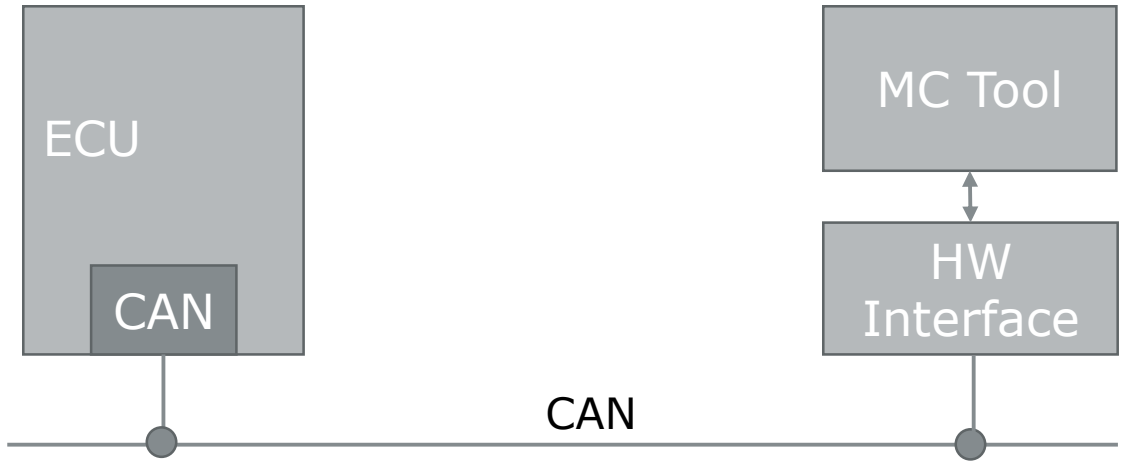
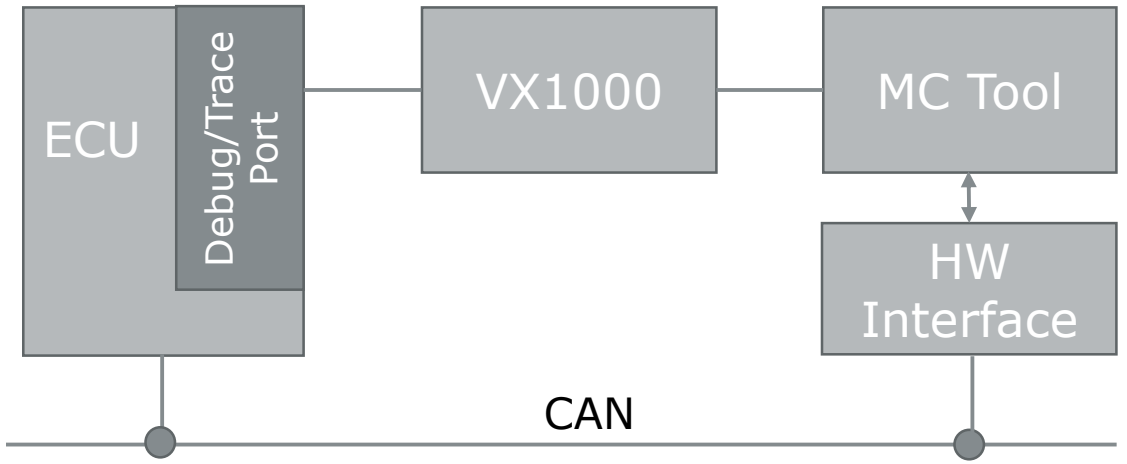
Principle

