

Application note:

DIVUS HEARTBEAT

Residential Intercom

Version **1.0**

REV01-180711

GENERAL INFORMATION

DIVUS GMBH
 PILLHOF 51
 I-39057 EPPAN (BZ)

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The manual has been conceived and written for users who are experienced in the use of PCs and automation technology.

CONVENTIONS

[KEYS]	Keys that are to be pressed by the user are given in square brackets, e.g. [CTRL] or [DEL]
COURIER	On-screen messages are given in the Courier font, e.g. C:\>
COURIER BOLD	Keyboard input to be made by the user are given in Courier bold, e.g. C:\>DIR).
“...”	Names of buttons to be pressed, menus or other onscreen elements and product names are given within double quotes. (e.g. “Configuration”).
PICTOGRAMS	In this manual the following symbolic are used to indicate particular text blocs.
	Caution! A dangerous situation may arise that may cause damage to material.
	Hint Hints and additional notes
	New New features

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1 Introduction

The aim of a system which uses DIVUS HEARTBEAT to manage the intercom system as well as the individual residential networks, is among others:

- To ensure optimal separation of the different networks where access is not desired.
- Time savings through ready-made configurations for network security, as well as for SIP/VoIP communication.

This document is intended as a guide for optimizing the configuration of a system where a SIP / VoIP system is planned for door communication of multiple residential units.

Requirements:

- Number of DIVUS HEARTBEAT used: Number of residential units + 1. These then take over the VoIP server role of the respective network.
- Number of SIP-enabled outside stations: 1 or more
- Number of SIP-capable indoor stations: at least 1 per residential unit

Possible alternative, whereby the configuration described here must be adapted accordingly:

- Additional use of private external stations (i.e. in front of the doors of the individual residential units - 1/residential unit). These devices comply with the so-called Zone 2 in the HEARTBEAT manual (also see the scheme 2.2).



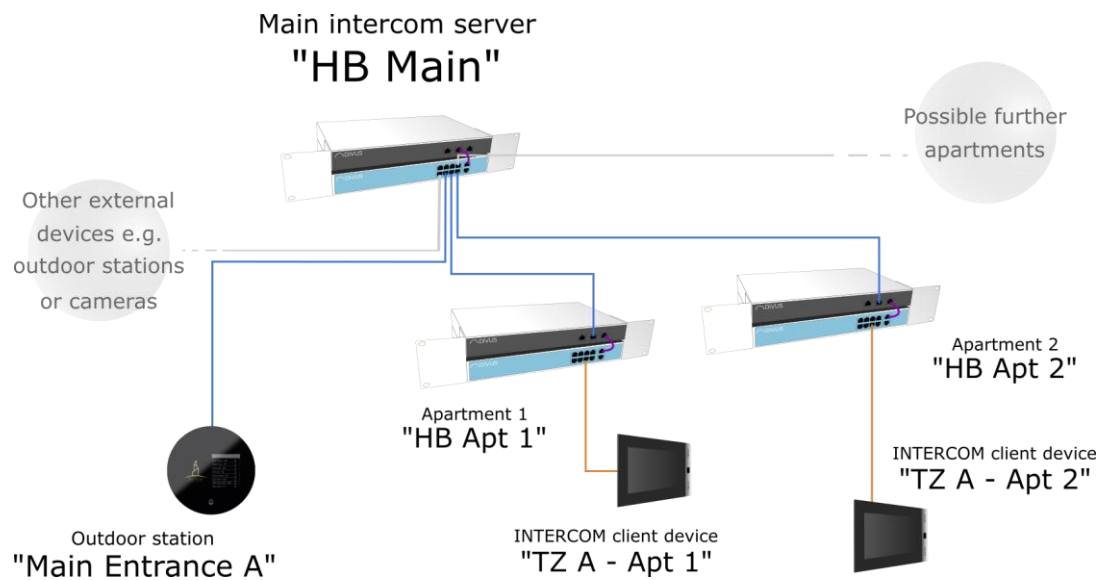
Note: general knowledge of DIVUS HEARTBEAT is required. Detailed information can be found in the [DIVUS HEARTBEAT manual](#).



