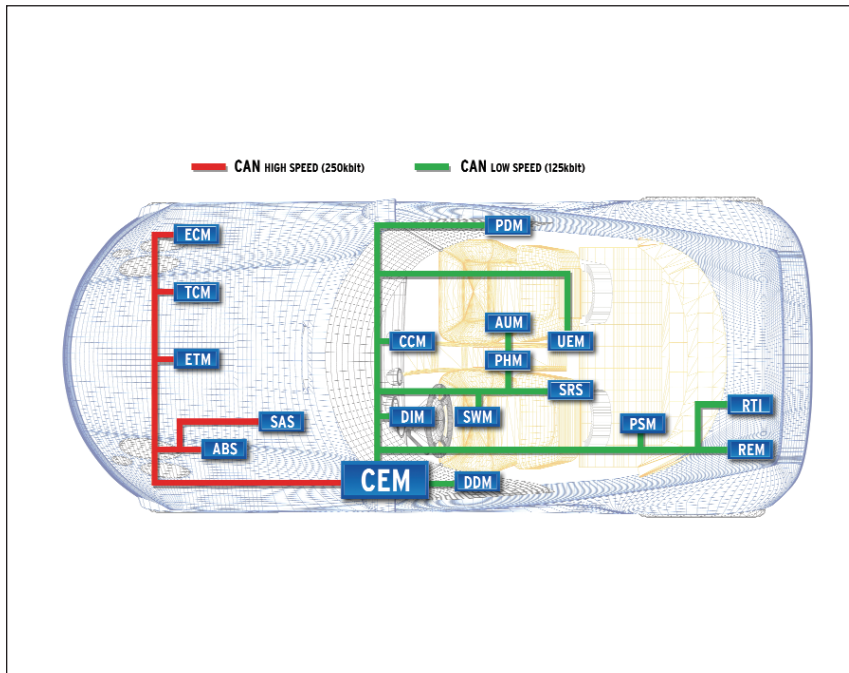


Volcano Target Package

D A T A S H E E T



Basic Vehicle System Architecture

Product features

- Signals-oriented API
- Support for multiple protocols (CAN, LIN)
- Transparent signal-based gatewaying
- Enables system-wide guaranteed message latencies
- Post-compilation reconfiguration capability of message list
- Optimized CPU resource usage (RAM, ROM, execution time)
- Update bits — to enable transport of sporadic signals in periodic frames
- Support for global constant handling through the API

The Volcano Target Package (VTP) embedded communication software offers maximum flexibility and ease-of-use for application programmers. VTP consists of a Configuration Tool (Volcano Configuration Generator – (VCFG)) and the software modules necessary to provide CAN and LIN communication for your application.

The embedded software is distributed in the form of pre-compiled and fully validated object libraries with associated documentation. The usage of slim interfaces guarantees an easy integration into the ECU software. Optimized utilization of all microcontroller resources allows the VTP to be used as a multi-purpose, customizable software package.

Communication Layer

Device Drivers

The Device Drivers manage message transmission and reception for both CAN and LIN. They also provide all low-level, controller-specific primitives required by the Network Management module such as initialization, bus-off, sleep and wake-up handling. A consistent timing model is implemented through the whole Volcano tool chain that allows you to use

the Volcano Network Architect (VNA) to design your network for efficient use of available bandwidth. The device drivers provide the predictable behavior that will guarantee end to end message latencies across your whole network.

Interaction Layer

The Interaction Layer provides a true signal-based API, greatly simplifying application development as you will not have to cope with CAN frames, only application-specific signals. Messages are sent according to predefined schedule table(s) typically generated by the VNA tool. Multiple transfer types such as periodic, sporadic or immediate messages are supported. Notification to the application upon message/signal reception is provided in an OS independent way through flags.

The maximum execution time for every Volcano function call is either guaranteed, or is controlled by the systems integrator (e.g. in case of received frames the maximum number of frames processed within one call can be bounded by the tx/rx budget configuration parameter).

The interaction layer also provides signals-based configurable gateway functionality without any special gateway hardware support required. It is also possible to perform local gatewaying between nodes connected to the same bus, to minimize IRQ load for a certain ECU.

NVRAM Pool

The NVRAM pool includes configuration parameters such as controller setup, signal mappings, frame parameters and schedule tables. It can be located in a dedicated address area and can be changed post compilation (this function requires flash or EEPROM).

The RAM pool stores signals in a compressed form. Unpacking is done when signal read/write function calls are executed, saving expensive RAM storage space.

Off-line Configuration Tool

The VNA tool generates three input files to the configuration tool: the fixed, network and target files.

The fixed file describes the available network interfaces and definitions of published and subscribed signals for each interface of each ECU. This can be defined in a very early phase of a project, even before a supplier has been selected.

The network file is normally created by the Systems Integrator, using the VNA Network Design Tool. It describes the network interface configuration, the data frames and related parameters (frame ID, transport type, period, offset and the list of mapped signals) plus the generated schedule tables, if applicable. This information will be stored in the NVRAM and is not directly visible to the application software.

