Multi-zone configuration guide

for

RTX8663 base station

Trademarks

RTX and all logos thereof are trademarks of RTX A/S, Denmark.
Other product names used in this publication are for identification purposes and may be trademarks of the respective companies.

Disclaimer

This document and the information contained is property of RTX A/S, Denmark. Unauthorized copying is not allowed. The information in this document is believed to be correct at the time of writing. RTX A/S reserves the right at any time to change said content, circuitry, and specifications.

Confidentiality

This document should be regarded as confidential.

© 2026 RTX A/S, Denmark, all rights reserved
Stroemmen 6, DK-9400 Noerresundby
Denmark
P. +45 96 32 23 00
F. +45 96 32 23 10
www.rtx.dk

Additional information:
Ref: HDJ, DVV, JON
Reviewed by: STA

Contents

1 Document info 5
1.1 Document scope 5
1.2 References 5
1.3 Terms and abbreviations 5
1.4 Document history 6
2 General information 7
2.1 Precision Time Protocol (PTP) 7
2.1.1 Layer 2 (ethernet) 7
2.1.2 Layer 3 (IP) 7
3 Requirements 7
3.1 Network equipment 7
3.2 Network 7
3.2.1 Jitter 7
3.2.2 Network delays 8
3.3 Network configuration 8
3.3.1 Routing 8
3.3.2 Multicasting 8
3.3.3 Network traffic during a call 9
3.3.4 Firewall (ports) 9
3.4 LAN sync 10
3.5 Multi-zone 10
3.6 PARI license 10
4 Recommendation 12
4.1 Zone (multicell) 12
4.2 Multi-zone 12
4.3 LAN sync 12
4.4 Handsets/headsets (PPs) 12
4.5 Selecting primary and alternative primary 12
5 Limitations 13
5.1 System limitations 13
5.2 LAN sync and Over-The-Air sync 13
6 Manual configuration 13
6.1 Prerequisites 13
6.2 LAN sync 13
6.2.1 Step 1 14
6.2.2 Step 2 14
6.2.3 Step 3 14
6.2.4 Step 4 15
6.3 Multi-zone 16
6.3.1 Step 1 17
6.3.2 Step 2 18
6.3.3 Step 3 19
6.3.4 Step 4 19
6.3.5 Step 5 20
6.3.6 Step 6 21
6.3.7 Step 7 21
6.3.8 Step 8 22
6.3.9 Step 9 22
7 Deployment scenarios 23
7.1 Campus 23

7.1.1 Requirements 24
7.1.2 Network layout 24
7.1.3 Multi-zone 25
8 Appendix A: Call flows 26

Figures

Figure 1: Jitter 8
Figure 2 Network traffic during a call 9
Figure 3 The RPN00 base station - Multicell settings menu 10
Figure 4: LAN sync setup 14
Figure 5: Site-to-site sync setup - primary zone 15
Figure 6: Site-to-site sync setup - secondary zone 16
Figure 7: Multi-zone settings 17
Figure 8: Multi-zone settings - new PARI license key 18
Figure 9: Multi-zone settings - zone 19
Figure 10: Multi-zone settings - primary/secondary 19
Figure 11: Multi-zone settings - multi-zone system 20
Figure 12: Multi-zone settings - enable multi-zone system 21
Figure 13: Multi-zone settings - add zone 21
Figure 14: Multi-zone settings - zone sync 22
Figure 15: Campus map 23
Figure 16: 3D satellite view of campus 23
Figure 17: Network layout of the campus 24
Figure 18: Multi-zone calls inside zone 26
Figure 19: Call not in home base 27
Figure 20: Call with handset in away zone 28
Figure 21: Handset 1 is calling handset 2 - both are in foreign zones 29
Figure 22: Handset 1 is calling handset 2 – both are in foreign zones (different) 30

Tables

Table 1: Jitter 7
Table 2: Firewall ports - outgoing connections from base stations 11
Table 3: Multi-zones 16

1 Document info

1.1 Document scope

This document provides guidance on how to configure a DECT system using multi-zone. Multi-zone is an extension to the multicell system which allows 2-16 multicell systems to be joined and form a single system, with up to 4.000 base stations and 16.000 handsets.

Multi-zone enables the use of DECT handsets and headsets from one multicell to another when joined into a multi-zone system. Multi-zone also provides handover between multicell (also referred to as zones) in the same multi-zone setup, provided there is DECT coverage between the zones and LAN sync is configured.

1.2 References

System designers or other readers of this document may find additional information and supportive specifications in the following documents.

Reference	Name
1	VoIP DECT system Traffic planning and deployment
2	VoIP System guide (latest version)

1.3 Terms and abbreviations

Abbreviation	Description
Air sync	Air sync is used, when base stations in a multicell system, synchronize Over-The-Air, also referred to as OTA sync.
DECT	Digital Enhanced Cordless Telecommunications
DECT MAC Connection	Is the wireless connection between the FP and PP.
FP	Fixed Part (base stations)
Handover	When a handset does have an active call and then moves away from the base station where the call is started. The audio stream will be relayed to the new base station and the handover will be seamless. Normal audio calls will not notice the handover. Music streaming, or a test tone may have few samples disturbance during the handover. Handover between base stations within a zone or between zones are handled in the same way.
Home base station	The base station, which handles the SIP registration and all call related signaling, is called the home base station.
Home zone	Home zone is the zone where the handset (PP) is first registered/provisioned. One handset must only be registered in one zone. This means that its IPEI MUST only be provisioned/exist in one zone. The zone where its IPEI is defined is called its home zone.
ISP	Internet Service Provider
IPEI	International Portable Equipment Identity
LAN	Local Area Network
LAN sync	LAN sync is used, when base stations in a multicell system synchronize over LAN instead of OTA.
Multicell	Multicell is a system that consists of 2-254 base stations, in a multi-zone system also referred to as a zone.
Multi-zone	Multi-zone system is a system that consists of two or more zones.
NAT	Network Address Translation
ns	Nanosecond
OTA	Over-The-Air
PP	Portable Part (handsets and headsets) **Note** Location Gateways are not supported.
PTP	Precision Time Protocol
PTT	Push To Talk

Abbreviation	Description
SIP	Session Initiation Protocol
SRTP	Secure Real-time Transfer Protocol
Site-to-site Connection	Site-to-site connection is used, when referring to connections between two sites that are not on the same LAN.
VLAN	Virtual Local Area Network
µs	Microsecond

1.4 Document history

Revision	Resp.	Date	Change History
1.0	HDJ/DVV/BKI	22-May-25	First published version.
1.1	HDJ/JON	30-Sep-26	• Added a requirement in the "Network Equipment" subsection about network switches PTP Transparent Clock support. • Added system limitations describing zone dependency and startup behavior when using External LAN Sync. • Added a note to the "Multi-zone" subsection (under "Manual Configuration") providing recommendations for Zone 0 sizing and the use of External LAN Sync.
1.2	JON	28-Oct-2026	Added limitation describing temporary audio loss during active inter-zone calls when Zone 0 is forcibly rebooted to the “System limitations” subsection.

2 General information

2.1 Precision Time Protocol (PTP)

Multi-zone uses PTP protocol to communicate between zones.

2.1.1 Layer 2 (ethernet)

PTP is commonly implemented at layer 2, where it is Ethernet frames for communication (Measured in microsecond (µs)). This approach allows for low-latency communication and precise time synchronization, as it bypasses IP routing. Layer 2 PTP packets are typically multicast within a local network, making it ideal for devices on the same network segment.

2.1.2 Layer 3 (IP)

PTP can also operate over layer 3 using UDP/IP packets, enabling time synchronization across routed networks. This is especially useful in complex networks where different segments or VLANs need time synchronization across layer 3 boundaries. Multicast or unicast methods can be used at layer 3 for distributing PTP packets.

3 Requirements

For a multi-zone system to function correctly there are some requirements that need to be fulfilled.

3.1 Network equipment

All switches must fulfil the following:

- Requirements in IEEE1588-2019 standard
- Use DSCP as QoS
- Support PTP Transparent Clock

3.2 Network

As IEEE1588 standard uses PTP, and this protocol is very sensitive to rapid changes in network delays and rapid fluctuations, the following network requirements must be meet:

- The backbone network must not exceed 50 percent of total link load
- All base stations must be connected to a dedicated VLAN
- The dedicated VLAN must have highest priority, on all switched connected to the LAN
- Must support multicast datagrams from IEEE1588

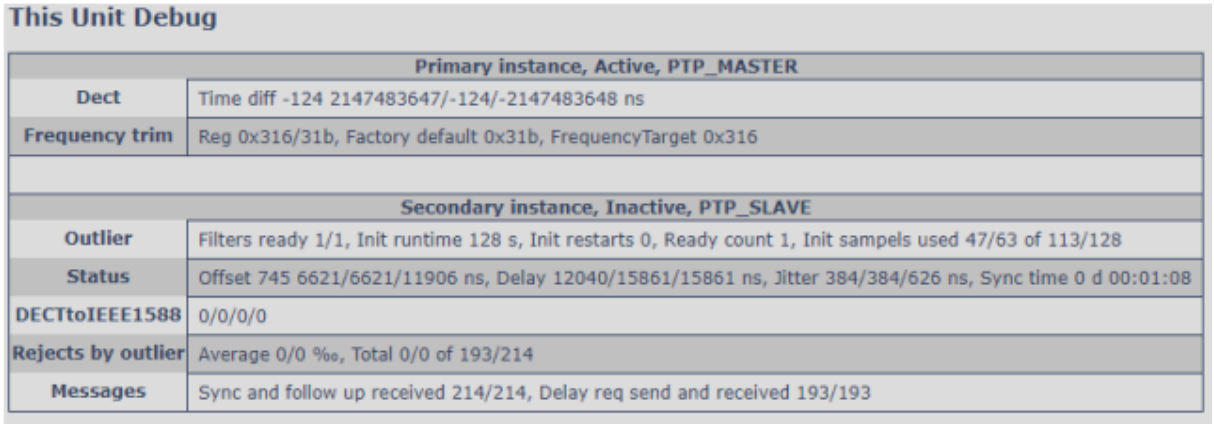
3.2.1 Jitter

The most important thing in a PTP setup is the jitter between base stations, as high jitter will cause the base station to get out of sync and this will cause the system not to function correctly.

