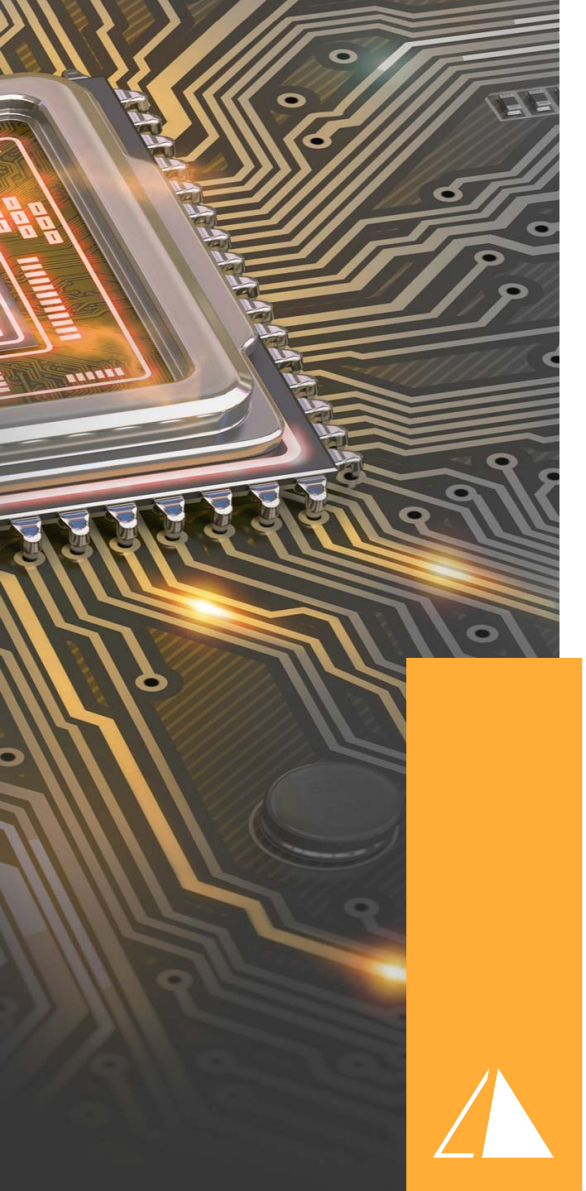
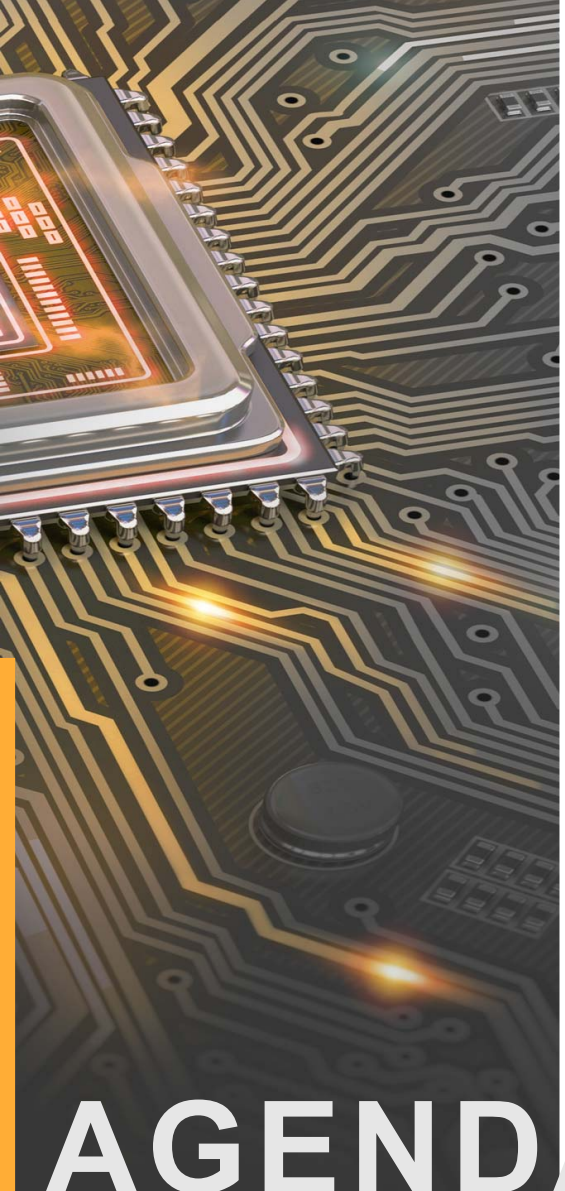


LAUTERBACH
DEVELOPMENT TOOLS

GTM Tech Day 2022

TRACE32® Debug and Trace Support for GTM

Elmar Stahleder Lauterbach GmbH Sep. 22./23. 2022



AGENDA

1. **Debugging Scenarios**
2. GTM V4.1, a big improvement for debugging
3. Onchip /Offchip Trace Features