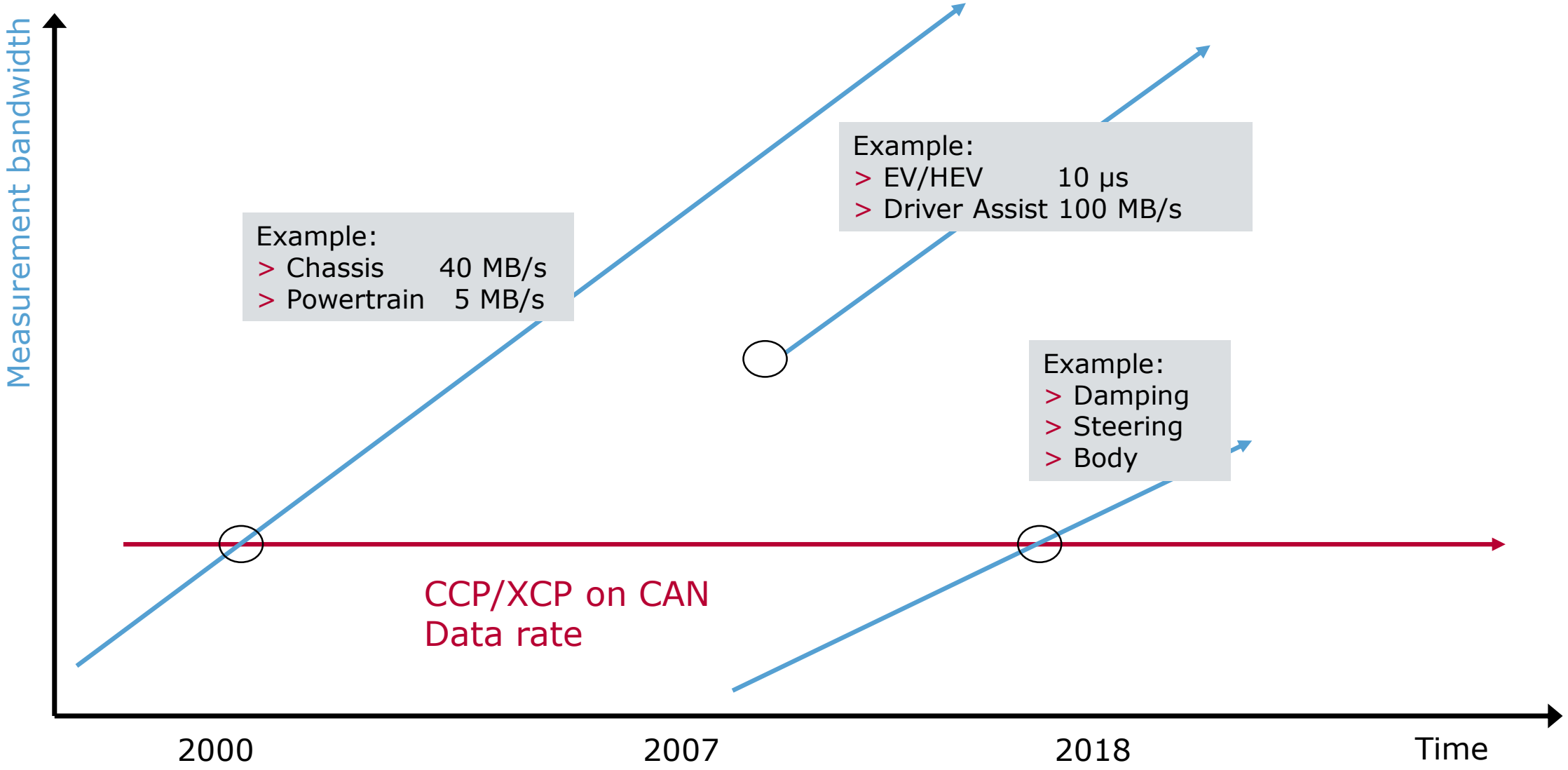
- Standard way: over Bus (CAN, LIN, FlexRay …)
  - Bottleneck
  - Few signals
  - Slow cycles
  - Influence on bus/ECU performance



