

# LAN-2-LAN API FOR DOORBIRD AND BIRDBGUARD

Revision: 0.20  
Date: February 20th 2018

## OVERVIEW

This document specifies the external API of Bird Home Automation products. The interface provides the functionality for IP communicating with Bird Home Automation products via LAN (Local Area Network), handled by the built-in servers in Bird Home Automation products.

## COPYRIGHT NOTICE

This document is copyright protected and is the property of Bird Home Automation GmbH and may not be copied, reproduced or distributed in any way without the prior written consent of Bird Home Automation GmbH.

## BETA AND SUPPORT NOTICE

**This API is currently in beta status and is subject to change without prior notice. This API is not part of the product purchase and thus comes without any kind of support and without any kind of warranty.**

## LICENSE AGREEMENT

This License Agreement (“License”) is a legal agreement between you (either individual or an entity) and Bird Home Automation GmbH (“Bird Home Automation”). By using the INTERFACE and INTERFACE DESCRIPTION (each defined below), whether in whole or in part, you agree to be bound by the terms of this License.

### 1. GRANT OF LICENSE

Bird Home Automation hereby grants to you the right to use BIRD HOME AUTOMATION LAN API (“INTERFACE”) and the written specification of the INTERFACE (the “INTERFACE DESCRIPTION”) for the sole and limited purpose of creating, manufacturing and developing a solution that integrates any unit or portion included in the product range of Bird Home Automation network products, as defined by Bird Home Automation at its discretion (an “Bird Home Automation Product”) and to market, sell and distribute any such solution.

### 2. COPYRIGHT

The INTERFACE and the INTERFACE DESCRIPTION are owned by Bird Home Automation and are protected by copyright laws and international treaty provisions. Any use of the INTERFACE and/or the INTERFACE DESCRIPTION outside the limited purpose set forth in Section 1 above is strictly prohibited.

### 3. RESTRICTIONS ON USE

You have no rights with respect to the INTERFACE, INTERFACE DESCRIPTION or any portions thereof and shall not use the INTERFACE, INTERFACE DESCRIPTION

or any portion thereof except as expressly set forth herein. You may not reverse engineer, decompile, or disassemble the INTERFACE except to the extent required to obtain interoperability with other independently created computer programs as permitted by mandatory law.

#### **4. THIRD PARTY RIGHTS**

You agree that you are fully responsible for your own conduct while using the INTERFACE and integrating any Bird Home Automation Products into your solution and the consequences thereof. Bird Home Automation Products may be combined with a virtually infinite number of potential solutions. Consequently, you recognize that (i) other third parties may claim to own patents or copyrights that could cover certain solutions which integrate Bird Home Automation products, or which result from the combination of Bird Home Automation products and additional technology or solutions and (ii) you are responsible for ensuring that any solution which integrates with an Bird Home Automation Product, or a combination of a solution and an Bird Home Automation product, does not infringe upon or misappropriate any intellectual property or personal right of any third party.

#### **5. TERMINATION**

This License is effective until terminated. Your rights under this License will terminate automatically without notice from Bird Home Automation if you fail to comply with any term(s) of this License. Upon the termination of this License, you shall cease all use and disposition of the INTERFACE and/or THE INTERFACE DESCRIPTION whether for the purpose set forth in Section 1 above or not.

#### **6. REPRESENTATIONS AND WARRANTIES; DISCLAIMER**

6.1. You represent and warrant that (i) any solution created, manufactured and/or developed by you which integrates an Bird Home Automation Product shall not infringe or otherwise violate any third party rights, including but not limited to third party intellectual property rights; and (ii) your use of the INTERFACE and INTERFACE DESCRIPTION will comply with all applicable foreign and domestic laws, rules and regulations.

6.2. YOUR USE OF THE INTERFACE IS AT YOUR SOLE RISK. THE INTERFACE AND THE INTERFACE DESCRIPTION ARE DELIVERED FREE OF CHARGE AND "AS IS" WITHOUT WARRANTY OF ANY KIND. THE ENTIRE RISK AS TO THE USE, RESULTS AND PERFORMANCE OF THE INTERFACE AND THE INTERFACE DESCRIPTION IS ASSUMED BY THE USER/YOU. BIRD HOME AUTOMATION DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, NON-INFRINGEMENT AND PRODUCT LIABILITY, OR ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION OR SAMPLE WITH RESPECT TO THE INTERFACE AND THE INTERFACE DESCRIPTION.

Without limiting the generality of the foregoing, you acknowledge and agree that Bird Home Automation does not make any representation or warranty that the integration of Bird Home Automation Products into your solution does not infringe any third party rights. You are solely responsible for any intellectual property infringement claims that are based on or relate to solutions created, manufactured and distributed by you which integrate Bird Home Automation Products. Bird Home Automation is unaware of the details regarding your particular solution, has not conducted any investigation relating

to potential third party rights issues relating to your solution and does not accept any responsibility or liability with respect thereto.

6.3. THIS LICENSE DOES NOT CONVEY ANY LICENSE TO THIRD PARTY INTELLECTUAL PROPERTY. YOU ARE SOLELY RESPONSIBLE FOR (I) EXAMINING WHETHER THE INTERFACE AND THE INTERFACE DESCRIPTION ARE ENCUMBERED BY OR INFRINGES UPON A RIGHT HELD BY A THIRD PARTY AND (II) ANY INTELLECTUAL PROPERTY INFRINGEMENT CLAIMS THAT ARISE OUT OF OR RELATE TO SOLUTIONS CREATED, MANUFACTURED AND DISTRIBUTED BY YOU WHICH INTEGRATE BIRD HOME AUTOMATION PRODUCTS.

## DOCUMENT HISTORY

Version	Description
0.16	Add information about Digest Authentication. Describe “test” parameter for notification requests. Change example to show HTTPS support at notifications. Update web links at AEC/ANR hint.
0.17	History images are stored in the cloud.
0.18	<p>Added document history. Add DoorBird D21x to compatible devices.</p> <p>Describe permission check and RC 204 for several requests: live video stream, live image, live audio transmit/receive, open door, light on, history image.</p> <p>Remove outdated chapters for notification, monitor and check requests.</p> <p>Add information about the “API operator” permission and where it's necessary.</p> <p>Add chapters for UDP events, favorites, schedules and peripherals.</p> <p>Extend info.cgi chapter (MAC address, device type and relays).            Extend description of history.image requests (permission check).</p> <p>Include information about the SIP API. SIP API now handles the “API operator” permission, property “autocall_doorbell_url” is now deprecated.</p>
0.19	<p>Added generic information about the integration scheme.</p> <p>Describe more response codes from favorites.cgi and schedules.cgi.</p>
0.20	Add monitor.cgi chapter.