Supported CPU Families with GTM

AURIX™ TriCore™ TC2xx, TC3xx and TC4x

MPC57xx Power Architecture®

Arm® Cortex®-R52, Cortex®-M33 based S32E2, S32Z2

RH850

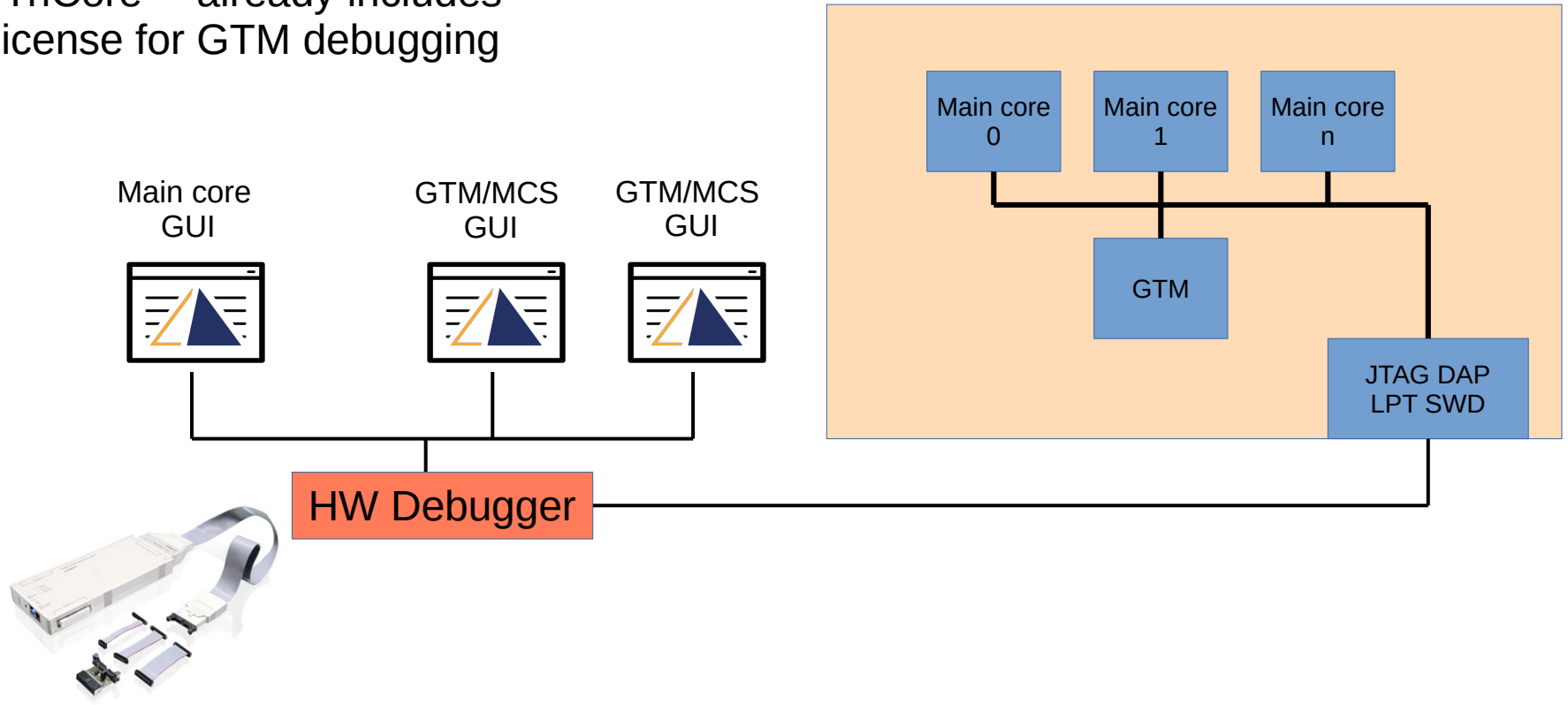
SPC57xx, SPC58xx Power Architecture®

