: 5 | | | |
| 5 | 8391864 | Production | 5 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | Radio: 13 | | | |
| 12 | 8388987 | incoming inspection | 12 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | Radio: 5/0 | | | |
| 13 | 8453790 | NEW RFP Oasen | 13 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 14 | 8389042 | PTA serial: 0008389042 | 14 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | Radio: 5/0 | | | |
| 15 | 8453837 | R&D | 15 | Spectralink_Horsens | devel 54057 | ✓ | 8:01:15:18 | ✓ | LAN: 20 | 0-0% | 11 | 34 |
| 16 | 8454024 | NEW RFP Indkøb | 16 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 18 | 8453879 | NEW RFP Mroom 8 1st floor | 18 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 19 | 8453834 | NEW RFP RnD Kristian | 19 | Spectralink_Horsens | | ✗ | 0:00:00:00 | ⊗ | LAN | | | |
| 20 | 8453817 | Service...osv. | 20 | Spectralink_Horsens | devel 54057 | ✓ | 8:01:15:20 | ⊕ | LAN | | | |

Showing 1 to 13 of 13 entries

First Previous 1 Next Last

Synchronization Free running Synchronized Not synchronized Unknown

The “Lost” column displays the number of times the synchronization has been lost and a percentage which is the ratio of time the base station has been without synchronization. The lost counter must be low but is expected to grow slowly over time. The percentage will start high and must be zero after some time.

Chapter 6: Troubleshooting

Synchronization

Table 4 Synchronization

| Symptom | Problem | Resolution |
|---|---|---|
| All base stations are synchronization masters | Multicast traffic is blocked in the network. | Enable multicast traffic on all switches between the base stations. |
| Synchronization is OK at startup but fails after a short period | IGMP snooping is active, but no IGMP querier is present on the network to refresh multicast group memberships. | Add an IGMP querier to the network or disable IGMP snooping. |
| Base stations do not synchronize or lose synchronization often. | The traffic between base stations is being delayed a varying amount of time due to traffic load, switch quality or configuration. | Reconfigure/replace switches or change the network topology to minimize the transmission time variance. |

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