Data Sheet

CONiX.HiL SDBI

Simulation Data Bridge & Inject Station

Designed for ADAS / AD HiL systems

SDBI – generic injection hardware

Based on data center grade SmartNIC technology, the SBDI is designed for scalable high performance data injection. Its configurable hardware interfaces can quickly be adopted to different ADAS/AD systems.

The integrated synchronization of the output channels, like SerDes (GMSL, FPD-Link…), CAN(FD), automotive Ethernet etc., delivers precise, reproducible results.

The device supports “standalone” and “slave” operating modes, allowing it to play back recordings and serve as an inject device for simulations.

CONiX.HIL Software Solution

The included software package offers automation capabilities and full remote functionality. Originally developed for ADAS systems such as cameras and radars, the software is now designed to meet the highest requirements of AD controller in terms of data throughput and channel count.

In standalone mode (player mode), the system acts completely autonomously and replays the input recordings as configured 24/7. Results are recorded automatically and stored to the cloud or local storages.

For simulation integration, we deliver an open API and example code to speed up the integration into existing frameworks and pipelines.

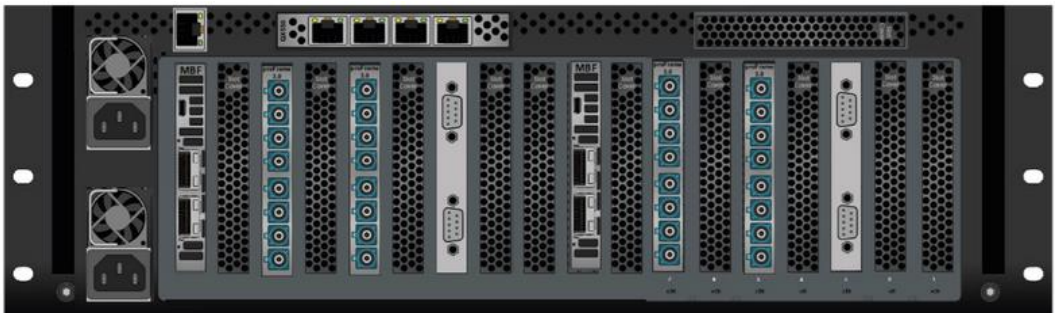
Highlights

- Data throughput without limits
- Replay / inject and record with one device
- Software defined HIL by network configuration
- Open and closed loop operation (Standalone or Slave)

- SerDes Interfaces like FPD-Linkx, GSMLx and others
- Various automotive interfaces CAN(FD), automotive Ethernet and others
- Protocol stacks for SomeIP, UDS, XCP,…
- Interface for remote diagnostics and configuration
- Support of different input files like mdf4, rosbag, pcap(ng) and others
- Support of time synchronization protocols like gPTP, IEEE802.1AS
- Realtime imager emulation capabilities

- Lowest latency by using RDMA technology
- Multiple simulation feeds simultaneously
- Highest bandwidth up to 4x200Gbit/s per SDBI
- 24/7 usage for highest availability

- Optimized SW for multi-gigabit raw data replay
- Automated HiL runs with KPI generation
- DuT/ECU start-up handling



Exemplary picture showing an SDBI with two injection docks, each equipped with 8x SerDes, 2x CAN(FD) interfaces and 2x 200GBit Ethernet

HW Specifications – Inject dock - basic (for other configurations, contact us!)

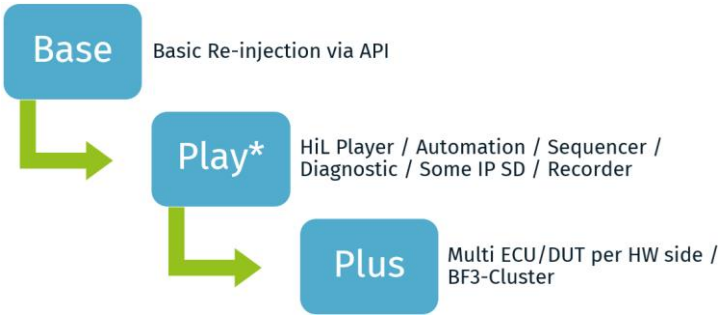
Part Number	please contact: sales@b-plus.com
System information	16x ARM Cortex-A78, 32 GB DDR5 ECC, 40 GB pSLC eMMC
LAN Uplink	2/4 x 200Gbit/s Network Connection with Dual-Port QSFP112
SerDes	SerDes Interface – ask for available serializers and quantity
CAN(FD)	4x CAN(FD) interface
Ethernet	2x automotive Ethernet 100/1000 BASE-T1 (with media converter)
Spare slots	4x spare slots for customer specific extensions (DSI3, SENT, DIO, AIO, …)
(g)PTP / XTSS	802.1AS/IEEE1588 compatible b-plus Quad-X550 (4x 10GBase-T) with GPS, UART, NMEA and PPS in/out
OS	Linux

