STREAMIT

Lisa Compact

User Manual

for software version 1.44

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EU Declaration of Conformity

This product carries the CE-Mark in accordance with the related European Directives. CE marking is the responsibility of Streamit B.V. The Netherlands.

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Compliance Statement

NOTE: This device complies with Part 15 of the FCC limits for Class B digital devices FOR HOME OR OFFICE USE (“home or office” interference requirements are more stringent than “outdoor” requirements). Operation of this device is subject to the following conditions:

1. This device may not cause harmful interference, and

2. this device must accept any interference received, including interference that may cause undesired operation.

The Streamit internet radio device does not contain any user-serviceable parts. Repairs should be made only by an authorized Streamit service center. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate the device under Part 15 regulations.

Disclaimer

This manual has been validated and reviewed for accuracy. The instructions and descriptions it contains are accurate for the Streamit internet radio devices at the time of this manual’s production. However, later Streamit internet radio devices and manuals are subject to change without notice. Streamit assumes no liability for damages incurred directly or indirectly from errors, omissions or discrepancies between the internet radio and the manual.

Understanding of Instructions

WARNING: These are instructions which can cause harm to people or damage to the device if not followed properly. It is important to read and follow these instructions carefully.

IMPORTANT: These instructions are important in order to understand the correct behavior of the device.

Notices about trademarks

- The Lisa family of devices is a registered trademark of Streamit
- Streamit is a registered trademark
- All other trade names that are used in this manual are owned by their respective owners

1 Getting started

This manual applies to Lisa software version 1.44.

1.1 Introduction

Thank you for purchasing the Streamit internet audio player Lisa Compact. The Lisa Compact is a device with many possibilities and we strongly recommend you to read this manual thoroughly before you start installing and using the device for the first time.

The Lisa is a fully autonomous working IP-audio receiver, able to tune in to web casts of internet radio stations and audio distributors. The different versions deliver the right set of features for your application.

For more information on Streamit products and technologies, we invite you to visit our website https://www.streamit.eu.

Finally, we wish you a lot of pleasure using your Lisa Compact.

1.2 Lisa product range

Currently the following products are on offer:

	Lisa Compact			Lisa LCD		
	Basic	SD	Ultimate	Basic	SD	Ultimate
LCD and keys				√	√	√
MP3	√	√	√	√	√	√
AAC+, OGG			√			√
SD card functions		√	√		√	√

1.3 Applications

The Lisa devices have been developed to be used for in-store audio a (also referred to as commercial audio or background music) applications. For these applications, we have identified the following operational setups:

- Standalone

- Streamit Device portal
- Streamit Audio Distribution Platform
- Your own platform

These variants are described in more detail below.

Standalone operation

You do not have to use the Lisa for playing from the internet. When you have a sufficiently large number of audio files available, you can also make exclusive use of the card functionality. The supported format for the audio files depends on the software edition of the Lisa. To make the Lisa play from the card, you need to create playlists and copy them together with the audio files on a memory card. You can read the details in Playing from card.

It is possible to switch between playlists. When the music that is already on the card is no longer sufficient, you can copy additional files on to the card and create new playlists.

Streamit Device portal

When you want to install a number of devices on a considerable number of locations, it is important for you to remember to keep track of which streams you have programmed for each device and each of your customers. It is also important for you to be able to change the stream presets of these devices remotely. The Streamit Device portal has been designed with all these requirements in mind.

To make proper use of the Device portal you need to create an account. You also need to have a Device portal subscription plan to use your Lisa device on the Device portal. For this purpose, Streamit currently offers 2 versions: the Device portal Basic subscription and the Device portal Extended subscription:

Included in:			
Device portal Basic subscription	Configuration	Task scheduling	
Device portal Extended subscription	Configuration	Task scheduling	Monitoring

- Configuration: Assign streams to the Lisa, add description, location and other settings, etc.
- Monitoring: Check if the Lisa is still connected and receive information on what it does
- Task scheduling: Plan tasks that the Lisa executes at scheduled times (e.g. power up, play a stream and update music contents)

On Device portal you can create user accounts for each of your clients and allow them a certain level of management of their device. You can for example allow them view the monitoring data, while you maintain control of the other aspects of the Lisa configuration.

Streamit Audio Distribution Platform

If you want to have a complete system for the planning and distribution of content and maintenance of playlists and players, Streamit's Audio Distribution Platform (ADP) is available for you. The Streamit ADP seamlessly links with available playlist generators and content creation solutions that you have already in place. Please read our commercial documentation for more information about this product.

Your own custom-built platform

If you want to have full control, you also can develop your own platform. Technical documentation of the Lisa devices is available to enable building your own platform. Please contact sales@streamit.eu for more information.

! Please note that you need to sign a support agreement with Streamit when building your own platform. This agreement makes clear what you may expect from Streamit in terms of professional support for such a crucial operation that a custom platform is for you.

2 Installation

This section of the manual will cover the installation of your Lisa internet radio, how to mount and connect your device.

2.1 Unpacking your device

Carefully take out of the package the device and the supplied materials. Make sure that all of the following components are included:

- 1x Lisa Compact
- Power supply
- Power plug adapters (see IEC world-wide power plug overview):
  - United States: US (Type A)
  - Non-USA countries: EU (Type C), UK (Type G), US (Type A)
  - Other types can also be order, please ask your sales contact for more information
- Ethernet cable

2.2 Device appearance

Front view

The front view of the Lisa Compact is depicted below. Lisa Compact features four status LEDs and a Micro-USB service connector. The MicroSD card slot can be found at the centre of the bottom side, covered by a hatch mounted with a single screw.

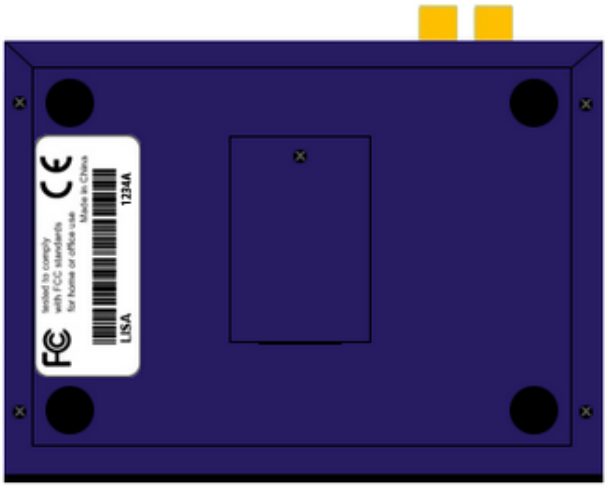
⚠ Always disconnect the power before inserting/removing an SD card in the Lisa Compact.

Each status LED can either be off or burn green, red or orange. Both constant and blinking light are possible. The status LEDs use green for no issue, orange for a warning and red for error. See LED status information for details

Back view

! With an RCA to female jack converter cable the RCA connectors can also be used for headphones.

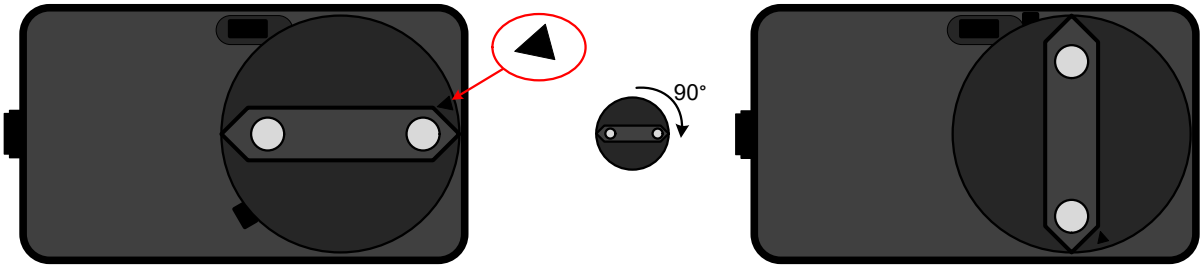
Bottom view



2.3 Connecting the Lisa

Connecting the power supply

Select the correct power plug adapter for your mains socket and mount this to the Lisa power adapter. Start at the position where the small triangle marking points to the top of the power supply, opposite to the side of the cord. Press down slightly and rotate the plug 90° clockwise as depicted below. You will hear a click and the adapter will be locked in place.



Start position End position

Plug the power adapter to the mains outlet and plug the other side in the Lisa. In the process we ask that you careful attention to the following instructions:

⚠ Never use wet hands when plugging the power adapter in the mains and never remove the power adapter from the mains with wet hands.

⚠ Do not cut or damage the cord of the power adapter; do not place heavy objects on the cord. This can cause short-circuit, resulting in electrical shocks or even fire.

⚠ Pulling the cord can also damage the wire and/or isolation causing electrical shocks or fire.

⚠ Using power adapters other than the one recommended for your Lisa, can result in overheating and damage you device. This can cause fire, electrical shocks and other hazards. Only use the supplied power adapter.

⚠ Applying your Lisa to situations with rapid changing temperatures can result in condensation (small amount of water) on the inner and outer surface of your device. To ensure a long lifetime of your Lisa, this should be prevented. In case of such a scenario, wait until you device is 'dry' before you use it again.

Connecting the Ethernet cable

Use the provided Ethernet cable to connect your Lisa with your local network. If everything is OK (and the power supply has also been connected) the yellow led of the Ethernet connector will blink randomly. The other led will either light up green (100Mbps connection) or remain dark (10 Mbps connection).

The Lisa will auto-detect and set the correct duplex mode (half- or full duplex) depending on the network environment in which the Lisa is placed.

Connecting the audio output

The audio output of the Lisa will be connected to the line input of the audio installation. No audio cables are included with the Lisa. The type of cable that should be used to connect the Lisa is on the Lisa-side RCA, the other end depends on the type of connector in your audio installation.

Connecting the USB service cable

The USB connection is used for service purposes, which include programming your device, software update, and monitoring of the communication between the Lisa and the internet. The small (type B micro) connector of the USB cable is plugged in the device, while the A-connector is intended for connection to your Windows PC. Before making this connection we recommend that the Lisa Configuration Tool is first installed.

3 First time setup

The Lisa Compact comes with default settings. The most important are the network settings. By default DHCP is used.

This section describes the first time start up and the device activation.

3.1 Switching on the Lisa for the first time

The first time the Lisa Compact is powered on, it will apply default settings for the most important settings, using DHCP for IP settings. When IP configuration via DHCP succeeds, the network status LED will burn green constantly.

1. In case DHCP is not supported in the specific network or a proxy is employed, you must use the Lisa Configuration Tool to configure the correct IP and proxy settings. Only then the Lisa will able to connect to the configuration platform, software update server and activation server.

2. Once IP settings are configured, the device will try to connect to the default configuration platform (Streamit Device portal). Shortly after that, it will look whether a new version of the software is available and update if required.

3. Register and assign the correct configurations for this device in the chosen configuration platform. The default configuration platform is the Streamit Device portal. When a different configuration platform must be used, please use LCT to configure the correct platform location.

4. Every minute the Lisa Compact will try to get new configurations from the configuration platform, until it receives a configuration with one or more presets. If you do not want to wait, a configuration update or reboot can be issued from any of the available command interfaces. It is also an option to unplug the power cable and plug it back again.

During startup, the device activation is executed. The Lisa device will receive code from the activation server, enabling the capabilities on the device that correspond to the purchased edition. For more information, please see Device activation.

3.2 Device activation

All Lisa devices are shipped with Basic edition capabilities. The Basic edition only supports streaming of content in MP3 format. If you have purchased a device of a different edition, this will only be enabled after the device has been activated.

Activation is done during startup. During activation, the Lisa device receives code from the activation server, enabling the capabilities on the device that correspond to the purchased edition (e.g. Ultimate). Please note that it is not possible to upgrade/downgrade to a different edition after the purchase is made.

The activation process is automatic and transparent to the user. During startup, a non-activated Lisa device will connect to the activation server. For this to succeed, internet connectivity is required, the device needs to be connected properly and correct network settings have to be programmed.

If activation fails or fails partly, the Lisa will try again, until it has completed the activation process, which is confirmed by activation server.

! All Lisa devices need to be connected at least once to the public internet for activation, before it can be used in a private network.

4 Configuration

The Lisa Compact comes with default settings. The most important are the network settings. By default DHCP is used.

The default settings on the Lisa may not be what is needed for your specific application, or they may have to be updated during use. This section describes the available configuration methods.

4.1 Configuration platform

Update the configuration during use, when the Lisa is in the field, is best done remotely. Therefore the Lisa by default retrieves its configuration via the network from a remote location (online configuration platform or server).

Streamit Device portal is the default configuration platform and recommended for use with the Lisa. However, the Streamit Audio Distribution Platform, or a custom-built platform, can also be used.

The most common configurations settings (e.g. list of presets) can be changed on the platform side and get communicated to the device when this performs a configuration update (see When is the configuration updated? for detailed information).

The configuration platform does not allow you to change the IP settings, see Configure the network settings for this.

4.2 When is the configuration updated?

It is important to realize when and from where the configuration of the Lisa is actually updated. This depends on the operation mode of the Lisa. Three modes are defined, which determine where the configuration of the Lisa comes from and how it is updated:

Configuration mode	Source of the configuration	Update
1 (default)	Streamit Device portal	When the Lisa retrieves its configuration: • At startup (either power on or restart) • When a task is scheduled with this command (see Task scheduling) • When the update configuration command is sent to the Lisa (see Commands)

Configuration mode	Source of the configuration	Update
2	Custom-built platform, or Streamit Audio Distribution Platform	When the Lisa retrieves its configuration: • At startup (either power on or restart) • When a task is scheduled with this command (see Task scheduling) • When the update configuration command is sent to the Lisa (see Commands)
3	Fixed on-board settings	Using one of the Alternative configuration methods

In all operation modes the Lisa can start by reading a configuration file from the SD card (see Configuration from SD card).

4.3 Alternative configuration methods

Next to using a configuration platform to update the settings on the Lisa, the following methods are available to configure Lisa devices:

- Using the Lisa Configuration Tool
- Via a configuration file on the SD card in the Lisa
- Via a Telnet client

The recommended configuration interface for the Lisa devices is the Device portal web-interface. By default, all Streamit devices will get their configuration from the Streamit Device portal.

4.4 Configuration from SD card

The Lisa can load a configuration from the SD card. This can be very useful when a large number of devices needs to be configured. The configuration file is loaded onto the SD card and the SD cards are then inserted in the Lisa. This section explains in detail how configuration from SD card works, which is also depicted schematically in the image below.

In every operation mode (see When is the configuration updated?) the Lisa will check during a configuration update (either at startup or when executing a configuration update task), whether a configuration file is available on the card. When that is the case, the settings from the configuration file will be applied.

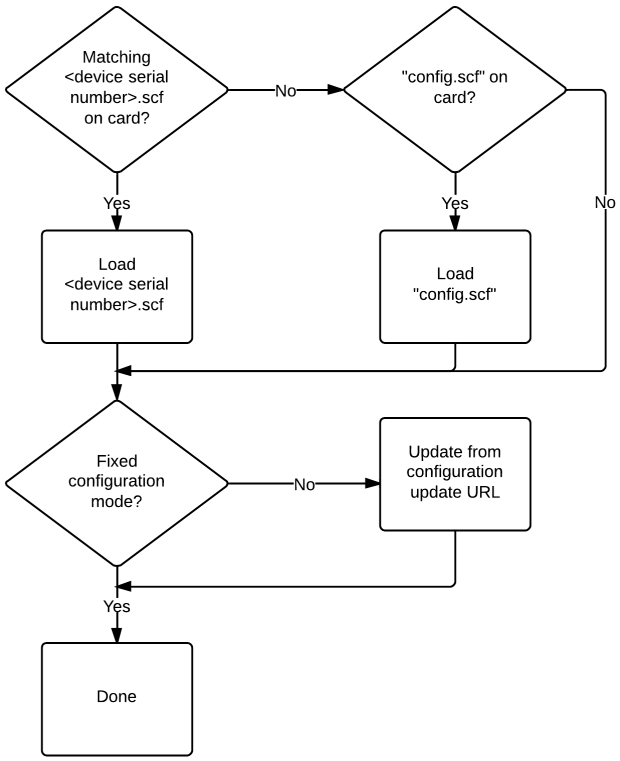
After configuration from card is finished (or skipped, when there is no card or there is no configuration file on the card) the device will perform the configuration update using the configuration update URL, just like it normally does. This configuration update is skipped when the device is configured in fixed configuration mode.

The configuration file can be created using the Lisa Configuration Tool.

The configuration file should be placed in the root folder of the SD card. The name of the configuration file can be either

- "config.scf"
- <device serial number>.scf

The latter option includes the serial number of a device. This means that only the Lisa that has this serial number, will load this configuration file from the SD card. Other Lisa devices will ignore this configuration file. This makes it possible to create a single SD card image that contains several configurations for specific devices. The image can be copied and used for many devices, each device will load the configuration file that has its serial number as file name.



5 LED status information

The Lisa features 4 LEDs, which are used to communicate the status of the device. The LEDs have the following meaning (from bottom to top):

- Power
- Network
- Card
- Audio

Each led can be switched OFF, switched ON, or BLINK in one of the three (3) possible colors. So, for each led, the following states are available:

OFF | Solid green | Solid red | Solid orange | Blink green | Blink red | Blink orange

LED: Power

Condition	
Power connected, but device is off	
Power connected, but a fatal error has occurred*	
Device is on	

* Please consult Streamit support for more information.

LED: Network

Condition	
There is no physical connection to the network	
DHCP configuration in progress	

The Lisa is configured via DHCP or with a static IP address	
IP configuration via DHCP failed (e.g., no DHCP server). The formerly assigned IP configuration (IP address, netmask, default gateway, DNS) has been applied	
DHCP configuration failed (e.g., no DHCP server)	

LED: Card

Condition	
No card present and card not required	
Card present, but card usage NOT allowed or card license not OK	
No card present, but this is required for playing from or content update	
Card is mounted and ready to use	
Playing from card	
Content update is running	
Cleanup card, Erase card, Erase playlist	

LED: Audio

Condition	
Not playing (no error situation)	
Buffering (card or inet)	
Playing card	

Playing inet	
Playing card in fallback	
Not playing (error situation e.g. missing codec license for specific code, no stations, no playlists etc.)	