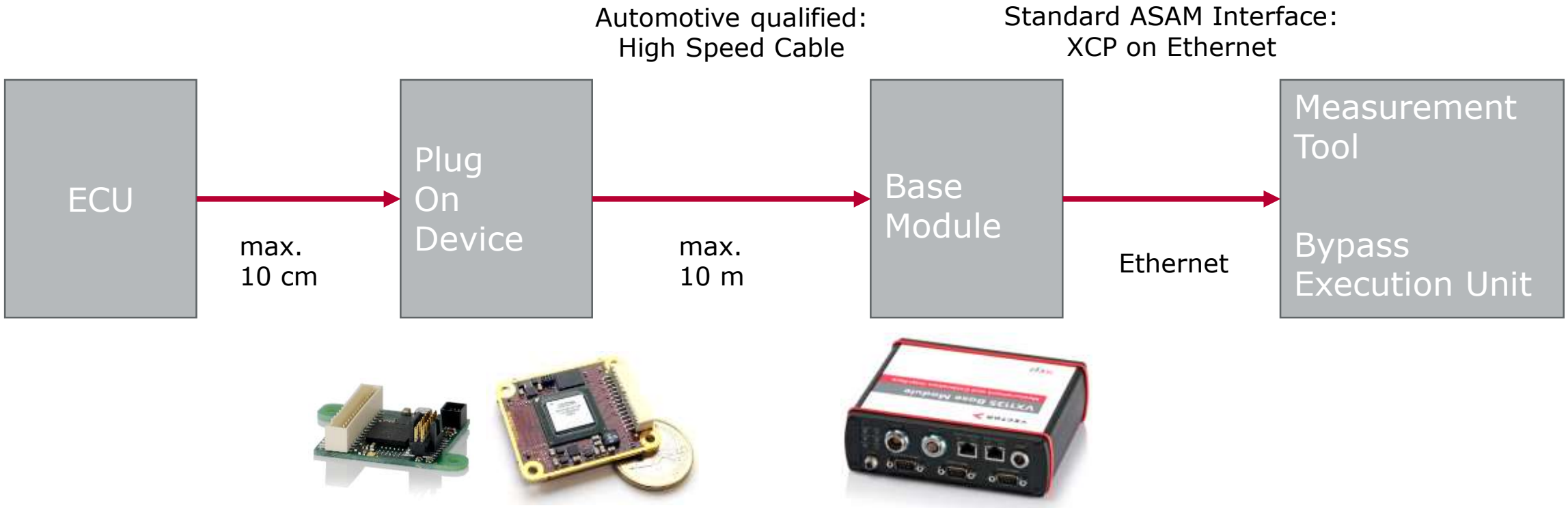
- Back door: debug and data trace ports
  - Higher data rates
  - Up to 100 000 signals
  - 10µs cycles
  - No influence on bus performance
  - (No) influence on ECU performance



Measurement Bandwidth for Different Automotive Divisions



Modular Measurement



- Standard Debug
  - JTAG / DAP(2) / AUDII / DigRF
- Trace Ports
  - RTP / NEXUS / AURORA

- Two principle measurement concepts
  - RAM data copy 3 MB/s with µC load
  - Data Trace 50 MB/s without µC load
- ECU “Cold Start” measurement possible with both concepts

Main Features

Measurement:	High speed measurement: >100 MB/s (XCP + Streaming) Fast measurement cycles, up to 100 kHz (10 µs raster) First loop data acquisition (Cold start)
Calibration:	Automatic calibration overlays and CAL page switching
Bypassing:	Very low latency bypassing
Flash Programming:	Brain dead flash programming
Calibration Data:	High speed upload and download
CAN support:	Integrated 5 x CAN-FD
FlexRay support:	Optional: Full FlexRay A+B channel
Tool Interface:	Up to 2 x 1 Gbit/s XCP on Ethernet (ASAM standard)
Integrated Eth:	Up to 2 x additional BroadR-Reach (100BaseT1) or 100/1000 Standard Ethernet connector

VX1060 Base Module

- Cost-effective Base Module for VX154x Serial PODs
- Connector for Debugger access
- PC uplink: 100 Mbit/s Eth
- Data rate: up to 10 MB/s
- Size 115 x 106 x 32 mm

