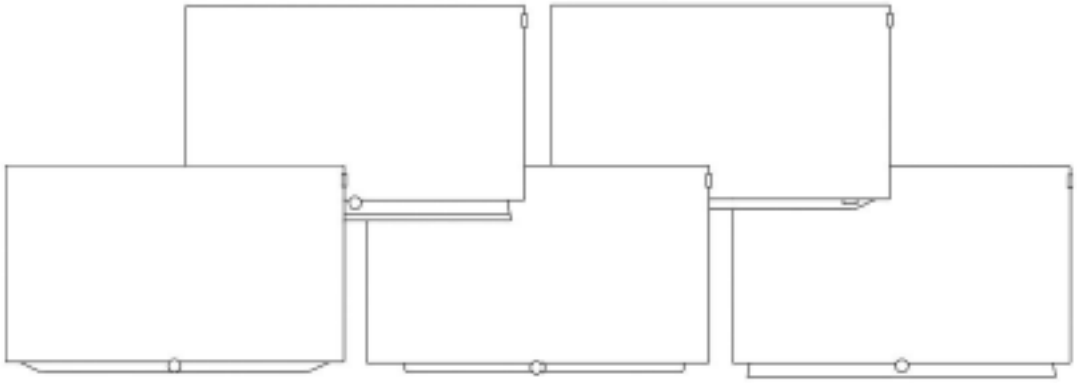
Control Interface Specification for Chassis SL3xx/SL4xx V4.1.1



Impressum

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1 Revision History

Version	Date	Name	Department	Description
0.1	2005-08-05	HG	SW TV	Initial draft (tentative, not reviewed)
0.2	2006-09-21	AB	SW TV	Results of review on July 26th 2006 added - baud rate setting via service menu - query values by '?' - add new commands
	2006-09-26	HG	SW TV	Formal changes
0.3	2007-03-16	AB	SW TV	- all supported port settings added - bass/treble changed to bass0,bass1/treble0,treble1 - software version added since a command is available - status values modified - command "frontkeys" exchanged by "keys" - Appendix 1 for IR codes added
0.4	2007-03-22	AB	SW TV	status parameter corrected
0.5	2007-04-26	AB	SW TV	- command "keys" replaced by command "config" - command "data" extended by different audio and video parameter - command "proglist" added - command "help": returns only list of available commands, no additional info for each command - IR codes for local keys added to IR table (Appendix)
0.6	2007-05-02	AB	SW TV	- commands "time" and "timer" added
0.7	2007-05-25	AB	SW TV	- AV channels for prog command: HDR and Photoviewer added - status command: substatus "uninit" added - power command: powermode "init" added - proglist command: parameter avtv and avradio added for reading additional inputs of tv and radio mode - increment and decrement for command data added (via +/-) - notification for command data added.
0.8	2007-05-20	AB	SW TV	some corrections
1.0	2007-06-06	AB	SW TV	- proglist command extended for favourite lists - data command: maxvolume added
	2007-06-11	AB	SW TV	- ir command: value of status bits for single command corrected; ir sequence for complete key press added
	2007-06-19	AB	SW TV	- data command: favourite added to get/set active favourites
1.1	2007-06-25	AB	SW TV	notify command: extended to set the format for notifications
1.1.1	2007-07-09	AB	SW TV	- Software version for command "notify format" corrected

2.0.0	2008-02-14	AB	SW TV	dynamic menus added
	2008-02-22	AB	SW TV	parameter pip and pipProg added for dynamic menu ‘message’
	2008-03-30	AB	SW TV	command proglist extended by paging and radio favourites
	2008-04-01	AB	SW TV	command timer extended to program a timer for an arbitrary point of time
	2008-08-04	AB	SW TV	some IR codes added to appendix 1
2.0.1	2009-09-03	AB	SW TV	- ir command: Status bits corrected for simulating a complete key event - prog command: HDMI3 and MusicBox added to AV channels
3.0.0	2010-06-14	AB	SW TV	Modifications for chassis SL1xx added.
3.0.1	2010-10-21	AB	SW TV	- Description of RJ12 socket added. - Settings for Microsoft Windows HyperTerminal added for testing the interface - prog command: Browser channel added
3.0.2	2011-06-22	OK	LOH	- Added new browser command
3.1.0	2011-09-20	AB	SW TV	epg command added
4.0.0	2013-08-19	AB	MW	Document updated for SL2xx
4.0.1	2014-01-13	AB	MW	Error messages for timer command updated.
	2014-01-27	AB	MW	Hint for ir command added.
	2014-02-11	AB	MW	Version info updated
SL3xx 4.0.1	2015-04-30	AB	MW	SL3xx version created (based on V4.0.1 of SL2xx) IR codes updated (Appendix 1)
4.0.2	2015-06-17	AB	MW	power command extended to switch-on the TV set with certain AV input or station number
4.0.3	2015-08-17	AB	MW	- dynamic menus added - ir command supported without status parameter for simulate as short key press
4.1.0	2015-09-17	AB	MW	status command: sub-mode “busy” added
4.1.1	2018-04-13	AB	Software Engineering	prog command: SPDIF-in not available for SL3xx/SL4xx
	2018-04-13	AB	Software Engineering	Appendix IR code: Code 72 (TV mode on) removed. Code 22 has to be used.
	2018-04-13	AB	Software Engineering	- Pin1 of RJ12 socket corrected (=Modulated RSIG-Signal) - data command: maxvolume added
	2018-04-13	AB	Software Engineering	Terminal for testing: Description for PuTTY added (Hyper Terminal removed).
	2018-04-27	AB	Software Engineering	Pronto hex codes added for RC5 code in Appendix 1

2 Open Items

3 Table of Contents

4 Revision History

Document	Description
ControlInterfaceSpecification_SL1xx_V3.1.0_20110930.pdf	Loewe Control Interface specification for chassis SL1xx.

5 General

This document defines a simple ASCII-based (but 8 bit) control interface via RS-232C.

The protocol has the following properties:

- Simple enough for to be emulated by any terminal program
- Readable command names
- Numbers transferred as ASCII strings, not as binary data
- Asymmetric at the application layer (commands vs. response / notification)
- Asymmetric at the data link layer (one-sided flow control only)
- No error protection

Possible applications are:

- Remote control of TV sets in a hotel installation
- Remote control in a home AV installation
- Remote control of public monitors
- Service (with limitations)

5.1 Differences to chassis SL1xx

- proglist command: The handling of the station list has been completely changed with chassis SL2xx/SL3xx. There are no more blocks for each front-end in one list. The station list of each front-end is stored in a separate favourite list. Additionally personal lists can be created which can contain stations with different front-ends in an arbitrary order. So the proglist command still exists, but it is used in a different way. The command is not compatible with SL1xx. See chapter 8.4.8.
- prog command: Due to the new concept of the station/favourite lists also the prog command has been extended by an optional parameter, the list-name. It is necessary to change to a station of another favourite.
  Please see also the note for AV inputs with negative station numbers in chapter 8.4.6.
- timer command: Due to the new concept of the station/favourite lists also the timer command has been extended by an optional parameter, the list-name.
  Recording to av1 is not possible.
- time command: the local time offset is defined in minutes now, in SL1xx it is defined in hours.
- “data favourite” does no longer exists. To activate a station of another favourite list you have to use the prog command now: prog [program number] [<”list name”>]
- config command: ir and frontkeys can be deactivated now also in consumer mode, not only when hotel mode is active. The ir notification has to be requested explicitly with “notify 1 ir”.
- ir command: With sl1xx most ir keys could be simulated with sending a single ir command with status value = 3 (first key press + auto repeat). In SL3xx/SL4xx it is recommended to send always two ir commands, first with status value = 3 and the second one with status value = 8 (key released). See section “Simulate a complete key event” in chapter 8.4.3.
- Dynamic menus
  The colour keys are no longer supported due to the new GUI concept of SL2xx/SL3xx/ SL4xx. But for this the function keys F1, F2, F3 and F4 have been introduced.

