**BARIX**

THE VOICE OF SIMPLICITY

# Streaming Client

**Network audio decoder firmware for MP3 streaming (HTTP, UDP, RTP) with automatic fail-over and USB playback**

# Technical Documentation

**Firmware**        **V03.22**

**Released**        **03rd Jul 2024**

**Supports:**

- **EXSTREAMER 100,105**
- **EXSTREAMER 110, 120**
- **EXSTREAMER 200, 205**
- **EXSTREAMER 500,1000**
- **EXSTREAMER P5**
- **IP Audio Module 100, 102, 300**

# Revision History

| Firmware Version | Date | Initials | Notes |
|---|---|---|---|
| B2.03 | 14.05.2008 | PK | Updated sections 1.2, 1.5, 4.1<br>Chapter 7 "Display interface" added |
| A2.04 | 06.06.2008 | PK | Added relay support, B274 |
| A2.05 | 09.06.2008 | PK | Added repeat function<br>Added sleep function |
|  | 15.09.2008 | PK | Described keyboard.html and added an image of the remote control |
|  | 30.09.2008 | PK | Added error code 19 (Audio Format Not Supported) |
| A2.06 | 05.01.2009 | PK | Added setup parameter B498 |
|  | 09.01.2009 | PK | Added setup parameter i680 |
|  | 12.01.2009 | PK | Updated FLASH layout |
|  | 19.01.2009 | PK | Default value for URL1 is the Barix radio |
|  | 21.01.2009 | PK | Removed messages.ini |
|  | 29.01.2009 | PK | Added commands c=71 and c=72<br>update.ini updated<br>WEB UI files updated |
|  | 30.01.2009 | PK | Described the display interface |
| A2.08 | 07.03.2009 | PK | Added audio peak levels |
|  | 31.03.2009 | PK | Default value of URL1 updated<br>Added relays 2-16<br>Relay 1 moved from B274 to B252 |
|  | 01.04.2009 | PK | Added &Lstate dynamic mark variables 31 and 51..66 |
|  | 08.04.2009 | PK | Added priority message volume B243 |
|  | 17.04.2009 | PK | Added dynamic marks 32, 33 and 34 |
|  | 18.04.2009 | PK | Added dynamic mark &LSetup 23 |
|  | 17.06.2009 | PK | MTELL renamed to Barimon |
|  | 24.06.2009 | PK | Added command port option to B498 |
| A2.09 | 13.07.2009 | PK | Section 3 rewritten, added serial command interface |
|  | 30.07.2009 | PK | Added Factory Defaults and B241 and B242 (min and max volume) |
|  | 31.07.2009 | PK | Setup.cgi section rewritten. |
|  | 05.08.2009 | PK | Added section WEB server together with a description of the mimetype.ini file<br>Added time of the last error |
| A2.11 | 21.08.2009 | PK | Default stream check period changed from 10-180s to 1-30s (feature #052.08) |
| A2.12 | 17.09.2009 | PK | Setup version increased to 1.2 |
| A2.13 | 29.12.2009 | PK | Removed MMS and MMST |
| A2.14 | 01.03.2010 | PK | Frame based buffering |
|  | 06.04.10 | PK | &Lstate variable nr. 38 |
|  | 22.04.10 | PK | New frame bufferparameters in Barimon report |
|  | 27.04.10 | PK | New UI files |
| A2.20 | 18.10.10 | PK | Added TCP and UDP command ports |
|  | 01.11.10 | PK | new parameter "usb_backup_switch_immediately" in update.ini<br>balance as B245 and b= command |
|  | 09.11.10 | PK | Volume interface changed from 5% to 1% steps. Setup version changed from 1.2 to 1.3. |
|  | 03.12.10 | PK | Added "V=" command (volume in 1% steps) |
| A2.24 | 30/05/11 | PK | Barimon alarm sent also on stream recovery<br>Default channel number 1<br>AD gain settings<br>Volume Offset<br>Currently decoded  audio format &Lstate(42<br>URL protocols, Line-in and triggered playback in Streaming Settings section |
| A2.26 | 06.09.11 | PK | New parameter priority volume control |
| 02.28 | 23.11.11 | PK | Updated remote-update example, using new parameter volume_100 |
| 02.29 | 18/01/12 | PK | Added file inputs.txt and dynamic mark to read I/O status<br>Relay while priority message |
| 03.02 | 29.02.12 | PK | Added IPAM type as dynamic mark 45 |
|  | 05.04.12 | PK | Flash memory layout updated (chapter 2.2)<br>Remote Firmware Update requires 2MB Flash devices (chapter 7) |
| 03.05 | 17.09.12 | PK | 2MB requirement for remote FW update<br>EOL required at the end of the remote-update ini file.<br>Extra &Lstate parameters 46 and 47 for remote firmware update.<br>Setup parameter B250 – audio buffer size. |
| 3.08 | 10.01.13 | PK | Audio formats, RTP/AAC |
| 3.10 | 08.03.13 | PK | Added configurable parameters SNMP SysName and SysLocation to Setup and into remote configuration. |
| 3.12 | 29.11.13 | PK | Setup parameters for Remote Content Update (W306) |

| Firmware Version | Date | Initials | Notes |
|---|---|---|---|
| | | | New firmware module rupdate.rom for remote content update in WEB14. Examples and description of the Remote Content Update (chapters 7.4. and 7.7.) Added new Setup parameter ContentUpdateFolder (S310) |
| | 15.01.14 | PK | Minor corrections in the Introduction |
| 3.13 | 08.04.14 | PK | Added new VSC DDF file |
| 3.14 | 21.11.14 | PK | Added Status parameter 44 – codec type |
| | 24.11.14 | PK | Added syslog address at Setup offset 200 |
| 3.15 | 07.01.16 | PK | SNMP RO community added into update.ini |
| | 08.01.16 | PK | Relay control via the R= command |
| 3.17 | 18.01.18 | ASI | Updated Streaming Client version to 3.17 Created links on ToC Converted the Barix logo from EPS to PNG for proper export to PDF |
| 3.19 | 20.05.20 | SG | few corrections, e.g. Barix Address and features IP addressing |
| 3.22 | 03.07.24 | SG | Add information for new Relay features and about "No HTTPS support", minor changes, updated external links and legal information |

# Table of Contents

# 1 Introduction

## 1.1 About the "Streaming Client" firmware

The "Streaming Client" firmware was designed for the professional field: audio bridging, audio distribution, in store and standalone applications.

It is capable of playing MP3 files using various protocols. Up to three sources can be defined (both streaming over network and playing from a local USB storage) for streaming with automatic failover.

Thanks to easy remote control and monitoring the "Streaming Client" firmware can be used on Barix devices to build a manageable distributed audio network.

The standalone capability (playing from external USB or internal flash memory, without network connection) allows the use of the Barix Exstreamer 100 or the Barix Exstreamer 200 as a simple MP3 player with automatic start on power up.

## 1.2 Features

- Plays MP3 streams from network (HTTP, BRTP, RTP) and M3U playlists (HTTP), HTTPS is not supported
- Plays MP3 files and M3U playlists from external USB memory
- Supports authentication (HTTP, Shoutcast, Icecast)
- Shoutcast meta-data displayed on hardware featuring LCD and homepage
- Supports up to 3 sources with automatic failover
- Control and configuration using a standard web browser
- Supports automatic Remote Update of settings, configuration, firmware and USB content
- Remote Monitoring via SNMP and Barimon (HTTP, UDP)
- Supports the Barix IR Remote Control
- Automatic network configuration (BOOTP, DHCP, AutoIP and IPzator) as well as manual static IP configuration
- Features SonicIP ® announcing the IP address on power up over the audio outputs
- Supports proxy server (HTTP proxy support)
- Autoplay functions plays all audio files without playlist (standalone mode)
- Stand-by mode to stop playback and save network bandwidth
- Priority port to receive high-priority RTP audio messages
- Serial gateway to transmit RS232 data to a remote location
- Serial command interface
- Configurable reset button function
- Background monitoring of playlists during playback and automatic reconnect on change

## 1.3 Installing the device

For the installation of the Barix Exstreamer type devices please refer to the corresponding "Quick Install Guide". A printed version is included in the box and can also be downloaded from our site help.barix.com/exstreamer/.

For the installation of the Barix IP Audio Module type devices please refer to the corresponding "Development Specification" which can be downloaded from our site www.barix.com.

## 1.4  Additional documents

Technical specifications can be found in the corresponding product sheet which can be downloaded from our site www.barix.com.

There are even some video tutorials on help.barix.com.

## 1.5  Preloaded Firmware

Barix currently pre-loads all Exstreamer 1xx/20x family devices with the Streaming Client firmware.

If you have another device please read this technical documentation before loading the Streaming Client firmware.

## 1.6  About this Technical Documentation

### Links to chapters

References to chapters (e.g. X Chapter name) are red and underlined and serve as direct links when viewed in Adobe Acrobat Viewer.
Click on the link to jump to the referenced chapter, click on the left arrow icon to jump back to where you came from.

### Bookmarks pane in Adobe Acrobat

The complete "Table of Contents" is available in Adobe Acrobat Viewer.
Click on the "Bookmarks" pane tab on the left side of Adobe Acrobat Viewer to open it. Click on any bookmark to directly jump to the corresponding part of the manual.

### Chapter overview

This technical documentation is divided into the following chapters:

- 2 Memory organization (explaining the use of the Flash memory and the EEPROM configuration memory)
- 3 Application Programming Interface (API) (explaining how to control the device using CGI web commands )
- 4 WEB User interface (explaining the User Interface functionality and how to customize it)
-  Advanced  (explaining the functionality of URL Variable substitution)
- 7 IR control interface (explaining the functionality IR Remote control interface)
- 8 Display interface (explaining the use of the LCD, where available, for additional device status information)
- 9 Remote Configuration and Update interface (explaining configuration and firmware update via a remote webserver)
- 10 Remote monitoring interface (explaining the remote monitoring capabilities using a Barimon or own monitoring server and explaining the SNMP interface capabilities and the required MIB file)

# 2 Memory organization

## 2.1 Serial Rescue Kit /Web Update

Two different procedures exist to upload the "Streaming Client" firmware into the device:
The "Serial Rescue Kit" using the serial cable will upload the firmware files, the boot loader and the "factory defaults configuration" which will erase the current configuration. The "Web update" using a browser will upload the firmware files and the "factory defaults configuration" but will not alter the current configuration. For factory defaults and memory usage details see the following two sections.

## 2.2 Flash Memory usage

The "Streaming Client" firmware is using the built-in Flash memory as described in the table below.

**Flash memory usage table**

| Page / Target | File name | Content | Address (Rescue Kit) |
|---|---|---|---|
| 8K (WEB0) | stream.rom | Firmware | 0xC00000 |
| WEB1 | fs.bin | USB file system | 0xC10000 |
| WEB2 | sg.bin | Audio and Utility library | 0xC20000 |
| WEB3 | sg.bin  continued | Audio and Utility library | Continued (0xC30000) |
| WEB4 | bclio.bin | IO Driver | 0xC40000 |
| WEB5 | streamapp.cob | Web Application and SonicIP Resources | 0xC50000 |
| WEB6 | streamapp.cob continued | Web Application and SonicIP Resources | continued (0xC60000) |
| WEB7 | streamapp.cob continued | Web Application and SonicIP Resources | continued (0xC70000) |
| WEB8...WEB13 | Unused | Unused | 0xC80000...0xCD0000 |
| WEB14 | rupdate.rom | Remote content update module | 0xCE0000 |
| WEB15...WEB30 | reserved for remote firmware update | | 0xCF0000...0xDE0000 |

A page uses 64 kilobytes of flash memory. Flash memory of 2MB is assumed.
Please note: 0xC00000 is mirrored to 0xE00000 and 0xD00000 to 0xF00000.

Both update procedures (Web update & Serial Rescue Kit) respect the above memory usage.

The above memory usage table must be used accordingly when loading single files using advanced web update.
The target has to be in capital letters (i.e. WEB4).

The remote firmware update feature splits the FLASH into two partitions where one contains the running firmware image and the other is reserved for the remote upload and is normally empty. The partitions are automatically switched. The complete firmware with all extension modules and resources must fit into 14 pages (the fifteenth page is reserved for the bootloader).

The compound WEB update overwrites the whole FLASH with and stores the Streaming Client

firmware into the FLASH first partition (pages 0 to 14). If the advanced WEB upload method is used together with the remote firmware update, the individual pages must be loaded carefully because the firmware can be currently placed in the second partition (pages 15 to 30).

## 2.3 Configuration storage (EEPROM)

The current configuration is stored in a non-volatile memory (EEPROM). To change the current configuration use the web user interface and hit the "Apply" button to store it into the EEPROM as described in the "Streaming Client Manual" in chapter "Device Configuration".

### Factory defaults using Serial Rescue Kit

The EEPROM is overwritten by the "factory defaults configuration" when applying the "Serial Rescue Kit" using the binary file **config.bin** which is stored in the folder "update_rescue". This file can be edited with a hex editor. Consult the "configuration memory usage" table carefully before you make any changes.

### Factory defaults using Web Update

The "factory defaults configuration" binary file **config.bin** is contained in the file **streamapp.cob** which is loaded into the flash memory (not the EEPROM!) when applying the "Web Update". To apply the "factory defaults configuration" the reset button has to be pushed for about 10 seconds.

The file **config.bin** can be edited with a hex editor. Consult the "configuration memory usage" table carefully before you make any changes. Before uploading the folder **streamapp** (residing in folder **webuidevkit**) has to be packed into the file **streamapp.cob** using the tool **web2cob.exe**. The file is loaded to the EEPROM as factory default when the reset button is pushed for about 10 seconds. For more details see chapter 4 WEB User interface.

### Configuration storage usage

The following table shows where the configuration is stored in the EEPROM. The column "Byte" shows the offset as a decimal number. The column "Len" shows the length in Bytes. The column "Default" shows the default value as stored in the original "factory defaults configuration".

