

Premium Partner

Partner Use Case

Central communication nodes in off-highway machinery

TTControl HYDAC INTERNATIONAL

Increased complexity, communication and security requirements of OEMs result in new electronic in-vehicle architectures



Products

32-bit TriCore™ Microcontroller AURIX™– TC297



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Use case

Application context and requirements

Major trends such as connectivity and automation, as well as the growing ecosystem of software and hardware that needs to coexist and interoperate, bring new challenges that must be addressed in the very first stages of the development of mobile machinery.

Challenge

In general, an increase in the amount of data being transmitted within mobile machinery can be monitored. Newer, more complex sensors and cameras produce more data which needs to be processed by ECUs and displays. Automated functions require guaranteed bandwidths and latencies, ensuring that mobile machinery works reliably and safely. Moreover, in the future, ECUs will no longer be only controllers, but sophisticated platforms that communicate with a multitude of different domains in the vehicles. Security will become one of the most important topics for future vehicle architectures, as machines will soon be equipped with wireless and wired ports and communicate with cloud platforms or other external infrastructures.

Implementation

The solution requires a robust and advanced connectivity platform that provides switch functionality or is able to act as an inter-domain gateway controller, connecting the multitude of different vehicle domains and networks in a safe, secure and reliable manner. TTControl developed TTConnect 616 and fitted the hardware with the AURIX™ TC297 32-bit TriCore™ Microcontroller, ensuring high real-time performance with three CPU cores and multiple on-chip memories. Based on these capabilities, TTControl is able to offer a connectivity platform that manages all in-vehicle interfaces such as CAN-FD, LIN or Ethernet (100BASE-T1 BroadR-Reach® or 100BASE-TX Standard Ethernet).

Benefits for the user

- Ethernet-based, high bandwidth backbone between ECUs, HMI, and cameras
- Safe and reliable connection of different domains in the vehicle such as power train, suspension or operator station
- Fast software updates
- Enhanced debugging
- Logging and diagnostic features
- Enhanced security

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Solution

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TTConnect 616 is a rugged hardware device based on Infineon AURIX™ TC297 and targeted mainly towards off-highway applications (mobile machinery). The device offers the following features:

- 6 x 100BASE-T1 interfaces
- 1 x 100BASE-TX interface
- 6 x CAN-FD interfaces
- 1 x LIN interface
- TC297 triple-Core CPU @300 MHz
- IP67 and extended temperature range for rough environmental conditions

TTConnect 616 can be used for different applications and use cases, based on software functionality. These are:

Configurable Ethernet switch:

TTConnect 616 distributes data throughout the vehicle using its Ethernet interfaces. An example is sending camera images to a display in order to provide complete visibility around the vehicle.

Programmable ECU:

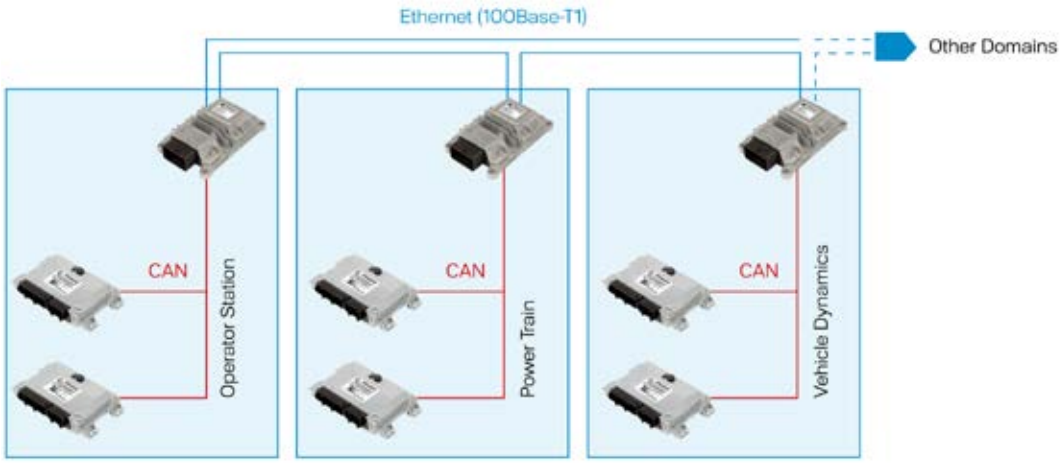
Customers can freely program TTConnect 616 using TTControl's standard API in order to create affordable and highly flexible control platforms. TTConnect 616 can control CAN-based devices such as I/O modules, reducing complexity and overall machine cost.

In-vehicle gateway:

TTConnect 616 routes data between interfaces in a pre-defined manner and provides security mechanisms in order to avoid external threats.