6 Playing a stream or playlist from internet

By default the Lisa will connect to the Streamit Device portal. If the Lisa is registered on the Streamit Device portal, the device will get a list of presets. When powered on the first time, the Lisa will start to play the stream or playlist of the first preset.

A preset can be the URL of an audio file, a stream or a playlist. Specifically the following online audio sources are supported:

- An audio file on a web server
- An HTTP internet audio stream (Icecast, Shoutcast)
- A playlist in the PLS format (see Wikipedia PLS format description)
- A playlist in the M3U or M3U extended format (see Wikipedia M3U format description)
- A playlist in the ASX format (see Microsoft documentation)

See Using a playlist as preset for more information on presets that point to playlists.

6.1 Change which stream is played

There are several options to change the preset (stream or playlist) that is played by the Lisa:

- Using a task (see Task scheduling)
- Using a command, for example via Lisa Configuration Tool or the monitoring server (see Remote control from monitoring server). See Controlling the Lisa with commands for a complete overview.

6.2 Using a playlist as preset

The URL of a preset can point to a playlist that is available online on a web server (an 'online playlist'). The Lisa will not store this playlist on the SD card for later use (see Store-and-Forward for this), but will simply play the playlist immediately after retrieving it.

The URLs in a playlist can point to an internet stream, which useful to configure a backup stream in case the first (primary) stream is not available: When a stream stops (e.g., when the connection fails), the Lisa will try to connect to the next entry in the list

An online playlist can also be used to dynamically change during the day what the Lisa plays. In this case the URL in the playlist points to a file rather than an audio stream. The variants of this application are explained in their respective sections: Single track playlist and Mixed source playlist.

6.2.1 Requirements for online playlists

Online playlists that are retrieved from web servers and played immediately, should comply to the following in order for the Lisa to be able to handle them:

- The size of the playlist file must be smaller then 16000 bytes
- All URL's contained must be absolute, relative paths e.g. "../../myaudioFile1.mp3" are not allowed
- URLs can point to streams and tracks on the internet or tracks on the SD card:
  - Example URL for a track on the internet: `http://myserver/audio/track001.mp3`
  - Example URL for a track on the card: `PHAT0:/music.mp3`
- The maximum URL length 1024 characters
- All 7-bit ASCII characters are supported, except the escaped characters '\n', '\r', '\0', '\t'
- The file format can be
  - A playlist in the PLS format (see Wikipedia PLS format description)
  - A playlist in the M3U or M3U extended format (see Wikipedia M3U format description)
  - A playlist in the ASX format (see Microsoft documentation)
- The content type in the HTTP header must be set correctly, or the prescribed extension must be used:

Content type	Extension
audio/x-scpls	pls
audio/x-mpegurl	m3u / m3u8
audio/x-ms-asf	asx

- Reference in the playlist to an other playlist (nesting) is not supported

Example of an M3U playlist

The simplest playlist file (e.g: myPlaylist.m3u) it looks something like the following:

```
http://myServer/audio/myAudioFile3.mp3
http://myServer/audio/myAudioFile1.mp3
..
..
http://myServer/audio/myAudioFileN.mp3
```

6.2.2 Limitations of online playlists

Playing the entries of a playlist in random order is only possible for playlists that are stored on the SD card (see Store-and-Forward). However, online playlists are retrieved from the web server and played immediately. They are not stored on the SD card and therefore random order playback of the entries is not supported.

6.3 Single track playlist

If the music and commercial program for a day has been planned, changes may be required during that day. For this purpose the concept of 'single track playlist' is developed: It allows for changes in the music and commercial programming while the program is executed. For example, a preplanned commercial may be canceled since the stores run out of stock.

Additionally, using the single track playlist method allows to plan a single music program for a group of stores, while commercials are planned for each store separately. For example, all stores get the 'Hard core lounge' playlist, while stores 1-3 get commercial A, and stores 4-6 get commercial B.

Single track playlist works as follows:

- The URL of a preset on the Lisa points to an online playlist, like this preset:
  - Preset name: 'Ambient music'
  - Preset URL: 'http://myServer/myPlaylist.pls
- When the Lisa starts, it makes an HTTP request to the preset URL
- The server returns the playlist, which contains one single entry, which points to an audio track, e.g.,

```
[playlist]
File1=http://myServer/audio/myAudioFile3.mp3
Title1=Online audio track
Length1=180
NumberOfEntries=1
Version=2
```

- The Lisa plays this track
- When a track has been played until the end, the playlist is finished and the Lisa again makes an HTTP request for the preset URL
- Again the server returns a playlist, now containing the next track or commercial according to the program that has been planned

This setup allows you to change the program 'on the fly', even while the Lisa is playing the program. Each time the Lisa requests a playlist, the server will base the response (the returned playlist) on the latest version of the program and the Lisa will (therefore) follow the new planning/program.

6.4 Mixed source playlist

The concept of single track playlist allows for changes to the music and commercial program 'on the fly'. However, it does not have the bandwidth efficiency of Store-and-Forward. Each time a track is required for playback, that track is downloaded and played (while being downloaded). Store-and-Forward on the other hand is efficient in bandwidth usage, but does not have the flexibility to change the music and commercial program or even add/use new content on the fly.

The 'mixed source playlist' makes it possible to use the content on the card while the music and commercial program is determined on the server and can be updated as required. This means that an Internet connection is still required, but very little data is being communicated.

It is also possible to use new content in the music and commercial program by making that available online and pointing to it in the playlist. Hence the name: mixed source playlist. However, this content will be downloaded each time it is played. On the one hand this means that the content is always fresh and up to date, but also that more data is sent over the internet connection compared to using tracks that are stored on the SD card.

Consider the following scenario: Generally the music is preplanned days ahead and tracks repeat regularly in the program, while commercials are planned and updated even during the day. For such a situation, the music can be downloaded to the card, to save bandwidth (also on the server-side). On the other hand, the commercials are served 'live' online, so they can be updated when needed. The single track playlist method is used to make the Lisa play the music tracks from the SD card and the commercials from the server.

For example, the first playlist may point to a music track on the card:

```
[playlist]
File1=PHAT0:/music.mp3
Title1=this is a music track
Length1=180
NumberOfEntries=1
Version=2
```

and the second playlist, downloaded after the first playlist is finished, points to a commercial (or track) that is available online:

```
[playlist]
File1=http://myServer/audio/myAudioFile3.mp3
Title1=Online audio track
Length1=180
NumberOfEntries=1
Version=2
```

Note that the mixed source playlist method is described in combination with single track playlists, but works also with playlists that are longer. If the playlist for example contains entries for 5 music tracks, all 5 tracks will be played before the Lisa makes a request for a playlist again.

Handling error conditions for mixed source playlists

The option to use tracks from the card in online playlists introduces a number of new error conditions. Because the mixed source playlist method is a cooperation between server and Lisa, some of these error conditions are best addressed on the server. For these error conditions, the following applies:

- The Lisa will request a new playlist from the server
- The error condition will be included in the header of the request that is sent to the server

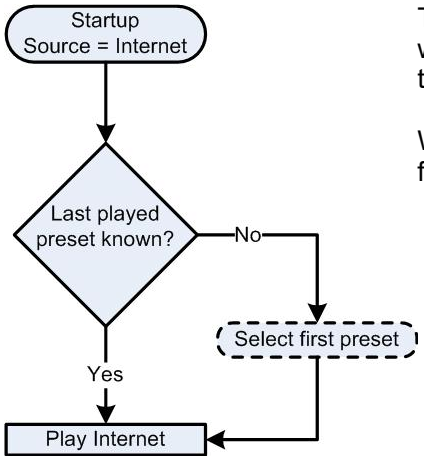
The server can parse the header and detect the error condition:

Header	Error condition
X-STREAMIT-PLAYER-PLSERR: No card (mounted)	The playlist refers to a track on the card, but there is no card present/mounted
X-STREAMIT-PLAYER-PLSERR: <x> Missing Entries	The playlist referred to one or more tracks that were not found on the card, where <x> will be replaced by the number of tracks that were not found on the card. Sent in combination with the next header.
X-STREAMIT-PLAYER-PLSTRK: PHAT0:/<filename>	The playlist referred to one or more tracks that were not found on the card, where <filename> will be replaced by the filename of the last track in the series that was not found on the card. Sent in combination with the previous header.

What the server response should be, is left to the designer of the server-side. Sending the same playlist is not advised, as this would repeat the error condition. An elegant solution would be to send a playlist to the Lisa that contains the URL of the corresponding track on a server, effectively replacing the track on the card with its online counterpart. Of course, this depends on the quality or other restrictions on the internet connection of the Lisa.

6.5 Background: Flow for playing from internet

The Lisa plays from the internet when it was the last used source.



The Lisa will try to retrieve from the last saved settings which preset was being played the last time. When the last played preset is valid, the Lisa will start to play from internet.

When the last-played preset is not known or not valid anymore, the first preset is selected.

7 Playing from card

The Lisa can play playlists from the memory card. A playlist is a text file with the “pls” extension, which contains a list of songs (referred to as entries) in a specific format. This can be used for straightforward 'playing music from the card'.

However, the real power of using the card lies in Store-and-Forward and Fallback to card:

- Store-and-Forward:

Store-and-Forward is a way of working with the Lisa that downloads the playlists and music tracks during the night (or some other convenient moment), so that the playlists can be played at a later moment, even if the internet connection is unstable, limited, or not available at all.

See Store-and-Forward for more information.

- Fallback to card:

'Fallback to card' makes the Lisa switch automatically and start playing from the card if there are problems with the network connection or with the stream that is being played. More specifically, when the Lisa receives no audio stream data, it will fade out, switch to the card and start playing tracks from the card.

See Fallback to card for more information.

! Before you can start playback from the card, you need to place a playlist and the tracks that it uses onto the SD Card, according to the Requirements for playlists on the card and to the Requirements for audio tracks on the card.

7.1 Supported cards

All Lisa devices equipped with a memory card connector can be used to play from audio from card, but the card also can be used for fallback purposes (see Fallback to card).

! In order to be able to use the card, you need a Lisa edition that supports this.

The Lisa device supports all modern SD, SDHC and SDXC cards when they have the FAT32 file system. Please note the SDXC cards are usually sold with the exFAT file system. Most if not all of these cards however can be formatted to FAT32.

Although the Lisa supports many cards, it is strongly recommended to use the SD cards that Streamit has on offer. These are strictly-specified cards that are custom-supplied by Transcend for Streamit for professional applications.

! Streamit will only officially support the use of these custom-supplied Transcend SD cards. Other cards may always be used at own risk. Streamit will not offer free support for other memory cards.

See Streamit custom SD cards for background information on this matter.

7.2 Prepare playback from card

Before you can start playback from the card, you need to place a playlist and the tracks that it uses onto the SD Card, according to the Requirements for playlists on the card and to the Requirements for audio tracks on the card.

7.3 Start playback from the card

When the files on the card are in place (see Prepare playback from card), there are several options to make the Lisa play a playlist from the card:

- Using a task (see Task scheduling)
- Using a command, for example via Lisa Configuration Tool or the monitoring server (see Sending commands using the monitoring server). See Commands for a complete overview.

After a couple of seconds, the Lisa will start playing and you will hear audio coming out of your audio installation.

7.4 Requirements for audio tracks on the card

The following rules apply for storing audio tracks on the card:

- It is recommended that you format your card in FAT32, because a FAT16 formatted card can have only 512 files in the root folder. When the filenames (without extension) are longer than 8 characters, the maximum number of files for FAT16-formatted cards decreases proportionally. The Streamit Card and Scheduler Toolkit can also be used to start formatting the card with the proper parameters.
- All files must be in the root and not arranged into folder(s)
- The audio file name length (including the file extension) must not exceed 128 characters characters (due to the Requirements for playlists on the card)
- The ASCII printable characters (see Wikipedia ASCII printable characters) are supported, except the characters that are excluded for FAT32 filenames: " * / : < > ? \\ |

The Lisa supports all audio file formats as described in Supported audio formats and streams.

7.5 Requirements for playlists on the card

Playlists on the SD card should be made following these rules (an example can be found below):

- You can have a maximum of 50 playlists with the ‘pls’ extension.
- The playlists “must” be named incrementally from 1 to 50. You are not obliged to have 50 playlists, but in case you want to have e.g. two, they must be named ‘1.pls’ and ‘2.pls’ (not 2.pls and 4.pls for example, this would result in no playlists being recognized by the Lisa at all).
- Playlists must follow the PLS standard (Wikipedia PLS format description), and specifically

- For filenames the ASCII printable characters (see Wikipedia ASCII printable characters) are supported, except the characters that are excluded for FAT32 filenames: " * / : < > ? \\ |
- For contents other than filenames, the ASCII printable characters (see Wikipedia ASCII printable characters) are supported, as well as the control characters *carriage return* (\r), *line feed* (\n), and *horizontal tab* (\t)
- Lines must only contain known key-value pairs, or be empty
- Empty lines may contain spaces and horizontal tabs
- The contents must be structured as follows: First the header, then one or more entries, followed by the footer
- The following applies to the entries in the playlist:
  - The entries must be numbered sequentially
  - Gaps in the numbering of the entries (1, 2, 4) are not allowed
  - There can be no more than 32768 entries per playlist
- Tags must come in the order that is indicated in the following tables:

Header section:

Key	Required	Remarks
`[playlist]`	yes	This is not a key-value pair, and should be included exactly as shown
`StartTime`		Intended start time in the hh:mm format (between 00:00 and 23:59). This value is used to determine where to start playing in the playlist.
`PlsName`		Value has a maximum length of 16 characters. The value is shown on the LCD display instead of the playlist filename (e.g., 1.pls).

Entries, repeated one or more times, as necessary:

Key	Required	Remarks
`File`*X*	yes	The X in the key must be replaced by the entry number. Value must be only the filename, no relative/absolute file paths are accepted. The length of the value must not exceed 128 characters (the audio file name including the file extension).
`Title`*X*	yes	The X in the key must be replaced by the entry number. Value may be empty.
`Length`*X*	yes	The X in the key must be replaced by the entry number. Value may be empty.
`PlayMaxVol`*X*		The X in the key must be replaced by the entry number. Value determines if the track should be played at maximum volume (1) or default volume (0). See Volume and sound for more information.

Footer section:

Key	Required	Remarks
`NumberOfEntries`	yes	Value must be equal to the total number of entries in the playlist. The key-value pair must end with a newline
`Version`		Value must be '2' (without the quotes)

Playlists can be created manually or by means of some software package/tool. During testing the Streamit Card and Scheduler Toolkit is recommended, this ensures that the playlist is compatible with the Lisa devices.

Example of a playlist

```
[playlist]

PlsName=Oldies

File1=Dream a little dream (Rough mix).mp3
Title1=LivingRoom - Dream a little dream of me
Length1=19

File2=Fleetwood Mac - Say you love me.mp3
Title2=Fleetwood Mac - Say you love me
Length2=250

File3=Am3.mp3
Title3=Am3
Length3=182
PlayMaxVol3=1

NumberOfEntries=3

Version=2
```

7.6 Background: Flow for playing from card

Which playlist the Lisa will play and which entry the Lisa will start with, depends on the situation, as detailed in the following sections:

- Play playlist at Lisa startup
- Play playlist following task or command

7.6.1 Play playlist at Lisa startup

This section describes how the Lisa selects an entry from a playlist on the SD card when the Lisa starts up. After selecting the starting point in the playlist, the normal flow of playing a playlist is followed..

If random playback is disabled

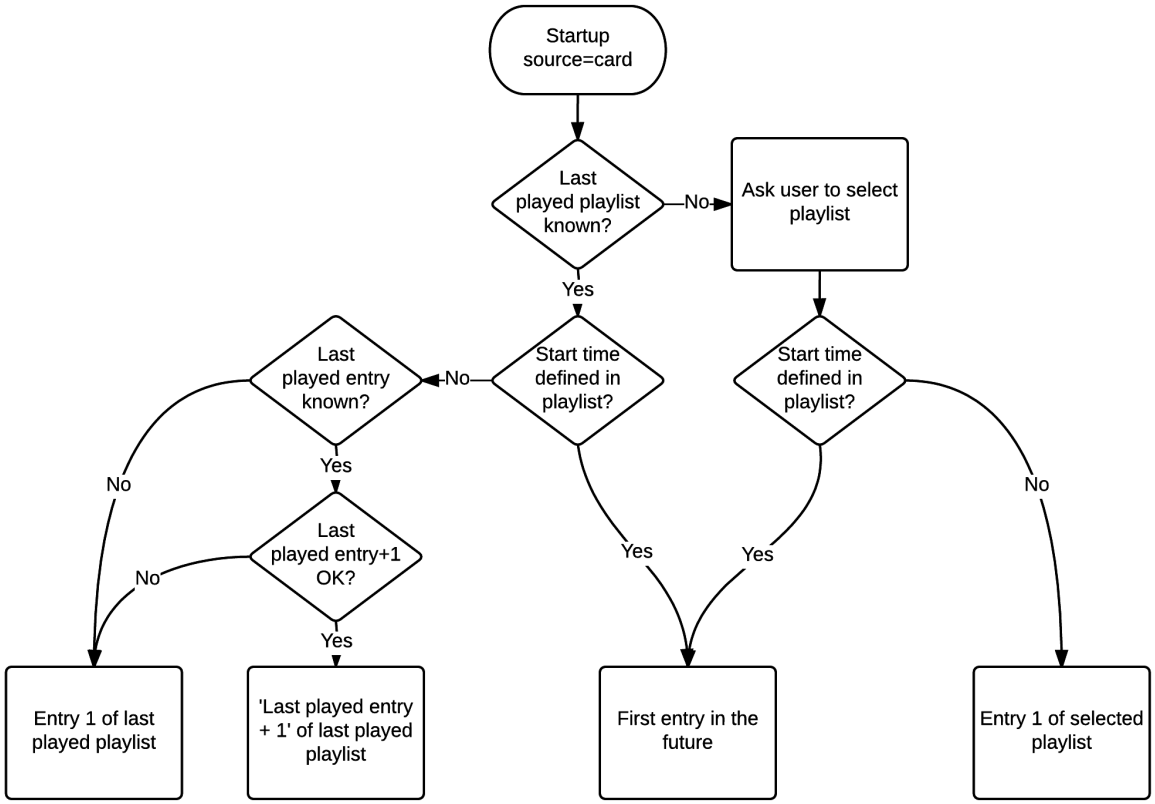
There may be many playlists on the card each with a number of entries. When the device has to play from card it needs to know where to start. It need to know which playlist it should start playing and from which entry.

