

Introduction

This driver provides the network connectivity for Linn DS series devices. A complete system configuration requires a single instance of this driver and one instance of the DS series driver per DS device in the system. The Linn DS device(s) and this driver should be fully configured before proceeding to install the Linn DS device driver(s).

Installation Types

This driver supports two alternative usages of the DS product. The DS can either be installed in a room and directly supply its audio/video to that room (standalone room mode, or “room” for short), or it can be installed behind an A/V matrix switch and its output is then supplied to one or more rooms via that switch (matrix switch mode, or “matrix” for short). Note that these two usages cannot be mixed – a DS behind a matrix switch cannot also be used to directly play to a room due to grouping and audio synchronization issues. Where set-up of the driver differs based on the usage, this will be highlighted in the instructions.

Linn Configuration

Please make sure that each Linn device has been configured correctly, and is on the same network as the Control4 processor, prior to configuration of the Control4 drivers. This Control4 Linn Network driver requires an instance of Kazoo Server (v4.9 or later) to be running on the same network.

The minimum configuration that is required to have a Linn DSM appear correctly in Control4 or Linn’s music control app, is to set the DSM’s Room and set which Sources are in use.

To configure a Linn DSM you will need Linn Konfig, which can be downloaded from <https://www.linn.co.uk/software>.

In Konfig, under the CONFIGURATION tab, click CHANGE and then select the Linn DSM that you want to configure.

Setting the Room name

Select the DS tab, and then Device from the Linn DSM’s configuration page. Enter the desired room name in the Room text box, by default it will be set to “Main Room”. It is important to view/change the room names for each device as these room names get discovered in the Control4 drivers. A meaningful name should be used to avoid confusion when associating Linn rooms to Control4 device drivers later on.

Setting up a Source

Select the DS tab, and then Sources from the Linn DSM’s configuration page. For each source that is in use on the Linn DSM, expand and enter the source’s name and ensure the source’s Visible is set to Yes. You must rename the source from the default name for it to register as being configured. It is useful to provide a meaningful name for the source as this is seen later during Control4 configuration. For each source that is not in use on the Linn DSM, expand and ensure the source’s Visible field is set to No. Set-up of the login details for any sources that are streaming services is done through the configuration of the Gateway API section of the Kazoo Server using Konfig.

Advanced Configuration

For more advanced configuration please refer to the [Konfig manual](#).

Driver Installation

Two driver files are included in the release package.

Driver File Name	Description
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comms_ip_linn_ds.c4z

This is the network driver and it handles discovery of devices. Only one instance is required.

mediaservice_ip_linn_ds.c4z

These drivers are used for control of individual DS or room player devices. One instance is required for each device.

Table 1: Driver Descriptions

If you are not installing directly from the Control4 online library, copy the above files from the zip package to your Control4 driver location (by default this is *Documents\Control4\Drivers*). Open Composer and choose the **Search** tab from the **Items** pane.

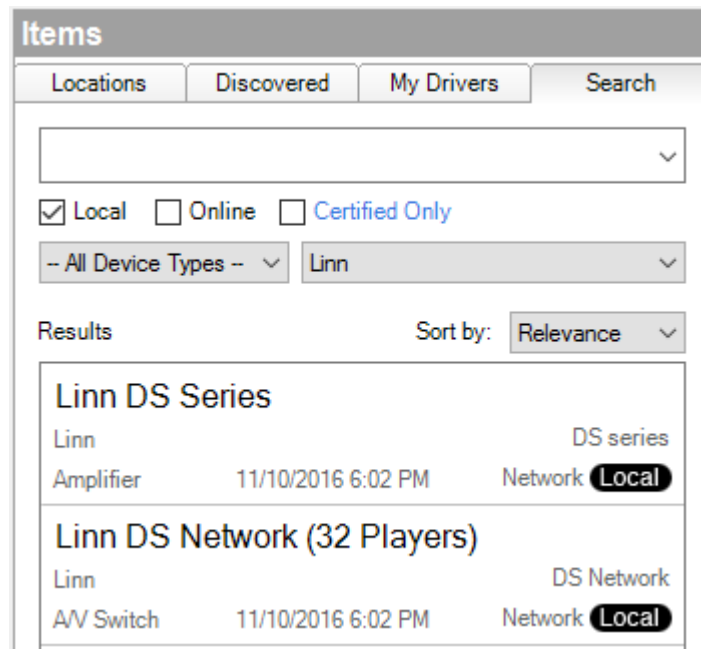


Figure 1: Driver Search

Add one instance of the driver entitled “Linn DS Network (32 Players)” into your project. We recommend installing the driver in a room of its own called “Linn Network” and then hiding the room (room Properties → Navigator tab → Hide Room in Location Menu).