	Time in µs	Time in ns
Excellent	0-499 µs	0-499.000 ns
Good	500-1.500 µs	500.000-1.500.000 ns
Acceptable	1.501-2.000 µs	1.501.000-.2.000.000 ns
Bad	2.001+ µs	2.001.000+ ns

Table 1: Jitter

The jitter mentioned is the average jitter on the network and can be seen on the base station.
In the below screen shot (Status) shows the delay in the network. (Min/Avg/Max). Spikes in the jitter (Max) can have affect on the performance.



This Unit Debug

Primary instance, Active, PTP_MASTER	
Dect	Time diff -124 2147483647/-124/-2147483648 ns
Frequency trim	Reg 0x316/31b, Factory default 0x31b, FrequencyTarget 0x316
Secondary instance, Inactive, PTP_SLAVE	
Outlier	Filters ready 1/1, Init runtime 128 s, Init restarts 0, Ready count 1, Init sampels used 47/63 of 113/128
Status	Offset 745 6621/6621/11906 ns, Delay 12040/15861/15861 ns, Jitter 384/384/626 ns, Sync time 0 d 00:01:08
DECTtoIEEE1588	0/0/0/0
Rejects by outlier	Average 0/0 ‰, Total 0/0 of 193/214
Messages	Sync and follow up received 214/214, Delay req send and received 193/193

Figure 1: Jitter

3.2.2 Network delays

- PTP is sensitive to rapid changes in network delays
- Rapid fluctuations in the network delay e.g., caused by a backup job in another VLAN
- The DECT VLAN is not configured to be the highest priority
- The sync offset between the base station was reaching critical levels

Combined jitter must be less than +/- 2µs. However, to allow air-travel and some slack, the requirement is +/- 1.6µs. The delay itself is not significant. However, it is assumed that we can do a full transaction before a new starts (clock transaction starts every second).

3.3 Network configuration

This section covers information on how the network equipment should be configured to support a multi-zone system.

3.3.1 Routing

When configuring network routing, NAT between the base station is not allowed. Multi-zone does not work if there is a NAT between any of the base stations.

Note If there is a NAT between two or more multi-zones, e.g., if two multi-zones are placed in two different networks with an Internet Service Provider (ISP) between, use a VPN to abstract away the NAT (as shown in Figure 17).

3.3.2 Multicasting

Multicast must be enabled on the VLANs/networks that the base station are connected to, otherwise the LAN sync cannot use PTP to keep the inner clock of the base station synchronized.

Note PTP is implemented to work with multicast only, so it is not possible to use unicast.

3.3.3 Network traffic during a call

Calls between two handsets within their home zone and located at the home zone are always relayed back to the handset home base (where the handset is SIP registered). The base station then connects to the SIP server. See Figure 2 Network traffic during a call.

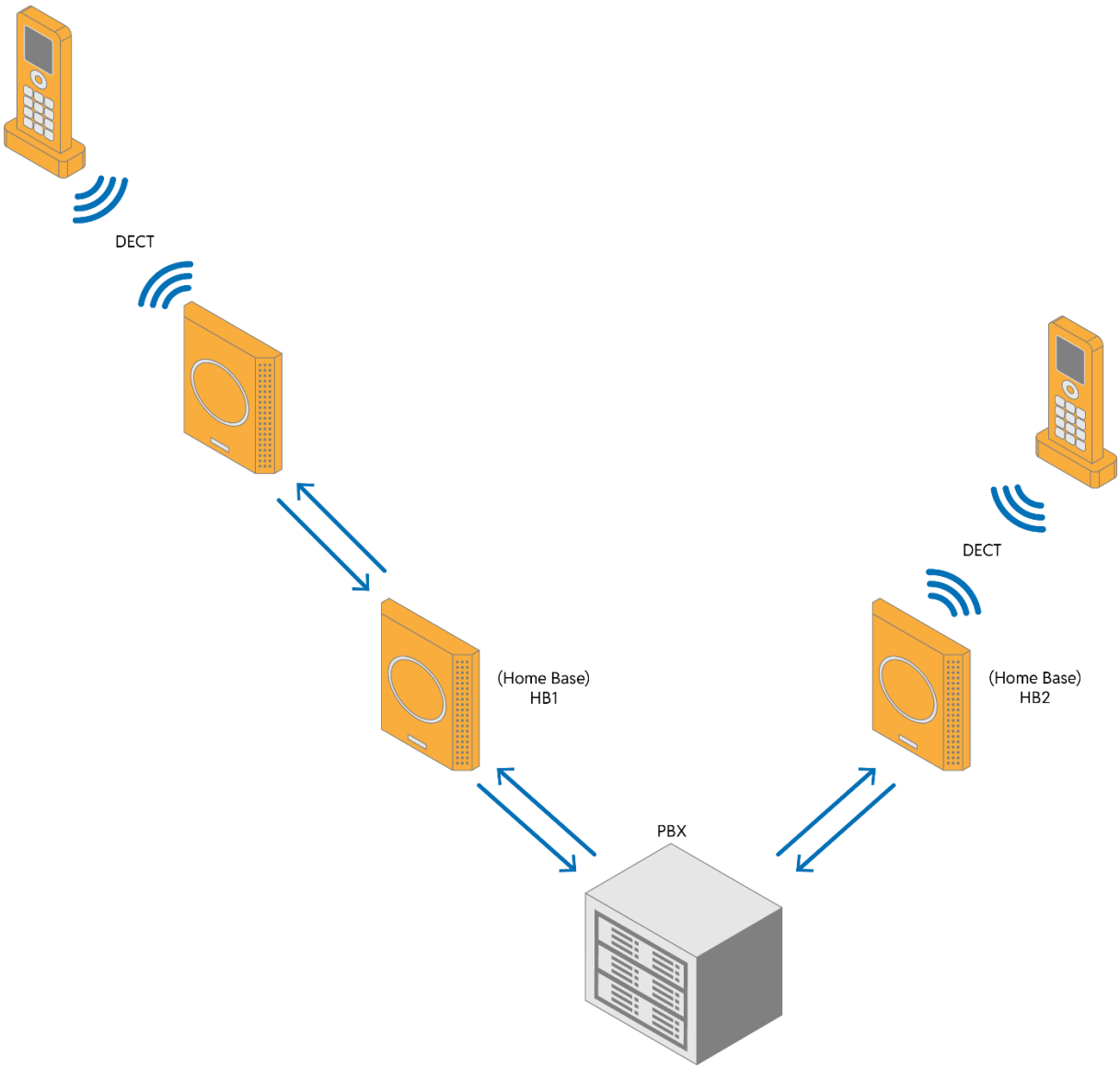


Figure 2 Network traffic during a call

Note Call between ANY two handsets from different zones, are handled the same way. All base stations in the multi-zone know the IP address of the home base stations within their home zone of ANY handset identified by International Portable Equipment Identity (IPEI). Therefore, it is vital that the IPEI is unique within a multi-zone deployment.

For a more detailed understanding of the call flow, refer to Appendix A: Call flows.

3.3.4 Firewall (ports)

Connections which are required to pass through the firewall are listed in Table 2, the definitions in the **Endpoints** columns for Table 2 are as follows:

All base stations in the zone
All base stations in a zone need to be able to communicate with all other base stations in the same zone.

All base stations in all zones
Every zone has multiple base stations, and all base stations in all zones need to be able to communicate with all other base stations in any zone.

All primary and second base stations in all zones
Every zone has a primary and a secondary base station, and they need to communicate with each other.

3.4 LAN sync

If the following requirements must be upheld, for handover to work between different buildings (zones) and/or base station.

When configuring different LAN sync systems for use in a multi-zone system, it is required that each system uses a unique combination of:

- Multicast IP address
- Multicast port
- Domain number
- Alternative domain number

This combination needs to be unique in zones and any other PTP providers in the network, see Figure 4. If this is not unique, the different PTP providers may interfere with each other.

3.5 Multi-zone

If a handover is required to work between two or more zones, the site-to-site sync for the different zones must be configured to use the same PTP source.

Note All base stations must be able to contact any other base station in any other zone, based on the IP address of the base station, see subsection 3.4

3.6 PARI license

A separate PARI license is needed to enable the multi-zone. A PARI license key is needed for each system, not for each zone. To obtain a PARI license key, please raise a ticket in **RTX Jira Service Portal** providing the MAC address of the base station with RPN00 in zone 0 – see Figure below.

Note The IP address in Figure below is replaced with AAA.BBB.CCC.DDD, the MAC address is replaced with AABBCCDDEEFF, and versions are replaced with XXX.YYY.

Base Station Group

DECT sync source recovery: Restore saved tree / Save current tree

	ID	RPN	Version	MAC Address	IP Address	IP Status	DECT sync source	DECT property	Ieee1588 state	Base Station Name
☐	0	00	XXX.YYY	AABBCCDDEEFF	AAA.BBB.CCC.DDD	This Unit	Primary:RPN35 (-∞dBm	Locked	LAN:ID:53	BS-000

Figure 3 The RPN00 base station - Multicell settings menu

When a system is using LAN sync **DECT sync source**, the dBm will always be -∞dBm, as the OTA is turned off in LAN sync mode.