Tip for experts: in Chap.2.1, 2.2 and 3.3.1 you will find graphical overviews of the system. See chapters 3.1 **Fehler! V erweisquelle konnte nicht gefunden werden.** and 3.2 for a concise summary of the settings. If you would like more details, simply read this document in the given order.

2 Configuration

2.1 FUNCTIONAL DIAGRAM

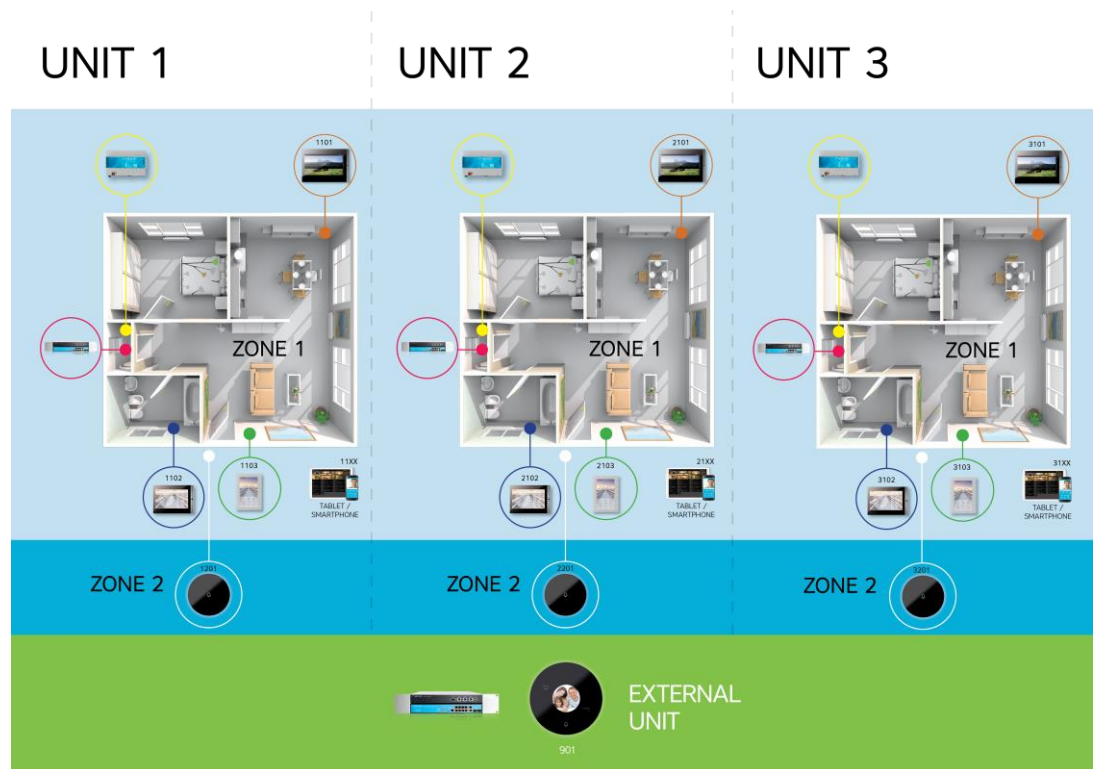


In a system with at least one apartment - but usually 2 or more - the network is set up as follows:

1. A DIVUS HEARTBEAT serves as INTERCOM central unit.
2. One DIVUS HEARTBEAT per unit
3. One or more external stations from which all internal units can be called
4. One or more intercom client devices per residential unit

Throughout this document, the names of the devices shown in the above scheme will be used for explanation.

2.2 DIVUS NUMBERING SCHEME



For more details, please refer to the DIVUS HEARTBEAT manual, from which this schema comes.

