SIEMENS

Industrial Edge

App
Audio Connector for Industrial Edge V1.0

Application Manual

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Introduction to the Audio Connector

1

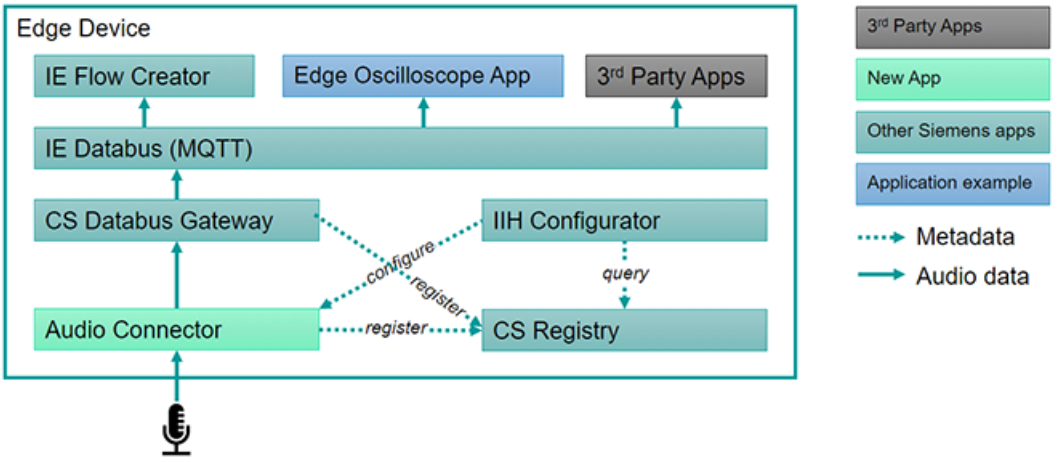
Description

By using the Audio Connector for Industrial Edge that works as a gateway on an Industrial Edge Device (IED), you can connect USB audio devices to the IED and make the audio data available on the IE databus via the Connectivity Suite (CS) of the Industrial Information Hub (IIH).

⚠ CAUTION
Approved USB audio devices Only use approved USB audio devices. USB audio devices running under Linux OS are supported.

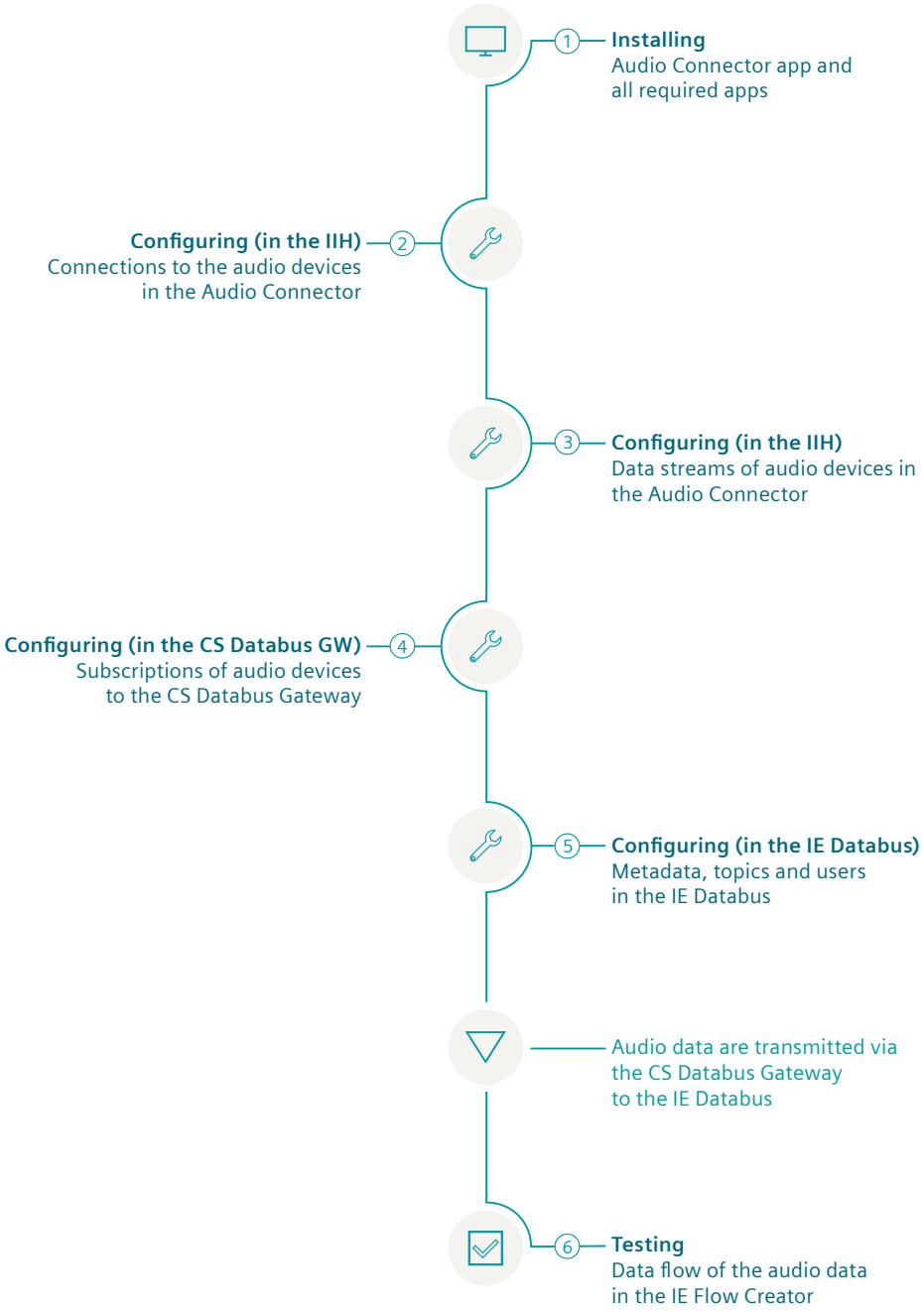
The Audio Connector is based on PortAudio and the Advanced Linux Sound Architecture (ALSA). It supports standard USB audio devices, such as microphones, headsets, external sound cards, etc.

You can analyze the audio data in the IE Flow Creator or in analytic apps you have developed yourself and use them to find, for example, a motor imbalance.



You create the configuration of the Audio Connector, such as the connection to audio devices and the connection of the metadata topics via the CS MQTT Gateway to the IE Databus, for example, in the Industrial Information Hub (IIH).

Overview of procedure



Installation

2

2.1 Validity of the documentation

Description

The "Audio Connector for Industrial Edge" documentation is valid for installing the app on an Industrial Edge Device (IED).

2.2 Overview of additional documentation

Overview

The following table lists additional documents that supplement this description, some of which are available on the Internet.

Documentation	Main contents
Industrial Edge Hub (https://iehub.eu1.edge.siemens.cloud)	This page describes the functions of the Siemens Industrial Edge platform and the functionalities of the Edge Management System.
System overview (https://new.siemens.com/global/en/products/automation/topic-areas/industrial-edge/production-machines.html)	This page provides an overview of all Edge solutions.
Industrial Information Hub (IIH) and Common Configurator (https://support.industry.siemens.com/cs/document/109803582/industrial-information-hub-(core)-and-common-configurator-for-industrial-edge?dti=0&lc=en-WW)	You can find the IIH manual here.
IE Flow Creator (https://support.industry.siemens.com/cs/ww/en/view/109794331)	You can find the IE Flow Creator manual here.

2.3 System requirements

Note the following system requirements for the installation of the Edge Apps.

Software requirements

The following Internet browsers are required:

- Google Chrome, Version ≥ 72
- Firefox Version ≥ 62

The following apps are required. The apps are available in the "Library" area of the Industrial Edge Hub. From there, you can transfer the latest version of the app to your Industrial Edge Management (IEM) and then install it on your Industrial Edge Device (IED):

- IIH (Industrial Information Hub) Configurator
  You configure the connections to the audio devices with the Industrial Information Hub und Common Configurator app and the data streams from the audio devices in the Audio Connector.
- Connectivity Suite
  The Connectivity Suite offers a standardized path for data exchange, as well as the configuration of different data sources. Required apps:
  - Databus Gateway
  - Registry Service
- IE Databus

Note

Installation of the apps

All apps must be installed on the same IED.

Hardware requirements

- A device on which the Industrial Edge Management (IEM) is running (VM - ISO: Version 1.0.8)
- An Edge device (IED) that is compatible with Industrial Edge Management:
  - IED Model: e.g. SIMATIC IPC 227E Nanobox, SIMATIC IPC 427E, IPC127E and IPC827E
  - Hard disk: At least 10 GB available
  - RAM: 2 GB available RAM
- The Edge device must be on board the Industrial Edge Management.
- USB audio devices
  The Audio Connector supports all USB audio devices that run on Linux OS. USB audio devices that only list Windows and Mac are also supported for the most part, since there is usually no explicit listing for Linux OS. You can find a list of common USB audio devices that work with Linux OS here: linuxaudio.org (https://wiki.linuxaudio.org/wiki/hardware_support)
  The USB specification defines a specific class for USB audio devices that allows the IED to automatically identify USB audio devices. With Linux OS, all USB audio devices are mounted in /dev/snd after being discovered by the IED operating system. USB audio devices that comply with this specification are referred to as audio class compliant and can be used with the Audio Connector. Internally, the Audio Connector provides the Advanced Linux Sound Architecture (ALSA) drivers to the IED to access and stream data from all detected USB audio devices.
  Unsupported and especially older USB audio devices may require special drivers that are not available on the IED.

