

# TodMasterClock

A low-footprint, highly configurable, 100% hardware only NMEA Time of Day (ToD) Master Clock solution, specifically designed for high-performance distributed systems. Allows standalone synchronization via NMEA messages towards a NMEA source e.g. IED via UART. All frame creation and time conversions are done completely in hardware.

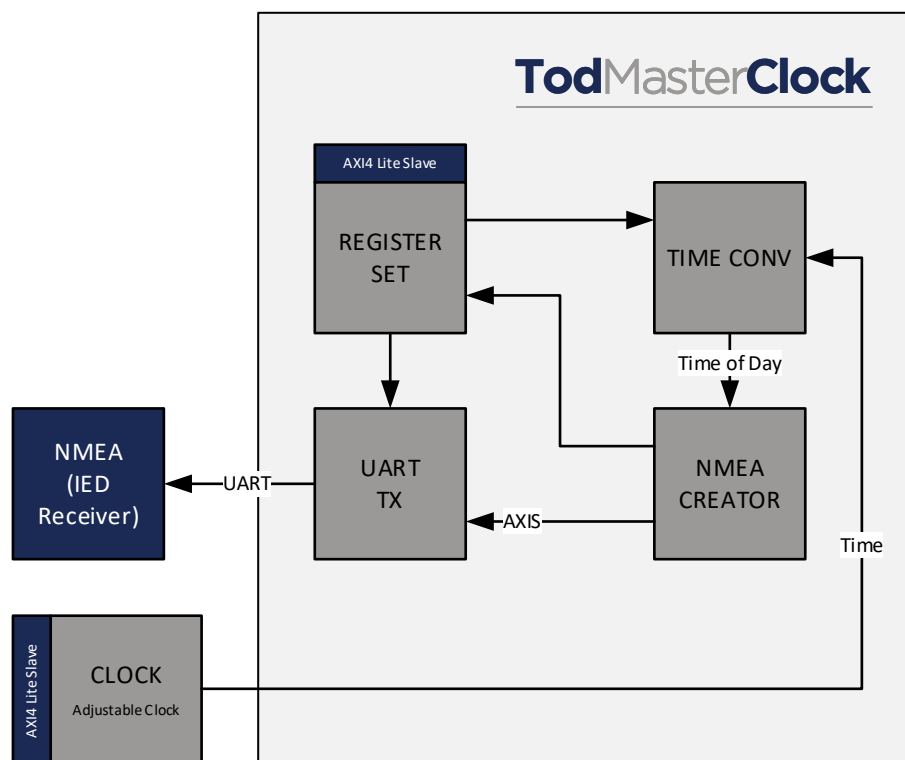
## Key Features:

- NMEA (ToD) Master Clock
- 100% hardware only solution
- Vendor independent
- Hardware frame creator
- GxZDA & GxRMC support
- Hardware time conversion
- Local time and offset

## Typical Applications:

- Legacy Networks
- Time converters
- Time serves with GPS
- Substation automation
- Distributed data acquisition
- Test and measurement
- Etc.

## IP Core Architecture:



## Specification:

NMEA	Supports GxZDA and GxRMC messages for Time distribution Selection if only one message type or both shall be sent Selection which GNSS system shall be used Sending is aligned with local second beginning Hardware UART with configurable baud rate: 9.6k - 1m baud Hardware conversion from seconds since midnight 1.1.1970 including leap years to time of day format. Configurable offset at the second overflow of the local clock to convert between UTC and TAI. Local Time distribution via hours and minutes and sign register.
Performance	Offload frame creation and time format conversion.
Portability	100% hardware only solution, no dependency on external CPU or UART Vendor independent, written in plain VHDL Low footprint and low frequency requirements
Modularity	Slim and standardized interfaces are used
Configuration	No CPU required, standalone configuration with signals Axi4 lite slave support, for status and configuration

## Deliverables:

- Ip core in plain VHDL
- Testbench in plain VHDL
- Reference Design with 1 PPS output
  - Top level VHDL file
  - Timing Constraint SDC files
  - Vivado/Quartus Project file

## Related Products:

- |                         |                     |
|-------------------------|---------------------|
| • PPS Master/Slave      | • IRIG Master/Slave |
| • PTP Ordinary Clock    | • TOD Slave         |
| • PTP Grandmaster Clock | • Adjustable Clock  |
| • PTP Hybrid Clock      | • Signal Generator  |



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