2.3 INTERCOM CENTRAL UNIT „HB MAIN“

2.3.1 PHYSICAL CONNECTIONS

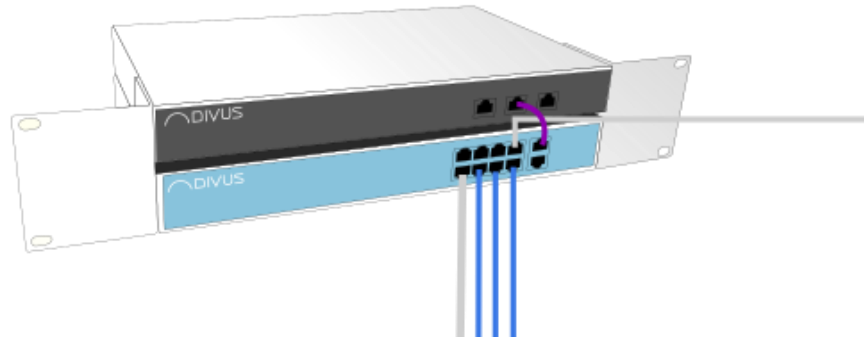
This device is used exclusively for the intercom network. It directly connects:

- the outside stations
- the DIVUS HEARTBEAT of the individual residential units
- any other devices, e.g. cameras

These devices are therefore connected directly to the Managed Switch of the *HB MAIN*. The short purple cable connects the Managed Switch to the **Residential Intercom Network (RIN)** of the *HB MAIN*, so all connected devices become part of this network and follow its rules.

The ports for **Home LAN / WAN** and **DIVUS Secure Network (DSI)** remain free.

Main intercom server "HB Main"



2.3.2 NETWORK CONFIGURATION

The *HB MAIN* intercom central unit should be configured as a DHCP server in the RIN. If necessary, an address range for static addresses can be reserved.

HB MAIN will distribute IP addresses to the other DIVUS HEARTBEAT via DHCP and create and manage a common network. See chap. 2.5.2 for the corresponding network configuration of the other DIVUS HEARTBEAT.

To be able to invoke the DIVUS HEARTBEATS by host name, you should rename them, because by default they are all named `dhb-heartbeat`: so, you should name the central unit **`dhb-main`**.



Attention! To configure the *HB MAIN*, connect directly to the DSI port via ethernet cable! Your computer must be set to DHCP in advance.

2.3.3 INTERCOM CONFIGURATION (EXPLANATION)

On the SIP configuration page, these entries are needed:

FOR EACH DIRECTLY CONNECTED OUTDOOR STATION:

```
[901] (osdevice)
secret=901
callerid=901<901>
```

The number highlighted in yellow becomes 2 (that is, 902) for the second external unit, then 3 (903), and so on. The number highlighted in light blue is the password for the client configuration. At the latest after a first successful test, it should be replaced on both the *HB MAIN* and the client device with a more complex, secure password!

FOR EACH CONNECTED RESIDENTIAL UNIT / ITS DIVUS HEARTBEAT:

An entry describing and governing this communication channel:

```
[apt1] (apt_tmplt)
host=192.168.1.11
secret=divushb
fromdomain=192.168.1.11
```

Depending on the number of apartments and IP addresses of their DIVUS HEARTBEATS, adjust the highlighted parts. Again, use the predefined password (purple highlighted) just for a first test and then replace it with a complex password!

For the second (3rd, etc.) apartment the corresponding entry is:

```
[apt2] (apt_tmplt)
host=192.168.1.12
secret=divushb
fromdomain=192.168.1.12
```



Attention! Username and password will be used in both directions! They therefore apply at the same time for logging in **on** the external VoIP server (*HB APT 1*) as well as for incoming calls **from** *HB APT 1*.

There are many predefined sections on the extension configuration page, each beginning with a square-bracketed label. We will focus exclusively on those that apply in the described scenario, `residential_external` and `residential_incoming`.

```
[residential_external]
exten => _11XX,1,NoOp()
exten => _11XX,n,Dial(SIP/apt1/${EXTEN},30)
exten => _11XX,n,Hangup()

exten => _21XX,1,NoOp()
exten => _21XX,n,Dial(SIP/apt2/${EXTEN},30)
exten => _21XX,n,Hangup()

exten => _31XX,1,NoOp()
exten => _31XX,n,Dial(SIP/apt3/${EXTEN},30)
exten => _31XX,n,Hangup()
```

The predefined configuration is ready for use for max. 3 residential units already and thus needs additional editing only if more than 3 residential units are to be served. In that case, just copy the last 3 lines, paste them underneath and change the highlighted value (apartment no.) To the next one (4, 5, etc):

```
exten => _41XX,1,NoOp()
exten => _41XX,1,Dial(SIP/apt4/${EXTEN},30)
exten => _41XX,n,Hangup()
```