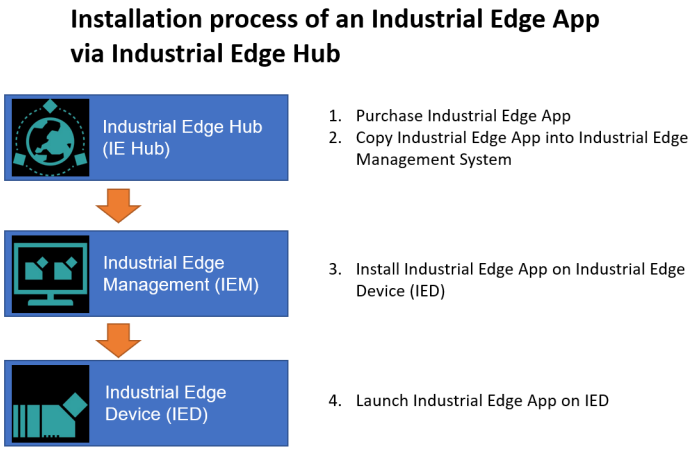
IEM, IED, and web browsers must be synchronous in the UTC time zone.

2.4 Installing Audio Connector on an IED

2.4.1 Overview of the installation process

Description

In the graphic below you can see the steps involved in the installation of an Industrial Edge app on an Industrial Edge device:



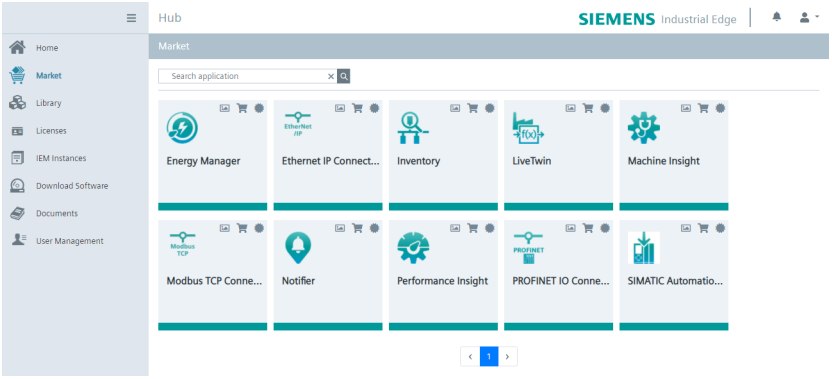
Additional information is available here:

1. Purchasing Audio Connector in the Industrial Edge Hub (Page 10)
2. Copying Audio Connector from the IE Hub to the IEM catalog (Page 11)
3. Installing Audio Connector on the IED (Page 11)

2.4.2 Purchasing Audio Connector in the Industrial Edge Hub

Description

The "Market" tab in the Industrial Edge Hub (IE Hub) contains the global app catalog via which you can buy the license for the Audio Connector in the Siemens Industry Mall.



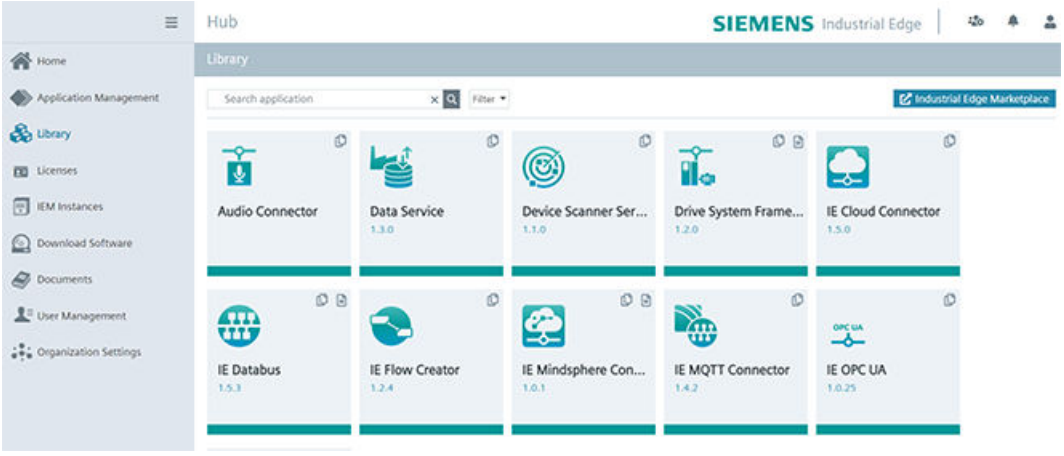
Procedure

To buy the license, follow these steps:

1. Click on the icon in the Audio Connector tile.
   The Siemens Industry Mall website is loaded.
2. Purchase the license for the app.
3. As soon as you have purchased the license, the icon for the license status turns green and the Audio Connector is displayed in the "Library" tab of the IE Hub.

Result

You can see all apps for which you have purchased licenses in the "Library" tab:



From the "Library" tab, you can now transfer the Audio Connector to your Industrial Edge Management (IEM) instance.

2.4.3 Copying Audio Connector from the IE Hub to the IEM catalog

Description

An IEM instance and an Internet connection are required to copy an app into the Industrial Edge Management (IEM) catalog. With this functionality, you can copy the app directly into a catalog of one of your IEM instances.

Procedure

To copy an app into the IEM catalog, follow these steps:

1. Open the "Library" tab in the Industrial Edge Hub.
2. Click the icon in the desired app tile.
   The "Copy Application to IEM catalog" window opens. The layout of the window depends on whether the app contains links for open source software (OSS) and for the readme. The relevant file is downloaded when you click on one of the links. If the app does not support these links, the screen is shown without links.
3. In the drop-down list, select the IEM instance to which you want to copy the app.
4. Click "Copy".
   The app is copied, and a corresponding job is created. You can follow the status of the job in the status window of the corresponding IEM instance.

2.4.4 Installing Audio Connector on the IED

Description

You can install and start the Audio Connector in the catalog of the Industrial Edge Management (IEM) instance. To be able to use the Audio Connector on your corresponding Industrial Edge Device (IED), you must install the following apps on this IED:

- IIH Configurator
- Databus Gateway
- Registry Service
- Audio Connector
- IE Databus

Note

Industrial Edge Device (IED)

All apps must be installed on the same IED.

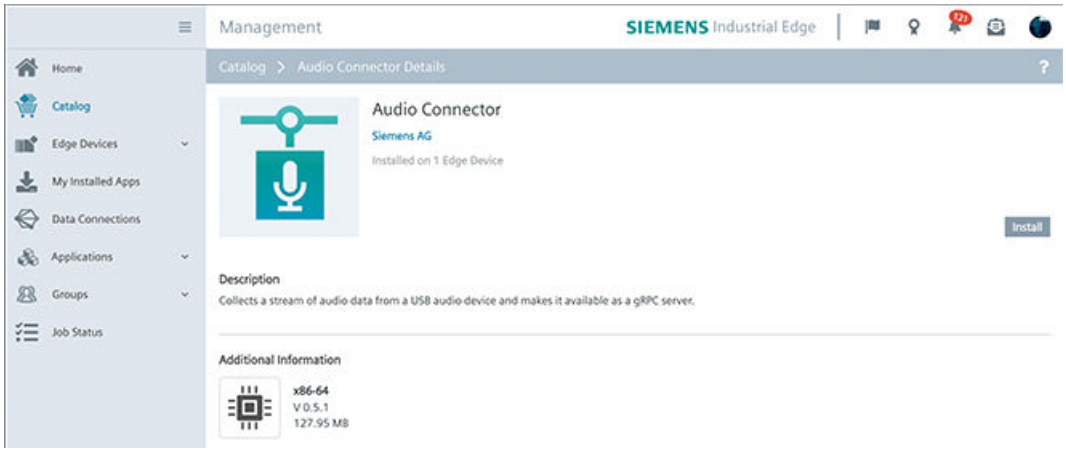
Requirement

- You must be logged onto the Industrial Edge Management (IEM).
- All apps were copied to the catalog. You can find more information here: Copying Audio Connector from the IE Hub to the IEM catalog (Page 11)

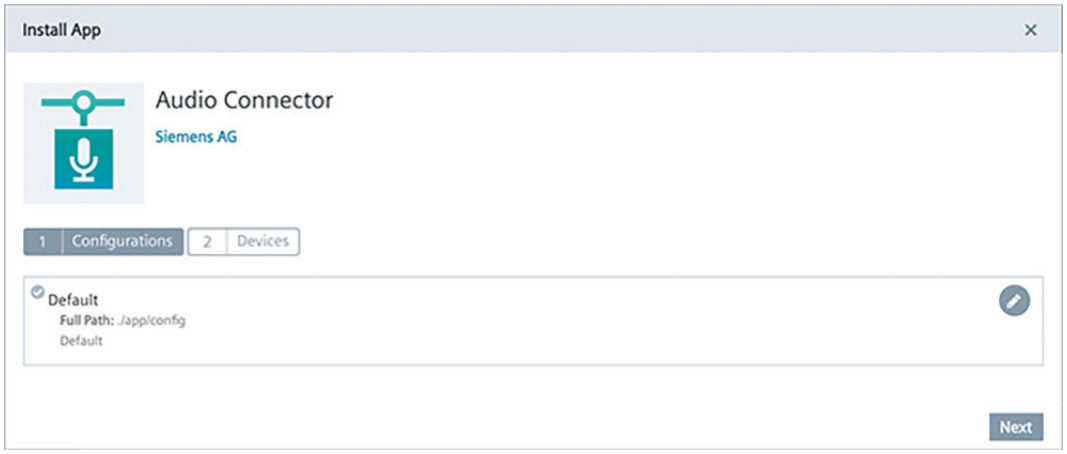
Procedure

To install the Audio Connector, follow these steps:

1. Open the "Catalog" tab.
2. Click on the "Audio Connector" tile.
   The following dialog box opens:



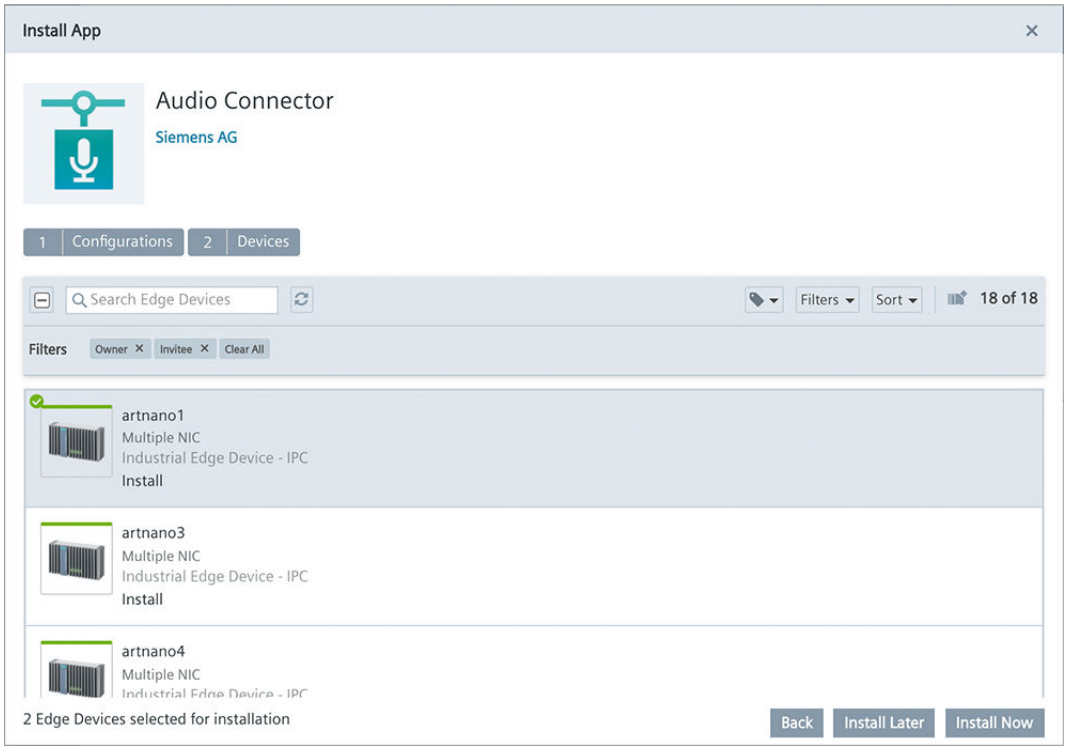
3. Click "Install".
   The "Install App" dialog window is displayed.



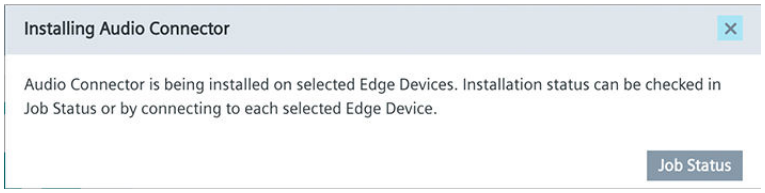
   If you already have a configuration file that you want to use, for example, downloaded from a different IED, you can upload it here. Otherwise, create the configuration of the Audio Connector in a later step.

4. Click "Next".

5. You can see a table with all associated IEDs. Select one or more IEDs on which you want to install the app:

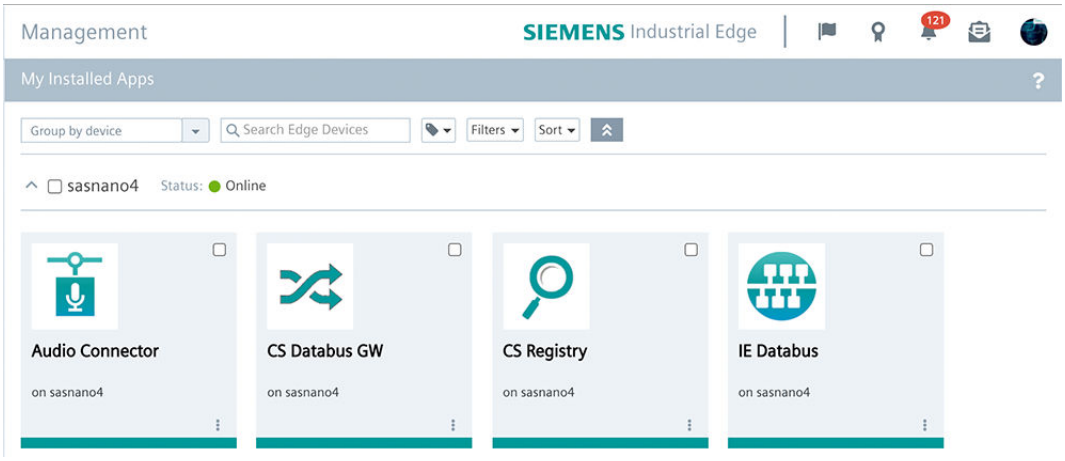


6. You have two options to continue:
   – Click "Install Later" to schedule the date and time of the installation.
   – Click "Install Now" to install the app immediately.
7. Click "Allow".
   The installation of the app is started on the selected IEDs:



Result

The Audio Connector is listed in the "My Installed Apps" tab:



Configuring connections to audio devices (IIH Configurator)

3

Description

After installing the Audio Connector and all other necessary apps on your IED, you configure the connections to the audio devices in the Industrial Information Hub (IIH).

You can find more information about the IIH here: Industrial Information Hub (IIH) (https://support.industry.siemens.com/cs/document/109803582/industrial-information-hub-(core)-and-common-configurator-for-industrial-edge?dti=0&lc=en-WW)

Requirement

- The Industrial Information Hub (IIH) is installed and open on your IED.
- Hardware settings on the audio device (read the manual of the audio device for more information), for example:
  - Clocking (clock source), e.g., internal, BNC, digital source, etc.
  - Analog gain/amplification
  - Phantom power +48 V for capacitor/electret microphones

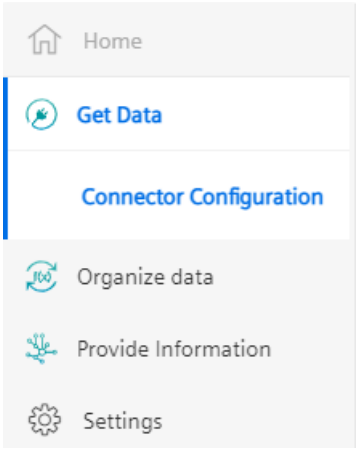
  For many audio devices, you can use the default settings here.

⚠ CAUTION
Approved USB audio devices Only use approved USB audio devices. USB audio devices running under Linux OS are supported.

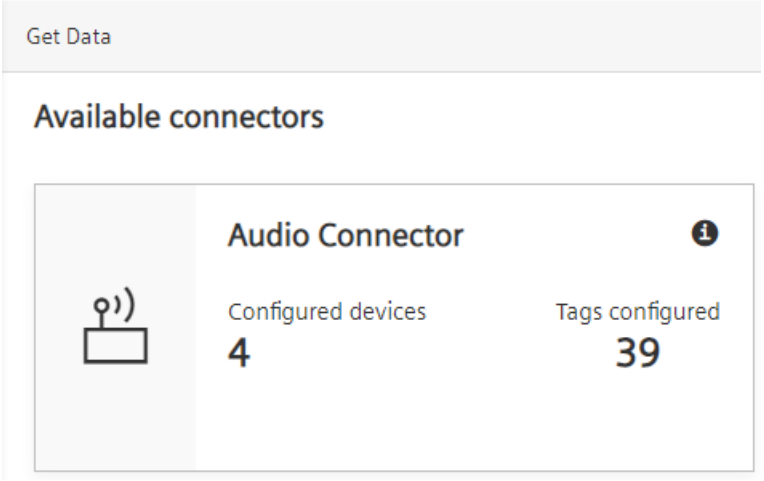
Procedure

To configure the connections, follow these steps:

1. Open the "Get Data" tab in the IIH.



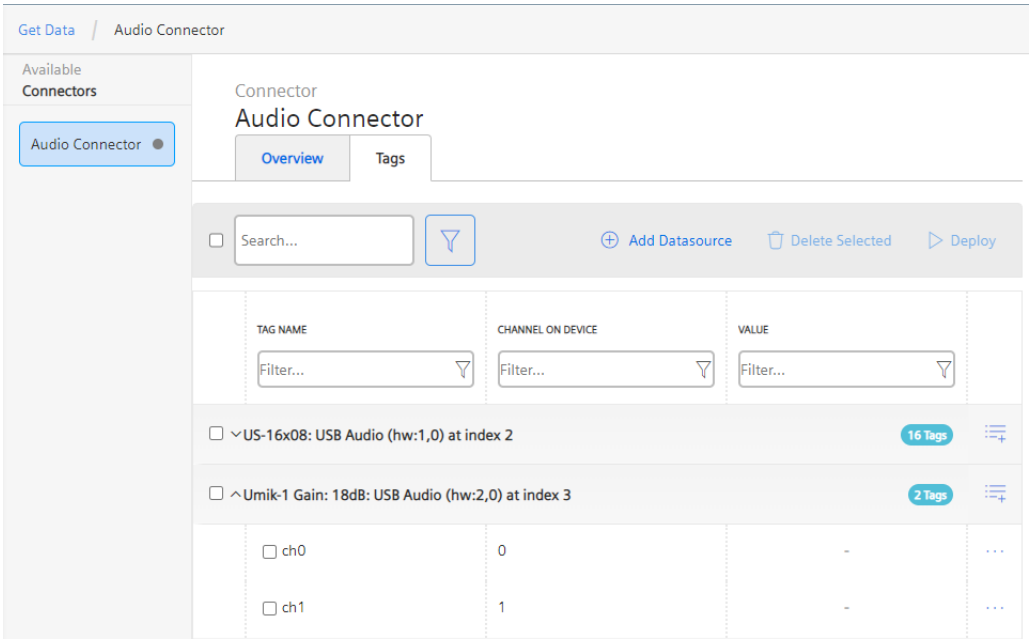
All installed or available connectors are displayed here. A connector can access multiple devices simultaneously. The status display shows you how many of the configured devices (e.g. microphones) are connected and how many tags are being transferred:



Click ℹ to open the Audio Connector manual.

2. Click on "Audio Connector".
   You can also see the connector status in the "Overview".

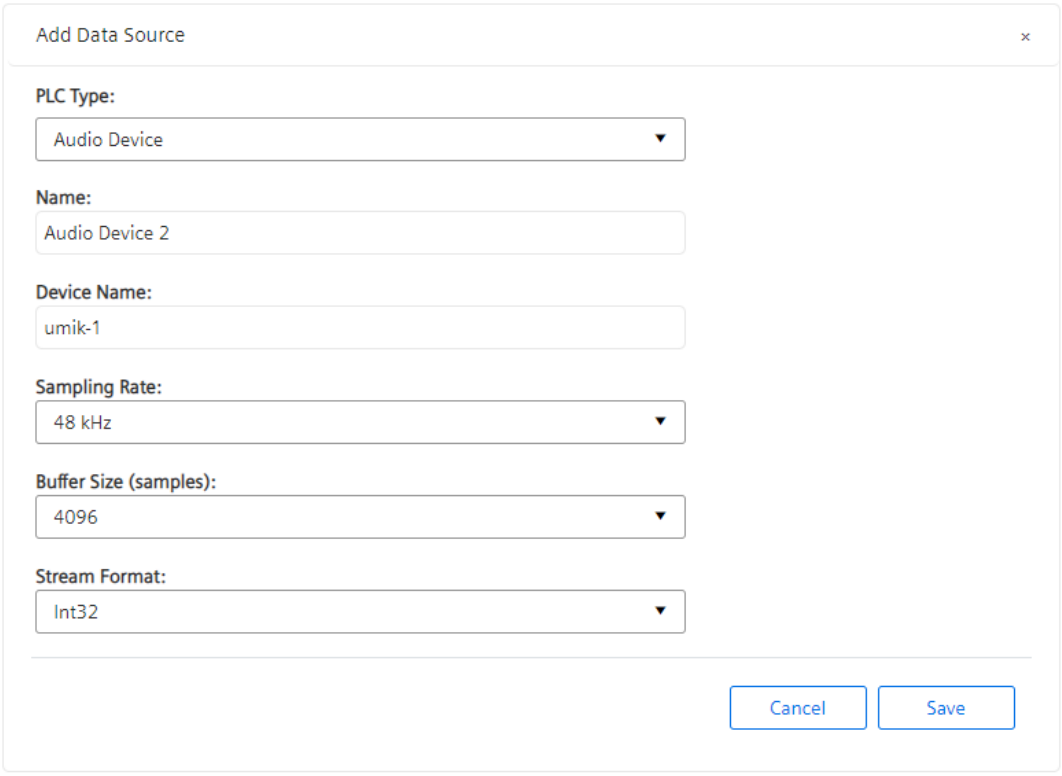
3. Open the "Tags" tab:



Here you can see all available tags that are transferred by the connector.

4. Click on "Add Datasource" and select "Audio Device" as PLC type.

5. Fill in the appropriate parameters for the configuration of the audio device:



   - Device Name: Displayed in the IED operating system.
   - Sampling Rate of the audio device in Hz
   - Buffer Size: The number of audio examples that are to be included in each message.
   - Stream Format
6. Click "Save".

Configuring data streams from audio devices (IIH Configurator)

4

Description

Define and configure the "Tags" or data points of the connected audio devices according to your specific audio channels.

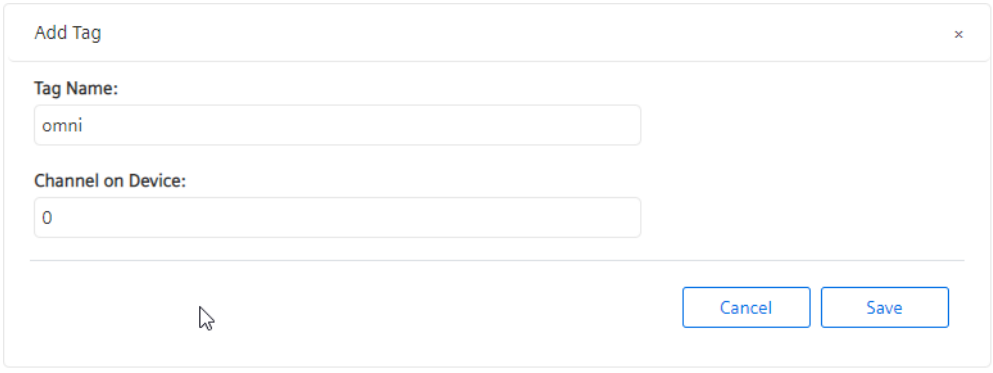
Requirement

- The connection to the desired audio device was configured.
- The parameters for the audio device as well as the connection to the audio device were set.

Procedure

To define the data points, follow these steps:

1. Open the "Tags" tab.
2. Click on the icon to the right of the desired audio device .
3. Click "Add Tag".
4. Configure the data point settings:



Note

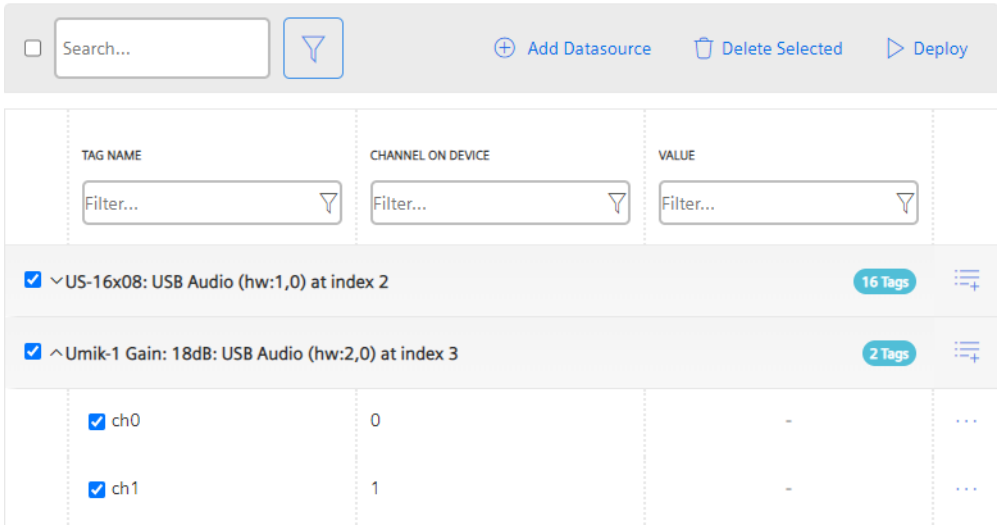
Channels of the audio device

If you want to use the first channel, enter => 0 under "Channel on Device".

If you want to use the second channel, enter => 1, etc.

5. Click "Save".

6. Click on the desired audio devices and data points you want to activate in the IIH:



7. Click "Deploy".

Result

The IIH generates a configuration file in the background (audio_conn_config.json), and sends it to the Audio Connector. This file defines the data points that are available for the Databus Gateway. However, no connection has been established yet. You establish the connection by configuring the Databus Gateway.

The audio data that is actually subscribed to by the IE Databus depends on the data points that were found by the Databus Gateway and forwarded to the IE Databus.