NOTE: It is important for the smooth installation of media player drivers that the network driver is added prior to the player drivers. The configuration of the player drivers cannot be completed without the network driver being in place and communicating correctly with a Linn gateway.

Once you have established that the network driver has installed and discovered all your Linn devices (see below), add one instance of a player driver “Linn DS Series” for each Linn DS player that you have in your system to the room in your project which contains the player.

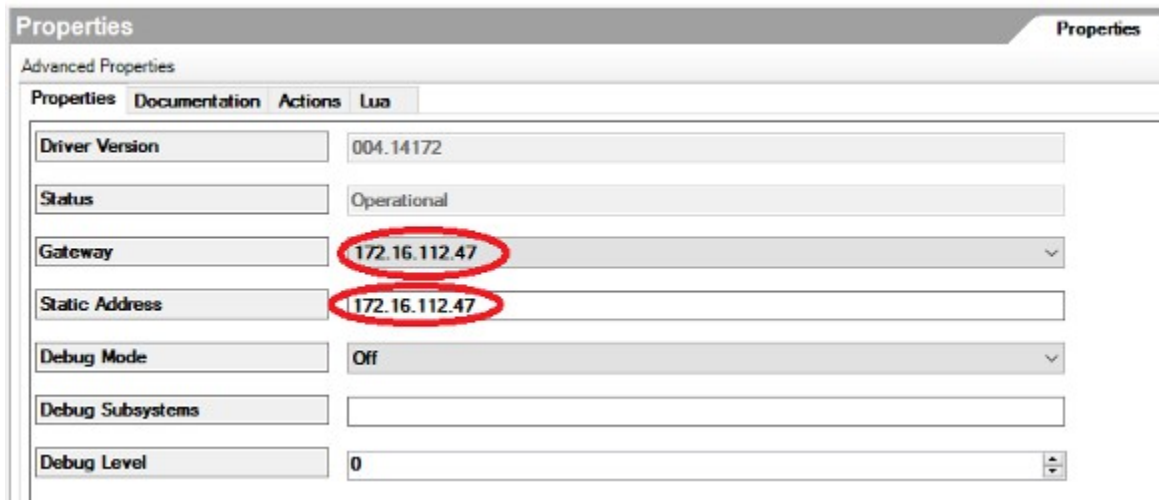
It is possible to directly install DS players discovered through SDDP just by dragging them into the appropriate room in the configuration. This will also automatically associate the driver with that player, setting the **DS or Player** property appropriately.

If the DS is providing audio directly to a room (standalone room mode), we recommend naming the driver in a way that indicates the room it is in, e.g. “DS (Lounge)”. If the DS is being routed through a switch (matrix switch mode), we recommend naming it according to its usage, e.g. “Martin’s Music DS” (for a dedicated personal player), “Network Music DS” (for a single shared player), or “DS Player 1” (for a player to be selected from a bank of players) and also name the subsidiary Network Stream device to match as this is the device that the user will see in the UI.

Driver Configuration

The network driver is used for discovery of Linn gateways connected to the network. Only one instance of this driver is required, even if multiple Linn devices are in use. Once it is installed it initiates a discovery process that will result in all the available Linn gateway devices being found.

In the **System Design** view, select the Linn **Network** device and choose the **Properties** tab from **Advanced Properties**. Select a gateway address from the **Gateway** dropdown box. If for some reason the gateway is not discoverable on the local network (for instance, it is over a VPN) then the gateway address can be manually entered in the **Static Address** field:

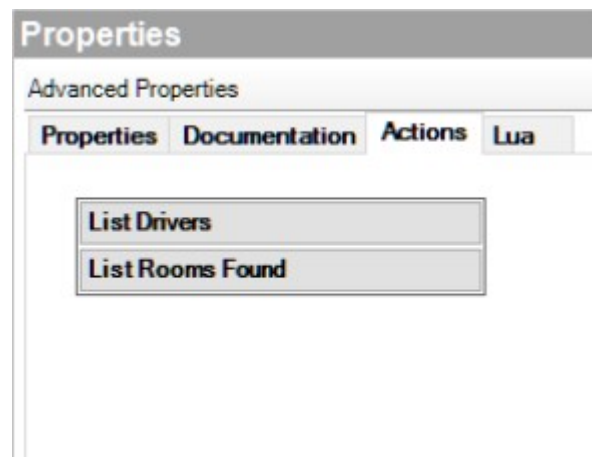


The screenshot shows the 'Properties' dialog box with the 'Advanced Properties' section. The 'Properties' tab is selected. The 'Gateway' dropdown menu is set to '172.16.112.47', and the 'Static Address' field is also set to '172.16.112.47'. Other fields include 'Driver Version' (004.14172), 'Status' (Operational), 'Debug Mode' (Off), 'Debug Subsystems' (empty), and 'Debug Level' (0).

Driver Version	004.14172
Status	Operational
Gateway	172.16.112.47
Static Address	172.16.112.47
Debug Mode	Off
Debug Subsystems	
Debug Level	0

Figure 2: Gateway Selection

In the **System Design** view, select the **Linn Network** device and choose the **Actions** tab from **Advanced Properties**. Two buttons are displayed:



The screenshot shows the 'Properties' dialog box with the 'Advanced Properties' section. The 'Actions' sub-tab is selected, displaying two buttons: 'List Drivers' and 'List Rooms Found'.

List Drivers
List Rooms Found

Figure 3: Driver Actions

You can check that all your configured room devices have been found by clicking on **List Rooms Found**. Select the **Lua** tab to see the results of the listing:

```

-- Gateways discovered on the network:
  1 172.16.112.47

-- C4 Device drivers:
[1029] = { ROOM_IDS="207,", PLAYER_NAME="Main Room", VERSION="5", PLAYER_INDEX=2, DEVICE_ID="1029", }
-- Linn rooms discovered on the network:
{ index=2, cache=table: 0xc473480 { }, id="Main Room", name="Main Room", drivers=table: 0xe2d9c20 {
["1029"]="1029", }, }{ index=3, cache=table: 0xd3103a0 { }, id="MARKTDELLPC", name="MARKTDELLPC",
drivers=table: 0x9ebeda0 { }, }{ index=1, cache=table: 0xd8cba20 { }, id="GREG-PC", name="GREG-PC",
drivers=table: 0xa6694e0 { }, }

```

Figure 4: Discovery

It is necessary to ensure that each device driver in your project is controlling the correct Linn device (known as a “room” in Linn terminology). Select the **System Design** view and one-by-one, choose each instance of a player device driver. The **DS or Player** drop-down in the **Properties** window may be used to check and select the correct Linn room name to use as the player in each Control4 room. If you have installed or associated the driver with a DS device using SDDP, the **DS or Player** property will change its name to **DS or Player (SDDP)** and will be read-only as SDDP has already been used to make the correct choice of Linn room name.

