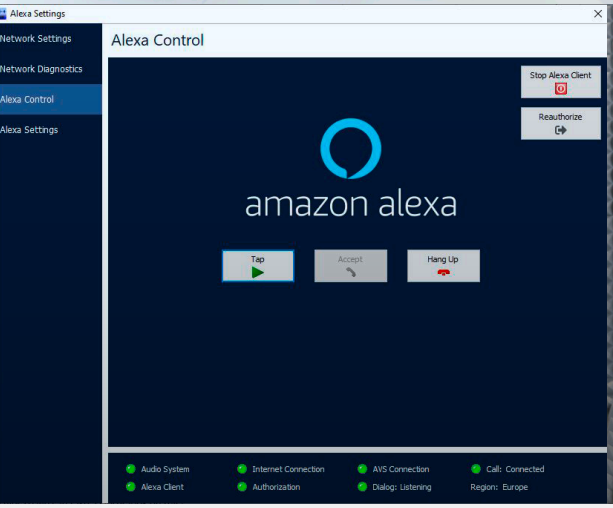
HEAD acoustics

APPLICATION NOTE



ACQUA

coreIP-Alexa – Connection & Call establishment

Application Note

*core*IP-Alexa – Connection & Call establishment

Revision 0

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1 Introduction

*core*IP-Alexa is a software extension for the multi-channel hardware platform *lab*CORE. It allows conclusive speech quality analysis during Alexa-to-Alexa calls with Alexa Built-in devices. *core*IP-Alexa enables *lab*CORE to become an Alexa reference client. Therefore, the hardware platform emulates an Amazon Alexa remote client and routes audio data of Alexa-to-Alexa calls to ACQUA for analysis of speech quality.

Furthermore, HEAD acoustics provides all necessary hardware and software to record and analyze the audio data from the established Alexa-to-Alexa call. Additionally, the background noise simulation software 3PASS *lab* generates a realistic environment to test devices under difficult environmental conditions.

Alexa is the intelligent cloud-based voice AI that communicates on *lab*CORE. Speak to Alexa through *lab*CORE to establish voice calls to Alexa Built-in devices and much more. Alexa lives in the cloud, so Alexa is always getting smarter, adding new capabilities that are delivered to Alexa Built-in devices automatically.

This application note provides all necessary information about equipment and procedure for a successful connection and call establishment from *core*IP-Alexa to another Alexa Built-in device. Nevertheless, *core*IP-Alexa only works appropriately with a working internet connection and available Alexa services. It is within the user‘s responsibility to ensure both.

2 Prerequisites for registration of *core*IP-Alexa

2.1 Hardware requirements

2.1.1 HEAD acoustics equipment

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
    - *core*IP-Alexa (Code 7775), *lab*CORE Alexa client option

2.1.2 Third party equipment

- USB headset
- Router with wireless LAN functionality and constant internet connection
- Device under test (e.g. Alexa Built-in device, smartphone / tablet with Alexa App)

2.2 Software requirements

2.2.1 HEAD acoustics equipment

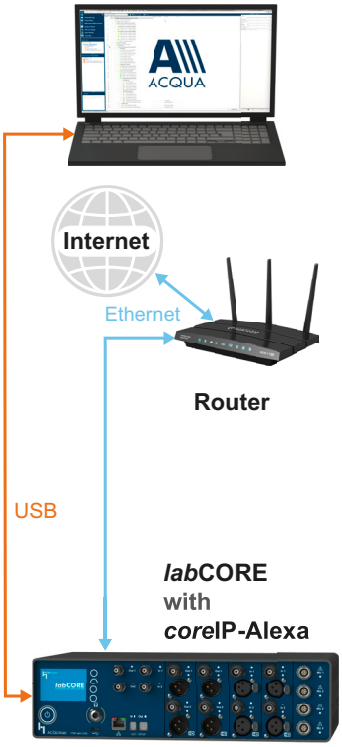
ACQUA (Code 6810), Advanced Communication Quality Analysis software

2.2.2 Third party equipment

- Amazon account
- Web browser
- Internet connection with full access to Amazon account and Alexa services
- Amazon Alexa App

2.3 Cabling for registration / login

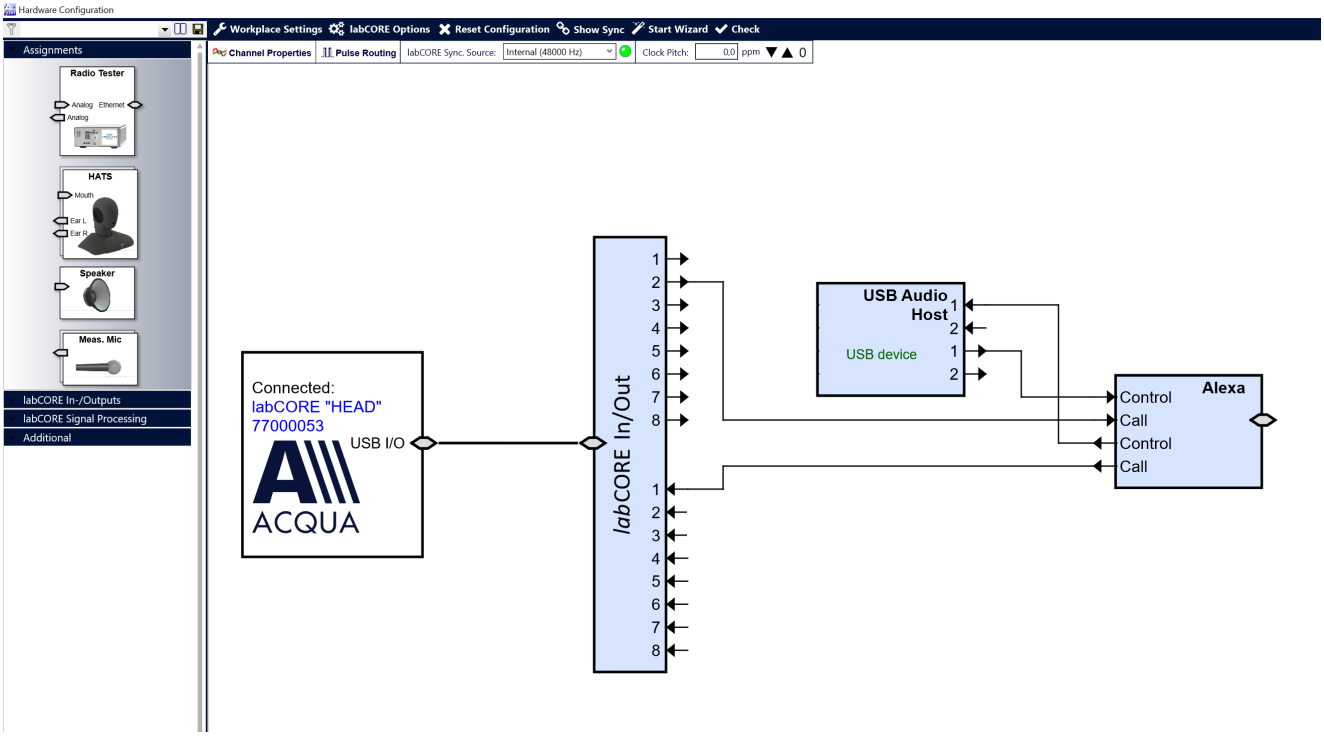
Interconnect the devices according to the block diagram for the registration of *core*IP-Alexa with an Amazon account. The registration is only necessary once. Once registered, *core*IP-Alexa connects automatically to the Amazon account and Alexa Voice Services (AVS) when starting the Alexa client. An appropriate and active internet connection is always mandatory for operation.