## COMPATIBLE DEVICES

Device	Hardware version	Firmware version
--------	------------------	------------------

DoorBird Video Door Station D10x	1.00 and above	000099 and above
DoorBird Video Door Station D20x	1.00 and above	000099 and above
DoorBird Video Door Station D21x	1.00 and above	000108 and above
BirdGuard B10x	1.00 and above	000099 and above

Please check also the Firmware Change Log at <http://www.doorbird.com/changelog> and check the descriptions of firmware updates.

For reasons of brevity, we use the terms “DoorBird device” to refer to our “DoorBird Video Door Station” and “BirdGuard” products and “mobile device” to refer to a smartphone or tablet.

## GENERAL INFORMATION

### PRIVACY STATEMENT

Please observe any relevant country-specific statutory regulations concerning the use of surveillance components and security surveillance applicable at the installation site and within your third-party solution.

### LOCATING DEVICES IN YOUR LAN

You can locate devices and obtain its IP address within your LAN using the Apple Bonjour Protocol, see e.g.

- DoorBird App → Settings → Administration → Search
- Online tool <http://www.doorbird.com/checkonline>
- Apple Bonjour command line tool “dns-sd”, e.g. “dns-sd.exe -B \_http.\_tcp local”. Please see the Apple Bonjour documentation for further information on this topic
- [http://en.wikipedia.org/wiki/Bonjour\\_%28software%29](http://en.wikipedia.org/wiki/Bonjour_%28software%29)
- <http://www.axis.com/de/de/axis-ip-utility/download>

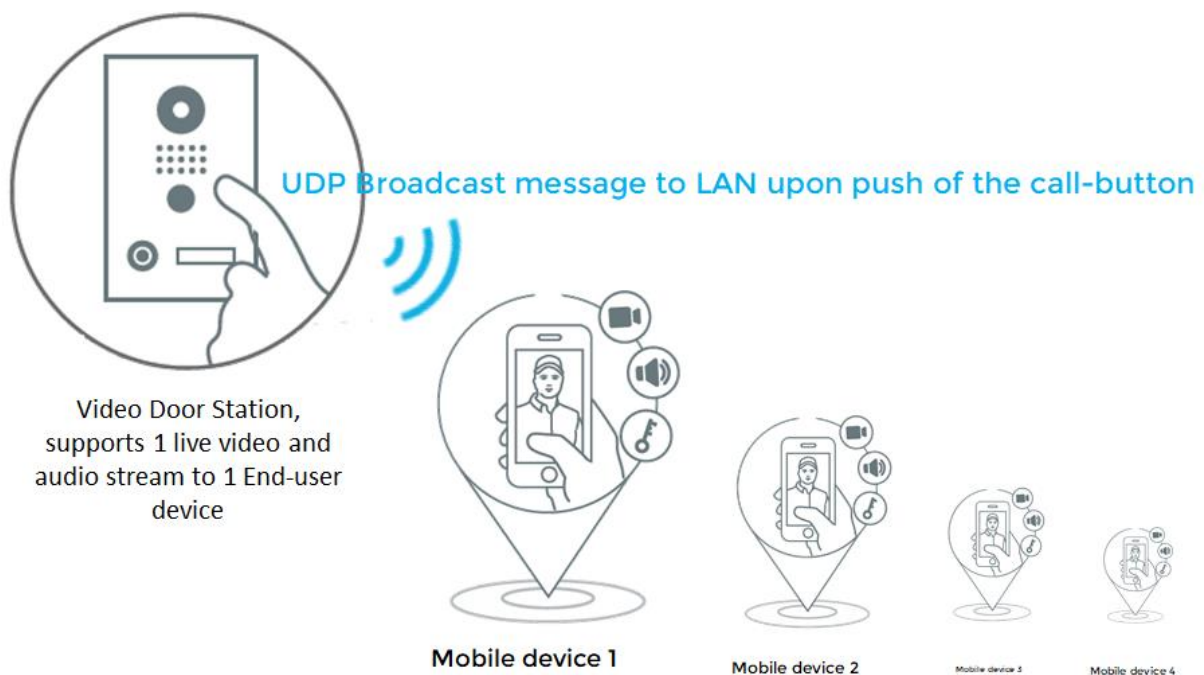
### CONCURRENT CONNECTIONS

The device handles via this third-party API a maximum of 1 concurrent connection per second for API access.

*Please keep in mind that the device is a Video Door Station, which handles in general - like all commercially relevant door stations - only one simultaneous audio/video call for live communication. You get a status code "503" (Busy) if another user already took the call. In that case you can notify the user with a message dialog on your GUI, e.g. "Line busy" and additionally preview one still image (LIVE IMAGE REQUEST).*

## INTEGRATION SCHEME

The following is a professional integration scheme and process flow. You should realize your integration like this.



The mobile devices (e.g. smartphone, tablet, smart-home panel) listen for UDP Broadcast messages within the LAN from the Video Door Station. If a valid UDP Broadcast message (valid: fits to the call-button number) is received from the Video Door Station by the mobile devices, then the mobile devices play a "ding-dong" notification sound and offer the End-user the possibility to take the call upon user-interaction by e.g. pressing a button on the mobile devices.

The mobile devices **MUST NOT** fetch the video and audio stream automatically upon receipt of a valid UDP Broadcast message, because a Video Door Station is a security device and not powered by an 8 GHz Octa-Core CPU with 32 GB RAM and thus is not capable to handle many concurrent streams.

**A Video Door Station (traditional and nowadays) is designed to have an active video and audio call with only one mobile device at the same time (1:1, not 1:n) and the connection to the first mobile device is automatically interrupted if another (additional) mobile devices picks the call. Please do not try to lower the end-user experience by realizing simultaneous video and audio calls with several mobile devices. A Video Door Station does not support this.**

When the End-user makes user-interaction (by e.g. pressing a button on the mobile device) then the mobile device tries to fetch a video and audio stream from the Video

Door Station. If it fails because the Video Door Station is busy because another mobile is already fetching the video and audio stream then the End-user should be notified with e.g. "Line is busy, someone is already speaking" by the mobile device.