The target file is provided by the ECU Developer. It includes the hardware and implementation-specific details of an ECU, for example, the type of CPU and of the C-compiler, size and start address of the reserved RAM and NVRAM pool.

The private file includes private information from the supplier, not required to be visible or known to the Systems Integrator.

The content of the files are strictly controlled and gather together information in one place that is normally scattered over different locations and over different phases of a car development project.

Diagnostics

Transport Layer Module

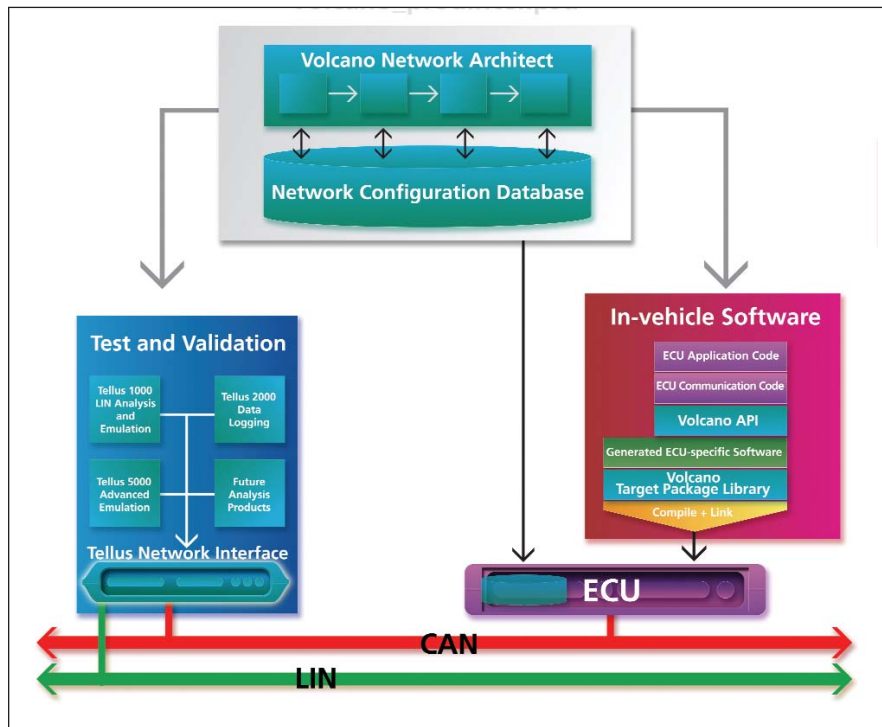
The Volcano Transport Layer (TLM) is an add-on module to the Volcano Communication Layer. It provides services for transport of data exceeding the size of a single CAN frame such as diagnostic communication.

- ISO 15765-2 compliant on the bus
- Volcano-specific API provided to add extra functionality such as composition of a data block from multiple sources
- Hardware-independent implementation
- Timing parameters are described in a configuration file

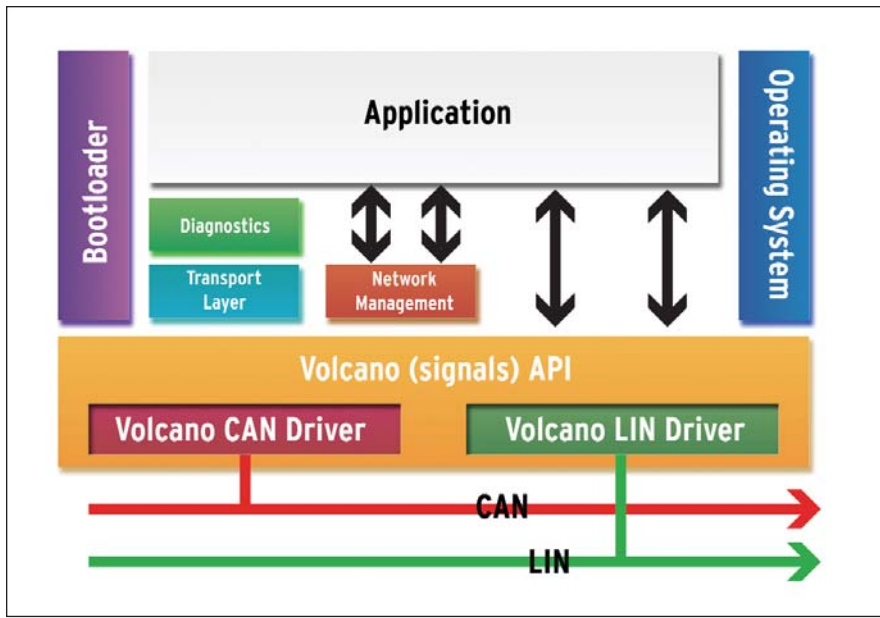
Diagnostic Service Layer Module

The Diagnostic Service Layer Module (DSL) provides a basic set of ISO diagnostic services to the application. It provides a Volcano-specific API to the application for sending back generated responses to the tester. Handling of the diagnostic session including timing and exception handling is always done within the diagnostics service layer.