2.4 Cabling for communication with *core*IP-Alexa client

*lab*CORE provides various interfaces to communicate with Alexa. HEAD acoustics recommends the usage of an USB headset. Connect the USB headset to the USB-C socket at the front of *lab*CORE.

2.5 ACQUA – Hardware configuration for registration



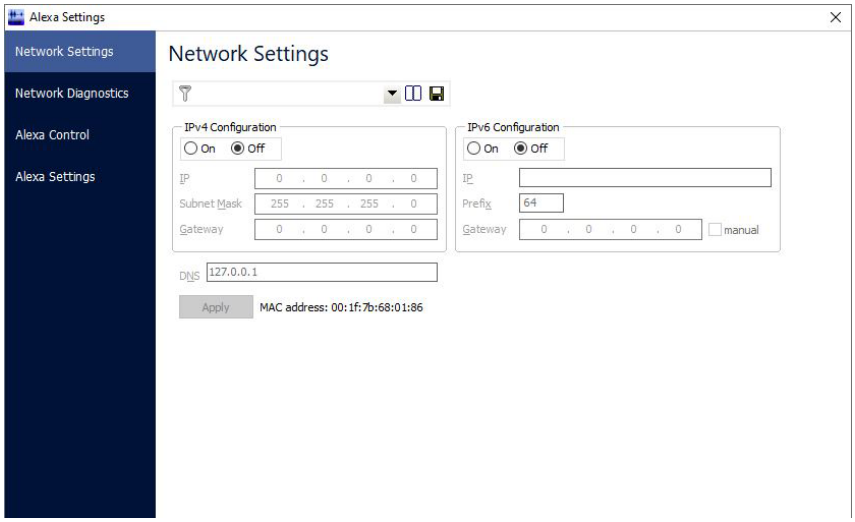
- The Call pins route the input and output of *core*IP-Alexa. Connect the Call pins to labCORE In/Out. *lab*CORE transmits the signals to ACQUA for analysis.
- The Control pins route voice commands to Alexa and feedback from Alexa to *lab*CORE. Connect an appropriate I/O device (e.g. USB headset) to *lab*CORE to send voice commands or listen to feedback from Alexa.

3 Alexa connection establishment

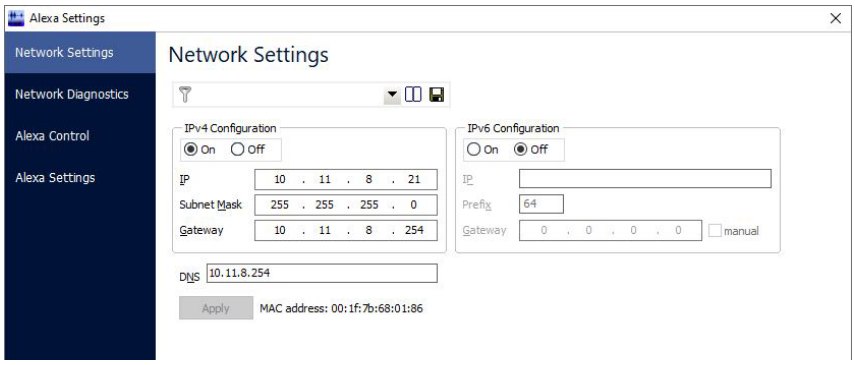
3.1 *core*IP-Alexa registration

The initial registration of *core*IP-Alexa is mandatory. It is only necessary once. After a successful registration, coreIP-Alexa connects automatically to Amazon account and AVS services when selecting Start Alexa Client.

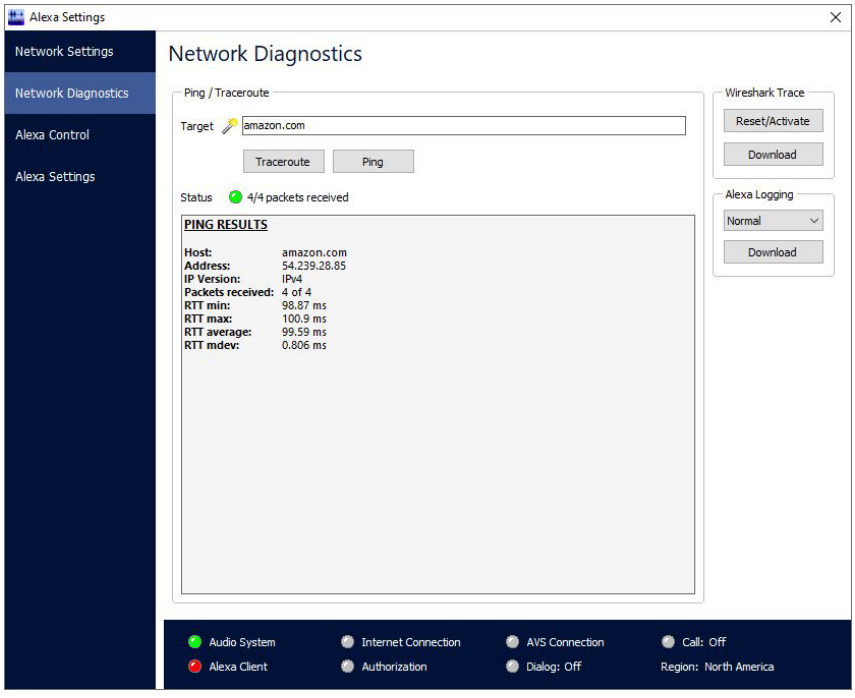
1. Interconnect *lab*CORE according to chapter 2.3.
2. Start ACQUA.
3. Open Hardware Configuration.
4. Built the desired hardware configuration around the Alexa block.
5. Right-click on Alexa block and select Alexa Settings.
6. Select Network Settings.