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| Own IP | 0 | B0,B1, B2,B3 | 4 | 0.0.0.0 | Static IP address of the device. 0.0.0.0 for automatic assignment<br>0.0.1.0 to disable AutoIP<br>0.0.2.0 to disable DHCP<br>0.0.4.0 to disable BOOTP<br>0.0.8.0 to disable IPzator<br>add these special IP addresses to disable multiple protocols, "0.0.13.0" recommend for DHCP use |
| .Gateway IP | 4 | B4,B5, B6,B7 | 4 | 0.0.0.0 | Gateway IP address. 0.0.0.0 for no gateway |
| Netmask | 8 | N8B0, N8B1, N8B2, N8B3 | 1 | 0 | Subnet mask. The value is the count of the zero bits counted from the lowest byte. (eg. 8 for 255.255.255.0) |
| DNS 1 | 64 | B64,B65, B66, B67 | 4 | 0.0.0.0 | Primary DNS IP address.  Set to 0.0.0.0 to get primary DNS from DHCP, if DHCP is configured, or to disable DNS, if DHCP is not configured. |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| DNS 2 | 68 | B68, B69, B70, B71 | 4 | 0.0.0.0 | Alternative DNS IP address. 0.0.0.0 here always disables secondary DNS |
| IFMODE0 | 80 | B80b0-1, B80b2-3, B80b4-5, B80b6-7 or B80 | 1 | 0x4C | Serial port 0 settings<br>Definition of the bits in that byte for the serial port 0:<br><table><tr><td>Function</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>RS232-C</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0</td><td>0</td></tr><tr><td>7 Bit</td><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td></td><td></td></tr><tr><td>8 Bit</td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td></td><td></td></tr><tr><td>no parity</td><td></td><td></td><td>0</td><td>0</td><td></td><td></td><td></td><td></td></tr><tr><td>even parity</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>odd parity</td><td></td><td></td><td>0</td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>1 Stopbit</td><td>0</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2 Stopbit</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> |
| BAUDRATE0 | 81 | B81 | 1 | 2 | Baudrate for the serial port 0. (7 = 300, 6 = 600, 5 = 1200, 4 = 2400, 3 = 4800, 2 = 9600, 1 = 19200, 0 = 38400, 9 = 57600, 8 = 115200) |
| FLOWCONTROL0 | 82 | B82 | 1 | 0 | Flow control for the serial port 0. (0 = no, 1= Software XON/XOFF, 2 = Hardware RTS/CTS) |
| GATEWAYDSTIP | 88 | B88, B89, B90, B91 | 4 | 0.0.0.0 | Serial Gateway destination IP address for active serial gateway. If this IP address is 0.0.0.0, then the serial gateway operates in passive (listening) mode. See also GATEWAYPORT below. |
| GATEWAYPORT | 92 | W92 | 2 | 0 | Serial Gateway Port. For active serial gateway this is the destination port to connect to (source port is random). For passive serial gateway it's the listening port. If the port number is 0, the serial gateway function is completely disabled. |
| BOOTTARGET | 94 | W94 | 2 | "2K" | If this parameter is set to 0x0000 the firmware with the highest version will be started.<br>If this parameter is set to a value highest version of the firmware with this target will be started. If the target is 3Q (like for the standard Exstreamer firmware) the value will be the ASCII code of this two characters 0x5133. The first character is the high byte. |
| Security settings | 97 | B97 | 1 | 0 | Bit 0: not used<br>Bit 1: disable factory defaults by button (0=enabled)<br>Bit 2: disable remote update functionality (0=enabled)<br>Bit 3: not used<br>Bit 4: not used<br>Bit 5: not used<br>Bit 6: not used<br>Bit 7: not used<br><br>See also "Reset Button Function" B276 |
| DHCP Host Name | 98 | S98 | 16 | | Name of the device sent in DHCP request. If not set, automatically generated name based on device's MAC address is sent. The string includes terminating zero. |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| Version Major | 116 | B116 | 1 | 1 | Version Major value (do not change) |
| Version Minor | 117 | B117 | 1 | 3 | Version Minor value (do not change) |
| Setupex Length | 120 | W120 | 2 | 894 | Length of the extended setup (always 894) |
| Password Level 0 | 122 | S122 | 8 | | Password reserved for future use, stored as a MD5 hash (first 8 bytes), all 0 means no password |
| Password Level 1 | 130 | S130 | 8 | | Password used for viewing and changing the configuration, stored as a MD5 hash (first 8 bytes)  all 0 means no password |
| Password Level 2 | 138 | S138 | 8 | | Password reserved for future use, stored as a MD5 hash (first 8 bytes), all 0 means no password |
| Password Level 3 | 146 | S146 | 8 | | Password reserved for future use, stored as a MD5 hash (first 8 bytes), all 0 means no password |
| Password Level 4 | 154 | S154 | 8 | | SNMP read-only community. Stored as a MD5 hash (first 8 bytes). All 0 means no protection, i.e. the device accepts any community. |
| Password Level 5 | 162 | S162 | 8 | | Password reserved for future use, stored as a MD5 hash (first 8 bytes), all 0 means no password |
| Syslog Address | 200 | B200,B201, B202,B203 | 4 | 0.0.0.0 | Syslog address for remote update module. 0.0.0.0 for broadcast |
| Priority Volume Control | 240 | B240 | 1 | 0 | 0 = use fixed priority volume "Priority volume" (see below), disable volume control during priority message 1 = same volume as the stream, allow volume control during priority playback |
| Minimum Volume | 241 | B241 | 1 | 0 | Minimum volume allowed to be set by the user. This is also the mute volume. In 1% steps. Default 0% |
| Maximum Volume | 242 | B242 | 1 | 100 | Maximum volume allowed to be set by the user. In 1% steps. Default 100% |
| Priority volume | 243 | B243 | 1 | 50 | Priority message volume in 1% steps. Default: 50% |
| Volume | 244 | B244 | 1 | 50 | Volume in 1% steps. Default: 50% |
| Balance | 245 | B245 | 1 | 0 | Balance: -10...+10 -10 = full left 0 = center +10 = full right |
| Bass | 246 | B246 | 1 | 0 | Bass: -10..+10 |
| Treble | 247 | B247 | 1 | 0 | Treble: -10..+10 |
| Reserved | 248 | | 1 | | Reserved for further audio parameters |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| A/D Gain | 249 | B249 | 1 | 64 | Attenuation of the line input signal on Exstreamer 205:<br> 0 = mute<br> 1 = -36dB<br> 2 = -30dB<br> 4 = -24dB<br> 8 = -18dB<br>16 = -12dB<br>32 = -6dB<br>64 = 0dB |
| Audio buffer size | 250 | B250 | 1 | 0 | Logarithmic audio buffer size. Valid values are:<br>16 = high buffer size: 65536 bytes (default)<br>15 = medium buffer size: 32768 bytes<br>14 = low buffer size: 16384 bytes<br>0 or any other value are interpreted the same way as the value 16 (high buffer size). |
| Reserved | 251 | | 1 | | Reserved for further audio parameters |
| Relay Function | 252 | B252..B267 | 16 | 0 | Relay function for relays 1-16 (where supported by the hardware):<br>0: disabled (inactive)<br>1: always on<br>2: relay while operating (off while stand-by)<br>3: relay while non-priority playback<br>4: control by the source (via Shoutcast metadata/RTP extension)<br>5: relay while Priority message<br>6: control via command<br>7: relay while Stream and Priority message |
| Reserved | 268 | | 8 | 0 | |
| Reset Button Function | 276 | B276 | 1 | 0 | Configures the function of the reset button, possible values are:<br>0: normal function – device reset (default)<br>1: reset disabled (no function)<br>2: playlist control<br>    short press SONG+,<br>    long press (>=1sec) SONG-<br>3: channel control<br>    short press CHAN+ and play<br>    long press (>=1sec) CHAN- and play<br>4: volume control<br>    short press VOL+<br>    long press VOL-<br><br>This configuration does not influence the "Factory Defaults" function of the reset button, see also "Security Settings" B97 |
| Media Configuration | 277 | B277b0, B277b1, B277b2, B277b3, B277b4, B277b5, B277b6, B277b7 | 1 | 0x02 | This values can be added (the function is activated by setting the bit):<br>0x01: 0 – shuffle off, 1 – shuffle on<br>0x02: 0 – USB Autoplay off, 1 – USB Autoplay on<br>0x04: 0 – USB streaming: finish file before switching back to higher priority stream, 1 – switch as soon as the stream is available<br>0x08: not used<br>0x10: not used<br>0x20: not used<br>0x40: not used<br>0x80: 0 – SonicIP on, 1 – SonicIP off |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| Remote Update File Version | 278 | W278 | 2 | 0 | Version of the last update-meta file processed. Internally used by the firmware. For further details see chapter 9 Remote Configuration and Update interface. |
| Web Server Port | 283 | W283 | 2 | 0 | Port on which built-in web server is running. Range: 0...65535 (0 stands for standard port 80) |
| USB Serial Number | 285 | D285 | 4 | | Used for playlist position memory |
| RTP Priority Port | 289 | W289 | 2 | 0 | RTP port for receiving priority messages. Range: 1...65535, 0 means disabled (default) |
| Priority buffer level | 291 | W291 | 2 | 300 | Decoding latency with RTP protocol, in milliseconds. Senseful settings are in the range from 80 ms up to 1000 ms, depending from used codec and audio bandwidth. Higher audio bandwidth requires less buffer. The minimum value is limited by a 2kB DSP buffer, which has to be always full. The maximum value is limited by the 64kB device buffer. When calculating the latency the jitter and possible lost frames have to be taken into account. |
| Channel Number | 293 | W293 | 2 | 1 | Last channel number |
| URL1 Playlist Position | 295 | W295 | 2 | 0 | Index (starting from 0) of the last playlist entry played on URLx. |
| URL2 Playlist Position | 297 | W297 | 2 | 0 | |
| URL3 Playlist Position | 299 | W299 | 2 | 0 | |
| URL1 Flags | 301 | B301 | 1 | 0 | URL Flags: Bit 0: 1= increase the playlist position on reconnect/reboot, 0 = start with the same position |
| URL2 Flags | 302 | B302 | 1 | 0 | Bit 1: 1= refresh URL even when it's currently playing and reconnect if playlist content changes |
| URL3 Flags | 303 | B303 | 1 | 0 | Bit 2: 1=stop playlist playing after the first error, 0=stop only if all entries fail Bit 3: unused Bit 4: unused Bit 5: unused Bit 6: unused Bit 7: unused |
| Fade-in period | 304 | W304 | 2 | 0 | Duration of audio fade-in period in milliseconds: long = 2500ms short = 1000ms none = 1ms Applies to all URLs, does not apply to priority stream. The value 0 is reserved for backwards compatibility and translates to 2500ms. |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| Content Update Status | 306 | i306 | 2 | 0 | Last result of the Content Update process:<br>  3 = success, completed without errors<br>  2 = success, however there were some errors (e.g. file not found)<br>  1 = aborted<br>  0 = no update performed since the last factory defaults<br><0 = failed; error code<br><br>This field is read-only. |
| Content Update Folder | 310 | S310 | 50 | | Folder on the local USB or microSD where to store files during remote content update. By default empty, i.e. all files are downloaded to the root folder. |
| SNMP SysName | 444 | S444 | 18 | | SNMP System Name.<br>Default is empty. |
| SNMP SysLocation | 462 | S462 | 18 | | SNMP System Location.<br>Default is empty. |
| Target Page | 480 | S480 | 17 | | This is a software field used by setup.cgi. It contains the target page to be displayed after device reboot. I.e. in rebooting.html. |
| IR Source | 497 | B497 | 1 | 1 | IR receiver type:<br>0= Serial IR Dongle<br>1= Built-in IR receiver |
| Serial port usage | 498 | B498 | 1 | 1 | Defines for what the serial port is used:<br>0 = serial GW<br>1 = VSC panel<br>2 = command port |
| UDP command port | 503 | W503 | 2 | 0 | Receive port for UDP commands, 0 = disabled |
| TCP command port | 505 | W505 | 2 | 0 | Receive port for TCP commands, 0 = disabled |
| TCP command port timeout | 507 | W507 | 2 | 0 | Timeout in seconds on the TCP command port. If there is no activity (no data coming in) for the defined period then the TCP connection is closed by the Barix unit.<br>Use 0 to disable (Barix device never closes the connection). |
| RTP latency | 509 | W509 | 2 | 600 | Decoding latency with RTP protocol, in milliseconds. A senseful setting is here between 50 ms and 1000 ms, depending from used codec and audio bandwidth.<br>The minimum value is limited by a 2kB DSP buffer, which has to be always full. The maximum value is limited by the 64kB device buffer.<br>When calculating the latency the jitter and possible lost frames have to be taken into account. |
| Preset | 515 | W515 | 2 | 0 | User-specific storage, this parameter has no functionality. It can be used by the user for the web interface. |
| User-Agent | 517 | S517 | 32 | | HTTP/Shoutcast/Icecast User-Agent string If empty, default Streaming Client identification is used. |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| Triggered Playlist | 570 | S570 | 100 | | Path to remotely triggered playlist. One file from the playlist is played and then playback returns to the standard URL1-3. Has lower priority than Priority message.<br>Can be used i.e. for advertisement. See section 5.3 Triggered Message Playback for more details. |
| Volume Offset | 677 | B677 | 1 | 0 | Output volume of the device can be offset to adjust the encoder-decoder path to 0dB. The Volume Offset is in dB units, stored in Setup as the value+128.  E.g. +3dB offset is stored in Setup as 131. The Setup value 0 has a special meaning "auto". "Auto" presets the gain automatically according to the hardware. |
| Decoding Speed Correction | 680 | i680 | 2 | 0 | Decoding speed correction factor in ppm (parts per million). This value is signed and allows fine tuning of the playback speed. A negative correction slows down the decoder, a positive value speeds up the decoder. Typical values are in the range between -500 and 500.<br>NOTE: On Exstreamer 1xx/20x a 48kHz audio stream/file cannot be speeded up any more (can be only slowed down). |
| Maximum Bitrate | 682 | W682 | 2 | 0 | Maximum desired bitrate in kbps for multi-bitrate streams.<br>0 (default) means receive the highest available. That´s a hidden feature , not available in the setup. |
| UDP Reporting port | 684 | W684 | 2 | 0 | UDP port where the device reports its Barimon status. 0 means disabled. |
| SNMP Target Trap IP address | 686 | B686, B687, B688, B689 | 4 | 0.0.0.0 | SNMP Target IP (0.0.0.0 for disable SNMP) |
| Update Period | 690 | W690 | 2 | 720 | Period in minutes how often to poll update information from a remote server. Range 1...1000. For further details see chapter 9 Remote Configuration and Update interface. |
| BARIMON Period | 692 | W692 | 2 | 5 | Period in minutes how often to send device's status to the BARIMON server. Allowed values are in range 1...1000. For further details see chapter _Barimon periodic report. |
| Stream Check Period | 694 | W694 | 2 | 1 | Period in seconds how often the stream sources are checked for availability. Allowed values are in range 1...65535 |
| Stream Max Check Period | 696 | W696 | 2 | 30 | Maximal time period (in seconds) the stream sources are checked. Sources are periodically checked and the period is dynamically changed. This is the maximum value the period can reach. Default is 30 s. |
| URL1 | 700 | S700 | 100 | | URL of first streaming source<br>Default value:<br>"http://www.barix.com/radio.m3u" |
| URL2 | 800 | S800 | 100 | | URL of second streaming source |

| Parameter | Byte | Dynamic Name | Len | Default | Short Description |
|---|---|---|---|---|---|
| URL3 | 900 | S900 | 100 | | URL of third streaming source<br>Default value: "playlist.m3u" |
| HTTP proxy URL | 1000 | S1000 | 100 | | URL of HTTP proxy server. |
| Update URL | 1100 | S1100 | 100 | | Remote update URL. For further details see chapter 9 Remote Configuration and Update interface. |
| BARIMON URL | 1200 | S1200 | 100 | | URL of BARIMON server. For further details see chapter _Barimon Remote Monitoring. |

# 3  Application Programming Interface (API)

## 3.1  Command interface

Barix Streaming Client features a command processor with several interfaces: Serial, TCP, UDP, CGI (HTTP) and IR remote control. The serial, TCP and UDP command interfaces can be enabled or disabled, the CGI and IR command interfaces are always on. Commands are processed asynchronous to the audio stream.

The available commands are listed in section  below. A general description of the command syntax follows:

- Commands are case sensitive

- General syntax: ***\<cmd\> = \<value\>***
  Where ***\<cmd\>*** is a single ASCII letter and  **=** is the equal sign (ASCII 0x3D)
  Example: **v=10**  sets volume to 50%

- Multiple commands are concatenated using **&**  (Ampersand, ASCII 0x26).
  For example, to move to next song and set volume to 60% use: **c=4&v=12** .
  The commands will be executed from left to right in sequence (not parallel).

- Commands from multiple sources (e.g. TCP and serial) are executed in parallel without defined order

## 3.2  CGI command interface

- Commands are passed to the **rc.cgi**  script using the HTTP GET method

- Example for CGI WEB commands: **http://x.x.x.x/rc.cgi?c=99**  (command for RESET on Streaming Client with IP  address x.x.x.x)

- If "**L=**" is used a specific WEB page or file stored in the FLASH is returned in response, otherwise a blank page is returned

- Respect the common character set for URLs and encode "forbidden" characters.

- A CGI request should not exceed 1024 bytes.