The complete extension for 4 residential units would be so then:

```
[residential_external]
exten => _11XX,1,NoOp()
exten => _11XX,n,Dial(SIP/apt1/${EXTEN},30)
exten => _11XX,n,Hangup()

exten => _21XX,1,NoOp()
exten => _21XX,n,Dial(SIP/apt2/${EXTEN},30)
exten => _21XX,n,Hangup()

exten => _31XX,1,NoOp()
exten => _31XX,n,Dial(SIP/apt3/${EXTEN},30)
exten => _31XX,n,Hangup()

exten => _41XX,1,NoOp()
exten => _41XX,n,Dial(SIP/apt4/${EXTEN},30)
exten => _41XX,n,Hangup()
```

The second extension `residential_incoming` deals with the incoming calls from the residential units. In most cases, you do not need to make any changes to this extension on *HB MAIN*.

```
[residential_incoming]
exten => _9XX,1,NoOp()
exten => _9XX,n,Dial(SIP/${EXTEN},30)
exten => _9XX,n,Hangup()
```

2.3.4 INTERCOM CONFIGURATION (EDITS ON THE HEARTBEAT'S PREDEFINED CONFIGURATION)

1. Go to this section of the SIP configuration:

```
;[apt1](apt_tmplt)
;secret=divushb
;host=192.168.200.11
;fromdomain=192.168.200.11
```

2. Remove the ";" at the beginning of each line
3. Change the IP address to that of the first apartment's HEARTBEAT
4. Change the password (secret) to a more secure one
5. An example result:

```
[apt1](apt_tmplt)
secret=Y0urOwnS3cur3P4$$w0rd
host=192.168.69.11
fromdomain=192.168.69.11
```

6. Repeat the same steps copying, pasting and editing the 4 rows for each additional unit.

2.4 OUTDOOR STATION MAIN ENTRANCE A

2.4.1 PHYSICAL CONNECTION

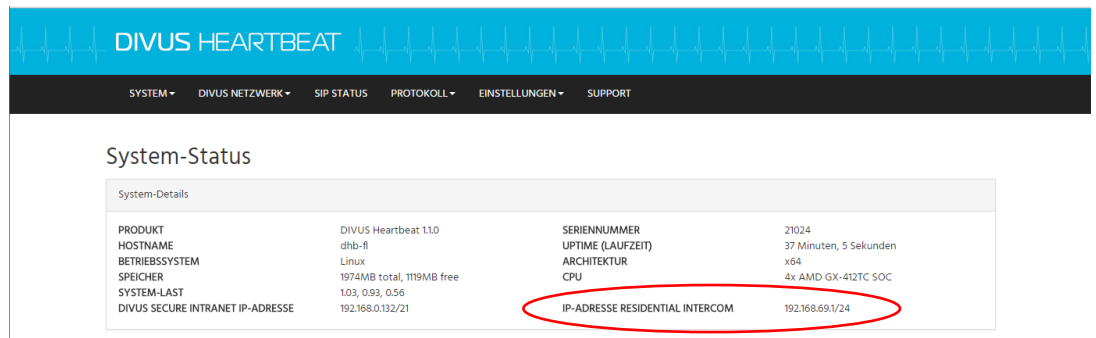
MAIN ENTRANCE A is directly connected to the Managed Switch of the *HB MAIN*.

2.4.2 NETWORK CONFIGURATION

If a static IP address is required, a free address of the RIN network of the *HB MAIN* must be used. If not, the device may be set to DHCP. If direct access is required, you can locate the IP address by means of a network scan on *HB MAIN*.