Arm® Cortex®-R52, Cortex®-M4 based

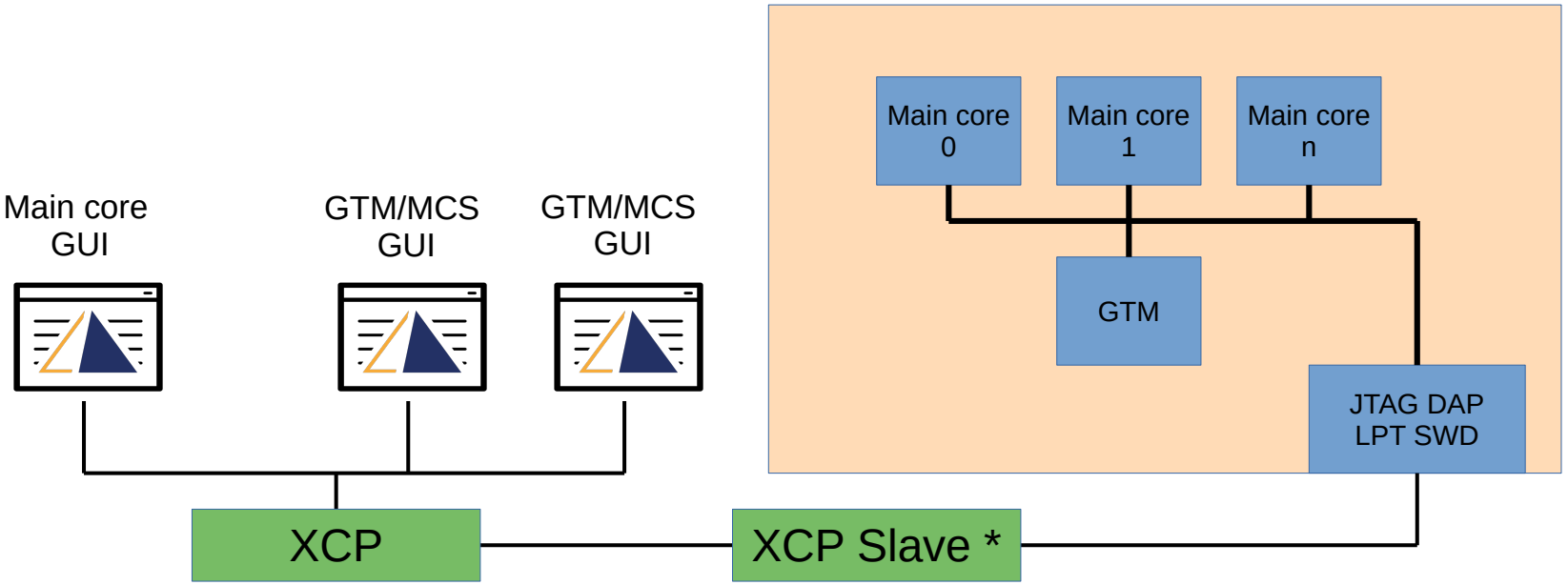
Stellar SR6P6/P7/G7

Debugging

The debugger for the main core
e.g. TriCore™ already includes
the license for GTM debugging