5.2 Differences to chassis SL2xx

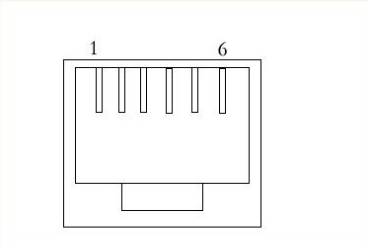
- Baudrates
  SL3xx/SL4xx does not support baudrates with 76800 and 115200 bps. The maximum baudrate is 57600 bps.

6 Requirements

The RS232 interface is supported by SL3xx chassis since version V1.1.14.

6.1 Hardware interface

The RS232 interface is available via an RJ12 socket:



Female connector on the side of TV set, viewed towards connector pins.

Pin	Signal	Signal requirements
1	IR-Link	Modulated RSIG-Signal
2	GND	Ground
3	TxD RS232	Data from TV, Standard RS232 specification
4	NC	Not connected
5	RxD RS232	Data to TV, Standard RS232 specification
6	IR from TV	VoL < 1.5V VoH > 3.5V 5V signal, internal 4K7 pull-up resistor in connected device requested. By default the signal is modulated (verified for remote control with 36 kHz carrier). If any hotel mode is active the signal is demodulated, but can be configured to demodulated (Hotel menu, menu item IR Link).

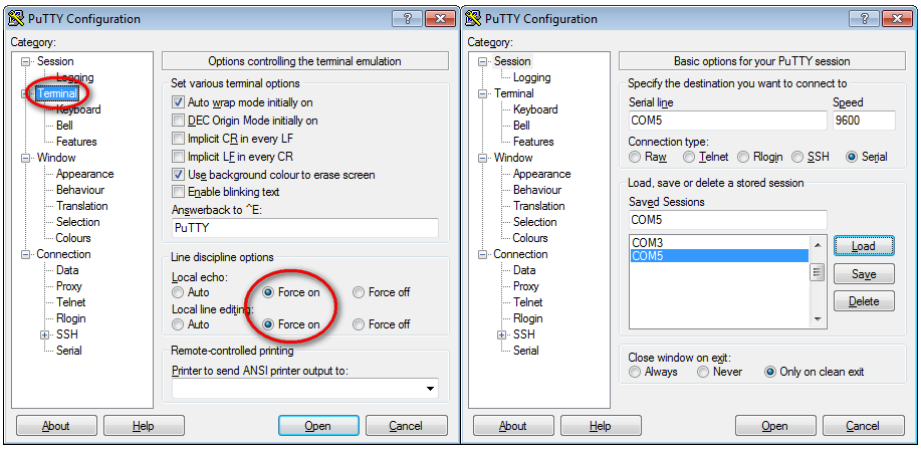
For connecting the TV set to a D-Sub 9 socket an adapter cable is available, Art.No. 70499 001.

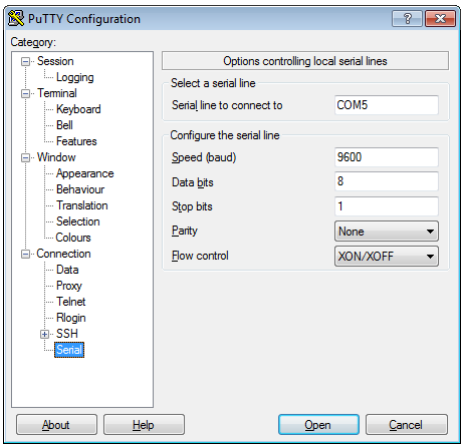
The pin mapping of a RJ12-to-D-Sub-9 adapter has to be as follows:

RJ12 Pin	D-Sub 9 pin	Signal
2	5	GND
3	2	Data from TV
5	3	Data to TV

6.2 Test via terminal program

The interface can be easily tested by using a terminal program. Here are the settings for the open source program PuTTY at 9600 baud for port COM5:





7 Protocol Format

7.1 Physical Layer

- Bidirectional communication by RS-232C lines TxD and RxD (no control lines used)
- Port settings:
  - modes:
    - 8 bit async
    - 9 bit
    - 8 bit parity
  - Parity: Even, Odd
  - Stopbits: 1 stopbit, 2 stopbit
  - Baud rates: 2400, 4800, 9600, 19200, 28800, 38400, 57600 bps
  - Default settings are: 9600 baud, 8 bit async, no parity, 1 stopbit

The port settings can be adjusted in the service menu of the TV set, menu item “RS232”, “port settings”.

This menu can also be opened by pressing the function key on the front panel (M or ↻) and simultaneously pressing key ‘7’ of the remote control.

7.2 Data Link Layer

The data link layer uses is an asymmetric, connectionless and line-oriented protocol:

The TV set will read in an entire data line of max. RCI_LINE_LENGTH_LIMIT 8 bit characters, and interprets it as soon as a line termination character has been received. Both carriage return (CR, 0x0D) and line feed (LF, 0x0A) character will be accepted as line termination characters, a line feed character following a carriage return character will be ignored.

The TV set will not mirror received characters, and the counterpart must not mirror any received characters.

The TV sends either lines terminated by a CR/LF combination, or the prompt character RCI_PROMPT_CHAR as the first character of a new line (following a LF character). The counterpart should not send (i.e. terminate by CR and/or LF) a new line before the RCI_PROMPT_CHAR has been received, but type-ahead is guaranteed for at least up to another RCI_LINE_LENGTH_LIMIT bytes.

7.3 Application Layer

The application layer transfers messages. The message types “command”, “response” and “notification” exist. This classification has no effect on the notation of the messages. It describes only the functionality of the messages sent to or received from the TV set.

7.3.1 Common Message Structure

A message consists of a message id followed by a space character, and optionally followed by a list of parameters.

The message id is a text string conforming to the pattern [A-Za-z][A-Za-z0-9_]*.

Parameters are decimal or hexadecimal numbers or text strings separated by a space. Numbers are decimal by default, hexadecimal numbers are preceded by a single ASCII quote.

Strings must be enclosed in double quotes if they contain spaces. The following control characters are supported using the backslash:

“\n”:	line feed
“\r”:	carriage return
“\t”:	tab
“\\”:	backslash
“\””:	double quote

The meaning of a parameter depends on its position in the list.

In the following required parameter are described in squared brackets ([...]). Optional parameters are enclosed by curly brackets ({...}) additionally.

7.3.2 Command

A command is sent to the TV set. It consists of one single line.

7.3.3 Response

A response is sent by the TV set immediately after receipt of a command. It may consist of one or more lines, the last line followed by the prompt character RCI_PROMPT_CHAR.

The content of the response to a valid command will be specific for that command, and has to be specified for each command. If an immediate response is not possible, only a RCI_PROMPT_CHAR will be sent for to allow subsequent commands, but the proper reply will be sent as a single notification later on. This is to be specified in each case.

On receipt of an invalid command, the ASCII “?” will be displayed (followed by CR/LF and RCI_PROMPT_CHAR as specified above).

7.3.4 Notification

Notifications will be sent by the TV set depending on specific events, provided the specific notification has been enabled by a preceding command. Notifications are terminated with CR/LF and the prompt character RCI_PROMPT_CHAR.

Since the RS232 version V1.1 the leading and/or trailing string for notifications can be defined arbitrarily. See the definition of the `notify` command.