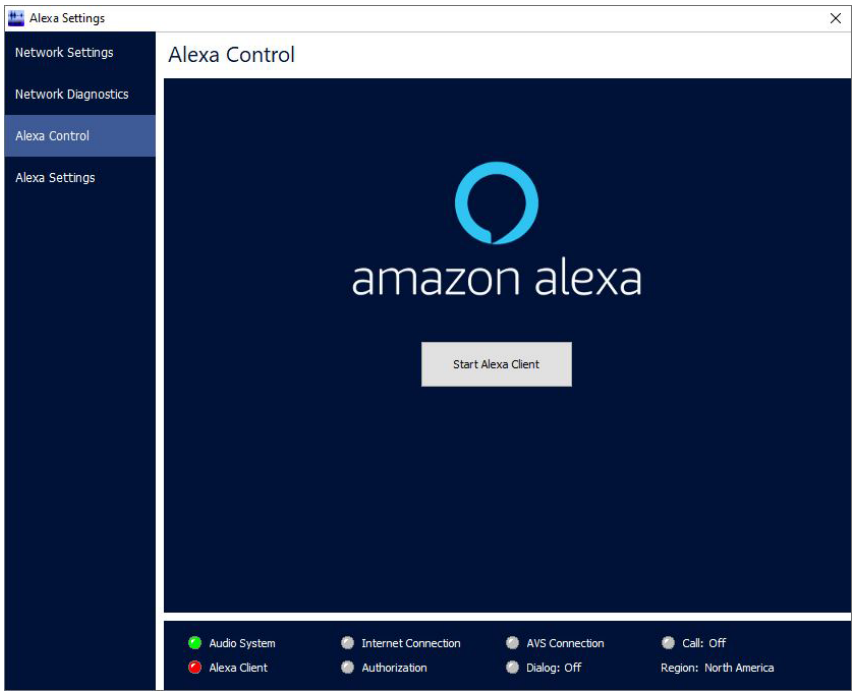
7. Enter the appropriate network parameters to connect *lab*CORE to the internet.
   - IPv4: Select On and enter IP, Subnet Mask, Gateway, DNS
   - IPv6: Seect On and enter IP, Prefix, Gateway
8. Select Apply to confirm the parameters.



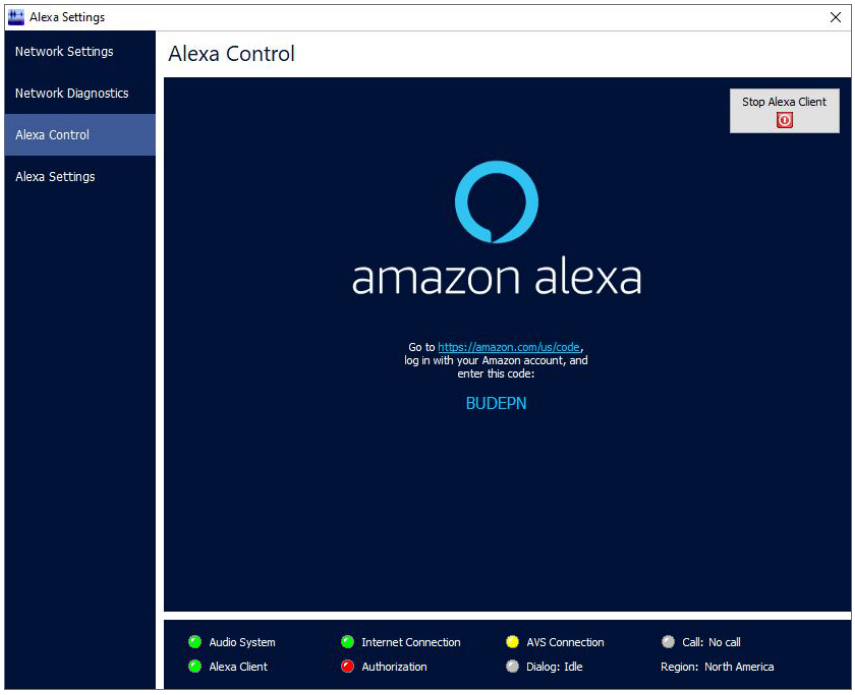
9. Select Network Diagnostics.
10. Enter a target URL and select Ping to confirm a working and appropriate internet connection.



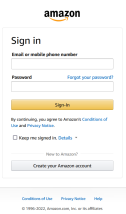
11. Select Alexa Control.
12. Select Start Alexa Client.



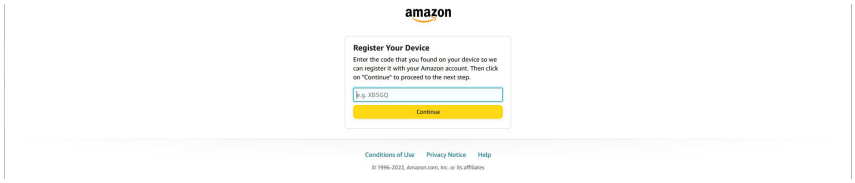
13. Select the provided Code to copy it to the clipboard.
14. Select the provided link to open the device registration from Amazon.



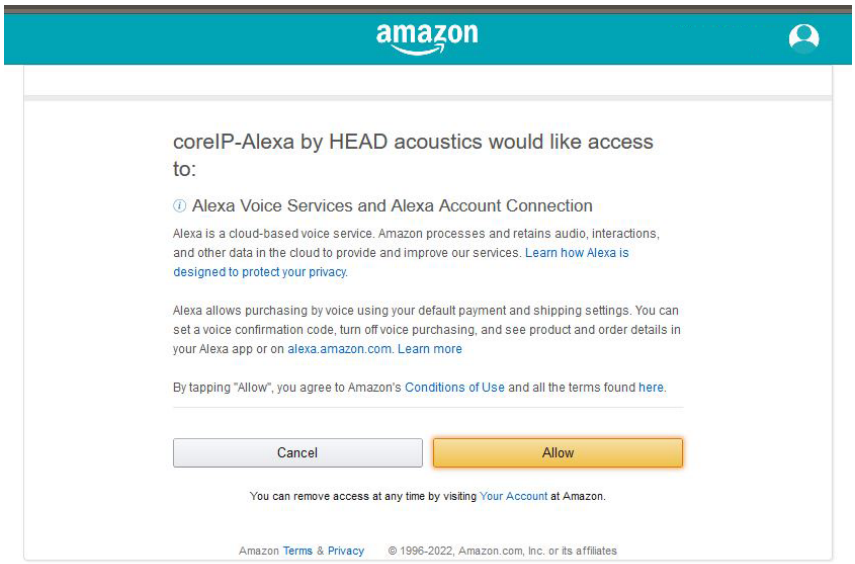
15. Enter email address and password to sign in to Amazon account.
16. Select Sign-in.