## URL SCHEME

You can use the URL Scheme "DoorBird" to start the DoorBird App for iOS using a third party iOS App. You can use the URL Scheme "DoorBird" to start the DoorBird App for Android using a third party Android App.



## HTTP INTERFACE DESCRIPTION

### AUTHENTICATION

Please use Basic or Digest Authentication as defined in RFC 2617 for each HTTP request. Use the same credentials as you are using to add a device to the DoorBird App.

Alternatively to authentication as defined in RFC 2617 you can use the plain-text HTTP parameters "http-user" and "http-password" to authenticate (more insecure because of plain-text, but some third-party home automation platforms support only HTTP parameters), e.g. "http://<device-ip>/bha-api/video.cgi?http-user=xxxxxx0001&http-password=xxxxxx".

### AVAILABLE PERMISSIONS

Users can have several permissions, which can be managed in the Administration area of the DoorBird App.

- **Watch always:** User can see live view and control the door/s at any time, even if there is no ring event
- **History:** User can access the history (e.g. Cloud-Recording)
- **Motion:** User can obtain motion notifications and access the motion history (e.g. Cloud-Recording)
- **API-Operator:** User can change settings through this Open API ( [www.doorbird.com/api](http://www.doorbird.com/api) ) e.g. schedules and notifications and e.g. initiate an active SIP call ( "makecall" ) sing API command. You should only enable the "API-Operator" permission for users which are used on central Home Automation Servers, you should NOT enable "API-Operator" permission for users which are configured in Home Automation panels or Apps of end-users

because then this user could change global settings for other users.

## **DEMONSTRATION**

You may browse to <http://<device-ip>/bha-api/view.html> with a web browser to see a demonstration of the API in a standard webpage.



## LIVE VIDEO REQUEST

Returns a multipart JPEG live video stream with the default resolution and compression as defined in the system configuration. When MJPG video is requested, the server returns a continuous flow of JPEG files. The content type is "multipart/x-mixed-replace" and each image ends with a boundary string <boundary>. The returned image and HTTP data is equal to the request for a live image request. An average of up to 8 fps can be provided using this third-party API, depending on the network speed and load factor of the device.

When the request is correct, but the requesting user has no permission to view the live stream at the moment, the request is answered with a return code 204. This usually happens for users without "watch-always" permission when there was no ring event in the past 5 minutes.

Please note, that the video connection can get interrupted at any time, when the official DoorBird App requests the stream. It has precedence over users of the LAN-API.

**Method:** GET

**Required permission:** valid user, "watch always" or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/video.cgi
```

**Example Request:**

```
http://<device-ip>/bha-api/video.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\nContent-Type: multipart/x-mixed-replace;boundary=<boundary>\r\n\r\n<boundary>\r\n<image>
```

where the proposed <boundary> is "myboundary" and the returned <image> field is

```
Content-Type: image/jpeg\r\nContent-Length: <image size>\r\n\r\n<JPEG image data>\r\n<boundary>\r\n<image>
```

**Example:** Requested Multipart JPEG image.



## LIVE IMAGE REQUEST

Returns a JPEG file with the default resolution and compression as defined in the system configuration. The content type is "image/jpeg".

When the request is correct, but the requesting user has no permission to view the live image at the moment, the request is answered with return code 204. This usually happens for users without "watch-always" permission when there was no ring event in the past 5 minutes.

**Method:** GET

**Required permission:** valid user, "watch always" or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/image.cgi
```

**Example Request:**

```
http://<device-ip>/bha-api/image.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\n  
Content-Type: image/jpeg\r\n  
Content-Length: <image size>\r\n  
\r\n  
<JPEG image data>\r\n
```

## OPEN DOOR

Energize the door opener/ alarm output relay of the device. Returns JSON.

We assume, that the API user watches the live image in order to open the door or trigger relays. So, when the request is correct, but the requesting user has no permission to view the live image at the moment, the request is answered with return code 204. This usually happens for users without “watch-always” permission when there was no ring event in the past 5 minutes.

**Method:** GET

**Required permission:** valid user, “watch always” or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/open-door.cgi?<parameter>=<value>
```

<parameter>=<value>	Values	Description
r=<string>	1 2  <doorcontrollerID>@<relay>	optional: relay to trigger, e.g. physical relay number or relay on an paired IP I/O DoorController. You can get the paired devices by calling info.cgi (see info.cgi chapter here in this document.  If the parameter is ommitted, physical relay 1 gets triggered.

**Example Requests:**

```
http://<device-ip>/bha-api/open-door.cgi
http://<device-ip>/bha-api/open-door.cgi?r=1
http://<device-ip>/bha-api/open-door.cgi?r=gggaaa@1
```

## LIGHT ON

Energize the light relay of the device. Returns JSON.

We assume, that the API user watches the live image in order to activate the light. So, when the request is correct, but the requesting user has no permission to view the live image at the moment, the request is answered with return code 204. This usually happens for users without “watch-always” permission when there was no ring event in the past 5 minutes.

**Method:** GET

**Required permission:** valid user, “watch always” or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/light-on.cgi
```

**Example Request:**

```
http://<deviceip>/bha-api/light-on.cgi
```

## HISTORY IMAGE REQUEST

Returns a JPEG history image with the default resolution and compression as defined in the system configuration. The history images are stored in the cloud.

If the authentication of the requesting user is ok, but he has no permission for this history, the request is answered with response code 204. This can be either the general “history” permission or the more specific “motion” permission.

**Method:** GET

**Required permission:** valid user, history permission, motion permission to access images from motion events

**Syntax:**

```
http://<device-ip>/bha-api/history.cgi?<parameter>=<value>
```

<parameter>=<value>	Values	Description
index=<int>	1..50	Index of the history images, where 1 is the latest history image
event=<string>	doorbell motionsensor	Event type (optional), default is the ring history for DoorBird devices and the input trigger history for BirdGuard devices.  The API automatically requests images from the history of the requesting user (doorbell number or keycode which got assigned in the administration settings).

**Example Request:**

```
http://<deviceip>/bha-api/history.cgi?index=1
http://<deviceip>/bha-api/history.cgi?index=22
http://<deviceip>/bha-api/history.cgi?event=motionsensor&index=5
```

**Return:**

```
HTTP/1.0 200 OK\r\n
Content-Type: image/jpeg\r\n
Content-Length: <image size>\r\n
\r\n
<JPEG image data>\r\n
```

## EVENT MONITORING (HTTP)

The “**EVENT MONITORING (HTTP)**” method **MUST NOT** be used for professional integrations, as it limits installations to a very few mobile devices as the device (Video Door Station) has a natural limitation of concurrent connections which it can

handle. The “*EVENT MONITORING (HTTP)*” method should only be used for quick proof-of-concept integrations.