	Serial POD	HSSL POD	HSSL2 POD	CAN/ FlexRay	BR/ ETH
VX1060	•				

VX1132 Base Module

- ECU interface: Serial or HSSL or HSSL2
- Connector for Debugger access
- PC uplink: 1000 Mbit/s Eth
- Data rate: up to 50 MB/s
- Max RAM Trace size: 1+1 MB
- 4 x CAN (Lemo)
- Optional 1 x FlexRay A+B Monitoring
- Size 147 x 172 x 55 mm

	Serial POD	HSSL POD	HSSL2 POD	CAN/ FlexRay	BR/ ETH
VX1132B		•		•*	
VX1132C			•		
VX1132H		•			
VX1132S	•			•*	

VX1134 / VX1135 Base Module

- ECU interface: HSSL2 or HSSL or Serial
- Data rate: +100 MB/s
  (XCP and streaming data)
- Max RAM Trace size: 8 MB
- Up to 2 x additional BroadR-Reach
  (100BaseT1) or 100/1000 MBit Standard
- VX1135
  - 5 x CAN-FD (DSub9)
  - Optional 1 x Full FlexRay A+B

	Serial POD	HSSL POD	HSSL2 POD	CAN/ FlexRay	BR/ ETH
VX1134B		•			•
VX1134C			•		•
VX1135A	•	•		•	•
VX1135C			•	•	•
VX1135D		•	•	•	•
VX1135E	•			•	2x

VX154x Serial PODs

VX1543A Serial POD

- Single side PCB, size 23 x 24 x 7 mm
- Temperature range -40°C to +115°C
- Optional housing or mounted inside the ECU
- Standard connectors for DAP and JTAG
- VX1543A: 1.2V to 5V IO Voltage

VX1544 Serial POD

- Same footprint and all feature like VX1543A
- Double Side PCB, with plastic interposer
- VX1544A/D Support of MPC57xx => DigRF/LFast (320 MHz)
  - IO Voltage: 0 – 5 V
- VX1544B Support of Aurix => DAP2 (320 MHz)
  - IO Voltage: 0 – 3.3 V
- FlexAdapter and new Serial cable (> 2m) necessary for high frequency
- Cal-Wake-Up Feature
- EMEM Power supervision connector

Supported Microcontrollers by Serial PODs

Infineon

- TriCore TC1xxx (ED) via DAP
- TriCore AURIX TC2xx (ED) via DAP2 or HSCT
- TriCore AURIX TC3xx (ED) via DAP2 or HSCT
- XC2000 Family via DAP

NXP/STM

- PowerPC xPC5xxx via Nexus JTAG Class 2+ or Zipwire

Renesas

- RH850 via Nexus JTAG Class 2+
- V850E2 via Nexus JTAG Class 2+

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Performance Data – Serial PODs

Serial PODs			
Target Controller	**xPC5xxx, V850, XC2000**	**TriCore Production Device (PD)**	**TriCore Emulation Device (ED) Data Trace**
Measurement data throughput	≤ 1 MB/s	≤ 3 MB/s (TC1xxx) ≤ 5 MB/s (TC2xx, TC3xx)	≤ 5 MB/s (TC1xxED) ≤ 15 MB/s (TC2xx, TC3xx)
Impact on CPU run-time	≈ 4% per 1 MB/s	≈ 4% per 1 MB/s	0%
DAQ RAM requirement	ø 3-6 bytes/signal	ø 3-6 bytes/signal	0 bytes/3 EMEM tiles
DAQ signals	10,000	10,000	100,000
DAQ events	31	31	256
Minimum measurement interval	≈ 65 µs	≈ 18 µs	≈ 10 µs
Bypassing latency time	≤ 400 µs	≤ 400 µs	–