Type	Port	Endpoints	Protocol name	Configurable
UDP / TCP	53	DNS Server	DNS	No
UDP	67	DHCP Server	DHCP	No
UDP	69	Firmware update	TFTP	Yes
UDP	69 / 80 / 443	Provisioning server	TFTP/HTTP/HTTPS	Yes
UDP	123	NTP server	NTP	No
TCP	389/636	LDAP server	LDAP / LDAPS	Yes
UDP	514	Syslog server	Syslog	Yes
TCP	6514	Syslog server	Syslog (TLS)	Yes
UDP	1300	Messaging server	Messaging	Yes
UDP / TCP	5060	PBX server	SIP	Yes
TCP	5061	PBX server	SIP (TLS)	Yes
UDP	50004-50258	PBX server	SRTP	Yes
UDP	319	All base stations in the zone	PTP	Yes
UDP	320	All primary and second base stations in all zones	PTP	Yes
UDP/ TCP	5060	All base stations in all zones	SIP	Yes
TCP	5061	All base stations in all zones	SIP (TLS)	Yes
TCP	10010	All base stations in all zones	TREL (data)	No
TCP	10011	All base stations in all zones	TREL (config)	No
UDP	50004-50258	All base stations in all zones	SRTP	Yes
UDP	68	DHCP server	DHCP	No
UDP	1300	Messaging server	Messaging	Yes
TCP	80	Management network	HTTP	No
TCP	443	Management network	HTTPS	No
UDP	4000	Management network	Is it alive?	No
TCP	10491	Management network	RTX EAI (debug only)	No
UDP	319	All base stations in all zones	PTP	Yes
UDP	49200-50000	All base stations in all zones	MC multicast (in cell)	No
UDP	320	All primary and seconds base stations in all zones	PTP	Yes
UDP / TCP	5060	All base stations in all zones	SIP	Yes
TCP	5061	All base stations in all zones	SIP (TLS)	No
TCP	10010	All base stations in all zones	TREL (data)	No
TCP	10011	All base stations in all zones	TREL (config)	No
UDP	12285	All base stations in all zones	STATISTICS (latency)	No
UDP	42000	All base stations in all zones	PTT	No
UDP	49100	All base stations in all zones	ZoneMGR (across zones)	No
UDP	50004-50258	All base stations in all zones	SRTP	Yes

Table 2: Firewall ports - outgoing connections from base stations

4 Recommendation

4.1 Zone (multicell)

Each zone can contain 2-254 base stations and up to 1.000 handsets/headsets. However, it is recommended to keep the zone as small as possible, as this reduces the load on the base station. E.g., if you have a system with 800 base stations, this can be divided into 4 zones (3x254 + 1x38), but as you have 16 zones available, it is recommended to divide it into e.g., 8 zones with 100 base stations in each is possible.

4.2 Multi-zone

Multi-zone data synchronization is using Peer-to-Peer communication between the zones. This means that the configuration of the primary/secondary MAC address and IP address MUST use equal parameters in ALL zones. Data between the zones is encrypted using a commonly known value across the zones. This value is based on the primary MAC address of the zones 0. Therefore, it is necessary to reconfigure ALL zones to use a new primary MAC address if this is changed. All base stations across all zones must be able to make a direct TCP connection between each other. If the network does not support this, the multi-zone system will not function.

4.3 LAN sync

LAN sync is only necessary, if handover between two or more zones is needed. In this case, the site-to-site sync also needs to be enabled. When using site-to-site sync, all zones need to use the same settings for this. Network isolated regarding multicast PTP must define a primary zone in each network. For example, see section 7.

4.4 Handsets/headsets (PPs)

It is recommended to assign handsets/headsets to the zone where they reside most of the time.

4.5 Selecting primary and alternative primary

It is recommended to manually select which ‘base stations’ are the primary and alternative primary LAN sync controller because if it is set to automatic, the primary and alternative primary LAN sync controller will be selected based on the lowest MAC address and there are no guarantees that the automation will select the best placed base station for the job.

It is recommended that you select base stations that are closest to the core switch, to ensure the best connection and shortest path to end nodes.

5 Limitations

5.1 System limitations

- Each zone is limited to 1000 handsets/headsets (PPs) per zone
- Max 16 zones in one multi-zone system
- No repeaters (not supported)
- 1.000 SIP registrations per zone*
- 2.000 calls in each zone*
- Max 4.000 base stations (FPs) in a multi-zone system
- Max 16.000 handsets/headsets (PPs) in a multi-zone system
- Changes made in one zone are only synchronized to all base stations in the specific zone
    - Each zone should be seen as a separate system and multi-zone is a way to join multiple zones into a single system
- PP information is only visible in the zone where the PPs are registered
- Primary and secondary zone controllers will not be assigned to any SIP registration
- When External LAN Sync is enabled, the DECT interface of a zone (e.g. handset connectivity) will not become operational after a restart until a valid synchronization signal is received via the External LAN Sync source.
- A zone can only serve as an extender network for another zone. E.g. handsets registered to Zone 1 are owned exclusively by Zone 1 and cannot operate through another zone if Zone 1 becomes unavailable. Therefore, if a zone fails, handsets belonging to that zone will lose service.
- If active calls are established between handsets registered in different zones and Zone 0 is forcibly rebooted, the calls remain connected, but audio will be interrupted for more than one minute during the reboot process.
    - For example, this behavior can occur for: A call between two DECT/SIP-registered handsets in Zone 1. A call between a DECT/SIP-registered handset in Zone 2 and a DECT/SIP-registered handset in Zone 3.

  During the Zone 0 reboot, the affected calls are not disconnected; however, two-way audio may be unavailable for more than one minute until system communication is re-established.

*Refer to reference no. 2 for call capacity overview, as multiple factors can have an influence on max number of active calls.

5.2 LAN sync and Over-The-Air sync

A multi-zone system supports zones that are running both types of synchronization, but handover is only possible between zones running LAN sync.

6 Manual configuration

6.1 Prerequisites

- Network equipment as described in subsection 3.1
- PARI License as described in subsection 3.6
- 2+ multicell system setups as described in reference no. 2

6.2 LAN sync

To configure a multi-zone system, each zone needs to be configured as LAN sync, before the site-to-site sync is set up. It is possible to have both OTA sync and LAN sync in the same multi-zone system, however handover will only work between zones running LAN sync.

6.2.1 Step 1

Go to the **LAN Sync** section in the side menu.

6.2.2 Step 2

Set the drop-down menu for **IEEE1588** to **Enabled**, as shown in Figure below.

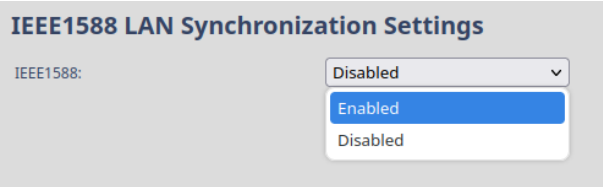


Figure 4: IEEE1588 drop-down menu

6.2.3 Step 3

Configure the **Zone LAN sync setup** as shown in Figure 4 below.

Multicast IP address
To a multicast address which is not used by anything else and ensure that nothing is blocking it (default: 224.0.1.129).

Multicast port
To a port which is not used by anything else and ensure that nothing is blocking it (default: 319).

Domain number
With a number which is not used by anything else (default: 0).
Allowed values: 0-127

Alternative domain number
With a number which is not used by anything else (default: 64).
Allowed values: 0-127

Multicell debug
Set to None unless you need to collect debug information (this should only be turned on if requested by RTX).

Note The multi-zone system does not integrate/coordinate with other PTP providers, it only accepts the PTP packages from the IP address from within the multicell setup. However, it may still interfere with other PTP providers if they are using the same:

- Multicast IP address
- Multicast port
- Domain number
- Alternative domain number

Keep the requirements from subsection 3.2 in mind when configuring the multi-zone system.

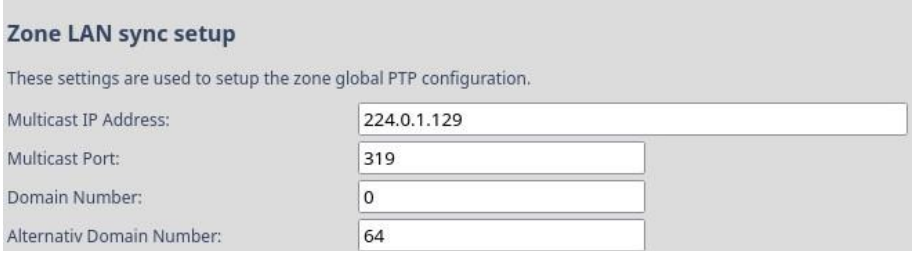


Figure 4: LAN sync setup

6.2.4 Step 4

Configure the site-to-site connection, see Figure 5 and Figure 6 below

External sync source
From the drop-down menu:

- Disabled
- Secondary
- Primary

Primary zone
It is an alias for grandmaster in PTP. It can also be referred to as **Sync time source**.

Secondary zone
It is an alias for slave clock in PTP. It can also be referred to as **Sync time receiver**.

Disabled
Is only used in a multi-zone setup, if there is no need for zones to be in sync with each other in the multi-zone setup. An example of this is given in subsection 6.1.3.

Multicast IP address
Must be a multicast address which is not used by anything else and ensure that nothing is blocking it (default: 224.0.1.129).

Multicast port
Must be set to a port number not used by anything else and should be a port number not used by anything. Also, make sure that nothing is blocking it (default: 319).

Domain number
Must be a number which is not used by anything else (default: 1).
Allowed values: 0-127

Alternative domain number
Must be a number which is not used by anything else (default: 65).
Allowed values: 0-127

Note If the **Multicast port** in the site-to-site connection is the same port as in one of the zones, then a port conflict will occur, because two services are trying to use the same port. There are no error messages if this happens.