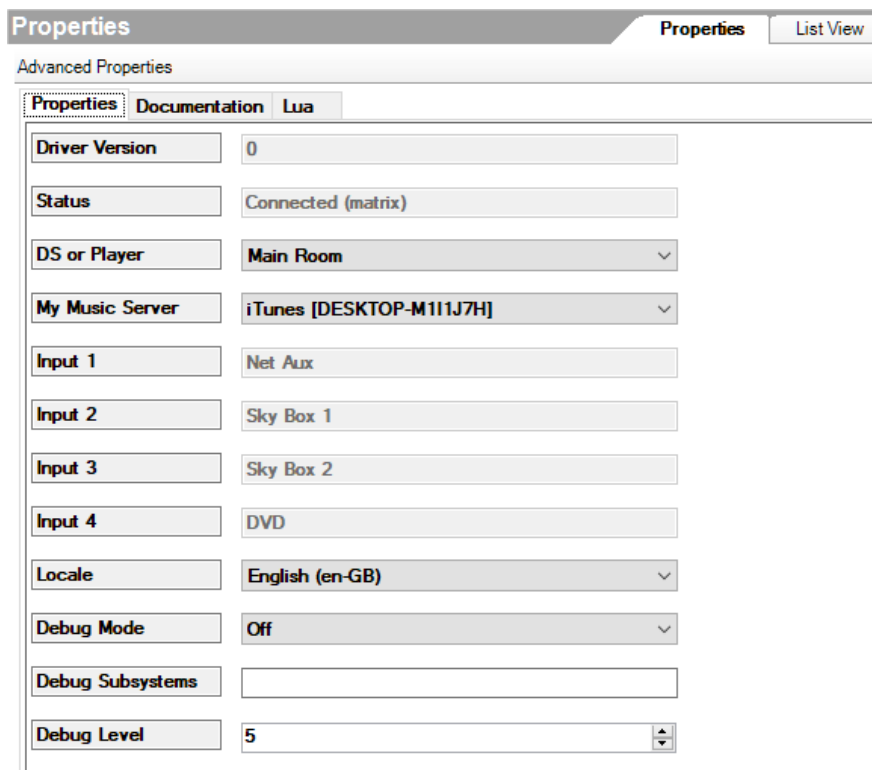


Figure 5: Room Selection

The driver has a “My Music” service associated with it. This allows the installer to configure a single UPnP or OpenHome server as the preferred source for music. The server is chosen through the **My Music Server** property of the driver. The alternative is the “Servers” service, which lists all the discoverable UPnP and OpenHome servers and then allows the user to browse through their content. The installer can choose to hide either of these sources in Navigator (see below) if they are not needed.

Control4 Connection Configuration

As per standard Control4 practice, it is necessary to establish audio end-point connections for each device. You do not need to manually configure any of the connections between the device driver and the Linn Network driver (classes RF_LINN_ROOM, RF_LINN_SONGCAST and LINN_NETWORK_COMMS); these are all managed automatically.

Choose the **Connections** view, and select the **Control/AV** tab. Select the Linn device driver to reveal its connections.



Figure 6: Driver Connections 1

Standalone Room Mode devices only

In the **Control & Audio Video Connections** window, select the **Audio End-Point** with the **Connection** type “AUDIO_SELECTION” and drag it onto an available **Audio End-Point** in the appropriate room. If the DS device supports video output and it is being used for this purpose, choose the **Video End-Point** with the **Connection** type “VIDEO_SELECTION” and drag it onto an available **Video End-Point** input in the appropriate room.

Name	Type	Connection	Input/Output
Audio/Video Outputs			
HDMI Out	Video	HDMI	Output
Audio Out	Audio	SPEAKER	Output
Audio Out	Audio	STEREO	Output
Audio Out	Audio	RF_LINN_SONGCAST	Output
Control Inputs			
Linn Network	Control	LINN_NETWORK_CO...	Input
Room Control			
Audio End-Point	RoomControl	AUDIO_SELECTION	Output
Audio End-Point	RoomControl	AUDIO_VOLUME	Output
HDMI Out Video End-Point	RoomControl	VIDEO_SELECTION	Output

Device	Name
Room	Audio End-Point 1
Room	Video's Audio End-Point 1
Room	Audio End-Point 2
Room	Video's Audio End-Point 2
Living	Audio End-Point 1
Living	Video's Audio End-Point 1
Living	Audio End-Point 2
Living	Video's Audio End-Point 2
Lounge	Audio End-Point 1
Lounge	Video's Audio End-Point 1
Lounge	Audio End-Point 2
Lounge	Video's Audio End-Point 2

Figure 7: Driver Connections 2

Depending on the model, DS players can be used to supply audio output directly through a built-in amplifier, by pairing them with a Linn pre-amp, or by pairing with a third-party alternative. If a Linn pre-amp is used then the inputs, outputs and audio control features of the pre-amp are seamlessly integrated into the control of the DS.

If using a built-in amplifier or a Linn pre-amp, drag the Audio End-Point with the Connection type “AUDIO_VOLUME” onto an available Audio Volume input in the appropriate room to indicate that the Linn device is in control of the volume. If integrating with a third-party pre-amp that has a corresponding Control4 driver, connect the STEREO Audio Out connection to the appropriate input of the pre-amp driver. You can then either use Konfig to disable volume control on the DS and connect the pre-amp driver to the room’s AUDIO_VOLUME connection to have the pre-amp control volume, or fix the pre-amp’s volume level and control volume through the DS, in which case the DS should be connected to the AUDIO_VOLUME end point.