8 Message Lists

Notes:

- All numbers in messages are ASCII, there are no binary data.
- Message texts are case-significant.
- The space character is generally used as a word separator. Strings in parameters have to be quoted if they contain spaces.
- Variable 8-bit text strings in message parameters are UTF-8 encoded unless specified otherwise. Any fixed texts are plain 7 bit ASCII.

8.1 Commands

For a detailed description of parameter values, see the additional tables/chapters under 8.4 Message Details. Parameters in curly braces are optional. The column “SL1xx Version” contains the software version of SL1xx chassis since the command is available.

Note: A command is always backward compatible when new features have been implemented with new TV software! This is valid at least for a chassis generation.

Standby and Wakeup Commands:

Due to the standby concept not all commands are supported in standby. There are two different types of commands which are supported in standby:

- Standby commands: Commands which are handled by the standby controller completely. There will be no significant delay for the response of the TV set.

- Wakeup commands: Commands which are accepted by the standby controller but which have to be handled by the main controller (e.g. for reading the program list via command proglist).
  For this the main controller is waked up (without picture and sound). After it has been booted the

command is handled. The boot up time is different for the different SL1xx chassis. Example: Chassis SL121 has a boot up time of about 7 seconds!
If there are no further commands for 5 seconds the main controller is switched off again. The different standby power states can be evaluated by the status command (see chapter 8.4.10).

The standby command type is described in the following table in the column “standby type”:
standby = Standby command
wakeup = Wakeup command
none = Command is not supported in standby at all.

Id	Parameters	Example	RS232 version	SL3xx version	standby type
browser	[command] [param]	browser 0 http://www.loewera.de	V 3.1	PV1.1.14	none
config	[ir 0/1/?] [localkeys 0/1/?]	config keys ir 0 localkeys 0	V1.0	PV1.1.14	**standby**
data	[name] [values] ... [name] [values]	data volume 17	V1.0	PV1.1.14	none
dmenu	[define/content/status/entry/undefined] … see chapter 8.4.17		V2.0	PV1.1.14	none
epg	s [station number}	epg s 1	V3.1	PV1.1.14	none
help		help	V1.0	PV1.1.14	**standby**
ident		ident	V1.0	PV1.1.14	**standby**
ir	[system] [subsystem] [command] [status] Since HL1 version V2.1.X the command is supported without status parameter to simulate a single (short) key press, but only when the TV is active, not in deep standby: [system] [subsystem] [command]	ir 0 0 1 3 ir 0 0 1	V1.0 V4.1	PV1.1.14 PV2.1.22	**standby**
msg	[message text]	msg “Hello world!”	V1.0	PV1.1.14	none
notify	[0/1] [id] ... [id] ... [0/1] [id] ... [id]	notify 1 status prog 0 ir	V1.0	PV1.1.14	**wakeup**
	format [0/1/2/3] {[string]} {[string]}	notify format 1 “\r\n!>”	V1.1	PV1.1.14	
power	[off/tv/audio/radio/photo] Optional parameter for “power tv” tv {[program number]}	power tv power tv -6	V1.0 V4.0.1	PV1.1.14 PV2.0.17	**wakeup**
prog	[program number]	prog 1001	V1.0	PV1.1.14	none
	prog number -22 = MusicBox		V2.0	PV1.1.14	
	prog number -13 = HDMI3		V2.0	PV1.1.14	

Id	Parameters	Example	RS232 version	SL3xx version	standby type
proglist	To get the available favourite lists: [tvlist/radiolist] To get the station list of a favourite: [tv/radio] [<“favourite name”>] [av]	proglist tvlist proglist tv “DVB-C” proglist radio “My Fav1”	V1.0	PV1.1.14	**wakeup**
	- paging [tv/radio/av] [<“favourite name”>] [page size] - page [first/last/next/+/prev/-] - page [page number] - page prog [program number]	- proglist paging tv “DVB-C” 10 - proglist page + - proglist page 10	V2.0	PV1.1.14	none
range	[name]	range volume	V1.0	PV1.1.14	none
status		status	V1.0	PV1.1.14	**standby**
time	[?] [yyyy-mm-dd] [hh:mm:ss] {[local time offset]}	time 2007-05-31 10:30:00 60	V1.0	PV1.1.14	none
timer	[add] [hdr] [station number] [duration] {<”list-name”>}	timer add hdr 1 90	V1.0	PV1.1.14	**wakeup**
	add [hdr] [station number] [date] [start time] [stop time] {<”list-name”>}	timer add hdr 2 2008-03-28 20:15 22:00			
version		version	V1.0	PV1.1.14	**standby**

To request a parameter value a question mark has to be inserted instead of the value. The question mark is not necessary (but valid) if the command has no parameter.

Examples:

data volume ? bass0 ? treble0 ?

data volume ?

status ?

status

Invalid:

data volume bass0 treble0

8.2 Responses

Id	Parameters	Example
data	[name] [value] {[name] [value] ....}	data volume 17
help	[list of all supported commands]	help config data ... version
ident	[type] [version]	ident SL320 V4.1.0
ir	[system] [subsystem] [command] [status]	ir 0 0 1 ,02
keys	ir [0/1] local [0/1]	keys ir 0 local 0
prog	[program number]	prog 1001

Id	Parameters	Example
proglist	List of available favourites: [tvlist/radiolist/avlist] [number of lists] [<"list name #1">] [<"list name #2">] ... CR/LF List of stations of a favourite: [tv/radio] [<"list name">] [number of programs] [program number] [program name] CR/LF [program number] [program name] CR/LF ... [program number] [program name] [av] ["<AVlist>"] [number of AV inputs] [input number] [input name] CR LF ... [input number] [input name]	proglist tvlist 3 "DVB-C" "Analog" "My Fav1" Hint: The station name is encoded in UTF-8 format.
	proglist [tv/radio/av] [<"list name">] paging count [number of programs] pages [number of pages] proglist [tv/radio] [<"list name">] [number of programs] page [page number] [program number [program name] CR/LF program number] [program name] CR/LF ... [program number] [program name]	proglist tv "DVB-C" paging count 67 pages 7 proglist tv 10 page 1 1 "Das Erste HD" 2 "ZDF HD" 3 "RTL" 4 "SAT.1" 5 "ProSieben" ...
range	[name] [lower limit] [upper limit]	range bass -12 12
status	[main] [sub] [pip] [record] the sub mode "busy" is supported since SL3xx version V2.1.22.0, RS232 version V4.1.0	status tv ttx pipoff recoff
time	[yyyy-mm-dd] [hh:mm:ss] [local time offset]	time 2007-05-31 10:30:00 -1
version	[protocol version]	version 1.2.0

8.3 Notifications

Id	Parameters	Example
ir	[system] [subsystem] [command] [status]	ir 0 0 1 3
prog	[program number]	prog 123
status	[main] [sub] [pip] [record].	status tv ttx pipoff recoff
data	[parameter name] [parameter value]	data volume 20
proglist	changed [tv/radio]	proglist changed tv
epg	[content: p/f] [station number] [start time] [stop time] „[title]" „[shortinfo]"	epg p 3 20:15 22:00 „CSI: Miami" „Episode 75"

8.4 Message Details

8.4.1 data

This message may be used to query or to set a selection of internal data, mainly user settings. A parameter value can be modified by a certain value or by incrementing or decrementing.

