28.2 Overview

GTM Kernel Architecture

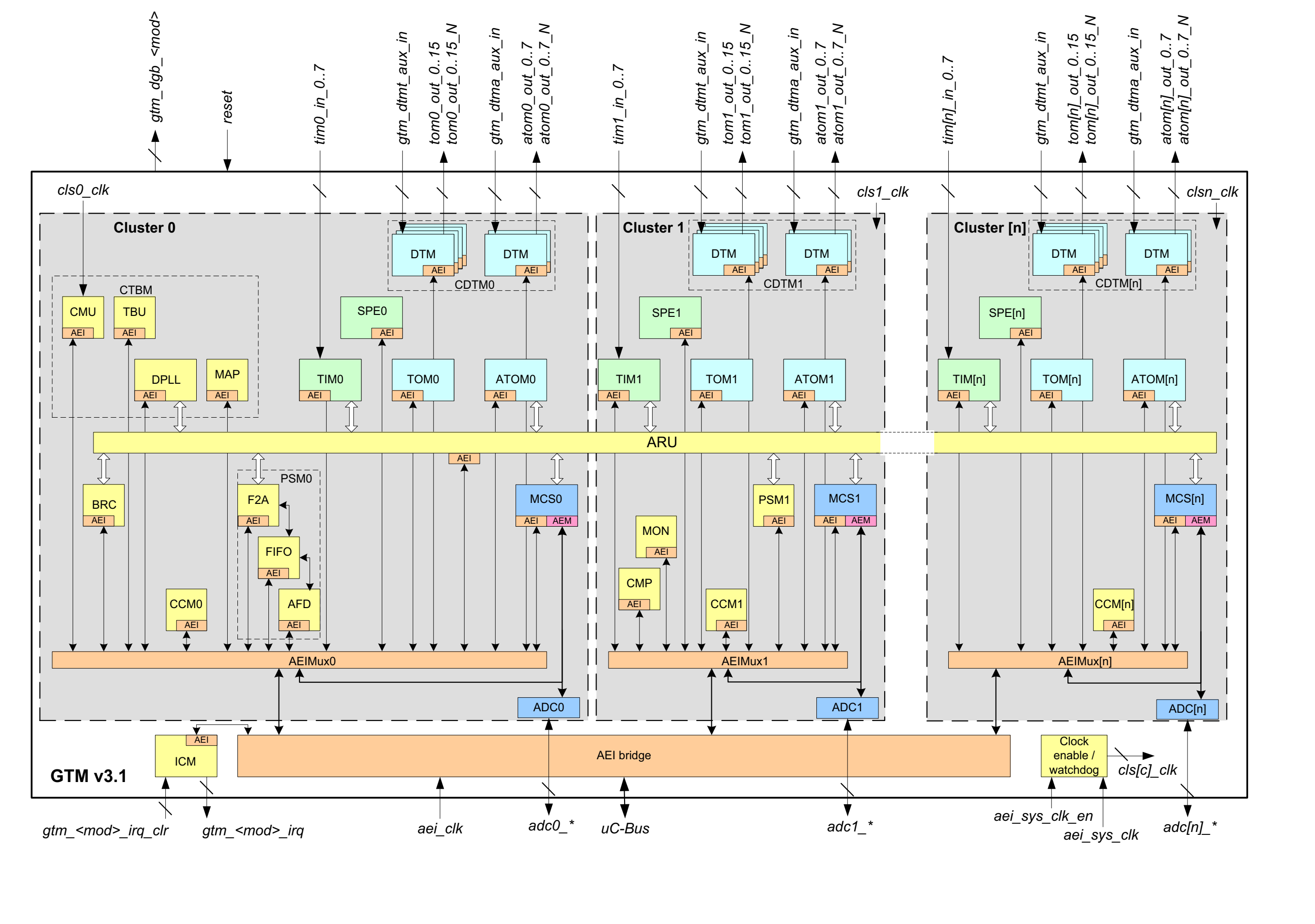

Figure 5 GTM Architecture Block Diagram

28.3 Generic Timer Module (GTM)

This document is based on the following GTM specification of the Robert Bosch GmbH:

- Version: release-v3.1.5.1-2016.03.24
- Date: 24 March 2016

28.3.1 Overview

This document is the specification for the Generic Timer Module (GTM). It contains a module framework with sub-modules of different functionality. These sub-modules can be combined in a configurable manner to form a complex timer module that serves different application domains and different classes within one application domain. Because of this scalability and configurability the timer is called generic.

The scalability and configurability is reached with an architecture philosophy where dedicated hardware sub-modules are located around a central routing unit (called Advanced Routing Unit (ARU)). The ARU can connect the sub-modules in a flexible manner. The connectivity is software programmable and can be configured during runtime.

Nevertheless, the GTM is designed to unload the CPU or a peripheral core from a high interrupt load. Most of the tasks inside the GTM can run -once setup by an external CPU- independent and in parallel to the software. There may be special situations, where the CPU has to take action but the goal of the GTM design was to reduce these situations to a minimum.

The hardware sub-modules have dedicated functionality's, e.g. there are timer input modules where incoming signals can be captured and characterized together with a notion of time. By combination of several sub-modules through the ARU complex functions can be established. E.g. the signals characterized at an input module can be routed to a signal processing unit where an intermediate value about the incoming signal frequency can be calculated.

The modules that help to implement such complex functions are called *infrastructure components* further on. These components are present in all GTM variants. However, the number of these components may vary from device to device.

Other sub-modules have a more general architecture and can fulfill typical timer functions, e.g. there are PWM generation units. The third classes of sub-modules are those fulfilling a dedicated functionality for a certain application domain, e.g. the DPLL serves engine management applications. A fourth group of sub-modules is responsible for supporting the implementation of safety functions to fulfill a defined safety level. The module ICM is responsible for interrupt services and defines the fifth group.

Each GTM is build up therefore with sub-modules coming from those four groups. The application class is defined by the amount of components of those sub-modules integrated into the implemented GTM.