You can find the configuration file in the "Management" tab of the IED.

```
{
  "configs":[
    {
      "$schema":"https://siemens.com/connectivity_suite/schemas/audio-connector/1.0.0/config.json",
      "config":{
        "connections":[
          {
            "name":"audio-device-1",
            "parameters":{
              "device_name": "umik-1",
              "sampling_rate": 48000,
              "frame_size": 4096,
              "bit_depth": 16,
              "num_chan": 1
            },
            "datapoints":[
              {
                "name": "omni",
                "address": {"channel":"0"}
              }
            ]
          }
        ]
      }
    }
  ]
}
```

Configuring subscriptions of audio devices (Databus Gateway).

5

Description

Define which data points are going to be published on the IE Databus. To do so, specify the following parameters in the configuration of the Databus Gateway:

- The audio devices or connections that will be used.
- The data points that will be subscribed to.
- The metadata topic of the IE Databus on which the audio data will be published.

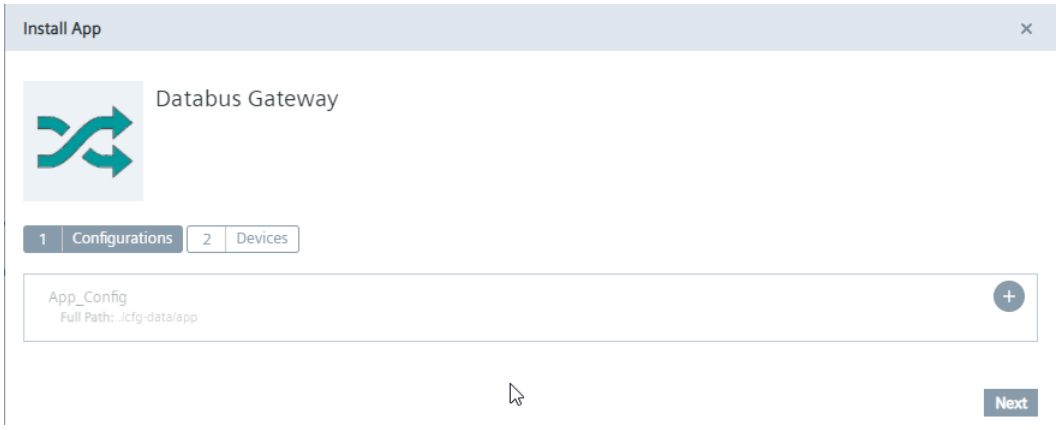
Requirement

- The data points of the audio device were defined and activated.

Procedure

To configure the connection to the Databus Gateway, follow these steps:

1. Create a configuration file (cs-connector-config.json) with the following parameters by clicking on "+" when installing the Databus Gateway app in the IEM:




```
{
  "configs":[
    {
      "$schema":"https://siemens.com/connectivity_suite/schemas/mqtt-gw/1.0.0/config.json",
      "config":{
        "parameters":{
          "mqtt_server_name":"ie-databus",
          "mqtt_client_id":"cs-mqtt-gateway",
          "user_name":"edge",
          "password":"edge",
          "pub_topic_metadata":"ie/m/j/simatic/v1/cs-mqtt-gtw/dp/r",
          "pub_topic_status":"ie/s/j/simatic/v1/cs-mqtt-gtw/status"
        },
        "data_sources":[
          {
            "name":"CS-Simulation-Server - Conn.1",
            "driver_instance":"csaudioconn",
            "connection_name":"audio-playback",
            "parameters":{
              "request_cycle":85,
              "pub_topic_timeseries":  "ie/d/j/simatic/v1/cs-simu/dp/r/demo-1/ConnSuiteSubscr1",
              "subscr_topic_write_req":"ie/d/j/simatic/v1/cs-simu/dp/w/demo-1/ConnSuiteSubscr1",
              "pub_topic_write_rsp":   "ie/d/j/simatic/v1/cs-simu/dp/w/demo-1/ConnSuiteSubscr1/response",
              "pub_topic_read_rsp":    "ie/d/j/simatic/v1/cs-simu/dp/r/demo-1/ConnSuiteSubscr1/response",
              "subscr_topic_read_req": "ie/d/j/simatic/v1/cs-simu/dp/r/demo-1/ConnSuiteSubscr1/request"
            },
            "datapoints":[
              { "name":"left",  "parameters": {"data_type":"Int"}},
              { "name":"right", "parameters": {"data_type":"Int"}}
            ]
          }
        ]
      }
    }
  ]
}
```

   - user_name: Must match the user name in the IE Databus configuration.
   - password: Must match the password in the IE Databus configuration.
   - driver_instance: Must be specified as follows: "csaudioconn"

- connection_name: Must match the name of the data source that was configured in the IIH.
- pub_topic_timeseries: This is the metadata topic on which the audio data is published.
- datapoints > name: Must match the name of the tag that was configured in the IIH below the data source.

Result

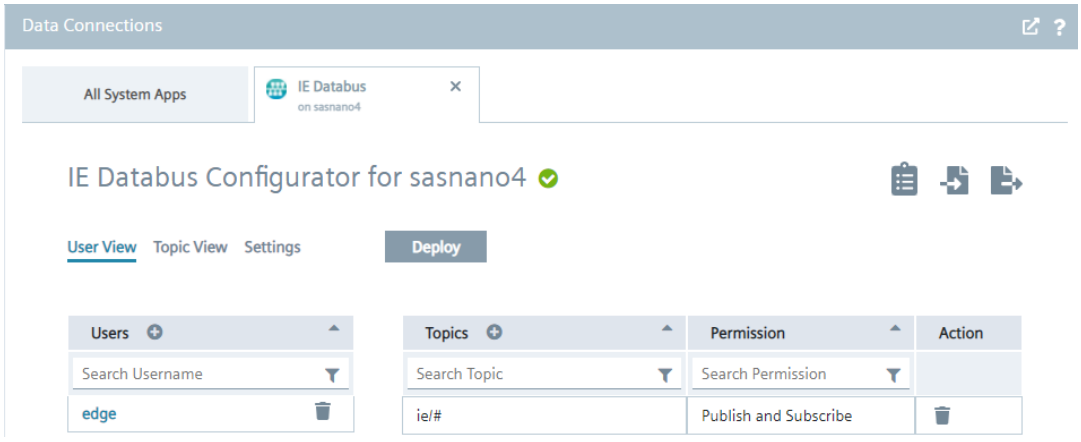
You have defined which data points are going to be published on the IE Databus.

You can find the configuration file in the "Management" tab of the Databus Gateway app.

Configuring metadata topics and users (IE Databus) 6

Description

To use the data of the Audio Connector via the IE Databus, you must also configure the IE Databus. In the configuration, you subscribe to the metadata topics used by the Audio Connector.



More information on the configuration of the Databus can be found here: Databus configuration (https://support.industry.siemens.com/cs/ww/en/view/109804042)

Note

User name and password

Make sure that the user name, password and metadata topic that you have configured in the Databus Gateway are used as such in the IE Databus configuration.

Testing the data flow of the audio data (IE Flow Creator)

7

Description

By using the IE Flow Creator app, you can quickly and easily test whether data from the audio device is actually being received.

You can find additional information here: IE Flow Creator (https://support.industry.siemens.com/cs/ww/en/view/109794331)

Requirement

- Install and start the IE Flow Creator app on your IED.

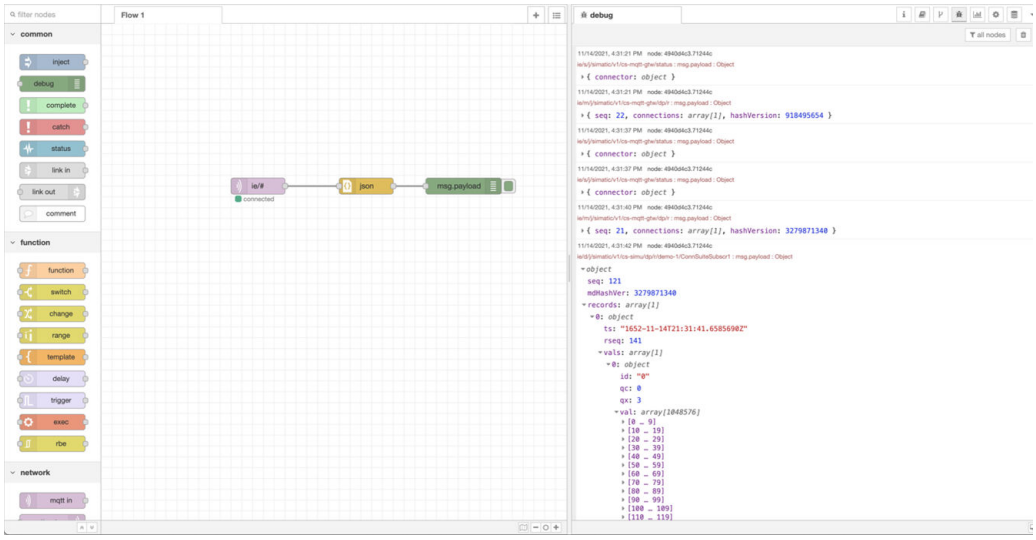
Procedure

To see whether you are receiving data, follow these steps:

1. Open the IE Flow Creator app.
2. Drag the following nodes into the Flow window:
   - MQTT subscriber node (ie/#)
   - JSON parsing node
   - Debug node (msg.payload)
3. Enable the Debug node.
4. Deploy the Flow.