Format:

data [parameter name] [?/+/-/[value]] {[parameter name] [?/+/-/[value]]...}

Examples:

Query a value: `data volume ?`
Set a value: `data volume 25`
Increment a value: `data volume +`
Decrement a value: `data volume –`

Parameter name	Contents	Value Range
volume	volume value	0..99 (maximum) Hint: The user setting “maximum volume” is considered!
maxvolume	user defined upper limit for volume	10 .. 99
hpvolume	headphone volume Attention: available since SL3xx V2.2.18.0 and SL3xx/SL4xx V3.1.2.0 (and higher).	0 ..99
mute	mute on/off Increment/decrement with +/- is not supported.	0/1
bass0	bass value for custom music sound	-12 .. +12
bass1	bass value for custom movie sound	-12 .. +12
treble0	treble value for custom music sound	-12 .. +12
treble1	treble value for custom movie sound	-12 .. +12
brightness	brightness value for current video mode	0 .. 20
contrast	contrast value for current video mode	0 .. 20
color	color value for current video mode	0 ...20
sharpness	sharpness value for current video mode	1 .. 5
3Dmode	Switching on/off 3D and selecting the mode	off / auto / sbs / tb auto: automatic sbs: side by side tb: top/bottom

The permitted range of values may be queried by the corresponding `range` message.

Data values can also be activated for notification. Whenever a value of any parameter is modified a data notification for the modified parameter is sent.

8.4.2 ident

The parameter list is a sequence of readable text strings. The first string identifies the TV type, the second one the software version.

8.4.3 ir

This command allows to emulate infrared remote control commands when used as a command, or to check the infrared receiver and decoder by monitoring notifications of received infrared commands.

Via the status byte the ir receiver can be disabled. That means all commands received from the remote control are ignored for TV control, but are forwarded as ir notification (if enabled). Only the ir commands received from the control interface are handled by the TV set. So the external control device connected to the control interface decides which ir commands are relevant.
Additionally the local keys are disabled. The events are not forwarded as ir notifications!
Hint: After power off/on via main switch the keys are enabled again. To disable key permanently use the command `config`.

parameter: `[system] [subsystem] [command] {[status]}`

Since the SL3xx version V2.1.x the command is also supported without the status parameter to simulate a short key press, but only when the TV is active, not in deep-standby.

For the relevant system, subsystem and command codes see Appendix 1.

status:

bit 0: first command in sequence
bit 1: auto-repeat command
bit 2: delayed command; it defines once that a key has been pressed for more than 600 ms.
bit 3: key released
bit 4: IR receiver disabled
bit 4 – 7: don’t care (have to be zero)

To simulate a single IR command bit 0 and bit 1 has to set.

Example:

“TV on”

```
ir 0 0 22 3
```

To disable/enable the IR receiver an ir command has to be sent with bit4 = 1/0. To avoid any action by the ir command use the following ones:

disable the ir receiver: `ir 0 0 0 16`

enable the ir receiver: `ir 0 0 0 0`

Simulating a complete key event

Some OSD elements or device controller evaluates the ir status in detail for different function. Examples:

- When the play key is pressed only short the HDR playback is started, if it pressed longer a bookmark is set.
- OK key: Short press opens the small station list, long press opens the extended station list

For this the internal ir status is updated every 110 ms as long as IR signals are received from the remote control. As the processing of the RS232 command can't be guaranteed in the same way as the remote control the update of the status has to be handled by the external application.

The status sequence dependent from the time the key is pressed is described below:

Time	Status bits				Status value
	first	auto-repeat	delayed	key released	
0 ms	1	1			3
110 ms					0
220 ms					0
330 ms					0
440 ms					0
550 ms		1			2
660 ms		1	1		6
770 ms		1			2
...					
n * 110 ms		1			2
key is released				1	8

A complete key press exists at least of two `ir` commands, because the release of the key also has to be sent. All other status settings only have to be sent, when the key has been pressed for the stated time.

ATTENTION: With SL3xx/SL4xx for several keys at least two ir command (first with status value = 3, second with status value = 8) has be sent to be sure that it will be handled by the TV set (e.g. for the digit keys 0 – 9).

Example for digit key 1:

```
ir 0 0 1 3
```

```
ir 0 0 1 8
```

It is recommended always to send two commands to simulate a complete key event.

Since the SL3xx version PV2.1.x a short key press can be simulated with a single ir command without the status parameter. So you can avoid sending two commands with status = 3 and status = 8.

Example for digit key 1:

```
ir 0 0 1
```

Hint: If the ir receiver is disabled ("`ir 0 0 0 16`") and the notification for the `ir` command is activated ("`notify 1 ir`"), the exact sequence is sent via RS232 when a key of the remote control is pressed.

The ir notification can't be enabled by activating all notification ("`notifiy 1`"), it has to be activated explicitly with "notify 1 ir".

8.4.4 notify

Notifications are not sent automatically, but only on request. This message allows to enable or disable specific notifications. Only those messages listed in chapter 8.3 can be enabled.

Notifications will be sent once after enabling a notification, and whenever the information has changed.

Format:

```
notify [0/1] {[id] ... [0/1] [id]...}
```

To activate/deactivate all notifications `notify 1` / `notify 0` can be used.

Hint: The epg notification for present/following and the ir notification can't be activated with `notify 1` due to the amount of data (e.g. for epg sent with every channel change). It has to be activated explicitly with `notify 1 epg / notify 1 ir.`, but it is deactivated with `notify 0`.

Since the RS232 version V1.1 the leading and/or trailing strings for notifications can be defined arbitrarily. This might be necessary to distinguish notifications from responses when using command sequences.

```
notify format [format: 0/1/2/3] {[string1] [string2]}
```

format:

0: Standard format. Notifications are terminated by CR/LF and the prompt character.
1: Notifications are sent with a trailing string defined by string1.
2: Notifications are sent with a leading string defined by string1.
3: Notifications are sent with a leading string defined by string1 and a trailing string defined by string2.

The strings are limited by a maximum of 5 characters. The `format` parameter can't be used in combination with the parameter to enable/disable notifications.

Examples:

```
notify format 0
notify format 1 "\r\n!>"
notify format 2 "!"
notify format 3 "@" "\r\n@>"
```

8.4.5 power

This command is used to switch the tv set to certain operation states:

parameter	description
init	If the TV is in standby after first power on (via main switch) the program list is not initialized (amongst others), so it is not available with the command proglist. In this case the command "power init" can be used to start the TV without picture and sound. When the initialization is done the TV returns to standby automatically. This can be evaluated with the command status. If the TV is already initialized the command "power init" has no effect. The current state of the TV set is not changed in this case.
off	Switch tv to standby. If a record is active the TV will change to "active" mode only.

parameter	description
tv {[program number]}	Switch tv on with the last active tv channel. Available since HL1-Version V2.0.17.0 (or higher): [program number] is an optional parameter and can be used to switch-on the TV set with a certain AV input or program number (of the last active station list). Example: Switch-on the TV set with HDMI 1: power tv -6
audio	Switch tv to radio mode with inactive screen (= audio mode) reproducing sound of last radio channel.
radio	Switch tv to radio mode with active screen (=radio mode) reproducing sound of last radio channel.

For evaluating the current power mode use command “status”.

8.4.6 prog

This message may be used to query the current program number (if used without parameters), or to request a switchover to a specific program number of a certain favourite. The message will be confirmed immediately by a single RCI_PROMPT_CHAR, and a single `prog` notification containing the current program number will be sent when the program change has either been completed or rejected. For to find out whether the request has been accepted, the returned program number has to be compared with the requested program number.

Format:

```
prog [program number] {<”list-name”>}
```

If no list-name is added the TV changes to program number of the current active favourite.

Negative program numbers are reserved for AV channels. In this case no list-name has to be added.