- If password is set on the unit command execution is password protected.
  A valid password must be sent with the "**a=**" command e.g. **http://x.x.x.x/rc.cgi? c=99&a=password**  or within the "Authorization" field of the HTTP request header

## 3.3  Serial command interface

- The serial command interface can be enabled via the WEB UI, by default is off

- The first serial port is used for communication using the configured speed and settings

- A command sequence is terminated by one of the following characters: 0x0A (ASCII LF), 0x0D (ASCII CR) or  0x00 (binary end of string)

- Unless "**L=**" is a part of the command string an answer "OK\r\n" (ASCII 0x4F, 0x4B, 0x0D, 0x0A) is returned in case of success or "ERROR\r\n" (ASCII 0x45, 0x52, 0x52, 0x4F, 0x52, 0x0D, 0x0A) in case of an error

- No authentication required, all commands and pages are accessible independent whether a password is set on the unit

## 3.4  TCP command interface

- The TCP command interface can be enabled via the WEB UI, by default is off

- commands are sent to a configured TCP port, only one client can be connected at a time

- the connection stays open until the client closes it or is closed by the Barix unit after configurable period of inactivity (timeout in seconds)

- A command sequence is terminated by one of the following characters: 0x0A (ASCII LF), 0x0D (ASCII CR) or  0x00 (binary end of string)

- If password is set on the unit the command execution is password protected.
  A valid password must be sent within each command sequence using "**a=**" command, e.g.: **a=password&v=10<LF>**

- Unless "**L=**" is a part of the command string an answer "OK\r\n" (ASCII 0x4F, 0x4B, 0x0D, 0x0A) is returned in case of success or "ERROR\r\n" (ASCII 0x45, 0x52, 0x52, 0x4F, 0x52, 0x0D, 0x0A) in case of an error (including password mismatch)


## 3.5  UDP command interface

- The UDP command interface can be enabled via the WEB UI, by default is off

- commands are sent to a configured UDP port

- commands are processed in sequences,  there is one command sequence per UDP packet, maximum length of a command sequence is 512 bytes

- command sequence is either non-terminated or can be terminated by one of the following characters: 0x0A (ASCII LF), 0x0D (ASCII CR) or  0x00 (binary end of string)

- command response is sent in one UDP packet to the originating IP address and port; the source port is the UDP command port

- If password is set on the unit the command execution is password protected.
  A valid password must be sent within each command sequence using "**a=**" command, e.g.: **a=password&v=10<LF>**

- Unless "**L=**" is a part of the command string an answer "OK\r\n" (ASCII 0x4F, 0x4B, 0x0D, 0x0A) is returned in case of success or "ERROR\r\n" (ASCII 0x45, 0x52, 0x52, 0x4F, 0x52, 0x0D, 0x0A) in case of an error (including password mismatch)

- command response is truncated to 512 bytes


## 3.6  List of commands

| Element | Description | CGI command |
|---|---|---|
| PLAY | Restarts current stream | c=1 |
| NEXTSONG | If current source is playlist, next song starts playing. | c=4 |
| PREVSONG | If current source is playlist, previous song starts playing. | c=5 |
| SHUFFLEON | Shuffle on. | c=6 |
| SHUFFLEOFF | Shuffle off. | c=7 |
| MUTE | Toggle volume mute. | c=8 |
| CHANNELINC | Increment channel number (see chapter 7 IR control interface). | c=15 |

| Element | Description | CGI command |
|---|---|---|
| CHANNELDEC | Decrement channel number (see chapter 7 IR control interface). | c=16 |
| VOLUMEINC | Increment volume by 2% | c=19 |
| VOLUMEDEC | Decrement volume by 2% | c=20 |
| TOGGLESHUFFLE | Toggle shuffle. | c=30 |
| CHANNELINC_2 DIGIT | Increment channel number in the range 0 to 99, used internally with VSC panel | c=71 |
| CHANNELDEC_ 2_DIGIT | Decrement channel number in the range 0 to 99, used internally with VSC panel | c=72 |
| TOGGLEREPEAT | Toggle repeat. If repeat is on, plays the current song in a loop. Valid only for playlists. | c=77 |
| DEFAULTS | Sets factory defaults (if enabled in security settings), preserves network settings and Sonic IP. | c=94 |
| DEVICERESET | Hard reboot of the device. | c=99 |
| BOOTLOADER | Starts the bootloader. The application will be left. It isn't running until the next reboot. | c=100 |
| STANDBY | Switch the device into the stand-by mode (command suitable for the remote management). | c=101 |
| RESUME | Abort the stand-by mode and resume normal operation (command suitable for the remote management). | c=102 |
| TOGGLESTANDBY | Toggle the stand-by mode (suitable for the ON/OFF button on the remote IR controller) | c=103 |
| SLEEP | Toggle sleep. If sleep function is activated, the device automatically switches into standby mode after 30min. | c=104 |
| ICGRAPH_DISCOVERY | Does the same as L=discover.txt Used by IC Graph to discover the device via the command protocol. | c=65535 |
| GETDYNFILE | The response is the dynamic file stored in a cob file with given name. Example: L=index.html | L=… |
| PASSWORD | Concatenate this command with the rest of the command sequence if the command interface is password protected. The password has to be added in plain text. Optionally the password can be provided as a part of the HTTP request header (the "Authorization" field) | a=… |
| PUSHDIGIT0 PUSHDIGIT1 --- PUSHDIGIT9 | Push digit 0. Push digit 1. --- Push digit 9. | r=0 r=1 --- r=9 see chapter 7 IR control interface |
| BASSM10 BASSM09 --- BASSP00 --- BASSP09 BASSP10 | Set minimum bass level set bass level to -9 --- set neutral bass level --- set bass level to +9 set maxium bass level | B=-10 B=-9 --- B=0 --- B=9 B=10 |

| Element | Description | CGI command |
|---|---|---|
| BALM10<br>BALM09<br>---<br>BALP00<br>---<br>BALP09<br>BALP10 | Set balance to full left<br>set balance to -9<br><br>set balance to center<br><br>set balance to +9<br>set balance to full right | b=-10<br>b=-9<br>---<br>b=0<br>---<br>b=9<br>b=10 |
| TREBLEM10<br>TREBLEM09<br>---<br>TREBLEP00<br>---<br>TREBLEP09<br>TREBLEP10 | Set minimum treble level<br>set treble level to -9<br><br>set neutral treble level<br><br>set treble level to +9<br>set maxium treble level | t=-10<br>t=-9<br>---<br>t=0<br>---<br>t=9<br>t=10 |
| VOLUME00<br>VOLUME01<br>---<br>VOLUME20 | Set minimal volume level (volume off).<br>Set volume level 1.<br><br>Set maximal volume level.<br>One step is showed as 5%. The level 0 equals the 0%. | v=0<br>v=1<br>---<br>v=20 |
| VOLUME_PERC<br>ENT | Sets volume in 1% steps.<br>Minimal volume level (volume off).<br>Set volume level 1%.<br>Set volume level 2%.<br><br>Set maximal volume level. | <br>V=0<br>V=1<br>V=1<br>---<br>V=100 |
| TRIGGERED_PL<br>AYBACK | Remotely triggers playback of a file on the local storage. S=-1 triggers the playback of the next file from the configured playlist. S=N, where N is an integer number >=0, triggers playback of the N-th file.<br>See section 5.3 Triggered Message Playback for more details. | S=-1<br>S=0<br>S=1<br>... |
| RELAY_CONTR<br>OL | Controls device relay(s) according to the provided bit mask. Each bit of the right value controls one relay, up to 16 relays are supported (16-bit value). The bit value 0 = relay off, bit value 1 = relay on.<br><br>The value mask is applied only to the relays configured as "control by command".<br><br>Example:<br>R=0 – all relays are off<br>R=1 – relay 1 is on, other relays are off<br>R=2 – relay 2 is on, other are off<br>R=4 – relay 3 is on, other are off<br>R=5 – relays 1 and 3 are on, other relays are off<br>R=8 – relay 4 is on, other relays are off<br>etc. | R=...<br>e.g. R=13 |

# 4  WEB User interface

## 4.1  User Interface Development Kit

With the "User Interface Development Kit" you can design your own web pages (skin) and modify the answers to your needs.
The "UI Development Kit" is included in the "Streaming Client firmware package" which is available on help.barix.com/exstreamer/streaming-client-firmware.

Change to the contained folder **uidevkit**.

The folder **streamapp** holds the original HTML files you need for the web pages, the answer text files, lookup files (ini), graphics and sounds as well as the default configuration file **config.bin**.
You can simply edit these files and/or add new ones.

**Note:** Filenames must not start with **rc.cgi** or **setup.cgi**.

### Web2cob tool

To generate the **streamapp.cob** file start the batch **streamapp.bat** which uses the packaging tool **web2cob.exe**.

Only .cob files up to 192 kilobytes are supported by the Streaming Client.

For the upload of the .cob file to the device, go to the configuration page of the device and click on the button "Update".
After the device has rebooted and the update page appears, click on "Advanced Update".
Enter the correct Target (check the flash memory usage table) in upper case letters.
Select the cob file you want to upload and hit the "OK" button.
Click on the "Upload" button.

### Rules:

- If you upload a .cob file to already used pages the current content will be overwritten

- The web server in the device sees all the targets (.cob files) as one directory

- If two files in different .cob files have the same name then the one from the lower page is chosen.

After the upload reboot the device and reload the modified page in the browser to see the changes.

Depending on the browser's cache strategy, sometimes it's needed to close and reopen the browser to see the changes.

### Original UI Files

The web interface (and the firmware) need at least the following files (more example files might be included):

| Type | Filename.extension | Description |
|------|--------------------|-------------|
| Styles | | |
| CSS | basic.css | Generic font settings for defaults, reboot, update and status pages |
| CSS | help.css | Styles for the help column (right hand column) |
| CSS | menu.css | Styles for the configuration menu (left hand column) |
| CSS | settings.css | Styles for the configuration forms (middle column) |

| Type | Filename.extension | Description |
|------|--------------------|-------------|
| CSS | vumeter.css | Style for VU-meter on the home page |
| Basic frameset | | |
| HTML | index.html | Main page of the web server, frame set including the frames: menu, uifstatus, empty. "empty" is a hidden frame that receives the answer of the CGI commands |
| HTML | menu.html | Horizontal menu and Streaming Client logo frame on the top of the page |
| Image | barix.png | Barix logo |
| "Home" page | | |
| HTML | uifstatus.html | "Home" page: the frame set |
| HTML | uihstatus.html | "Home" page: the help (right hand column) |
| HTML | uistatus.html | "Home" page: the run-time device status |
| HTML | keyboard.html | "Home" page: the device control (left hand column) |
| Image | remote_512.jpg | Image of the remote control – for keyboard.html |
| Image | o0.gif | Relay status indicator: inactive (gray square) |
| Image | o1.gif | Relay status indicator: active (green square) |
| Image | o9.gif | Relay status indicator: not available (white square) |
| Javascript | cmd.js | Scripts to send commands from remote control (keyboard.html) to the device. |
| Javascript | update.js | Scripts for background update of the "Home" page |
| Javascript | vumeter.js | VU-meter object for graphical display of peak levels, buffer level and volume. |
| Text | realtime_status.txt | Realtime status parameters fetched by update.js |
| Configuration | | |
| HTML | uifbasic.html | Basic Settings: the frame set |
| HTML | uibasic.html | Basic Settings: the form with parameters |
| HTML | uihbasic.html | Basic Settings: the help (right hand column) |
| HTML | uimbasic.html | Basic Settings: the menu (left hand column) |
| HTML | uifadvanced.html | Advanced Settings: the frame set |
| HTML | uiadvanced.html | Advanced Settings: the form with parameters |
| HTML | uihadvanced.html | Advanced Settings: the help (right hand column) |
| HTML | uimadvanced.html | Advanced Settings: the menu (left hand column) |
| Javascript | util.js | Javascript functions to check the input values in the configuration (Basic and Advanced Settings) |
| Javascript | visual.js | Javascript functions to show/hide configuration pages in Advanced Settings |
| Logout | | |
| HTML | uilogout.html | logout page |
| Reboot | | |
| HTML | uifreboot.html uireboot.html uihreboot.htmll | Page for device reboot: frame set, content and help |
| HTML | rebooting.html | Page shown while the device is rebooting |
| Image | 4to0.gif | Countdown while the device is rebooting |

| Type | Filename.extension | Description |
|------|--------------------|-------------|
| HTML | uirdefaults.html<br>uirloader.html<br>uirreboot.html<br>uirupdate.html | Shown after pressing "apply" or during reboot of the device |
| HTML | uirdefaults1.html<br>uirreboot1.html | Shown after the device is successfully rebooted |
| Update | | |
| HTML | uifupdate.html<br>uiupdate.html<br>uihupdate.html | Firmware update: frame set, content and help |
| HTML | update.html | Forwarding page to hide the command for the update |
| HTML | uifloader.html<br>uihloader.html | Shown after the device comes into the bootloader: frame set and help |
| Factory defaults | | |
| HTML | uifdefaults.html<br>uidefaults.html<br>uihdefaults.html | Factory defaults: frame set, content and help |
| Status page | | |
| HTML | ixstatus.html | Frameset for the status page |
| HTML | status | Status page showing all configuration and useful run time parameters |
| Sonic IP files | | |
| Sound | 0.mp3 | Sonic IP: spoken "0" |
| Sound | 1.mp3 | Sonic IP: spoken "1" |
| Sound | 2.mp3 | Sonic IP: spoken "2" |
| Sound | 3.mp3 | Sonic IP: spoken "3" |
| Sound | 4.mp3 | Sonic IP: spoken "4" |
| Sound | 5.mp3 | Sonic IP: spoken "5" |
| Sound | 6.mp3 | Sonic IP: spoken "6" |
| Sound | 7.mp3 | Sonic IP: spoken "7" |
| Sound | 8.mp3 | Sonic IP: spoken "8" |
| Sound | 9.mp3 | Sonic IP: spoken "9" |
| Sound | dot.mp3 | Sonic IP: spoken "dot" |
| Configuration and other files | | |
| Binary | config.bin | Factory default settings. The file is binary and it is an exact mirror for the EEPROM Setup record |
| Text | channels.ini | textual description of channels |
| Text | discover.txt | File returned in answer to c=65535 command. Used by IC Graph. |
| Text | inputs.txt | File containing a comma separated list of values of first 8 digital inputs.<br>Value meaning:<br>    0 = input activated or not present<br>    1 = input not activated<br>Further, for 4-state inputs:<br>    2 = short circuit<br>    3 = not connected |
| Text | mimetype.ini | MIME type database for the WEB server, see section "The WEB Server" below |

| Type | Filename.extension | Description |
|------|-------------------|-------------|
| Text | remote.ini | lookup file for IR commands, see section File "remote.ini" |
| Text | SONICIPVERSION | for the version number of SonicIP implementation |
| Text | STREAMAPPVERSION | for the version number and the history of Streaming Client |
| Text | update.ini | lookup file for names used in remote controlling, see section File "update.ini" |
| Text | ex110.ddf<br>vsc.ddf<br>vsc95a03.ddf | Display definition files for Exstreamer 110/120 and VSC panel (old and new); see section Display interface |

## 4.2  The WEB Server

The Firmware runs two WEB server processes, which by default serve incoming HTTP requests on TCP port 80. The port number can be changed by setting the W263 parameter in Setup (see the Web Server Port parameter on page 14). HTTPS is not supported on the device.

**Mimetype.ini**

To return a proper MIME type for each file, a database of valid MIME types is held in the FLASH file **mimetype.ini**. This text file contains a translation table from file extension to a MIME type. The MIME type database should be updated in case new file types are added to the WEB UI. If the file extension is not recognised, no MIME type description is returned to the browser and it is upon the browser to interpret the data correctly or to guess the file format.

The format of the MIME database is following:

- each file extension/MIME type pair is on a separate line

- lines are terminated by CR/LF (ASCII 0x0D 0x0A) or a single LF (ASCII 0x0A)

- the file content is case-sensitive

- a line starts with the file extension (without the leading dot and in the proper case), followed by a single space character (ASCII 0x20) and by the MIME type

- the line order is not significant

| Default content of the **mimetype.ini** file |
|-----------------------------------------------|
| **html text/html**<br>**gif image/gif**<br>**jpg image/jpeg**<br>**png image/png**<br>**js application/x-javascript**<br>**mp3 audio/x-mpeg**<br>**css text/css** |

**Backwards compatibility**

> Please note that in the Streaming Client versions prior to 02.09 the MIME types were statically stored in the FLASH files by the **web2cob** tool at the creation time of the COB file. To avoid conflict with the previous versions the file **webuidevkit/mimetype.ini** in the rescue kit must be kept empty. The new **mimetype.ini** file (as described above) resides in the **webuidevkit/streamapp/** directory.

## 4.3  Dynamic Web Pages

Web pages can include dynamic values. Dynamic Web Pages are built in HTML or XML or in an other text file format that exclude the binary character 0x00, i.e. the dynamic page can be an HTML file. It's possible to use scripts or everything else allowed in the given document's file format.