VX145x HSSL PODs

- Size 40 x 35 x 9 mm
- Samtec QSH connector
- Temperature range -40°C to +105°C
- Optional housing or mounted inside the ECU
- VX1451: Nexus Aux + RTP/DMM
- VX1453: Aurora

Supported Microcontrollers by HSSL PODs

Infineon

- TriCore AURIX TC2xx ED via Aurora
- TriCore AURIX TC3xx ED via Aurora

NXP/STM

- PowerPC xPC5xxx via Nexus AUX
- PowerPC MPC57xx via Nexus Aurora

Renesas

- RH850 via Nexus Aurora

Texas Instruments

- TMS570 via RTP/DMM

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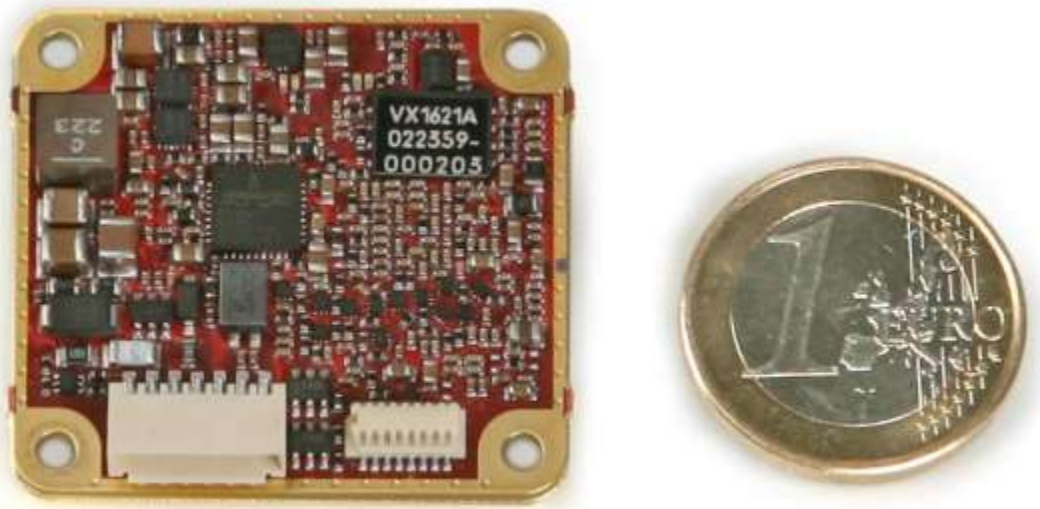
Performance Data – HSSL PODs

Generic HSSL PODs	
Target Controller	**xPC5xxx with Nexus AUX or Nexus Aurora** **RH850 with Nexus Aurora** **TC2xx ED, TC3xx ED with Aurora** **TMSx70 with RTP/DMM**
Measurement data throughput	Up to 100 MB/s
Impact on CPU run-time	0%*
Trace window size	2 or 8 MB (VX1132 / VX1135)
DAQ RAM requirement	0 bytes
DAQ signals	100,000
DAQ events	512
Minimum measurement interval	8 µs
Bypassing latency time	≈ 300 µs

VX1621A XPOD

- Standalone measurement and calibration device
- Standardize XCP protocol support
- No need for VX1000 Base Module
- BroadR-Reach / Automotive Eth
- Requires only simple conductor pair
- Size 37 x 35 x 9 mm
- Temperature range -40°C to +120°C