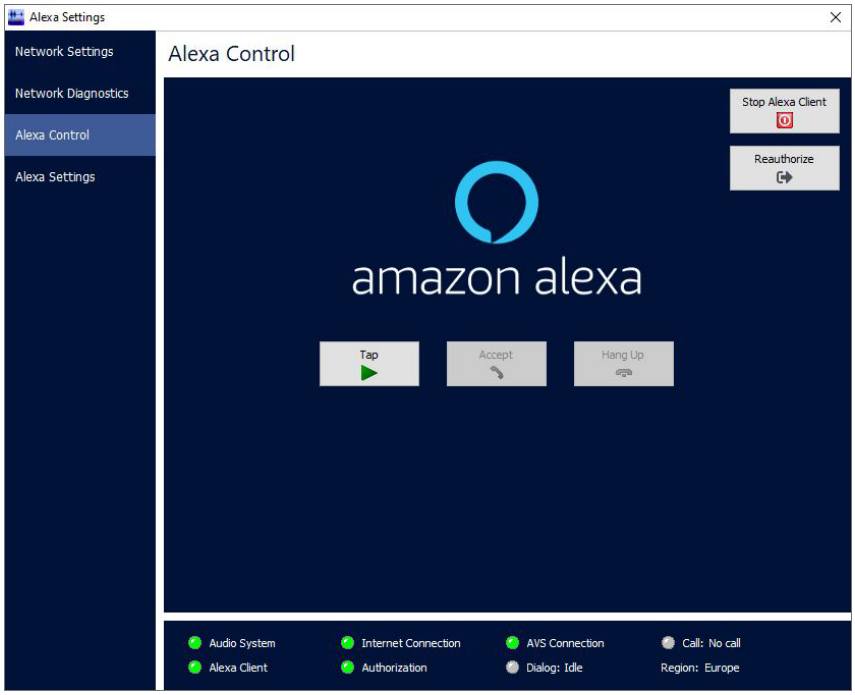
17. Paste or enter the provided code from ACQUA.



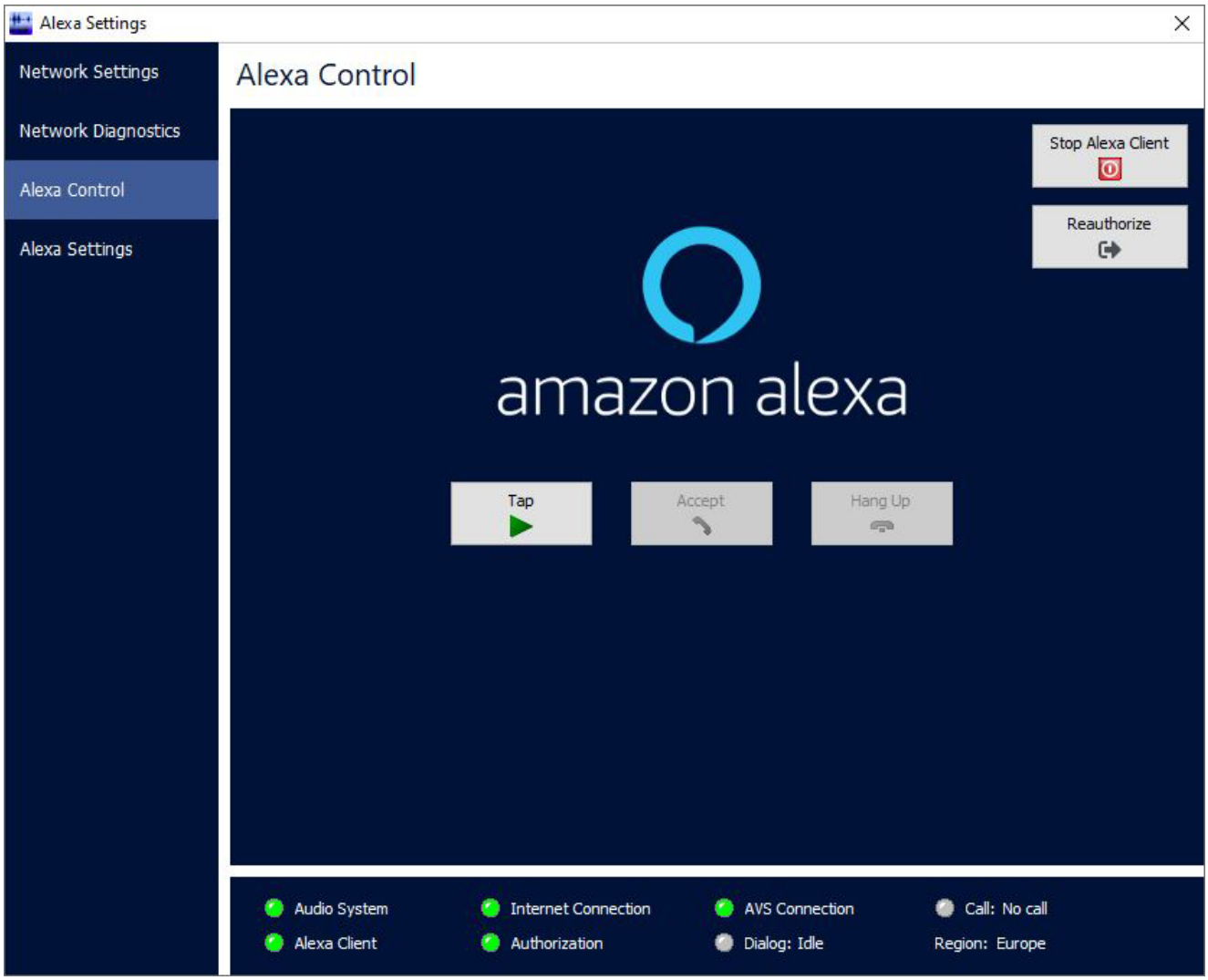
18. Read the information text carefully.
19. Select Allow to connect *core*IP-Alexa to Alexa Voice Services and Alexa Account Connection.



20. Optionally: Rename *core*IP-Alexa in the Amazon Alexa App to a more comprehensible name, e.g. *lab*CORE.
21. Use Alexa Control to communicate with Alexa and / or initiate a call to another Alexa built in device.



