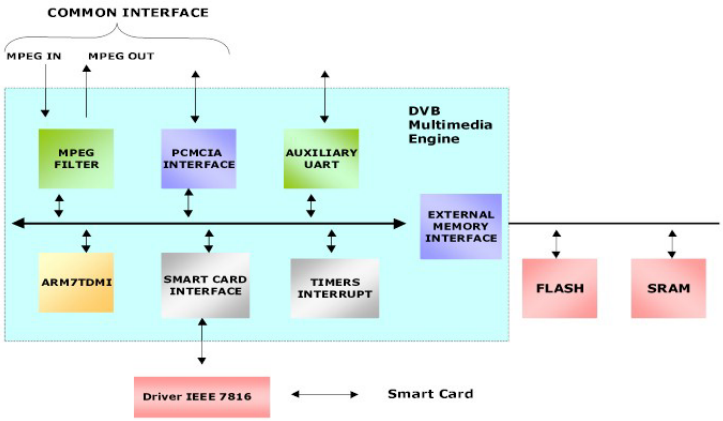
MAC tsp

Multimedia Engine for DVB Conditional Access



Overview

Conditional Access systems for DVB (Digital Vide Broadcasting can be located in a Set Top Box, in a plug-in PCMCIA module or in a digital receiver for TV diffusion. Typical solutions are based on standard uC-based solutions with associated cost overheads and low performance. **SIDSA's MAC tsp multimedia engine** is a high performance ARM7TDMI™ based single-chip which requires very few external components (SRAM, FLASH and Smart Card Driver). Indeed several Conditional Access Systems (CAS) can be quickly implemented on the same engine using our associated software development tools and reference designs.

The **MAC tsp multimedia engine** implements Conditional Access (CAS) applications, expansion host resources and extended services for data broadcasting: Data streaming, multi-protocol encapsulation (Internet), data carrousel, etc . For this purpose a powerful PID and section filtering mechanism is included

The common interface (CI) consists of two components, The transport Stream Interface and the Command Interface. Both share the same physical interface based on the PC Card standard EN50221.

Due to the complete development platform provided by SIDSA, Conditional Access System and additional services can be easily implemented. Industry standard RTOS such as pSOS™ and eCOS are supported and an extensive development software library is available.

Key Features

The MAC tsp Multimedia Engine has the following:

- Fast hardware MPEG and filtering Implementation on a single ARM7TDMI™ uC based chip.
- PID filter 100% software configurable, 64 simultaneous PIDs
- Common Scrambling DVB Algorithm
- 32 couples of 64 bits control words (odd & even)
- Section Filter 100% configurable (Datagram and carrousel extraction) max length/max number of filters 16bytes/8filters or 15bytes/16filters
- ISO7816-3 Smart Card Interface supporting T0 and T1 asynchronous protocol
- External FLASH, SRAM interfaces, Auxiliary UART
- PCMCIA & MPEG transport stream interface (Common Interface)
- Processing: ClkSys=30MHz => 48Mb/s, ClkSys=40Mhz=>64Mb/s

Transport Stream and Common Interface

The **transport stream interface** carries MPEG-2 transport packets in both directions. In conditional access applications, if the module gives access to any services in the transport stream and those services have been selected by the host, then the packets carrying those services will be returned de-scrambled, and the other packets are not modified.

The **command interface** carries all the communication between applications running in the module and the host. A Common Interface module is implemented as a variant of the 16-bit PC Card Electrical Interface. The command interface uses the least significant byte of the data bus, together with the lower part of the address bus (A0-A14), and appropriate control signals. The command interface operates in I/O interface mode. The upper address lines (A15-A25), the most significant half of the data bus (D8-D15), and certain other control signals are redefined for MPEG-2 stream input and output flow.

MPEG2 filter

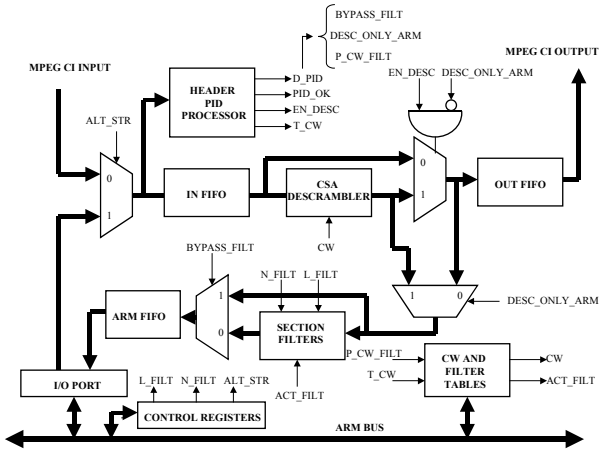
The MAC tsp multimedia engine adheres to the DVB Common Scrambling specification. It uses the EN50221 compliant PCMCIA interface and performs conditional access processing such as ECM and EMM extraction.

Filtering is performed by a MPEG2 co-processor implemented in hardware, controlled by the ARM7™ uC. The MAC tsp multimedia engine has a capacity of 64 for channel management, each of which can be de-scrambled with up to 32 Control Word pairs at TS or PES level at 68MBits/s.

For ECM, EMM, PSI/SI or any private data filtering and extraction, 64 PID are selectable and can be connected with up to 16 x 16 byte programmable and maskable filters.

Device drivers for smart card interface, Transport and Session layers of the DVB Command Interface, High Level MMI and Descrambler and ARM7™ and MPEG2 filter programming are supported. All ISO7816-3 smart card protocols are addressed: asynchronous T0, T1, synchronous PTS burst mode 155kbaud/s.