The “*EVENT MONITORING (UDP)*” method **MUST** be used for professional integrations (see below) as it does not have a limit of mobile devices.

Returns the current event state of the call button (doorbell) and motion sensor as a continuous multipart stream, matching to the authenticated user requesting this information.

Trigger information about RFID and keypad events coming soon.

**Method:** GET

**Required permission:** valid user

**Syntax:**

*http://<device-ip>/bha-api/monitor.cgi?ring=doorbell[,motionsensor]*

<parameter>=<value>	Values	Description
ring=<string>	doorbell motionsensor	Event type to monitor. <b>Note:</b> RFID and keypad events coming soon

**Example Request:**

*http://<device-ip>/bha-api/monitor.cgi?ring=doorbell,motionsensor*

**Example Return:**

```
HTTP/1.1 200 OK\r\n
Content-Type: multipart/x-mixed-replace; boundary=--ioboundary\r\n
\r\n
--ioboundary\r\n
Content-Type: text/plain\r\n
\r\n
doorbell:H\r\n
\r\n
--ioboundary\r\n
Content-Type: text/plain\r\n
\r\n
motionsensor:L\r\n
\r\n
..
--ioboundary\r\n
Content-Type: text/plain\r\n
\r\n
doorbell:L\r\n
```

```

\r\n
--ioboundary\r\n
Content-Type: text/plain\r\n
\r\n
motionsensor:L\r\n
\r\n

```

**HTTP status codes:**

200 – OK  
 400 – Parameter missing or invalid  
 401 – Authentication required

## EVENT MONITORING (UDP)

After an event occurred, the device sends multiple identical UDP-Broadcasts on the ports 6524 and 35344 for every user and every connected device. You can split the package in two sections. The first one contains information about the package, the second part about encryption with payload. Please notice, we are also sending keep alive broadcasts every 7 seconds on this two ports, these packets are not relevant for the decryption of event broadcasts, you can skip them.

To decode these UDP packets in version 1, the algorithms Argon2i and ChaCha20 must be supported. Both are included in the well-known Sodium crypto library (libsodium).

**First Part:**

Fieldname	Length in Bytes	Datatype	Explanation
IDENT	3	Byte	To identify this kind of package the first three bytes contains a identifier. IDENT[0] = 0xDE IDENT[1] = 0xAD IDENT[2] = 0xBE
VERSION	1	Byte	The VERSION Flag allows us to distinguish between different encryptions and package types. Right now we support the following ones: 0x01 – ChaCha20-Poly1305 with Argon2i (currently the only supported version)

**Second Part for a package in VERSION 0x01:**

Fieldname	Length in Bytes	Datatype	Explanation
OPSLIMIT	4	Long	Used for password stretching with Argon2i.
MEMLIMIT	4	Long	Used for password stretching with Argon2i.
SALT	16	Byte	Used for password stretching with Argon2i.

NONCE	8	Byte	Used for encryption with ChaCha20-Poly1305
CIPHERTEXT	34*	Byte	With ChaCha20-Poly1305 encrypted text which contains informations about the Event.

\*The encrypted CIPHERTEXT contains 16 byte with random values, these bytes are no longer present after decryption.

### The CIPHERTEXT after decryption:

Fieldname	Length in Bytes	Datatype	Explanation
INTERCOM_ID	6	String	The first 6 digits of the user name. You can ignore all packets, where this doesn't match your DoorBird user).
EVENT	8	String	Contains the doorbell or „motion“ to detect which event was triggered. Padded with spaces.
TIMESTAMP	4	Long	A Unix timestamp, long.

### Used Algorithms:

Version	Name	Function
0x01	Argon2i	Key derivation
0x01	ChaCha20-Poly1305	Authenticated Encryption



### Step by step example:

Your DoorBird-User: foobar0001  
 Password from foobar0001: QzT3jeK3JY

#### Step 1: You capture the following packet via UDP:

```
0xDE 0xAD 0xBE 0x01 0x00 0x00 0x00 0x04 0x00 0x00 0x20 0x00 0x77 0x35 0x36 0xDC 0xC3 0x0E 0x2E 0x84
0x7E 0x0E 0x75 0x29 0xE2 0x34 0x60 0xCF 0xE3 0xFF 0xCC 0x52 0x3F 0x37 0xB2 0xF2 0xDC 0x1A 0x71
0x80 0xF2 0x9B 0x2E 0xA0 0x27 0xA9 0x82 0x41 0x9C 0xCE 0x45 0x9D 0x27 0x45 0x2E 0x42 0x14 0xBE 0x9C
0x74 0xE9 0x33 0x3A 0x21 0xDB 0x10 0x78 0xB9 0xF6 0x7B
```

#### Step 2: Split it up:

Field	Content
IDENT	0xDE 0xAD 0xBE
VERSION	0x01
OPSLIMIT	0x00 0x00 0x00 0x04
MEMLIMIT	0x00 0x00 0x20 0x00
SALT	0x77 0x35 0x36 0xDC 0xC3 0x0E 0x2E 0x84 0x7E 0x0E 0x75 0x29 0xE2 0x34 0x60 0xCF
NONCE	0xE3 0xFF 0xCC 0x52 0x3F 0x37 0xB2 0xF2
CIPHERTEXT	0xDC 0x1A 0x71 0x80 0xF2 0x9B 0x2E 0xA0 0x27 0xA9 0x82 0x41 0x9C 0xCE 0x45 0x9D 0x27 0x45 0x2E 0x42 0x14 0xBE 0x9C 0x74 0xE9 0x33 0x3A 0x21 0xDB 0x10 0x78 0xB9 0xF6 0x7B

#### Step 3: Generate stretched password.

To achieve this take the first 5 chars of your password („QzT3j“), use the OPSLIMIT with value 4 and the MEMLIMIT with value 8192 and stretch it with Argon2i, the result of stretching:

```
0x47 0xB8 0xA5 0xBC 0xDD 0xDA 0x29 0xEB 0x4C 0x0F 0xF6 0x78 0x46 0x41 0xE7 0x2F 0x7B 0x9C 0x45
0xD5 0x46 0x1A 0x60 0x71 0x2C 0x68 0x1F 0x05 0x23 0x9B 0xCC 0xA2
```