### Initial Dynamic Mark

In order to indicate that Web page is dynamic, it has to contain the special initial dynamic mark **&L(0,"*");** in the first 500 Bytes and before any other dynamic value is used. The initial mark can also have decimal number as its optional third parameter. Example of such initial mark is **&L(0,"*",1);** .

The third parameter is parsed bitwise and has the following meaning:

- bit 0 is reserved for backwards compatibility and can be set to any value
- bits 1-3 select the password level (as a 3-bit number), which protects this page; 0 for no password protection
- bits 4-6 are reserved for future use and should be set to 0
- bit 7 is reserved for backwards compatibility and can be set to any value

### Syntax of Dynamic Marks

Dynamic marks can be used to put dynamic values in Web pages. All dynamic marks have the following syntax: **&L<name>(<id>,<format>[,par]);**
A dynamic mark always starts with &L and it is always case sensitive.

- **<name>** selects a group of dynamic values. Defined is the "Setup" group for all configuration parameters and the "State" group for actual parameter states. Remaining parameters are included in parentheses, with the right parenthesis followed by a semicolon.
- **<id>** determines the desired function.
- **<format>** is a C-style format string (refer to the ANSI documentation).
- **<par>** are optional additional parameters. If additional parameters are needed, it is mentioned in the function lists below.

**Note:** The string "**);**" is not allowed inside a dynamic mark.
To have this construct inside the format string, use "**)\;**"(in an unknown escape sequence, only the '**\**' will be removed).
To have a "**%**" sign (percent sign) inside the format string, use "**%%**" (two signs without space).

The whole mark is replaced by the dynamic value formatted with the **<format>** string. Only one value is allowed per dynamic mark. The length of the dynamic mark mustn't exceed 500 characters. The resulting string  from the dynamic mark must not exceed 500 characters.

A dynamic mark can be contained in an another dynamic mark. Only one recursion step is allowed and correct "escaping" has to be applied. Example:

**&LSetup(3,"%s",419,B,!0,"<meta http-equiv=refresh content=\"&LSetup(1,\"%u\",419)\;; url=info.html\">");**

Note the special "**\**" before the semicolon of the dynamic mark inside. This is because the escape sequence is interpreted as only a semicolon and is needed in order to include the prohibited sequence "**);**"  inside a dynamic mark.

### List of Dynamic Mark IDs for &LSetup

| ID | Type | Description |
|---|---|---|
| 1 | Function | Print setup value<br>3. [par]: Address (decimal) of the value in the setup<br>4. [par]: Type of the value (B for unsigned byte, W for word, D for double |

| ID | Type | Description |
|---|---|---|
| | | word, c for char/signed byte, b for bit numbered from 0 to 7, e.g. **b3** for the fourth bit). If this parameter isn't available the type will be B.<br>e.g. **&LSetup(1,"%08lx",315,D);** as hexadecimal value with 8 characters and leading zeros<br>e.g. **&LSetup(1,"%lu",311,D);** as unsigned long decimal value |
| 2 | Function | Print Netmask Byte<br>3. [par]:Address (decimal) of the value in the setup<br>4. [par]: Byte number of the Netmask IP address byte starting with 0 for the first left byte and incremented by one for the next bytes |
| 3 | Function | Print string if equal<br>Compares a Setup entry with a value and outputs a string if the condition is true.<br>3. [par]: Address (decimal) of the value in the setup<br>4. [par]: Type (see id 1 above)<br>5. [par]: value to compare. By default compared as "x=y". Alternatively operators !, > or < can be prepended to the value (no spaces between) to compare "x!=y", "x>y" or "x<y"<br>6. [par]: string for output if value at address is equal to 5. [par] |
| 4 | Function | Print string<br>3. [par]: Address (decimal) of the value in the setup |
| 5 | Byte (integer) | Firmware Version Major |
| 6 | Byte (integer) | Firmware Version Minor |
| 7 | Byte (integer) | Bootloader Version Major |
| 8 | Byte (integer) | Bootloader Version Minor |
| 9 | Function | Prints the version out of a standard version file in a *.cob application<br>3. [par]: name of the version file<br>4. [par]: 1 for major version number (byte), 0 for minor version number (byte) |
| 10 | Byte (integer) | year of the firmware build (only decade), BCD coded, use %02x to print |
| 11 | Byte (integer) | month of the firmware build, BCD coded, use %02x to print |
| 12 | Byte (integer) | day of the firmware build, BCD coded, use %02x to print |
| 13 | Byte (integer) | sg.bin (Audio and Utility library) Version Major |
| 14 | Byte (integer) | sg.bin (Audio and Utility library) Version Minor |
| 15 | Byte (integer) | fs.bin (USB file system) Version Major |
| 16 | Byte (integer) | fs.bin (USB file system) Version Minor |
| 17 | String | sg.bin (Audio and Utility library) date of the build |
| 18 | Byte (integer) | reserved |
| 19 | Byte (integer) | reserved |
| 20 | Byte (integer) | fs.bin (USB file system) year of the build (only decade), BCD coded, use %02x to print |
| 21 | Byte | fs.bin (USB file system) month of the build, BCD coded, use %02x to print |

| ID | Type | Description |
|---|---|---|
|  | (integer) |  |
| 22 | Byte (integer) | fs.bin (USB file system) day of the build, BCD coded, use %02x to print |
| 23 | Function | Print "selected" on condition<br>Compares a Setup entry with a value and outputs "selected" if the condition is true. Used in <select> WEB forms.<br>Parameter 2 is ignored and can be set to an empty string("")<br>3. [par]: Address (decimal) of the value in the setup<br>4. [par]: value to compare. By default compared as "x=y". Alternatively operators !, > or < can be prepended to the value (no spaces between) to compare "x!=y", "x>y" or "x<y" |
| 24 | Byte (integer) | rupdate.bin (Remote update module) Version Major |
| 25 | Byte (integer) | rupdate.bin (Remote update module) Version Minor |
| 26 | Byte (integer) | rupdate.bin (Remote update module) year of the build (only decade), BCD coded, use %02x to print |
| 27 | Byte (integer) | rupdate.bin (Remote update module) month of the build, BCD coded, use %02x to print |
| 28 | Byte (integer) | rupdate.bin (Remote update module) day of the build, BCD coded, use %02x to print |

## List of Dynamic Mark IDs for &LState

| ID | Type | Description |
|---|---|---|
| 1 | Function | Print status variable<br>3. [par]: Variable index, see the parameters table below, e.g.<br>**&LState(1,"%s",12);** prints out device's MAC address |
| 2 | Function | Print string if condition is true<br>3. [par]: Index of the variable to be compared, see the parameters table below<br>4. [par]: value to compare. Variable is compared with the value "if equals", the prefixes !, > or < can be used to change the comparison (no spaces between allowed). If comparing variable with a string, the string has to be quoted ( e.g. "string")<br>5. [par]: string to output output if condition is true. The string has to be quoted. |

## List of Dynamic Mark Parameters for &LState

| Par | Type | Description |
|---|---|---|
| 0 | Boolean (Int.) | File system present (1 if present) |
| 1 | Integer | File system type (0,1,2,4,8) 0=unknown, 1=FAT12, 2=FAT16, 4=VFAT, 8=FAT32 |
| 2 | Integer | File system serial number |
| 3 | Integer | Audio volume in 1% steps |
| 4 | Integer | Current stream number (or 99 for priority stream) |
| 5 | Integer | Last error (number) |
| 6 | Integer | Audio buffer level |
| 7 | Integer | Lost frames counter. Resets with every RTP stream (reconnect or a new sequence of frames). |
| 8 | Integer | Soft error counter |

| Par | Type | Description |
|---|---|---|
| 9 | String | Current URL ("PRIORITY" when receiving priority stream, "STDBY" when in standby mode) |
| 10 | Integer | Stream bit rate in kilobits per second |
| 11 | Integer | Reconnection counter |
| 12 | String | Device's MAC address (each byte separated by a colon e.g. 00:08:E1:00:3D:90) |
| 13 | String | Current IP address (four numbers, dot separated, without leading zeroes) |
| 14 | Integer | USB device vendor ID |
| 15 | Integer | USB device product ID |
| 16 | Integer | USB device class |
| 17 | Integer | USB device subclass |
| 18 | Integer | USB interface class |
| 19 | Integer | USB interface subclass |
| 20 | Integer | USB device's max. power consumption in milliamperes |
| 21 | Boolean (Int.) | USB device attached |
| 22 | Integer | USB device capacity in kilobytes |
| 23 | Integer | Number of audio bytes transferred to the codec since playback start |
| 24 | Integer | Current channel number |
| 25 | String | Current netmask (four numbers, dot separated, without leading zeroes) |
| 26 | String | Current gateway address (four numbers, dot separated, without leading zeroes) |
| 27 | String | Current address of the first nameserver (four numbers, dot separated, without leading zeroes) |
| 28 | Integer | Hardware identification (hardware type) |
| 29 | Boolean (Int.) | Shuffle – current state |
| 30 | Boolean (Int.) | Repeat – current state |
| 31 | Integer | Number of relays supported by the current hardware |
| 32 | Integer | Player process status: 0=idle, 1=buffering, 2=playing |
| 33 | Integer | Stand-by mode: 0=off (normal operation), 1=on (stand-by) |
| 34 | String | Song title: Title of the currently played song/Name of the internet radio station. |
| 35 | Integer | Duration of the current data in the audio buffer in milliseconds (for RTP streaming only). |
| 36 | Integer | Number of dropped frames due to the RTP buffer management (can indicate that the encoder runs faster than the decoder). Resets with every RTP stream (reconnect or a new sequence of frames). |
| 37 | Integer | Number of duplicated frames due to the RTP buffer management (can indicate that the encoder runs slower than the decoder). Resets with every RTP stream (reconnect or a new sequence of frames). |
| 38 | Integer | Average duration of the data in the audio buffer in milliseconds (for RTP streaming only). |
| 39 | Integer | System uptime in milliseconds |
| 40 | Integer | System uptime in seconds |
| 41 | Integer | Time of the occurrence of the last error (in seconds) |
| 42 | Integer | Currently decoded audio format: |

| Par | Type | Description |
|---|---|---|
| | | 0 = MP3<br>1 = u-Law<br>2 = A-Law<br>3 = PCM<br>5 = WMA<br>6 = Ogg Vorbis<br>7 = AAC/AAC+ |
| 44 | Integer | Codec type<br>0 = invalid<br>1 = MAS3509<br>2 = MAS3587<br>4 = VS1003<br>5 = VS1023<br>6 = VS1033<br>7 = VS1053<br>8 = VS1063 |
| 45 | Integer | IPAM identification (module type) |
| 46 | Integer | Flash memory size in kB |
| 47 | Boolean (Int.) | Remote firmware update:<br>0 = not available (flash too small)<br>1 = available |
| 49 | Integer | Left audio output channel quasi peak in dBFS |
| 50 | Integer | Right audio output channel quasi peak in dBFS |
| 51..66 | Integer | Current state of the relay 1..16:<br>0=not activated<br>1=activated<br>9=not available on the hardware |
| 1000.. | Integer | Access to device I/O registers. Returns the value of I/O register "par-1000". See complete I/O table for each hardware device in ABCL Technical Documentation. |

## 4.4  Configuration via HTML Pages

The HTML pages for the device configuration use the "dynamic web page" functionality. All of the configuration parameters are placed in HTML forms and are transferred by the "POST" method. Input values can be checked by Javascript to prevent incorrect values (see example below). Not all configuration parameters have to be present in the form. It is possible to have only a part of the configuration on a web page. The form has to start with the following three tags:

**<form method=POST action=setup.cgi target="empty">**

**<input type="hidden" type="text" name=S480 value=__target__>**

**<input type="hidden" type="text" name=L value=rebooting.html target=_top>**

Please note that the above example illustrates the default WEB UI HTML set. It is possible to design custom pages with a different structure, then the targets of the form and of the **rebooting.html** as well as the answer page can be different.

After submitting the configuration the page **rebooting.html** is returned while the device reboots. On error the respective error code is returned without ddisplaying the page **rebooting.html**.

The page **rebooting.html** contains a count-down timer and a redirect back to the configuration page. The value __*target*__ specifies the name of the page to be redirected to

(without the ".html"; i.e. "uisettings") and should correspond to the name of the HTML file. I.e. in **uinetwork.html** the value contains:

**<input type="hidden" type="text" name=S480 value=uinetwork>**

Please note that the maximum length of the target page is 16 characters. To prevent collision and a potential damage of the configuration in case of simultaneous access only one client is allowed to access **setup.cgi** at a time.

## Examples

The following example shows how to implement a form field for the configuration value of the highest byte in the 'own IP address'.
The input element name is a defined string, which has to be handled with care. The type character **B** stands for an unsigned value. **0** is the address of the expected configuration parameter . The value is a dynamic mark. The string **onChange=IPCheck(this)** will call the Javascript **util.js** to check if the value entered is in the range of 0 to 255.

**<input name=B0 size=3 maxlength=3 value=&LSetup(1,"%u",0); onChange=IPCheck(this)>**

In the next example the name selects the configuration parameter "DHCP Host Name".

**<input name=S98 size=15 maxlength=15 value="&LSetup(4,"%s",98);">**

This example shows how to implement a form field for the configuration of the Netmask. The names for the bytes of the Netmask are **N8B0**, **N8B1**, **N8B2** and **N8B3**. **8** is the address of the Netmask in the configuration memory. The value after the **B** is the byte number of the byte in the Netmask starting with **0** for the first byte at the left. This special handling for Netmask is needed because the Netmask is stored in one byte and not like the IP address in 4 bytes. The string **onChange=netMaskCheck(this)** will call the Javascript **util.js** to check if the value entered is in the correct range.

**<input name=N8B0 size=3 maxlength=3 value=&LSetup(2,"%u",8,0); onChange=netMaskCheck(this)>**

The next example shows how to implement a form field for the configuration of the parameter "Volume" as a selection. If the value of the configuration parameter is equal to the second last parameter in the dynamic mark it will be replaced by the last parameter of the dynamic mark.

```
<select size=1 name=B244>
        <option value=0 &Lsetup(3,"%s",244,B,0,"selected");>0</option
        <option value=1 &Lsetup(3,"%s",244,B,1,"selected");>5</option>
        ......
        <option value=19 &Lsetup(3,"%s",244,B,19,"selected");>95</option>
        <option value=20 &Lsetup(3,"%s",244,B,20,"selected");>100</option>
</select><font size=2>
```

This example shows how to implement radio buttons for the configuration parameter 'Sonic IP'. The functions of the dynamic marks are equal to the example above.

**<input type=radio name=B277b7 value=0&LSetup(3,"%s",277,b7,0," checked");>Yes**
**<input type=radio name=B277b7 value=1&LSetup(3,"%s",277,b7,1," checked");>No**

To transmit the new configuration data to the device the submit input type of the form is used.

```
<input type=submit value=" Apply ">
```

By pressing the Apply button the new configuration data will be transferred to the device. It will store the new data to its configuration memory (EEPROM).
After this it sends the answer (see above) to the browser and reboots itself to apply the new configuration.

Passwords are hashed (MD5) and stored in memory and set using the name **Px**, where **x** stands for the password level.
If the password is set already, the old password must also be supplied (with the name **Px**) together with the new password using the name **Px.1** (P level dot one).

```
<tr>
     &Lsetup(3,"%s",130,D,0,"
     <td><b><font size=2>Set Password</font></b></td>
     <td><input name=P1 size=18 maxlength=25 type=password
value=></td>
     ");
     &Lsetup(3,"%s",130,D,!0,"
     <td><b><font size=2>Old Password</font></b></td>
     <td><input name=P1 size=18 maxlength=25 type=password
value=></td>
</tr>
<tr>
     <td><b><font size=2>New Password</font></b></td>
     <td><input name=P1.1 size=18 maxlength=25 type=password
value=></td>

     ");
</tr>
```

**Px** and **Px.1** can also be used for remote configuration.

## Form element names

- If the value is an nusigned integer (1 byte) the first character is a **B**.
- If the value is an IP address the first character is an **I**, the complete IP address can be set as a string at once e.g.:
  **I0=192.168.1.2** (same as **B0=192 B1=168 B2=1 B3=2**) for IP address
  **I4=192.168.1.1** (same as **B4=192 B5=168 B6=1 B7=1**) for Gateway IP address
- If the value is a Netmask the first character is an **N**, e.g.:
  **N8=255.255.255.0** (same as **N8B0=255 N8B1=255 N8B2=255 N8B3=0**)
- If the value is a string the first character is an **S**.
- If the value is a word (2 bytes) the character is a **W**.
- If the value is a signed integer (2 bytes) the character is an **i**.
- If the value is a double word (4 bytes) the first character is a **D**.