The Lisa will continue with the playlist it was last playing. We call this the Last Played Playlist. If this playlist contains a start time, the Lisa will determine and start with playing the first entry that is 'in the future', based on the current time on the Lisa. If there is no valid start time in the Last Played Playlist, the entry that was last played is considered.

If the Last Played Entry is known, Last Played Entry + 1 (when available) is used as starting point for playing, avoiding repetition of the Last Played Entry. In the rare case that the Last Played Entry is unknown, the Lisa will start to play the Last Played Playlist from the first entry.

When the Last Played Playlist is not known, typically when the card was removed/inserted, the user will be asked to choose from the available playlists. The selected playlist is inspected for a start time and playback will start from the first entry 'in the future'. If no start time is present in the selected playlist, the Lisa will start to play the selected playlist from the first entry.

The whole process is depicted in the figure below:



If random playback is enabled

The Lisa will start with a random entry from the Last Played Playlist. If Last Played Playlist is not known, the Lisa will start with a random entry from 1.pls.

7.6.2 Play playlist following task or command

When the Lisa is instructed to play a playlist by a task in the task schedule or by a command using e.g., LCT, a series of checks and actions are executed to determine which playlist and playlist entry should be played. This is outlined in the flow diagram below and explained in detail in the accompanying text.

To review the play playlist task and command, see Schedule tasks and Command overview list, respectively.

Playlist available?

The first question is whether the requested playlist is available. The play playlist command has a mandatory parameter that indicates which playlist should be started.

Further action depends on whether the requested playlist is available:

- If not: The question is, if a task is being executed
- If yes: The question is, if the playlist is updated

These questions are explained below.

Executing task?

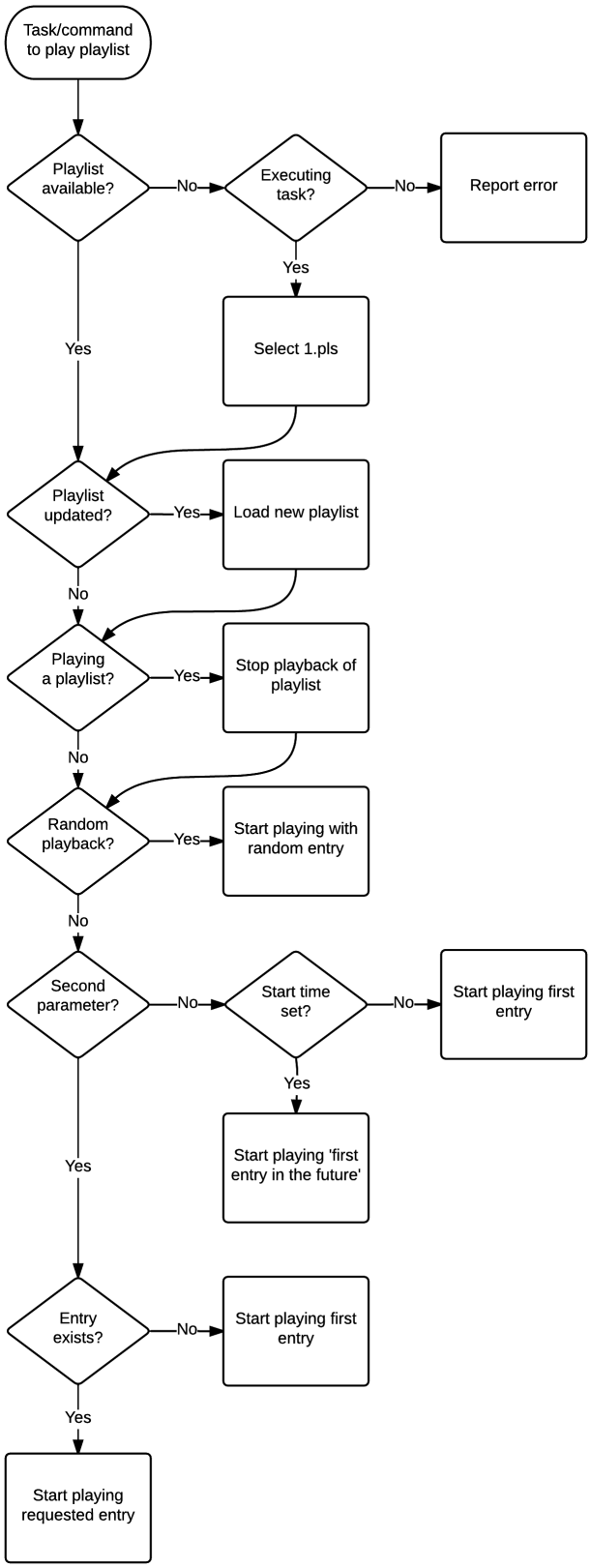
If the requested playlist is not available, the Lisa verifies if the request to play a playlist comes from a task (see Task scheduling) or from a command (see Controlling the Lisa with commands) that is sent directly to the Lisa (e.g., using LCT).

If the action to play a playlist was triggered by a command that is sent to the Lisa directly, an error is reported and no further action is taken.

If the action to play a playlist is triggered by a task from the task schedule that the Lisa is executing, playlist '1.pls' is selected instead of the requested playlist that is not available. If a specific entry was requested using the second parameter for the task, this will be ignored.

Playlist updated?

Because it is possible to do content update in the background, it is checked whether the playlist has been updated since the last time it was used. If so, it is reloaded so that the updated playlist is used.



Playing a playlist?

In case the Lisa is already playing a playlist, this playback is stopped. This happens even if the Lisa currently already plays the playlist that is requested. This makes it possible to restart playing a playlist, from the same or a different point.

Random playback?

The playback of playlists can be done sequentially or randomized. If random playback is enabled, the playback of the playlist starts with a random entry of that playlist.

Note: The playlist may be the requested playlist, or '1.pls' if the selected playlist is not available.

If a specific entry was requested by a second parameter in the task or command, this parameter is ignored if random playback is enabled.

Second parameter?

A specific entry may be requested by providing a second parameter in the task or command. If this parameter is not given, playback starts with the first entry of the playlist (because random playback is not enabled when the flow reaches this point).

Note: The playlist may be the requested playlist, or '1.pls' if the selected playlist is not available.

If a specific entry was requested by a second parameter in the task or command, this parameter is ignored if the requested playlist was not available and '1.pls' was selected instead as fallback.

If a specific entry was requested and the second parameter is not ignored as indicated above, the question is, if the requested entry exists, see below.

Entry exists?

If a specific entry was requested by a second parameter in the task or command, it is checked whether the playlist contains the requested entry. If so, playback starts with the requested entry.

If the requested entry is not available, playback starts from the first entry of the playlist.

Start time set?

A playlist may contain a start time field. This indicates the time that the playlist should be started. At the moment the playback of the playlist actually starts, the Lisa uses (and trusts) the track length information in the playlist to determine the first entry for which the start time lies in the future (compared to the time on the Lisa).

If there is no start time field in the playlist, playback starts from the first entry of the playlist.

7.7 Background: Streamit custom SD cards

The SD card is the key component in using Store-and-Forward and Fallback to card on Streamit's audio devices. Streamit always puts a lot of effort in making sure the hardware and software follows the SD specifications. However, there are numerous manufactures each with their own implementation. These implementations are also continuously updated and Streamit has no influence on that.

In general, SD cards are consumer devices and the manufacturer is constantly under high price pressure. To cut production costs the manufacturers look at cheaper components. These newer cards are built with cheaper electronics, but get sold under the same product name, making it impossible for the end user to identify.

For example, Transcend started using cheaper flash memory (TLC) to reduce costs. This type of flash memory has a lower endurance limit than the previously used MLC memory. TLC is a good fit for low-end basic products, but is not recommended for important applications which require frequent updating of data.

So, although generally available SD cards might very well be acceptable for some basic consumer electronics, certainly not all of them are acceptable for professional applications. Testing and certifying all these SD cards would be an impossible task for Streamit. Instead Streamit contacted Transcend, the manufacturer of the best-performing SD card at the time. Transcend agreed to custom-supply Streamit with strictly-specified cards for professional applications.

! Streamit will only officially support the use of these custom-supplied Transcend SD cards. Other cards may always be used at own risk. Streamit will not offer free support for other memory cards.

8 Fallback to card

An important card-related feature of the Lisa is the fallback in case of network or streaming failure. When you use the Lisa to play audio from the internet, you rely on a stable internet connection. A problem with the stream provider, the Internet Service Provider (ISP), a problem in the IP network (failure of modem/switch etc.), all of these can cause problems with the audio playback from internet.

'Fallback to card' makes the Lisa switch automatically and start playing from the card if there are problems with the network connection or with the stream that is being played. More specifically, when the Lisa receives no audio stream data, it will fade out, switch to the card and start playing tracks from the card.

While playing form the card in fallback, the Lisa continually checks if the stream is available again. If so, the track that is currently played will be finished, fading the audio out towards the end of the track. Then the Lisa switches back to the stream (which it has been buffering in the mean time) and fade back in to the stream audio.

! It may take some time before the Lisa switches back to the stream when the internet connection is restored, because the Lisa finishes the track it is playing before returning to the stream

See also Verify if the Lisa plays from the SD card in fallback mode to learn how this scenario can be recognized.

For more information about the audio buffer size and the time that the Lisa can keep playing in case of a network issue, see The audio buffer.

! Note that for proper operation of the fallback to card, the preset URL must point directly to an audio stream. If the preset URL actually points to a playlist that contains several audio stream URLs, the Lisa will try the next URL in the playlist in case of problems with the stream. However, if the internet connection itself is failing, this will not help.

For a detailed description of the flow that the Lisa follows in case of network or streaming failure, the selection of tracks that are played during fallback and in which order these are played, see Fallback in case of stream failure.

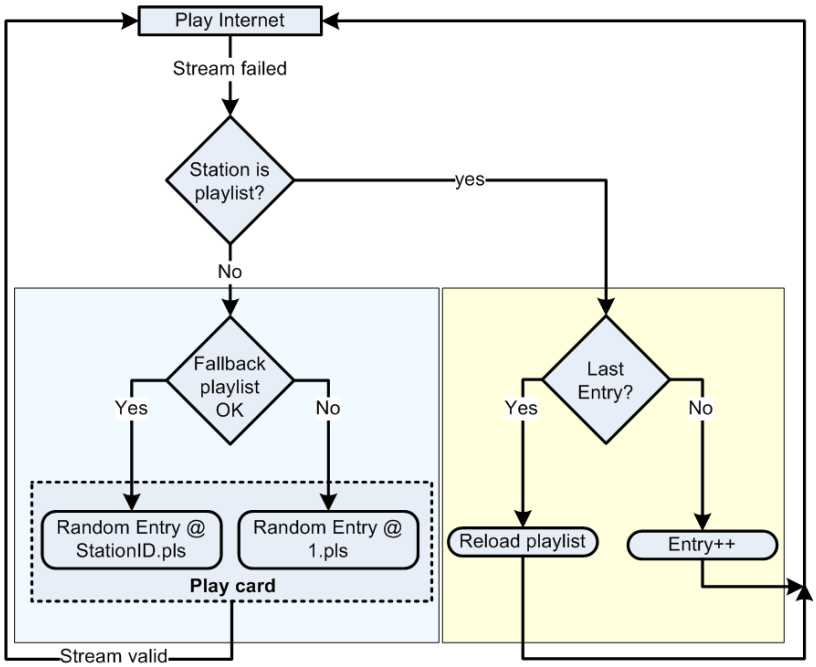
8.1 Fallback in case of stream failure

When the playback of audio from the internet fails, the Lisa will fallback to the card (see Fallback to card for more information on this feature). This section details which tracks are selected (or rather: which playlist) and the order in which the tracks are played.

Consider you have a Lisa device with preset 1 being a Pop station while preset 2 being a Lounge station. Should the device fallback to card, you would normally want that the same genre of music starts playing from card. The Lisa does not have genre information, so this is arranged differently. For fallback to card, there is a coupling between the list of stations and fallback playlists. It allows you to couple a matching fallback playlist to each station. It works as follows:

- Playlist one (1.pls) is the fallback playlist for preset 1.
- Playlist two (2.pls) is the fallback playlist for preset 2 and so on.

This fallback implementation for both playlist presets and fallback to card is depicted in the figure below.



Suppose the Lisa was playing preset 2, an internet audio stream (say dance music, not a playlist). When the internet connection is experiencing problems the device will enter the fallback mode. Preset 2 was the last preset that was being played before entering fallback, hence the name Last Played Station (LPS).

As a first step, the Lisa will check if the matching fallback playlist (2.pls) is valid on the card.

Especially for bad connection the device can enter fallback many times per day. You also want to make sure that not the same entries are being played over and over again when in fallback. The Lisa solves this issue by playing the fallback playlist starting with a random entry.

If the fallback playlist (the playlist with the ID same as the LPS, in our case 2.pls) is not OK is not valid on the card, the Lisa will start to play as default playlist 1.pls at random.

! Note that for proper operation of the fallback to card, the preset URL must point directly to an audio stream. If the preset URL actually points to a playlist that contains several audio stream URLs, the Lisa will try the next URL in the playlist in case of problems with the stream. However, if the internet connection itself is failing, this will not help.

8.2 Set up the Lisa for fallback

This section describes in detail a minimal setup to make the Lisa fallback and play from the SD card in case of network or streaming failure. It is assumed that the Lisa has a preset 1 configured to play an audio stream.

! Note that for proper operation of the fallback to card, the preset URL must point directly to an audio stream. If the preset URL actually points to a playlist that contains several audio stream URLs, the Lisa will try the next URL in the playlist in case of problems with the stream. However, if the internet connection itself is failing, this will not help.

Take the following steps to set up the Lisa for fallback:

- Create a playlist with the name '1.pls' (without the quotes), according to the Requirements for playlists on the card. For testing purposes, it is recommended to use the Streamit Card and Scheduler Toolkit to create the playlist.
- Copy the playlist and the tracks that it uses onto the SD Card, according to the Requirements for audio tracks on the card.
- Insert the SD card into the Lisa
- Power cycle the Lisa (power off, power on)

8.3 Test the fallback setup

Testing the fallback setup is straightforward and is done as follows:

- Make the Lisa play an audio stream from internet

! Note that for proper operation of the fallback to card, the preset URL must point directly to an audio stream. If the preset URL actually points to a playlist that contains several audio stream URLs, the Lisa will try the next URL in the playlist in case of problems with the stream. However, if the internet connection itself is failing, this will not help.

- Remove the network cable from the Lisa
- Wait 1-2 minutes and verify that the Lisa plays from the card in fallback mode (see Verify if the Lisa plays from the SD card in fallback mode). Fallback may start sooner, but depending on the bit rate of the stream that was playing, the audio buffer may last longer and actual start of fallback may take time (see The audio buffer for details).

! It may take some time before the Lisa switches back to the stream when the internet connection is restored, because the Lisa finishes the track it is playing before returning to the stream

8.4 Verify if the Lisa plays from the SD card in fallback mode

You can verify that the Lisa plays from the SD card in fallback mode by the following:

- After fading out, the Lisa starts playing again, even though the network cable is removed
- The 'Audio' LED lights up orange (see LED status information)
- If monitoring the Lisa on the platform is enabled, '(FB)' is shown in front of the playlist and track number information.

8.5 Troubleshooting fallback to card

For troubleshooting, use the following checklist:

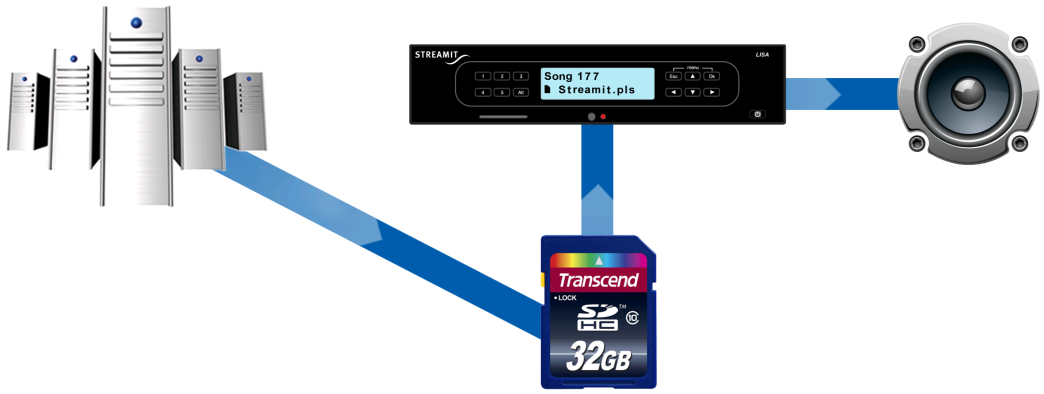
- The internet stream is not the URL of a playlist
- A Streamit-supplied SD card is used (see Supported cards)
- The playlist on the SD card is in the correct format (see Requirements for playlists on the card)
- The tracks included in the playlist are on the SD card
- The SD card is mounted properly by the Lisa. Use the Lisa Configuration Tool to check if the card was mounted, look for "Info MM: Card mounted".
- The playlist is found by the Lisa. Use the Lisa Configuration Tool to check if the playlist was found, look for "Debug MM: Found 1.pls".