#### Step 4: Decrypt CIPHERTEXT with ChaCha20-Poly1305, use the stretched password and NONCE, output should be this:

```
0x66 0x6F 0x6F 0x62 0x61 0x72 0x31 0x30 0x32 0x20 0x20 0x20 0x20 0x20 0x5A 0x12 0xE4 0x13
```

#### Step 5: Split the output up:

Field	Byte Value	Value
INTERCOM_ID	0x66 0x6F 0x6F 0x62 0x61 0x72	„foobar“ Starting 6 chars from the user name. Skip the packet, if this doesn't match your DoorBird user).
EVENT	0x31 0x30 0x32 0x20 0x20 0x20 0x20 0x20	„102 “ (doorbell number from an D2102 or D2103 in this example, padded with spaces)
TIMESTAMP	0x5A 0x12 0xE4 0x13	1511187475 or readable for humans:

		Monday, 20. November 2017 14:17:55 UTC
--	--	--

## EXAMPLE SOURCE CODE

The following c-code shows the decoding part using libsodium method calls. It uses a few internal structs, methods and macros, but these are self explanatory.

### Password stretching:

```
unsigned char* stretchPasswordArgon(const char *password, unsigned char *salt, unsigned* oplimit, unsigned* memlimit) {
    if (sodium_is_zero(salt, CRYPTO_SALT_BYTES) && random_bytes(salt, CRYPTO_SALT_BYTES)) {
        return NULL;
    }
    unsigned char* key = malloc(CRYPTO_ARGON_OUT_SIZE);
    if (!*oplimit) {
        *oplimit = crypto_pwhash_argon2i_OPSLIMIT_INTERACTIVE;
    }
    if (!*memlimit) {
        *memlimit = crypto_pwhash_MEMLIMIT_MIN;
    }
    if (crypto_pwhash(key, CRYPTO_ARGON_OUT_SIZE, password, str_len(password), salt, *oplimit, *memlimit, crypto_pwhash_ALG_DEFAULT))
    {
        LOGGING("Argon2 Failed");
        *oplimit = 0;
        *memlimit = 0;
        CLEAN(key);
        return NULL;
    }
    return key;
}
```

### Decryption:

```
NotifyBroadcastCiphertext decryptBroadcastNotification(const NotifyBroadcast* notification, const StretchedPassword* password) {
    NotifyBroadcastCiphertext decrypted = {{0},{0},0};
    if(crypto_aead_chacha20poly1305_decrypt((unsigned char*)&decrypted, NULL, NULL, notification->ciphertext, sizeof(notification->ciphertext),
    NULL, 0, notification->nonce, password->key)!=0){
        LOGGING("crypto_aead_chacha20poly1305_decrypt() failed");
    }
    return decrypted;
}
```



## LIVE AUDIO RECEIVE AND TRANSMIT – General information

- Audio can be received and transmitted via our HTTP interface or SIP interface.
- AEC/ANR: The transmitting user device (e.g. Home Automation tablet) MUST do the echo and noise reduction on its own (AEC, ANR). The DoorBird Video Door Station has a high-end hardware- and software-based echo canceller built-in, but due to natural physical circumstances you have to do echo cancellation on both sides, user device and door station. Our native Apps use high-end self-learning AEC and ANR algorithms. Our AEC and ANR algorithms in our native Apps are one of our core technologies and thus not available for any third party. You must develop an AEC / ANR on your own or use the native AEC / ANR of the operating system, see e.g.  
[https://developer.apple.com/library/content/documentation/MusicAudio/Conceptual/AudioUnitHostingGuide\\_iOS/UsingSpecificAudioUnits/UsingSpecificAudioUnits.html](https://developer.apple.com/library/content/documentation/MusicAudio/Conceptual/AudioUnitHostingGuide_iOS/UsingSpecificAudioUnits/UsingSpecificAudioUnits.html) and  
<https://developer.android.com/reference/android/media/audiofx/AcousticEchoCanceller.html> for information about acoustic echo cancellation.
- Codec: When using this API audio MUST be G.711  $\mu$ -law (sampling rate 8000 Hz).
- Wireshark: When using Wireshark for packet inspection during development, audio transmission might not be shown in the “http” Filter, please chose a different filter.

## LIVE AUDIO RECEIVE

Use this method to obtain real-time audio (G.711  $\mu$ -law) from the device.

When the request is correct, but the requesting user has no permission to view the live stream at the moment, the request is answered with a return code 204. This usually happens for users without “watch-always” permission when there was no ring event in the past 5 minutes.

Please note, that the audio connection can get interrupted at any time, when the official DoorBird App requests the stream. It has precedence over users of the LAN-API.

**Method:** GET

**Required permission:** valid user, “watch always” or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/audio-receive.cgi
```

**Example Request:**

```
http://<device-ip>/bha-api/audio-receive.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\n<AUDIO DATA>
```

```
<AUDIO DATA>
<AUDIO DATA>
...
```

## LIVE AUDIO TRANSMIT

Transmit audio (G.711  $\mu$ -law) from your mobile device (e.g. Home Automation tablet) to the device. Only one consumer can transmit audio (talk) at the same time. The second consumer will be rejected.

When the request is correct, but the requesting user has no permission to view the live stream at the moment, the request is answered with a return code 204. This usually happens for users without “watch-always” permission when there was no ring event in the past 5 minutes.

Please note, that the audio connection can get interrupted at any time, when the official DoorBird App requests the stream. It has precedence over users of the LAN-API.

**Method:** POST

**Required permission:** valid user, “watch always” or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
http://<device-ip>/bha-api/audio-transmit.cgi
```

**Example 1:** Singlepart audio data transmit with G.711  $\mu$ -law (authorization omitted).

```
POST /bha-api/audio-transmit.cgi HTTP/1.0\r\n
Content-Type: audio/basic\r\n
Content-Length: 9999999\r\n
Connection: Keep-Alive\r\n
Cache-Control: no-cache\r\n
\r\n
<AUDIO DATA>
<AUDIO DATA>
<AUDIO DATA>
...
```

**Example 2:** Multipart audio data transmit with G.711  $\mu$ -law (authorization omitted).

## INFO REQUEST

Get some version information from the device in JSON format. Starting with firmware 000108, the relays configuration is included in the JSON output. It includes both, physical relays and paired DoorBird IP I/O Door Controllers.