The following decimal value in the name is the address of the configuration parameter (see chapter _).

To set a bit in a configuration parameter (e.g. Media Configuration) add the character **b** followed by the number of the bit (starting at 0), e.g.:
**b7** for the 8. bit in the byte.

Examples of names:

- **B0**          first (left) byte of the configuration parameter 'own IP address'

- **B1**      second byte of the configuration parameter 'own IP address'
- **N8B0**    first (left) byte of the Netmask
- **N8B1**    name of the second byte of the Netmask
- **N8**      Netmask
- **S98**     DHCP Host Name
- **B277b7**  Sonic IP

- **B1**      second byte of the configuration parameter 'own IP address'
- **N8B0**    first (left) byte of the Netmask
- **N8B1**    name of the second byte of the Netmask
- **N8**      Netmask
- **S98**     DHCP Host Name
- **B277b7**  Sonic IP

# 5  Streaming Settings

## 5.1  Streaming URLs

This chapter gives an overview of the supported URL protocols. The general URL syntax is:

**protocol://user : password @ address : port /path**

| Protocol | Description | Example |
|---|---|---|
| **file://** | **Local file playback** (from USB storage or an SD card).<br>Prefix is followed by a full path to a file or playlist.<br>The "file://" prefix can be omitted. | **file://music/backup.m3u** |
| **http://**<br>**icy://**<br>**icyx://** | **HTTP or Shoutcast/Icecast protocol**.<br>An IP/DNS address must be provided, usually is followed by a path to a playlist, file or stream. A specific TCP port can be provided, otherwise standard port 80 is used. In case user name/password are provided then the Streaming Client authenticates itself to the server with the credentials. HTTPS streams are not supported! | **http://www.barix.com/radio.m3u** |
| **rtp://** | **Real-time Transport Protocol**.<br>Requires an IP/DNS address and a UDP port. The address can be:<br>• 0.0.0.0 – any stream coming to the configured port is played<br>• multicast address – Streaming Client subscribes to the multicast group and plays the stream<br>• unicast address – only a stream from that specific address is played (source address filtering) | **rtp://0.0.0.0:3030** |
| **brtp://** | **Barix extension to RTP** to pull a stream.<br>Requires an IP/DNS address and a UDP port. The address must be a unicast or multicast address. The Streaming Client sends a request for RTP stream to the configured address and then plays the incoming stream. | **brtp://** |
| **null://** | **Special URL** that does not output anything and is always present.<br>Can be used in playlists to mute the output.<br>E.g. if you use dynamically generated playlists with channels and want to make certain channels unavailable to specific customers/devices. | **null://** |
| **line://** | **Line input** on Exstreamer 205.<br>This URL is "present" only if channel 0 is selected. It passes analogue signal from the line input to the speakers.<br>To use line input on channel 0 and other channels for streaming put "line://" into URL1 and your stream URL into URL2.<br>**NOTE:** the volume does not affect the line-in signal strength, the signal is passed at fixed volume level. An additional attenuation can be configured in the "Audio and Playback" section of the Advanced settings. | **line://** |

## 5.2 URL Variable Substitution

URLs may contain variables which are processed and substituted by their values. Variables have syntax **$NAME$** , where name consists of printable upper case characters other than '$'. Following variable names are defined:

| Name | Description | Example |
|------|-------------|---------|
| **MAC** | Device MAC address (12 digits in hexadecimal notation with no separators, A..F digits in capital letters) | **0008E1002B0E** |
| **IP** | Device IP address (four numbers, dot separated, without leading zeroes) | **192.168.2.202** |
| **NAME** | DHCP Host name (ASCII string configured in network settings) | **XSTREAM1** |
| **NUM** | channel number (three digits) | **003** |

When the device is fetching a stream then the above variables will be substituted. This allows for specific tasks like identification, zoning and logging of the device. The variable **$NAME$** for an example could be used to group several devices to a zone which will be supplied with different streams by the server analyzing the name of the fetching device.

Example:

- URL1: **http://myserver.com:4567/device.cgi? zone=$NAME$&id=$MAC$&logip=$IP$**
- URL1: **http://myserver.com:4567/device.cgi? channel=$NUM$&id=$MAC$&logip=$IP$**

The variable **$NUM$** can also be used to select numbered playlists stored on a USB memory stick using the IR remote control**.**

The variable **$MAC$** can be used e.g. also for the Remote Update function as file name and would allow to use a separate configuration file for each device.

## 5.3 Triggered Message Playback

Streaming Client supports playback of files from a local storage triggered remotely via Shoutcast or by a command. This can be useful e.g. for playing local adverts, pre-recorded announcements, etc. To use this feature enter a playlist name in the Priority section of Advanced Settings.

The following special names in StreamTitle section of Shoutcast metadata (song name) are recognised:

- **BARIX song next** : plays next song from the priority playlist

- **BARIX song N** : where N is an integer number, plays N-th file from the playlist. N counts from 0.

Further, the playback can be triggered with the **S=N** command:

- **S=-1** : plays the next song from the priority playlist

- **S=N** : where N is an integer number, plays N-th file from the playlist. N counts from 0.

When such a trigger is received, the current playback (URL1-3) stops, the requested file from the local playlist is played and when the file ends then the normal playback (URL1-3) starts again. The triggered playback is considered as priority and therefore also "Priority message" appears on device's display.

If Shuffle is on the "next song" command picks up a random song. The play N-th file command is not affected by shuffle.

**NOTE 1:** Please note that the triggered playback cannot be interrupted, therefore the files should be reasonably short.

**NOTE 2:** Triggered playback and priority message work exclusively. If a priority message is being received then triggered playback is ignored and vice versa.

**NOTE 3:** It is important that Streaming Client receives the Shoutcast trigger only once, otherwise the message will be repeated.

# 6  Audio Formats

## 6.1  RTP

Audio format is automatically detected from payload type of the the incoming RTP stream (on both standard and priority stream). The following table provides an overview of the formats recognized by Streaming Client.

| Payload type | Audio Format |
|---|---|
| 0 | µ-Law, 8bit, mono, 8kHz |
| 8 | A-Law, 8bit, mono, 8kHz |
| 9 | G.722, mono, 16kHz     (requires IPAM102 inside to play) |
| 10 | PCM 16bit, MSB first, signed, 44.1kHz stereo, left channel first |
| 11 | PCM 16bit, MSB first, signed, 44.1kHz mono |
| 14 | MPEG audio |
| 96 | PCM, 16bit, MSB first, signed,  8kHz mono |
| 97 | µ-Law, 8bit, mono, 24kHz |
| 98 | A-Law, 8bit, mono, 24kHz |
| 99 | PCM, 16bit, MSB first, signed, 24kHz mono |
| 100 | µ-Law, 8bit, mono, 32kHz |
| 101 | A-Law, 8bit, mono, 32kHz |
| 102 | PCM, 16bit, MSB first, signed, 32kHz mono |
| 103 | PCM 16bit, MSB first, signed, 48kHz stereo, left channel first |
| 104 | PCM, 16bit, LSB first, signed,  8kHz mono |
| 105 | PCM, 16bit, LSB first, signed, 24kHz mono |
| 106 | PCM, 16bit, LSB first, signed,  32kHz mono |
| 107 | PCM 16bit, LSB first, signed, 44.1kHz stereo, left channel first |
| 108 | PCM 16bit, LSB first, signed, 48kHz stereo, left channel first |
| 109 | µ-Law, 8bit, mono, 12kHz |
| 110 | A-Law, 8bit, mono, 12kHz |
| 111 | PCM, 16bit, MSB first, signed, 12kHz mono |
| 112 | PCM, 16bit, LSB first, signed,  12kHz mono |
| 126 | AAC ADTS |

**Note:** Only some Payload types are standardized, 3rd party application could use for non-standardized formats other Payload types what could result in bad audio or incompatibility !

### AAC over RTP

As there is no standard for AAC in RTP yet, the format depends on the vendor. Two major formats of AAC encapsulation are used on the network: RAW and ADTS.

Streaming Client is capable to decode RTP with AAC encapsulated in ADTS. Set your AAC encoder device to:

- payload type 126
- AAC encapsulated in ADTS format; RAW is not supported

Both PS (parametric stereo) and SBR (spectral band replication) are supported in AAC/AAC+

decoding.

# 7 IR control interface

When using IR Remote Control, make sure there is line of sight between the IR Serial receiver and the IR Remote control.

## IR Buttons

With the default factory configuration, following buttons can be used:

- +VOL/-VOL – Volume up/Volume down
- +SONG/-SONG – Next song/Previous song (for use with playlists)
- SHUFFLE – Toggles the Shuffle Play Mode
- The digit buttons (0..9) and the Play button (4) can be used to select channel number.
- Buttons PLIST+ and PLIST- increase/decrease the channel number by one. To start playback of the selected channel, the Play button has to be pressed.
- MUTE – Toggles volume mute
- ON/OFF – Toggles the Stand-by mode, see below

## Channel Selection

The channel number can be used as a part of the source URL (see chapter 5.2 URL Variable Substitution for details). The channel number is common for all three source URLs.

Last three digits pressed within five seconds before pressing 4 are set (from left to right) as the channel number.
If less than three digits were pressed within five seconds before 4, remaining positions (from left) are filled with the current channel number (reverted).

The channel number can be also selected by pressing PLIST+/PLIST- buttons, which increase/decrease the channel number. After channel selection, the Play button MUST be pressed to confirm the selection.

If multiple sources are configured, the Play button (4) forces playback restart from URL1 (without checking the actual availability of URL1). This can be useful if a backup USB stream is playing and the selected channel (higher priority network stream) is not available – the Play button aborts the USB playback and forces the network stream to play.

The current channel number is stored in Setup (W293) and retrieved after reboot.

Examples:

- After pressing 2,3,4 the channel number will be 023
- After pressing 1,4,5,6,7, 4 the channel number will be 567
- Playing channel 15; after pressing PLIST-, PLIST-, 4 the channel number will be 13

## Stand-by Mode

To reduce network bandwidth usage and decrease associated costs for transferred data, the device features Stand-by Mode. In this mode the device stops checking source availability and streaming (including playback from USB source) and goes idle. The Remote Configuration and Update function, Barimon and SNMP monitoring, Web server, IR remote control as well as Priority message stay active in the Stand-by Mode.

Stand-by Mode can be toggled by the ON/OFF button on the IR remote controller or externally triggered by issuing the STANDBY or RESUME command (e.g. using the Remote Configuration and Update function). A typical usage is e.g. in instore applications during closing-time.

## File "remote.ini"

The commands triggered by each button of the IR Remote Control can be user defined. To upload the altered **remote.ini** file follow the procedure described in chapter 4.1 User Interface Development Kit. The **remote.ini** file in the sub folder **webuidevkit/streamapp** contains the commands for each button in a separate line. The file format is comma-separated and the values are case-sensitive. Don't write spaces between the separation, the only space needed is

the one after the IR coding token ("**NE:** " stands for NEC coding). Every line that doesn't contain an IR remote control command is handled as a comment.

- The first field is the IR remote control code sequence received from the remote control (e.g. "**NE: 00FE7887** " for the play button).
- A "**\***" in the second field tells the IR handler that this button is accepted for repetition (as defined for Volume + and Volume -).
- The third field is not used and should be empty.
- The fourth and following fields contain commands. The commands can be chained using the ampersand ('&') character. The commands are executed in the given sequence.
- In fourth field, an "**L**" followed by a decimal number tells to the IR handler to switch to numbered level for the next command. To select the command for the corresponding level, simply add more fields to the end of the line for that button. The fifth field is for the level 1, the sixth field is for the level 2 and so on. The maximal level is 255. The selected level is declined after 2 seconds or when the next button is pressed.

Example: Execute NEXTSONG command upon pushing the +SONG button on the remote control when in level 0: "**NE: 00FE48B7,,,c=4** "

Channel number selection can be implemented using IR Remote Control. There is a three digit buffer in the firmware, that can be used with "r=x" and "c=1" commands. The "r=0"..."r=9" commands push digits to the buffer and the "c=1" command sets the value of the NUM variable to the current value of the buffer. The buffer is cleared to the "currently being played" value if no digit have been pressed for 5 seconds.

| Excerpt of the remote.ini file contained in the "Streaming Client Update Kit" |
|---|

```
Exstreamer Remote Control NEC 00FE
NE: 00FE7887,,,c=1
NE: 00FE08F7,,,c=2
NE: 00FED827,,,c=3
NE: 00FE48B7,,,c=4
NE: 00FE6897,,,c=5
NE: 00FEF807,,,c=8
NE: 00FE00FF,,,c=15
NE: 00FEB04F,,,c=16
NE: 00FEA857,*,,c=19
NE: 00FEC837,*,,c=20
NE: 00FEB847,,,c=30
NE: 00FE38C7,,,c=77
NE: 00FE30CF,,,r=0
NE: 00FE40BF,,,r=1
NE: 00FEC03F,,,r=2
NE: 00FE20DF,,,r=3
NE: 00FEA05F,,,r=4
NE: 00FE609F,,,r=5
NE: 00FEE01F,,,r=6
NE: 00FE10EF,,,r=7
NE: 00FE906F,,,r=8
NE: 00FE50AF,,,r=9
NE: 00FED02F,,,s=
NE: 00FE8877,,,c=104
NE: 00FE807F,,,c=103
```

**Barix IR Remote Control Button Assignment**

| Button | IR code sequence | Button | IR code sequence |
|--------|------------------|--------|------------------|
| 0 | **NE: 00FE30CF** | * | **NE: 00FED02F** |
| 1 | **NE: 00FE40BF** | # | **NE: 00FE8877** |
| 2 | **NE: 00FEC03F** | + VOL | **NE: 00FEA857** |
| 3 | **NE: 00FE20DF** | - VOL | **NE: 00FEC837** |
| 4 | **NE: 00FEA05F** | + SONG | **NE: 00FE48B7** |
| 5 | **NE: 00FE609F** | - SONG | **NE: 00FE6897** |
| 6 | **NE: 00FEE01F** | MUTE | **NE: 00FEF807** |
| 7 | **NE: 00FE10EF** | ON/OFF | **NE: 00FE807F** |
| 8 | **NE: 00FE906F** | PLIST + | **NE: 00FE00FF** |
| 9 | **NE: 00FE50AF** | PLIST - | **NE: 00FEB04F** |
| Play 4 | **NE: 00FE7887** | SHUFFLE | **NE: 00FEB847** |
| Stop < | **NE: 00FE08F7** | REPEAT | **NE: 00FE38C7** |
| Pause ; | **NE: 00FED827** | WAKEUP | **NE: 00FE38C7** |

| Button | IR code sequence | Button | IR code sequence |
|--------|------------------|--------|------------------|

# 8  Display interface

On Barix devices featuring an LCD (Exstreamer 110), additional device status information is displayed, as follows:

- **At startup:** welcome message followed by device's IP address

- **During normal operation** : status, channel number, URL number, current bitrate, song name if available (see below)

- **On user request:** shuffle on/off, volume change, channel selection, factory defaults, reboot

- **During remote update:** status of the update, firmware update indication

The display content and its layout is freely programmable using the Display Interpreted Language Library (DILL). Two displays are supported per device: the built-in display and a display attached via the serial port (e.g. the VSC panel). The display content is defined for each display (can be different) in a separate Display Definition File (**.ddf**) There are two DDF files in this version of the Streaming Client: **ex110.ddf** and **vsc.ddf.**

The display layout described in this section refers to the default DDF fiels provided in the package.

The DILL language is described later in this section.

## Song information

During playback the current song information is shown on the display.