2.4.3 INTERCOM CONFIGURATION (EXPLANATION)

As already mentioned, 901 is by default the username as well as the password of the first external station, i.e. *MAIN ENTRANCE A* in our example. The IP address of the *HB MAIN*, which you must configure on *MAIN ENTRANCE A* as a VoIP server, can be found here (on the homepage of *HB MAIN*):



System-Details			
PRODUKT	DIVUS Heartbeat 1.10	SERIENNUMMER	21024
HOSTNAME	dhb-fl	UPTIME (LAUFZEIT)	37 Minuten, 5 Sekunden
BETRIEBSSYSTEM	Linux	ARCHITEKTUR	x64
SPEICHER	1974MB total, 1119MB free	CPU	4x AMD GX-412TC SOC
SYSTEM-LAST	1.03, 0.93, 0.56		
DIVUS SECURE INTRANET IP-ADRESSE	192.168.0.132/21	IP-ADRESSE RESIDENTIAL INTERCOM	192.168.69.1/24

2.4.4 INTERCOM CONFIGURATION (EDITS ON THE HEARTBEAT'S PREDEFINED CONFIGURATION)

1. Go to this section of the SIP configuration file:

```
[901] (osdevice)
secret=901
callerid=901<901>
```

2. Change the password to a secure one.
3. Add other entries for additional outdoor stations if needed
4. An example result:

```
[901] (osdevice)
secret=TOP$@cr3tp4SSword!
callerid=901<901>

[902] (osdevice)
secret=0th@r$@cr3tp4SSword!
callerid=902<902>
```

2.5 DIVUS HEARTBEAT *HB APT 1 (2, 3, ...)*

2.5.1 PHYSICAL CONNECTION

HB APT 1 (2, 3, ...) is connected directly to the managed switch of *HB MAIN* via the RIN port. Its Managed Switch is normally used for the apartment's smart home devices and is connected to the DSI port via the short purple cable. For more information, please refer to the DIVUS HEARTBEAT manual.

2.5.2 NETWORK CONFIGURATION

The Residential Intercom Network (RIN) is set to DHCP - but as a client (not as a DHCP server!). The *HB MAIN* gives a DHCP address to the *HB APT 1* and they can communicate with each other.

Also, rename this device to: **dhb-apt1** (hostname). According to the same scheme, also rename the other apartments: **dhb-apt2** for *Apartment 2* etc.

2.5.3 INTERCOM CONFIGURATION (EXPLANATION)

In the intercom system, the primary role of the *HB APT 1* is to manage the internal intercom system of the residential unit *Apartment 1*. This system includes all internal client devices of the residential unit. In addition, it also plays the role of the forwarder of calls to the outside or from outside.¹

For internal devices, the following is needed:

FOR EACH CONNECTED CLIENT DEVICE:

On the SIP configuration page an entry like this is needed:

```
[1101] (clientdevice)
defaultuser=1101
secret=1101
callerid=1101<1101>
```

The number highlighted in yellow becomes 02 for the second client device (i.e. 1102), and so on. The number highlighted in light blue is the password. At the latest after a first successful test, it should be replaced with a more complex, secure password on both the *HB APT 1* and the client device!

For *Apartment 2* the procedure is exactly the same. However, the device ID always begins with a 2. The entry for the first client device is thus:

```
[2101] (clientdevice)
defaultuser=2101
secret=2101
callerid=2101<2101>
```

On the extension configuration page, no configuration change is required for internal client devices of *Apartment 1* because the system is preconfigured for any number of devices (theoretically up to 99). The corresponding entry is this:

¹ Falls auch private Außensprechstellen vorhanden sind (siehe Schema 2.2, Zone 2), wird ein zusätzlicher Switch benötigt, der sei es die private Außensprechstelle als auch *HB MAIN* mit *HB APT 1* verbindet.

```
[internal]
exten => _11XX,1,NoOp()
exten => _11XX,n,Dial(SIP/${EXTEN},30)
exten => _11XX,n,Hangup()
```

For *Apartment 2*, this change is needed:

```
[internal]
exten => _21XX,1,NoOp()
exten => _21XX,n,Dial(SIP/${EXTEN},30)
exten => _21XX,n,Hangup()
```

FOR EACH OUTDOOR STATION (*MAIN ENTRANCE A* IN OUR EXAMPLE):

On the SIP configuration page, an entry like this:

```
[mainhb]
type=peer
host=192.168.1.10
defaultuser=mainhb
secret=divushb
context=internal
fromdomain=192.168.1.10
insecure=port,invite
```

The IP address is that of the DIVUS HEARTBEAT *HB MAIN*. Again, use the predefined password (highlighted purple) just for a first test and then replace it with a complex password (then on both servers!).