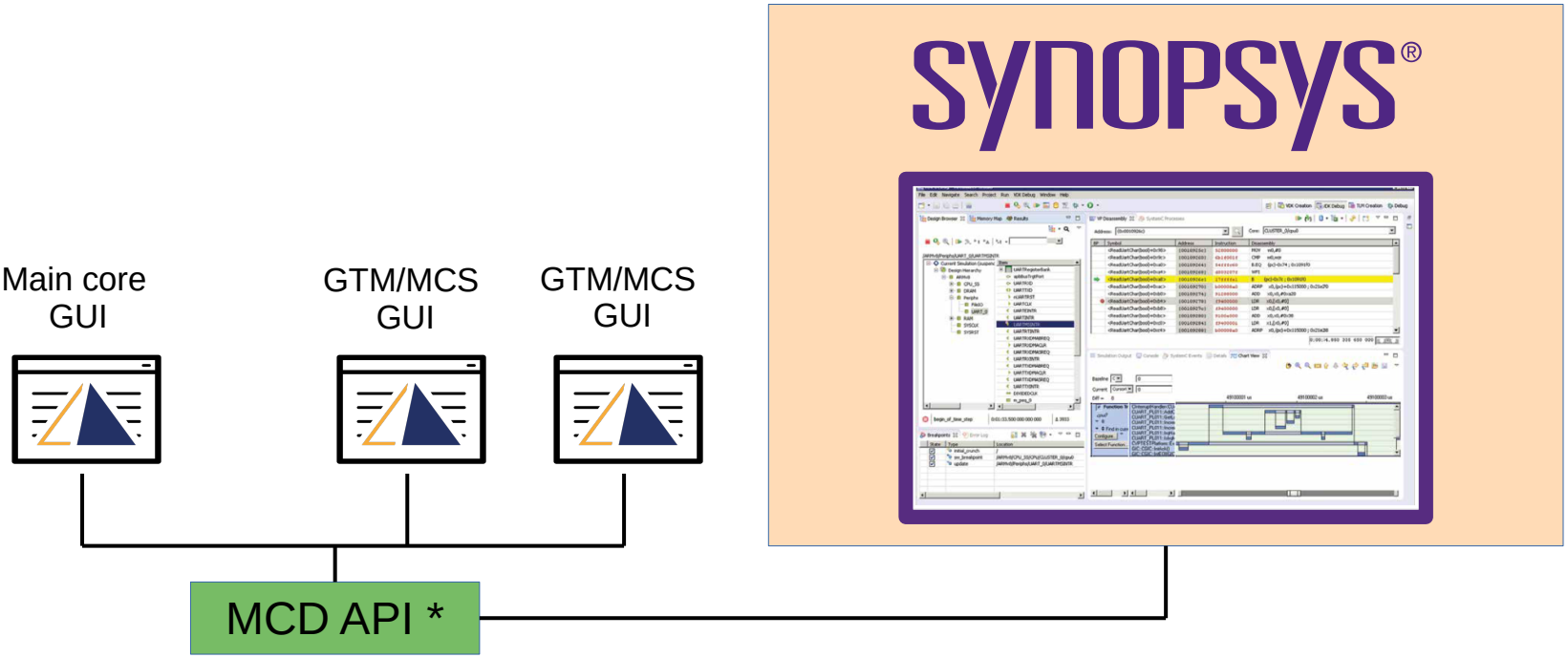


XCP Debugging



* e.g. Calibration Tool

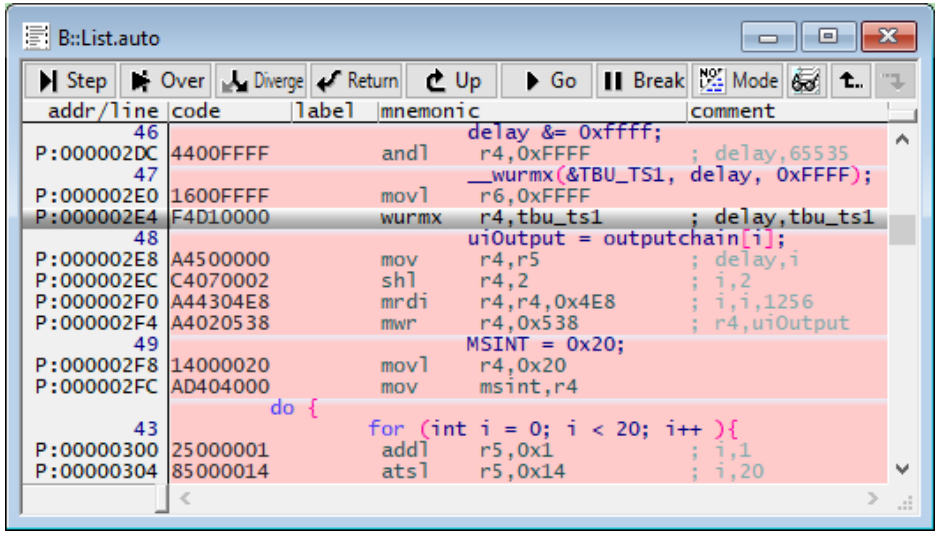
Access a Virtual GTM

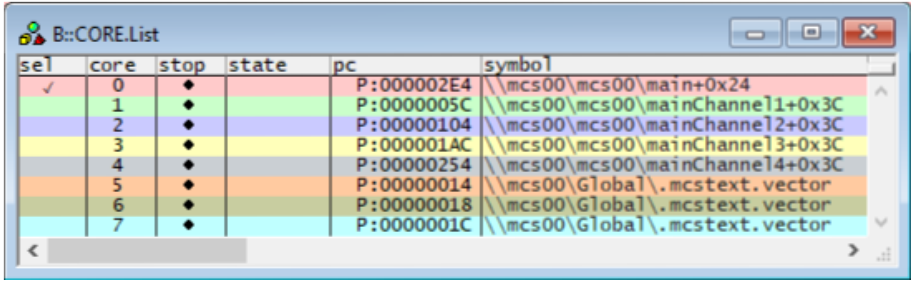


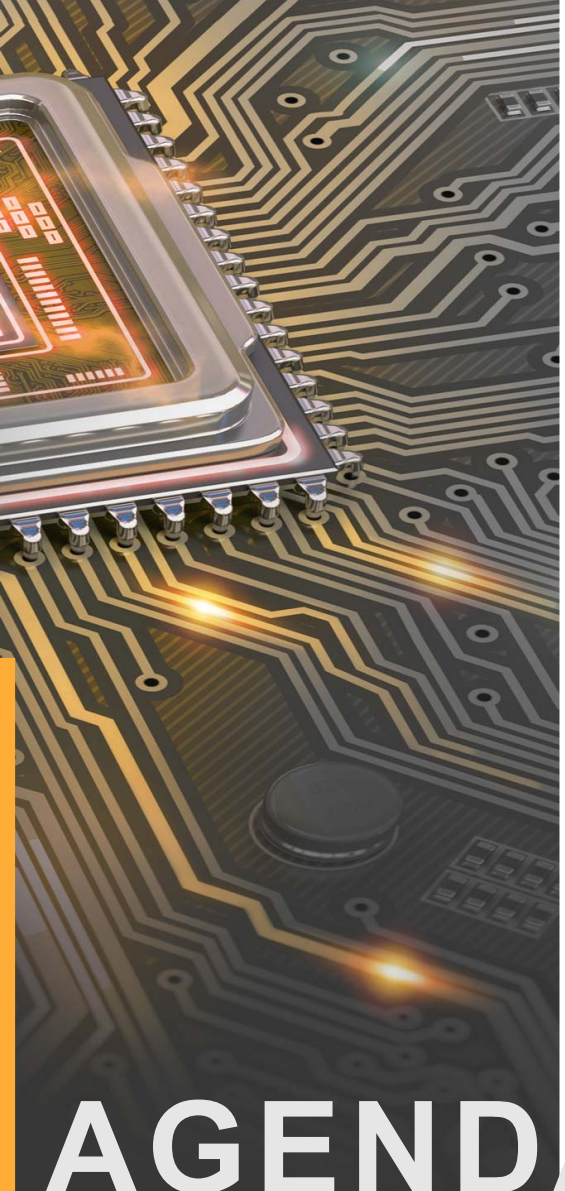
* MCD is an open interface, more details at https://www.lauterbach.com/mcd_api.html

Debug Features

- Debug Support for MCS