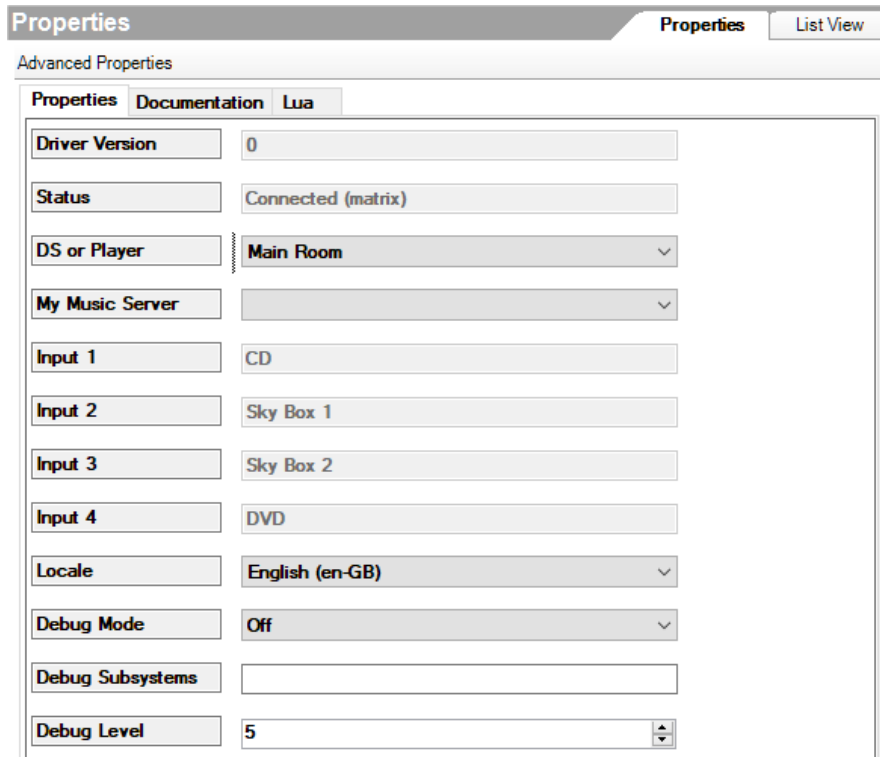
For more details about pre-amp configuration, consult the [Konfig manual](#).

Matrix Switch Mode devices only

Connect the STEREO Audio Out connection and, if appropriate, the HDMI Out connection to the appropriate input(s) on the A/V switch driver(s) that represent the switch(es) to which the DS is connected.

All devices

If you are using a player with input connections, then you can also make connections to the relevant line-in connections on the driver. The properties of the driver will tell you which Control4 input each available Linn input is mapped onto, giving you the Control4 input number and the Linn name:



The screenshot shows a 'Properties' dialog box with a 'List View' button. The main area is titled 'Advanced Properties' and contains several tabs: 'Properties', 'Documentation', and 'Lua'. The 'Properties' tab is active and displays a list of configuration items:

Driver Version	0
Status	Connected (matrix)
DS or Player	Main Room
My Music Server	
Input 1	CD
Input 2	Sky Box 1
Input 3	Sky Box 2
Input 4	DVD
Locale	English (en-GB)
Debug Mode	Off
Debug Subsystems	
Debug Level	5

Figure 8: Driver Connections 3

then the connections might look as follows:

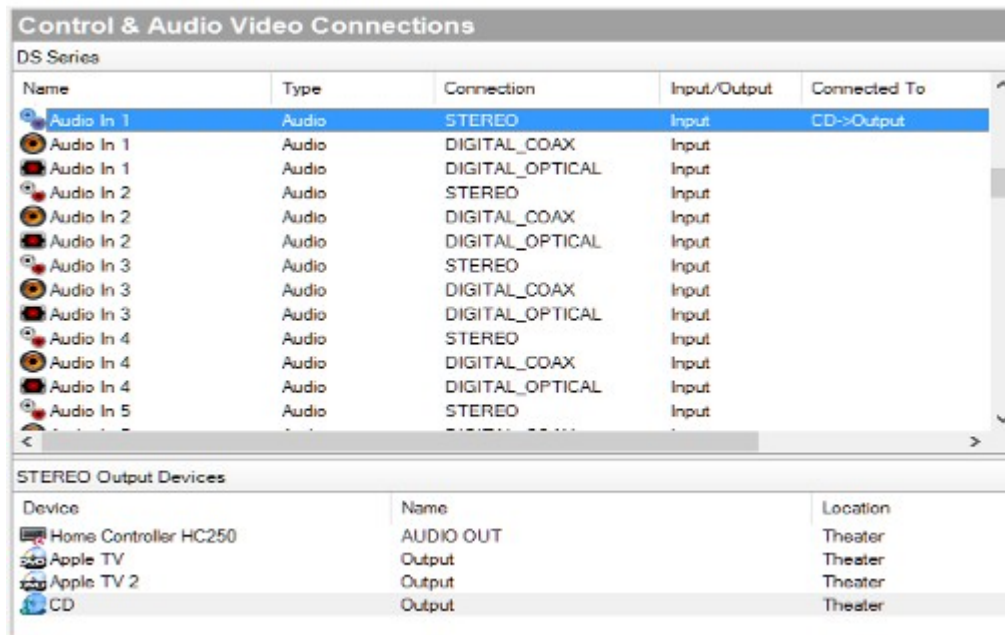


Figure 9: Driver Connections 4

Note that for devices that are connected to Linn pre-amps, the pre-amp inputs will also appear in the list of inputs on the driver properties page and should be connected up in a similar way to the DS's own inputs.

Repeat these steps for all Linn device drivers added to your project.

Control4 Navigator Configuration

By default, Control4 Navigators will automatically display all Linn device drivers in the project in every room (as well as unnecessarily exposing end-points). To change this, choose the **System Design** view, select a **Room** and display the **Navigator** tab.

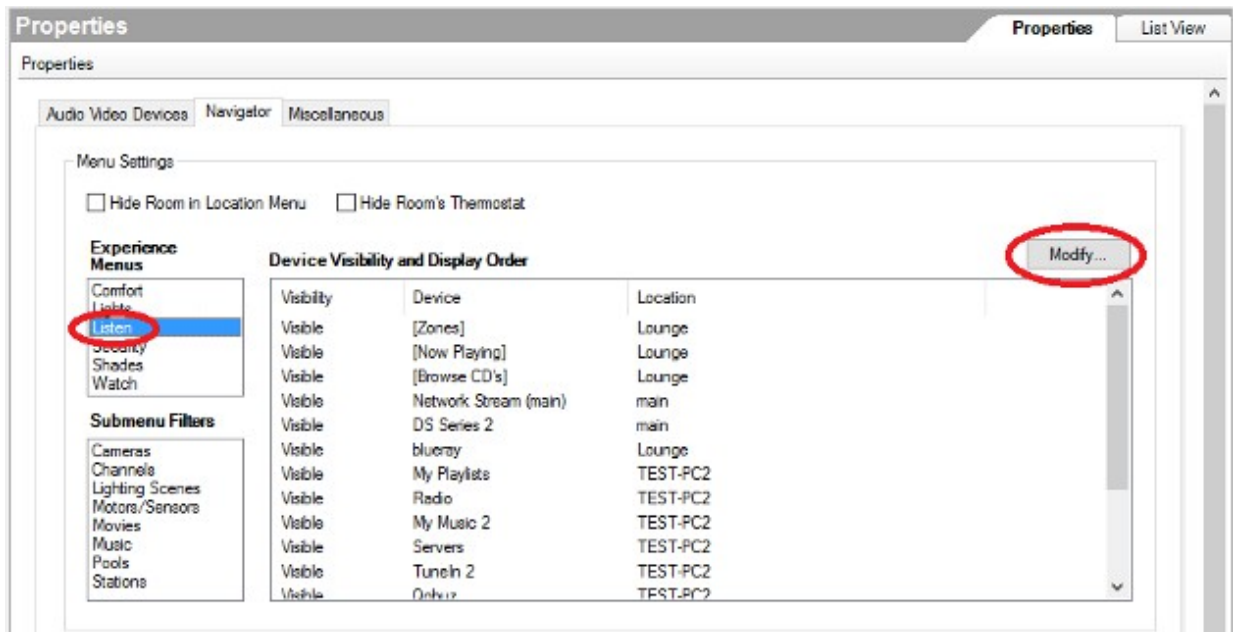


Figure 10: Device Visibility

Choose **Listen** from the **Menu** list and click on **Modify** to change the device display visibility.