The song information (name, artist, radio station...) is retrieved either from the **#EXTINF** data from an M3U playlist (playlist playback), or from a Shoutcast server (Shoutcast playback) from the metadata (**StreamTitle**) and the from the header (**icy-name**).

The following list shows the displayed information by availability (the first available is displayed):

1. song name (Shoutcast metadata **StreamTitle)** and/or radio station name (Shoutcast **icy-name**)

2. song name from the playlist (**#EXTINF** data**)**

3. channel name from **channels.ini** if available (see below), if the current URL contains the channel variable **$NUM$**

4. "Channel" followed by the current channel number, if the current URL contains the channel variable **$NUM$**

5. "URL" followed by the current URL number (1, 2 or 3)

## Channel names

The user can define an optional name for each channel. The channel names are stored in the file **channels.ini** in the FLASH memory. Each name is stored on a separate line, the end-of-line marker is either LF (linefeed, ASCII 0x0A) or CR LF (carriage-return, line-feed; ASCII 0x0D 0x0A). The first line contains the name of channel 000, the second line contains the name of channel 001, etc.

The length of the channel name is limited by the display size.

**channels.ini** does not have to cover all 1000 channels. If the **channels.ini** file does not exist, or the appropriate line in the file is empty or not present (file too short), the channel number is printed instead of the channel name.

**Example 1:** only the first 10 lines of **channels.ini** are present. The appropriate channel name is displayed for channels 000 to 009; for channels 010 to 999, the channel number is displayed.

**Example 2:** only the name of channels 017, 020 and 021 is defined. **channels.ini** contains 17 empty lines, followed by the name of channel 017 on the next line, followed by two empty lines and channel names for 020 and 021 on the last two lines.

By default, the **channels.ini** file is empty.

## 8.1  The DILL Language

### Introduction

The purpose of the DILL interface is to define a generic interpreted language describing display content and events.

The DILL language is simple (in terms of complexity) to allow low memory fingerprint of the interpreter as well as small size of the display description file.

It does not feature any text identifiers, but all functions, variables, etc. are indexed. The indexing is described further in this section.

### Language elements

The language describes **FUNCTIONS** which are called by the application on specific events. E.g. when the user changes the volume, when the song changes, etc.

A function can manipulate the content of the display or control the execution of the program (see the Program Execution section below).

A function is a set of **COMMANDS**. A command is an elementary operation like print, scroll, wait, etc. The commands are executed sequentially. Every command has a name in the format of one capital letter and is terminated with a semi-colon (the character ';' - ASCII 0x3B). A complete list of commands follows below.

Commands have optional parameters which are either **VARIABLES, CONSTANTS** or **INTEGER EXPRESSIONS**. Parameters are comma separated and enclosed in brackets (characters '(' and ')' - ASCII 0x28 and 0x29). A command with zero parameters is called with empty brackets. E.g.: **A();**

The variables or constants have either an **INTEGER** or a **STRING** type.

String constants are quoted "like this" and can contain ANSI escape sequences to alter the cursor position, clear the display, etc. String constants can also contain backslash sequences: **\000** (octal character code), **\\**(backslash), **\"**(quote), **\n** (new line).

Variables are indexed, a separate indexing for integer and string variables is used. Integer variables are prefixed with a small 'i' letter (ASCII 0x69) followed by the variable index (starting from 0). String variables are prefixed with a small 's' letter (ASCII 0x73) followed by the variable index. E.g. 'i12' or 's4'

**INTEGER EXPRESSIONS** can be build from integer constants or integer variables using the + - * / operators. The order of operator evaluation is strictly left-to-right, there is no precedence of evaluation (e.g. * before + ).

Certain commands also accept **BOOLEAN EXPRESSIONS.** They are built from a single **BOOLEAN OPERATOR** optionally prefixed with the exclamation mark ('!', ASCII 0x21) for the logical NOT function.

A boolean operator has a name: a small letter, and its parameters enclosed in brackets. The parameters of a boolean operator are either integer or string constants or variables.

### DDF file

The display content is defined in a DDF file stored in device's FLASH. It is a text file with either CRLF (ASCII 0x0D 0x0A) or LF only (ASCII 0x0A) end-of-line characters. Each line of the file contains one function definition.  Empty lines and lines starting with a hash ('#', ASCII 0x23) are

considered as comments and are ignored.

Function definition starts with capital 'F' (ASCII 0x46) followed by a decimal index of the function and the colon character (':', ASCII 0x3A). Then one or more commands follow (as described above). No spaces between commands are allowed.

A function which is not found is not executed. This is not considered as an error (simply some functions don't do anything on some displays).

Example:

**F4:T(g(2,i0));G(100);T(!z(i1));G(100);P("\033[0;9H");I("3",i8);P("kbps");**

## Program execution

The display program interpreter runs in a single thread. The program execution can be in several logical states. Normally it is in the **DEFAULT** state where all functions are executed. In the default state the function called by the application is executed to its end and then the interpreter is released to other potential function calls.

A display can be **LOCKED** using the Lock command: **L();** Immediately after the lock command the execution of the current function is terminated, the interpreter is released and all further function calls from the application are ignored until a function with the Unlock command: **U();** is called. In that case the unlock command must be the first command of the function. The unlock command brings the interpreter to the default state.

This is typically used if the application switches to a specific mode (e.g. firmware update, reset, standby mode, etc.) disallowing other tasks (e.g. volume control, song name printing) to output anything to the display.

A display can be **WAITING** if the Wait command: **W(n);** is called. Immediately after the execution of the W(n); command, current function is temporarily stopped, the context is stored and the interpreter is released. All subsequent calls of the interpreter are ignored unless a function with either the Abort: **A();** or Unlock: **U();** command is executed. Again, the command must be the first command of the function.

If no Abort and Unlock commands are called, the execution of the original function resumes after n*100ms. The function is then normally executed up to the end.

If an Unlock or Abort command is used the stored context is discarded and the new function starts.

This is typically used if a message should be displayed for a limited time. E.g. when volume is changed, the "Volume X%" is displayed for few seconds and then the player information (song name, bitrate, etc.) is displayed again.

## Special commands

Most of the commands manipulate the display. However, there are two special flow-control commands: G (Goto) and T (Test).

The command **G(n);** (go to function number n) terminates the execution of the rest of the current function and continues with the function **n.** The Goto command is uninterruptible.

The command **T(x);** (test condition) evaluates the boolean expression **x** and executes the next command only if the condition is TRUE. If the condition is FALSE, the next command after the Test command is skipped.

## Display control

The content of the display can be altered by printing to the display; commands: Clear Block, Print Character, Print Formatted Integer, Print String, Print Message. Alternatively, up to three independent scroll fields can be set up using the Scroll command.

The back-light can be controlled using the Backlight command: **H(x);** The back-light is controlled in 16 steps and can be smoothly faded in and faded out. Please note that not all displays feature a back-light.

Only ASCII characters in the range 0x20-0x7F are allowed as printable characters.

The following backslash sequences are accepted in string constants: **\000** (octal character code), **\\**(backslash), **\"**(quote), **\n** (new line).

The cursor position and other features are controlled by printing standard ANSI escape sequences. Each control sequence starts with the "escape" character (ASCII code 27, hexadecimal 0x1B) followed by the '[' character (left square bracket, ASCII code 91, hexadecimal 0x5B). The following sequences are recognised:

| ESC [ 2 J | **Display Clear**<br>clears the display and moves cursor to the upper left corner of the display (position 0,0) |
|---|---|
| ESC [ *Pn* A | **Cursor Up**<br>Moves cursor up by the given specified of lines. If the cursor is already at the top line ignores this sequence. |
| ESC [ *Pn* B | **Cursor Down**<br>Moves cursor down by the given specified of lines. If the cursor is already at the bottom line ignores this sequence. |
| ESC [ *Pn* C | **Cursor Forward**<br>Moves cursor right by the given specified of lines. If the cursor is already in the rightmost column ignores this sequence. |
| ESC [ *Pn* D | **Cursor Backward**<br>Moves cursor left by the given specified of lines. If the cursor is already in the leftmost column ignores this sequence. |
| ESC [ *PL* ; *Pc* H | **Cursor Postition**<br>Moves the cursor to the specified position (coordinates). If the position is not specified moves the cursor to the upper left corner. If the coordinates are out of the screen they are clipped to the display size. |
| ESC [ *PL* ; *Pc* f | Same as the previous sequence. |
| The following abbreviations are used:<br>*Pn* – stands for a decimal number<br>*PL* – stands for a line number, line 0 is the topmost line<br>*Pc* – stands for a column number, 0 is the leftmost column | |

### Commands

An alphabetic list of all display commands follows:

#### A() - abort waiting

- aborts any waiting started with the W() command
- discards any unexecuted commands after the W() command (the stored context)

#### B(x) - clear block

- accepts an integer parameter
- clears x characters starting from the current cursor position and advances the cursor position accordingly

#### C(n) - print character

- accepts an integer parameter
- prints the character with ASCII code n to the current cursor position

#### G(n) - goto function

- accepts an integer parameter
- stops execution of the current function and starts executing the function number n


## H(x) - set display backlight

- accepts an integer parameter
- controls the display backlight
- x can have the following values:
    - 0 - light off
    - 15 - light fully on
    - 1..14 - light dimmed in steps
    - 256 - fade out
    - 257 - fade in


## I(f,i) -  print formatted integer

- accepts one string (f) and one integer (i) parameter
- prints the integer i to the current cursor position, formatted according to the string f
- f has the following format:
    - <empty> - left align
    - <n> - format to n characters, right aligned
    - 0<n> - format to n characters, right aligned, prefixed with zeroes


## L() - lock the display

- locks the display
- if display is locked execution of all functions is stopped; only the function starting with the unlock command U() can resume the operation


## M(f,n) - print message from a file

- accepts one string (f) and one integer (n) parameter
- prints the n-th line (counting from 0) from a message file "f"  (e.g. channels.ini) to the current cursor position
- the file "f" is stored in the FLASH


## P(s) - print string
- accepts a string parameter
- prints s to the current cursor position


## S(n,x,y,l,s,c)  - set up scroll
- accepts four integer parameters (n,x,y,l), one string (s) and one integer parameter (c)
- sets up a scroll element to start from position [x,y] and l characters
- there are 3 scroll elements available; n is the element number (starting from 0)
- the text (string s) will be scrolled with the speed c (higher number = higher speed)
- to disable the scroll call with an empty string


## T(x) - test command
- accepts a bool expression x (see below)
- if x is TRUE then executes the immediately following command otherwise skips the command


## U() - unlock display
- also aborts waiting
- must be used as the first command of a function


## W(n) - wait
- accepts one integer parameter n
- waits n*100 milliseconds

## Boolean expressions

A single boolean operators can be used in conditional execution (see the Test command above).

A boolean operator has a name: a small letter, and its parameters enclosed in brackets. The parameters of a boolean operator are either integer or string constants or variables. Optionally, a boolean expression can be prefixed with the exclamation mark ('!', ASCII 0x21) for the logical NOT function.

### m(f,n) - n-th message in file f exists

- similar to the Print Message command M(f,n) above
- tests if a FLASH message file (e.g. channels.ini) contains a non-empty message on the line number n; the top line in the file has the number 0
- is TRUE if the message exists and is non-empty, otherwise is FALSE

### p(s) - string is empty

- accepts one string parameter
- is TRUE if the string is empty, otherwise is FALSE

### z(i) - integer is zero

- accepts one integer parameter
- is TRUE if the integer is zero, otherwise is FALSE

### g(i1,i2) - i1>i2

- accepts two integer parameters i1 and i2
- is TRUE if i1 is greater than i2, otherwise is FALSE

### e(i1,i2) - i1=i2

- accepts two integer parameters i1 and i2
- is TRUE if i1 equals to i2, otherwise is FALSE

### t(i1,i2) - i1>=i2

- accepts two integer parameters i1 and i2
- is TRUE if i1 is greater or equals to i2, otherwise is FALSE

## Variables

Variables are indexed, a separate indexing for integer and string variables is used. Integer variables are prefixed with a small 'i' letter (ASCII 0x69) followed by the variable index (starting from 0). String variables are prefixed with a small 's' letter (ASCII 0x73) followed by the variable index. E.g. 'i12' or 's4'

The following string variables are defined:

| ID | Description |
|----|-------------|
| **s0** | Device's IP address as a string; e.g. "192.168.1.2" |
| **s1** | The current song name and radio station name obtained from meta tags |

The following integer variables are defined:

| ID | Description |
|----|-------------|
| **i0** | The player status: 0=idle, 1=tuning, 2=playing |

| ID | Description |
|---|---|
| i1 | non-zero if priority message is being played, otherwise 0 |
| i2 | 1 if the device is in stand-by mode, otherwise 0 |
| i3 | The current volume in 1% steps |
| i4 | The currently selected channel number |
| i5 | The channel number being currently played |
| i6 | 1 if the current URL is channel based (contains $NUM$), otherwise 0 |
| i7 | The current URL number: 1, 2 or 3 |
| i8 | The current bitrate in kbps |

## Function calls

The below table lists all the display function calls of the Streaming Client application:

| Fn. Number | Description |
|---|---|
| F0 | Print the welcome message directly after the power up |
| F1 | Print IP device's address at startup |
| F2 | Print the current player status: priority, standby, idle, tuning, playing Called on status change |
| F3 | Update the song/radio station name; called if the name changes |
| F4 | Print the current bitrate; called periodically during playback |
| F5 | Print the current volume if volume is changed by the user |
| F6 | Print the "repeat on" message; if repeat is activated by the user |
| F7 | Print the "repeat off" message; if repeat is deactivated by the user |
| F8 | Print the "shuffle on" message; if shuffle is activated by the user |
| F9 | Print the "shuffle off" message; if shuffle is deactivated by the user |
| F10 | Print the "sleep on" message; if the sleep function is activated by the user |
| F11 | Print the "sleep off" message; if the sleep function is deactivated by the user |
| F12 | Print the "Channel xxx" message; called on user's change-channel request |
| F13 | Start of the user channel selection: print "Ch" message on VSC; then the function 12 is called if the user changes the channel number |
| F60 | Entering the standby mode: clear the display, turn backlight off, lock display |
| F61 | Leaving the standby mode: unlock the display, turn backlight on, print the status |
| F80 | Starting the remote update procedure (parameters, commands): print the "Updating..." message and lock the display |
| F81 | End of the remote update procedure: unlock display |
| F82 | Start of the remote firmware update: print the "Firmware update" message and lock the display |
| F83 | Successful end of the remote firmware update: print "Unit updated " message and unlock the display |
| F84 | Unsuccessful end of the remote firmware update: print "Update failed" message and unlock the display |
| F90 | Rebooting after the firmware update: print the "rebooting" message and lock |

| Fn. Number | Description |
|---|---|
| | the display |
| **F91** | Reset via the button: print the "reset" message and lock the display |
| **F92** | Factory defaults and reset: print "factory defaults" message and lock the display |
| **F93** | Entering the bootloader: print "Bootloader..." message and lock the display |

# 9  Remote Configuration and Update interface

## 9.1  Features summary

The Remote Update mechanism in the Streaming Client allows to remotely manage a device in four different ways:

- Remote Command Execution – execute runtime commands without device reboot

- Remote Configuration Update – update Setup parameters

- Remote Firmware Update – update device Firmware

- Remote Content Update – update device's media storage (USB or microSD card) content

An arbitrary combination of these four actions can be configured via a common configuration file (meta-file) placed on an HTTP server. A device specific configuration can be created on the server e.g. by creating an individual folder or file per device's MAC address.

The Remote Update mechanism uses a central HTTP server, devices can be located in various geographical locations connected to the Internet. A direct network access from the outside network to the devices is not needed for successful operation of the Remote Update.

> **NOTE :** Please note that the Remote Firmware Update is supported only on devices with 2MB Flash memory.
> Remote Configuration Update as well as Remote Command Execution can be performed on devices with 1MB as well as 2MB Flash memory.

## 9.2  Configuration parameters

Remote Update is configured via a text based configuration meta file located on an HTTP server. HTTPS is not supported! The device is configured with URL of the configuration file and a time interval. Devices poll the server in the configured interval for an update.