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Domains separated by Ethernet interfaces using a ring topology

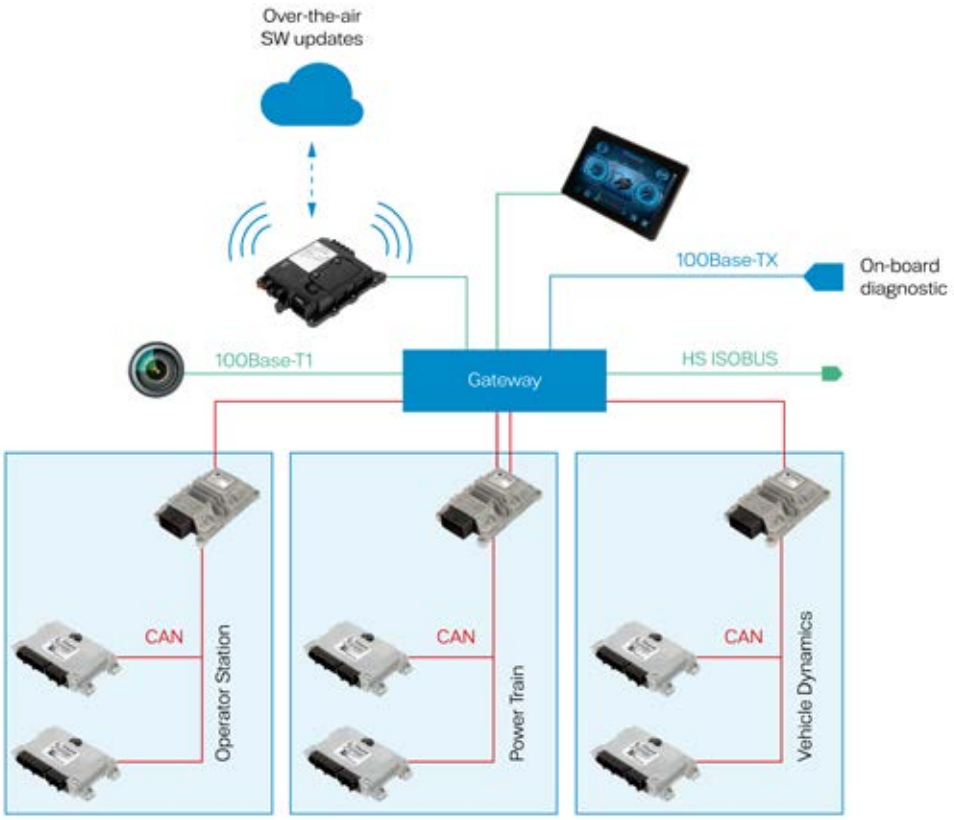


Illustration of vehicle architecture with a central communication node

Main benefits of the Infineon product

- Hardware security module (HSM) allows for the development of advanced security concepts
- Wealth of interfaces provides the ideal platform for in-vehicle gateway
- Triple-core CPUs provide the performance levels required for the powerful head control unit and enable simple and flexible machine architectures

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Partners from the Infineon Partner Ecosystem help you design your device and application based on our components. They have been selected by us on the basis of their competence and ability to design and deliver strong and trustworthy solutions, especially for new technologies and application fields. Their knowledge and experiences are diverse in the areas of Hardware, Software, Tools, Services and End Applications.

TTControl GmbH

TTControl is a joint venture company of TTTech and HYDAC International and operates under the umbrella of the TTTech Group. TTControl offers safety controls, displays and connectivity solutions for mobile machinery. As a leader in functional safety, TTControl provides software and hardware platforms that enable equipment manufacturers to develop highly reliable electronic control systems quickly and economically.
More than 130 employees at TTControl's headquarters in Vienna, Austria and Brixen, Italy, support their customers in the construction, agriculture and municipal machinery industry. They provide deep technical experience, safety consulting and profound know-how for complex electronic vehicle architectures. TTControl's products fulfil a multitude of vehicle safety standards. The portfolio ensures ease of integration and usage, as well as modularity and scalability of solutions. Additionally, customers benefit from the "factoryless" business concept, which is based on the co-operation with known European electronics manufacturers.

TTControl's contribution to the Infineon Partner Network

TTControl's offering consists of safety-certified ECUs, connectivity solutions and rugged operator interfaces, as well as application software development and trainings:

- ECUs and I/O slave modules designed to for the demanding work environment of off-highway vehicles
- ECUs and I/O modules, protected by a compact automotive-style aluminum pressure die-cast housing
- Interfaces such as CAN, ISOBUS, Standard or BroadR-Reach® Ethernet
- Programming in C or CODESYS®
- Display portfolio that sets new standards with maximum resolution, programmability with CODESYS® 3.x and advanced user experience
- TTConnect Cloud Service management platform that enables ECU firmware updates over the air
- Advanced connectivity platform TTConnect 616, which combines and manages all in-vehicle interfaces such as CAN-FD, FlexRay, LIN or Ethernet
- Trainings for CAN, CANopen, J1939, CSE/m, MATCH, functional safety etc.

A multitude of TTControl's ECUs and I/O modules as well as TTConnect 616 are fitted with chips from Infineon's AURIX family, ensuring high-performance and the right mix of interfaces. In addition, they provide safety and security features in order to fulfil the required safety standards in the off-highway market. As Infineon's CPUs offer long-term availability and extended product road maps, they are ideal for the life cycle requirements of mobile machinery.

Published by
Infineon Technologies AG
81726 Munich, Germany

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Date: 09 / 2019

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