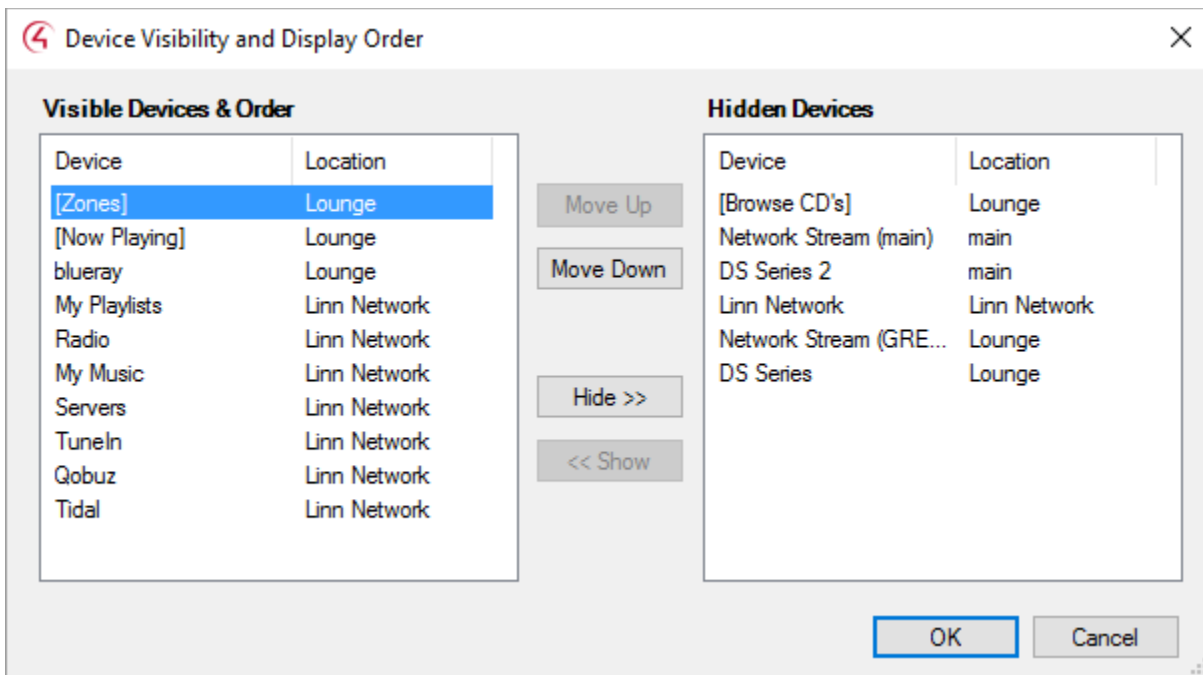


Figure 11: Modify Device Visibility

For rooms that have a DS in the room itself (Standalone Room Mode), you will see devices corresponding to:

- The Linn Network
- All DS devices that are in Standalone Room Mode
- The streaming media players built into these DS devices
- All the individual streaming services available (e.g. Tidal, My Music)
- Any devices connected to the inputs of the DSEs

In the **Visibility and Display Order** window, choose the devices you do not want to display from the **Visible Devices & Order** and click **Hide>>** to move them to the **Hidden Devices** list. Click **OK** once all devices not relevant to the room are removed. You are advised to hide all of the above except the streaming services and the connected input devices that you wish to use in that room. Note that the **My Music** service browses directly to the **My Music Server** chosen in the driver properties for the DS in that room, while **Servers** lists all the available UPnP and OpenHome servers. If you don't have a particular preferred server, you can hide **My Music**, while if you have only one music server in the system it would make sense to select that as the **My Music Server** and hide the **Servers** service.

For rooms that have one or more DS devices available through a matrix (Matrix Switch Mode), you will see devices corresponding to:

- All DS devices that connect to the room via the matrix
- The streaming media players built into these DS devices
- Any devices connected to the inputs of the DS devices

You are advised to hide the DS devices as selecting these serves no purpose. The streaming media players are items that the user will choose to browse and select content to play.