- C Level Debugging
- Inline Assembler
- Peripheral View of GTM Registers, also when the Program Execution is Running
- Synchronous Go/Break between Main Core e.g. TriCore™ and GTM







AGENDA

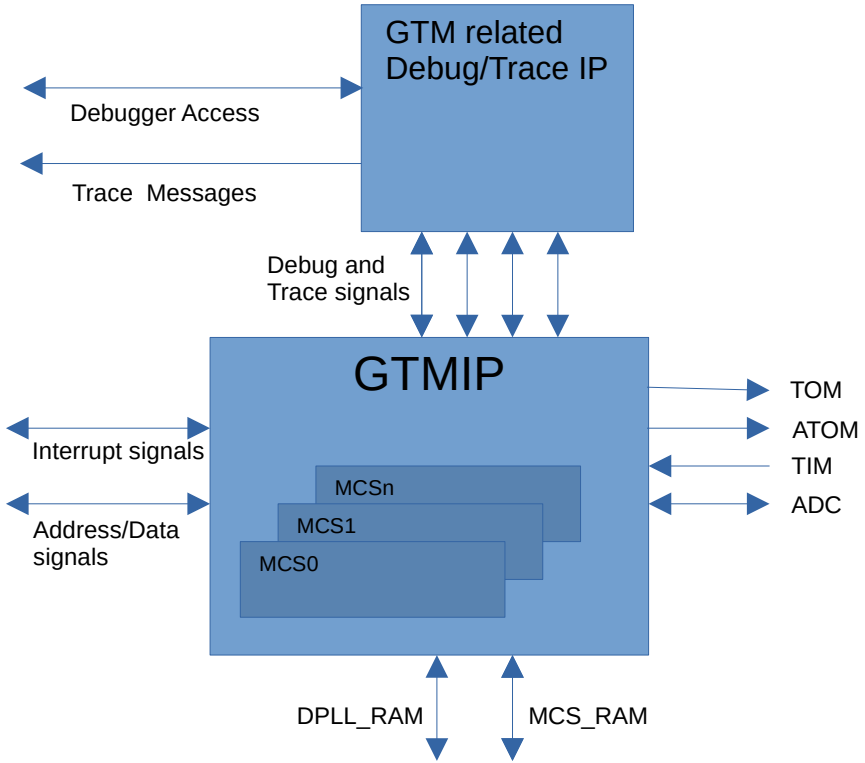
1. Debugging Scenarios
2. **GTM V4.1, a big improvement for debugging**
3. Onchip /Offchip Trace Features