Through these entries, a device of the residential unit *Apartment 1* can call the outside station *Main Entrance A*, as well as receive and forward incoming calls from *MAIN ENTRANCE A* correctly.

For *Apartment 2* (3, 4, ...) the entry would be identical.

The extension configuration page requires no further intervention: all internal devices can be called directly from outside.

If a group call is desired (i.e., if *MAIN ENTRANCE A* calls, several internal devices should ring), see Chap. 2.7 for a configuration example.

2.5.4 INTERCOM CONFIGURATION (EDITS ON THE HEARTBEAT'S PREDEFINED CONFIGURATION)

1. Go to this section of the SIP configuration:

```
; [mainhb]
; type=peer
; host=192.168.200.10
; defaultuser=mainhb
; secret=divushb
; context=internal
; fromdomain=192.168.200.10
; insecure=port,invite
```

2. Remove the “;” at the beginning of each line
3. Change the IP address to that of the HEARTBEAT *HB MAIN*

4. Change the password (secret) to a more secure one
5. An example result:

```
[mainhb]
type=peer
host=192.168.69.1
defaultuser=mainhb
secret= T0P$@cr3tp4SSword!
context=internal
fromdomain=192.168.69.1
insecure=port,invite
```

6. Repeat the procedure on each additional unit's HEARTBEAT.

2.6 TZ A - APT 1

2.6.1 PHYSICAL CONNECTION

TZ A - APT 1 is connected via Ethernet cable directly to the managed switch of the *HB APT 1*. As the Managed Switch is connected to the DSI port of the Manager, *TZ A - APT 1* becomes a member of this privileged network.

2.6.2 NETWORK CONFIGURATION

For client devices in general: always set them to DHCP whenever possible. When you use DIVUS applications, this is a great advantage both during commissioning and in the long term.

2.6.3 INTERCOM CONFIGURATION

Follow the scheme shown in 2.2! Therefore, assign the SIP ID X101 to the first client device with the corresponding password - where the X is to be replaced with the apartment number e.g. 1101 for *Apartment 1* or 3101 for apartment 3. As SIP/VoIP server, use the IP address of the DIVUS HEARTBEAT - in our case *HB APT 1* at *Apartment 1* and *HB APT 2* for *Apartment 2*.

For other devices (including mobile) the same applies.

If you are using the DIVUS VIDEOPHONE app, you should enter the host name as the VoIP server instead of the IP address: **dhb-apt1** (dhb-apt2, etc.) in the example.

2.7 GROUP CALLS

For this purpose, use the same naming scheme as in Chap. 2.2, only with 99 as last digits. For e.g. *Apartment 1* it would be the number 1199, for unit 7 the 7199.

1. First, store the selected phone number (for us as example 1199) as the number to call for the desired residential unit on the outside station.

2. *HB MAIN* will forward a call to 1199 to the correct residential unit / its DIVUS HEARTBEAT.
3. There, a small addition to the Extensions configuration page is needed:

Go to the extension `internal`:

```
[internal]
exten => _11XX,1,NoOp()
exten => _11XX,n,Dial(SIP/${EXTEN},30)
exten => _11XX,n,Hangup()
```

4. Add this below:

```
exten => _1199,1,NoOp()
exten => _1199,n,Dial(SIP/1101&SIP/1102,30)
exten => _1199,n,Hangup()
```

The call number is highlighted in yellow. The clients called in light blue. For more details on creating a group call in general, see the DIVUS HEARTBEAT manual.