NOTE: Changes made in Composer will only be reflected on Navigators if you choose **File > Refresh Navigators**.

Properties Summary

The Linn Network driver has the following properties (see the documentation tab of the player driver for its properties):

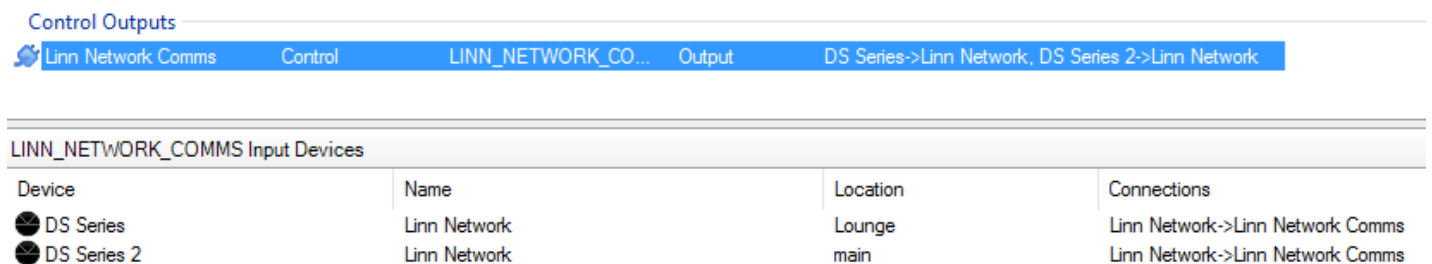
Property	Purpose
Driver Version	The version of the driver
Status	The connection status of the driver, which can be: Created Just created. If stuck in this status there is a fault with the driver. Not connected Not yet connected to a gateway device. Connecting Establishing a connection with a gateway device. Connected Connected to the device and querying initial status. Operational Working correctly.
Gateway	The IP address of the gateway to which the driver has connected. One will be selected automatically but this can be overridden by selecting an alternative from the drop-down menu.
Static Address	If the desired gateway is not discoverable for some reason (such as being on a VPN) then its IP address can be entered manually here. This overrides anything in the Gateway property.
Locale	Used to select the locale for localising any messages and text strings returned by the network driver.
Debug Mode	Used to show debug output in the Director logs and/or Lua debug window.
Debug Subsystems	For use as directed by technical support. Usually leave blank.
Debug Level	Level of debug output detail. 0 is errors only, 1 is errors and other important warning or status messages. Other levels give increasing detail but are usually only used under direction by support.

Table 2: Driver Properties

Troubleshooting

Discovery isn't working

This is likely due to missing bindings between the network driver and the device drivers (one cause of which, is adding the network driver to the project after adding the device drivers). To check this, open Composer and display the Connections view, selecting the Control/AV tab. Choose the Linn Network driver and scroll down to the Control Outputs:



LINN_NETWORK_COMMS Input Devices			
Device	Name	Location	Connections
DS Series	Linn Network	Lounge	Linn Network->Linn Network Comms
DS Series 2	Linn Network	main	Linn Network->Linn Network Comms

Figure 22: Driver Bindings

The control bindings should be established (as highlighted in the above image). If they are not, drag the Linn Network Comms control output onto each device in turn.

Communication lost with an individual player

Check that the player is still visible on the network and operating correctly. If it is, check whether the Linn Gateway has discovered the device (use the List Rooms Found action on the Linn Network driver). If it has not, press the Restart

Discovery action button to prompt it to rediscover the device.

Communication lost with all players

Check that the gateway device being used by the Linn Network driver is still visible on the network and operating correctly. If it is, but the driver is not showing its status as “Operational” then press the Restart Discovery action button to prompt it to rediscover the device.

Adding new devices to the system

If you add new devices to the system (either players or a new Kazoo Server that you want to use as a gateway) you will need to run device discovery again to have the drivers recognise them correctly. Press the Restart Discovery button on the Actions page of the Linn Network driver. Allow a couple of minutes for the system to settle and then you should be able to install drivers for the new devices.

Other problems

To get an idea of what the driver is doing, set the Debug Mode property to Print and the Debug Level property to 1 on either or both of the network and player drivers and then look at the output in the Lua window. This will show any errors, warnings and connectivity messages from the driver.

Technical Support

For further technical support, please contact service@linn.co.uk.