Debugging before GTM V4.1

TC2xx TC3xx:
MCDS Multi-Core Debug Solution and
OTGM OCDS Trigger Mux

MPC57xx SPC57xx SPC58xx:
GTMDI GTM Development Interface

RH850:
TEU Trigger Event Unit

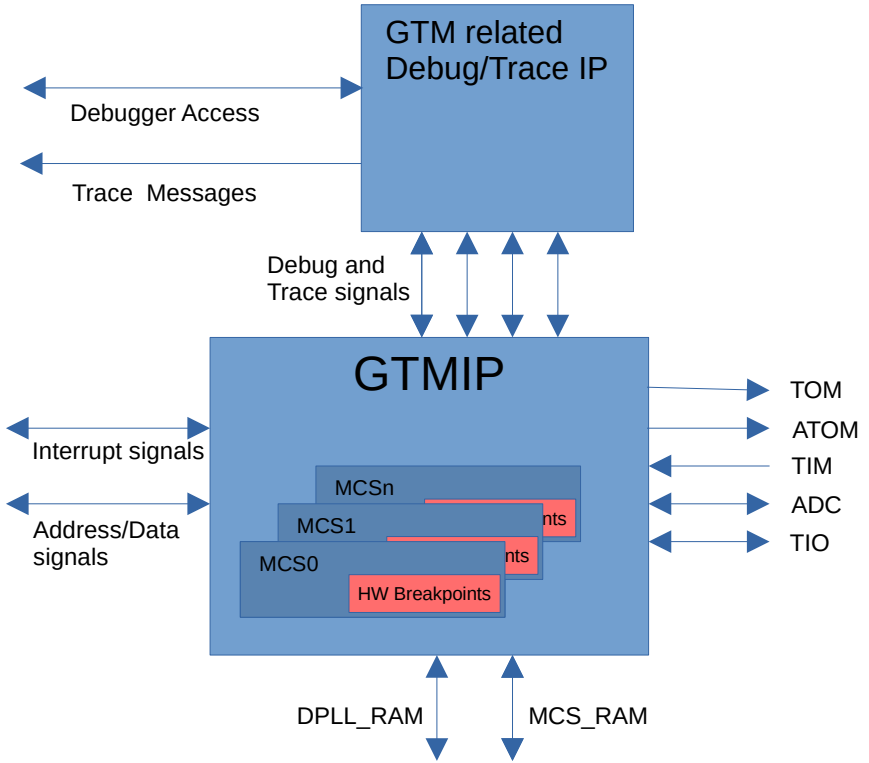


Debugging GTM V4.1

TC4x:
MCDS OTGM
GTM Hardware Breakpoints

SR6P7 S32E2 S32Z2:
GTMDI
GTM Hardware Breakpoints

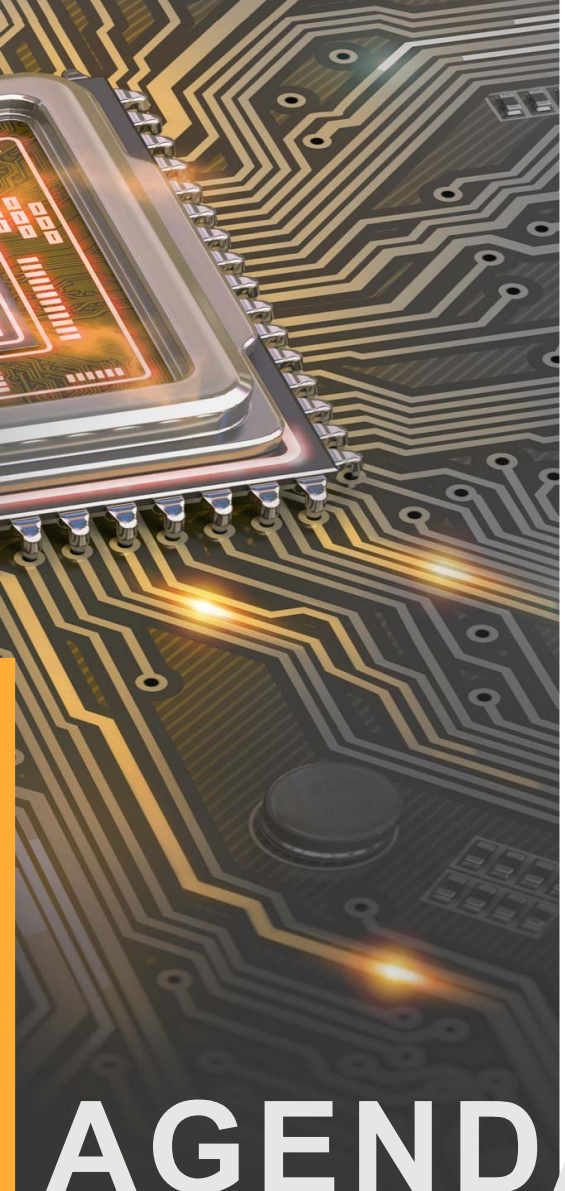
RH850 U2B:
TEU
GTM Hardware Breakpoints



Debug Features GTM V4.1

- New Hardware Breakpoint Unit
- Two Breakpoints (break before make) for every MCS Module

  Used for Single Stepping or Breakpoints
- Breakpoints on Program Address or Range
- Breakpoints on Data Address or Range; Read or Write Access
- Breakpoint on Data Address or Range and Data Value
- Channel Selection possible