**Method:** GET

**Required permission:** valid user

**Syntax:**

```
http://<device-ip>/bha-api/info.cgi
```

**Example Request:**

```
http://<deviceip>/bha-api/info.cgi
```

**Example Return 1: DoorBird D101 with outdated firmware**

```
{
  "BHA": {
    "RETURNCODE": "1",
    "VERSION": [{
      "FIRMWARE": "000096",
      "BUILD_NUMBER": "41865"
    }]
  }
}
```

**Example Return 2: DoorBird D21x with paired DoorBird IP I/O DoorController**

```
{
  "BHA": {
    "RETURNCODE": "1",
    "VERSION": [{
      "FIRMWARE": "000109",
      "BUILD_NUMBER": "15120529",
      "PRIMARY_MAC_ADDR": "1CCA3700000",
      "RELAYS": ["1", "2", "gggaaa@1", "gggaaa@2"],
      "DEVICE-TYPE": "DoorBird D101"
    }]
  }
}
```

## FAVORITES MANAGEMENT

In order to react on events and execute actions on the DoorBird device, this API features favorites and schedules. Favorites are basic configuration units that can be used in schedules, e.g. an HTTP(S)-URL for notifications or SIP numbers. Favorites can be seen as address book entries.

The user needs the “API operator” permission in order to access favorites.cgi.

Firmware 000110 or higher is required on your DoorBird/BirdGuard in order to access favorites and schedules.

## LIST FAVORITES

List all currently configured favorites as JSON.

**Method:** GET

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/favorites.cgi
```

**Example Request:**

```
http://<device-ip>/bha-api/favorites.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\n
\r\n
{
  "sip":{
    "0":{
      "title":"Concierge",
      "value":"1234@sip.example.com"
    }
  },
  "http":{
    "1":{
      "title":"MyServer",
      "value":"http://10.0.0.1/foo/notify"
    },
    "5":{
      "title":"ServerX",
      "value":"https://login:password@192.168.1.100?action=notify"
    }
  }
}
```

## ADD OR CHANGE FAVORITE

Add a new favorite or change an existing favorite. If you add a new favorite, it's id is available as response header value for key "favoriteid".

**Method:** GET

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/favorites.cgi?action=save<parameter>=<value>
```

<parameter>=<value>	Values	Description
action=<string>	save	Fixed parameter for saving favorites
type=<string>	sip http	Type of the favorite; ATTENTION: it's not allowed to switch this type when saving an existing favorite!



title=<string>	name / title	Name or short description of the favorite
value=<string>	URL / address	URL of the favorite, including protocol and user credentials, if necessary (see example above). This can be an HTTP(S) URL or an SIP target.
id=<int>	optional: id of the favorite	Specify the ID of the favorite to change; omit, if saving a new favorite

**Example Requests:** add HTTP favorite, change SIP favorite

```
http://<device-ip>/bha-api/favorites.cgi?action=save&type=http&title=RingServ&value=https://172.17.1.5/notify/ring
```

```
http://<device-ip>/bha-api/favorites.cgi?action=save&type=sip&title=Johns%20Phone&value=101@sip.domain.local&id=2
```

**Return:**

```
HTTP/1.0 200 OK\r\n\r\n
```

**HTTP status codes:**

- 200 – OK
- 400 – Parameter missing or invalid
- 401 – Authentication required
- 500 – Internal error
- 507 – Size limit exceeded (too many or too large favorites)

## DELETE FAVORITE

Remove a favorite from the DoorBird device. If the favorite is actively used in a schedule configuration, the schedule entry will also be removed.

**Method:** GET

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/favorites.cgi?action=remove&<parameter>=<value>
```

<parameter>=<value>	Values	Description
action=<string>	remove	Fixed parameter for deleting favorites
type=<string>	sip http	Type of the favorite
id=<int>	ID of the favorite	The ID of the favorite to delete

**Example Request:**

```
http://<device-ip>/bha-api/favorites.cgi?action=remove&type=sip&id=2
```

**Return:**

```
HTTP/1.0 200 OK\r\n\r\n
```

**HTTP status codes:**

- 200 – OK
- 400 – Parameter missing or invalid
- 401 – Authentication required
- 500 – Internal error

## SCHEDULE MANAGEMENT

With schedule entries one can configure the actions, that a DoorBird device executes at certain events. It is possible to setup the input event (e.g. ring, motion), the output event (e.g. HTTP notification, SIP call) and the time window, where this rule is active.

The API handles 3 different schedule types: “once” (one time event), “from-to” and “weekdays” (recurring time ranges on a weekly base).

“Once” is rather self-explanatory, the schedule gets invalid after a single use. You can enable it again, so you don't have to configure it again.

“From-to” can be used for all distinct – not recurring - time ranges. Time unit are seconds since 1.1.1970 and the time zone is UTC.

Seconds are used as unit for time information in “weekdays” setup. Starting point is Sunday 0:00 o'clock. Maximum time value for weekly events is 604800 (7 days \* 24 hours \* 60 minutes \* 60 seconds). The 24 hours of a day are divided into 48 time slices of 30 minutes (1800 seconds) length each. It is important, that all time schedules are multiples of 1800 seconds.

There can be only one schedule entry for each output type, time slot and event slot. Example: just one HTTP trigger for ring events at 8 o'clock. But an SIP call at the same time is possible. If more events are needed, one needs to implement event-multiplexing. Exceptions are relays, where more can be triggered for the same event.

The user needs the “API operator” permission in order to access `schedules.cgi`.

Firmware 000110 or higher is required on your DoorBird/BirdGuard in order to access favorites and schedules.

**Hint:** entries from the old “notification.cgi” configuration get migrated to schedule entries.

## LIST SCHEDULES

List all currently configured schedules settings as JSON.

**Method:** GET

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/schedule.cgi
```

Attributes of the schedule JSON object:

JSON attributes	Values	Description
input	doorbell motion rfid input	The input event type, e.g. doorbell or motion
param	<doorbell-number> <> <transponder-id> <input-number>	Parameter value for the input, e.g. doorbell number, RFID transponder id, input

output	JSON array	JSON array of output action configurations
--------	------------	--

Attributes of the JSON object for an “output” configuration:

JSON attributes	Values	Description
event	notify sip relay http	The action to execute. e.g. issue HTTP notification or trigger a relay Type “notify” is used to trigger push notifications and cloud recordings
param	<> <sip-favorite-id> <relay-number> <http-favorite-id>	Parameter for the configured event, e.g. favorite id (for sip or http) or relay number for relay events
schedule	once from-to weekdays	Schedule configuration, e.g. trigger just once, trigger for a certain time range, trigger on weekday base

**Example Request:**

```
http://<device-ip>/bha-api/schedule.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\n
\r\n
[
{
  "input": "doorbell",
  "param": "1",
  "output": [
    {
      "event": "http",
      "param": "1",
      "schedule": {
        "weekdays": [
          {
            "from": "122400",
            "to": "151200"
          }
        ]
      }
    }
  ]
},
{
  "input": "motion",
  "param": "",
  "output": [
    {
      "event": "relay",
      "param": "2",
      "schedule": {
        "from-to": [
          {

```

```
    "from":"1509526800",           <!-- 1.11.2017 10:00 UTC -->
    "to":"1509555600"            <!-- 1.11.2017 18:00 UTC -->
  },
  {
    "from":"1509613200",         <!-- 2.11.2017 10:00 UTC -->
    "to":"1509642000"          <!-- 2.11.2017 18:00 UTC -->
  }
]
}
}
}
{
  "input":"input",              <!-- example for relay input events -->
  "param":"1",                  <!-- input relay number 1 -->
  "output":[
    {
      "event":"sip",
      "param":"4",              <!-- call sip favorite #4 -->
      "schedule":{
        "once":{
          "valid":"1"           <!-- this one time event is valid -->
        }
      }
    }
  ]
}
]
```

**HTTP status codes:**

- 200 – OK
- 204 – No data for the requested input (if parameter “input” is available at the request)
- 401 – Authentication required

**ADD OR UPDATE SCHEDULE ENTRY**

Add or update a schedule setting by sending the configuration as JSON object.

**Method:** POST

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/schedule.cgi
```

**Example Request:**

```
http://<device-ip>/bha-api/schedule.cgi
```

**Return:**

```
HTTP/1.0 200 OK\r\n\r\n
```

**HTTP status codes:**

- 200 – OK
- 400 – Any of: invalid JSON format; Content-Length header missing; Content-Length header does not match real content size; content size too large
- 401 – Authentication required
- 500 – internal error

507 – Size limit exceeded (too many or too large schedules)

## DELETE SCHEDULE ENTRY

Delete a schedule entry.

**Method:** GET

**Required permission:** valid user, API operator permission

**Syntax:**

```
http://<device-ip>/bha-api/schedule.cgi?action=remove<parameter>=<value>
```

<parameter>=<value>	Values	Description
action=<string>	remove	Fixed parameter for deleting a schedule entry
input=<string>doorbell motion rfid input	doorbell motion rfid input	The input event type, e.g. doorbell or motion
param=<string>	<doorbell-number> <> <transponder-id> <input-number>	The ID of the schedule entry to delete, e.g. doorbell number, RFID transponder id, input

**Example Request:**

```
http://<device-ip>/bha-api/schedule.cgi?action=remove&input=motion&param=xxx
```

**Return:**

```
HTTP/1.0 200 OK\r\n\r\n
```

**HTTP status codes:**

200 – OK  
 401 – Authentication required  
 500 – internal error  
 9



## RTSP INTERFACE DESCRIPTION

### LIVE VIDEO REQUEST

Returns a MPEG4 H.264 live video stream with the default resolution and compression as defined in the system configuration. Uses RTSP on 554 and the RTSP-over-HTTP protocol on port 8557 of DoorBird and BirdGuard devices. An average of up to 12 fps can be provided using this third-party API, depending on the network speed and load factor of the device. Requires standard RTSP authentication (no parameter authentication supported as we support for HTTP).

When the request is correct, but the requesting user has no permission to view the live stream at the moment, the request is answered with a return code 204. This usually happens for users without “watch-always” permission when there was no ring event in the past 5 minutes.

Please note, that the RTSP connection can get interrupted at any time, when the official DoorBird App requests the stream. It has precedence over users of the LAN-API.

**Method:** GET

**Required permission:** valid user, “watch always” or ring event in the past 5 minutes for the requesting user

**Syntax:**

```
rtsp://<device-ip>:<device-rtsp-port>/mpeg/media.amp
```

**Example Request:**

```
rtsp://<device-ip>:8557/mpeg/media.amp  
rtsp://<device-ip>/mpeg/media.amp
```



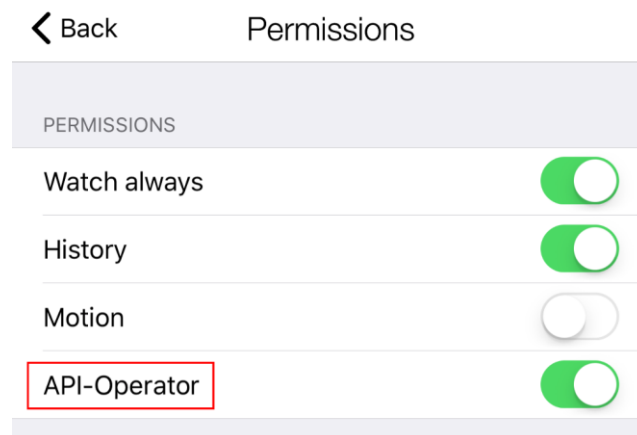


## Session Initiated Protocol (SIP)

### SIP

This method is to configure and use the SIP service which is built into the device. The SIP service is in early stage of development, please note the following:

- The SIP registration will be stored permanently in the device. Every hardware restart will force the SIP service to restart / register again
- You must use a username/password combination with the “API operator” permission (DoorBird App → Administration → User → Edit → Permissions). This makes sure that no other user (a non SIP relevant user) can modify the



SIP settings.

- Each SIP call terminates 180 seconds after it was initiated, for security reason (auto-hangup).
- The SIP service will not initiate the call automatically when someone pushes the doorbell button, you have to listen to the notifications of the device (see document: LAN API) and initiate the call with the "makecall" action of "sip.cgi"
- The device supports only one simultaneous SIP call
- If DTMF Support is enabled the telephone (recipient of the SIP call) can trigger the door open relay by pressing the pincode for relay.
- Making / establishing the call takes sometimes a few seconds, the SIP handshake needs some synchronization, this is comparable to a standard SIP softphone or hardphone.
- We do a lot of debugging. If something is not working, please wait 5-7 seconds. If this doesn't solve the issue, please restart the device and let us know what environment you are using (network, SIP Proxy, calling device etc.)
- Don't penetrate the device with many concurrent SIP requests, please wait min 3 seconds between each SIP request
- Please note that you need an Acoustic Echo Canceller (AEC) on the client-side as well as an Acoustic Noise Canceller (ANC). This ensures high quality audio calls

- The device will close any ongoing SIP connection, if there is an listen/talk request from the official DoorBird App.
- From device version 000099 on, peer-2-peer (P2P) SIP calls are supported. After enabling the SIP functionality with “enable=1”, the device is ready to receive SIP calls on port 5060. To issue outgoing calls from the device, call “action=makecall” or configure automatic calls on ring events using parameter “autocall\_doorbell\_url”.

## SIP Registration

Register to a SIP Proxy. This is not necessary, if you are using peer-2-peer calls.

**Method:** GET  
**Required permission:** valid user, “API operator” permission

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=registration&user=<user>&password=<password>&url=<url>
```