9 Store-and-Forward

Streaming requires a stable internet connection. This may not be available.

Store-and-Forward is a way of working with the Lisa that downloads the playlists and music tracks during the night (or some other convenient moment), so that the playlists can be played at a later moment, even if the internet connection is unstable, limited, or not available at all.

The following image shows the general idea:



Using the Lisa with Store-and-Forward requires a platform that supports Store-and-Forward for the Lisa. The documentation is of course platform-specific and beyond the scope of this manual. There are several options for a platform that supports Store-and-Forward for the Lisa:

- Set up your own Simple Store-and-Forward Server
- Use Streamit ADP, the ADP - User Manual includes a step-by-step 'How to' for Store-and-Forward
- Use your own custom-built platform

9.1 Configuring the Lisa for Store-and-Forward

To use the Lisa with Store-and-Forward, the following is required:

- The Lisa needs to run an up-to-date software edition that supports the use of the SD card
- A supported SD card needs to be placed in the Lisa
- The content update URL must be set as part of the configuration
- An appropriate task schedule for store-and-forward must be loaded on the Lisa (see Example Store-and-Forward task schedule and Task scheduling)
  - A task to update the content on the card
  - A task to start playing from card

- A task to update the schedule itself

9.2 Example Store-and-Forward task schedule

The following task schedule gives an idea of how Store-and-Forward can be implemented with the Task Scheduler. Note that this is a rather basic example. In practice the task schedule probably contains more sophisticated planning of playlists over time. More information on the Task Scheduler can be found in Task scheduling.

Store-and-Forward schedule

Add new task | Rename schedule | Remove schedule | Back to overview

Task	Parameter	Start date	Start time	Repetition
Update schedule		Sun 1 Nov 2015	21:00	Daily
Update content		Sun 1 Nov 2015	23:00	Daily
Play playlist	1	Mon 2 Nov 2015	9:00	Daily

On Sunday Nov 1st 2015 at 21:00 in the evening, the Lisa updates its schedule.

This task is repeated daily, to update the schedule daily.

On Sunday Nov 1st 2015 at 23:00 in the evening, the Lisa performs a "Content update" task. The content update file is downloaded and processed (see Updating the content on the card).

This task is repeated daily, to be able to update the contents on the card daily.

On Monday Nov 2nd at 09:00 (shop opening time) the Lisa starts playing playlist 1.pls. This playlist will be played every day, as the task is daily repeating.

10 Commercials and Announcements

The support for Commercials and Announcements on the Lisa can be summarized as follows: Commercials and announcements can be specified that will be played at indicated times 'interrupting' the playlist in the manner that is appropriate for the commercial or announcement:

- A commercial is a track that is played between two music tracks at the indicated time or as soon after that time as the currently playing track finishes.
- An announcement is a track that is played at the indicated time, stopping the playback of the currently playing track.

10.1 Working conditions

Commercials and announcements are played under certain conditions, as outlined below.

Commercials

Playing commercials only works when the Lisa plays from the SD card (not in fallback mode). The Lisa finishes reading the file that is currently being read into the playout buffer, and then starts the reading the commercial file. When the end of the commercial file is reached, the Lisa will continue with the rest of the playlist.

If the Lisa is off, or performing an update (up, uo) or cleanup (cc, ep, ec), the commercial is not played and rescheduled (see Handling task execution failure). Ongoing tasks are not interrupted.

Announcements

Playing of announcements is given more priority than playing commercials. This results in the following rules:

- If the Lisa is playing, all audio data already in the buffer is cleared and the announcement file starts buffering. Playing starts shortly after. This introduces a delay (silence) of 3-4 seconds. Depending on the prior situation, the Lisa reconnects to the stream (playing stream, fallback mode) or continues with the rest of the playlist (playing from the SD card).
- If the Lisa is off, or performing an update (up, uo) or cleanup (cc, ep, ec), the task is interrupted and the announcement is played. When finished playing the announcement, the Lisa will power off again.

10.2 Programming the execution of commercials

To play commercials, the Lisa needs both the commercial tracks, as well as the planning. How the Lisa receives the tracks and the planning, depends on the configuration platform. Please consult the user manual of the configuration platform for more information.

10.3 Update Commercials and Announcements

The commercials and announcements are updated as part of the content update proces. This is described in Updating the content on the card.

11 Updating content on the card

Typically, the content on the card is automatically updated using the 'Update content' task (see Command overview list).

When the Lisa executes the 'Update content' task, it will

- download the necessary information from the Content update URL,
- update the playlists
- download the audio tracks to the card that are required but not present (for fallback and Store-and-Forward)
- download the audio tracks that specified for the commercials and announcements

! The 'Update content' task will only work if the Content update URL (in the configuration of the Lisa) points to a platform that supports this, for example Streamit Audio Distribution Platform (ADP) or a custom-built platform.

11.1 The content update commands

There are several commands that trigger (parts) of the content update process. These commands and their differences are detailed in the following table. The value 'optional' means that the action is executed by the Lisa if the required information is included in the content update by the configuration platform.

	Update content (full)	Update commercials and announcements tracks	Update playlists only (no tracks)	Update only commercial plans
Command:	up	uca	uo	ucp
Update playlists	yes	optional	yes	optional
Download tracks required by playlists	yes			
Update commercial plans	yes	optional	optional	yes
Download specified commercial tracks	yes	yes		
Update keep.me file	yes	optional	optional	optional

11.2 Content update in the background

By default playback is stopped when the content update is performed. However, in certain situations it may be desirable to continue playback during the content update. The Lisa can be configured to perform the content update in the background. This can be done via a configuration platform that supports this (for example Streamit ADP), or via a command (see Command overview list).

Even the playlist that is actually being played during the content update in the background, can be updated in the background. However, the new playlist will only be used the next time that playlist starts (for example, when the playlist finishes or the Lisa restarts).

11.3 Automatic card cleanup

To prevent that the card is completely full and content update runs into problems, the card is cleaned up automatically if there is less than 5% free space on the card. This is done by automatically starting the 'Clean up SD card' task, no action from the user is required.

During the card cleanup process the device will *not* delete the following files:

- Any file that is required by a playlist on the card
- Any file that is listed in the list of files that must be kept on the SD card

All other files are deleted, regardless of their extension.

The advantage of the automatic card cleanup is that old tracks that are no longer used, are removed automatically.

12 Task scheduling

Lisa devices are autonomous until a certain degree, they support reconnects, fallback etc. However, some operations require dynamic (inter)action. For instance powering the device on/off, updating the content on the card, etc.

This is the role of the Task Scheduler. The Task Scheduler is a process running in the background which is always checking if any 'tasks' need to be performed. These time-stamped tasks are downloaded from a remote server, in the form of a schedule file.

Two things are required for the Task Scheduler:

- A schedule file, which contains a list of tasks (max. 50 tasks). This is a collection of time-stamped tasks, which the Lisa has to perform.
- The correct time 'on the clock', so that the Lisa knows when to perform the tasks.

By default the Lisa will retrieve its schedule file from the Device portal, if enabled there. The Lisa can also be programmed to retrieve the schedule from Streamit Streamit Audio Distribution Platform (ADP), or a custom-built platform. A task can be defined on the selected platform, see the manual for that platform for details. Finally, the Lisa can also read its schedule from the SD card.

The time and date of the clock of the Lisa is set by a special tasks in the schedule file (the Streamit Device portal and Streamit ADP include this task in all schedules).

Schedule update

The task schedule may require changes from time to time. Therefore, the task schedule can be updated by restarting the Lisa (during startup the schedule is updated) or by executing a schedule update task. This task can be part of the schedule itself, so that it regularly updates itself, or the schedule update task can be requested via one of the methods available to send commands to the Lisa (see Controlling the Lisa with commands).

12.1 Tasks and interruptions

The only responsibility of the Task Scheduler is to start certain tasks at the required moment in time When it is time for the next scheduled task, the Task Scheduler will in principle interrupt the on-going process and initiate the next scheduled task, no matter if the on-going process was initiated from the Task Scheduler or the user. The other way around is also true: When the device is busy with tasks initiated from the Task Scheduler, the user is able to interrupt these tasks with user actions.

As mentioned, tasks will interrupt the on-going process. There are three main exceptions to this:

- If the Lisa plays an announcement, no other task will interrupt the playback of the announcement. In some cases the other task will be rescheduled (see Handling task execution failure). A commercial will not be rescheduled. Instead, the commercial will be played immediately after the announcement and before the playback of the playlist resumes.
- If the Lisa performs a schedule update, all other tasks will be postponed until the schedule update task is completed.

- If the Lisa performs a content update in the background, the content update is not interrupted, except when the Lisa is powered off or rebooted (note that some commands do this!)

The nature of the interruption by the task on the on-going process depends on the exact combination of the task and the current state or on-going process of the Lisa. The exact effects are detailed in the following table. The first column describes the task, the second column presents the actual task commands, the remaining columns represent the current state or on-going process of the Lisa, the rows represent a task being 'fired'. The resulting action is described in the various cells.

		Playing a stream	**Playing from card**	**Executing content update** (when content update is not done in the background)
Power on	pw 1	Task is not executed	Task is not executed	Content update is stopped, Lisa is powered on
Power off	pw 0	Lisa is powered down	Lisa is powered down	Content update is stopped, Lisa is powered off
Update configuration	ud	Task is performed in the background, Lisa is rebooted	Task is performed in the background	Content update is stopped, task is executed, Lisa is powered off
Update software	uf	Check for newer software is done in the background. If there is newer software: Lisa is powered down, software is updated, Lisa is powered on.	Check for newer software is done in the background. If there is newer software: Lisa is powered down, software is updated, Lisa is powered on.	Content update is stopped, check for newer software is done, Lisa is powered off. If there is newer software: software is updated, Lisa is powered off.
Update software unconditionally	un	Lisa is powered down, software is updated, Lisa is powered on.	Lisa is powered down, software is updated, Lisa is powered on.	Content update is stopped, software is updated, Lisa is powered off.
Update schedule	us	Task is performed in the background	Task is performed in the background	Content update is stopped, task is executed, Lisa is powered off

		Playing a stream	Playing from card	Executing content update (when content update is not done in the background)
Update content	up, uo, uca, ucp	By default: Playback is stopped, task is executed, Lisa is rebooted and powered off If content update in the background is enabled: Content update is (re) started and executed in the background	By default: Playback is stopped, task is executed, Lisa is rebooted and powered off If content update in the background is enabled: Content update is (re) started and executed in the background	Content update is stopped, task is executed, Lisa is powered off
Play stream	ps	Switch to the requested stream, if that is not the current stream	By default: Switch to the requested stream If content is updated in the background, the task 'Play stream' is not executed	Content update is stopped, Lisa is powered on, playback is started
Play playlist	pp	Switch to the requested playlist	Switch to the requested playlist, if that is not the current playlist	Content update is stopped, Lisa is powered on, playback is started
Clean up card	cc, ec, ep	Lisa is rebooted, task is executed, Lisa is powered off	Lisa is rebooted, task is executed, Lisa is powered off	Content update is stopped, task is executed, Lisa is powered off
Start announcement	sa	Playback is stopped, announcement is played, playback continues	Playback is stopped, announcement is played, playback continues with the next track from the playlist	Content update is stopped, announcement is played, Lisa is powered off
Start commercial	sc	Task is not executed	Playback is stopped at the end of the current track, the commercial is played, playback continues with the next track from the playlist	Task is not executed

12.2 Multiple tasks at the same time

Tasks should not be planned for execution at the same time.

In some cases this is hard to avoid, for example with repeating commercials. Consider the following situation:

	Start	Repeat	Executes at
Commercial A	10:00	Every 15 minutes	10:00 10:15 10:30 10:45 11:00 11:15 11:30 11:45 12:00 ...
Commercial B	11:00	Every hour	11:00 12:00 ...

To address this situation, tasks that are planned for execution at the same time, will be executed consecutively. This has the following consequences:

- Commercials planned for execution at the same are all played, back-to-back
- Because tasks can interrupt each other, task execution for other cases is nearly impossible to predict and should be avoided

12.3 Handling task execution failure

Failure due to power problems

Power may fail, which is handled in the following way: If the last task was playlist update or playing a playlist, this task will be initiated again without considering the time-stamp.

Failure due to other problems

Tasks may also fail due to a failing internet connection or due to an announcement that was playing at the (intended) time of task execution. When the following tasks cannot be executed, they are rescheduled to start again after 5 minutes:

Task type	Task	Task Command
Schedule update	Update schedule	us
Content update	Update playlists Update playlists only (no tracks) Update commercials and announcement tracks Update commercial plans	up uo uca ucp

Rescheduled tasks will be canceled when another schedule task is started or when the Lisa resets.

13 Commands

The Lisa can be controlled via commands. In many situations it is not acceptable or even realistically possible to be physically near the Lisa when actions on the Lisa are required. Therefore there are several options to remotely control the Lisa. This section outlines the available options to send commands to the Lisa and includes the full list of commands that are supported.

The following options are available to send commands to the Lisa:

- Using a task in a task schedule (not all commands are supported on all platforms)
- Via the monitoring server
- Via Live Communication
- Using the Lisa Configuration Tool
- Using Telnet

13.1 Monitoring server

When the Lisa sends log messages to the monitoring server, there is a connection available for 15-30 seconds. Within this time frame it is possible to remotely control the device from the monitoring server. This is done by sending the desired commands to the device. The commands that can be used are described in Command overview list.

This feature is available on Streamit Device portal and Streamit Audio Distribution Platform.

13.2 Live Communication

With Live Communication, the Lisa makes a persistent connection to the Live Communication URL. When this connection is broken, the Lisa will try to reconnect. The connection can be used to

- change settings
- start actions
- retrieve status and diagnostic information*

This is done by sending commands to and receiving the responses from the Lisa.

*Sending self-test commands is not recommended.

Read the section on Live Communication for a detailed description.

13.3 Lisa Configuration Tool

With the Lisa Configuration Tool you can program the Lisa and send commands to control the Lisa (e.g., power on, play a stream).

To program settings and control the operation of the Lisa, the Lisa Configuration Tool sends textual commands to the Lisa. In return the Lisa will send back a textual message to indicate whether the setting was applied.

For most settings, the current setting can be read by issuing the command without the parameters. For example, to see which Telnet settings are used, the command '`telnet`' (without the quotes) can be used. When the Lisa receives the command, it returns the current value of the setting.

In Command overview list the complete list of commands is documented, including examples. A device reset may be required to apply changes in settings. The “reset” will power the Lisa Compact device back on. The Lisa needs to be powered on after a "reset", using the “pw 1” command .

See Lisa Configuration Tool for more information.

13.4 Telnet

A Telnet client is available on all (TCP/IP-enabled) computer platforms. Therefore, it makes sense to support this protocol on the Lisa as well. Because a limited set of Telnet features are supported by the Lisa, Telnet should be regarded as a command interface over port 23 for the Lisa.

When Telnet is enabled, the Lisa is constantly waits for an incoming Telnet connection. If the connection is made, the Lisa can be controlled by sending commands. The list of available commands is listed in the Command overview list.

To disconnect from the Lisa, type 'quit' (without the quotes).

Port use

Telnet on the Lisa uses port 23 (the standard port for Telnet). Since the Lisa acts as a server in this case, inbound TCP network connections on port 23 to the Lisa are required for Telnet to work. Port-forwarding is required when the Lisa must be reachable from outside the local area network.

! The Telnet feature on the Lisa is not protected by a username and/or password. Be careful when making the Lisa accessible from outside the local area network.

13.5 Command overview list

The list below presents all available commands for the Lisa. Examples of using these commands are given in Examples of sending commands, links to these examples are offered in the overview below as well.

By default the Lisa sends a response when it receives a command. In case the Lisa is required to report a setting, it will send these settings back. In case the Lisa is required to change a setting, it will respond with an “OK” when successful. When the Lisa fails to execute the command, it will send “ERROR” back.

For most settings it is required that the device is reset to apply changes to settings. The Lisa Configuration Tool always will send the <reset> command after it has program settings to the device.

For most settings, the current setting can be read by issuing the command without the parameters. For example, to see which Telnet settings are used, the command '`telnet`' (without the quotes) can be used. When the Lisa receives the command, it returns the current value of the setting.