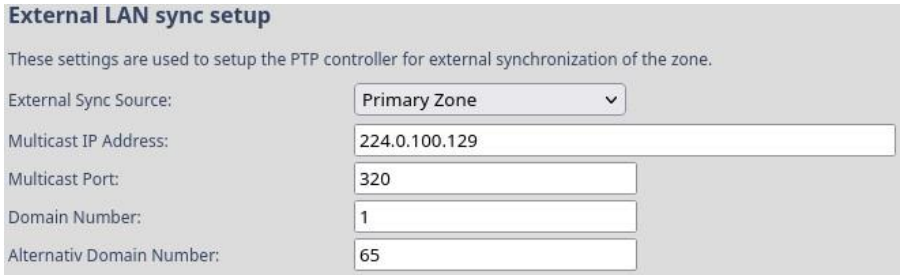


Figure 5: Site-to-site sync setup - primary zone

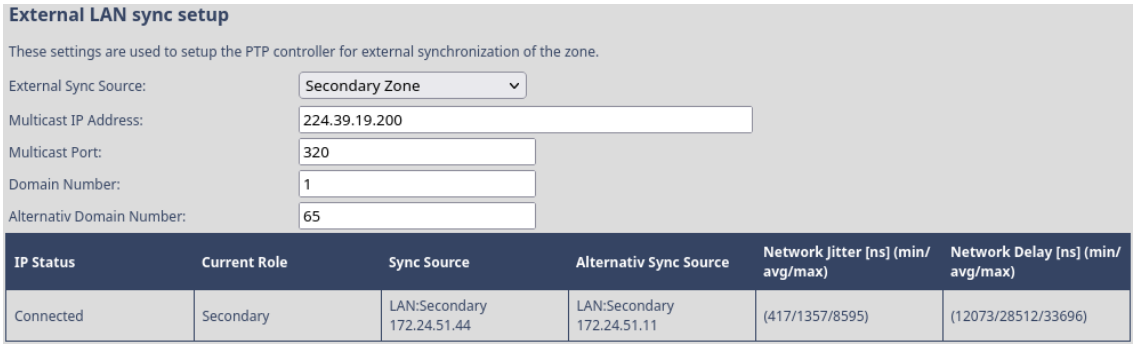


Figure 6: Site-to-site sync setup - secondary zone

6.3 Multi-zone

Note Zone 0 is a critical part of the system architecture, and its availability directly affects system operation.
To minimize the impact of failures, it is recommended to keep Zone 0 as small as possible (typically 2-4 base stations).

When External LAN Sync is enabled, the Zone 0 Clock Master should be configured as the primary synchronization source.
When External LAN Sync is used, it is recommended to configure Zone 0 as the primary LAN synchronization source.

It is possible to link up to 16 zones together into one multi-zone system. Fill in a table with the IP and MAC address from the primary and secondary base station, including the zone name, for all your zones. See Table 3 below.

Index	Zone name	Primary MAC	Primary IP	Secondary MAC	Secondary IP
0	Zone 0				
1	Zone 1				
…	Zone …				
15	Zone 15				

Table 3: Multi-zones

From here on, each zone will be referred to by its index number, so **Zone 0** will be referring to first row of the table.

6.3.1 Step 1

Go to the webpage (as show in Figure 7 below) of the primary base station of **Zone 0** and do the following:

1. Enable **Multi-zone system**
2. Insert the name of the zone in the **Zone name** field
3. Insert the PARI license in the **PARI license** field
4. Enable **SARI (FFFFFFFF)**
5. Click **Save**

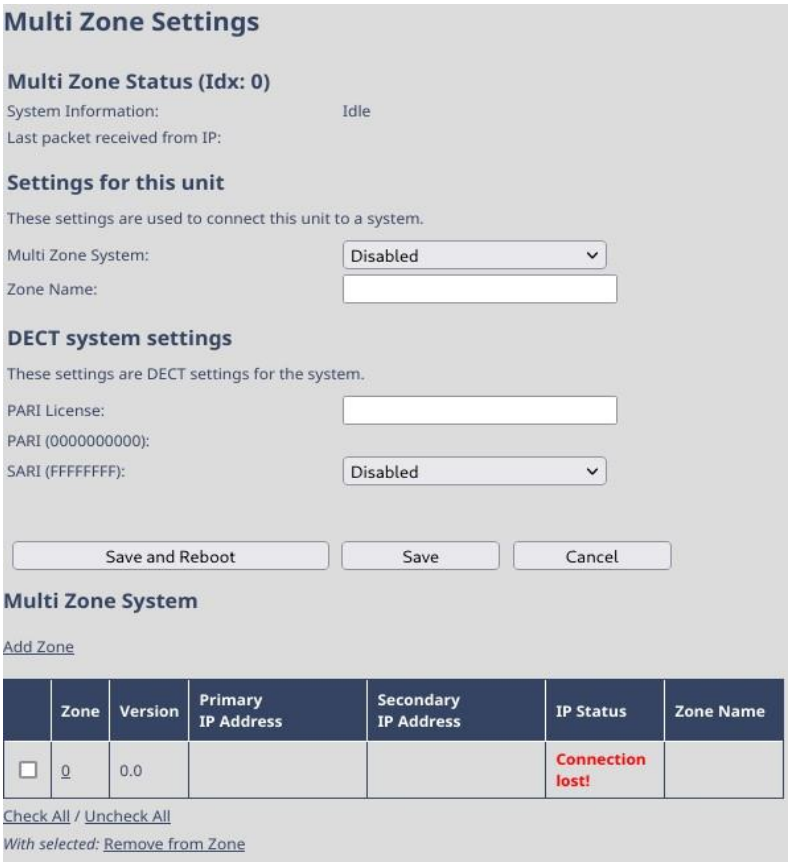


Figure 7: Multi-zone settings

6.3.2 Step 2

Verify that the PARI key was accepted by the base station.

- PARI (0000000000)
- SARI (FFFFFFFF)

The value in parenthesis should be filled in with a different value, as shown in Figure 8.

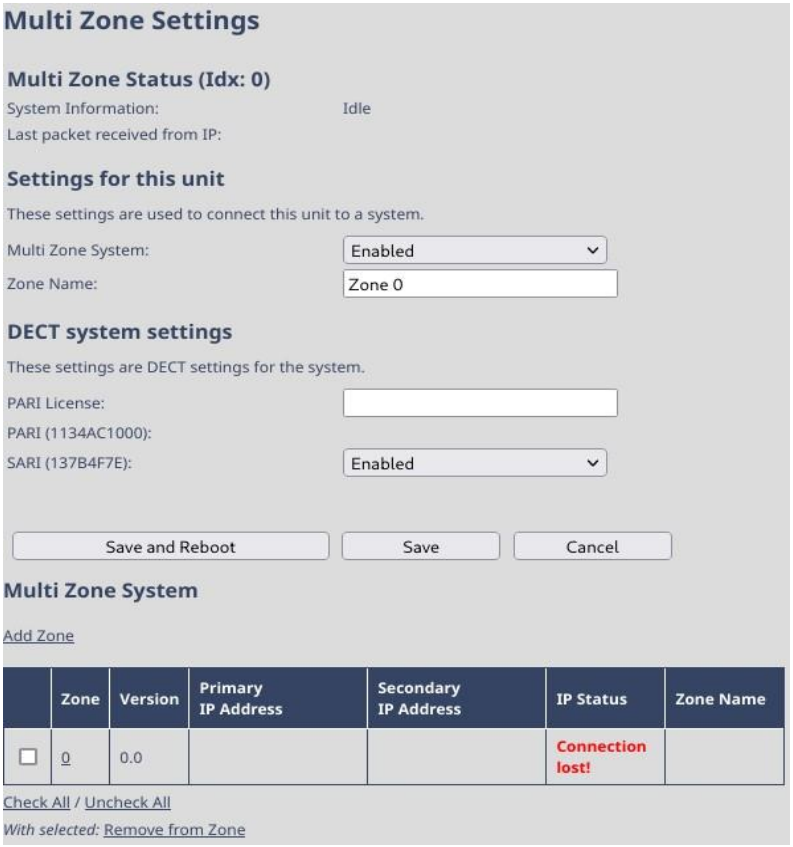


Figure 8: Multi-zone settings - new PARI license key

6.3.3 Step 3

Click on the **0** in the column **Zone** in the table **Multi-zone system**, as shown in Figure 9.

