An Introduction to Telematics Control Unit (TCU) and Telematics Gateway Unit (TGU)

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Know about the differences and how TCU/TGU powers a Vehicle Telematics Solution

A typical vehicle telematics system consists of 4 fundamental components:

A **Vehicle ECU network/ Car Head-Unit:** In-Vehicle Network of Automotive Electronic Control Units (ECUs), is a interconnected network of micro-super computers (Automotive ECUs').

These Electronic Control Units help the Telematics Device (Telematics Control Unit or Telematics Gateway Unit) to fetch the necessary vehicle data like vehicle diagnostics data, speed, engine temperature, and more.

B **Telematics Cloud server:** Stores , processes and manages the telematics data sent by the Telematics Control Unit or Telematics Gateway Unit.

A Cloud based Telematics Server consists of the following components:

A web server

An application Server

A database

C **The front-end application (Web/Mobile Dashboard):** A web based or a mobile based application acts as an interface between the Telematics Cloud Server and the end-users.

This enables the end-users or enterprises to view, access and send/receive commands/output from the telematics cloud server.

D **Telematics control unit or a Telematics gateway Unit:** The central hardware module of a telematics device that collects, stores and transmits the data fetched from the Electronic Control Units (ECUs) to the telematics cloud server. This can either be a Telematics Control Unit(TCU) or a Telematics Gateway Unit (TGU).

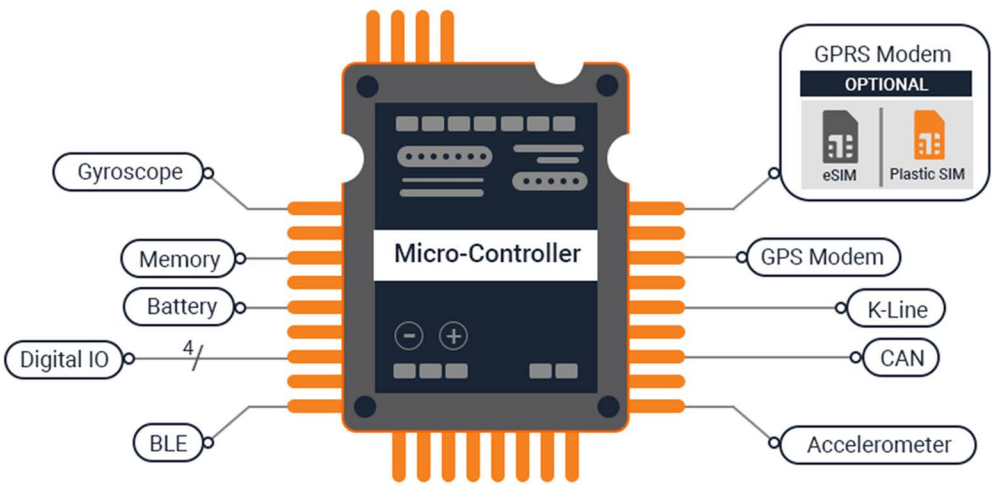
Whether your telematics product development project requires a **Telematics control unit** or a **Telematics Gateway Unit**, can be evaluated based on the following parameters:

- Complexities of the functionalities that your Telematics Product should support
- Expected Memory and Power Footprints
- Required Data throughput and data bandwidth
- Safety Criticality (**Functional Safety**)of the Hardware and Software involved

To successfully complete this evaluation, it is important for your Telematics Product design teams to understand the inherent differences between a **Telematics Control Unit (TCU)** and a **Telematics Gateway Unit (TGU).**

Let us explore the key differences between Telematics Control Unit and Telematics Gateway Unit

Telematics Control Unit (TCU):



Architecture diagram of Telematics Control Unit

- Telematics control unit supports the following key functionalities:

Fleet tracking and management

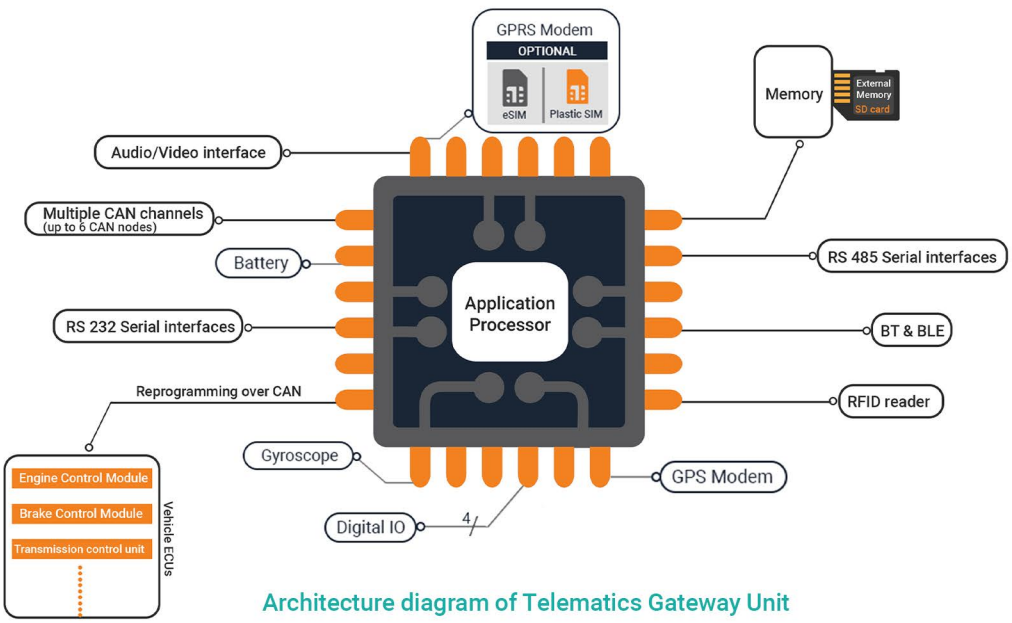
Track and Trace

Remote vehicle diagnostics

- A TCU is designed on a Microcontroller Hardware Platform
  (E.g: RL 78 Renesas RL78 Family , STMicroelectronics' STM32)

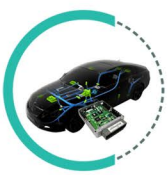
- Is a low-power solution with low-memory footprint. But offers a lower data throughput.
- Can store offline data for a shorter duration.
- TCU can communicate over CAN and dual CAN.
- The complexity of Hardware Circuit design is less .
- A Telematics Control Unit is used as a entry-level low-cost telematics solution.

Telematics Gateway Unit:



Architecture diagram of Telematics Gateway Unit

- Telematics control unit supports the following key functionalities:



Aggregation of (ECU) vehicle usage statistics

Reprogramming of Vehicle ECU

. Remote vehicle diagnostics

- A TGU is designed on an high-performance Application Processor Hardware Platform -. (E.g: ARM Cortex-M , Jacinto TI etc).
- Offers the advantage of higher data throughput. However, TGU design involves higher Memory and Power Footprint.

- Has the capacity to store offline data for a longer duration.
- A TGU is designed to communicate with multiple CAN networks (Upto 6 CAN network nodes).
- The complexity of Hardware Circuit design is higher, as compared to a TCU.
- Includes Audio/Video interface.
- Since a TGU Solution supports Vehicle ECU reprogramming, it is important that your Telematics Gateway Unit (TGU) is compliant with ISO 26262 Functional Safety Standards (ASIL B/ASIL C/ASIL D).

CONNECT WITH US

INDIA : +91 80 41694200

USA : +1-248-385-2017

GERMANY: +49 711-60 17 47-789

UK : +49 170 1688028

EMAIL : sales@embitel.com