3.2 Alexa Control



Status LED

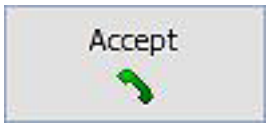
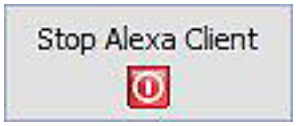
	Inactive / idle
	Active
	Failed / inactive
	In progress / Queue

Function status

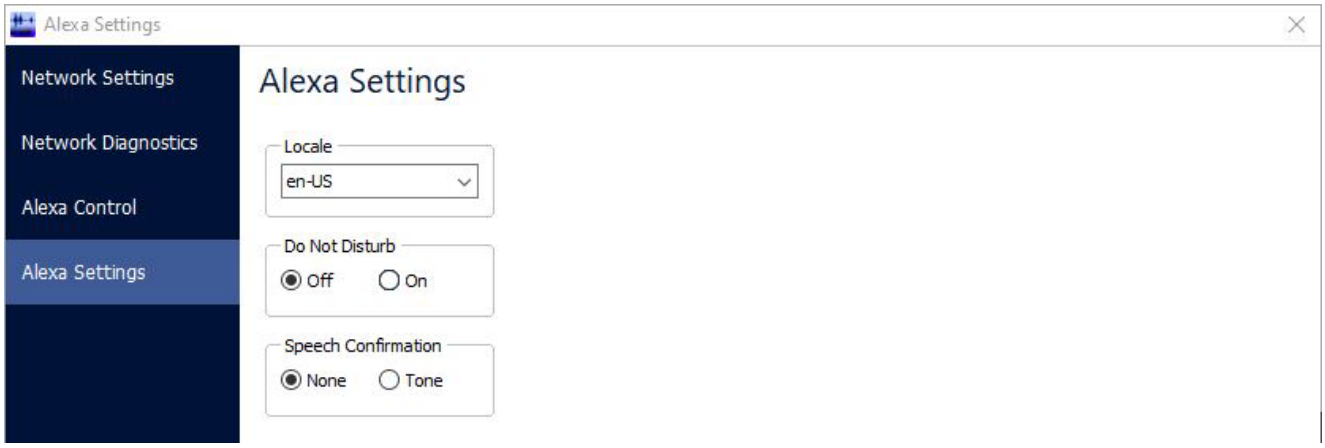
Function	Definition
Audio System	Status of audio system of *lab*CORE.
Alexa Client	Status of Alexa client from *core*IP-Alexa.
Internet Connection	Status of *lab*CORE internet connection.
Authorization	Status of Alexa account connection.
AVS Connection	Status of connection from *core*IP-Alexa to Alexa Voice Services.
Dialog	Listening → Alexa is awake and listens to input. Thinking → Alexa processes the input. Speaking → Alexa responses to the input.

Function	Definition
Call	Off → *core*IP-Alexa is not connected to Amazon account and / or AVS. No call → There is no active Alexa call. Connected → Alexa call / drop in between *core*IP-Alexa and the device under test is established.
Region	Location / region of *core*IP-Alexa.

Buttons

Button	Definition
	The Tap button substitutes the wake word. Using the Tap button puts Alexa in Listening mode.
	Illuminates green when a call comes in. Accept incoming Alexa calls via the Accept button.
	Illuminates red during an active Alexa-to -Alexa call. Terminate an established Alexa-to-Alexa call between *core*IP-Alexa and another device by selecting the Hang Up button.
	Stops Alexa on *core*IP-Alexa. This terminates active calls or any communication with Alexa immediately.
	Removes *core*IP-Alexa as Alexa device from the Amazon account. A new registration of *core*IP-Alexa is necessary to communicate with Alexa via *core*IP-Alexa again.

3.3 Alexa Settings



Locale

Select the locale of *core*IP-Alexa from the drop-down list. The locale setting determines the input language for Alexa and the language which Alexa uses to respond.

Do not disturb

On	Alexa blocks Notifications, calls and messages.
Off	Do not disturb function inactive.

Speech confirmation

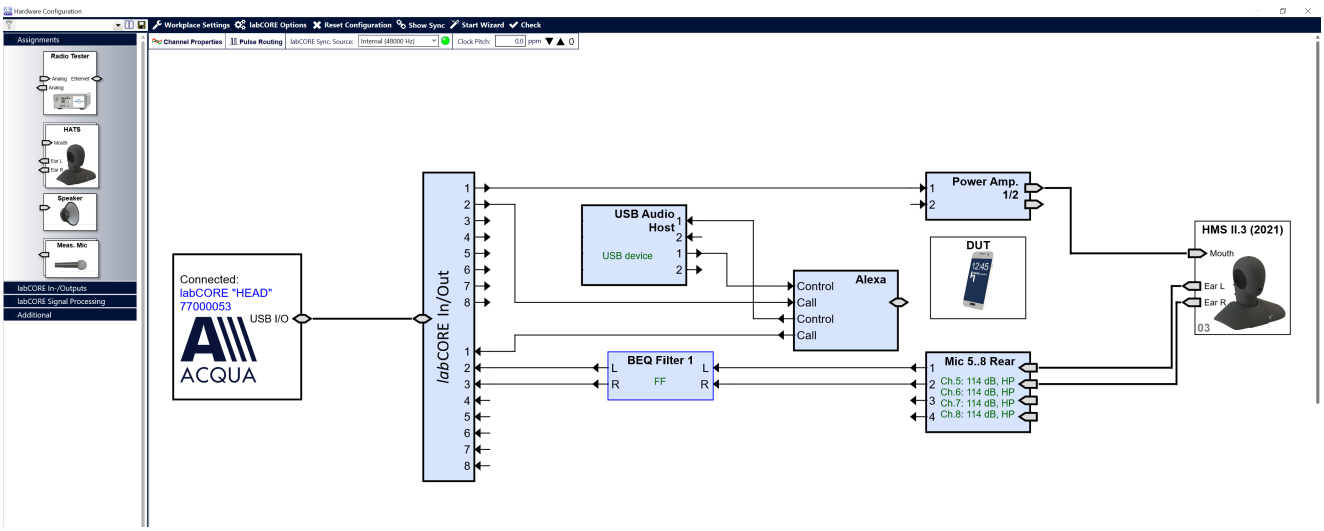
None	Alexa does not confirm activation (via Tap button) by playing a tone.
Tone	Alexa confirms activation by wake word and / or processing the voice command by playing a tone.