### Update URL

For remote configuration and update the configuration field "Update URL" can be used to point to the web server (http) containing the "Configuration Meta File". Only the HTTP protocol is supported, including all its options and the possibility of using HTTP Proxy.

### Remote  Update  Period

The URL provided is checked and processed periodically. The frequency of checking the configuration meta file can be set in the configuration field "Remote  Update Period"  in minutes.

## 9.3  Configuration Meta File

The consistency of the update meta file is maintained by a numeric version stored in the meta-file.

When the "Configuration Meta File" is loaded, its version is checked against the last file version processed by the device (stored in "Remote Update File Version" parameter in the EEPROM).

The "Configuration Meta File" is only processed if the version number is higher than the last file processed by the device. A version number of 65536 (or higher) or the serial firmware update reset the version counter.

The "Configuration Meta File" can contain three different types of assignments: keywords, control commands and configuration statements.

Each line has to be terminated by a CR LF.

The recommended structure of the meta file is: keywords, commands, configuration statements. Empty lines and lines starting with '#' are ignored (comments).

> **NOTE:** Please note that the configuration meta file is case sensitive.

## Keywords

Keywords are all in capital letters. Four keywords are recognized:

| ID | Type | Description |
| --- | --- | --- |
| **VERSION** | 16bit unsigned decimal number | Meta file version, highest 16 bit value resets counter |
| **FW_VERSION** | 16bit unsigned hexadecimal number | Version of the firmware file |
| **FW_URL** | URL string with maximum length of 99 characters | URL of the firmware .bin file |
| **CONTENT_URL** | URL string with maximum length of 99 characters | URL pointing to file set description for USB/microSD content update |

## Control commands

Control commands start with a single letter followed by the "equals" sign ('='). A complete list of control commands can be found in chapter 3.2 CGI command interface.

There must be only one command per line, no command concatenation is supported. Commands are executed in the same order as they appear in the file.

## Configuration statements

Configuration statements allow to change the non-volatile device configuration (Setup). They have a form "parameter=value", where "parameter" is a textual descriptor of Setup configuration parameter and "value" is the parameter value. Example "url2=rtp://0.0.0.0:4444", "volume=10".

The textual parameter descriptors are looked up in the `update.ini` file stored in device's FLASH and translated to the Setup location like e.g. "S700", "W273", etc. See more chapter 4.1 User Interface Development Kit on how to modify the `update.ini` file.

## Processing sequence

If a newer version of the configuration file is found by the device on the server, the "Configuration Meta File" is processed in the following four steps:

• control commands are executed

• configuration values are stored in Setup

• the firmware is updated if the value of the keyword **FW_URL** is pointing to a valid firmware file (**compound.bin**) and the value of the keyword **FW_VERSION** differs (smaller or bigger) from the currently running firmware version

• the local storage content is updated if CONTENT_URL is present, points to a valid file listing and the version of the file set is different to the last content downloaded. See chapter 9.4 Remote content update for more details.

• on success the version of the just executed meta file is stored in device's EEPROM

• device restarts if necessary (configuration has been altered, content is to be updated, firmware has been changed or the **c=99** command has been issued)

> **IMPORTANT:** If the firmware update fails the version of the executed "Configuration Meta File" is not stored. As a consequence the device attempts to perform the remote update again after reboot.

For a detailed specification of the configuration meta file grammar see section  further below.

## Update file request

The update meta file is requested via HTTP from the configured URL. The following device information is sent in the HTTP header to the server:

| Parameter | Description |
|---|---|
| **MAC** | MAC address of the device in format "aa:aa:aa:aa:aa:aa".<br>All letters are small, individual octets are separated with colon. |
| **mem-size** | Device's flash memory size in kB, followed by the two letters "kB" |
| **hw-type** | Device hardware type code in decimal |
| **ipam-type** | Device IPAM type code in decimal |

Example:

| Example of HTTP headers sent in remote update file request |
|---|
| **Pragma: MAC=00:08:e1:00:01:02**<br>**Pragma: mem-size=1024kB**<br>**Pragma: hw-type=14**<br>**Pragma: ipam-type=0** |

## File "update.ini"

The file **update.ini** is a text file containing lines with the following syntax:
**<descriptor>,<address>[,<size>]**

Where:

- **<descriptor>** is a textual descriptor of a configuration value

- **<address>** is a dynamic name of a configuration value (see chapter ˍ for details).
  For passwords, use **Px** and **Px.1** (see chapter  4.4 Configuration via HTML Pages)

- **<size>** is an optional parameter used only for strings. It defines the length of the string in the setup memory.

> **IMPORTANT:** The terminating end-of-line in the file is mandatory for proper function of the remote update.

| Content of the update.ini file contained in the "Streaming Client Update Kit" |
|---|
| **volume_100,B244**<br>**min_volume_100,B241**<br>**max_volume_100,B242**<br>**balance,c245**<br>**bass,c 246**<br>**treble,c247**<br>**url1,S700,100**<br>**url2,S800,100** |

```
url3,S900,100
proxy_url,S1000,100
update_url,S1100,100
barimon_url,S1200,100
rtp_latency_ms,W509
web_server_port,W283
shuffle,B277b0
usb_autoplay,B277b1
sonic_ip,B277b7
udp_reporting_port,W684
dhcp_host_name,S98,16
remote_update_period,W690
barimon_period,W692
stream_check_period,W694
stream_max_check_period,W696
rtp_priority_port,W289
priority_latency_ms,W291
priority_volume_control,B240
priority_volume_100,B243
ip_addr,I0
netmask,N8
gateway,I4
dns1,I64
dns2,I68
snmp_trap_ip,I686
password,P1.1
ir_input,B497
user_agent,S517,32
reset_function,B276
disable_factory_defaults,B97b1
disable_remote_update,B97b2
url1_inc_plist_pos,B301b0
url2_inc_plist_pos,B302b0
url3_inc_plist_pos,B303b0
url1_periodic_refresh,B301b1
url2_periodic_refresh,B302b1
url3_periodic_refresh,B303b1
url1_plist_end_after_1st_err,B301b2
url2_plist_end_after_1st_err,B302b2
url3_plist_end_after_1st_err,B303b2
relay_function,B252
relay1,B252
relay2,B253
relay3,B254
relay4,B255
decoding_speed_correction,i680
serial1_usage,B498
serial1_baudrate,B81
serial1_data_bits,B80b2-3
serial1_parity,B80b4-5
serial1_stop_bits,B80b6-7
serial1_flowctl,B82
```

| Content of the update.ini file contained in the "Streaming Client Update Kit" |
|---|
| **serialgw_port,W92** |
| **serialgw_ip,I88** |
| **udp_cmd_port,W511** |
| **tcp_cmd_port,W513** |
| **tcp_cmd_port_timeout,W507** |
| **usb_backup_switch_immediately,B277b2** |
| **ad_gain,B249** |
| **triggered_playlist,S570,100** |
| **volume_offset,B677** |
| **audio_buffer_size_log,B250** |
| **snmp_sys_name,S 444,18** |
| **snmp_sys_location,S462,18** |
| **fade_in_period,W304** |
| **content_update_folder,S310, 50** |
| **syslog_address,I200** |
| **snmp_ro_community,P4.1** |

## Configuration Meta File Grammar

| Type | Description |
|---|---|
| OCTET | <any 8-bit sequence of data> |
| CHAR | <any US-ASCII character (octets 0-127) > |
| CTL | <any US-ASCII control character (octets 0 - 31) and DEL (127)> |
| TEXT | <any OCTET except CTL, but including HT> |
| LF | <US-ASCII LF, linefeed (10)> |
| CR | <US-ASCII CR, carriage return (13)> |
| HT | <US-ASCII HT, horizontal-tab (9)> |
| UPALPHA | <any US-ASCII upper-case letter "A" .. "Z"> |
| LOALPHA | <any US-ASCII lower-case letter "a" .. "z"> |
| DIGIT | <any US-ASCII digit "0" .. "9"> |
| ALPHA | UPALPHA \| LOALPHA |
| ALPHADIGIT | ALPHA \| DIGIT |
| CRLF | CR LF |
| EOL | LF \| CRLF |
| comment | "#" *(TEXT) |
| rvalue | *(TEXT) |
| control | ALPHA |
| keyword | UPALPHA  1*[ ALPHADIGIT \| "_" ] |
| config | LOALPHA  1*[ ALPHADIGIT \| "_" ] |
| lvalue | keyword \| control \| config |
| assignment | lvalue "=" rvalue |
| content | comment \| assignment |
| line | [ content ] EOL |
| file | *(line) |

## 9.4 Remote content update

### Brief description

Remote USB and microSD content update is integrated into the Remote Update mechanism of Streaming Client. The content update performs a single folder synchronization function. Files from HTTP server are downloaded to a configured directory (see ContentUpdateFolder, Setup parameter S310) on the local storage (USB or microSD), which is created if it does not exist. A list of files to be downloaded is stored in a text file on the server. The file listing contains a version number to detect if an update is to be performed.

The content update is performed off-line, i.e. the main audio functionality of Streaming Client is not available during the whole update time. The device automatically reboots in order to perform content update.

The status of content update is reported to syslog.

### File listing

Files to be downloaded to the device are put in a folder on an HTTP server. In the same folder there is a text file with the file listing. The URL to the file listing is stored in the Remote Update meta-file parameter "CONTENT_URL" (see above).

The first line of the file listing must contain string "#VERSION=" followed by a version number. Files to be downloaded follow, one per line. Empty lines and lines starting with "#" are treated as comments and are skipped.

Example:

| Example of a file set descriptor on the server |
|---|
| ```
#VERSION=7

file1.mp3
file2.mp3
My Music File.aac
file7.mp3

playlist.m3u
``` |

The file listing contains both music files (MP3, AAC, etc.) and playlists. All files are relative to the server folder, where the file listing resides. Do not use paths in the file listing.

File names must be at maximum 255 characters long and must not contain special characters '\' (backslash), ':' (colon), ';' (semicolon), "*" (star), '?' (question mark), '"' (double quote), '<' (less than), '>' (greater than) and '|' (pipe).

### File update

The file update is triggered if the version of the file listing differs from the last file version loaded by the device or if there has been no update performed at all.

The update is executed in the following sequence:

1. Download files that exist only on the server (i.e. are listed in the file listing), but not on the device (new files).

2. Files that exist both on the server and on the device are downloaded and overwritten only if they are playlists, e.g. end with ".m3u" extension. Other files are skipped and kept in the version that exists on the device.

3. Delete files that exist only on the device, but not on the server.

> **NOTE:** Please note that in order to perform a content update both the file listing version and the Remote Update metafile version need to be adjusted.

## 9.5 How to update the firmware remotely

> **IMPORTANT:** Please note that the Remote Firmware Update is supported only on devices with 2MB Flash memory.

Let's assume you have an HTTP server **http://www.myserver.net** and want to update your device with firmware version 01.31.
Here is an example how to do it:

- create a directory **http://www.myserver.net/streamingclient/update/** on the server

- Upload the **compound.bin** file from the "Streaming Client Update Kit" folder **update_rescue** into your HTTP directory, the URL will be

  **http://www.myserver.net/streamingclient/update/compound.bin**

- create new text file **http://www.myserver.net/streamingclient/update/update.txt** containing :

Content of the update.txt

