

ZD BOX 2

High-Performance Simulation Platform

Version 1.0

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ZD BOX 2 is an industry-leading high-performance simulation platform. The compact design integrates diverse bus interfaces and edge computing power for rapid deployment in a variety of scenarios, including R&D lab environments and real vehicle tests. With the ARM Cortex-A72 and ARM Cortex-A53 processors, ZD BOX 2 balances computing power and energy consumption, reducing the need for external power and heat dissipation of automotive applications. It covers a wide range of business needs from R&D to testing in the automotive industry. The compact design of hardware and software saves users' resources both in equipment management and project management.

ZD BOX 2 is a highly versatile product, designed for high-end electrical architectures based on domain controllers. It can meet the user's requirements of simulation and monitoring in R&D and testing for the Ethernet communication between domain controllers, domain controllers and its sub-controllers based on CAN/CANFD, LIN and FlexRay (A&B). With this high-density feature of ports, ZD BOX 2 can meet the demand for synchronal simulation of multiple sub-buses under domain controllers; especially, it supports 100/1000 Base-T1, which can be easily deployed as Media Gateway to meet the demand for information interaction between different buses.

As a simulation platform, ZD BOX 2 can realize the graphical simulation and monitoring of CAN, LIN, and SOME/IP PDU through the matching software ZD TSP (Trace-Simulation-Platform). At the same time, ZD provides SDK (Software Development Kits), supporting CAN, LIN, FlexRay (A&B) and Automotive Ethernet SOME/IP protocols, which can effortlessly integrate into existing applications.

The edge computing of ZD BOX 2 can be targeted to encapsulate application scenarios and independently meet business needs as an actuator in the form of an in-resident software module, getting rid of the limitation that an interface device must connect with an upper

computer, which is an irreplaceable advantage in the automation testing with a high degree of integration. The automation service package provided by ZD supplies users the functions such as text recognition, image comparison and voice recognition in the form of RESTful API interface or SDK. With ZD Server, the automation test management system and ZD datalogger, the automotive bus data logging product, ZD offers users a full-stack solution in functional testing scenarios for infotainment systems and telematics.



Features

- Integrating edge computing and rich bus interfaces, independent and rapid deployment with built-in software function modules
- Supporting high-density stand-alone interfaces:
CAN/CAN FD, FlexRay (A&B), LIN (extension module ZD Connect), 1000Base-T, 100/1000 Base-T1, Serial, GPIO
- Extensible integrated software function modules, supporting bus simulation, image processing, OCR, SDS etc., SOME/IP stack, ADB
- Real-time simulation performance, supporting at the same time full-load and real-time simulation of up to 8 CAN/CAN FD, as well as concurrent LIN, FlexRay (A&B) and 100/1000 Baes-T1
- Desktop software TSP (Trace-Simulation-Platform) and WebGUI, convenient for the recall function and system configuration

- Meeting business requirement, base software and extended software modules, upgraded via OTA
- RESTful API, following the REST framework specification, providing Javascript and Python SDK

Introduction to the main software functional modules

- Lambda Executor

The built-in Lambda executor of ZD BOX 2 provides convenient script for execution service, so that there is no need for users to consider the complex operating environment Bus Monitoring Service (Trace Service).

With this Trace Service, users can easily monitor all communication interface information in real time, including vehicle bus signals and information transmitted by upper layer protocols, such as system logs or debugging logs. Based on the powerful database processing capability of ZD BOX 2, users can subscribe to the communication logs from individual signals to the whole bus through the RESTful and Websocket interfaces provided by the Trace Service. In addition, users can define events based on signal values or filter the keywords of log messages by regular expressions. The simulation service --- Runtime Management makes it easy and fast to run its business code. Simply download the code as a ZIP file to ZD BOX 2 or synchronize the project in the cloud via git, and Lambda will automatically run the code according to the incoming requests or events.

With the Lambda executor, users can call more than 20 microservices and applications integrated in ZD BOX 2 from within the code, and even call services from other ZD BOX 2 or other companion software of ZD that have a network connection to the ZD BOX 2, such as Datacloud and TestServer. Users can choose a familiar programming language (Node.js, Python, etc.) to write a Lambda script and then use ZD BOX 2 to test and execute it.

- Simulation

ZD BOX 2 supports the simulation of current common automotive bus systems: CAN/CAN FD, FlexRay (A&B), LIN (extension module ZD Connect), 1000Base-T, 100/1000Base-T1, Serial.