- ISO 14230 or ISO 14229 service set supported
- The implementation follows the ISO 15765-3
- The TLM is used for data transfer
- Callback functions provides interface to the application



Volcano Product Interaction



Embedded Software Components

- Configurable usage of security access and diagnostic session types for the most diagnostic services

The Diagnostic Service Layer software runs according to requirements that are specified in configuration files.

A Volcano configuration tool using a standard graphical user interface under MS Windows may be used to originate these files. In this case, a callout template header file in ANSI C is provided to the application programmer to ensure a proper integration process.

Network Management

Network Management Package

The Volcano Network Management (VNM) package is another add-on module to the Volcano Communication Layer. It is provided for management of coordinated start-up, shut-down, sleep mode and wake-up behavior and for error handling related to configuration and communication.

- Implementations fulfill the functional scope coverage of OSEK Direct and Indirect NM specifications

- Volcano-specific network management (network configuration identification service)
- Hardware-independent implementation
- Configuration check performed, based on the configuration ID and implemented as a global constant
- Multiple customer-specific implementations are available
- Network Management can be easily configured by using the Volcano Network Architect

Bootloader

The Bootloader is a standalone program which allows download and replacement of any program module within the ECU. This functionality requires either Flash or EEPROM memory. The Volcano Bootloader is divided into two parts:

- a primary Bootloader (PBL)
- a secondary Bootloader (SBL)

The PBL is permanently placed in a protected boot sector and will execute directly after Reset. The PBL acts as a communication engine to download and activate the secondary Bootloader

(SBL) from the internal RAM of the ECU. The SBL adds functions for erasing and programming of flash memory and EEPROM and handles the actual download of new or updated software.

Mentor Graphics has developed a large number of Bootloaders using different types of protocols from complete car OEM-specific to standardized protocols using ISO 15765-2 transport layer and ISO 14229 diagnostic services. A KWP2000-compliant Bootloader is also available.

Availability

The Volcano Target Package is available for a number of widely used Micro Controller Units (MCUs):

- Fujitsu 16LX
- Hitachi H8S, SH7055, SH7058
- Infineon C16x, TC17x
- Mitsubishi M32R, MC32C
- Motorola HC08, HC12, Star12, MC683xx, MPC5xx, MAC71xx
- PowerPC
- National CR16
- NEC V85x
- ST Microelectronics ST9, ST10
- Texas Instruments TMS470
- Toshiba TMP92/TMP94

Details of the compilers and compiler switches used for the different versions are available directly from Mentor Technical Marketing.

Mentor Graphics also provides complete software solutions in close collaboration with most microcontroller vendors (e.g. for new microcontroller derivatives).

Recommended Configurations

The modular structure of the Volcano Target Package allows the integration of different kinds of module combinations.

Communication Layer Only

This configuration is recommended for users who want to integrate an existing ECU into a Volcano-based vehicle network or users who want to change their communication base to Volcano to benefit from the advantages using the Volcano Network Architect.

Communication Layer and Network Management

This configuration is recommended for users who want to integrate an existing ECU into a Volcano-based vehicle network that still uses Volcano Network Management or users who want to change their network management to Volcano.

Communication Layer and Diagnostics

This configuration is recommended for users who want to integrate a still ready-made application software into a Volcano-based vehicle network or users who want to replace older vehicle network solutions from other vendors.

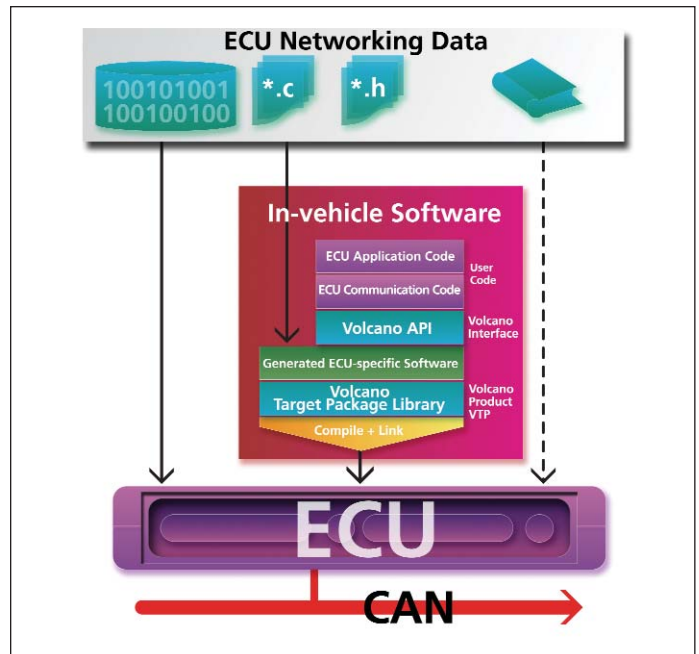
Communication Layer, Network Management and Diagnostics

This configuration is recommended for users who want to add a complete communication solution to their application prototype to integrate an ECU software in a Volcano-based vehicle network.

It is also recommended for users who want to replace older vehicle network solutions from other vendors and want to adapt their ECU to a Volcano Network.

Bootloader

The Bootloader can be used for any of the recommended VTP configurations.



Target Package (VTP/LTP) Communication Software

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05-2006

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