Description	Command	Parameters and response
Activate device	ad	
Audio chip registers	vshow	
Audio chip type	vstype	
Audio source (example)	audiosource	"inet", "card"
Bass level	bass	0 to 15
Clear scheduled tasks	ct	
Clean up SD card	cc	This command should be used with care and is rarely needed, because of the Automatic card cleanup
Clean up to execute in the background, while playing	ccinbg	0 = Disable, 1 = Enable
Configuration URL (example)	isp streamit 7	URL (maximum 144 characters)
Connect to Monitoring and Control Server	rc	
Connection test	ctest	
Contents of the SD card	dir	
Content update URL	saf streamit 2	URL (maximum 144 characters)
Current stream	curchan	Stream/preset number 1-50
Delete file from SD card	fdelete	Filename Response can be: OK — File has been deleted FAILED — File could not be deleted NOFILE — File not found on the card, or card not available

Description	Command	Parameters and response	
		ERROR	Filename was missing in the command
DHCP on/off	isp streamit D	1 = DHCP, 0 = Static IP	
Downmix audio to mono	forcemono	0 = Disable, 1 = Enable	
Encryption key (onboard) integrity check	kchk		
Erase SD card	ec		
Erase playlists	ep	Playlist number 1-50 (corresponding to 1.pls...50.pls) that must be deleted together with the higher numbered playlists	
File information	finfo	Filename If the file is found, the following information is shown: Size: 123 bytes Updated: 2015-11-09 12:34 Otherwise the response can be:	
		NOFILE	File not found on the card, or card not available
		ERROR	Filename was missing in the command
File system information	chkdsk		
Heap usage	heap		
Help	help		
IP address (example)	isp streamit 9	IP address (maximum 15 characters)	
IP and provider settings	isp		
IP DNS 1	isp streamit 5	IP DNS 1 (maximum 15 characters)	
IP DNS 2	isp streamit 6	IP DNS 2 (maximum 15 characters)	

Description	Command	Parameters and response
IP gateway	isp streamit A	IP Gateway (maximum 15 characters)
IP netmask	isp streamit 8	IP Netmask (maximum 15 characters)
Keylock PIN	pin	4 digits between 1 and 5
Live Communication URL	livecom 1	URL (maximum 144 characters)
Live Communication	livecom 2	0 = disable, 1 = enable
List of scheduled tasks	stask	
Log level	loglev	0 = Debug, 1 = Info, 2 = Error
Menu language	lang	"EN","NL","DE", "FR", "ES"
Monitoring server disconnect	dc	
MSS to 1460 (use with care, TCP fragmentation is not supported)	usemss1460	0 = MSS of 536 (default), 1 = MSS of 1460
Operation mode (configuration source)	mode streamit	1 = Streamit Device Portal, 2 = Custom web resource, 3 = Fixed settings
Play announcement	sa	Filename of the announcement on the SD card (maximum 128 characters)
Play commercial	sc	Filename of the commercial on the SD card (maximum 128 characters)
Play playlist (example)	pp	*Parameter 1*: Playlist number 1-50 (corresponding to 1.pls...50.pls) *Parameter 2*: Number of the entry that the playing of the playlist should start with. See Play playlist following task or command for information on how this works exactly
Play stream	ps	Station/preset number 1-50
Player status (when playing also audio format and bitrate)	status	
Power on/off	pw	0 = off, 1 = on

Description	Command	Parameters and response
Provider name	isp streamit 1	Provider name (maximum 16 characters)
Proxy on/off (example)	proxy 1	0 = disable, 1 = enable
Proxy URL (example)	proxy 2	Proxy URL (maximum 144 characters)
Random playback	random	0 = disable, 1 = enable
Remote Monitoring and Control interval (example)	rcs 2	Monitoring message interval in minutes (maximum 32767)
Remote Monitoring and Control URL	rcs 1	URL (maximum 144 characters)
Remove all presets	channel 3	
Reset (device will power down)	reset	
Restart	restart	
Schedule and Content update URL	saf	
Schedule enable/disable	sen	0 = Disable, 1 = Enable
Schedule update URL	saf streamit 1	URL (maximum 144 characters)
SD card test	sdtest	Possible outcomes: All tests finished -> no errors — The card is available for use by the Lisa All tests finished -> there were errors — The Lisa cannot (properly) use the card
Selftest	e	
Serial number	snum	Serial number
Software update on/off	isp streamit C	1 = enable, 0 = disable
Software update URL	isp streamit B	URL (maximum 144 characters)
Stream list	channel	

Description	Command	Parameters and response
Stream name (example)	channel 1	*Parameter 1*: Channel ID (Hexadecimal 0 up to 31, corresponding the first to the last streams) *Parameter 2*: Stream name (maximum length 16 characters)
Stream url (example)	channel 2	*Parameter 1*: Channel ID (Hexadecimal 0 up to 31, corresponding the first to the last streams) *Parameter 2*: Stream URL (maximum 250 characters)
System status (internal)	systat	
Telnet enable/disable	telnet 1	0 = Disable, 1 = Enable
Telnet connection timeout	telnet 2	Timeout in minutes (maximum 255)
Thread status	threads	
Ticker on/off	tck 2	0 = Disable, 1 = Enable
Ticker URL	tck 1	URL (maximum 144 characters)
Time and date (example)	time	Time/date string
Timer usage	timers	
Title of the current entry (SD card) or stream metadata (internet)	title	
Treble level	treble	-8 to 7
Update only commercial plans	ucp	
Update commercials and announcements tracks	uca	
Update content (full)	up	
Update content in the background	udinbg	0 = Disable, 1 = Enable
Update device configuration	ud	

Description	Command	Parameters and response
Update playlists only (no tracks)	uo	
Update software	uf	
Update software unconditionally	un	
Update task schedule	us	
Volume	volume	0-31
Volume in steps of 0.5 dB	volctrl2	0-124
Volume difference audio / commercials	vdiff	0-31

13.6 Examples of sending commands

The following examples aim to clarify how the commands are used. From these examples the use of the other commands can be derived.

Get the current audio source

Command to the Lisa `audiosource`

Reply by the Lisa `audiosource = card`

Set the time

Command to the Lisa `time 21:04:00 @ 31/03/2013`

Reply by the Lisa `OK`

Read the IP and related settings

Command to the Lisa isp

Reply by the Lisa

```
current Network settings:
Provider name: Channelservice
Local IP (DHCP): 0.0.0.0
Netmask:         0.0.0.0
Gateway:         192.168.10.1
DNS1:            0.0.0.0
DNS2:            0.0.0.0
Web URL:   http://staging.devices.streamit.eu:9999/config
Remote Update: Enabled
Update URL:    http://www.streamit.eu/lisaupdate/
>
```

Play playlist from card

Play playlist 2, starting with entry 15:

Command to the Lisa `pp 2 15`

Reply by the Lisa `OK`

Set stream name

Set the name of preset 4 to 'Lounge Radio'

Command to the Lisa `channel 1 3 Lounge Radio`

Reply by the Lisa `OK`

Set stream URL

Set the URL of preset 12 to 'http://my.radioserver.com:8853/private'

Command to the Lisa `channel 2 B` http://my.radioserver.com:8853/private

Reply by the Lisa `OK`

Enable the use of a proxy server

Command to the Lisa `proxy 1 1`

Reply by the Lisa `OK`

Set proxy server URL

Command to the Lisa `proxy 2 http://123.4.56.78:8080`

Reply by the Lisa `OK`

Set monitoring interval to 15 minutes

Command to the Lisa `rcs 2 15`

Reply by the Lisa `OK`

Set configuration URL

Command to the Lisa `isp streamit 7 http://devices.streamit.eu/config`

Reply by the Lisa `OK`

13.7 Reading the current setting

For most settings, the current setting can be read by issuing the command without the parameters. For example, to see which Telnet settings are used, the command '`telnet`' (without the quotes) can be used. When the Lisa receives the command, it returns the current value of the setting.

14 Monitoring

The Lisa is much more extended than a simple internet player. It features automatic software update, playing from card, card content update, task scheduling and more. In this section the options to monitor the Lisa are described. This is a useful feature for a device with so many possibilities.

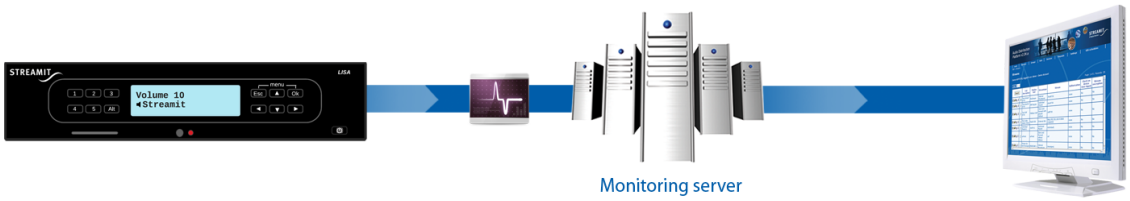
The recommended starting point is to use the remote monitoring that the Lisa sends to the monitoring server. Both Device portal and the Streamit Audio Distribution Platform support this and show the monitoring messages that the Lisa sent. This section explains this type of monitoring in detail.

If the remote monitoring is not available for you on the platform that you use, you could use the Lisa Configuration Tool (LCT) instead. If the Lisa is connected via USB to a local Windows PC, LCT can communicate with the device and show very detailed logging. This is also useful in (very rare) cases where the regular remote monitoring is not sufficient.

However, using LCT for logging is not recommended when the Lisa is new to you. If possible, you would better get familiar with the regular monitoring of the Lisa on the platform, before using LCT for monitoring.

14.1 Monitoring the Lisa on the platform

For the use of the remote monitoring feature, a monitoring server is required. This is implemented on both the Streamit Device portal and the Streamit Audio Distribution Platform (ADP). Every “in-minutes-configurable” interval, the Lisa will make a TCP (socket) connection with the monitoring server and send a textual log message. This message contains a number of tags, which the server parses and displays in an intuitive way using tables, color codes, etc. Depicted below is the current implementation on the Streamit ADP and Device portal.



There are two settings that need to be programmed, so that the Lisa knows where to send the logs and how often. This can be done on the Device portal or Streamit ADP, or manually. See the <rcs> command described in Command overview list for more details on how to manually configure the monitoring settings of the Lisa.

! Depending on the platform that is used (Device portal, Streamit ADP, or a custom-built platform), the right network ports should be open for outbound connections from the Lisa. See Ports used by Lisa devices for more information.

14.2 Example log message

Below, a screen shot of how one single log message is displayed on the Streamit Audio Distribution Platform.

Search	Device S/N	Date	Time	Version	Power	Status	PUD	Source
	AB940	2009-03-31	10:21:31	01.04.00	on	playing card	idle	card: 1.pls/song 36

Next is a screen shot of a single log message on the Device portal:

Date/time at device ▼	Application version	Power	Player status	Playlist update status	Card present	Audio source	Misc.
		- Sele	- Select -	- Select -	- Select -	- Select -	
Mon Dec 2 2013 09:43:08 CET	01.10.00	On	Playing stream	Idle	Not present	Internet: Great Eighties	str.to: 0, buf.emp: 0, str.dsc: 0, vs.eof: 0

14.3 Periodic log messages

Player status

An important part of the periodic log messages is the player status information. The player status can be one of the following:

Player status	Comment
OK	Lisa is off, or in the initial state of starting up
Connecting to stream/card	Connecting to a preset stream or busy opening a playlist from card
Buffering (iNet)	Buffering before playing a stream (playback has not yet started)
Playing stream	Playing a stream (this may be a file when the Lisa is playing mixed mode)
Fallback	Moving to playback from card, while the Lisa should be playing a stream (but fails for some reason)
Connecting to update server(s)	Busy updating configuration, software, or schedule at start up, before starting playback

Player status	Comment
Buffering (Card)	Buffering before playing from card (playback has not yet started)
Playing card	Playing a playlist from card
User abort	Lisa is powering down

Content update stages

Because the content update is important for Store-and-Forward, the status of the content update process is included in the periodic monitoring messages. The content update status can be one of the following:

Content update status	Comment
Idle	
Starting	Content update is getting started, content update info not yet downloaded
Parsing	Content update info has been downloaded and is being parsed. Busy creating/updating playlists and other update information
Syncing	Update is ongoing, playlist entries are being checked and new content is being downloaded
Stopping	Content update is being finalized

Misc. field - Stream stability information

The periodic messages have a miscellaneous information field. This contains information about the stream stability. This information is printed in the Misc column on the Streamit Device portal and the Streamit Audio Distribution Platform. The stream stability is represented by a number of counters.

When *during playback* the counters have value 0, then no streaming issues have occurred. Other values, especially high counter values, or consistent non-zero values might require your attention. The meaning of the values is explained in the following table.

timeout Number of stream timeouts (no data for 5 seconds) since the last ‘periodic’ connection

A stream timeout counter higher than zero does not necessarily mean that the end user has heard issues with the audio. The Lisa has a buffer that lasts many seconds. Many consecutive read timeouts will eventually result in an empty audio buffer and the end user will hear a silence while the device reconnects (and re-buffers), or resorts fallback.

disconnect The number of times the stream was disconnected since the last 'periodic' connection

Each time the connection with the streaming server is unexpectedly terminated, the disconnect counter will be increased. When no fallback is possible, or when the device was playing a playlist stream, the device will try to establish the connection as soon as possible and pick up the stream where it left off. When the connection is re-established before the buffer has run out of data, the end user will not notice any problems (no silence in the audio). When the device does not succeed to connect to the stream before the buffer runs out of data, the audio will stop playing.

When fallback is possible and the device is playing a direct stream (no playlist), a disconnect from the streaming server will make the device switch to fallback immediately. When this occurs, the end user will hear a silence while the device prepares to start playing from card.

buf.emp The number of times the buffer of the Lisa ran out of data since the last 'periodic' connection

When the device receives less data than it consumes, the audio buffer will run empty. When this occurs, the end user will hear a silence while the device re-buffers.

fallback The number of times the Lisa switched to fallback since the last 'periodic' connection

14.4 Event-driven log messages

Event-driven log messages

In addition to the periodic log messages, the Lisa also sends log messages when the device goes into a certain state, e.g. when the playlist update is started etc. For a large part the log message is the same as a periodic log message. However, the information on stream stability is left out and an extra message is added to describe the event or state change. Currently the following messages have been implemented.

Message	Description
<scheduled_task> task started <scheduled_task> task failed	Task scheduler triggered, or failed to trigger, execution of a task. Triggering may file because the task misses information, has wrong parameters, there is no card in the Lisa while the task requires a card, etc. Tasks that can be reported: Activate device Clean up card Comm. & Ann. update Configuration update

Message	Description
	Content update Erase card Erase playlists Play announcement Play commercial Play playlist <playlist_id> Play stream <stream_id> Playlist only update Power <power_state> Schedule update Software update Software update - forced
Brownout reset. Possible power supply failure.	System reset due to power supply voltage drop. In case it occurs repeatedly, it is recommended to exchange the power supply.
Cannot play from card - card not mounted	
Cannot play from card - no playlists available	
Cannot start content update - card not mounted	
Card command interrupted	Cc, ec or ep task was interrupted by another task or user interaction (power button)
Card cleanup failed	
Card cleanup finished - tr.proc: <nr>, tr.del: <nr>	Cleanup of the card has finished, where tr.proc represents the number of tracks that were processed and tr.del represents the number of tracks that were deleted from the card
Card cleanup started	
Card usage not activated	Use of the SD card is not supported by this edition of the Lisa
Configuration update failed	Device does not succeed to get its configurations at start-up
Connection to activation server failed	Device tries to activate, but connection fails
Content update started	Device starts the content update procedure
Could not play announcement '<filename>'	The announcement is not played, because the required file is not available on the card
Could not play commercial '<filename>'	The commercial is not played, because the required file is not available on the card

Message	Description
Erase card failed	Could not start the erase card, e.g., because there is no card present
Erase card finished	Erase card procedure has completed
Erase playlist finished - <nr> playlists remaining	<nr> represents the number of playlists remaining on the card after the task completed
Failed to execute <scheduled_task> task - card usage not allowed	A card-related task cannot be executed on a Lisa Basic edition, or the Lisa is not yet activated
Failed to play announcement. Announcement info was lost.	Error with announcement task administration
Format not supported	The audio stream is in WMA format, or the playlist consists of playlists (nested playlist)
Head task no longer available	Error with scheduler task administration
Head task failed and got lost	Error with scheduler task administration
Invalid activation code: Card usage	Invalid code was sent by activation server, or part of the activation instructions were lost because of a bad connection
Invalid activation code: Codec	Invalid code was sent by activation server, or part of the activation instructions were lost because of a bad connection
Invalid activation code: EV	Invalid code was sent by activation server, or part of the activation instructions were lost because of a bad connection
Invalid activation instructions	Invalid activation instructions were sent by the activation server or instructions were incomplete because of a bad connection
Issue encountered, Lisa restarted	The issue could not be resolved, a reboot is performed
Lisa has no presets and no card	The Lisa cannot play, because it has no presets and no card. The Lisa will periodically perform a configuration update in the background, to try and get presets
Lisa has no presets, playing from card	The Lisa plays from card, because it has no presets. The Lisa periodically performs a configuration update in the background, to try and get presets

Message	Description
Lisa powered up	Lisa is ready to start the various updates and commence playing from the selected source
Not found on update server: <filename>	The specific file was not found on the update location. Server returned HTTP error 404 when asked for the specific filename.
Playlist <id> (<size> bytes) is invalid: <reason_id> (see manual)	The indicated playlist cannot be used, the reason is one of the following: 1: Unable to open playlist file 2: Unable to re-open playlist file 3: Invalid playlist identifier 4: Playlist file empty 5: Unable to read playlist file contents 6: [playlist] tag not found 7: NumberOfEntries tag not found 8: No entries requested by the playlist could be found 9: File read error 10: Playlist contains more than the maximum number of entries 11: Number of entries is 0 or negative (possible issue with playlist generation)
Pls.ud finished - <INFO>	Content update finished. See table below for <INFO>
Pls.ud finished with error (<error code>) etc - <INFO>	Content update finished with an error. See Error codes for information on the error, see table below for <INFO>
Received activation code: Card usage	Part of the activation process
Received activation code: Codec	Part of the activation process
Received activation code: EV	Part of the activation process

Message	Description
Required codec not activated	The audio stream or playlist entry has an audio format that is not supported by this edition of the Lisa
RTC access error	Hardware issue
RTC power failure detected. Backup battery empty or missing.	It is highly recommended to exchange the battery when the issue persists.
Running task was interrupted	The running task (e.g. up) is interrupted from another scheduled task. Currently, this only applies to the playlist update. In upcoming release could apply to other tasks as well.
Schedule update failed (error <id>). Old schedule kept - <INFO>	Schedule update failed, see Table with error codes for information and table below for <INFO>
Schedule updated - <INFO>	The schedule update was completed successfully. See table below for <INFO>.
Schedule updated (!) <INFO>	Non fatal issues occurred, e.g. a task has execution time in the past, or a task is incomplete (i.e., platform did not generate the task according to requirements). See table below for <INFO>.
Scheduler thread running	Debug message that can be enabled run-time to confirm the scheduler thread is running
Scheduler extra debug message	Debug message, not in use.
Serial flash access error	Failure to read/write schedule and preset information. Hardware issue if error persists
Software update check failed	RSU enabled but device fails to connect to update server or does not get correct info file.
Software update failed	Software update is required, but the Lisa cannot complete the update. It cannot download the software file or the downloaded software file is not correct.
Trying configuration via failover resource	Failure to connect to or resolve the configuration resource. At least one failover configuration resource has been configured and the Lisa will try configuration from there.