Diagram MPEG2 Filter and DVB descrambler



Developer's Toolkit

Software Support for MAC tsp

- Common Interface protocol stack
- Smart Card protocol stack
- Hardware Abstraction layer MAC tsp
- Dynamic Memory management
- Conditional Access Software (CAS) implementation services
- Proprietary CAS – "SIDSA-Vision"
- PSOS, eCOS Integration
- Programmers user manual
- Reference designs with libraries for customer CAS porting

"EXCIS" PCMCIA Module Reference Design

The Extended Common Interface Services DVB Module "EXCIS" reference design from SIDSA is a complete platform for operators and service providers to target their Conditional Access System (CAS) in a DVB Common Interface (CI) standard PCMCIA module.

Based on SIDSA´s powerful proprietary MAC tsp multimedia engine several CAS systems can be implemented on a single CI module offering the end user complete flexibility. Additional services such as Home Banking, EPGs (Electronic Program Guides) and Video Games can also be executed in any decoder, or Set Top Box via the Common Interface (CI). Thus a customer does not have to purchase a different decoder or Set Top Box for every additional service as customisation is achieved simply by inserting the EXCIS module in the Common Interface slot.

Embedded Set Top Box CAS

Traditionally, CAS functions are implemented in a Set Top Box via software or using a standard uC. However, many cases exist where it is desirable to embed several CAS systems or add a PCMCIA Common Interface slot to interface with an external CAS module.

SIDSA's MAC tsp can be used to port three or four Conditional Access Systems at once providing a very flexible and cost effective embedded CAS solution.

As the MPEG transport stream (TS) is directly accessible, the MAC tsp can be used inside the Set Top Box on the mother board or indeed on a separate daughter board for flexible production. The only external components required are memory and the SIM card interface.

In addition, the same MAC tsp multimedia engine chip can be used on an external CAS PCMCIA module providing a STB manufacturer full Common Interface and embedded functionality from one single-chip.

"SINTAC" Low Cost Fast Satellite Internet Access

Satellite Internet Access hardware normally consists of a stand-alone box which interfaces the satellite signal feed to the USB port of the PC. The "SINTAC" reference design is a PCI card based on the MAC tsp multimedia engine that plugs into the back-plane of a standard PC.

The "SINTAC" is a low cost solution and uses few external components (MAC tsp, PCI converter, Smart Card Driver, SRAM, FLASH). It also permits a high speed access using the PCI interface rather than USB.

Digital Receiver for TV-signal Distribution

Many apartment blocks have a single antenna or satellite dish which delivers TV signals to the individual apartments. Traditionally this is achieved using amplifiers for each individual analogue terrestrial TV channel. Alternatively an encoded digital TV channel can be delivered to every household and decoded using a set-top box or digital TV.

Sharing a decoded digital TV channel can be an attractive alternative due to reduced costs. Firstly the cost of a pay-per-view channel or bouquet is shared. The "head-end" amplifier module can also convert the digital TV signal to an analogue one avoiding the necessity for a digital TV or set–top box in every household and the installed cables suitable for analogue do not need to be changed.

Depending upon the region the digital TV signal can come from cable, satellite of terrestrial broadcast.

SIDSA's MAC tsp multimedia engine is ideally suited for integration within such a "head-end" decoder and converter.

"BRONET" BROadcast NETwork

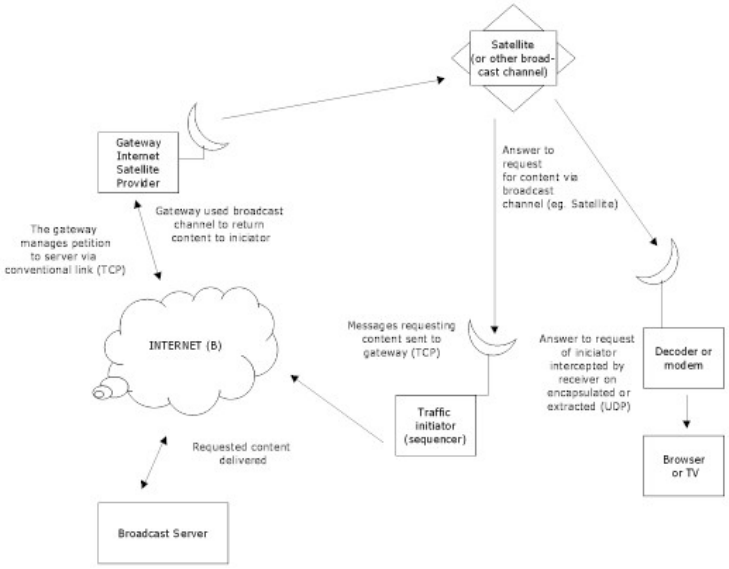
BRONET is a patented broadcast system for Video, audio and Internet without a return channel or license from the satellite internet service provider. Based on SIDSA's MAC tsp multimedia engine, BRONET can be considered as a very advanced form of teletext.

The digital information in contained within the TCP/IP (Internet) protocol on MPEG based digital transmission systems such as Internet access via satellite. Using standard procedures and services to access diffusion based broadband data networks such as Internet, audio-video and data, BRONET allows the data to be broadcast.

The broadcast information can only be decoded using a PC based card or PCMCIA module in a set-top box or digital TV based on the MAC tsp multimedia engine.

The user would access an HTML page with an Internet browser on a PC or interactive TV. He would then select a menu and the appropriate "channel" information would be encapsulated within the standard TCP/IP traffic. When the user selects a particular page, he is opening a port in the PC or digital TV which will receive the UDP packets associated with the selected "channel".

As the content is encapsulated within the standard TCP/IP protocol, only user with the appropriate conditional access keys, stored on a smart card, to access or view the information.



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