ZD BOX 2 supports not only the basic simulation mode for PDU raw data, but also bus-specific database description files, such as DBC and ARXML files of CAN/CAN FD, Fibex of FlexRay (A&B), and ARXM and XML files for Ethernet, to simulate signals at the application level. The support for SOME/IP provides functional encapsulation of its application layer services in addition to the common PDUs.

- Bypassing---Supporting filtering gateway function

ZD BOX 2 provides link the gateway function of different bus protocols, which can realize the interoperability of information in different buses. For different application scenarios, the gateway function can be configured as cross-bus filtering forwarding, cross-bus full forwarding, single-bus information selective filtering, and single-bus information interception processing. All these configurations can be implemented in transport protocol or application layer protocol.

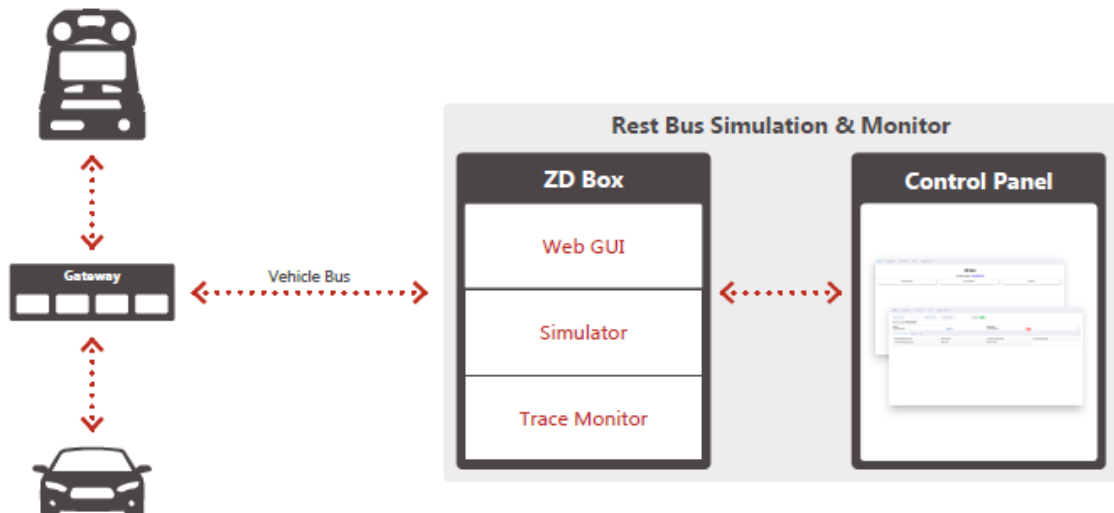
Application Scenarios

The rich interfaces and powerful computing power of ZD BOX 2 are suitable for a wide range of application scenarios. Its basic product features satisfy the hardware-in-the-loop (HiL) testing of single-domain controllers, environmental bus simulation, automated testing of infotainment systems and connected vehicle systems, and gateway functionality. Software extensions also enable ECU Rapid prototyping with integrated models and functional code.

- Restbus Simulation

With ZD TSP software, the Signal Monitoring and Simulation Platform, ZD BOX 2 enables bus simulation in real time. ZD TSP supports the import of standard communication description files (communication matrix) such as Fibex, DBC or ARXML files. It is convenient for users to directly configure the data unit PDUs and signals of the service layer.

In addition, the signal simulation service of ZD BOX 2 provides API interface and corresponding SDK to facilitate users to integrate signal simulation into the existing business environment for automatic execution.