5. For *Apartment 2*, the whole thing looks like this:

```
[internal]
exten => _21XX,1,NoOp()
exten => _21XX,n,Dial(SIP/${EXTEN},30)
exten => _21XX,n,Hangup()

exten => _2199,1,NoOp()
exten => _2199,n,Dial(SIP/2101&SIP/2102,30)
exten => _2199,n,Hangup()
```

3 Appendix

3.1 TABULAR NETWORK CONFIGURATION OVERVIEW

Device	Network setting (RIN)	SIP ID	Connected to
<i>HB MAIN</i>	DHCP (SERVER) Hostname: dhb-main	n/a	Managed Switch (RIN-Port)
<i>MAIN ENTRANCE A</i>	DHCP or static	901	Managed Switch (<i>HB MAIN</i>)
<i>MAIN ENTRANCE B, C, ...</i>	DHCP or static	902, 903, ...	Managed Switch (<i>HB MAIN</i>)
<i>HB APT 1</i>	DHCP (CLIENT) Hostname: dhb-apt1	n/a	Managed Switch (<i>HB MAIN</i>) over RIN-Port
<i>HB APT 2, 3, ...</i>	DHCP (CLIENT) Hostname: dhb-apt2, 3, ...	n/a	Managed Switch (<i>HB MAIN</i>) over their RIN-Port
<i>TZ A – Apt 1</i>	DHCP (CLIENT)	1101	Managed Switch (<i>HB APT 1</i> – DSI)
<i>TZ B – Apt 1</i>	DHCP (CLIENT)	1102	Managed Switch (<i>HB APT 1</i> – DSI)
<i>TZ B – Apt 2</i>	DHCP (CLIENT)	2102	Managed Switch (<i>HB APT 2</i> – DSI)
<i>TZ D – Apt 3</i>	DHCP (CLIENT)	3104	Managed Switch (<i>HB APT 3</i> – DSI)

3.2 TABULAR INTERCOM CONFIGURATION OVERVIEW

Device	Setting for / in	Setting (to edit)
HB MAIN	HB APT 1 (2, 3, ...) / SIP	<pre>[apt1] (apt_tmplt) host=192.168.1.11 secret=divushb fromdomain=192.168.1.11</pre>
HB MAIN	MAIN ENTRANCE A (B, C, ...) / SIP	<pre>[901] (osdevice) secret=901 callerid=901<901></pre>
HB MAIN	HB APT 1 (2,3, ...) / EXTENSIONS	<pre>[residential_external] exten => _11XX,1,NoOp() exten => _11XX,1,Dial(SIP/apt1/\${EXTEN},30) exten => _11XX,n,Hangup()</pre>
HB APT 1 (2, 3, ...)	HB MAIN / SIP	<pre>[mainhb] type=peer host=192.168.1.10 defaultuser=mainhb secret=divushb context=internal fromdomain=192.168.1.10 insecure=port,invite dtmfmode=rfc2833</pre>
HB APT 2 (3, 4, ...)	Client devices / EXTENSIONS (not needed for <i>HB APT 1</i> because preconfigured)	<pre>[internal] exten => _21XX,1,NoOp() exten => _21XX,n,Dial(SIP/\${EXTEN},30) exten => _21XX,n,Hangup()</pre>
HAUPT- EINGANG A (B, C, ...)	HB MAIN	<p>VoIP server: IP addr. of the <i>HB MAIN</i> ID: 901, password: 901 Call number: direct # of the internal device or group call number (1199) → siehe Kap. 2.7</p>
TZ A –APT 1	HB APT 1	<p>VoIP server: IP addr. of the <i>HB APT 1</i> ID: 1101, password: 1101</p>
TZ X –APT Y	HB APT Y	<p>VoIP server: IP addr. of the <i>HB APT Y</i> ID: Y10X, password: Y10X</p>

3.3 HOW DO CALLS OVER TWO VOIP SERVERS WORK IN DETAIL?

Given **Server A** and **Server B**, having:

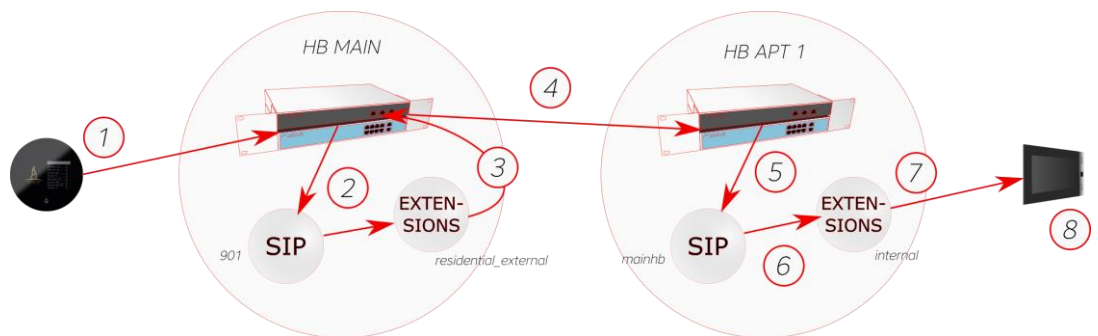
SERVER A: Section [apt1] defining the relation with **SERVER B**
 Section [901] defining the outdoor station

