

BitRouter

TVrefpak—Digital Cable Ready TV Reference Design Software

Technology

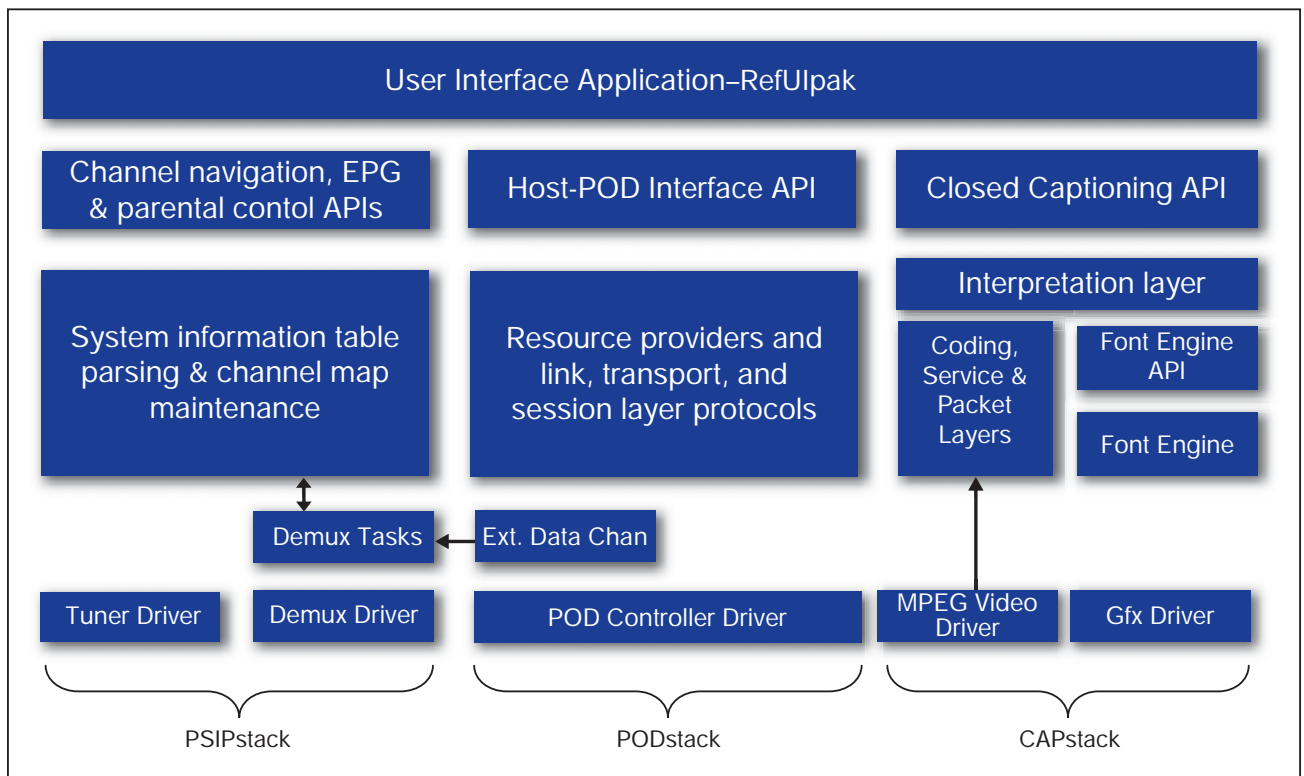
TVrefpak is a suite of protocols which provide a complete solution for “uni-directional digital cable ready” and “terrestrial broadcast” TV sets in the US market. TVrefpak contains all the FCC-mandated protocols for digital TV. These protocols are tied together by a user interface called the RefUIpak which provides a user interface suitable for a reference board.

All components of TVrefpak are completely portable to any real-time operating system and target silicon. They use BitRouter’s kernel abstraction layer which contains approximately 30 OS calls and can be ported to a new OS with minimal effort. A hardware abstraction layer is used to port to any target silicon. TVrefpak works with Linux and most major real-time operating systems.

TVrefpak consists of the following components:

- ▶ **RefUIpak**—a complete user interface for a digital TV reference board. It shows the capabilities of the underlying hardware and proper functioning of all underlying protocols. Its interface is designed to allow a technical evaluation of the reference board and accompanying software.
- ▶ **PSIPstack**—BitRouter’s implementation of the ATSC T3S8 A/65B PSIP (Program and System Information Protocol for Terrestrial Broadcast and Cable, Rev. B) and ANSI/SCTE 65 2002 (formerly DVS 234, Service Information Delivered Out-of-Band for Digital Cable Television) protocols. It includes support for the optional ATSC Directed Channel Change table and full support for processing of SCTE 18 2002 (formerly DVS 208, Emergency Alert Message for Cable, approved as a joint standard with CEA as ANSI-J-STD-042-2002). Over fifty API calls are provided to support frequency scan, channel navigation, retrieval of EPG information and

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retrieval of private data. PSIPstack supports both analog and digital tuners and stores both analog and digital channels in its channel map. More details on PSIPstack can be found in the PSIPstack data sheet located at www.bitrouter.com/PSIPstack.pdf.

- ▶ **PODstack**—implements the CableCARD™ interface mandated by the FCC for digital televisions as specified by ANSI/SCTE 28 2004 and SCTE 41 2004. OEM specific functionality is isolated in a CableCARD Interface API for easy adaptability to individual models. The implementation is provided with a unique CableCARD software simulator. More details on PODstack can be found in the PODstack data sheet located at www.bitrouter.com/PODstack.pdf.
- ▶ **CAPstack**—implements the digital TV closed captioning standard specified by EIA-708-B and mandated by the FCC order number “FCC 00-259.” It is a complete implementation of the EIA-708-B standard. The implementation provides a font engine interface to allow any commercial font engine to be used. An API is provided to allow applications to change font and display settings as per the FCC mandate. More details on CAPstack can be found in the CAPstack data sheet located at www.bitrouter.com/CAPstack.pdf.

TVrefpak and its components will work with future products under development at BitRouter:

- ▶ **biPODstack**—implements the bi-directional CableCARD™ specification.
- ▶ **PVRstack**—implements a file system and API suitable for a personal video recorder.
- ▶ **PODseed**—manages certificates during manufacturing in conjunction with PODstack.
- ▶ **DSM-CC Object Carousel**—implementation for host devices.
- ▶ **TVpak**—a suite of protocols and customizable TV user interface for an analog plus digital TV set.

Demonstration

The demonstration shows TVrefpak software running on a TV reference board provided by Toshiba Semiconductor. The board uses Toshiba’s Seine (TC81240) chip. The demonstration shows the following:

- ▶ Use of a CableCARD to decode scrambled digital video from a digital headend.
- ▶ Ability to channel surf between scrambled and unscrambled channels.
- ▶ Extraction and display of out-of-band channel and electronic program guide (EPG) information per SCTE 65.
- ▶ Extraction and display of in-band channel and EPG information per ATSC PSIP A/65B.
- ▶ Decoding and display of digital closed captions per EIA-708-B.
- ▶ A customizable GUI to manage all of the above.

Benefits to Cable

TVrefpak provides a turnkey solution which can be offered by silicon vendors to manufacturers of digital cable ready TV receivers. This will accelerate the acceptance of uni-directional cable products. It will allow rapid penetration of digital cable into homes which may not already subscribe to digital cable but possess a digital cable ready TV receiver.

CableCARD™ is a trademark of Cable Television Laboratories, Inc.

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