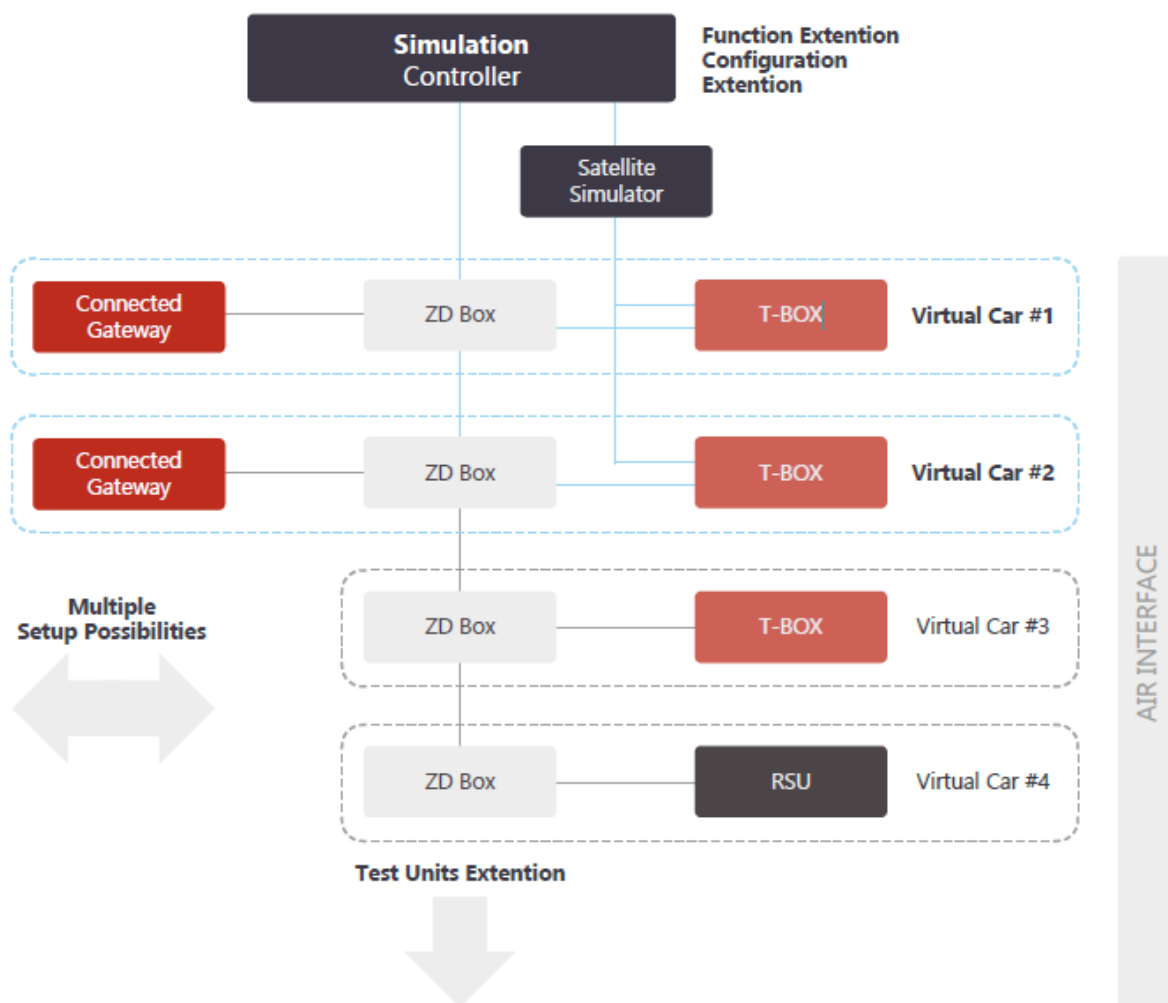
- Simulation and testing of ECU

Unlike the relatively static environmental bus simulation, ECU simulation and testing requires dynamic simulation at the signal level. For the aspect of ECU simulation, users can use the interface provided by the ZD BOX 2 simulation service to integrate the business logic of the ECU and complete the signal simulation based on a dynamic model. For the aspect of ECU testing, users can integrate a model of the external environment through ZD BOX 2, simulating the external environment with dynamic signals to verify the input, output, and business logic of ECU. In both cases, users can verify the correctness of the business in real time through the monitoring function of TSP.

- Telematics testing

The gateway function of ZD BOX 2 supporting filtering and the bus simulation function in real environment are both enabled in the business scenario of Telematics testing, such as C-V2X. The ZD BOX 2 is used to simulate a virtual vehicle in conjunction with a connected gateway and a T-BOX: ZD BOX 2 is connected to the 1000 Base-T1 communication of the connected gateway and the T-BOX for filtering and listening, and