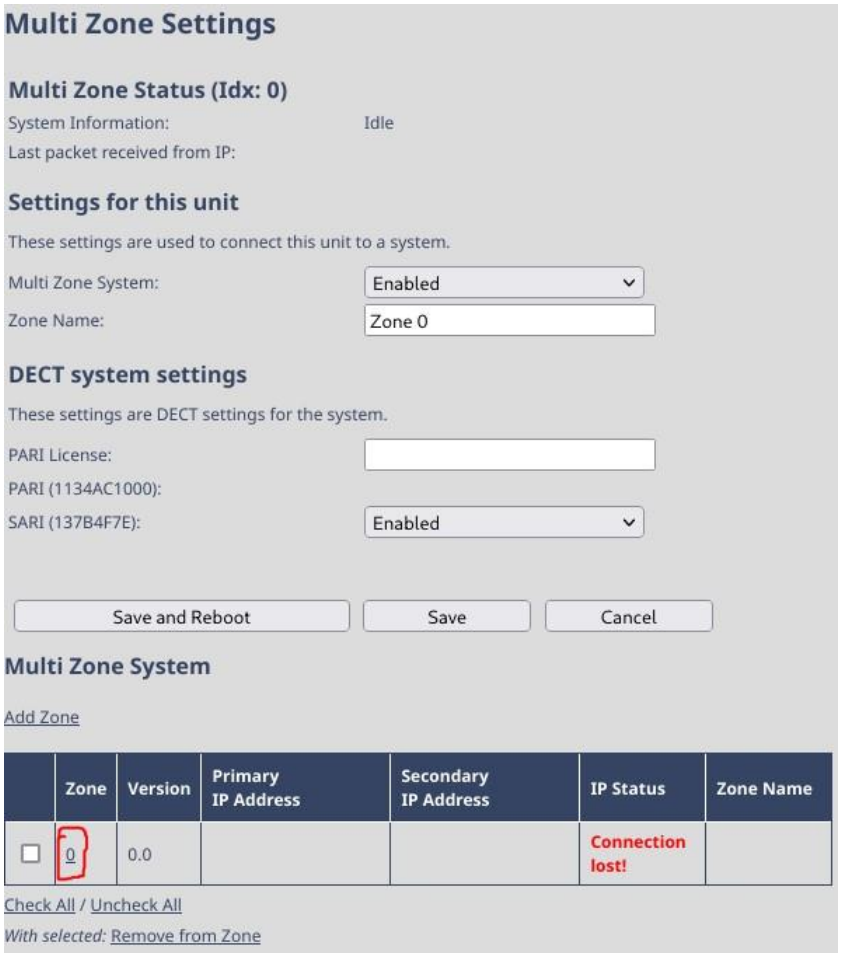


Figure 9: Multi-zone settings - zone

6.3.4 Step 4

Fill out the fields (shown in Figure 10 below) with information from **Zone 0** – refer to what you filled in in Table 3 and click **Save**.

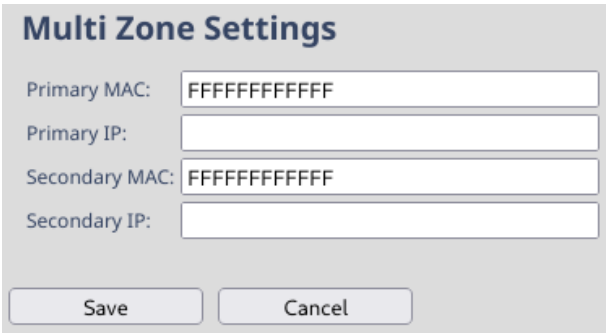


Figure 10: Multi-zone settings - primary/secondary

6.3.5 Step 5

The information from **Zone 0** should show up in the **Multi-zone system** table in the first row, as shown in Figure 11.

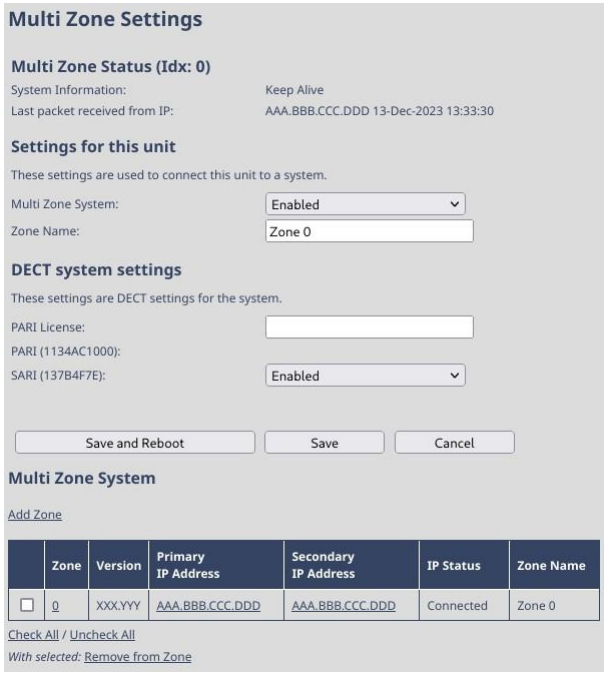


Figure 11: Multi-zone settings - multi-zone system

Note The IP address in Figure 11 above is replaced with AAA.BBB.CCC.DDD and versions is replaced with XXX.YYY.

6.3.6 Step 6

Go to the webpage of primary base station for **Zone 1**

1. Enable **Multi-zone system**
2. Insert the name of the zone in the **Zone name** field
3. Click **Save** as shown in Figure 12

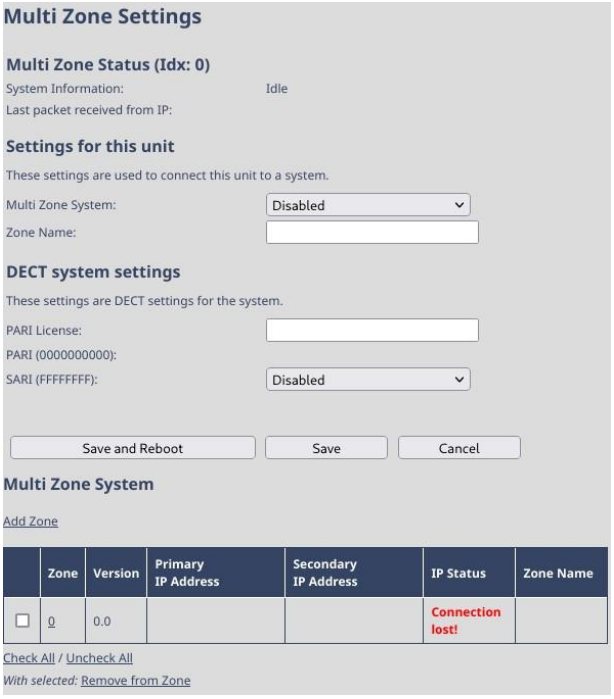


Figure 12: Multi-zone settings - enable multi-zone system

6.3.7 Step 7

Click **Add zone** in the **Multi-zone system** table, as shown in Figure 13.

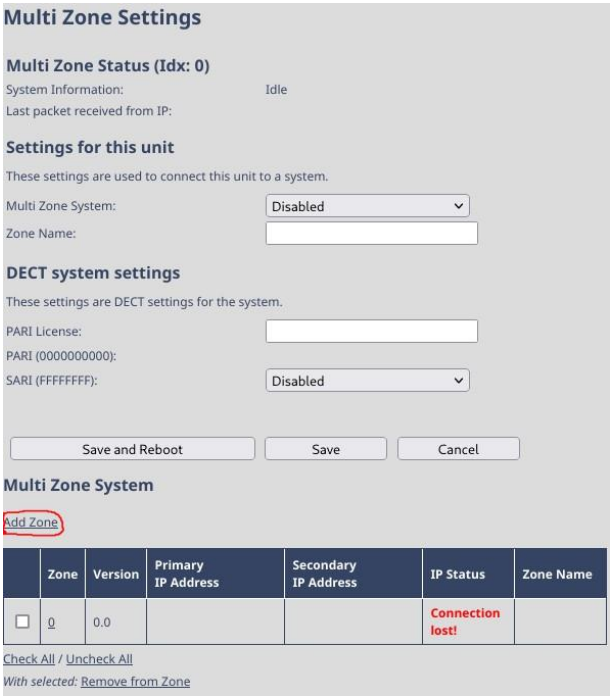


Figure 13: Multi-zone settings - add zone

6.3.8 Step 8

Fill out the fields (shown in Figure 10 above) with information from **Zone 0** – refer to what you filled in in Table 3 and click **Save**.

6.3.9 Step 9

Wait until the system has synchronized (it can take a few minutes). After the synchronization is done, the **Multi-zone** page on the primary and secondary base stations in all zones should look the same, see Figure 14. To add more zones to the multi-zone system, repeat step 6-8.

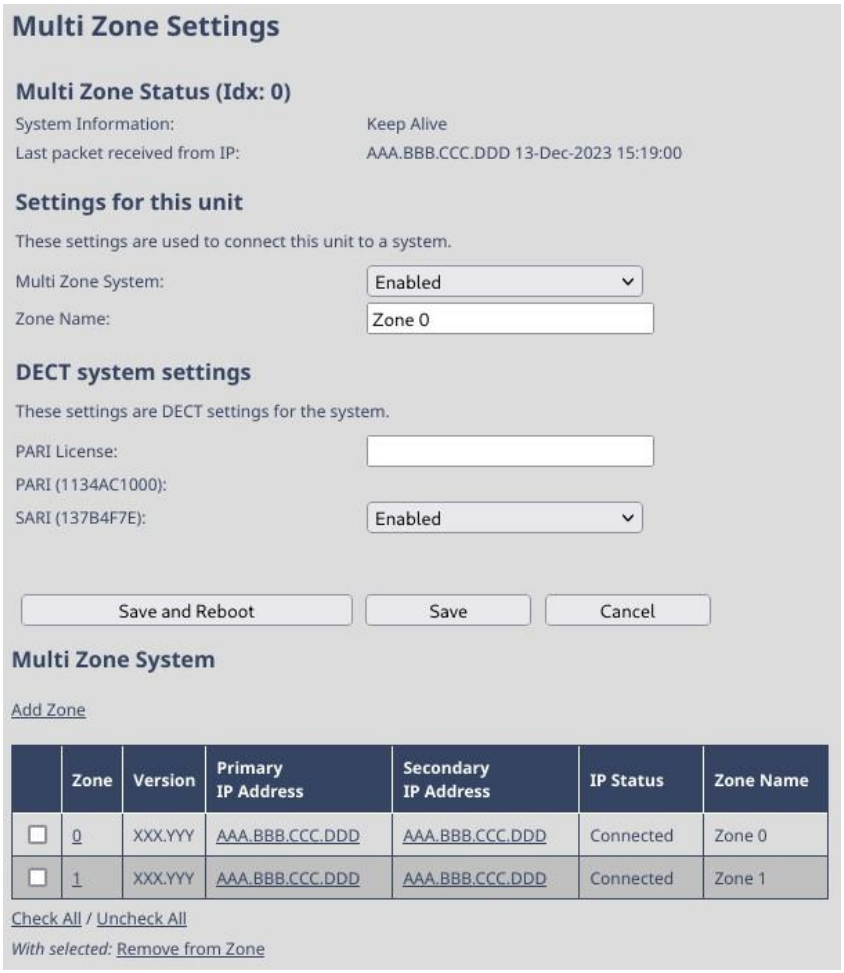


Figure 14: Multi-zone settings - zone sync

Note The IP address in Figure 14 above is replaced with AAA.BBB.CCC.DDD, and versions is replaced with XXX.YYY.