Result

In the Debug window, you can see the data stream that flows from the Audio Connector via the metadata topics in the MQTT Broker Databus Gateway to the IE Databus:



Finding errors in log files

8

Description

There are several causes as to why audio data is not being transmitted. The errors can occur, for example, in the Databus Gateway or in the Audio Connector.

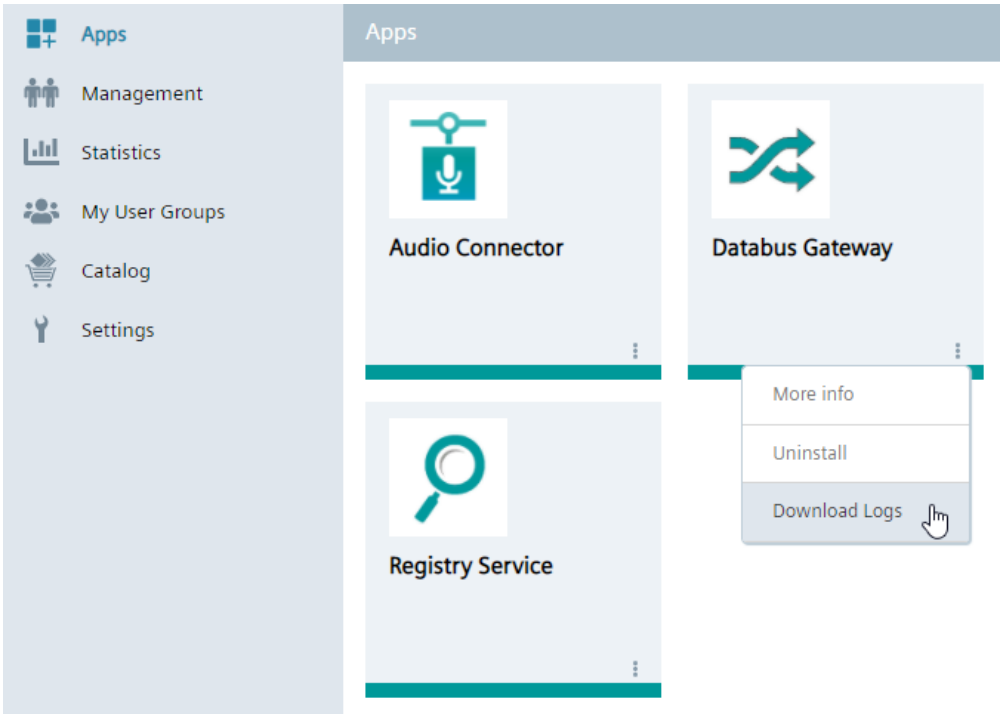
You have two options for finding errors:

- Log files
  The log files contain information on the runtime status of the Audio Connector, for example.
- Configuration file
  In the configuration file, you can verify whether the parameters, connections, data points, etc. that were configured in the Audio Connector are correct.

Procedure for log files in the CS Databus Gateway

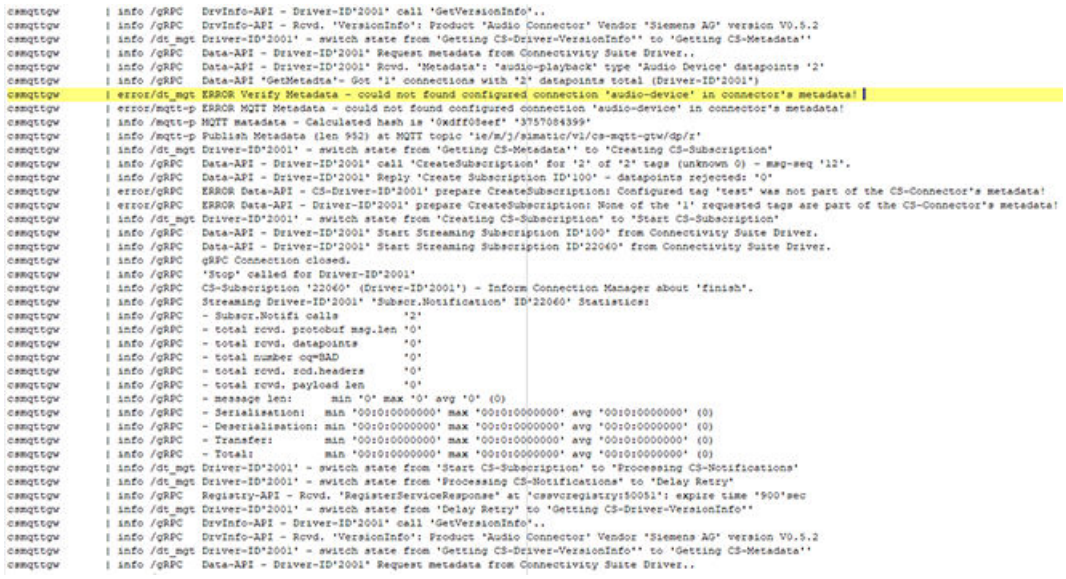
To download the log files, follow these steps:

1. Click on the three dots (ellipsis) in the Databus Gateway tile:



2. Click "Download Logs".

3. Store the log file locally and open it.
   The log file may look like this:



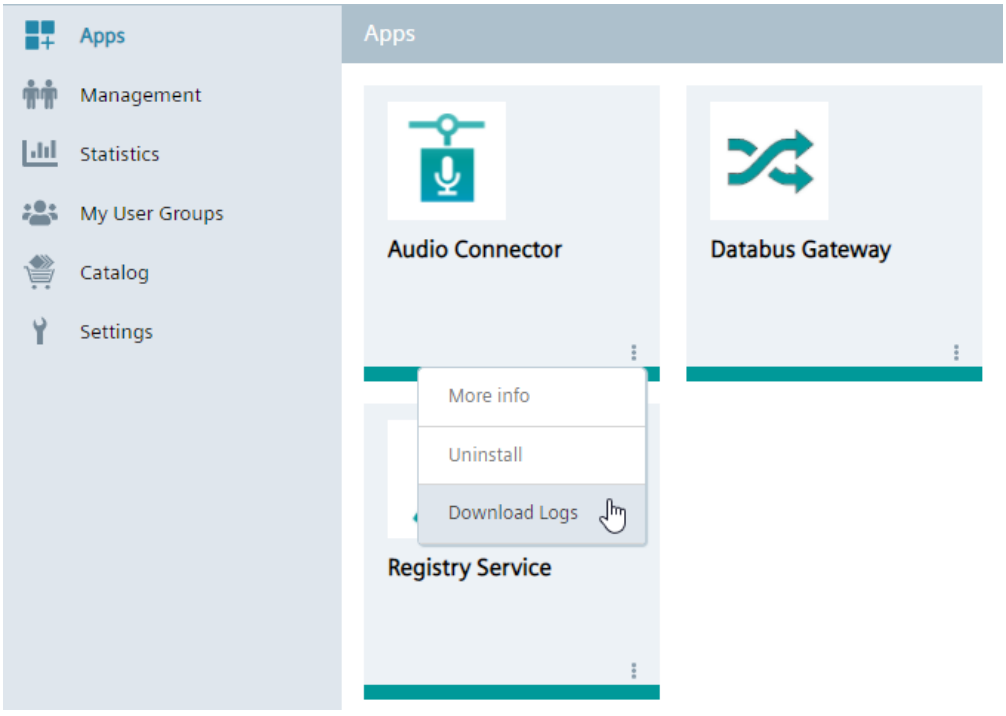
```
csmqttgw      | info /gRPC   DrvInfo-API - Driver-ID'2001' call 'GetVersionInfo'..
csmqttgw      | info /gRPC   DrvInfo-API - Rcvd. 'VersionInfo': Product 'Audio Connector' Vendor 'Siemens AG' version V0.5.2
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Getting CS-Driver-VersionInfo'' to 'Getting CS-Metadata''
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Request metadata from Connectivity Suite Driver..
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Rcvd. 'Metadata': 'audio-playback' type 'Audio Device' datapoints '2'
csmqttgw      | info /gRPC   Data-API 'GetMetadta'- Got '1' connections with '2' datapoints total (Driver-ID'2001')
csmqttgw      | error/dt_mgt ERROR Verify Metadata - could not found configured connection 'audio-device' in connector's metadata!
csmqttgw      | error/mqtt-p ERROR MQTT Metadata - could not found configured connection 'audio-device' in connector's metadata!
csmqttgw      | info /mqtt-p MQTT metadata - Calculated hash is '0xdff05eef' '3757084399'
csmqttgw      | info /mqtt-p Publish Metadata (len 952) at MQTT topic 'ie/m/j/simatic/v1/cs-mqtt-gtw/dp/z'
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Getting CS-Metadata'' to 'Creating CS-Subscription'
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' call 'CreateSubscription' for '2' of '2' tags (unknown 0) - msg-seq '12'.
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Reply 'Create Subscription ID'100' - datapoints rejected: '0'
csmqttgw      | error/gRPC   ERROR Data-API - CS-Driver-ID'2001' prepare CreateSubscription: Configured tag 'test' was not part of the CS-Connector's metadata!
csmqttgw      | error/gRPC   ERROR Data-API - Driver-ID'2001' prepare CreateSubscription: None of the '1' requested tags are part of the CS-Connector's metadata!
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Creating CS-Subscription' to 'Start CS-Subscription'
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Start Streaming Subscription ID'100' from Connectivity Suite Driver.
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Start Streaming Subscription ID'22040' from Connectivity Suite Driver.
csmqttgw      | info /gRPC   gRPC Connection closed.
csmqttgw      | info /gRPC   'Stop' called for Driver-ID'2001'
csmqttgw      | info /gRPC   CS-Subscription '22040' (Driver-ID'2001') - Inform Connection Manager about 'finish'.
csmqttgw      | info /gRPC   Streaming Driver-ID'2001' 'Subscr.Notification' ID'22040' Statistics:
csmqttgw      | info /gRPC   - Subscr.Notifi calls          '2'
csmqttgw      | info /gRPC   - total rcvd. protobuf msg.len '0'
csmqttgw      | info /gRPC   - total rcvd. datapoints       '0'
csmqttgw      | info /gRPC   - total number oq=BAD          '0'
csmqttgw      | info /gRPC   - total rcvd. zcd.headers      '0'
csmqttgw      | info /gRPC   - total rcvd. payload len      '0'
csmqttgw      | info /gRPC   - message len:      min '0' max '0' avg '0' (0)
csmqttgw      | info /gRPC   - Serialisation:    min '00:0:0000000' max '00:0:0000000' avg '00:0:0000000' (0)
csmqttgw      | info /gRPC   - Deserialisation: min '00:0:0000000' max '00:0:0000000' avg '00:0:0000000' (0)
csmqttgw      | info /gRPC   - Transfer:         min '00:0:0000000' max '00:0:0000000' avg '00:0:0000000' (0)
csmqttgw      | info /gRPC   - Total:            min '00:0:0000000' max '00:0:0000000' avg '00:0:0000000' (0)
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Start CS-Subscription' to 'Processing CS-Notifications'
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Processing CS-Notifications' to 'Delay Retry'
csmqttgw      | info /gRPC   Registry-API - Rcvd. 'RegisterServiceResponse' at 'csmvcregistry:50051': expire time '900'sec
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Delay Retry' to 'Getting CS-Driver-VersionInfo''
csmqttgw      | info /gRPC   DrvInfo-API - Driver-ID'2001' call 'GetVersionInfo'..
csmqttgw      | info /gRPC   DrvInfo-API - Rcvd. 'VersionInfo': Product 'Audio Connector' Vendor 'Siemens AG' version V0.5.2
csmqttgw      | info /dt_mgt Driver-ID'2001' - switch state from 'Getting CS-Driver-VersionInfo'' to 'Getting CS-Metadata''
csmqttgw      | info /gRPC   Data-API - Driver-ID'2001' Request metadata from Connectivity Suite Driver..
```