<parameter>=<value>	Description
user=<String>	Authentication user for the SIP Proxy
password=<String>	Authentication password for the SIP Proxy
url=<String>	IP/Hostname of the SIP Proxy

**Example "registration" Request:**

```
http://<deviceip>/bha-api/sip.cgi?action=registration&user=foo&password=bar&url=192.168.123.22
```

**Returns:**

- 200 if everything is okay.
- 401 on authentication failure (user name/password from Basic Authentication wrong or no “API operator” permission)

## SIP Make Call

Manually initiate the SIP call. This can either be an peer-2-peer call or a “normal” SIP call using the configured PBX / SIP proxy.

**Method:** GET  
**Required permission:** valid user, “API operator” permission

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=makecall&url=<url>
```

<parameter>=<value>	Description
url=<String>	SIP URL to call

**Example "makecall" Request:**

```
http://<deviceip>/bha-api/sip.cgi?action=makecall&url=sip:108@192.168.123.22
```

**Returns:**

- 200 if everything is ok

- 400 if there is something wrong, e.g. parameter missing
- 401 on authentication failure (user name/password from Basic Authentication wrong or no "API operator" permission)
- 503 if the call does not work, e.g. line busy

## SIP Hangup

Hangup the SIP call. If there is currently no ongoing call, this CGI returns "200 OK" too.

**Method:** GET

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=hangup
```

**Returns:**

- 200 if everything is ok
- 401 on authentication failure (user name/password from Basic Authentication wrong or no "API operator" permission)

## SIP Settings (CGI)

Configure several SIP related settings.

**Important note on the autocalldoorbell\_url setting: this feature is deprecated here and will be removed in the future.** It got replaced by schedule.cgi (together with favorites.cgi), because of the possibility to use schedules (e.g. call a different number at night). Currently all changes to autocalldoorbell\_url get migrated into appropriate favorite and schedule entries in order to stay compatible with existing 3<sup>rd</sup> party drivers.

**Method:** GET

**Required permission:** valid user, "API operator" permission

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=settings&<parameter>=<value>
```

<parameter>=<value>	Values	Description
enable=<Integer>	0..1	Enable or disable SIP registration after reboot of the device, default: 0
mic_volume=<Integer>	1..100	Set the microphone volume, default: 33
spk_volume=<Integer>	1..100	Set the speaker volume, default: 70
dtmf=<Integer>	0..1	Enable or disable DTMF support, default: 0
autocalldoorbell_url=<String>	URL or "none"	<b>DEPRECATED: use schedule.cgi</b> SIP URL to automatically call upon doorbell event. By the second doorbell event hangs the previous call. Set to "none" to disable this automatic call. Default: "none"
relay1_passcode=<Integer>	0..99999999	Pincode for triggering the door open

		relay
incoming_call_enable=<Int>	0..1	Enable or disable incoming calls, default:0
incoming_call_user=<String>	SIP user	Allowed SIP user which will be authenticated for DoorBird. E.g. "sip:10.0.0.1:5060" or "sip:user@10.0.0.2:5060".
anc=<Integer>	0..1	Enable or disable acoustic noise cancellation, default: 1

**Example "settings" Request:**

```
http://<deviceip>/bha-api/sip.cgi?action=settings&autocall_doorbell_url=sip:108@192.168.123.22
```

**Returns:**

- 200 if everything is okay
- 401 on authentication failure (user name/password from Basic Authentication wrong or no "API operator" permission)

## SIP Status

You can query the current SIP status by calling the following URL.

**Method:** GET

**Required permission:** valid user, "API operator" permission

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=status
```

**Returns:**

- JSON, where "LASTERRORCODE": "200" means that the SIP client is successfully registered. The attribute LASTERRORCODE contains the most recent SIP status code and "LASTERRORTXT" the most recent SIP error text.
- 200 if everything is okay
- 401 on authentication failure (user name/password from Basic Authentication wrong or no "API operator" permission)

## SIP Settings Reset

Resets all SIP related settings except the license, e. g. SIP proxy settings (action=registration) and SIP settings (action=settings). Hangs up any ongoing call.

**Method:** GET

**Required permission:** valid user, "API operator" permission

**Syntax:**

```
http://<device-ip>/bha-api/sip.cgi?action=reset
```




**Returns:**

- JSON, where 'LASTERRORCODE': "200" means that the SIP client is successfully registered. The LASTERRORCODE returns the most recent SIP status code and "LASTERRORTXT" the most recent SIP error text.
- 200 if everything is okay
- 401 on authentication failure (user name/password from Basic Authentication wrong or no "API operator" permission)


## SIP Settings (DoorBird App)

The DoorBird App supports setting SIP properties directly at the Administration section. Log into your DoorBird with the Administration credentials (e.g. QR code), scroll down to "Expert Settings" where you can find the "SIP Settings".

Example SIP settings at the DoorBird App:

iPad  09:09 100%  


[← Back](#) SIP Settings [Save](#)

SIP SETTINGS 

SIP activated

SIP Proxy 192.168.123.22

SIP User User

SIP Password  ●●●●●●

Call on ring 108@192.168.123.22

DTMF


Light PIN Light PIN


Relay 1 PIN Relay 1 PIN

Allow incoming calls

Allowed SIP Users 0 >

Noise cancellation

Microphone volume  33%

Speaker volume  70%

Last error code 0