Schedule update summary information

tsk.rcv

Number of tasks that was found in the schedule. If the message includes '+st', then one of the tasks was for time synchronization (added automatically in case of DP)

tsk.pln

Number of tasks that was planned for execution. Will be same as tsk.rcv if all of the tasks were valid and not expired.

Content update summary information

pls.found	number of playlists to update, found in the SAF file	
pls.proc	number of playlists that were processed	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
tr.chk	number of tracks (playlist entries) that were checked (whether present on the card or needed downloading)	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
tr.skip	number of tracks which were already available on the card	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
tr.dwn	number of tracks that were downloaded	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
tr.nf	number of tracks which needed downloading, but were not found on the update server	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
tr.fail	number of files which failed to download because of other reasons than not found on the server	Always 0 for *playlist only* update and the update of *only the commercials and announcements*
crd.fr	the free space on the card in kilobytes	
ca.chk	number of commercials/announcements that were found in the content update information and processed.	Only included if CAN update information was found
ca.skip	number of commercials/announcements which were already available on the card	Only included if CAN update information was found
ca.dwn	number of commercials/announcements that were downloaded	Only included if CAN update information was found

ca.nf	number of commercials/announcements which needed downloading, but were not found on the update server	Only included if CAN update information was found
ca.fail	number of commercials/announcements which failed to download because of other reasons than not found on the server	Only included if CAN update information was found

15 Live Communication

With Live Communication, the Lisa makes a persistent connection to the Live Communication URL. When this connection is broken, the Lisa will try to reconnect. The connection can be used to

- change settings
- start actions
- retrieve status and diagnostic information*

This is done by sending commands to and receiving the responses from the Lisa.

*Sending self-test commands is not recommended.

For Live Communication to work, both the Lisa and an end-user/client application need to connect to a platform that supports Live Communication. This platform can be the Streamit Live Communication Gateway.

You can also develop your own platform to handle Live Communication. See Your own custom-built platform for more information

15.1 The Streamit Live Communication Gateway

The Streamit Live Communication Gateway is a platform to which the Lisa and end-customer/client applications can connect for Live Communication.

You can build your own applications for 'live' interaction with Lisa devices anywhere in the world, using the API of the Streamit Live Communication Gateway.

To use the fully documented API of the Streamit Live Communication Gateway a subscription is required, please contact sales@streamit.eu for more information.

Streamit does not provide an end-user/client application to use Live Communication. The wide range of use cases for Live Communication and the vast number of potential target platforms (from PCs to all types and versions of smartphone operating systems) makes this impossible.

A minimum working example of an end-user/client application for the Streamit Live Communication Gateway is available for testing and reference. This simple example application is provided free of charge and 'as-is'.

15.2 Enable Live Communication on the Lisa

To use Live Communication with the Lisa, the following is needed:

- The Live Communication URL should point to a platform that supports Live Communication

- The Live Communication feature should be enabled on the Lisa (selective use of this feature can help to prevent overload on a platform)

These setting can be enabled via the configuration and via a command.

16 Volume and sound

The Lisa can play commercials and announcements at a different volume level than music tracks. For this different volume levels are defined and applied to streams, playlists, commercials and announcements.

The volume itself, as well as bass and treble can also be set.

16.1 Defined volume levels

There are two volume levels defined for the audio of the Lisa:

- Default level
- Max level

These two volume levels are defined by two settings:

- Volume
- Volume difference between audio and commercials

The volume levels are calculated from the settings as follows:

Max level = Volume

Default level = Volume - Volume difference

16.2 Volume for streams, playlists and commercials

The volume levels are applied to streams, playlists, and commercials and announcements as follows:

Stream	A stream is played at the Max level.
Playlist	When playing a playlist, each entry is played at the Default level, except when the playlist entry contains the tag that it has to be played at Max level.
Commercials and announcements	Commercials and announcements are played at the Max level. The Lisa knows that it plays a commercial or announcement, because it is a task with the command sc or sa, respectively. There is no need to have a volume parameter as part of the task.

16.3 Fading

The audio will fade out in all cases where audio playback is interrupted or stopped. This includes switching between playlists and stream presets and the start of announcements, but also when powering the device off and executing tasks which require the device to power off or reboot.

Fade in is applied when the device returns from fallback, switching back to the stream and starting to play the stream audio.

16.4 Setting the volume

To set the volume, use one of the methods to send a command to the Lisa (see the section on Commands).

16.5 Setting bass

To set the bass, use one of the methods to send a command to the Lisa (see the section on Commands).

16.6 Setting treble

To set the treble, use one of the methods to send a command to the Lisa (see the section on Commands).

16.7 Downmix audio to mono

Some audio installations only accept mono input. To avoid a stereo-to-mono converter (an additional component), the Lisa can be configured to downmix the audio. The Lisa will mix the audio data of the left and right channel together and send the (down-sampled) result to both RCA output connectors.

The Lisa can be configured to downmix by sending a command (see Command overview list).

17 Network and internet

17.1 Configure the network settings

Configuration of the network settings can be done using the Lisa Configuration Tool.

To configure the network settings of the Lisa with the Lisa Configuration Tool, use the help presented in the tool.

17.2 Using a proxy server

The Lisa supports the use of HTTP proxy servers. To make the Lisa work with an HTTP proxy server, two steps are required:

- Programming the proxy server URL into the Lisa
- Enabling the use of the proxy server on the Lisa

By separating both steps, it is possible to prepare the Lisa for a proxy server in one network (e.g. your office) and to enable the use of the proxy server when the Lisa is placed in the target network where the proxy server should be used.

17.2.1 Programming the proxy server URL into the Lisa

The proxy server URL can be programmed using the respective command (see Command overview list) using the Lisa Configuration Tool. Alternatively, the proxy server URL can be defined in the Device portal and loaded into the Lisa through a configuration update.

17.2.2 Enabling the use of the proxy server

The use of a proxy server can be enabled using the respective command (see Command overview list) via one of the methods available to send commands to the Lisa (see Commands).

17.2.3 Proxy server with authentication

The Lisa only supports basic authentication with the proxy server. For basic authentication, the username and password are added as part of the proxy URL which is programmed in the device (e.g. http://username:pass@server:port). See HTTP Basic Authentication for more information how basic authentication is supported by the Lisa.

Other authentication protocols, such as NTLM (Microsoft proprietary) are **not** supported. You can find out whether you are dealing with a server requiring NTLM authentication, by investigating the Lisa Configuration Tool logs. When the device tries to connect, the proxy server will respond with HTTP error 407. The HTTP response also contains a header indicating the type of authentication protocol used. Below, part of a HTTP proxy response, requiring NTLM:

```
HTTP/1.0 407 Proxy Authorization Required
Proxy-Authenticate: Negotiate
Proxy-Authenticate: NTLM
```

As mentioned above, Streamit devices do not support NTLM, but only basic authentication. Some proxy servers can be configured to fall back to basic authentication. Configuration options for the different proxy servers are beyond the scope of this manual.

17.2.4 Remote monitoring data via proxy server

The Lisa will use the HTTP CONNECT method for the remote monitoring when the use of a proxy server is enabled. This requests from the proxy a tunnel between the Lisa and the destination server. Some proxy servers allow such tunnels only on specific ports. You need to verify that such tunnels are allowed by the proxy server for the port that you configured for monitoring. It should be sufficient (in most cases) for the proxy server to allow secure communication on said port.

More (non-authoritative) information on HTTP tunneling can be found on http://en.wikipedia.org/wiki/HTTP_tunnel

17.3 Test network connection

When installing Lisa devices in a specific network, it is important that the device is properly configured to work in this network. The minimum requirements for this is that the IP configurations are correct. But, correct IP configurations are not always sufficient for the device to function properly. E.g. when a firewall is used, then it is required that traffic from and to the Lisa is allowed on specific ports etc.

To verify that the various connections can actually be made, the Lisa can perform a connection test. See Interpreting connection test results to understand the connection test results.

17.3.1 Performing a connection test

To make the Lisa Compact perform a connection test, send the command '`ctest`' (without the qoutes) via the Lisa Configuration Tool.

The connection test verifies six connections:

Short description	
Config server	Connection to the configuration update server. Not applicable for fixed configuration mode.
SW (=software) update server	Connection to the software update server
Schedule server	Connection to the schedule update server
PL (=playlist) update server	Connection to the playlist update server
Monitoring server	Connection to the remote monitoring server
Proxy server	Connection to the proxy server

There are four possible result values for each connection, each represented with a single letter abbreviation:

Abbreviation	Full result	Meaning
S	Success	The device supports this feature, the feature is enabled and the device can connect to the server
F	Failure	The device supports this feature, the feature is enabled but the device cannot connect to the server
E	Empty URL	The device supports this feature, the feature is enabled but the URL for the specific resource is “empty”
N	Not applicable	Either the device does not support the feature, or the feature is disabled or not applicable for the specific configurations

17.3.2 Interpreting connection test results

The following list presents suggested interpretations for common combinations of results. However, other combinations may occur and need careful interpretation/analysis.

- **Proxy server shows F (=failure)**: The Lisa is configured to use a proxy server, but cannot connect to it. That means all internet connections will fail. First check with your network administrator whether a proxy server must be used. If so, make sure the connection with the proxy server can be made and test again. See also Using a proxy server.

- **Only Proxy server shows S (=success)**: The Lisa is configured to use a proxy server, but there is an issue with the configuration of the proxy server. To resolve this issue, consult your network administrator.

- **None of the connection tests show an S (=success)**: The Lisa has no internet connection. Check the IP settings of the Lisa, take special note of the proxy server settings (see instructions above). Verify the network using a different device on the same network connection. If the settings in the Lisa are correct and the other device has a working internet connection, the router may restrict internet access to devices with a specific MAC address, consult your network administrator.

- **Only SW (=software) update server shows S (=success), all other tests show something else (F, E, or N)**: Only port 80 is available to the Lisa, all other ports are closed. Check the settings in the firewall, see Ports used by Lisa devices. If Device portal is used to manage the Lisa, replace 'Device portal on port 9999 (old platform)' in the general settings for 'Device portal' to use port 80 for all services.

- **Config server and SW (=software) update server show S (=success), but Monitoring server shows F (=failure)**: The Lisa uses port 4444 for the monitoring server, but that port is closed. Check the settings in the firewall, see Ports used by Lisa devices. If Device portal is used to manage the Lisa, replace 'Device portal on port 9999 (old platform)' in the general settings for 'Device portal' to use port 80 for all services.

- **Config server shows N (=not applicable)**: The Lisa is configured to use a fixed configuration and will not apply changes from the configuration server (e.g., Device portal or Streamit's Audio Distribution Platform)

17.4 Ports used by Lisa devices

For correct operation of the Lisa on networks with restrictions on incoming or outgoing traffic, TCP traffic needs to be allowed on specific ports. This section specifies which ports need to be open for the Lisa to function properly. Two sets of ports are discussed, both should be considered:

- Ports used for device-related activities (configuration, monitoring, etc.)
- Ports used for streaming audio

In addition, all Lisa devices will try to connect to the activation server during startup until the activation succeeds (see Device activation). Regardless of the configuration platform (if any), the device must be allowed to reach the activation server. Once activated, the device will no longer try to connect to the activation server:

activate.streamit.eu, port 80

! In all cases the Lisa initiates the connection to the outside, requiring permission for outbound TCP traffic only. Only when Telnet is used from outside the local network, an inbound TCP connection on port 23 of the Lisa should be allowed. See Telnet for more information.

17.4.1 Ports used for device-related activities (configuration, monitoring, etc.)

The Lisa performs a number of functions that require information to flow over the network, such as retrieving its configuration, its schedule, playlists, as well sending monitoring data, etc. In all cases the Lisa makes a connection to a remote location, for which the address (the URL) is configured in the device settings.

By reading the settings from the device, you can extract the ports that are used by the device for these different functions (see Extracting the port from a URL). When Streamit platforms are used, this is not required, the ports that are used are listed below.

! Note that all mentioned ports need to be open for all functions to operate properly. Only opening the configuration port will not be sufficient for, e.g., the monitoring to work.

Streamit Device portal

When the Device portal is used as provisioning platform, connections will be made with the following servers:

Function	Domain	Port
Activation	activate.streamit.eu	80
Software update	www.streamit.eu	80
Configuration update	devices.streamit.eu	80
Schedule update	devices.streamit.eu	80
Monitoring	monitoring.streamit.eu	80

! Different ports are used by Lisa devices that are registered on Device portal before February 2, 2015

For more information, see the manual that is available online on Device portal.

Streamit Audio Distribution Platform (ADP)

When the Streamit ADP is used as configuration platform, connections will be made with the following servers:

Streamit ADP (adp2.streamit.eu)

- Port 80 - for configuration update, schedule update and content update (download of content update file)
- Port 8099 - for monitoring

- Port 87xy - for streaming from the ADP. For the actual port number please have a look at your account details, or as an admin view the 'client' details of the customer in question to find out what port the distribution server is configured to operate.

Streamit webserver (streamit.eu)

- Port 80 – for software update, used as default software update resource

Streamit Live Communication Gateway

For more information on the domain and port used for the Streamit Live Communication Gateway, see the corresponding documentation.

17.4.2 Ports used for streaming and Store-and-Forward audio

For streaming audio, in principle any port can be used. While most streams from distribution servers (e.g. radio stations) use port 8000 (or a range close to 8000) for audio, this is not standard. When the Lisa may play any stream from any source, all URLs of all presets need to be reviewed to identify which ports need to be open (Extracting the port from a URL).

Streamit ADP uses ports in the 87xy range for audio streaming and serving tracks for <%STORE-AND-FORWARD%>. For the actual port number, you have to look at your account details. If you run your own instance of ADP, log in as admin and view the 'client' details of the customer in question to find out which port is used.

17.4.3 Extracting the port from a URL

The locations where the Lisa gets its configuration, sends its monitoring data, retrieves the audio stream, etc., are specified using so-called Uniform Resource Locators or URLs. A URL consists of at least of a host name and may indicate a port. The port is easy to determine:

- If specified, the port follows the host name after the colon : character
- If not specified, the port is 80

For example:

URL	Port
123.45.6.78:8890	8890
http://streamit.eu/sirupdate/	80

17.5 Secure connections

The Lisa can make secure connections using TLS/HTTPS. Whether or not the Lisa makes a secure connection is determined only by the URL that is used, no other configuration of the Lisa is required. This works as follows: If the URL starts with `https://` or `tls://` the Lisa will set up a secure connection. Specifically:

Secure connection for	Start URL with
Configuration, Schedule, Content update, Software update	https://
Monitoring, Ticker	tls://

The Lisa will make the secure connection on the specified port. If no port is specified, port 443 will be used.

Device portal supports secure connections for all services, see the online user manual of Device portal for more information.

17.6 HTTP Basic Authentication

Out of the box, Lisa devices support basic authentication to connect to the different resources. This works as follows: Each time the device tries to connect to a particular URL, it starts by sending a non-authenticated request to the web-URL resource. When a server returns “HTTP Error 401 Unauthorized”, the device will retry again, by including the Authorization header in the HTTP request. This is completely transparent to the user.

The credentials for the authorization will be parsed from the resource URL , e.g. http://username:pass@server:port/path.

17.7 Lisa host name

The host name of the Lisa is the hardware version+serial number. For example,

18 Remote software update (RSU)

The Lisa features Remote Software Update (RSU). When the device starts up and the RSU feature has been enabled, it will first check if a new software version is available. When that is the case, the device will automatically update to the new version (certain conditions may apply, see When will Lisa device(s) update automatically).

The Remote Software Update feature can be enabled for all devices. Whether Remote Software Update is enabled, depends on the operation mode/where the device gets its configuration from. In the coming section we describe how your device(s) need to be programmed in order to make use of the RSU feature.

By default the Lisa will update its software from the Streamit update server.

18.1 Streamit Device Portal

When your device has been programmed to get its configuration from the Device portal, the RSU feature can be switched on and off in the Device portal. When this feature has been enabled, your device will automatically update to the latest version on the Streamit update server or to the version on your own update server, depending on how this is configured in the Streamit Device portal.

If for any reason you would decide to update the software of your device to a different version, please use the Lisa Configuration Tool. Note that the device will update back to the version on the provider's update server if RSU is enabled and the device resets. You can prevent this by disabling the RSU on the Device portal. Preferably this is done before loading the different software version in the Lisa.

18.2 When will Lisa device(s) update automatically

The behavior of the Remote Software Update feature depends on the software that is present in the device when the update is performed as well as on the software that is available on the server.

Under normal operation, the software in the device will be Release Software. This will only update when the software on the update server is Release Software. You will not by accident end up with Beta Software when using the Remote Software Update. However, there may be reasons to 'retract' a release and therefore the device will downgrade to an earlier version, if Release Software with a lower version number is placed on the update server.

Beta Software will only be required when Streamit staff will inform you about this. They will then also provide you the necessary information to install this.

18.3 Forcing an update to a particular version

The Lisa will never automatically update to Beta software when running Release software. In order to circumvent the automatic update rules and perform a remote software update that upgrades the Lisa from Release software to Beta software, an unconditional update task can be executed. This is described in section Command overview list.

18.4 Forcing an update when RSU is disabled

In case the Remote Software Update feature has been disabled, updates can still be performed using Lisa Configuration Tool.

18.5 Best practice

The software of the Lisa can be updated in many ways. You can use the Lisa Configuration Tool, you can enable RSU, or you could schedule a task for it. All this ways would work, but let us look at the big picture.