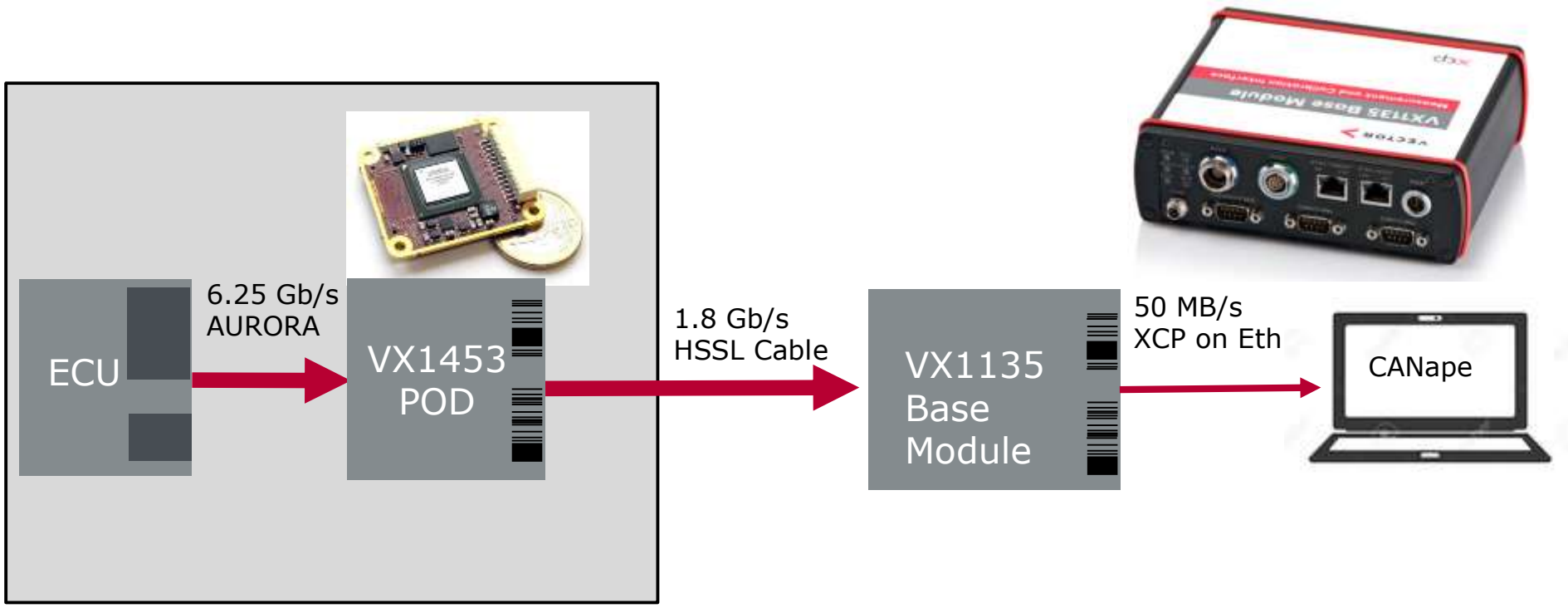
Performance Data – XPOD

XPOD	
Target Controller	**TriCore TC2xx Emulation Device (ED)**
Measurement data throughput	≤ 5 MB/s
Impact on CPU run-time	≈ 4% per 1 MB/s
DAQ RAM requirement	ø 3-6 bytes/signal in EMEM
DAQ signals	10,000
DAQ events	31
Minimum measurement interval	≈ 20 µs
Bypassing latency time	–

VX0312 Ethernet/CAN Interface

- 100/1000 Mbit/s (standard Eth)
- BroadR-Reach (100BASE-T1)
- CAN/CAN-FD (Lemo)
- Size 86 x 57 x 26 mm