4 Measurement configurations (exemplary)

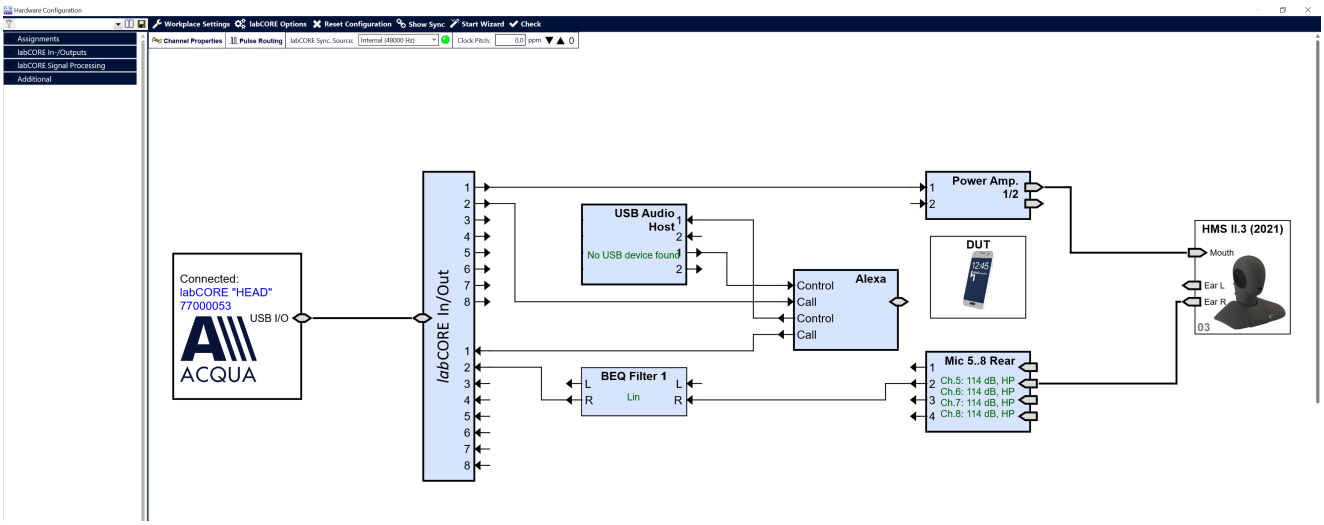
The provided configurations are only exemplary and do not include the whole scope of applications.

4.1 ACQUA – Hardware configurations for measurements

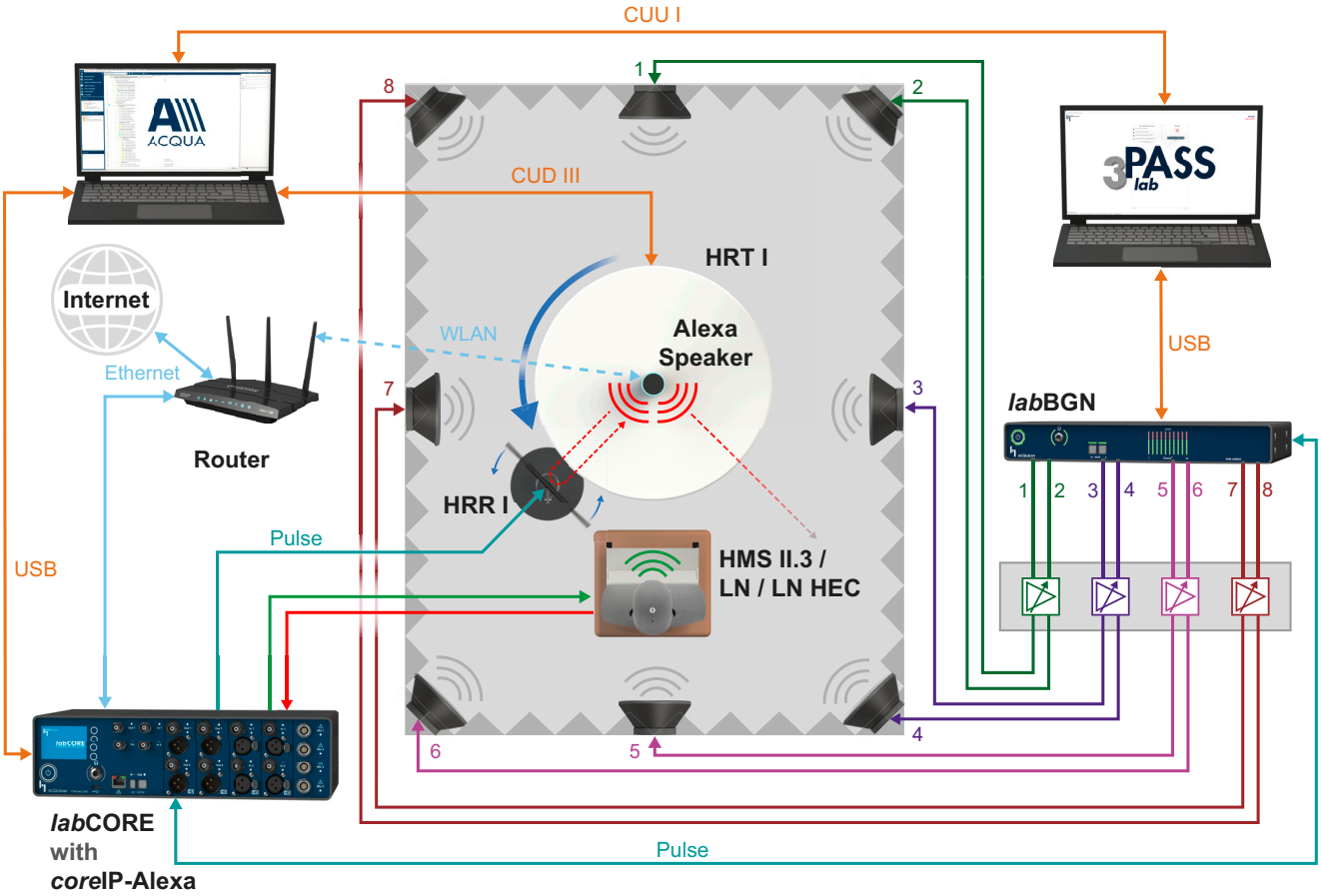
4.1.1 Binaural measurement (exemplary)



4.1.2 Monaural measurement (exemplary)



4.2 Smart speaker (exemplary)



Exemplary test configuration for a surface supported smart speaker qualified for Alexa-to-Alexa calls. The speaker stands on a tabletop rotated by turntable HRT I. HMS II.3 / LN / LN HEC simulate the user conducting a far-field (1 m) Alexa-to-Alexa call. Background noise simulation comes from 3PASS *lab*. In collaboration, *lab*CORE and ACQUA generate, send and receive signals and automatically trigger background noise playback for precise synchronization. HRT I rotates the speaker for orientation dependent measurements. HRR I changes the echo path according to the test requirements.

