tttech auto

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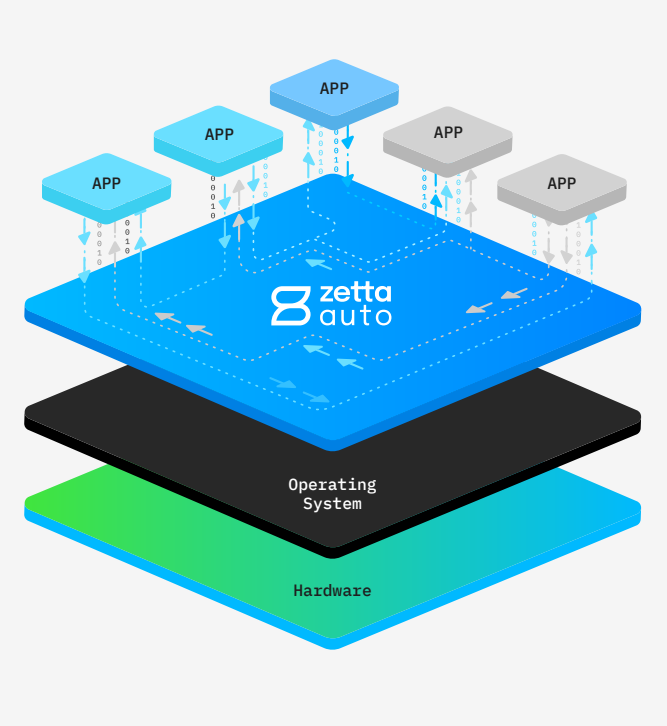
zetta auto

Zetta Auto is the unified solution for in-vehicle and V2X communication for the automotive market by TTTech Auto and ZettaScale.

Targeting service-oriented architectures (SOA) for in-vehicle communication, Zetta Auto builds upon ZettaScale's open core Eclipse Cyclone DDS, a proven, performant, interoperable, scalable and real-time capable implementation of OMG Data Distribution Service (DDS) and *Eclipse Zenoh*, a next generation pub/sub/query protocol with incredible high performance and scalability as well as exceptionally low resource usage.



Zetta Auto extends these core technologies with automotive features such as integration with Time Sensitive Networking (TSN) to provide end-to-end communication properties and compatibility with AUTOSAR Classic RTE communication on Microcontrollers (MCUs).

It also comes with an integrated tool suite that enables users to configure and monitor communication data as well as their TSN network.

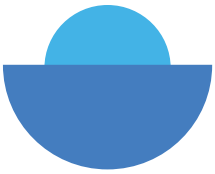
Zetta Auto Certified, coming in 2025, will furthermore offer an ISO 26262 ASIL-D certified version of the in-vehicle stack.

Looking beyond the vehicle, customers currently find it technically challenging communicating and managing data in the cloud-to-microcontroller continuum. This is due to the diverse set of environments, requirements, and technical solutions. Thanks to the interoperability with the *Zetta Platform*, Zetta Auto will make it possible to seamlessly manage and communicate data between the cloud and the vehicle.

ZETTA AUTO USPs

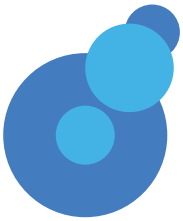
Suitable for prototype and production systems, enabling seamless transition between development phases

ISO26262 ASIL-D certification in progress



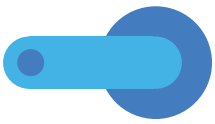
Top performance with optimal resource usage for Microcontrollers

Open source foundation with a path towards safety certification



End-to-end timing properties with Time Sensitive Networking (TSN) integration

Integrated tool suite for DDS and TSN



Unified communication for the Software-Defined Vehicle, in-vehicle and V2X.

HIGHLIGHT PRODUCT FEATURES

In-vehicle communication stack

Data-centric communication for the automotive industry

- Build your in-vehicle communication stack on a standards-based solution compliant with: OMG DDS v1.4, OMG IDL4 v4.2 and OMG DDS-RTPS v2.5 specifications.
- Brings developers a best-in-class user experience with C, C++ and Python APIs.
- High performance zero-copy shared memory management, fully abstracted for the user.
- Broad automotive ecosystems support across operating systems (Linux,QNX) and automotive middlewares: MotionWise – TTTech Auto's Safety Middleware, ROS2 and AUTOSAR Adaptive.

Built together with TSN for end-to-end predictable communication

- Zetta Auto leverages TSN (IEEE 802.1Qbv Time Aware Shaping) and unleashes both DDS and TSN to achieve communication timing properties.
- Includes end-to-end tool for the configuration of TSN networks, topology design, traffic scheduling and deployment of the result.

Resource-efficient and performant microcontroller solution with Zenoh Pico

- Optimized MCU stack and integrated tooling that enables access to DDS topics through AUTOSAR Classic RTE.
- Minimal resource usage and optimal performance in comparison to XRCE-DDS implementations for resource-constrained environments.