4. Search for the word "ERROR".
   All errors are listed, and you can use the marking to recognize the source of the error: gRPC, dt_mgt, mqtt-p;

Procedure for log files in the Audio Connector

To download the log files, follow these steps:

1. Click on the three dots (ellipsis) in the Audio Connector tile:

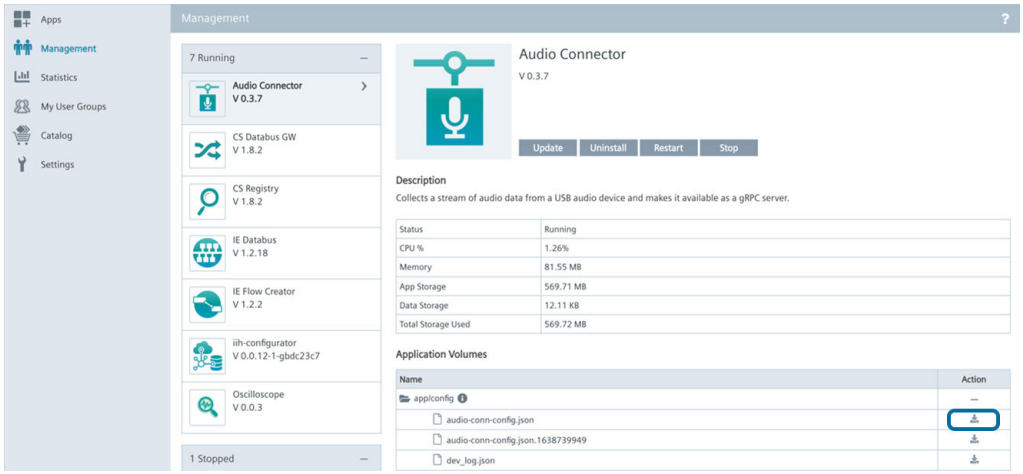


2. Click "Download Logs".
3. Store the log file locally and open it.
   The log file may look like this:

Procedure for configuration file

To download the configuration file, follow these steps:

1. In the "Management > Audio Connector" tab, click the download icon to the right of the "audio-conn-config.json" file:



Note

Latest configuration file

The latest configuration file is always called "audio-conn-config.json". The name of previous versions of the configuration file is always extended by the time stamp.

Interpreting errors from log files

9

Description

Here, you can read how to rectify errors found in the log files.

Identifying supported device settings

At the start, the Audio Connector generates a list of all the recognized audio devices and their supported settings. Only these valid settings should be used to configure the Audio Connector in the IIH.

In the example below, you can see which sampling rates, data types and number of channels are supported for the Umik-1 audio device:

```
{"log":"AudioInterfacesManager Device 3: Umik-1  Gain: 18dB: USB Audio (hw:2,0)\n","stream":"stdout","time":"2022-01-21T19:42:48.231132866Z"}
{"log":"AudioInterfacesManager Device 3 supports sampling rates: [48000] Hz\n","stream":"stdout","time":"2022-01-21T19:42:48.231305834Z"}
{"log":"AudioInterfacesManager Device 3 supports bit depths: [8, 16, 24, 32]-bit integers\n","stream":"stdout","time":"2022-01-21T19:42:48.231397886Z"}
{"log":"AudioInterfacesManager Device 3 supports 2 input channels maximum.\n","stream":"stdout","time":"2022-01-21T19:42:48.231487238Z"}
```