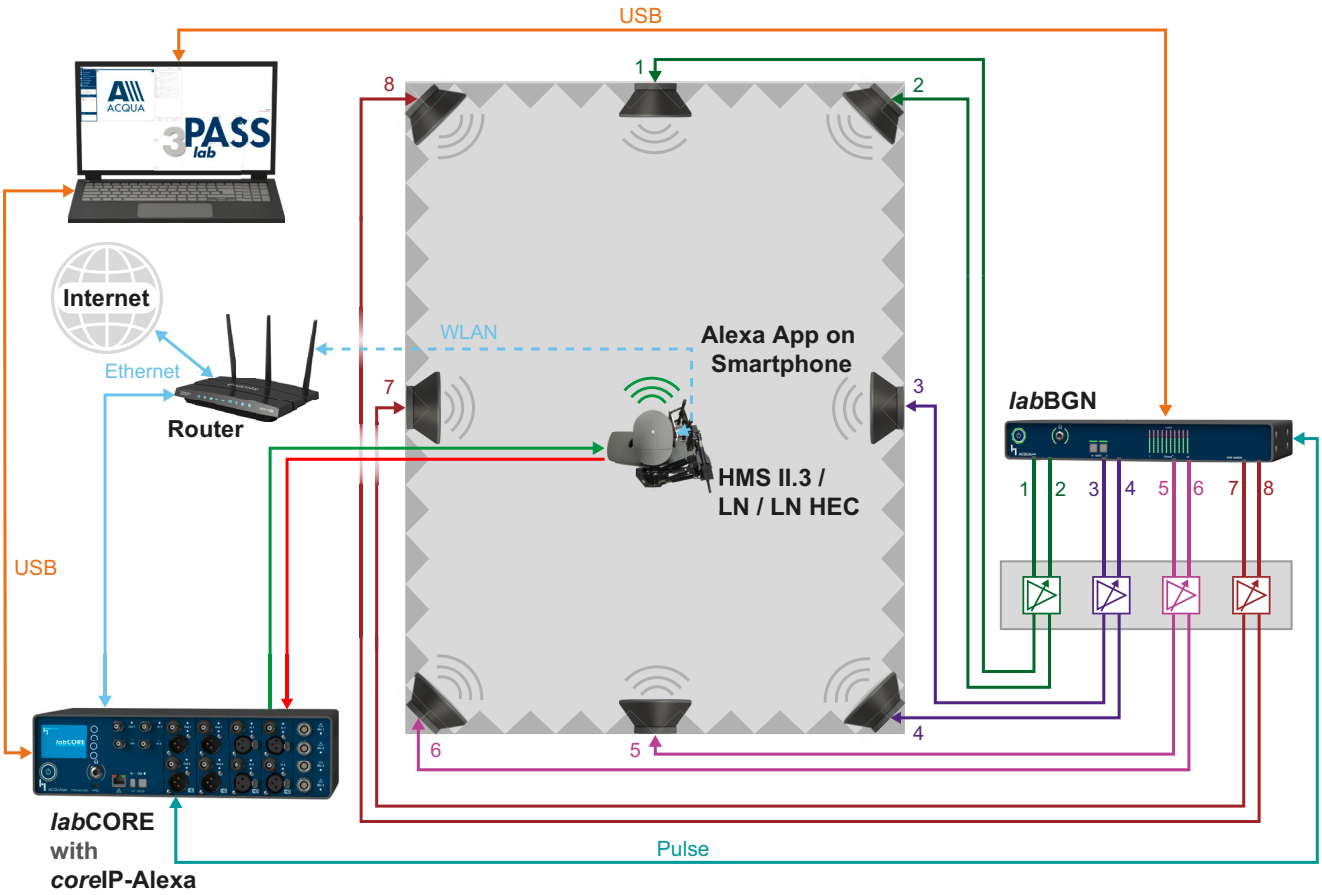
4.2.1 Required hardware from HEAD acoustics

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*BEQ (Code 7740), Binaural equalization incl. filter set for one artificial head
  - *core*IP-Alexa (Code 7775), *lab*CORE Alexa client option
- HMS II, One of the listed versions
  - HMS II.3 (Code 1703), HEAD Measurement System, basic version
  - HMS II.3 LN (Code 1703.1), HEAD Measurement System, low-noise version
  - HMS II.3 LN HEC (Code 1703.2), HEAD Measurement System, low-noise version with human-like ear canal simulator
- *lab*BGN (Code 6486), Background noise simulation hardware platform
- HRR I (Code 6597), HEAD acoustics Rotating Reflector
- HRT I (Code 6498), HEAD acoustics Remote-operated Turntable

4.2.2 Required software from HEAD acoustics

- ACQUA (Code 6810), Advanced Communication Quality Analysis software
- 3PASS *lab* (Code 6990), Background noise simulation system

4.3 Smartphone (exemplary)



Exemplary test configuration for an Alexa-to-Alexa call from a smartphone to *lab*CORE via Alexa App. HMS II.3 / LN / HEC bears the handset positioner HHP IV that positions the smartphone in variable positions at the artificial ear. Background noise simulation comes from 3PASS *lab*. In collaboration, *lab*CORE and ACQUA generate, send and receive signals and automatically trigger background noise playback for precise synchronization.