NOTE: With an AV input also the favourite “AV list” is active. When it is active the command prog without a list name will execute a change to another input of the AV list (e.g. “prog 2” will change to HDMI2). That means: When an AV input is active you have to add the list-name always to change to a TV channel.

number	AV channel	additional information
-1	AV1	
-2	AV2	Not available in SL3xx/SL4xx
-3	AV3	Not available in SL3xx/SL4xx
-4	AVS	
-5	VGA (=PC-In)	
-6	HDMI1	
-7	HDMI2	
-8	COMP-IN-1	Not available in SL3xx/SL4xx.
-9	COMP-IN-2	Not available in SL3xx/SL4xx.
-10	Audio-In-1	
-11	Audio-In-2	Not available in SL3xx/SL4xx.

number	AV channel	additional information
-12	Audio-Digital-In (SPDIF In)	Not available in SL3xx/SL4xx.
-13	HDMI3	
-14	HDMI4	
-15 to -19	reserved	
-20	HDR playback	This number is readable only. It can't be used to start a HDR playback by sending "prog -20"!!!
-21	Photoviewer	This number is readable only. It can't be used to start the Photoviewer.
-22	Musicplayer	This number is readable only. It can't be used to start the Musicplayer.
-23	Videoplayer	This number is readable only. It can't be used to start the VideoPlayer.
-24	Mediaplayer	This number is readable only. It can't be used to start the Mediaplayer mode.
-25	Internet Brower	This number is readable only. It can't be used to start the Internet Browser.

8.4.7 progdata

not implemented.

8.4.8 proglist

This message is used to get the available favourites and the containing program/stations or the list of the AV inputs.

The program name is UTF-8 encoded. DVB channels also can contain some special character ([0xC2 0x86] / [0xC2 0x87]) to encode a short name.

[0xC2 0x86]: Begin of part of short name

[0xC2 0x86]: End of part of short name

Example:

```
[0xC2 0x86]S[0xC2 0x87]uper[0xC2 0x86] RTL[0xC2 0x87]
```

Long name: "Super RTL"

Short name: "S RTL"

To get the long name removed these special characters.

8.4.8.1 Get the available favourites

First you have to know the names of the available favourites.

Format for command:

```
proglist [tvlist/radiolist]
```

Format for response:

```
Proglist [tvlist/radiolist] [number of lists] [<"list name #1">]
[<"list name #2">] ... CR/LF
```

8.4.8.2 Get the stations of a favourite or the AV list

Via the name of the favourite you can request the list of staprogtions or the name of the AV inputs.

The program number and the program name are replied. The first parameter of the response always contains the program type information (tv/radio/av).

Format for command:

```
proglist [tv/radio] [<”list-name”>]
proglist [av]
```

Format for response:

```
proglist [tv/radio] [<”list-name”>] [number of programs] [[program number] ”[program name]” CR/LF]]...
```

Response for the AV list:

```
av ”<AVlist>” [number of AV inputs] [[input number] ”[input name]” CR LF]]...
```

The string “<AVlist>” is sent because the displayed name in the GUI depends on the selected menu language, which is not known by the middleware.

8.4.8.3 Get program list page by page

The format of the chapter before is used to get the complete station list.
But it is also possible to request single pages of a favourite. The page size can be defined arbitrarily (2 – 255 items per page). E.g. this could be necessary for external devices without enough memory to store up to 5000 channels.

For paging the page size has to be defined first:

```
proglist paging [tv/radio] [<”list name”>] [items per page]
```

The TV will response by sending the total number of programs and the total number of pages:

```
proglist [tv/radio] [<”list name”>] paging count [number of channels] pages [number of pages]
```

After this it is possible to navigate within the program list:

```
proglist page [first/last/prev(+)/next(-)/<number of page>/
               prog <program number>]
```

Get first page: `proglist page first`

Get last page: `proglist page last`

Get next page: `proglist page next` or `proglist page +`

Get previous page: `proglist page prev` or `proglist page -`

Get certain page by number: `proglist page [page number]`

The page number starts with 1 (first page) and ends with *number of pages* (last page).

Get page containing a certain program number:

`proglist page prog <program number>`

The program number needs not to be the first item of the page. It depends on the absolute position of the program number within the complete list.

The TV will send the requested page in the following format:

```
proglist [tv/radio] [<"list name">] [number of programs] page [page number] [[program number] "[program name]" CR/LF]]...
```

Paging is possible only for one list type (tv or radio) at one time. If the type is changed the paging has to be initialized with defining the page size again.

Paging is not possible for the AV inputs (av).

8.4.8.4 proglist notification

If the notification for proglist is activated the modification of the tv or the radio list is notified. This is done whenever a channel or a channel block is moved or deleted.

Format:

```
proglist changed [tv/radio]
```

8.4.9 range

This message may be used to query the permitted range of values for data. For a list of supported data, see the `data` message (8.4.1) above.

8.4.10 status

This message may be used to find out some major status information. The information will be transmitted in textual form for to guarantee long-term consistency.

It is not possible to change the status by this command, proper `ir` or `power` messages have to be used instead.

The status can be request by sending `status` or `status ?`.

The response can contain 4 parameters:

```
status <power mode> <sub mode> <pip mode> <record mode>
```

Currently specified is this information:

Position	Contents	Value	Description
1	power mode	standby	standby
		active	active standby for EPG nightupdate or recording.
		audio	audio mode = Radio digital mode with screen switched off
		radio	Radio digital mode
		tv	tv mode

Position	Contents	Value	Description
2	sub modes for power mode = “standby”	off	TV is in standby mode. The standby processor handles the RS232 commands, the main processor is switched off completely. Only standby commands can be handled.
		wakeup	The main processor has been started by the standby processor and boots up to handle a command. This state takes some seconds (e.g. chassis SL121 about 7 seconds). The command will be handled as soon as the main controller has been booted.
		on	The main processor is running but the TV is still in standby mode (without picture and sound). All commands can be handled now.
	sub modes for power mode = “active”	off	TV is in active standby (with orange front LED), e.g. for recording (see parameter “record mode”).
		epg	EPG nightupdate is active
		busy	This sub mode has been introduced with the interface (RS232) version V4.1.0 (available since HL1 version V2.1.22.0). The busy state is notified when the TV is switched off to deep-standby or any active-standby (quickstart mode, DR+ recording, streaming standby etc.) and indicates a state transition of the TV set. When the substate “busy” active do not send a power command to switch on the TV set again (e.g. “power tv). See further details below.
	sub modes for power mode = “tv”	off	no sub mode is active
		ttx	Teletext is active
		photo	Photo Viewer is active
		music	Music Box is active
		video	Video Player is active
	sub modes for power mode = “radio” and “audio”	off	There are no further submodes.
3	pip mode	pipoff	PiP off
		pipon	PiP on
4	record mode	recoff	no record active
		rechdr	record to DR+ active

Sub mode “busy”

When the TV is switched off (via RS232 command or remote control), it notifies

```
status active busy ... ...
```

for a certain period during state transitions. Please do not send a “power tv/radio/audio” to switch on the TV set again in this period, because it might be ignored.

You can switch it on again when the status is:

1. status active [sub mode != busy] [pip mode] [record mode]

Examples:

`status active off pipoff recoff` (e.g. Quickstart standby is active, Streaming standby is active)

`status active epg pipoff recoff` (EPG night update is active)

`status active off pipoff rechdr` (Recording standby is active)

`2. status standby off pipoff recoff`

TV is in deep standby

8.4.11 time

This message is used to get or set the current system date, time and local time offset (lto). The value of the local time offset (in minutes!) is independent from daylight saving time.

get time:

`time` or `time ?`

response: `time [yyyy-mm-dd] [hh:mm:ss] [lto]`

set time:

`time [yyyy-mm-dd] [hh:mm:ss] {[lto]}`

The lto parameter is optional. If the values are valid the command is confirmed with the prompt. If the number of the parameter or the values are invalid a ? or `time "[error message]"` is returned.

error messages:

```
time "date invalid"
time "time invalid"
time "lto invalid"
```

8.4.12 timer

With this message it is possible to program the internal TV record timers.