SERVER B: Section [mainhb] defining the relation with **SERVER A**
 Section e.g. [1101] defining an indoor station

3.3.1 SCENARIO 1: [901] CALLS [1101]

The Steps are:

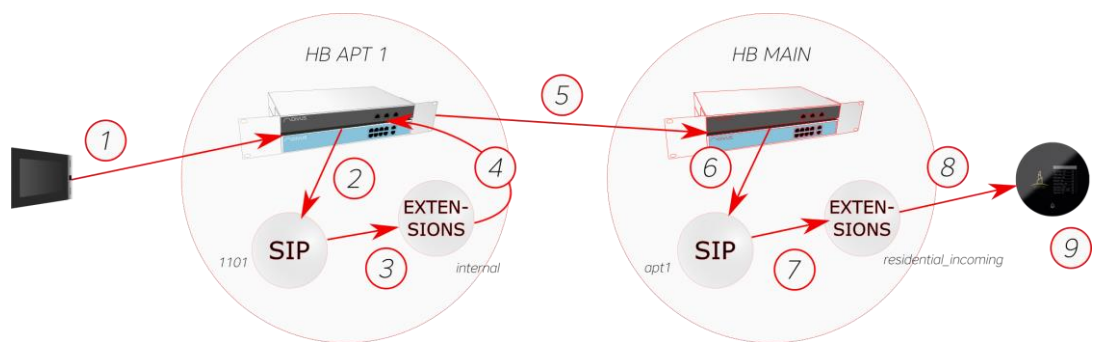
Step	Description	Conf. file / location
1	Device authenticates on SERVER A using 901 / 901	SIP / SERVER A
2	Gives call details to SERVER A : "1101"	-
3	Entry is matched in [residential_external] (context of 901): exten => _11XX,n,Dial(SIP/apt1/\${EXTEN},30)	EXTENSIONS / SERVER A
4	The entry leads to apt1 i.e. SERVER B	-
5	On SERVER B the incoming call is matched to the section [mainhb]	SIP / SERVER B
6	Section [mainhb] leads to context [internal]	SIP / SERVER B
7	Context [internal] has a match which is then executed exten => _11XX,n,Dial(SIP/\${EXTEN},30)	EXTENSIONS / SERVER B
8	The two devices are connected, callee rings, etc.	-



3.3.2 SCENARIO 2: [1101] CALLS [901]

The Steps are:

Step	Description	Conf. file / location
1	Device authenticates on <i>SERVER B</i> using 1101 / 1101	SIP / <i>SERVER A</i>
2	Gives call details to <i>SERVER B</i> : "901"	-
3	<i>SERVER B</i> goes to context <i>phones</i> and from there to <i>internal</i> (<i>external, residential_internal, residential_external</i>)	EXTENSIONS / <i>SERVER B</i>
4	In <i>internal</i> it finally finds a match and executes exten => _9XX,n,Dial(SIP/mainhb/\${EXTEN},30)	EXTENSIONS / <i>SERVER B</i>
5	The entry leads to mainhb i.e. <i>SERVER A</i>	
6	On <i>SERVER A</i> the incoming call is matched to the section [<i>apt1</i>]	SIP / <i>SERVER A</i>
7	Section [<i>apt1</i>] leads to context [<i>residential_incoming</i>]	SIP / <i>SERVER A</i>
8	A match is found and executed exten => _9XX,n,Dial(SIP/\${EXTEN},30)	EXTENSIONS / <i>SERVER A</i>
9	The two devices are connected, callee rings, etc.	-



3.4 APARTMENT BUILDING SCHEME