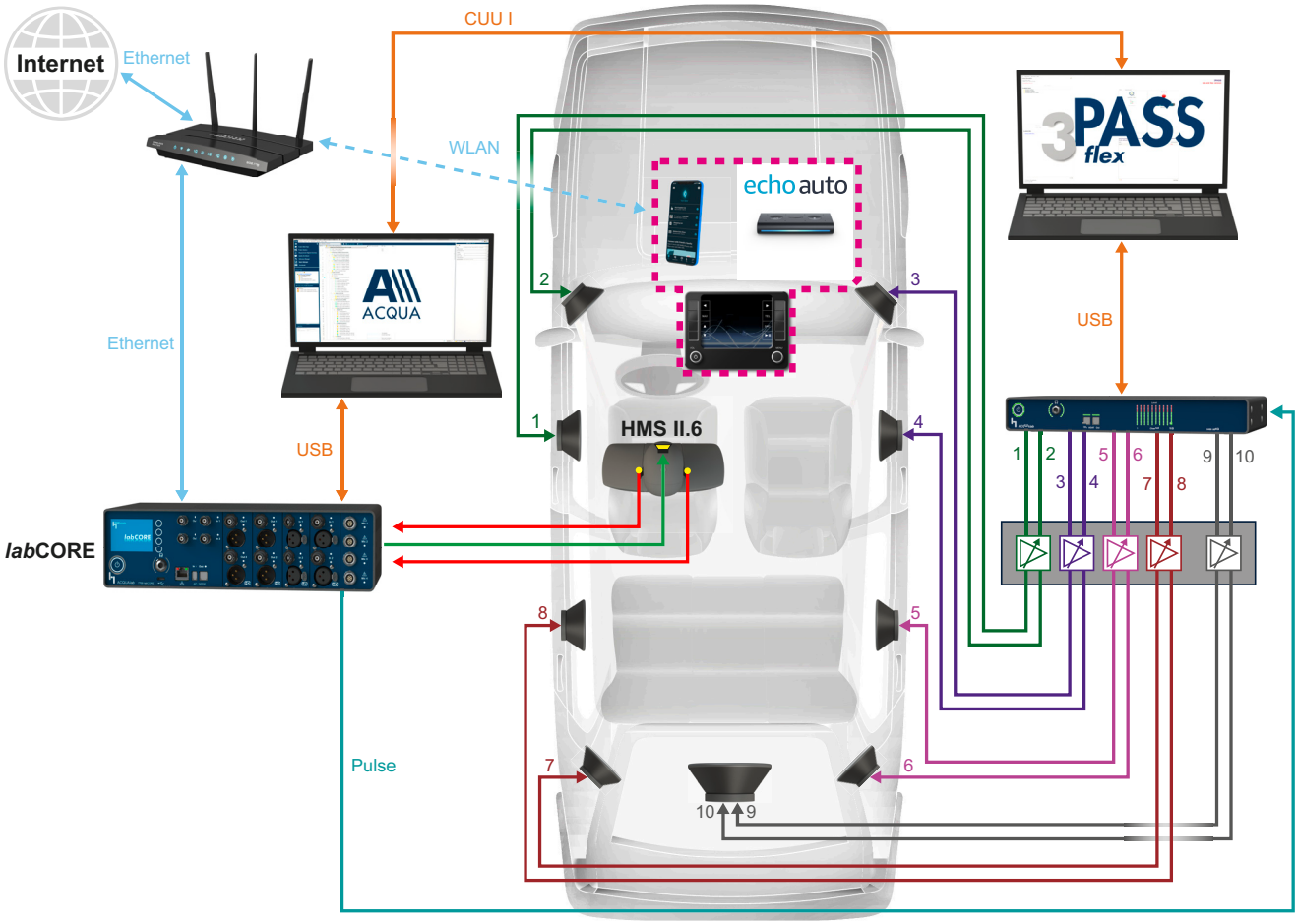
4.3.1 Required hardware from HEAD acoustics

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*BEQ (Code 7740), Binaural equalization incl. filter set for one artificial head
  - *core*IP-Alexa (Code 7775), *lab*CORE Alexa client option
- HMS II, One of the listed versions
  - HMS II.3 (Code 1703), HEAD Measurement System, basic version
  - HMS II.3 LN (Code 1703.1), HEAD Measurement System, low-noise version
  - HMS II.3 LN HEC (Code 1703.2), HEAD Measurement System, low-noise version with human-like ear canal simulator
- *lab*BGN (Code 6486), Background noise simulation hardware platform
- HHP IV (Code 1406), HEAD Handset Positioner

4.3.2 Required software from HEAD acoustics

- ACQUA (Code 6810), Advanced Communication Quality Analysis software
- 3PASS *lab* (Code 6990), Background noise simulation system

4.4 In-vehicle (exemplary)



Exemplary test configuration for an Alexa-to-Alexa call from an echo auto to *lab*CORE. echo auto connects via Bluetooth to the car's head unit and to a smartphone including the Alexa App. HMS II.6 simulates the user conducting a far-field Alexa-to-Alexa call. Background noise simulation comes from 3PASS *flex*. *lab*CORE and ACQUA generate, send and receive signals and automatically trigger background noise playback for precise synchronization.

4.4.1 Required hardware from HEAD acoustics

- *lab*CORE (Code 7700), Modular multi-channel hardware platform
  - *core*OUT-Amp2 (Code 7720), Power amplifier board
  - *core*IN-Mic4 (Code 7730), Microphone input board
  - *core*BEQ (Code 7740), Binaural equalization incl. filter set for one artificial head
  - *core*IP-Alexa (Code 7775), *lab*CORE Alexa client option
- HMS II, One of the listed versions
  - HMS II.3 (Code 1703), HEAD Measurement System, basic version
  - HMS II.3 LN (Code 1703.1), HEAD Measurement System, low-noise version
  - HMS II.3 LN HEC (Code 1703.2), HEAD Measurement System, low-noise version with human-like ear canal simulator
  - HMS II.6 (Code 1706), HEAD Measurement System, free-field microphones
  - HMS II.7 (Code 1707), HEAD Measurement System, free-field ICP® microphones

- *lab*BGN (Code 6486), Background noise simulation hardware platform

4.4.2 Required software from HEAD acoustics

- ACQUA (Code 6810), Advanced Communication Quality Analysis software
- 3PASS *flex* (Code 6995), Background noise simulation system

5 Alexa-to-Alexa call establishment

5.1 Requirements

- Add both, *core*IP-Alexa and the device under test (Alexa Built-in device), to an Amazon account.
  - Refer to chapter 3.1 for *core*IP-Alexa.
  - Follow instruction from the Amazon Alexa App to add the device under test.
- If the Amazon accounts of *lab*CORE and the device under test are different, connect the contact information of the accounts in the Amazon Alexa App. Thus, the devices can call each other.

5.2 Call

5.2.1 Call from *core*IP-Alexa

1. Select Tap button.
2. Initiate call by voice command. Speak into the USB headset (e.g. Call [name of recipient]).

5.2.2 Call from DUT

1. Address Alexa on the device under test by wake word (e.g. Alexa, Amazon, Computer, Echo).
2. Tell Alexa to call *core*IP-Alexa.
3. Select Accept button in Alexa control.

5.2.3 Terminate call

Perform one of the following actions:

- Select Hang Up button to terminate an active call.
- Select Tap button and terminate the call by voice command (e.g. Stop, Hang up).
- Address Alexa on the device under test by wake word and terminate the call by voice command (e.g. Stop, Hang up).