For a direct recording starting at the current time running for a certain time use the following format:

`timer add [destination] [station number] [duration in minutes] {<"list-name">}`

A recording for an arbitrary time can be defined as follows:

`timer add [destination] [station number] [date: yyyy-mm-dd] [start time: hh:mm] [stop time: hh:mm] {c`

destination:
- hdr: start record to a HDR
- av1: not available for SL3xx/SL4xx!

<"list-name">}:
This parameter is optional (to be compatible with SL1xx). It defines the favourite the program number refers to. If no list-name is added the channel of the current active favourite is recorded. It is recommended to add the lis-time because a recording will not work if an AV-input is active.

Examples:

Start a recording of station number 2 on HDR for 1.5 hours:

```
timer add hdr 2 90 "DVB-C"
```

Start a recording of station number 2 on HDR on the 28th of June 2010 from 20:15 to 22:00:

```
timer add hdr 2 2010-06-28 20:15 22:00 "DVB-C"
```

If the record is possible the command is confirmed with the prompt. Otherwise a ? or `timer "[error message]"` is returned.

Error messages:

Error message	Description
"conflict"	There is a conflict with another timer record.
"invalid duration"	The duration exceed the maximum value (23 hours 59 min = 719 min)
?	- The parameters are invalid. E.g. not enough parameter. - The station number which has to be recorded doesn't exist.
"unknown"	All other failure: - Time/Date hasn't been detected or inserted by user.

8.4.13 config

This message may be used to set different system configurations.

The following parameters are supported:

Parameter	Value	Description
ir	0: disable IR commands 1: enable IR commands	"config ir 0" disables the IR commands received from the remote control. The IR commands are forward as ir notification to the RS232 interface independent whether notification of ir is enabled or not. Attention: This setting is stored in the EEPROM, so it is still active after power off/on via mains switch.
localkeys	0: disable local keys at the front panel 1: enable local keys	"config localkeys 0" disables the local keys at the front panel. The key events are forward as ir notification to the RS232 interface independent whether notification of ir is enabled or not. For the corresponding ir command see Appendix 1, keys for subsystem 27. Attention: This setting is stored in the EEPROM, so it is still active after power off/on via mains switch.

8.4.14 help

This command shows a list of all supported command.

In standby it returns the commands which are supported in standby only.

8.4.15 version

This command returns the version string of the control interface protocol defined in this document.
For chassis SL2xx/SL3xx the version starts with V4.0.0 to point out the difference to the versions of chassis SL1xx (V3.x.y) and L27xx (2.x.y or lower).

8.4.16 msg

This command is used to display any text in an OSD message window. The message can be closed by sending this command without parameter.

Example:

```
msg "First line.\nSecond line.\tThis is a backslash in double quotes: \" \\ \"\!"
```

8.4.17 dmenu

The command is used for an interactive communication via dynamic menus (dmenu) of the TV OSD. So it is possible to ask the user for certain actions to execute, to do configurations for an external system (e.g. home automation) or to display its state or any other information.

Via dmenu different types of menus can be defined and controlled. Additionally it is possible to add menu items to the existing menu of the TV set, so called entry points. Relevant events (mainly key events) necessary for the control of the dynamic menus are reported by notifications.

The menus are subjected to the designing rules of the Loewe OSD. It defines that a dialog is closed by the BACK key. So the behaviour of this key is fixed. It can't be configured via the dmenu command and will be available whenever a dynamic menu is opened.
The displayed texts and the handling of some keys can be defined arbitrarily.

8.4.17.1 Menu type "list"

This list contains up to 10 selectable rows. The rows can be divided into three columns (e.g. for a key-value presentation). Optionally an info (title and text) can be added. Up to four functions can be defined which are displayed the botton of the list. Additionally the OK key can be logged for event handling. The info text for each function and the OK key can be defined arbitrarily.

< screen shot >

8.4.17.2 Menu type "message"

The message is used to display an info text requiring feedback from the user via a defined key event. Up to four functions at the bottom and the OK key can be logged for event handling. The info text for each function/key can be defined. Additionally the PIP can be opened with a given channel resp. AV input (e.g. for door camera). For a simple message use the msg command (see chapter 8.4.16).

< screen shot >

8.4.17.3 Entry points

Up to two menu items can be defined which are accessible via the menu "System Settings" -> "Extras" -> "Home Automation" of the TV set. When the user selects an item and ok is pressed the corresponding event is reported. This can be used as the initial event for opening a dynamic menu. These menu items are so called "entry points". A name and an optional description can be defined.

If at least one entry point has been defined the menu “System Settings” -> “Extras” contains the additional item “Home automation”.

<screen-shot t.b.d>

Hint: The command dmenu is not supported in standby at all. So entry points have to be defined when the TV is active. As the information about entry points is deleted when the TV is switched off to standby, the entry points have to be redefined whenever the TV gets active again.
It is recommended to activate notification for the status command to get the information whenever the TV gets active.

8.4.17.4 Command format

Format of dmenu;

```
dmenu [subcommand] [parameter list]
```

```
subcommand = [define / undefine / content / status / event / entry]
```

The parameter list is a list of parameter names and its value or values. The list is only terminated by the maximum length of a RS232 command RCI_LINE_LENGTH_LIMIT. So it is possible to send several parameters with one dmenu command, but only for one subcommand.

The parameter (and its values) depends on the subcommand and the selected menu type.

For some subcommands and parameter shortcuts exists. So it is possible to send more parameter using shortcuts with one RS232 command to get a better performance for opening menus. The corresponding shortcut of a subcommand/parameter is marked by the underlined characters (e.g. `d` for `define`).

The following chapters give an overview of the subcommands, parameters and parameter values.
The sequence of commands to define and open/close a menu is described in chapter 8.4.17.5.

8.4.17.4.1 Subcommand `define`

Defines the menu type and the layout parameter.

define parameter	**values**	**description**
`type` `[menu type]`	**menu type:** **`list`** A list is a menu containing a selectable list of up to 10 rows. A row can be separated into 3 columns for a key/ value relationship. **`message`** Used to display a message and requesting a confirmation from the user by pressing a key of the remote control. Additionally a PiP can be opened with a given channel or AV input.	It is the very first parameter which has to be set for initialization. Whenever it is set all menu type specific parameter values are set to default and previously defined content strings are deleted.
define parameter for menu type `list`:		
`rows` `[number of rows]`	number of rows: 1 – 10 default: 5	Defines the number of rows displayed for the selection.

define parameter	values	description
cols [number of columns]	number of columns: 1 – 3: default: 1	Defines the number of columns and so the number of strings which have to be defined for an item.
items [number of items]	number if items: 1 – [number of rows] default: 5	Defines the number of items the user can select with the cursor. It can be lower than the number of rows. In this case the remaining rows are empty and can't be selected.
info [0/1]	0: info has to be displayed 1: info has not to be displayed default: 0	Define whether an info additionally has to be displayed at the top of the TV screen.
subtitle [0/1]	0: subtitle has to be displayed 1: subtitle has not to be displayed default: 0	Defines whether a subtitle at the top of the list has to be displayed.
key [key name] [0/1]	key name: ok / F1 / F2 / F3 / F4 0: key is not requested for notification 1: key is requested for notification	Defines whether one of the listed function / key is requested for notification when it is selected / pressed by the user or not. A function / key has to be requested to display a corresponding hint in the hint area of the menu. The ok key is exclusively used for activating a selection. So it is displayed additionally as hint in the selected row when it is requested.
selected [item index]	item index: 0 – ([items] – 1)	Defines the selected item of the list. The first item has index 0.
define parameter for menu type `message`:		
info [0/1]	see above	
key [key name] [0/1]	key name: ok	see above.
pip [0/1]	0: no PIP 1: an inactive PIP is opened additionally	For the message menu additionally a PIP can be opened. The program is defined by the content parameter pipProg (see chapter below). If no program is defined the previous PIP program is displayed. Hint: The position of the PIP allows up to three lines in the info text at the top of the screen.