If the **Multi-zone system** table does not contain the same primary and secondary IP addresses, then it needs to be updated manually. Click on the number in the **Zone** column for the zones which have the wrong IP addresses. Then update the IP addresses and click **Save**.

7 Deployment scenarios

The different deployment scenarios are described in this section.

7.1 Campus

Deploying a multi-zone system on a campus (see Figure 15 and Figure 16) involves planning and consideration of various factors to ensure uninterrupted communication in the buildings and in between some buildings. This section provides guidance through the essential steps and best practices for implementing a DECT system in a campus environment. The focus will be on configuration of the base stations and network equipment to achieve the best result.



Figure 15: Campus map

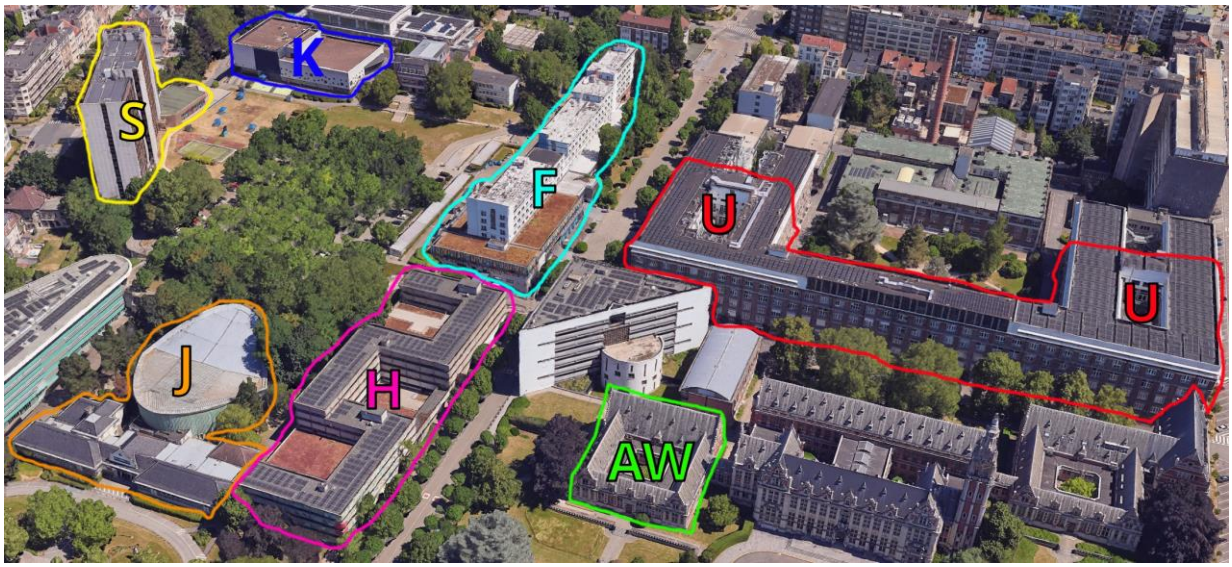


Figure 16: 3D satellite view of campus

7.1.1 Requirements

The requirements for the deployment are as follows:

- No call interruption (handover) while walking directly between (the shortest distance)
  - Building J and building H
  - building F and building U
  - building H and building F

- Handsets/headsets should be usable in all the buildings without any configuration from the end user.

7.1.2 Network layout

In Figure 17 below, the network diagram of the campus shows how the different buildings are connected.

- **Black lines** are connections between routers and switches which MUST support multicast traffic.
- Green lines are connections between buildings which MUST support multicast traffic.
- Red lines are connections between buildings which do not need to support multicast traffic.
- Blue lines are the connection between the core-router and the ISP.
- Yellow dotted line is a VPN connection, which in this case is connecting building S with the other buildings (see Figure 17). The VPN connection also does not need to support multicast traffic.

Note The placement and number of the routers and switches are mostly for illustrative purposes. The actual number and placement of the routers and switches will depend on the size and number of buildings on the campus, see Figure 17 below. Remember to keep the requirements from subsection 3.4 in mind.

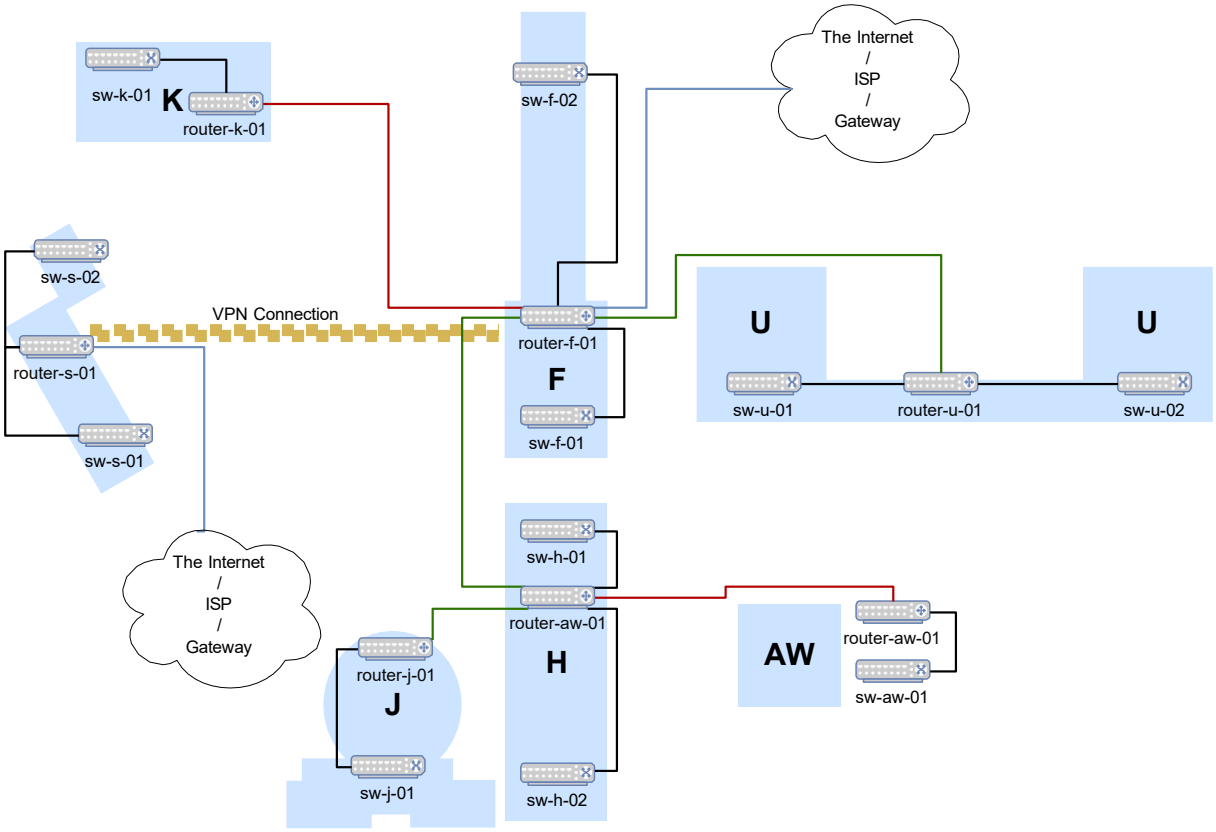


Figure 17: Network layout of the campus

7.1.3 Multi-zone

It is estimated that the following is needed:

- One zone for building J
- Two zones for building H
- Two zones for building F
- Four zones for building U
- Two zones for building S
- One zone for building K
- One zone for building AW

This means that 13 out of the 16 zones will be used in the campus setup.

In this setup, two zones will be configured to **Primary zone** and nine zones will be configured to **Secondary zone**. One **Primary zone** will be in building F connected directly to the **router-f-01**, and the other **Primary zone** will be in building S connected directly to the **router-s-01** (see Figure 17 above). The rest of the zones in building F, U, H, J and S will be configured to **Secondary zone**.

The last two zones in building K and AW are too far away from other buildings to setup the handover. Therefore, they are not required nor recommended to have external LAN sync configured (see subsection 3.6) and therefore, external LAN sync should be set to Disabled, see subsection 6.2.4 for more information.

Note There is no real reason for having the **Primary zone** in building F (connected to **router- f-01**) instead of building H (connected to **router-h-01**). Because in both cases, the highest amount of connection points would in both cases be 4 (including routers and switches from building F, U, H and J).
Even though there is no handover between building S and the other buildings, building S still have two zones which needs to be in sync for handover to work between the zones in the building.

8 Appendix A: Call flows

|Line Color| Type | Port|

|<#Black>| DECT | (N/A) |

|<#Green>| P2P sync | () |

|<#Darkorange>| (S)RTP | () |

|<#Blue>| SIP | () |

Note that Base 1 is homebase of Handset 1, and Handset 1 is in range

Note that Base 2 is homebase of Handset 2, and Handset 2 is in range

Note: This example does NOT include LAN-Sync data!