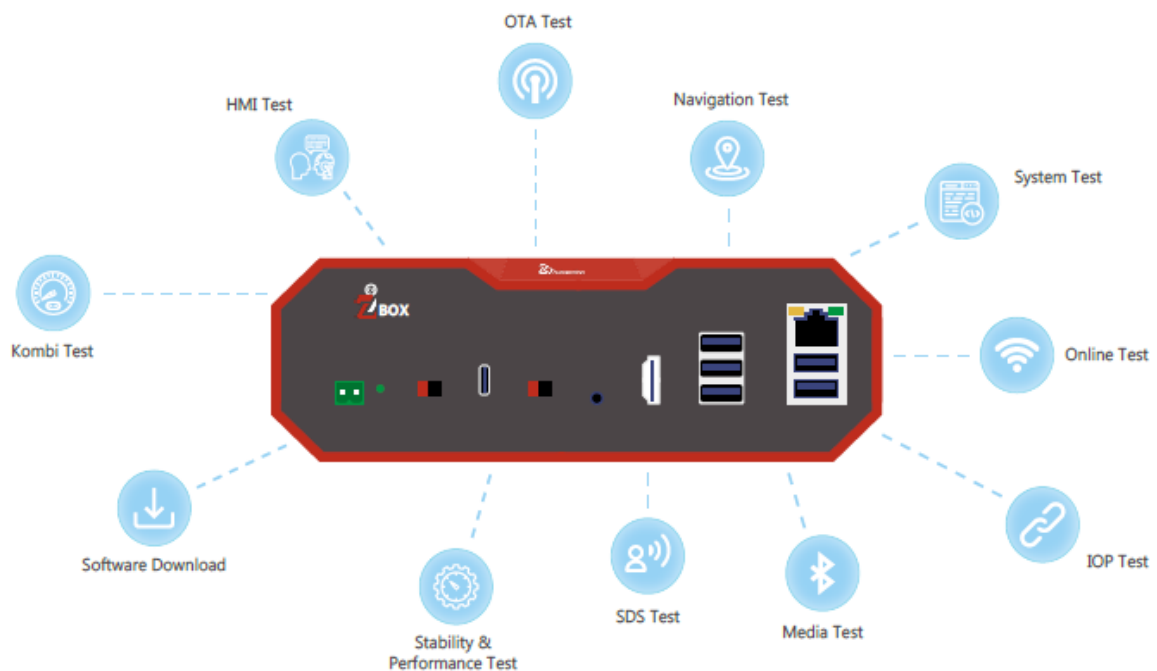
its CAN and FlexRay (A&B) are also connected to the other inputs of the gateway controller to simulate the vehicle operating status. Through the interaction of multiple virtual vehicles, the emergency status of a simulated vehicle can be broadcast to another vehicle via the air interface-based communication of the intelligent vehicle terminal, and the accuracy and time delay of the telematics communication can be judged by listening to the communication between the intelligent vehicle terminal and the gateway of the receiving vehicle. In addition to simulating vehicles, ZD BOX 2 can also work with roadside telematics devices to realize rich vehicle communication scenarios in a simulated environment, such as traffic failures or traffic accidents, to achieve the optimal solution between testing cost and testing efficiency for users.



- Automated Testing

ZD BOX 2 has a number of built-in software function modules for intelligent cockpit, telematics and automation testing, and can be operated independently as an excuator for automation testing. Regarding ZD BOX 2 as the core excuter, together with the image acquisition device, ZD Datalogger and ZD Automation Test Suite, users can realize simulation via bus signals, analyze the output images and data, and realize automated test cases based on user-defined rules.

With the desktop software ZD Code, users can debug and edit automation test cases, upload them to ZD BOX 2, and execute them with the Lambda excuter. As an excuter for automation testing, ZD BOX 2 can be used to automately test SDS, HMI, and stability-level functionality testing of infotainment systems.



Speculation	
Processor	<ul style="list-style-type: none"> • ARM Cortex-A72 (2 Core) & ARM Cortex-A53 (4 Core) • ARM Mali-T860 MP4 (4 Core) GPU • NXP MPC
Memory	<ul style="list-style-type: none"> • 4GB DDR SDRAM
Storage	<ul style="list-style-type: none"> • Integrated 32GB flash storage • M.2 PCIe SSD (500GB/1TB/2TB, optional)
Interfaces	<ul style="list-style-type: none"> • Integrated Gigabit Ethernet host interface • WiFi • USB <ul style="list-style-type: none"> ➤ 2 * USB 2.0 ➤ 3 * USB 3.0 • Serial <ul style="list-style-type: none"> ➤ 4 * UART (RS232) • CAN <ul style="list-style-type: none"> ➤ 8 * CAN/CAN FD • LIN <ul style="list-style-type: none"> ➤ 6 * LIN (with ZD-Connect LIN) • Digital signal <ul style="list-style-type: none"> ➤ 3 * Digital I/O • Automotive Ethernet <ul style="list-style-type: none"> ➤ 4 * 100/100Base-T1 (Marvell 88Q2012) • Gigabit Ethernet <ul style="list-style-type: none"> ➤ 2 * 1000Base-T (RJ45) • HDMI 2.0 • Audio input and output

Operation Conditions	<ul style="list-style-type: none">• Temperature range: 0°C to +70°C• Input voltage: 8V - 24V DC
Dimensions & Weight	<ul style="list-style-type: none">• Dimensions: 190 * 170 * 63 mm (W * H * D)• Weight: 586 g

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