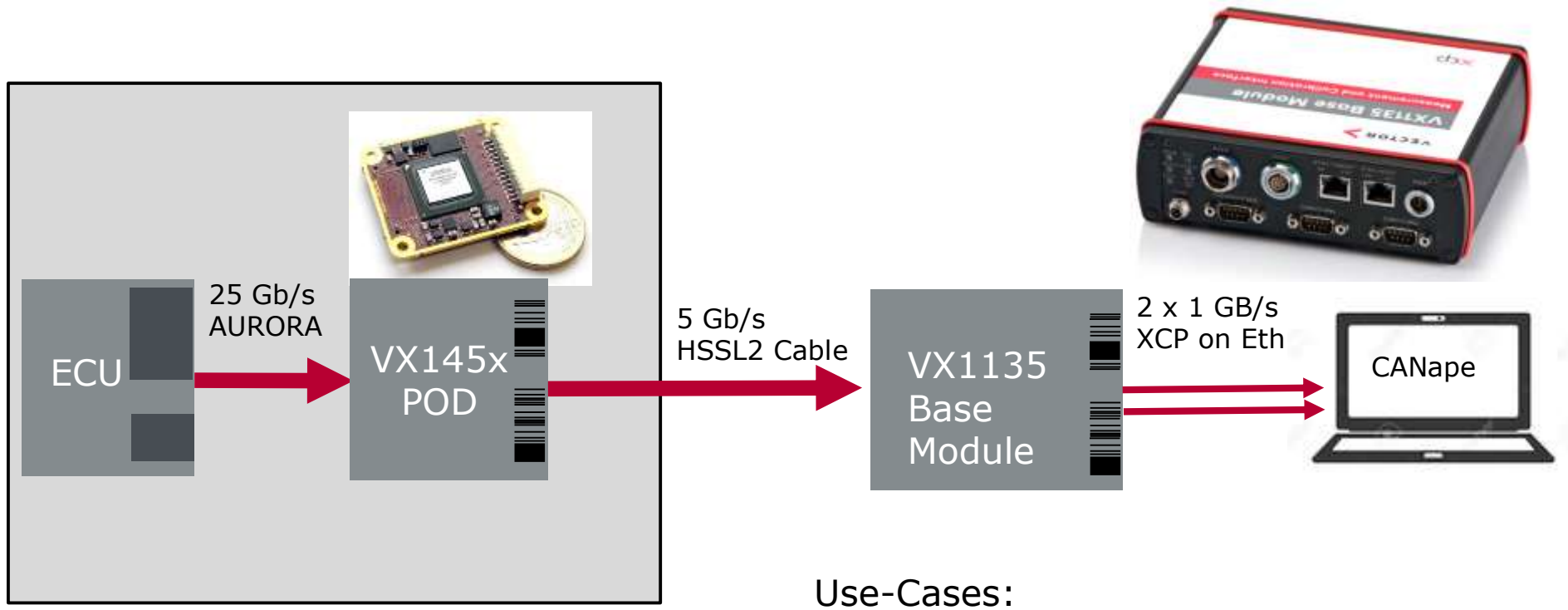
Standard Aurora Data Trace Setup (No CPU load)



- Current Aurora setup for
  IFX: 1 x 2.5 Gb/s
  NXP/STM: 4 x 1.25 Gb/s
  REN: 2 x 3.125 Gb/s

- Pins: JTAG/DAP pins +
  Aurora: up to 2 x 3.1 Gbit
- Signal prefiltering
  and 128 MB buffer