V2X communication stack

Pub/sub/query from cloud-to- vehicle

- Built on Zenoh protocol, Zetta Platform and fully integrated with Cyclone DDS.
- Unified data in motion, data at rest and computations from microcontrollers up to the data center.
- Location-transparent abstractions for high performance pub/sub and distributed queries across heterogeneous systems.
- Supports a continuously expanding set of Protocol and Storage plug-ins, such as MQTT, REST and a variety of storage providers.

Tool Suite

Monitor, configure and test your network with NetLens

- Provides a dashboard to capture the Key DDS computational entity, Data & metadata they exchange and their QoSs.
- Detects QoS conflicts, datatype, and configuration mismatches.
- Provides System-wide view of the network topology and helps making health monitoring.
- Operates in headless and GUI based mode from any place in the network.
- Measurement tool for key performance indicators such as latency, throughput and roundtrip tie in your own system.

Plan your TSN network with Slate

- Provides GUI to define the network topology and visualization of the schedule.
- Supports Windows and Linux.
- Schedule your network traffic based on supported TSN profiles: 802.1AS, 802.1Qbv, 802.1Qbu, 802.1Qci and 802.1CB.
- Deploy schedule in supported TSN switches through a standard configuration process (YAML).
- Integrate into custom toolchain via CLI.

NOTABLE FEATURES OF THE DDS STACK

FEATURE	AVAILABLE	DESCRIPTION
API		▪ DDS APIs in C, C++ or Python
▪ C	Yes	
▪ C++	Yes	
▪ Python	Yes	
LARGE DATA SUPPORT		▪ The Application Writing thread is decoupled from the DDS sending thread
▪ Async publication	Yes	▪ Ability to protect data topics, DDS partitions , DDS domains with Read/Write access controls
SECURITY		▪ Cryptography uses AES-GCM and AES-GMAC for message authentication
▪ Authentication	Yes	▪ The ability to check application identity and/or that invokes operations on DDS
▪ Access control	Yes	
▪ Message encryption	Yes	
▪ Message authentication	Yes	
DDS XTYPES 1.3	Yes	▪ Ability to evolve data type definition while maintaining backward compatibility with old versions
DYNAMIC DISCOVERY	Yes	▪ Ability to automatically discover new DDS entities in the system at runtime
TIME SENSTIVIVE NETWORK ▪ Qbv (scheduled traffic) ▪ Simplified configuration	Yes	▪ Abitity to synchronise Cyclone writing and reading thread with the overall end to end scheduling ▪ VLAN tagging in the DDS stack without OS dependencies
ASIL ZERO-COPY SHARED MEMORY IPC	Roadmap QM availible	▪ Ability to share data by exchanging pointers instead of content
STATIC DISCOVERY	Roadmap	▪ Static discovery mechanism

DDS STACK QOS SUPPORT

QUALITY OF SERVICE (QOS)	SUPPORTED
USER DATA	Yes
TOPIC DATA	Yes
GROUP DATA	Yes
DURABILITY	
▪ Volatile	Yes
▪ Transient-local	Yes
▪ Transiant	(Roadmap)
▪ Persistent	(Roadmap)
DURABILITY SERVICE	
▪ Cleanup Delay	(Roadmap)
▪ History	Yes
▪ Resource limits	(Roadmap)
PRESENTATION	No
DEADLINE	Yes
LATENCY BUDGET	Yes
OWNERSHIP	Yes

QUALITY OF SERVICE (QOS)	SUPPORTED
OWNERSHIP STRENGTH	Yes
LIVELINESS	Yes
TIME BASED FILTER	Yes
PARTITION	Yes
RELAIBILITY	Yes
TRANSPORT PRIORITY	Yes (default)
LIFESPAN	Yes
DESTINATION ORDER	Yes
HISTORY	Yes
RESOURCE LIMITS	Yes
ENTITY FACTORY	(On customer demand)
WRITER DATA LIFECYCLE	(Roadmap)
READER DATA LIFECYCLE	(Roadmap)

DELIVERY PACKAGE

In-Vehicle DDS Stack

- Zetta Auto DDS stack binaries for Linux and QNX on ARM. (Source code delivery option available)
- IDL compilers for C, C++ and Python
- User Manual for Application Developers and System Integrators

In-Vehicle MCU Stack

- Complex Device Driver binaries incl. gateway and gateway API for mapping between RTE and DDS communication. (Source code delivery option available)
- Generators for gateway and model integration
- Zenoh Pico binaries. (Source code delivery option available)
- Integration Manual for AUTOSAR Classic
- Zenoh transport plugin for DDS stack

DDS Tooling

- NetLens
- NetLens User Manual

TSN Option: TSN Tooling

- TSN Integration Manual
- Slate XNS binaries
- Slate User Manual