Although the Lisa has a rich feature set, we are still adding functionally to it. This means that the software is sometimes changed considerably and no matter how well we test before making a release, there might be cases that we miss. That is why we recommend the following:

Test phase

During the test phase you can have RSU enabled. In this case the person responsible for the device has some knowledge about the configuration of the device and can address issues that may be present in the latest release software.

Installed at the client's location

After the test phase is completed and the device is configured properly and ready to be installed at the client's location, you can disable the RSU. If later a software update is required, it can be realized in one of the following ways:

- Switch on RSU using the platform where the device retrieves its configuration
- Switch on the RSU or load the software directly into the Lisa using the Lisa Configuration Tool.

19 Protecting device and content

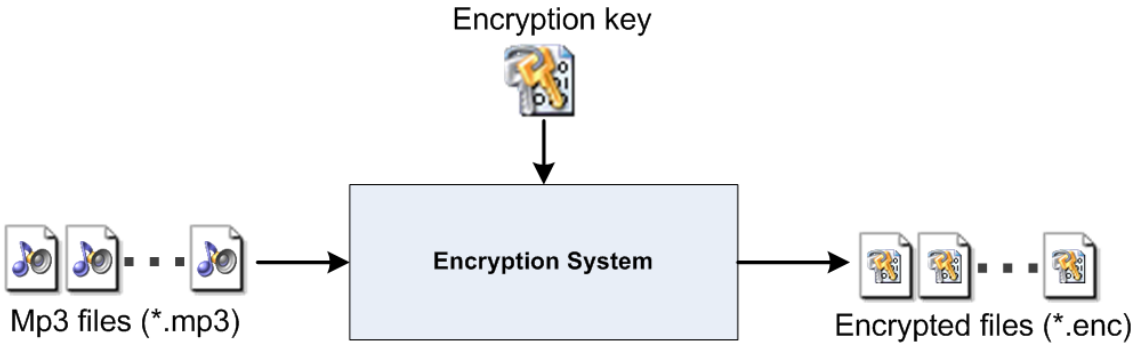
19.1 Card track encryption

When you use the Lisa as a standalone player, the audio files need to be copied on the (micro) SD memory card to be used with the device. When you copy audio files directly onto the card, anyone can copy and later play them on their own system. The problem increases when “Store and Forward” is used. For such an application it is required that files are placed on a web server and downloaded by the device.

Rather than trying to prevent copying the content, the approach to address this issue with the Lisa is to encrypt the content and make it unplayable on other devices than the Lisa.

An encryption system using Streamit’s encryption technique is depicted in the figure below. The main idea is simple; you use a “key” to encrypt your audio files. This is called the Encryption key and is randomly generated using the Streamit Card and Scheduler Toolkit. The output (encrypted) files cannot be played with conventional audio players.

The only way to play these files is with a Lisa device which contains the encryption key on-board, loaded via the Lisa Configuration Tool.



! Important:

- Although the mp3 format is used in our examples, Streamit’s encryption technique is independent of the file format.
- The encrypted filename will be the same as that of the original file, but with all lower case characters and the file extension .enc.
- Once the files have been encrypted, you must not modify the filename or extension of the encrypted files anymore.
- Encryption key(s) are generated using the Streamit Card and Scheduler Toolkit.
- The encryption key is loaded to the Lisa device using the Lisa Configuration Tool.

19.1.1 Generating an encryption key

The Streamit Card and Scheduler Toolkit is used to generate the encryption key(s). The full version of the Streamit Card and Scheduler Toolkit is required to encrypt tracks, the free version does not offer that functionality. Ask your sales contact at Streamit for details of the SCS Toolkit.

! Some documentation or software may refer to the 'decryption key'. This is exactly the same key as the encryption key.

To generate an encryption key you choose the option 'Generate (CARD) Encryption/Decryption key' from the File menu. A dialog window opens, allowing to choose the file name and location of the encryption key. We recommend that logical names are used for the keys and discourage the generation of many keys if not needed.

19.1.2 Loading the encryption key into the Lisa

To load the encryption key to Lisa devices, use the Lisa Configuration Tool and follow these steps:

- Press on the “Load decryption key” button, browse to and select the encryption key (*.bin) to load to your device.
- Press on the "Upload key" button, the upload will start.
- Upload progress is shown in the panel below the "Upload key" button
- Wait for the upload to finish.

During the upload of the encryption key, your Lisa must stay switched off. Please, wait for the key upload to finish before you switch the device on again!

20 Useful tools

20.1 Lisa Configuration Tool

The Lisa Configuration Tool (LCT) is a Windows PC software program that communicates with the Lisa over USB. It provides the following features:

- Device configuration, with easy to use templates for using the Lisa with Streamit Device portal, Streamit Audio Distribution Platform, your own platform, or standalone operation
- Software update
- Device monitoring & control

The Lisa Configuration Tool can be downloaded from the Streamit site in the download section and is available free of charge.

! The Lisa Configuration Tool needs to be installed and started at least once, before the USB cable is connected. At startup the Lisa Configuration Tool will check and install drivers if required. Only after the drivers have been installed, the Lisa can be connected to the PC using a USB A to USB Micro-B cable.

Detailed device monitoring

When a connection is available between the Lisa and the Lisa Configuration Tool (LCT), the Lisa constantly sends log messages which are displayed in the monitoring window of LCT. The LCT interface is the same for all Lisa devices. This monitoring has much greater detail than can be derived from the regular platform-based monitoring (see Monitoring).

Sending commands and reading settings

With the Lisa Configuration Tool you can program the Lisa and send commands to control the Lisa (e.g., power on, play a stream).

To program settings and control the operation of the Lisa, the Lisa Configuration Tool sends textual commands to the Lisa. In return the Lisa will send back a textual message to indicate whether the setting was applied.

For most settings, the current setting can be read by issuing the command without the parameters. For example, to see which Telnet settings are used, the command '`telnet`' (without the quotes) can be used. When the Lisa receives the command, it returns the current value of the setting.

In Command overview list the complete list of commands is documented, including examples. A device reset may be required to apply changes in settings. The “reset” will power the Lisa Compact device back on. The Lisa needs to be powered on after a "reset", using the “pw 1” command .

20.2 Streamit Card and Scheduler Toolkit

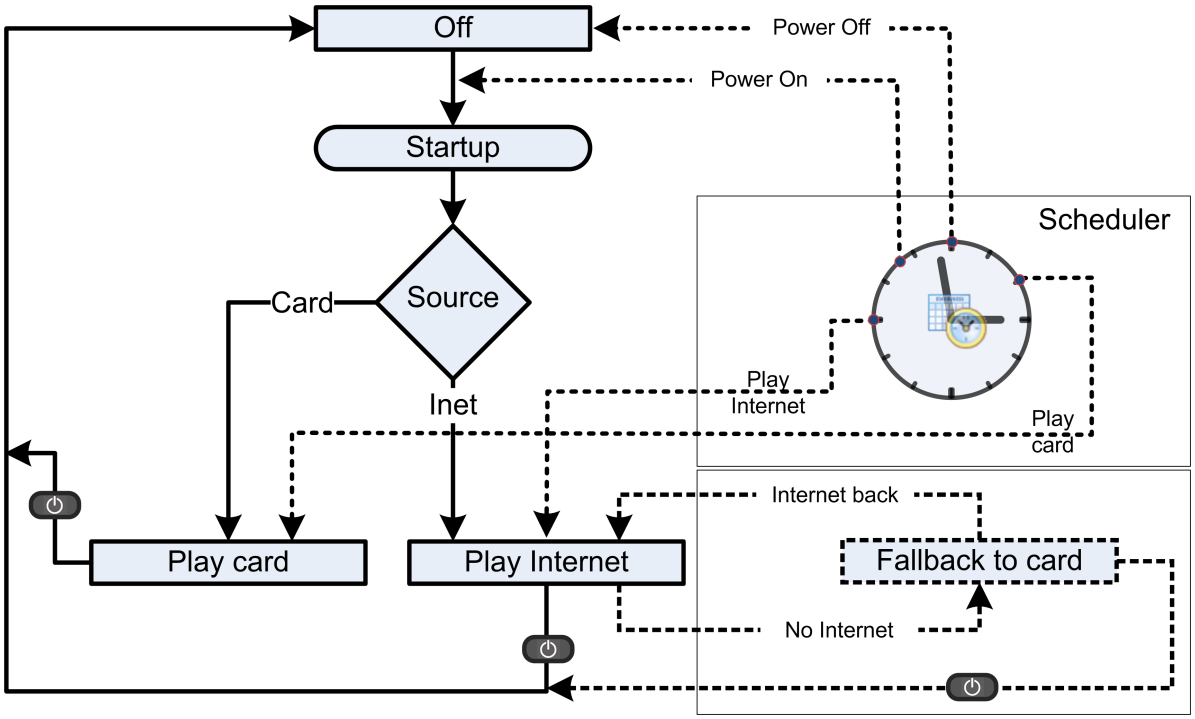
The Streamit Card & Scheduler Toolkit (SCS Toolkit) is a collection of useful tools. You can use these tools to convert audio files into encrypted files (Streamit encryption method) and for other Store and Forward and card-related operations. You can further use the SCS Toolkit to create playlists and playlist update files, to format your card and to create schedule files.

21 Background knowledge

There is a lot to know when you want to fully understand the Lisa. Some of the more important background information is included in this section for reference.

21.1 The general flow in Lisa devices

The Lisa is a compact device that can be used for streaming via internet and for playing from memory card (Store-and-Forward). For a better understanding of the flow in the device, we have depicted the high-level flow of a Lisa device in figure below.



When Remote monitoring is enabled and there is a connection to the internet or local network, the Lisa will send log messages to the monitoring server, even when the device is off.

When powered on, the Lisa first performs the startup procedure. This takes care of some initialization and update procedures. These are explained more in detail in the startup procedure. After starting up, the Lisa will carry on with one of its main functions, either streaming from internet or playing from card.

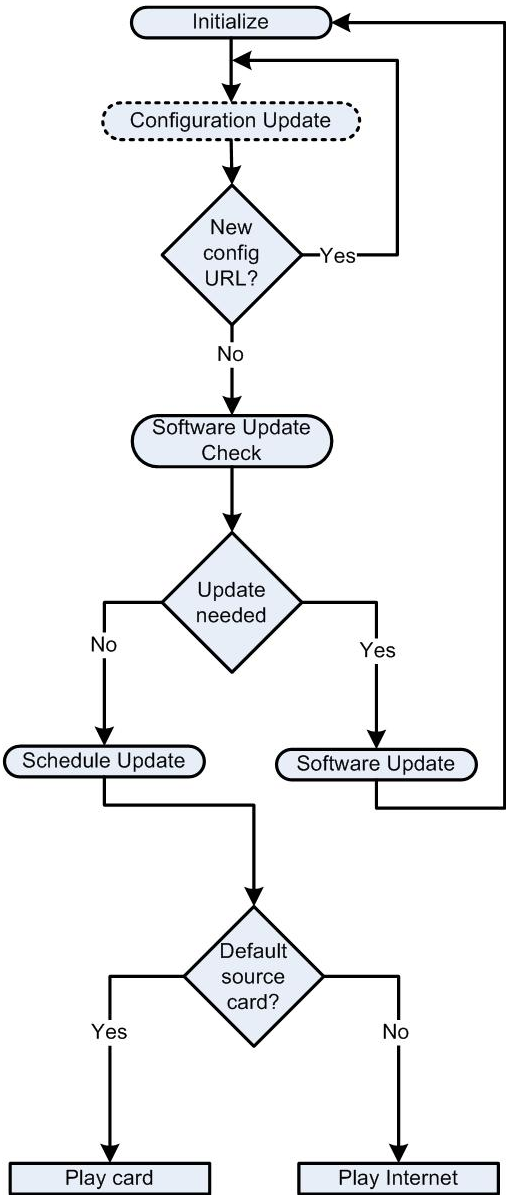
The 'Fallback to card' is a special case of playing audio from card and is explained in Fallback to card.

The Task Scheduler makes it possible to remotely instruct the Lisa to perform certain tasks, such as powering on/off, switching source etc. at given moments in time.This is covered in detail in Task scheduling.

It is also possible to control the Lisa from a remote server, by sending it commands (like those supported by Lisa Configuration Tool), over a local network or internet. This is covered in the section on Commands.

21.2 The startup procedure

Every time the Lisa device is powered up, it will perform the startup procedure, consisting of a few initialization steps. These steps are carried out automatically and in most cases no input is required from the user. The status messages on the LCD are updated according to the on-going procedure.



The first step in the startup procedure is the software initialization. As the name indicates, the software of the device is properly initialized. Everything in this step is transparent to the user.

The Lisa edition will be activated after the Lisa is connected for the first time to the public internet.

! This means that the Lisa devices always need to be connected one time to the public internet before they can be used in a private network.

If the configurations are retrieved from a platform (Streamit Audio Distribution Platform, Device portal, or a custom-built platform) the Lisa will perform a configuration update. However, this will not be done when the Lisa is not programmed to work with Fixed settings.

During the configuration update the settings of the device are updated. When a new configuration URL is found, the Lisa will perform the configuration update again, this time getting the settings from the 'new' platform.

Next, a software update check will be performed. When the feature is enabled, the Lisa will look if there is a new software version available on the update server. In case a software update is needed, the Lisa will get the new software. The conditions for software update are explained in detail in When will Lisa device(s) update automatically.

The next step in the startup procedure is the update of the task schedule. The Lisa will get the schedule file (when available) from a remote server and update the on-board schedule.

Next, the Lisa will try to retrieve from the last saved settings whether it was playing from internet or from the card, which we also call the source.

After power on, the Lisa "picks up where it left". In other words, if station 2 was playing from internet when you powered off your device, the same station starts playing the next time when you power on the device. The Lisa achieves this by saving certain settings, such as last played station, last played playlist etc.

The first time the Lisa will choose internet as the source and (try to) start playing the first preset.

21.3 Playing of playlists

The files or streams contained in the playlist are played one after another (as long as random playback is disabled):

- When a track has been played until the end, playback continues with next entry in the playlist
- When a stream stops (e.g., when the connection fails), the Lisa will try to connect to the next entry in the list

Also if an entry is not available, the Lisa will continue with the next entry and so on. When the playlist is finished, the Lisa will first reload the playlist file, after which the first entry of the new playlist is being played.

21.4 Random playback

The Lisa supports random playback of playlists. If playback of the entries in the playlist is randomized, depends on several factors:

- If the Lisa is in fallback (see Fallback in case of stream failure)
- If the setting for random playback has been enabled
- If the playlist has more or fewer than 2000 entries

How these factors result in random playback is outlined below.

Random playback when the Lisa is in fallback

Playlist has fewer than 2000 entries:	All entries are played in random order
Playlist has more than 2000 entries:	The first entry to play is selected at random, from there on the playlist is played sequentially

Random playback during normal playback of playlists

	Random playback setting:	
	enabled	disabled
Playlist has fewer than 2000 entries	All entries are played in random order	All entries are played sequentially*
Playlist has more than 2000 entries	All entries are played sequentially*	All entries are played sequentially*

*First entry to be played depends on how the playlist is started:

- Immediately after power on: Start from the last played entry
- When executing play-playlist task and when switching between playlists: Start from the first entry in the playlist

21.5 The audio buffer

For streaming applications, the Lisa has a buffer of 1.5MB. The streaming algorithm in the Lisa tries to fill the buffer to its maximum. The time it takes to fill the buffer to the maximum level, depends mainly on the streaming server configuration and the quality (data rate and reliability) of the stream.

The more data available in the buffer, the longer the Lisa can keep playing in case of a network issue (e.g. network unavailability or limited bandwidth). The time that the Lisa can survive a bad network situation, depends mainly on the buffer level when the problems starts and the quality (bit rate) of the audio stream.

The time a Lisa can keep playing audio from the buffer while the stream is not available, can be calculated as follows:

$$time\ (in\ seconds) = \frac{Buffer\ level\ (in\ kilobytes) * 8}{Audio\ quality\ (in\ kilobits\ per\ second)}$$

Example: If the buffer of the Lisa is filled completely (1.5 times 1024 kilobytes = 1536 kilobytes) and the Lisa plays a 128 kbps stream, the time the Lisa can keep playing without internet connection would be:

$$time = \frac{1536 * 8}{128} = 96\ seconds$$

21.6 Power off

The Lisa can power down and the state of the device is then best described as 'standby'. Although the playback of music stops and the display is switched off, several functions keep operating. In particular the monitoring and task scheduler keep working. So, a task to power up is both executed as well as reported through the monitoring.

21.7 Supported audio formats and streams

The Lisa devices support the following audio formats: MP3, OGG, AAC+. Please note that depending on the type of Lisa you have, not all formats are supported. All Lisa devices support MP3, see Lisa product range for more details.

21.7.1 MP3 formats

Supported bitrates for MPEG1.0

MPEG 1.0	Bitrate(kbit/s)													
Samplerate	32	48	56	64	80	96	112	128	160	192	224	256	320	384
48000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
44100 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
32000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Supported bitrates for MPEG2.0

MPEG 2.0	Bitrate(kbit/s)													
Samplerate	32	48	56	64	80	96	112	128	160	192	224	256	320	384
24000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
22050 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
16000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Supported bitrates for MPEG2.5

MPEG 2.5	Bitrate(kbit/s)													
Samplerate	32	48	56	64	80	96	112	128	160	192	224	256	320	384
12000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11025 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8000 Hz	+	+	+	+	+	+	+	+	+	+	+	+	+	+

21.7.2 OGG Vorbis formats

Only floor 1 is supported and all one- and two-channel Ogg Vorbis files should be playable.