Examples:

```
dmenu define type list rows 6 cols 2 items 4 info 1 subtitle 1
```

8.4.17.4.2 Subcommand `content`

Content parameter contains mainly the text strings displayed in the menus:

content parameter	value	description
content parameter for menu type `list`		
`title` `[<title string>]`		Title displayed at the top of the list.
`subtitle` `[<subtitle string>]`		Subtitle displayed at the top of the list below the title. Precondition: The define parameter subtitle has to be set.
`info` `[<title string>] [<text string>]`		Defines the info at the top of the TV screen. The info title can be an empty string (“”). The text string must not be empty.
`item` `[index] [<string for col0>] {[<string for col1>]} {[<string for col2>]}`	index: row number starting with 0	Defines the strings displayed for an item in the list. The number of string parameter depends on the value of the define parameter cols. The strings can be empty. Shortcut: i
`keyinfo` `[key name] [<info string>]`	key name: ok / F1 / F2 / F3 / F4	Defines the info string displayed besides the key icon in the hint area of the menu. Precondition: the key has to be requested by the define parameter key. Shortcut: ki
content parameter for menu type `message`		
`info` `[<title string>] [<text string>]`	see above	
`keyinfo` `[key name] [<info string>]`	key name: ok	see above.
`pipProg` `[program number]`	For AV channels use the negative program ids defined in chapter 8.4.6.	Precondition: To open the PIP the define parameter pip has to be set to 1.

Examples:

```
dmenu content title “Home automation” subtitle “Main menu”
dmenu content item 0 “Function 1” “Status A” item 1 “Function 2” “Status C”
dmenu content keyinfo ok “execute” keyinfo F1 “F1”
```

using shortcuts:

```
dmenu c i 0 “Function 1” “” i 1 “Function 2” “Status A”
dmenu c ki ok “execute” ki F1 “F1”
```

8.4.17.4.3 Subcommand `status`

It is used to open, close and update a menu.

Syntax:

```
dmenu status [open / close / update]
```

Example:

```
dmenu status open
dmenu status close
```

8.4.17.4.4 Subcommand `event`

This subcommand is sent by the TV set whenever a relevant event occurs.

Syntax:

```
dmenu event [event type] {[event parameter]}

Examples:
dmenu event onOpen
dmenu event onKey ok
dmenu event onSelect 1
```

event type	parameter	Description
`onOpen`	---	onOpen is sent when a menu has been opened successfully.
`onClose`	---	onClose is sent when a menu has been closed.
`onKey [key name]`	key name: ok / F1 / F2 / F3 / F4	onKey is sent when a requested key / function has been pressed.
`onSelect [index]`	index: index of the selected item in the list menu	The event is only sent when the list menu is active and the user has moved the cursor of the selected list item.
`onEntry [entry point id]`	entry point id: 0: entry point #0 of the assist menu 1: entry point #1 of the assist menu	If an entry point has been defined with subcommand `entry` the event is sent when the user has selected the menu item by pressing ok.

8.4.17.4.5 Subcommand `entry`

This subcommand is used to add up to 2 menu items to the assist menu of the TV set. When the user select an item and ok is pressed the corresponding onEntry event is sent. This can be used as the initial event for opening a dynamic menu.

Syntax:

```
dmenu entry [entry point id] [status] {[<item name>]} {[<item description>]}
```

entry point id: 0 or 1

status: 0: disable entry point
1: enable entry point

When the entry point is enabled an item name has to be added, an item description is optional.

Examples:

```
dmenu entry 0 1 “Home automation” “Configure your home automation system”
dmenu entry 1 1 “Audio server” “Configure your audio server”
dmenu entry 0 0
```

8.4.17.4.6 Subcommand `undefine`

Use this subcommand to reset all menu definitions and to delete all text strings. After this a dynamic menu has to be defined completely new. This subcommand should be sent whenever a dynamic menu has been closed and will not be used any longer.

8.4.17.5 Handling of Dynamic menus

The “construction” of a dynamic menu is executed in three steps:

1. define the menu type and its layout parameter

   Commands: `dmenu define type ...`
   `dmenu define ...`

2. define its content mainly the text strings which have to be displayed

   Command: `dmenu content ...`

3. open the menu

   Command: `dmenu status open`

If a large menu (containing many information) has to be opened the following procedure possibly makes sense for a better performance to provide a prompt reaction after a user interaction.

1. define the menu type and its layout parameter

   Commands: `dmenu define type ...`
   `dmenu define ...`

2. define some basic content strings (e.g. title of the menu)

   Command: `dmenu content ...`

3. open the menu

   Command: `dmenu status open`

4. define all other content strings

   Command: `dmenu content ...`

5. update the menu

   Command: `dmenu status update`

8.4.17.6 Examples

8.4.17.6.1 Entry Points

```
dmenu entry 0 1 “Home Automation” “Configure your Home Automation system”
dmenu entry 1 1 “Audio Server” “Configure your Audio Server”
```

< screen shot >

When the user selects one of these items and presses ok an event notification is sent by the TV:

```
dmenu event onEntry 0
```

or

```
dmenu event onEntry 1
```

8.4.17.6.2 Message

Open a message when a visitor arrives and show the door camera in PiP. The door camera is connected to scart socket AV1:

```
dmenu d type message info 1 key ok 1 pip 1
dmenu c info “Hint” “You have a visitor! Press OK to open the door.”
dmenu c keyinfo ok “Open door” pipProg -6
dmenu status open
```

<screen shot>

When the user presses OK an onKey event is sent by the TV set:

```
dmenu event onKey ok
```

8.4.17.6.3 List

The following example shows a list with 5 rows and 2 columns containing the status of different components controlled by a home automation system. The first column contains the component name the second one the component status. The status can be changed by selecting the corresponding row and pressing OK (possibly by opening another menu). Additionally the functions F1 – F4 are used in the hint area.

```
dmenu d type list subtitle 1 info 1 rows 5 cols 2 items 5
dmenu d key F1 1 key F2 1 key F3 1 key F4 1
dmenu c title “Home Automation” subtitle “Settings”
dmenu c keyinfo F1 “F1” keyinfo F2 “F2” keyinfo F3 “F3” keyinfo F4 “F4”
dmenu d selected 1
dmenu c i 0 “Ceiling lights” “on” i 1 “Blinds” “closed” i 2 “Room temperature” “20.8°”
dmenu c i 3 “Exterior lights” “off” i 4 “Garage” “open”
dmenu s open
```

<screen shot>

When the menu is opened the TV set sends an onOpen event command:

```
dmenu event onOpen
```

Whenever the user selects a row via the cursor up/down key and releases the key of the remote control an onSelect event is sent by the TV set:

```
dmenu event onSelect 2
```

When the user presses OK to change the status an onKey event is reported:

```
dmenu event onKey ok
```

When the menu is closed via the END key an onClose event occurs:

```
dmenu event onClose
```

8.4.18 browser

The “browser” command enables sending commands to the tv’s web browsing subsystem. The first parameter contains the command proper to send to the browser while the second parameter, if given, is an optional parameter of that command.