```
VERSION=1
FW_VERSION=0131
FW_URL=http://www.myserver.net/streamingclient/update/compound.bin
```

- configure your devices "Update URL" field with
  **http://www.myserver.net/streamingclient/update/update.txt**

- push the "Apply" button on the WEB interface. The device will reboot and automatically update the firmware. If you want the device to check the update file every 30 minutes set the configuration field "Remote Update Period" to 30.

> **IMPORTANT:** Remote firmware update is supported only on devices with 2MB and more flash memory. The flash memory size and availability of the firmware update can be retrieved from the device WEB UI via the &Lstate parameters 46 and 47.

-

## 9.6  How to configure the device remotely

In previous section we configured the HTTP server and the device for remote update and updated the firmware.  In this section we will use the same server and paths but will alter the file **update.txt**.

In this example we will change the streaming URLs and set volume to 25% (Volume range is 0 to 20). Change the **update.txt** as follows:

| Content of the update.txt |
|---|
| **VERSION=2**<br>**url2=rtp://85.124.188.115:4000**<br>**url1=http://vruk.sc.llnwd.net:12265**<br>**volume_100=62** |

The device will change the three configuration fields and then reboot.

In situations where we want to change temporarily (without rebooting) CGI commands can be used instead of configuration change directives.
The following example shows how to change the volume without rebooting:

| Content of the update.txt |
|---|
| **VERSION=3**<br>**v=10** |

This way we can issue any CGI command. See chapter  WEB  for available commands.


### Device dependent update files

Sometimes we need to update devices with different configurations. This can be easily done using the URL Variable Substitution in the Update URL.

Let us imagine we have two devices and want to load them with different settings (e.g. to play two different radio stations).
Let us assume the devices have IP addresses **192.168.2.100**  and **192.168.2.101** . Here is an example how to do it:

• Configure both devices with following Update URL:
   **http://www.myserver.net/streamingclient/update/update-$IP$.txt**

• Create the file **http://www.myserver.net/streamingclient/update/update-192.168.2.100.txt**  with following content:

| Content of the update-192.168.2.100.txt |
|---|
| **VERSION=1**<br>**url1=http://www.barix.com/radio.m3u**<br>**url2=file://backup.m3u** |

- Create the file **http://www.myserver.net/streamingclient/update/update-192.168.2.101.txt** with following content:

| Content of the update-192.168.2.101.txt |
|---|
| **VERSION=1**<br>**url1=http://vruk.sc.llnwd.net:12265**<br>**url2=file://backup.m3u** |

If the devices use dynamic addressing (IP might change) use MAC addresses (**$MAC$**) or DHCP names (**$NAME$**) to identify the right configuration file on the server. See <u>URL Variable Substitution</u> for more details.

## 9.7 How to update the USB content remotely

In previous sections we configured the HTTP server and the device for remote update and updated the firmware.  In this section we will use the same server and paths to update the files on device's USB stick or microSD card.

### File listing

First of all we put some files on our HTTP server <u>www.myserver.net</u> into the folder **/streamingclient/usb-content/**:

- **music1.mp3**

- **file2.mp3**

- **file3.aac**

- **My Music File 4.mp3**

- **playlist.m3u**

In the playlist.m3u we list our four music files in the order to be played:

| Content of the `playlist.m3u` |
|---|
| **music1.mp3**<br>**file2.mp3**<br>**file3.aac**<br>**My Music File 4.mp3** |

Then we create a file listing **file-listing.txt** in the same folder on the server, where we put all files (i.e. including the playlist) and a version string at the top. Please note that the version number is different to the one in the **update.txt**.

| Content of the `file-listing.txt` |
|---|
| **#VERSION=1**<br>**music1.mp3**<br>**file2.mp3**<br>**file3.aac**<br>**My Music File 4.mp3**<br>**playlist.m3u** |

As the last step we modify the **update.txt** file to point to our freshly created **file-listing.txt**, set the **content_update_folder** to a folder, where all the files should be downloaded on the USB, and change URL3 to point to our playlist.

Content of the `update.txt`

**VERSION=3**

**CONTENT_URL=http://www.myserver.net/streamingclient/usb-content/file-listing.txt**
**content_update_folder=my_music**
**url3=my_music/playlist.m3u**

# 10 Remote monitoring interface

The "Streaming Client" firmware supports two different ways of remote monitoring: SNMP and Barimon.

SNMP can send a trap on start-up and when switching the stream and can be requested at any time . Barimon sends periodic reporting as well as information on request. The features of these protocols are described in the following chapters.

## 10.1 Barimon Remote Monitoring

The device can be monitored using Barimon technology. Please visit http://www.barimon.net for detailed information and to create your own free Barimon project.

### Barimon periodic report

With Barimon, the device's streaming status is sent actively by the device to the pre-configured server via HTTP. The report is sent in regular time intervals (configurable), at stream stop and at stream start (that means, when a stream switch happens, two reports are sent).

The Barimon server has to be specified in the configuration field "BARIMON URL". Only the HTTP protocol is supported, including all its options and possibility of using the HTTP Proxy. The "BARIMON URL" syntax is:

**http://[**<name>**:**<password>**@]**<address>**/** (name and password can be omitted, e.g. **http://www.barimon.net/**)

The frequency of Barimon reporting can be set in the configuration field "BARIMON Report Period" in minutes. The complete report will be sent in this defined time interval.

The following table show the content of the periodic report.

| Value | Type | Description |
|---|---|---|
| **mac** | String (e.g.: **0008E1003D90** ) | Devices MAC address used for Barimon "sensor" identification |
| **alarm** | Boolean: "**true**" or "**false**" | Alarm trigger: "**true**" on stream change, otherwise "**false**" |
| **Bitrate** | 8bit unsigned decimal number | Bitrate of the played stream in kilobits per second |
| **BufferLevel** | 16bit unsigned decimal number | Amount of bytes in the buffer |
| **Error** | 8bit unsigned decimal number | Number of last error (see the definition in the File "BARIXAUDIOSNMP.MIB") |
| **FrameDrop** | 32bit unsigned decimal number | Number of RTP frames dropped to correct long term clock drift. Resets with every RTP stream (reconnect or new sequence of frames). |
| **FrameDup** | 32bit unsigned decimal number | Number of RTP frames duplicated to correct long term clock drift. Resets with every RTP stream (reconnect or new sequence of frames). |
| **FrameLoss** | 32bit unsigned decimal number | Number of RTP frames lost on the network since the stream start. Resets with every RTP stream (reconnect or new sequence of frames). |
| **Latency** | 16bit unsigned decimal number | Average latency of the RTP decoder; valid only for RTP streams. |
| **Reconnects** | 16bit unsigned decimal number | Amount of reconnects due to loss of the stream source |
| **SoftErrorCount** | 16bit unsigned decimal number | Amount of stream drop-outs (missed more than 5 frames in a row) |

| Value | Type | Description |
|---|---|---|
| **StreamNumber** | String (0,1,2,3 or "prio" for priority) | Number of played stream |
| **UpTime** | 16bit unsigned decimal number | Up time of the device in seconds (since last reboot) |
| **URL** | String | URL of the currently played stream |
| **Volume** | 8bit unsigned decimal number | Current volume level in percent |

### Requesting Barimon report over UDP

Furthermore, the actual status of the device can be requested over UDP. The Port number used must be the same as specified in the configuration field "UDP Reporting Port"**.** Setting the Port to 0 disables this function.

Sending a UDP datagram with the payload "**MTELL\r\n**", i.e. 7 bytes: **0x4D, 0x54, 0x45, 0x4C, 0x4C, 0x0D 0x0A**, will result in a UDP reply sent on same port to the IP address the request originated from. The reply is comma separated and contains no spaces and no line feeds (the table below is word wrapped).

| Example content of the UDP reply |
|---|
| **BufferLevel=10528,Latency=598,FrameLoss=0,FrameDup=0,FrameDrop=0,SoftErrorCount=0,StreamNumber=1,Bitrate=192,Reconnects=2,Error=11,Volume=25,UpTime=25,URL=rtp://0.0.0.0:4444/** |

To test this we recommend the free PC software called "UDP Test Tool" from http://www.simplecomtools.com.

## 10.2 Own Monitoring Server using Barimon protocol

To run an own monitoring server you will need to write your own scripts depending on the server architecture and OS (PHP, ASP...).

The script has to be named "submit" and should be available in the folder "/sensors/data" as the "Streaming Client" firmware sends an HTTP GET request for "sensors/data/submit?..." to that server. This path is fixed and can not be changed. The information is included after the questions mark.

**GET sensors/data/submit?mac**= <mac address>**&alarm=false&info=**<info> **HTTP/1.0**

<mac address> is 12 hex character string without any delimiters: XXXXXXXXXXXX e.g.: **0008E1003D90**

<info> is a string in the format: **BufferLevel=**<int>**,FrameLoss=** <long int>**,SoftErrorCount=**<long int>**,StreamNumber=**<string>**,URL=**<string>**, Bitrate=**<int>**,Reconnects=** <long int>**,Error=**<int>**,Volume=**<int>**,UpTime=**<long int>

<int> is an 8bit integer decimal number, <long int> is an 16bit integer decimal number, <string> is a string of characters

### Configuration Parameters for Barimon periodic report

The Barimon server has to be specified in the configuration field "BARIMON URL". Only the HTTP protocol is supported, including all its options and possibility of using the HTTP Proxy. The "BARIMON URL" syntax is:

**http://[**<name>**:**<password>**@]**<address>**/** (name and password can be omitted e.g. **http://www.myserver.com/**)

The frequency of Barimon reporting can be set in the configuration field "BARIMON Report Period" in minutes. The complete report will be sent in this defined time interval.

### Example "submit.php"

The submit PHP script can read the variables from the $_GET array e.g.:

**$mac=$_GET["mac"];** *//*here you can check if the MAC address is registered in your database and decide to accept/ignore this request

**$alarm=$_GET["alarm"];** *//*a is this an alarm ?

**$info=$_GET["info"];** *//*comma separated list of "measured values"

The $info variable will contain complete device info which is the string as described in the section above.

The GET variable handling is all standard, there's nothing "Barimon specific", you can access the variables as in any other web CGI script.

## 10.3 SNMP Remote Monitoring

The "Streaming Client" firmware supports SNMPv1 (Simple Network Management Protocol Version 1) which uses UDP for the transfer of information.

### SNMP trap sending

The IP address of the receiver of SNMP traps has to be specified in the configuration field "SNMP Trap Receiver". If set to 0.0.0.0 then no traps are sent.
Traps are sent on UDP port 162 to the specified receiver.

The following traps are supported:

- **cold start** – sent at startup

- **private trap** – sent at stream stop or at stream start. System time and the stream number are sent in the trap.

### SNMP querying

The device can be queried using the SNMPv1 protocol on UDP port 161, the MIB (Management Information Base) version supported is 2.
The MIB file **BARIXAUDIOSNMP.MIB** is included in the "Streaming Client Firmware Kit" and can be found in the folder **update_rescue** .
See the following print out of the MIB file for capabilities.

### File "BARIXAUDIOSNMP.MIB"

Content of the BARIXAUDIO.MIB file contained in the "Streaming Client Firmware Kit"

```
-- The Barix Audio MIB leaf
-- The Barix MIB Registration Authority is barix.mib
-- Version:    2.2
-- Date:       07 March, 2006
-- Copyright (c) 2004-2006 Barix AG

-- Changes:
-- 20050503 KPS    Updated according to Barix MIB registration authority
-- 20060116 KS/PK  Added streaming variables
-- 20060307 KS unit net, hostname added
```

```
-- 20060307 KS instreaming levels added


  BARIXAUDIOSNMP-MIB DEFINITIONS ::= BEGIN



IMPORTS
       enterprises, IpAddress, Counter, TimeTicks, Gauge
            FROM RFC1155-SMI
       OBJECT-TYPE
            FROM RFC-1212
       DisplayString
            FROM RFC-1213;



barix      OBJECT IDENTIFIER ::= { enterprises 17491 }
products     OBJECT IDENTIFIER ::= { barix 1 }
systems      OBJECT IDENTIFIER ::= { barix 2 }
unit       OBJECT IDENTIFIER ::= { barix 3 }
-- 4-9 Spare
oem         OBJECT IDENTIFIER ::= { barix 10 }

-- Audio Section
-- states for dynamic audio states that don't fit into any streaming category
-- streaming for general streaming information
-- exstreaming for specific out to audio information
-- instreaming  for specific in from audio information
audio       OBJECT IDENTIFIER ::= { systems 1 }
states       OBJECT IDENTIFIER ::= { audio 1 }
streaming    OBJECT IDENTIFIER ::= { audio 2 }
exstreaming   OBJECT IDENTIFIER ::= { audio 3 }
instreaming   OBJECT IDENTIFIER ::= { audio 4 }



-- unit Group
-- contains information common to all Barix units
--
net         OBJECT IDENTIFIER ::= { unit 1 }
netHostName    OBJECT-TYPE
        SYNTAX     DisplayString (SIZE (0..15))
        MAX-ACCESS   read-only
        STATUS     current
        DESCRIPTION
        "The bootP and DHCP host name"
        ::= { net 1 }



-- Barix Audio MIB

audioStateLeft OBJECT-TYPE
      SYNTAX      INTEGER(0..65535)
```

```
        ACCESS          read-only
        STATUS          mandatory
DESCRIPTION         "Audio State Left Channel
0 = silence
1 = running
2 = high"
::= { states 1 }


audioStateRight OBJECT-TYPE
        SYNTAX      INTEGER(0..65535)
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION         "Audio State Right Channel
0 = silence
1 = running
2 = high"
::= { states 2 }




-- streaming
-- Buffer level
streamingBufferLevel OBJECT-TYPE
        SYNTAX      Gauge
        ACCESS          read-only
        STATUS          mandatory
        DESCRIPTION         "Streaming buffer level"
::= { streaming 1 }


-- Frame drop out count
streamingFrameLoss OBJECT-TYPE
        SYNTAX      Counter
        ACCESS          read-only
        STATUS          current
        DESCRIPTION         "Lost frames counter"
::= { streaming 2 }


-- Stream drift correction counter
streamingSoftErrorCount OBJECT-TYPE
        SYNTAX      Counter
        ACCESS          read-only
        STATUS          current
        DESCRIPTION         "Number of soft errors since stream start.
Soft error is:
RTP: lost more frames than could be corrected
TCP, UDP: buffer empty (sampled every 100ms)
"
::= { streaming 3 }
```

```
-- exstreaming
-- Current Stream number
exstreamingStreamNumber OBJECT-TYPE
      SYNTAX      INTEGER(0..65535)
      ACCESS            read-only
      STATUS            mandatory
      DESCRIPTION       "Current stream number
0 - inactive
1 and more - stream number
      "
::= { exstreaming 1 }


-- Current URL
exstreamingURL OBJECT-TYPE
      SYNTAX      OCTET STRING
      ACCESS            read-only
      STATUS            mandatory
      DESCRIPTION       "Current URL"
::= { exstreaming 2 }


-- Stream bitrate
exstreamingBitrate OBJECT-TYPE
      SYNTAX      INTEGER(0..65535)
      ACCESS            read-only
      STATUS            mandatory
      DESCRIPTION       "Stream bitrate in Kbits/sec"
::= { exstreaming 3 }


-- Number of reconnects
exstreamingReconnects OBJECT-TYPE
      SYNTAX      Counter
      ACCESS            read-only
      STATUS            mandatory
      DESCRIPTION       "Number of reconnects/stream-switches since
device startup"
::= { exstreaming 4 }


-- Time of last reconnect
exstreamingReconnectTime OBJECT-TYPE
      SYNTAX      TimeTicks
      ACCESS            read-only
      STATUS            mandatory
      DESCRIPTION       "Time of last reconnect"
::= { exstreaming 5 }


-- Last streaming error
exstreamingError OBJECT-TYPE
      SYNTAX      INTEGER{
            No-Error(0),
            DNS-Problem(1),
            No-TCP-Reply(2),
```

```
                    TCP-Closed(3)
                    No-HTTP-Response(4),
                    Invalid-HTTP-Response(5),
                    Missing-Path(6),
                    Missing-Port-Number(7),
                    Missing-Hostname(8),
                    Invalid-Filetype(9),
                    Filesystem-Error(10),
                    Connection-Timed-Out(11),
                    Invalid-Protocol(12),
                    Too-Many-Dropouts(13),
                    Invalid-Port(14),
                    Wrong-Filename(15),
                    Playlist-Error(16),
                    Epty-URL(17),
                Bad-MMS-Response(18),
                    Internal-Error(99),
                    HTTP-Bad-Request(400),
                    HTTP-Unauthorized(401),
                    HTTP-Payment-Required(402),
                    HTTP-Forbidden(403),
                    HTTP-Not-Found(404),
                    HTTP-Method-Not-Allowed(405),
                    HTTP-Not-Acceptable(406),
                    HTTP-Proxy-Authentication-Required(407),
                    HTTP-Request-Time-Out(408),
                    HTTP-Conflict(409),
                    HTTP-Gone(410),
                    HTTP-Length-Required(411),
                    HTTP-Precondition-Failed(412),
                    HTTP-Request-Entity-Too-Large(413),
                    HTTP-Request-URL-Too-Large(414),
                    HTTP-Unsupported-Media-Type(415),
                    HTTP-Server-Error(500),
                    HTTP-Not-Implemented(501),
                    HTTP-Bad-Gateway(502),
                    HTTP-Out-of-Resources(503),
                    HTTP-Gateway-Time-Out(504),
                    HTTP-Version-not-supported(505)
            }
        ACCESS              read-only
        STATUS              mandatory
        DESCRIPTION         "Last streaming error
0-90    = connection/configuration errors
90-99   = internal errors
400-599 = HTTP errors"
::= { exstreaming 6 }


--  Time of last streaming error
exstreamingErrorTime OBJECT-TYPE
        SYNTAX      TimeTicks
        ACCESS              read-only
```

```
           STATUS          mandatory
           DESCRIPTION     "Time of last error"
::= { exstreaming 7 }



-- --- Trap
-- name NOTIFICATION-TYPE
--       OBJECTS     {
--              Object
--                  }
--       STATUS      current
--       DESCRIPTION
--           ""
--       ::= { OID in MIB tree }
--
--



-- instreaming Levels
--

levels  OBJECT  IDENTIFIER ::= { instreaming 1 }
audioInputLevelLeft OBJECT-TYPE
      SYNTAX       INTEGER(0..65535)
      ACCESS           read-only
      STATUS           mandatory
      DESCRIPTION      "Audio Level Left Channel"
::= { levels 1 }

audioInputLevelRight OBJECT-TYPE
      SYNTAX       INTEGER(0..65535)
      ACCESS           read-only
      STATUS           mandatory
      DESCRIPTION      "Audio Level Right Channel"
::= { levels 2 }

END
```

## 10.4 Error Code Listing

| Error Code | Name | Description |
|---|---|---|
| 0 | No Error | |
| 1 | DNS Resolution Problem | Host not found or DNS server not accessible |
| 2 | No TCP Response | Host not responding to TCP SYN, connection can't be established, port closed or host not accessible |
| 3 | Reserved | |
| 4 | No HTTP Response | No answer to HTTP GET request or partial response received – timed out |
| 5 | Invalid Response | Invalid HTTP response header received |
| 6 | Missing Path | The selected protocol requires a path to be specified |
| 7 | Missing Port Number | The selected protocol requires a port number to be specified |
| 8 | Missing Hostname | The selected protocol requires a hostname to be specified |
| 9 | Invalid Filetype | The requested file type doesn't match the protocol. E.g. trying to play a playlist on non-playlist source (RTP) |
| 10 | Filesystem Error | USB storage not attached, not detected or file not found |
| 11 | Connection Timed Out | Connection timed out during stream/file receiving |
| 12 | Invalid Protocol | Unknown protocol entered |
| 13 | Too Many Dropouts | Stream ended due to excessive audio dropouts |
| 14 | Invalid Port | Port collision – port already in use (e.g. trying to receive RTP stream on the same port as the priority port or UDP Reporting port) |
| 15 | URL Syntax Error | Variable substitution failed - invalid syntax or variable not found |
| 16 | Playlist Error | Playlist loading failed |
| 17 | Reserved | |
| 18 | Reserved | |
| 19 | Audio Format Not Supported | The audio format is not supported by the hardware or by the software. E.g. trying to play an AAC+ stream on a device without AAC+ functionality. |
| 98 | Not Implemented | Function not implemented, this should not happen and should be considered as a software error |
| 99 | Internal Error | Memory allocation failed, codec crash detected |
| 400-415, 500-505 | HTTP Errors | Server responded with HTTP error, the appropriate error number is set |

# 11  Legal Information

For information about our devices and the latest version of this manual please visit **https://help.barix.com/exstreamer/**.

Barix AG
Limmatquai 120
8001 Zürich
SWITZERLAND

Phone: +41 43 433 22 11
Fax:     +41 44 274 28 49

Internet

web:      www.barix.com

email:    sales@barix.com

support:support@barix.com