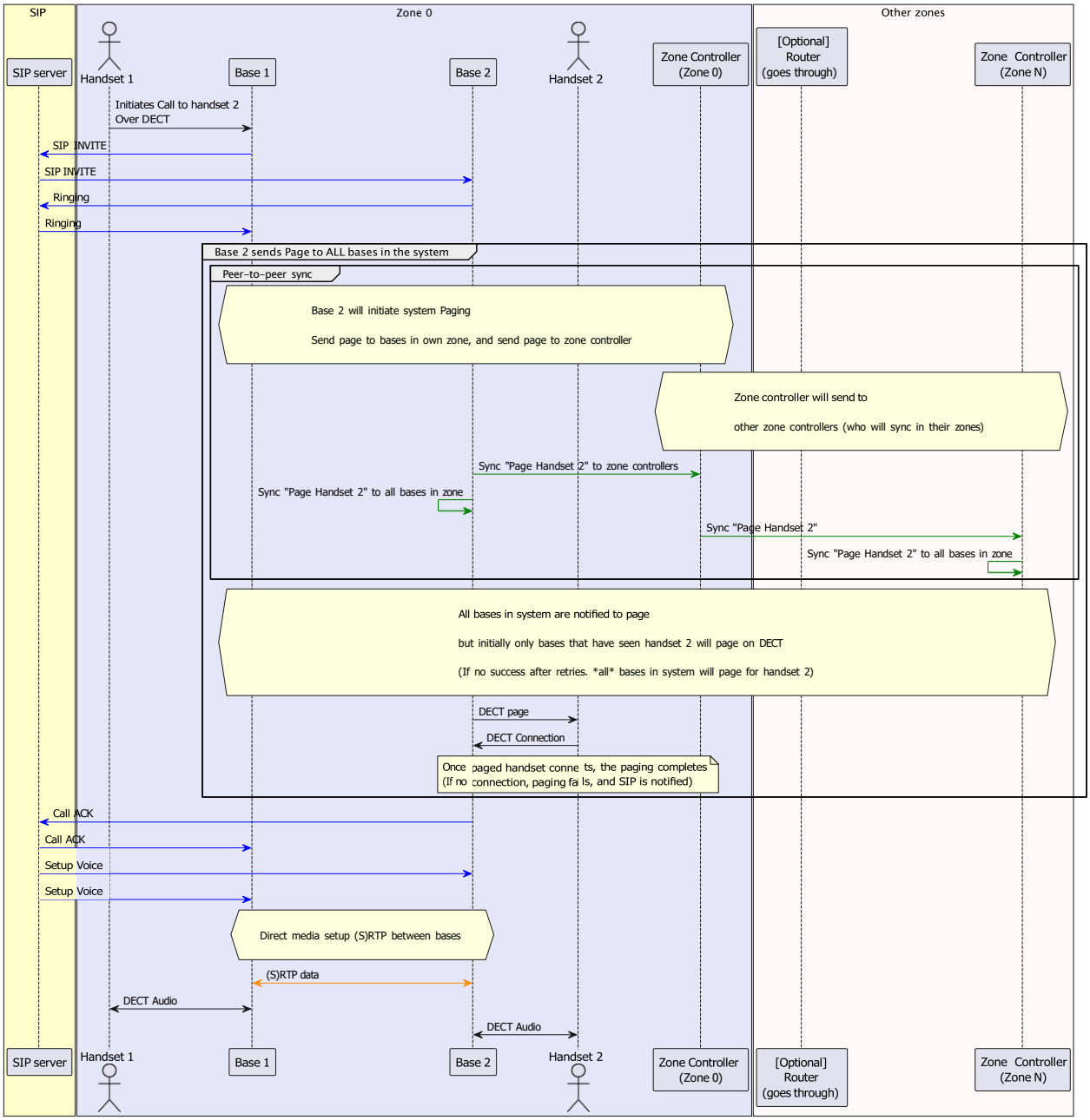


Figure 18: Multi-zone calls inside zone

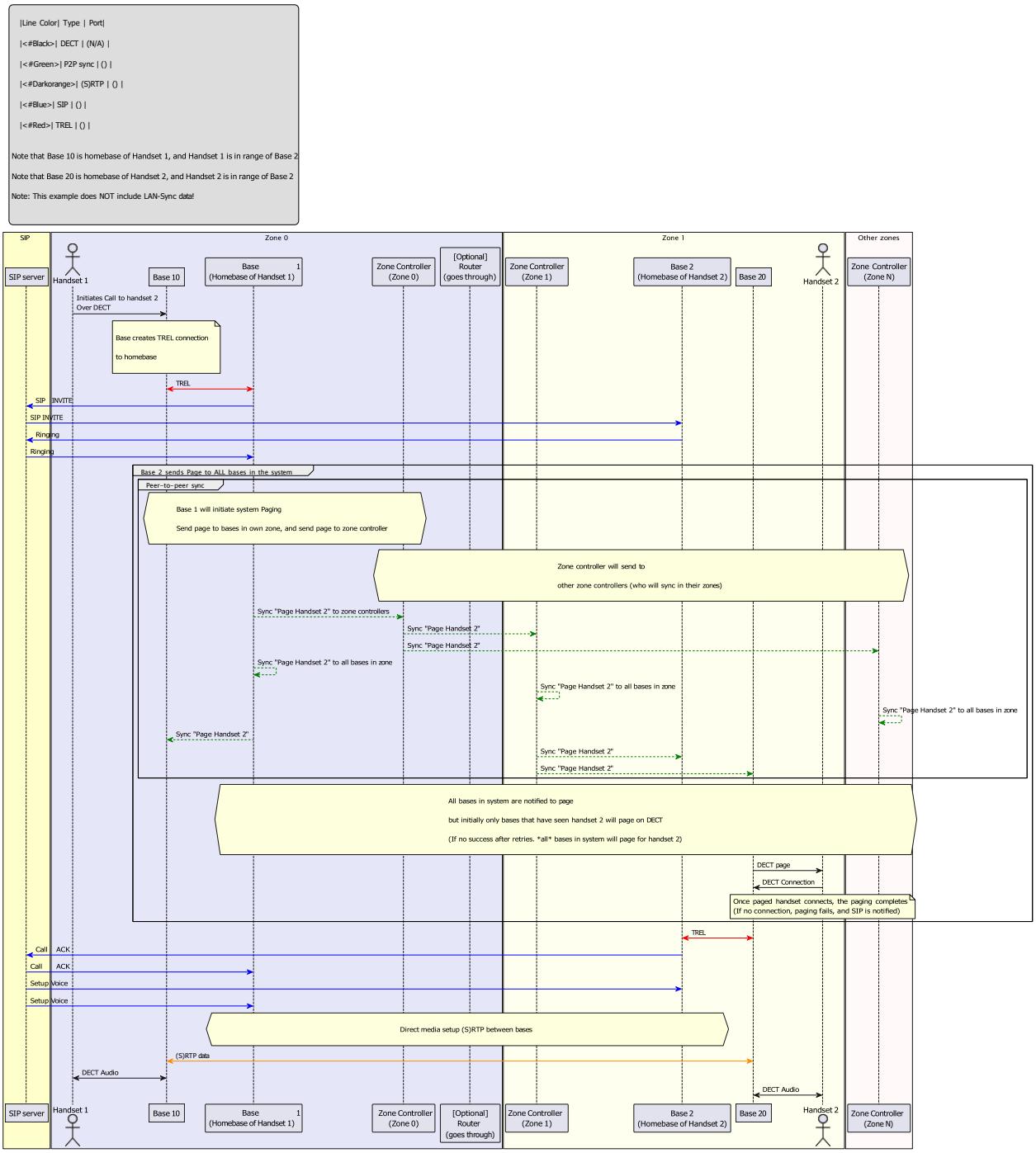


Figure 19: Call not in home base

|Line Color| Type | Port|

|<#Black>| DECT | (N/A) |

|<#Green>| P2P sync | () |

|<#Darkorange>| (S)RTP | () |

|<#Blue>| SIP | () |

|<#Red>| TREL | () |

Note that Base 1 is homebase of Handset 1, and Handset 1 is in range of Base 1

Note that Base 2 is homebase of Handset 2, and Handset 2 is in range of Base 30

Note: This example does NOT include LAN-Sync data!