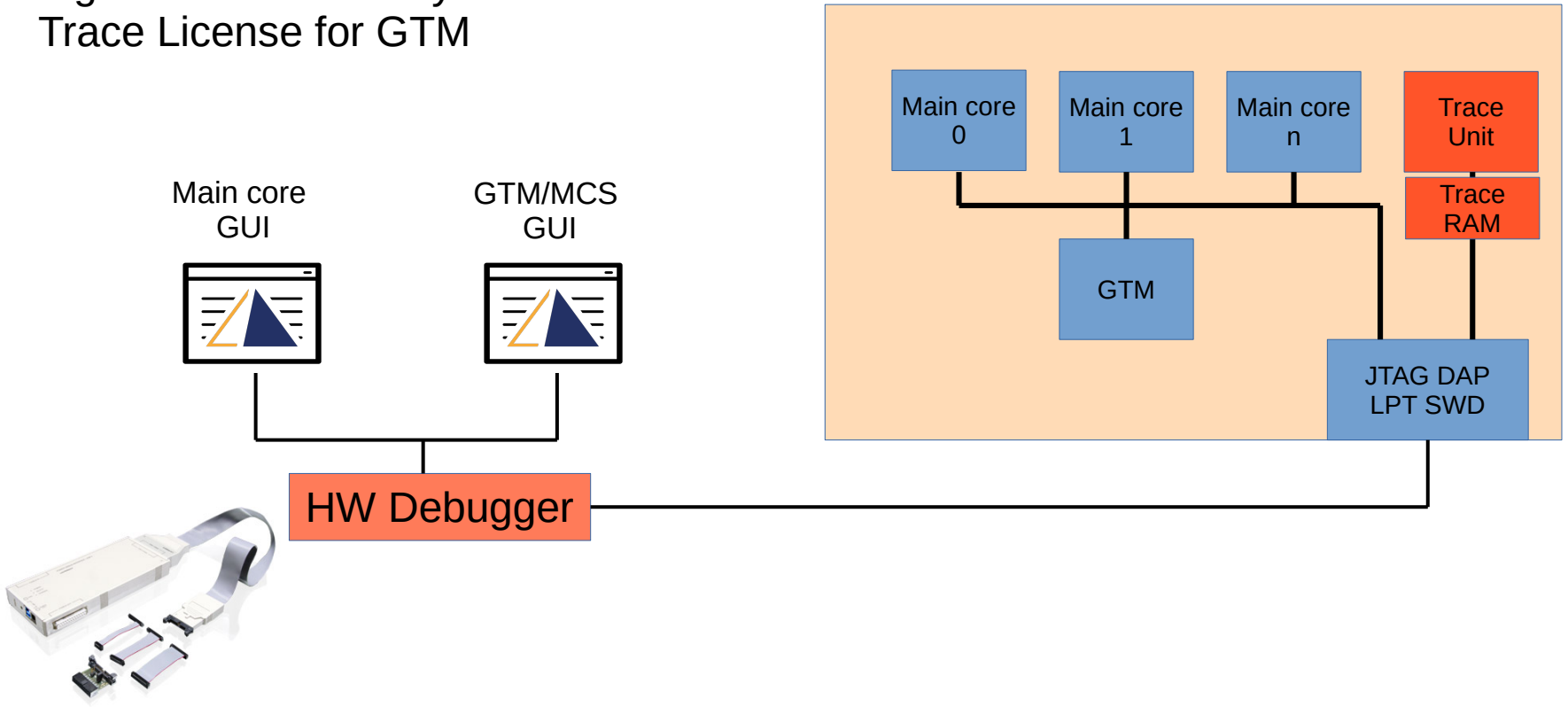


AGENDA

1. Debugging Scenarios
2. GTM V4.1, a big improvement for debugging
3. **Onchip /Offchip Trace Features**

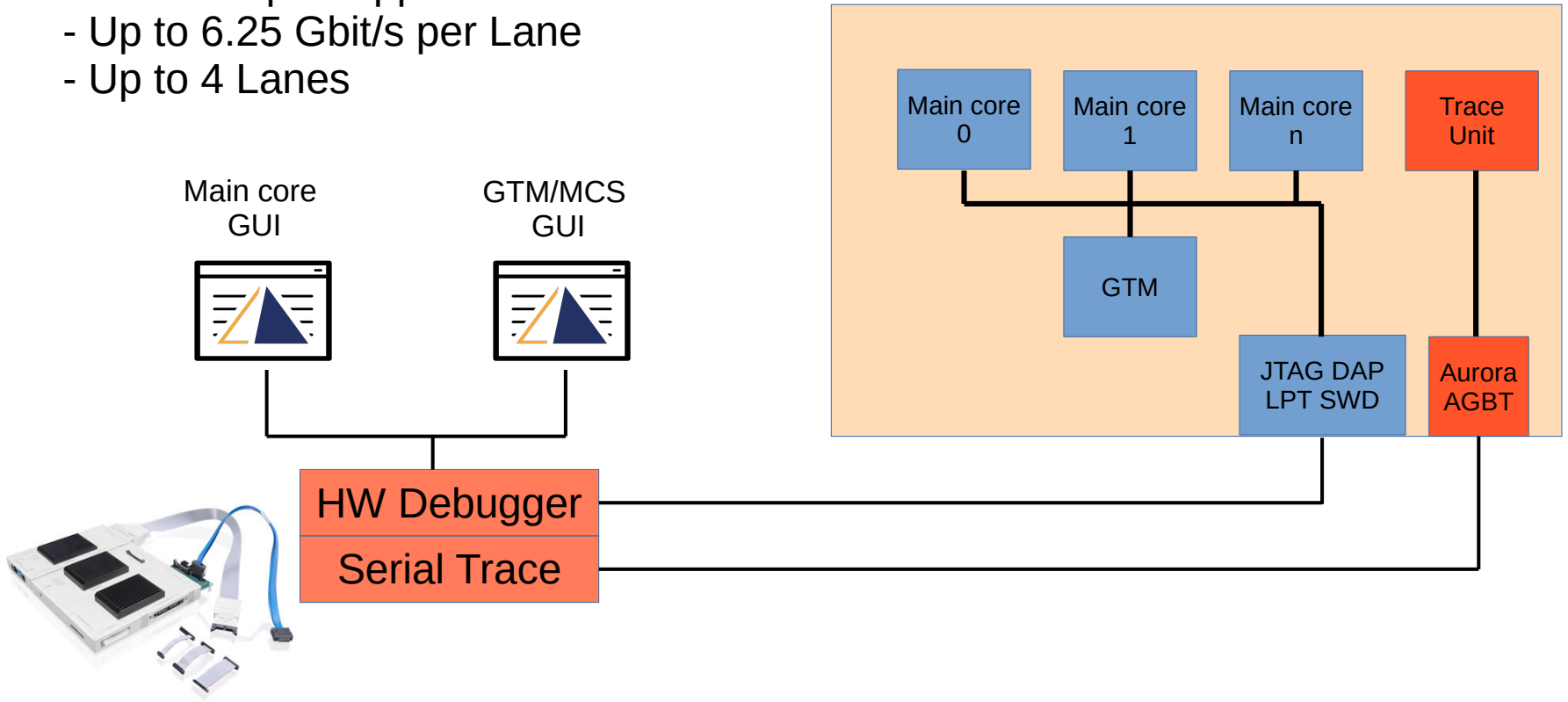
Onchip Trace