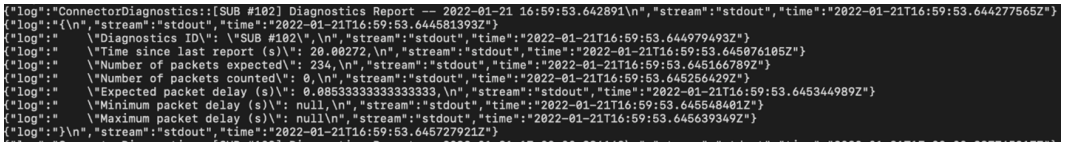

Verifying the connection quality

The Audio Connector regularly generates diagnostics reports on all the active audio data streams (from the audio device/devices Audio Connector) and on the subscriptions (from the Audio Connector to the CS Databus Gateway). The quality of the connection can be determined by comparing the number of expected data packets with the number of data packets counted:

```
{"log":"ConnectorDiagnostics::[SUB #102] Diagnostics Report -- 2022-01-21 19:54:40.176937\n","stream":"stdout","time":"2022-01-21T19:54:40.178178558Z"}
{"log":"{\n","stream":"stdout","time":"2022-01-21T19:54:40.178300214Z"}
{"log":"    \"Diagnostics ID\": \"SUB #102\",\n","stream":"stdout","time":"2022-01-21T19:54:40.178358234Z"}
{"log":"    \"Time since last report (s)\": 20.021094,\n","stream":"stdout","time":"2022-01-21T19:54:40.178524218Z"}
{"log":"    \"Number of packets expected\": 234,\n","stream":"stdout","time":"2022-01-21T19:54:40.178579814Z"}
{"log":"    \"Number of packets counted\": 234,\n","stream":"stdout","time":"2022-01-21T19:54:40.17863301Z"}
{"log":"    \"Expected packet delay (s)\": 0.08533333333333333,\n","stream":"stdout","time":"2022-01-21T19:54:40.178696694Z"}
{"log":"    \"Minimum packet delay (s)\": 0.001067,\n","stream":"stdout","time":"2022-01-21T19:54:40.178987514Z"}
{"log":"    \"Maximum packet delay (s)\": 0.263256\n","stream":"stdout","time":"2022-01-21T19:54:40.179066858Z"}
{"log":"}\n","stream":"stdout","time":"2022-01-21T19:54:40.179234486Z"}
{"log":"ConnectorDiagnostics::[STREAM #1] Diagnostics Report -- 2022-01-21 19:54:48.878995\n","stream":"stdout","time":"2022-01-21T19:54:48.880397092Z"}
{"log":"{\n","stream":"stdout","time":"2022-01-21T19:54:48.880580296Z"}
{"log":"    \"Diagnostics ID\": \"STREAM #1\",\n","stream":"stdout","time":"2022-01-21T19:54:48.880673416Z"}
{"log":"    \"Time since last report (s)\": 60.01869,\n","stream":"stdout","time":"2022-01-21T19:54:48.88076336Z"}
{"log":"    \"Number of packets expected\": 703,\n","stream":"stdout","time":"2022-01-21T19:54:48.8808530447"}
{"log":"    \"Number of packets counted\": 703,\n","stream":"stdout","time":"2022-01-21T19:54:48.88094164Z"}
{"log":"    \"Expected packet delay (s)\": 0.08533333333333333,\n","stream":"stdout","time":"2022-01-21T19:54:48.881029972Z"}
{"log":"    \"Minimum packet delay (s)\": 0.000285,\n","stream":"stdout","time":"2022-01-21T19:54:48.88111948Z"}
{"log":"    \"Maximum packet delay (s)\": 0.17177\n","stream":"stdout","time":"2022-01-21T19:54:48.881207536Z"}
{"log":"}\n","stream":"stdout","time":"2022-01-21T19:54:48.8812950447"}
{"log":"ConnectorDiagnostics::[STREAM #0] Diagnostics Report -- 2022-01-21 19:54:48.949200\n","stream":"stdout","time":"2022-01-21T19:54:48.950608478Z"}
{"log":"{\n","stream":"stdout","time":"2022-01-21T19:54:48.950775722Z"}
{"log":"    \"Diagnostics ID\": \"STREAM #0\",\n","stream":"stdout","time":"2022-01-21T19:54:48.950868626Z"}
{"log":"    \"Time since last report (s)\": 60.057994,\n","stream":"stdout","time":"2022-01-21T19:54:48.9509599827"}
{"log":"    \"Number of packets expected\": 703,\n","stream":"stdout","time":"2022-01-21T19:54:48.9510494787"}
{"log":"    \"Number of packets counted\": 697,\n","stream":"stdout","time":"2022-01-21T19:54:48.9511390827"}
{"log":"    \"Expected packet delay (s)\": 0.08533333333333333,\n","stream":"stdout","time":"2022-01-21T19:54:48.951227798Z"}
{"log":"    \"Minimum packet delay (s)\": 0.0003,\n","stream":"stdout","time":"2022-01-21T19:54:48.951317114Z"}
{"log":"    \"Maximum packet delay (s)\": 0.273199\n","stream":"stdout","time":"2022-01-21T19:54:48.951404666Z"}
{"log":"}\n","stream":"stdout","time":"2022-01-21T19:54:48.951494774Z"}
{"log":"ConnectorDiagnostics::[SUB #102] Diagnostics Report -- 2022-01-21 19:55:00.196586\n","stream":"stdout","time":"2022-01-21T19:55:00.198005934Z"}
{"log":"{\n","stream":"stdout","time":"2022-01-21T19:55:00.198191226Z"}
{"log":"    \"Diagnostics ID\": \"SUB #102\",\n","stream":"stdout","time":"2022-01-21T19:55:00.198288186Z"}
{"log":"    \"Time since last report (s)\": 20.018837,\n","stream":"stdout","time":"2022-01-21T19:55:00.198378042Z"}
{"log":"    \"Number of packets expected\": 234,\n","stream":"stdout","time":"2022-01-21T19:55:00.198617766Z"}
{"log":"    \"Number of packets counted\": 231,\n","stream":"stdout","time":"2022-01-21T19:55:00.19870731Z"}
{"log":"    \"Expected packet delay (s)\": 0.08533333333333333,\n","stream":"stdout","time":"2022-01-21T19:55:00.198813558Z"}
{"log":"    \"Minimum packet delay (s)\": 0.00122,\n","stream":"stdout","time":"2022-01-21T19:55:00.198902994Z"}
{"log":"    \"Maximum packet delay (s)\": 0.263971\n","stream":"stdout","time":"2022-01-21T19:55:00.198992106Z"}
{"log":"}\n","stream":"stdout","time":"2022-01-21T19:55:00.199081374Z"}
```

Check connection to the audio device

The diagnostics report can also show whether the connection to an audio device was interrupted. If that is the case, the number of counted data packets is shown as 0:



Alarms and errors

1. The device format is not supported:
   If a configuration is transferred to the Audio Connector (for example, either via the IEM or the IIH Configurator), which is not supported by one or several audio devices, a warning is output in the log file that indicates that the desired device settings are not supported. In this case, the Audio Connector will determine the default settings of the audio devices and attempt to set up a connection. You must ensure that all the subscribing or consumer apps determine the device parameters from the meta-data provided (via CS Databus Gateway), instead of assuming that the configuration that has been provided is fulfilled exactly.
   The example shows a possible warning from the log file:

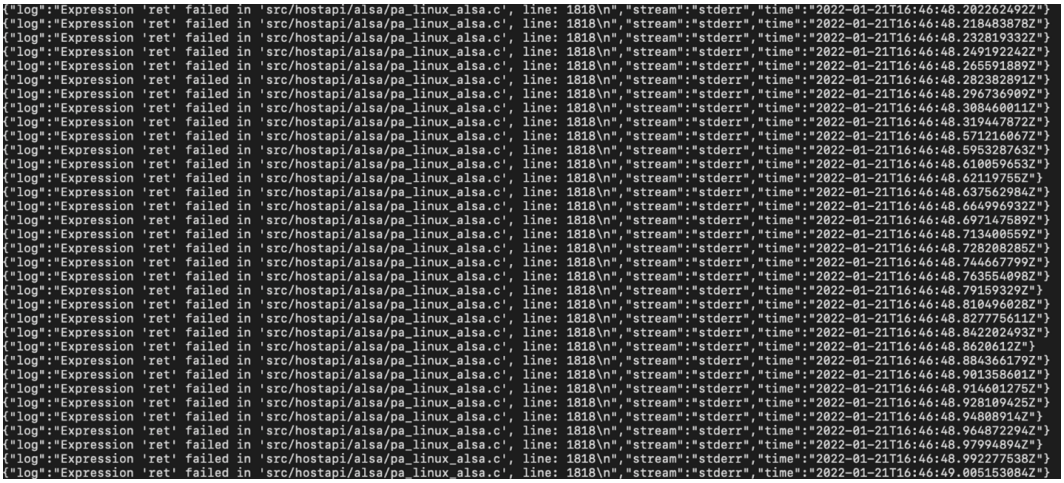
```
{"log":"ConnectionManager creating a new connection to Umik-1  Gain: 18dB: USB Audio (hw:2,0)\n","stream":"stdout","time":"2022-01-21T21:10:25.323210957Z"}
{"log":"AudioStreamManager new stream created from audio device Umik-1  Gain: 18dB: USB Audio (hw:2,0) with sampling rate
44100.0Hz\n","stream":"stdout","time":"2022-01-21T21:10:25.325437798Z"}
{"log":"ConnectorDiagnostics::[STREAM #0] Starting diagnostics engine...\n","stream":"stdout","time":"2022-01-21T21:10:25.325505694Z"}
{"log":"AudioInterfacesManager Trying to set sample rate: 44100.0Hz\n","stream":"stdout","time":"2022-01-21T21:10:25.331401546Z"}
{"log":"AudioInterfacesManager Now setting stream sample rate — desired_rate is 44100Hz\n","stream":"stdout","time":"2022-01-21T21:10:25.331461378Z"}
{"log":"AudioInterfacesManager Warning: the selected rate, 44100Hz, is not supported by your device; will use the device default instead: 48000.0Hz.
\n","stream":"stdout","time":"2022-01-21T21:10:25.347134497Z"}
{"log":"AudioInterfacesManager Stream sample_rate set to: 48000.0\n","stream":"stdout","time":"2022-01-21T21:10:25.347205969Z"}
{"log":"AudioInterfacesManager opening stream for device 3: Umik-1  Gain: 18dB: USB Audio (hw:2,0)\n","stream":"stdout","time":"2022-01-21T21:10:25.347238981Z"}
{"log":"AudioStreamManager stream activated for audio device Umik-1  Gain: 18dB: USB Audio (hw:2,0)Stream active: True\n","stream":"stdout","time":"2022-01-21T21:10:25.350707845Z"}
{"log":"AudioStreamManager start all streams successful! Now streaming from 1 data sources.\n","stream":"stdout","time":"2022-01-21T21:10:25.350866245Z"}
```


2. Bad connection quality / data packet loss
   The diagnostics report can sometimes show a large discrepancy between the expected and counted data packets.

   – If this behavior occurs with an audio data stream ("STREAM" in the log file), it indicates a bad connection quality between the audio device and the IED, because not all the data generated by the audio device arrive at the Audio Connector. The reason for this is most likely an unsupported audio device or incorrect settings. Try unplugging the USB audio device and plugging it into another USB port. You should also check whether the device is compatible with Linux-based operating systems.

   – If this behavior occurs with a subscription ("SUB"), it is an indication that the Audio Connector is not able to make all the data available as quickly to the CS Databus Gateway as they are produced by the audio device. Try to increase the buffer size of the audio device or to reduce the sampling rate in the IIH Configurator.

3. Unsupported hardware devices
   Some audio devices cause the Audio Connector to generate many error messages in the log. This is an indication that the audio device is probably not compatible with Linux-based operating systems.
   The example shows error messages from the log file:




```
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.202262492Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.218483878Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.232819332Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.249192242Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.265591889Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.282382891Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.296736909Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.308460011Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.319447872Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.571216067Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.595328763Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.610059653Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.62119755Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.637562984Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.664996932Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.697147589Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.713400559Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.728208285Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.744667799Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.763554098Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.79159329Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.810496028Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.827776611Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.842202493Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.8620612Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.884366179Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.901358601Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.914601275Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.928109425Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.94808914Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.964872294Z"}
{"log":"Expression 'ret' failed in 'src/hostapi/alsa/pa_linux_alsa.c', line: 1818\n","stream":"stderr","time":"2022-01-21T16:46:48.97994894Z"}
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