HW Specifications - Chassis

Part Number	please contact: sales@b-plus.com
LAN	Management port on BMC (Redfish compatible)
Management	IPMI system monitoring and control (Temperature monitoring, dynamic fan speed control, power status)
Inject docks	2x independent inject docks
PCIe Gen 4 housing	Two backplanes PCIe 4.0 (9 + 9 FHFL) each with: - One PCIe 4.0 x16 Cable-Target Interface Slot - Eight PCIe 4.0 x16 Single-Width Slots (The eight x16 slots are x8 electrically)
PCIe Gen 5 housing	Two backplanes PCIe 5.0 (9 + 9 FHFL) each with: - One PCIe 5.0 x16 Cable-Target Interface Slot - Two PCIe 5.0 x16 Single-Width Slots - Six PCIe 5.0 x16 Single-Width Slots (The six x16 slots are x8 electrically)
Power Supply	AC: Dual redundant 1600 W
Mechanics	4U, 19” rackmount, (17,2”) 444 mm (W) x (18,5”) 470 mm (D) x (7”) 178 mm (H) ~19,5 kg
Temperature	PCIe Gen 4: 0 °C to +50 °C operating PCIe Gen 5: 0 °C to +35 °C operating
IP Class	IP20
Humidity	10-90% relative humidity
Fans	3x 180CFM 120mm fans
Housing Approvals	PCIe Gen4: CE – TUV-GS (EN60950-1 /IEC60950-1,EK1-ITB2000) Agency Certifications (testing pending): FCC Class A, CE Safety & Emissions, UL, cUL, RoHS3, REACH

CONiX.HiL Software and overall information

License options



The **Base** license offers headless/API options for the CONiX.HiL solution like:

- Video data replay with side channel (I²C) communication
- CAN(FD)
- Ethernet replay (no protocol handling)
- Trigger mechanism (immediate, ECU triggered)
- Simple user interface

The **Play** license includes the base license topics and offers further options for the CONiX.HiL solution like:

- HiL-Player, Replay of mdf4 and pcapng files
- Automation (job processing platform)**
- Time synchronization (IEEE802.1AS) and Trigger mechanism time synchronized
- Ethernet replay with Some IP SD**
- Diagnostic services like XCP, UDS DoIP**
- Recorder light for re-record of e.g. CAN signals for customer KPI generation
- DuT/ECU updater**
- HiL Sequencer**

**ECU/DUT Integration (start up / signals / updater / diagnostics and switch to recording must be considered by project setup (engineering effort to be discussed)).

*Currently only Play license available per DuT (Device under Test) – for further information on the license please contact sales@b-plus.com

Project adaptability, Exemplarly housing pictures

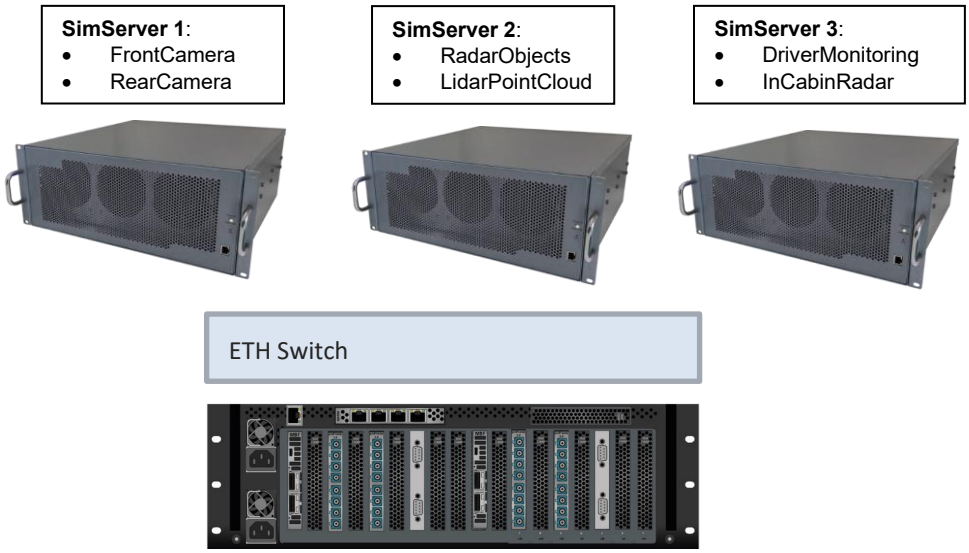
The CONiX HiL solution is a scalable open or closed loop ADAS/AD-HiL System. It consists of cutting edge hardware, designed for high precision raw and network data replay, combined with modular software building blocks. Coupled with highly expertised project teams we offer engineering services that ensure reliable customer solutions with early system availablity.

The DuT/ECUs differ from customer to customer. The SDBI concept with PCIe slots enables simple, customer-specific integration of the needed interfaces.

Need for adaptability / project diversity

- Possible connection of sensors / ECUs with different interfaces and use cases for the customer (e.g. GMSL, FPDIII or CSI-2, audio interfaces ...)
- Variable for sensors (imager, radar, ...)
- Emulation of sensor parts possible
- Replay of real recorded data or synthetic generated image data
- Customer-specific imager-initialization (e.g., with I²C)
- Implementation of customer specific protocols and support for e.g. Some IP SD mechanism
- Implementation of customer flashing tools for automated HiL runs
- Diagnostic services for DuT/ECUs like XCP or UDS DoIP

CONiX.HiL Software and overall information

Multi simulation feed use case

Exemplary setup for a complex AD system with several simulation servers running to create the environment and sensor simulations.
As the SDBI is pure network based, the operation mode can be handled as follows. Three server are generating the scenario for the device under test. Data communication paths are established by data center methods, using a high end switch and appropriate network configurations.
No more bottlenecks because of missing CPU or GPU power for your simulation.