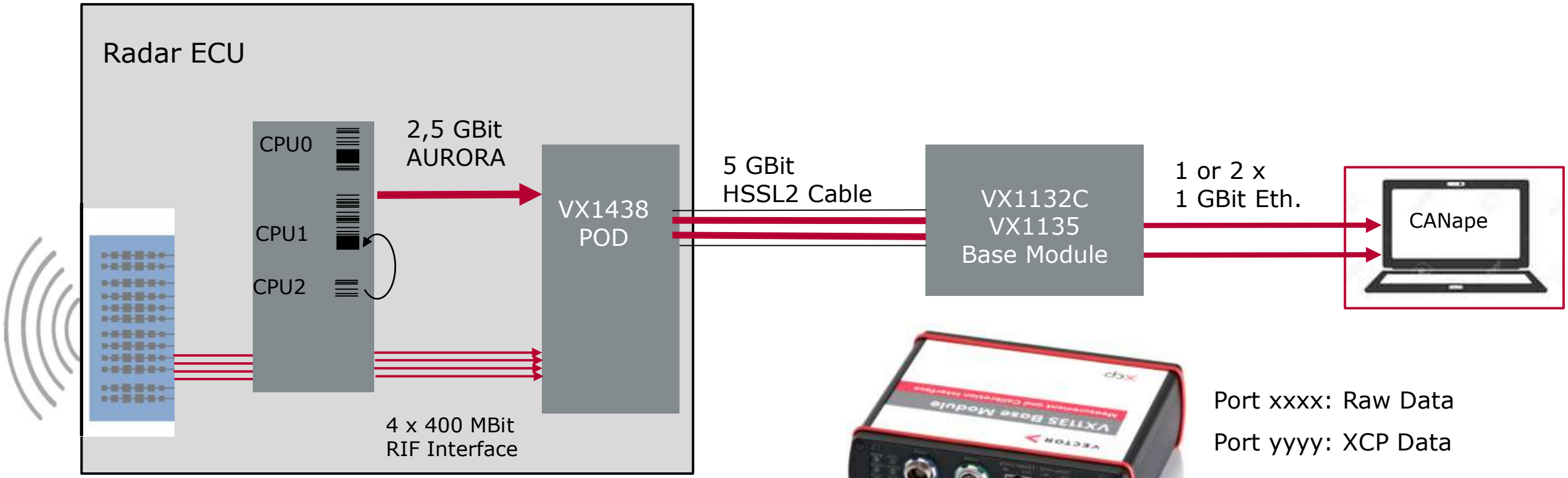
Advanced Aurora Data Trace Setup (No CPU load)



Use-Cases:

- Next Gen uC : Aurora up to 4 x 6,25 Gbit/s
- Radar-ECU: Raw Data + XCP Data via Aurora
- Fusion-ECU: PCIe as an MC interface
- Fusion-ECU: PCIe + IFX Aurora on one POD

Customer Project : Infineon Aurix Radar Setup: XCP-Data + Radar-Raw Data



Port xxxx: Raw Data

Port yyyy: XCP Data

VX1135D
+ 5 x CAN-FD
1 x FR A/B

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Overview: µC Debug and Data Trace interfaces

ECU-Interface	CPU Type Examples	Interface Frequency	Pins to connect	~ DAQ data rate	Min. cycle time	POD
JTAG/ Nexus Cl.2+	Renesas V850E2 Renesas RH850 FSL MPC55/56xx FSL MPC57xx	20 MHz 20 MHz 20 Mhz 40 MHz	5 JTAG	0,7 MB/s 1,2 MB/s	100 µs	Serial POD Size: 23 x24 mm VX1543A 
AUDII	Renesas SHx Renesas RH850	4 x 20 MHz	8 AUD	1,5 MB/s	100 µs	
DAP	Infineon TriCore Aurix / XC2000	80 MHz	2 DAP	2 MB/s	40 µs	
LFAST/ DigRF	FSL MPC57xx Infineon Aurix	320 MHz	6 DigRF	3 MB/s	40 µs	VX1544
DAP2	Infineon AurixPD Infineon AurixED	2x160 MHz	3 DAP	3 MB/s Copy 10 MB/s Trace	40 µs 15 µs	
Nexus Cl.3 **RTP_DMM**	FSL MPC55/6xx TI TMS570	12/16x 80 16x 80 MHz	JTAG + 15 AUX 25 RTP/DMM	50 MB/s Trace **VX1451**	10 µs	HSSL POD Size: 40 x 35 mm
Aurora	FSL 57xx ED REN RH850 IFX Aurix ED	4 x 1,2 GHz 2/4 x 3,1 GHz 1 x 2,5 GHz	Aurora up to 4 lanes + JTAG/ DigRF	50 MB/s Trace **VX1453**	10 µs	

Key Advantages

- No need to implement and XCP slave inside your ECU
  - Better utilization of resources : Memory
- It is faster because the values are cached and available on internal bus
- VX driver can be disabled later for SOP
- In case of XCPonEthernet, additional wiring is needed
- Ethernet stack will need more resources
  - Processor time is utilized to process the signals
  - Memory is needed for the stack itself

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