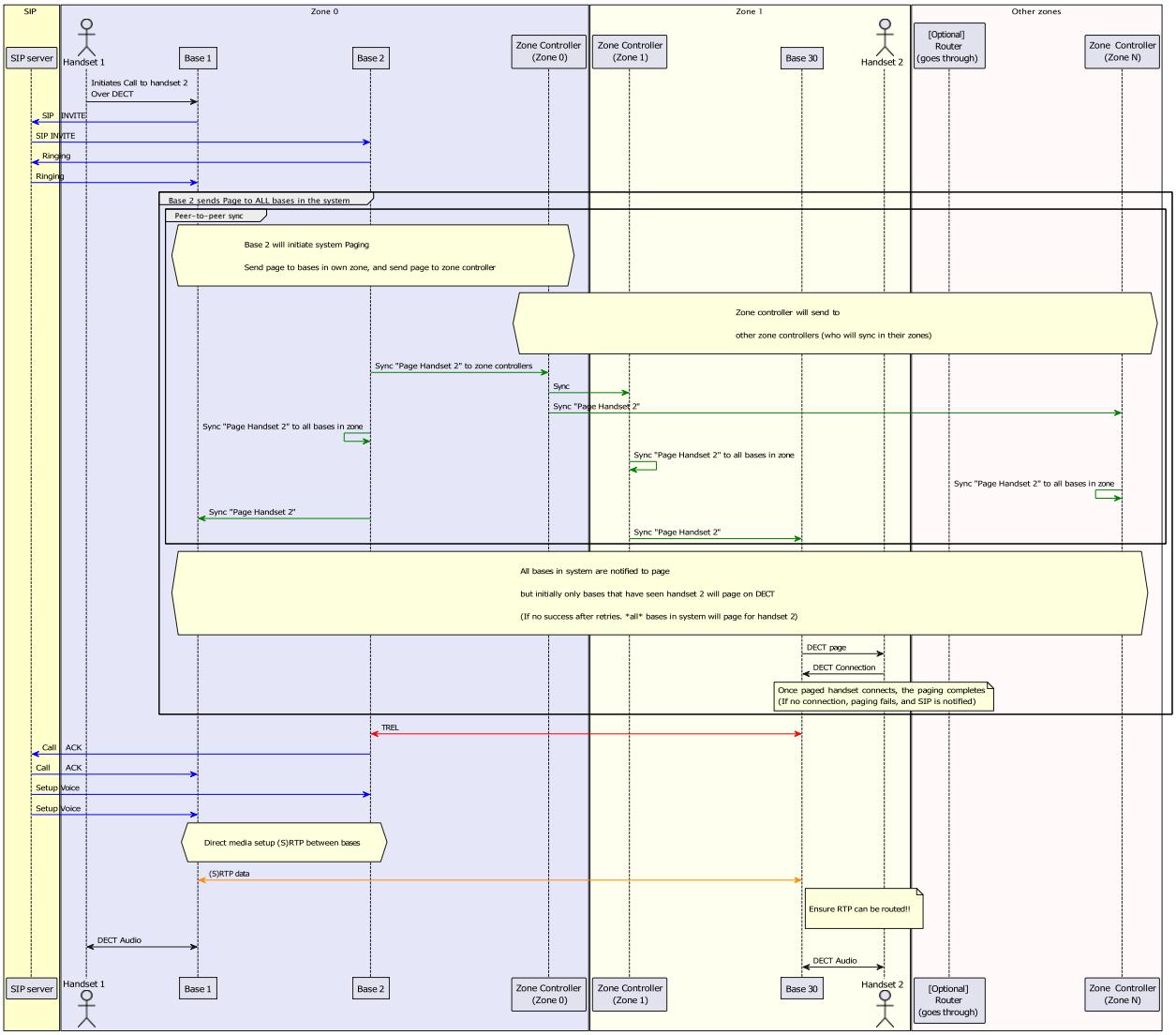


Figure 20: Call with handset in away zone

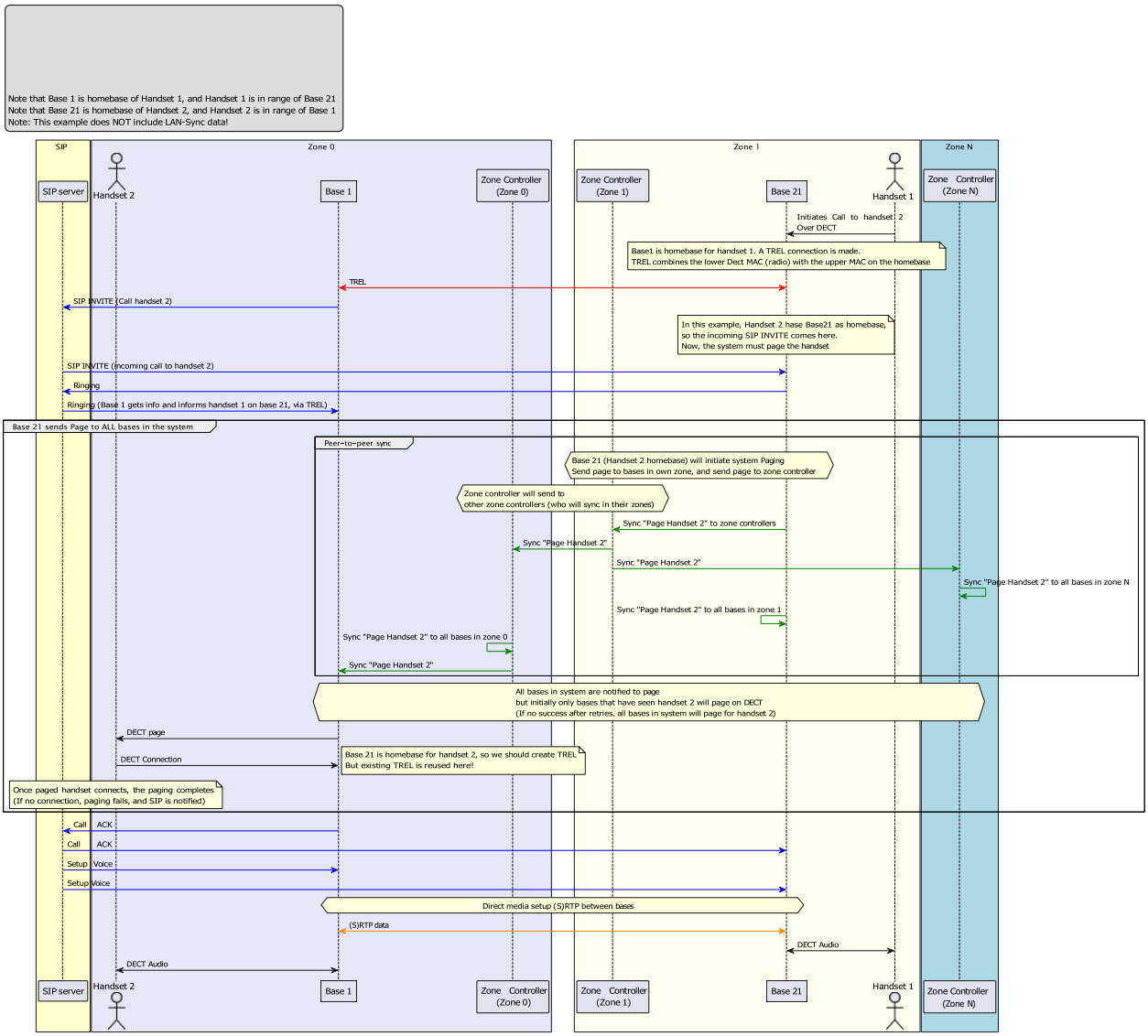


Figure 21: Handset 1 is calling handset 2 - both are in foreign zones

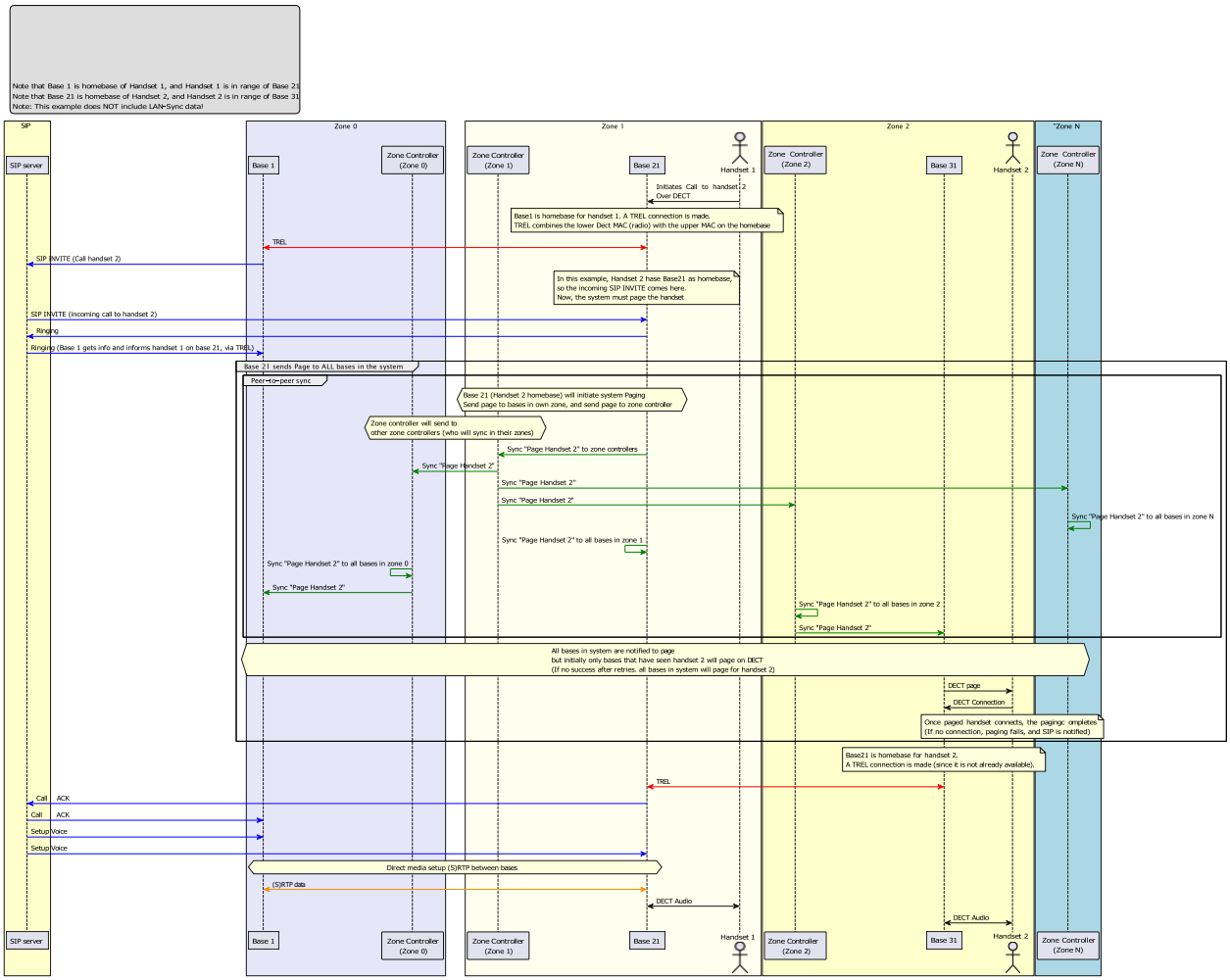


Figure 22: Handset 1 is calling handset 2 – both are in foreign zones (different)