OGG format specifications

Parameter	Min	Max	Unit
Channels		2	
Window size	64	4096	samples
Samplerate		48000	Hz
Bitrate		500	kbit/sec

21.7.3 AAC formats

MPEG2-AAC-LC-2.0.0.0 and MPEG4-AAC-LC-2.0.0.0 streams, i.e. the low complexity profile with maximum of two channels can be decoded. For streams containing more than one element and/or element type, the first one that appears in the stream is selected.

The table below shows the maximum bitrates allowed for two channels for a specific samplerate as defined by the AAC specification, while the Lisa itself does actually not have a lower limit.

! Please note that bitrates above 384 kbps are not tested. Also: 64000 Hz, 88200 Hz and 96000 Hz AAC files are played, but with wrong speed

AAC	Maximum Bitrate(kbit/s) – for 2 channels								
Samplerate	≤96	132	144	192	264	288	384	529	576
48000 Hz	+	+	+	+	+	+	+	+	+
44100 Hz	+	+	+	+	+	+	+	+	
32000 Hz	+	+	+	+	+	+	+		
24000 Hz	+	+	+	+	+	+			
22050 Hz	+	+	+	+	+				
16000 Hz	+	+	+	+					
12000 Hz	+	+	+						
11050 Hz	+	+							
8000 Hz	+								

21.8 PCI DSS compliance

The payment card industry has set out a data security standard. Compliance to this standard is required for all companies that process credit card transactions. This section answers some questions related to PCI DSS and the Lisa.

Is the Lisa PCI DSS compliant?

PCI DSS compliance is not required of and assessed for individual devices, but for the combined relevant systems, processes and policies of a company. It is therefore not possible or even meaningful to say that 'The Lisa is PCI DSS compliant'.

Does the Lisa put the PCI DSS compliance of a network at risk?

Part of the PCI DSS compliance validation is a network security scan: A non-intrusive network scan to identify vulnerabilities in operating systems, services, and devices that could be used by hackers to target the company’s private network. The question could be asked whether the Lisa puts the PCI DSS compliance of a network at risk.

Streamit does not know of network scans performed by an Approved Scanning Vendor (ASV) on networks where a Lisa device is installed. Nor has Streamit been able to find tools for testing this. Considering Streamit's large, world-wide customer base and the strict enforcement of PCI regulations, it should be safe to say with a high degree of certainty that the Lisa does not compromise the PCI DSS compliance of a network.

The question whether the Lisa puts the PCI DSS compliance of a network at risk, can also be answered from a technical point of view.

The Lisa is a client network device, initiating all connections with the outside world. The standard software in the Lisa only contains what is required for the device to perform its functions. There does not appear to be any possibility for a Lisa running standard software to compromise the security of a network.

Theoretically it would be possible for the Lisa device to be 'infected', in order to be used for malicious purposes. However, this would require:

- Expert knowledge of the Lisa architecture
- Very good knowledge of decompiling the Lisa software
- Expert knowledge in reproducing the Lisa functionality and adding malicious code to it
- Good hacking skills to install the 'infected' application to the device
- Expert hacking skills to gather data in the network and communicate that data outside of the network

This makes the Lisa an unattractive and highly improbable device to target for 'infection'. There will be more 'interesting', more common, devices in a network that are easier to attack.

How can the security impact of the Lisa on the network be minimized?

By placing the Lisa outside the local network in a well-configured DMZ, the Lisa can be denied access to the local network. In such a setup, the Lisa cannot be used to attack other devices in the local network, even in the theoretical case that the Lisa would be 'infected'.

22 Troubleshooting

In this section several tools and options for troubleshooting are described. Please consider these options before contacting support, this may save you time.

22.1 Self test

To make the Lisa Compact perform a self-test, send the self-test command '`e`' (without the qoutes) via the Lisa Configuration Tool. The self-test should return '`Selftest Ok`'. Otherwise, please save the logging and contact support.

22.2 Test network connection

When installing Lisa devices in a specific network, it is important that the device is properly configured to work in this network. The minimum requirements for this is that the IP configurations are correct. But, correct IP configurations are not always sufficient for the device to function properly. E.g. when a firewall is used, then it is required that traffic from and to the Lisa is allowed on specific ports etc.

To verify that the various connections can actually be made, the Lisa can perform a connection test. See Interpreting connection test results to understand the connection test results.

22.2.1 Performing a connection test

To make the Lisa Compact perform a connection test, send the command '`ctest`' (without the qoutes) via the Lisa Configuration Tool.

The connection test verifies six connections:

Short description	
Config server	Connection to the configuration update server. Not applicable for fixed configuration mode.
SW (=software) update server	Connection to the software update server
Schedule server	Connection to the schedule update server
PL (=playlist) update server	Connection to the playlist update server
Monitoring server	Connection to the remote monitoring server
Proxy server	Connection to the proxy server

There are four possible result values for each connection, each represented with a single letter abbreviation:

Abbreviation	Full result	Meaning
S	Success	The device supports this feature, the feature is enabled and the device can connect to the server
F	Failure	The device supports this feature, the feature is enabled but the device cannot connect to the server
E	Empty URL	The device supports this feature, the feature is enabled but the URL for the specific resource is “empty”
N	Not applicable	Either the device does not support the feature, or the feature is disabled or not applicable for the specific configurations

22.2.2 Interpreting connection test results

The following list presents suggested interpretations for common combinations of results. However, other combinations may occur and need careful interpretation/analysis.

- **Proxy server shows F (=failure)**: The Lisa is configured to use a proxy server, but cannot connect to it. That means all internet connections will fail. First check with your network administrator whether a proxy server must be used. If so, make sure the connection with the proxy server can be made and test again. See also Using a proxy server.

- **Only Proxy server shows S (=success)**: The Lisa is configured to use a proxy server, but there is an issue with the configuration of the proxy server. To resolve this issue, consult your network administrator.

- **None of the connection tests show an S (=success)**: The Lisa has no internet connection. Check the IP settings of the Lisa, take special note of the proxy server settings (see instructions above). Verify the network using a different device on the same network connection. If the settings in the Lisa are correct and the other device has a working internet connection, the router may restrict internet access to devices with a specific MAC address, consult your network administrator.

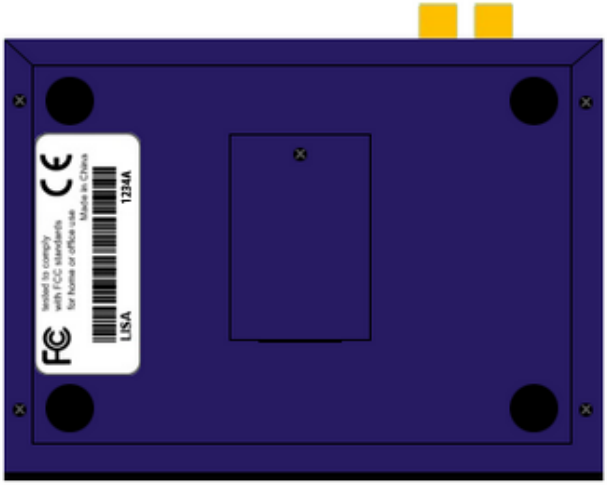
- **Only SW (=software) update server shows S (=success), all other tests show something else (F, E, or N)**: Only port 80 is available to the Lisa, all other ports are closed. Check the settings in the firewall, see Ports used by Lisa devices. If Device portal is used to manage the Lisa, replace 'Device portal on port 9999 (old platform)' in the general settings for 'Device portal' to use port 80 for all services.

- **Config server and SW (=software) update server show S (=success), but Monitoring server shows F (=failure)**: The Lisa uses port 4444 for the monitoring server, but that port is closed. Check the settings in the firewall, see Ports used by Lisa devices. If Device portal is used to manage the Lisa, replace 'Device portal on port 9999 (old platform)' in the general settings for 'Device portal' to use port 80 for all services.

- **Config server shows N (=not applicable)**: The Lisa is configured to use a fixed configuration and will not apply changes from the configuration server (e.g., Device portal or Streamit's Audio Distribution Platform)

22.3 Find the serial number

The serial number of the Lisa is printed on the sticker on the bottom of the device and on the gift box.



22.4 Forcing an update when RSU is disabled

In case the Remote Software Update feature has been disabled, updates can still be performed using Lisa Configuration Tool.

22.5 Manual device activation

The activation process for a Lisa device can be initiated from any of the available command interfaces, by issuing the respective command. At this stage Lisa Configuration Tool will most probably be used.

Command: **getlic**
Description: Start activation process

After the command is issued, the device contacts the activation server and receives the appropriate code.

22.6 Monitoring logging on the platform

If available, the remote monitoring logging on the platform (Device portal, Streamit Audio Distribution Platform, or a custom-built platform) is a great source of information on what happens with the Lisa 'in the field'. The section Remote Monitoring provides information on the conditions under which monitoring is available and how the monitoring logs should be read.

The basic principle is that the Lisa has two types of log messages:

- Periodic log messages that are status updates and that signify that the Lisa still is functioning and connected to the network

- Special log messages that are sent when an event happens, e.g., the device has updated its task schedule

22.7 Detailed logging

When a connection is available between the Lisa and the Lisa Configuration Tool (LCT), the Lisa constantly sends log messages which are displayed in the monitoring window of LCT. The LCT interface is the same for all Lisa devices. This monitoring has much greater detail than can be derived from the regular platform-based monitoring (see Monitoring).

The logging of LCT can be saved for careful review and may be required by Streamit when providing support. Please include the LCT log data in support requests when LCT log data is available.

22.8 Error codes

In the monitoring server logging and Lisa Configuration Tool logging error codes may be shown. The listings below give more information on the meaning of these codes.

! Lisa error codes depend on the software version that is loaded in the Lisa. Be sure to look carefully.

Warnings

201	New configuration update URL received, will update configuration
211	Invalid host: invalid/unreachable DNS, or no network connection
212	Could not connect to host (IP address was resolved)
213	Server responds with (HTTP) error, or response timed out
214	Redirected to another resource
215	Resource requires authentication from device
216	No data received for too long
217	Device fails to play specific audio data, or too little data available. Device will reset automatically.
218	End of stream/file reached. Server closed the connection or EOF reached.
219	Insufficient data is received for stable playback of the stream. Re-buffering will follow with audio silence during re-buffering.
220	Last played station or last played playlist is no longer valid, default will be selected.
221	Device has stopped playing because codec license is missing for specific format, or the device is not (yet) activated
222	A software update is available on the update server. Software update will be started.

223	Device tries to start a content update without having terminated the previous instance of the content update [internal error]
226	No URLs are available for streaming. Configuration is not yet completed or device could not connect to configuration resource.
227	Insufficient data is read for stable playback from the card. Re-buffering will follow with audio silence during re-buffering.
228	Invalid playlist ID requested, playlist content is invalid, or there is no audio content available for the playlist entries
230	Proxy server requires authentication from device

Errors

405	Remote software update failed to complete
406	No data read or received from configuration resource
407	Playlist inside (an online) playlist is not supported
408	Online playlist references file on the card, but card is not present
410	EOF reached for a file on the card that is referenced by online playlist
411	File that is referenced by online playlist is not found on the card
412	DNS retries have failed (device will try again, except for content update task)
413	Connection retries have failed (device will try again, except for content update task)
414	Too many redirects (device will try again, except for content update task)
415	Bad responses (or timeout) from server (device will try again, except for content update task)
416	Access to a web resource is denied by the server, e.g. because of invalid credentials
417	Requested content file not found on the card
418	Attempt to start a playlist which is already in use [internal error]
419	Maximum number of open files supported by the OS was reached [internal error]
420	Device needs to perform card related functionality (e.g., play content from card), but card is not present
421	Failure to allocate requested memory for card functionality [internal error]
422	Card present in the device, but not useable

423	Encryption key calculation result is out of bounds [internal error]
424	End of the playlist is reached, playlist will start over
425	Device is trying to start a card related task (cc, ec, ep) without having terminated a previous instance [internal error]
426	License is required to use the content on the card, but license file not available on the card
427	License is required to use the content on the card, but license file on the card is not valid
428	License is required to use the content on the card, but license file on the card has expired
429	Card content usage license administration cannot be updated due to issue with the real-time clock
430	The card usage license administration has not been updated correctly [internal error]
431	Configuration file or online playlist is too large and will not be downloaded
432	No configuration file was found on the card
433	TLS initialisation failed
434	TLS handshake failed
435	TLS device creation failed
436	TLS invalid certificate ID
437	TLS certificate update file does not contain data
438	TLS certificate update has wrong format
439	TLS certificate update has invalid size
440	TLS certificate validation failed during connect
441	TLS certificate update failed
442	Server could not find what was requested (404 Not found)

System errors

501	Player was not successfully initialised [internal error]
502	Failure to register ethernet device, indicates hardware issue with network interface
509	Failure to allocate requested memory for receiving configuration or online playlist [internal error]
513	Could not start streamer thread [internal error]

514	Failure to allocate requested memory for streamer functionality [internal error]
520	Size of downloaded software does not match the size reported in the update information file
521	Downloaded update software exceeds the maximum size supported for specific device type [internal error]
522	Software was not downloaded completely or incorrect files were available on the software update server
523	Remote software update is disabled (or size of update file on server is too small [internal error])
524	Failure to allocate required memory for software update or content update process [internal error]
525	Error accessing a card, writing to or reading from the card
526	Card required for content update, but no card was found. Content update will fail.
527	Card required for content update, but file system failed to mount the card. Content update will fail.
528	The content update information sent to the device is either empty or the content is not according to specification
529	The content update file incorrect
530	The software update information file incorrect
532	Failed to terminate the content update process in 30 seconds
533	Connection was terminated before a download to card was completed during content update
534	No more incoming data, before a download to card was completed during content update
535	Content update was terminated because of a new task executing, or user interaction (e.g. power button, or command line instructions)
537	No usable network configuration. Tasks requiring network connection (e.g. content update) will fail to execute.
538	The size of the downloaded file on the card differs from the content length reported by the server (typical for interrupted content update)
539	Failure to allocate required memory resource for setting up a network connection [internal error]
540	Failure to create a socket for the connection [internal error]
541	Failure to set socket option MSS [internal error]
542	Failure to set socket option RCVTIMEO or SNDTIMEO [internal error]
543	Failure to set socket option RXBUF [internal error]

544	Maximum number of open files supported by the OS was reached [internal error]
545	Failure to send an HTTP request
546	Device is trying to connect an empty (non-configured) resource URL
549	Could not start player thread [internal error]
551	Failure to get or set the RTC date/time. Indicates potential hardware issue.
552	Failure to read or write data to the external serial flash memory [internal error]
553	Calculated memory address is out of range [internal error]
554	Downloaded size of the new schedule differs from the content length reported by the server
555	Failure to allocate requested memory for scheduler functionality [internal error]
556	Schedule file contains incomplete tasks or expired tasks
557	The command of at least one task in the schedule is not known by the device
558	The time, date or repetition interval of a task in the schedule is incorrect, or a non-repeating task is outdated
559	The scheduler requires more time to process certain tasks, e.g. when interrupting other tasks. Waiting for completion.
560	Task cannot be executed, pre-conditions are not met (e.g. commercial is only possible when playing a playlist from card)
561	The card is required to execute a specific task, but there is no card mounted
562	Some (non-fatal) issue occurred during schedule update, e.g. expired, invalid, or incomplete task(s) are found in the schedule
563	The card is required to execute specific task, but software edition of this device does not support card functionality, or the device is not yet activated
564	v. 1.4Failure to allocate requested memory for remote monitoring functionality [internal error] v 1.6+ No schedule file was found on the card
565	v. 1.4Failed to create a connection with the remote server v. 1.6+ Failure to allocate requested memory for remote monitoring functionality [internal error]
566	Failed to disconnect from the remote server

567	Lisa (already) connected to the remote server
568	No connection allowed since the interval = 0 secs
569	v. 1.4Failure to allocate requested memory for ticker functionality [internal error] v. 1.6+ No messages can be sent to monitoring server when monitoring is disabled
570	Device (already) connected with ticker server (not likely)
571	v. 1.4Failure to allocate requested memory for activation functionality v. 1.6+ Attempt to send a remote message which is not known [internal error]
572	v. 1.4Request to activate while activation is already ongoing v. 1.6+ Failure to allocate requested memory for ticker functionality [internal error]
573	v. 1.4Activation instructions are incomplete or incorrect [internal error] v. 1.6+ Failure to send message to ticker, because previous connection is still open
574	v. 1.4 Activation instructions are incorrect v. 1.6+ Failure to allocate requested memory for activation functionality
575	v. 1.4 Tried to start a card function but no card license is present v. 1.6+ Request to activate while activation is already ongoing
576	v. 1.4 Tried to start a codec function but no codec license is present v. 1.6+ Activation instructions are incomplete or incorrect [internal error]
577	Activation instructions are incorrect
578	Could not access PHY. Indicates potential hardware issue.
579	Link not available, make sure the device is physically properly connected to the network infrastructure

581	Could not access PHY. Indicates potential hardware issue.
582	Link not available, make sure the device is physically properly connected to the network infrastructure
583	No connection can be made because network interface is not yet configured (e.g. when device is in configuration wizard)
584	Playlist entry will be skipped, because this is being downloaded at the specific moment
587	Not enough memory for certificate

23 More information

In addition to this manual, the following sources are available for your reference:

- Streamit support site with knowledge base: http://support.streamit.eu/
- Streamit site with additional manuals: https://www.streamit.eu
- The Lisa Technical Manual site for customers with a support contract for a custom-built platform

24 Support

For technical support regarding the Lisa devices, software tools or technical documentation, please contact your dealer first. In case you are a direct customer of Streamit, please visit the knowledgebase, or the support page (http://support.streamit.eu/) where you will find an option to submit support tickets.

STREAMIT

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FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

To assure continued compliance, any changes or modifications not expressly approved by the party.

Responsible for compliance could void the user's authority to operate this equipment. (Example- use only shielded interface cables when connecting to computer or peripheral devices).

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:

The equipment complies with FCC Radiation exposure limits set forth for uncontrolled enviroment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

.