



CBgui

ATSC Converter Box GUI

INTRODUCTION

The US Government has mandated that all analog terrestrial TV broadcasts will cease on February 17, 2009. After this date all broadcasters are required to switch from NTSC to ATSC transmission. Existing analog TV sets will need to use a converter box with an ATSC tuner that would convert digital over-the-air signals to analog; the National Telecommunications and Information Administration (NTIA) has issued final "Rules to Implement and Administer a Coupon Program for Digital-to-Analog Converter Boxes" [47 CFR Part 301](#) which will be eligible for a \$40 US Government subsidy. The converter boxes are known as ATSC Converter Boxes or NTIA Coupon Eligible Converter Boxes (CECB)

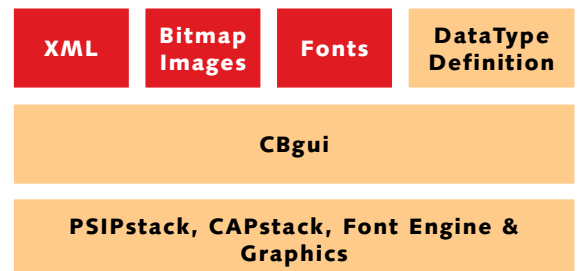
CBgui is based on BitRouter's, patent-pending, [XML State Machine \(XSM\) technology](#). It implements all the user interface features required by NTIA's [47 CFR Part 301](#).

FEATURES OF XSM TECHNOLOGY

- The GUI is described in XML, just like skins for popular PC programs. This allows the look and feel to be changed without changing or recompiling the program's source code.
- XSM allows for a very compact description of "look and feel". The complete user interface for an ATSC converter box can be defined in around 2,000 lines of XML. That is the entire source code an OEM or ODM needs to modify.
- The XML file, combined with images and fonts, provides complete control over the GUI's look and feel.
- XSM allows control over event handling such as remote control key press, front panel key press, timeouts, menu option highlighting and unhighlighting, etc.
- The XML skin is converted to a binary form using PC based tools provided by BitRouter. Only the binary form of the XML is stored in a device's Flash memory. This makes CBgui very responsive to user input.
- XSM based UIs provide IP protection by not requiring release of source code and APIs.
- XSM based GUIs utilize hierarchical state machine building blocks that can be reused across product lines.

ARCHITECTURE

The diagram on the right shows a high level block diagram of how CBgui fits into BitRouter's TVrefpak product. The red blocks below can be replaced to completely change CBgui's look and feel.



BLOCK	FUNCTIONS
XML	Completely describes the GUI. It must follow the Data Type Definition (DTD).
Images	PNG format images can be used for such things as background images and menu items.
Font(s)	CBgui can use any of the eight basic fonts mandated for digital closed captioning. Other fonts can be added as required.
CBgui DTD	The Data Type Definition to be followed by the XML.
CAPstack	Implements EIA-708-B and CEA-608-B specifications. See CAPstack .
PSIPstack	Implements ATSC A65/B and SCTE 65. SCTE 65 (digital cable support) is not used in converter boxes. See PSIPstack .
Graphics	BitRouter Graphics layer. This provides support for windowing, basic graphics functions and support for input devices, like remote controls.
Font Engine	TVrefpak implements a Font API under which third party font engines can be supported.

CBgui FEATURES

CBgui includes one feature complete and ready to use skin. Additional skins are available. Licensees can either modify existing skins or develop completely new skins. Skins can be modified using BitRouter's TV GUI Editor or various third party XML editing tools. BitRouter provides tools to create a final binary embeddable version of the skin. This includes binary-XML, images and fonts. CBgui runs on top of BitRouter's TVrefpak APIs. There is no additional porting required for CBgui.

CBgui implements the following NTIA CECB features:

- View and change the currently selected audio mode.
- Implement the optional Electronic Program Guide (EPG).
- View and change the currently selected closed-captioning service.
- View the channel information for the current channel.
- Tune to a different channel.
- Perform an auto scan to find all available channels.
- View the rating information for the currently playing program.
- View and change the movie and TV ratings that will be blocked.
- Block or unblock unrated programs.
- Handle parental control password input and parental control.
- Select RF input source.
- Select the viewer's language preferences.
- View the network time.
- 4:3 center cut-out of 16:9 transmitted images.
- Letterbox output of 16:9 letterbox transmitted images.
- Fully or partially zoomed output of unknown transmitted images.
- Process and display ATSC A/65C Program and System Information Protocol (PSIP) data to provide the user with tuned channel and program information.
- Support RF channels 2 through 69 inclusive.
- Display all channels, including multicast channels, broadcast by a digital television station that can be displayed on an analog TV receiver.
- Display EAS message broadcast pursuant to 47 CFR Section 11.11 of the FCC Rules.
- Display parental control information as required by the FCC Rules in 47 CFR Section 15.120 and incorporate the EIA/CEA-766-A standard.
- Display closed captioning information as required by the FCC Rules in 47 CFR Section 15.122 and incorporate the CEA 708/608 standard.
- Automatically switch from the On state to the Sleep state after a period of time without user input. This capability can be enabled at the factory as the default setting for the device as required by 47 CFR Part 301.
- Allow default period of inactivity before the equipment automatically switches to the Sleep state to be four hours as required by 47 CFR Part 301.
- Disallow the default energy related settings from be altered during the initial user set-up process as required by 47 CFR Part 301.
- Support front panel buttons and LEDs as required by 47 CFR Part 301.
- Display on the television receiver signal quality indications such as signal strength per ATSC A/74, Section 4.7.

CBgui is backed by BitRouter' years of experience designing software for commercial DTV sets. BitRouter also provides GUI design services and ongoing support.