Currently there is one browser command defined:

- 0 (**LOCOM_BROWSER_CMD_START_WITH_URL**)
  Opens the browser in portal mode with the URL given in the second parameter. Will start the browser if it is not already open.

The browser command does not send a reply as of yet.

8.4.19 epg

The epg command is used to get the epg info for the **current** event of **any** station (= scheduled data), that means only the “Now” information for all channels are supported.
Additionally it is possible to get the event info for the **present and following** event of the **current active** station (=event info for present/following) via notification.

Scheduled data:

Format for requesting the epg data:

```
epg s [station number]
```

s: scheduled data

station number: It is the station number of the general station list, not the station number of the current active favorite.

The request is confirmed by the prompt only as confirmation for the correct syntax. The data are sent after this:

```
epg s [station number] [start time] [stop] “[title]” “[shortinfo]”
```

start/stop time: format = `hh:mm`

title, shortinfo: title and shortinfo of the event are UTF-8 encoded

If there are no data available for the given station the following command is sent:

```
epg s [station number] "no data"
```

Event info for Present/Following:

The data for present/following are transmitted for the current active station as event info in the DVB transport stream.

To get the data you have to activate the notification for epg via the `notify` command:

```
notify 1 epg
```

After a station change the event info for present/following are sent automatically as soon as the data have been acquired by the TV set. The data are sent also when the event info are updated after an event change

```
epg [content: p/f] [station number] [start time] [stop time] "[title]"
"[shortinfo]"
```

content: p = present
f = following

station number: station number of the current active station

start/stop time: Format hh:mm

title, shortinfo: title and shortinfo of the event are UTF-8 encoded

Example:

```
epg p 3 20:15 22:00 "CSI: Miami" "Episode 75"
epg f 3 22:00 22:15 "News" ""
```

Note: The epg notification for present/following cannot be enabled by activating all notification ("`notifiy 1`") due to the amount of data which are sent. So the epg notification has to be enabled explicitly always. Nevertheless it is deactivated with command "`notify 0`".

The maximum length of an epg response/notification is limited to 127 bytes. If the shortinfo is too long it is truncated and the last three characters are replaced by "…".

The scheduled data are only available when the data have been acquired during the the EPG update (which is executed automatically at 02:00 am) or while the TV is active with the channel the data are sent with.

Hint: The scheduled data can be different to the present data of the event info, e.g. when a event overruns and the event info is updated. But this depends on the provider.

9 Configuration Data and Limit Values

Symbol	Value
RCI_LINE_LENGTH_LIMIT	256
RCI_PROMPT_CHAR	‚>‘

10 AMX

For AMX home automation the poll message “AMX” is supported. For this in the service menu of the TV set the following parameter has to be set:

Open the “Service menu” on the TV set. Change to the menu item “RS232”. Set the item “AMX” to “on”. Additionally the port settings required by AMX are adjusted: 9600 baud, 8 bits, no parity, 1 stop bit.

The command is available also in standby as command type “standby” (see chapter 8.1).

Appendix 1: IR codes

The following table contains relevant RC5 control codes. Not all of them are available on the Loewe remote control (e.g. Assist 2), but are used as a direct key function (e.g. switch to HDMI1 input).

subsystem	control code	description	Pronto HEX code
0	0	Key 0	0000 0073 000D 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 09B7
0	1	Key 1	0000 0073 000D 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 09B7
0	2	Key 2	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 09B7
0	3	Key 3	0000 0073 000D 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 09B7
0	4	Key 4	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 09B7
0	5	Key 5	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0020 09B7
0	6	Key 6	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 09B7
0	7	Key 7	0000 0073 000D 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 09B7
0	8	Key 8	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0020 0020 09B7
0	9	Key 9	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0040 0020 09B7
0	11	MENU	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0020 0020 0020 09B7

subsystem	control code	description	Pronto HEX code
0	12	Power on/off	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 09B7
0	13	Mute on/off	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 09B7
0	16	Cursor right	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0020 0020 0020 0020 09B7
0	17	Cursor left	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0020 0020 0040 0020 09B7
0	20	Volume -	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0040 0020 0020 09B7
0	21	Volume +	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0040 0040 0020 09B7
0	22	(TV) TV on (TV mode on)	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0020 0020 0040 09B7
0	23	Program –	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0020 0020 0020 0020 0020 09B7
0	24	Program +	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 0020 0040 0020 09B7
0	25	TV off	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 0040 0020 09B7
0	26	Green key	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0040 09B7
0	27	Red key	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0020 09B7
0	32	Cursor up	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0020 0020 0020 0020 0020 09B7
0	33	Cursor down	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0020 0020 0020 0020 0040 0020 09B7
0	38	OK key	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0020 0020 0040 0020 0020 0040 09B7

subsystem	control code	description	Pronto HEX code
0	40	Blue key	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0040 0020 0020 0020 0020 09B7
0	43	Yellow key	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0040 0040 0040 0040 0020 0020 0020 09B7
0	49	HOME	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 0020 0020 0040 0020 09B7
0	53	Radio mode (on/off)	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0040 0040 0020 09B7
0	60	TEXT (teletext on/ off)	0000 0073 000C 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 0020 0040 0020 0020 09B7
0	63	BACK	0000 0073 000D 0000 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 09B7
0	64	WEB or ⊡ (Sources)	0000 0073 000D 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 09B7
0	78	EPG	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0040 09B7
0	79	INFO	0000 0073 000D 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 0020 09B7
0	88	PIP	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 0020 0020 09B7
0	90	⊡ (= Favourite)	0000 0073 000B 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0040 09B7
0	91	DR+	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0020 09B7
0	114	AV input	0000 0073 000B 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0020 0020 0040 0040 09B7
0	117	AVS input	0000 0073 000B 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0040 0040 0020 09B7
0	118	PC IN input	0000 0073 000B 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 09B7

subsystem	control code	description	Pronto HEX code
0	119	HDMI-1 input	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0020 0020 0020 09B7
0	121	HDMI-2 input	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0020 09B7
0	122	HDMI-3 input	0000 0073 000B 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0040 0040 0040 09B7
0	123	HDMI-4 input	0000 0073 000C 0000 0040 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0020 0040 0020 0020 0020 0020 0040 0040 0020 0020 0020 09B7
6	41	HDR: pause	0000 0073 000A 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0040 0040 0040 0020 0020 0040 0020 09B7
6	50	HDR: rewind	0000 0073 000A 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 0020 0020 0040 0040 09B7
6	52	HDR: fast forward	0000 0073 000A 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 0040 0040 0020 0020 09B7
6	53	HDR: play	0000 0073 000A 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 0040 0040 0040 0020 09B7
6	54	HDR: stop	0000 0073 000A 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0040 09B7
6	55	HDR: record	0000 0073 000B 0000 0020 0020 0040 0020 0020 0020 0020 0040 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0020 0020 0020 09B7
27	16 (15)	local keys: + key	0000 0073 000A 0000 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0040 0040 0040 0020 0020 0020 0020 0020 0020 09B7
27	17 (45)	local keys: - key	0000 0073 000A 0000 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0040 0040 0040 0020 0020 0020 0020 0040 0020 09B7
27	32 (46)	local key: M key	0000 0073 000B 0000 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 0020 0020 0020 09B7
27	33 (19)	local keys: R key	0000 0073 000B 0000 0020 0020 0040 0040 0020 0020 0040 0040 0020 0020 0020 0020 0040 0020 0020 0020 0020 0020 0020 0040 0020 09B7

LOEWE.