The Trace License for the main core e.g. TriCore™ already includes the Trace License for GTM



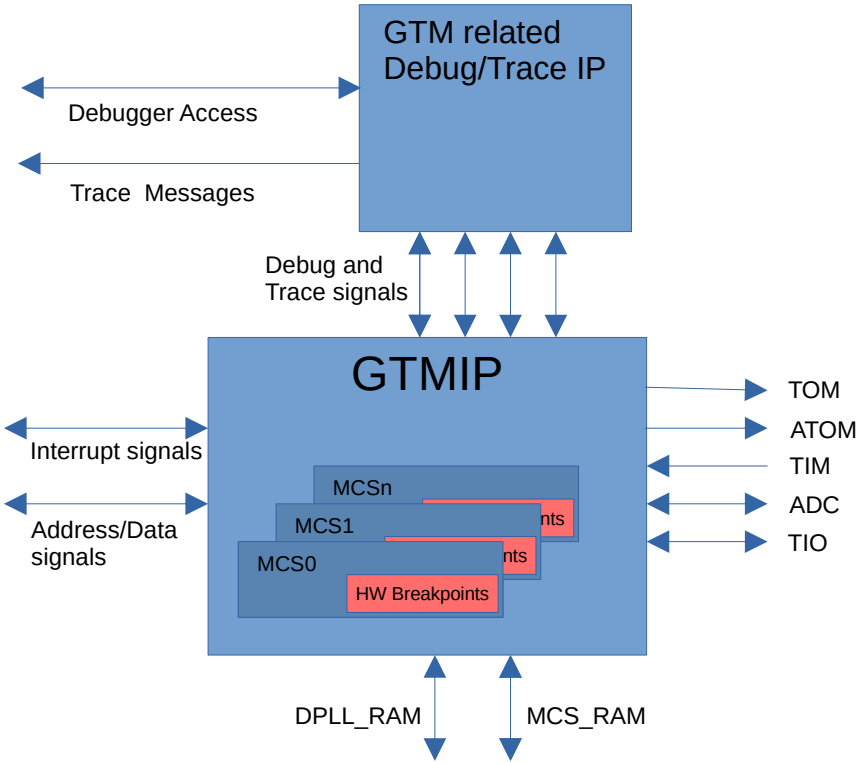
Off-Chip Trace

Aurora GigaBit Trace
Current Chips Support:
- Up to 6.25 Gbit/s per Lane
- Up to 4 Lanes

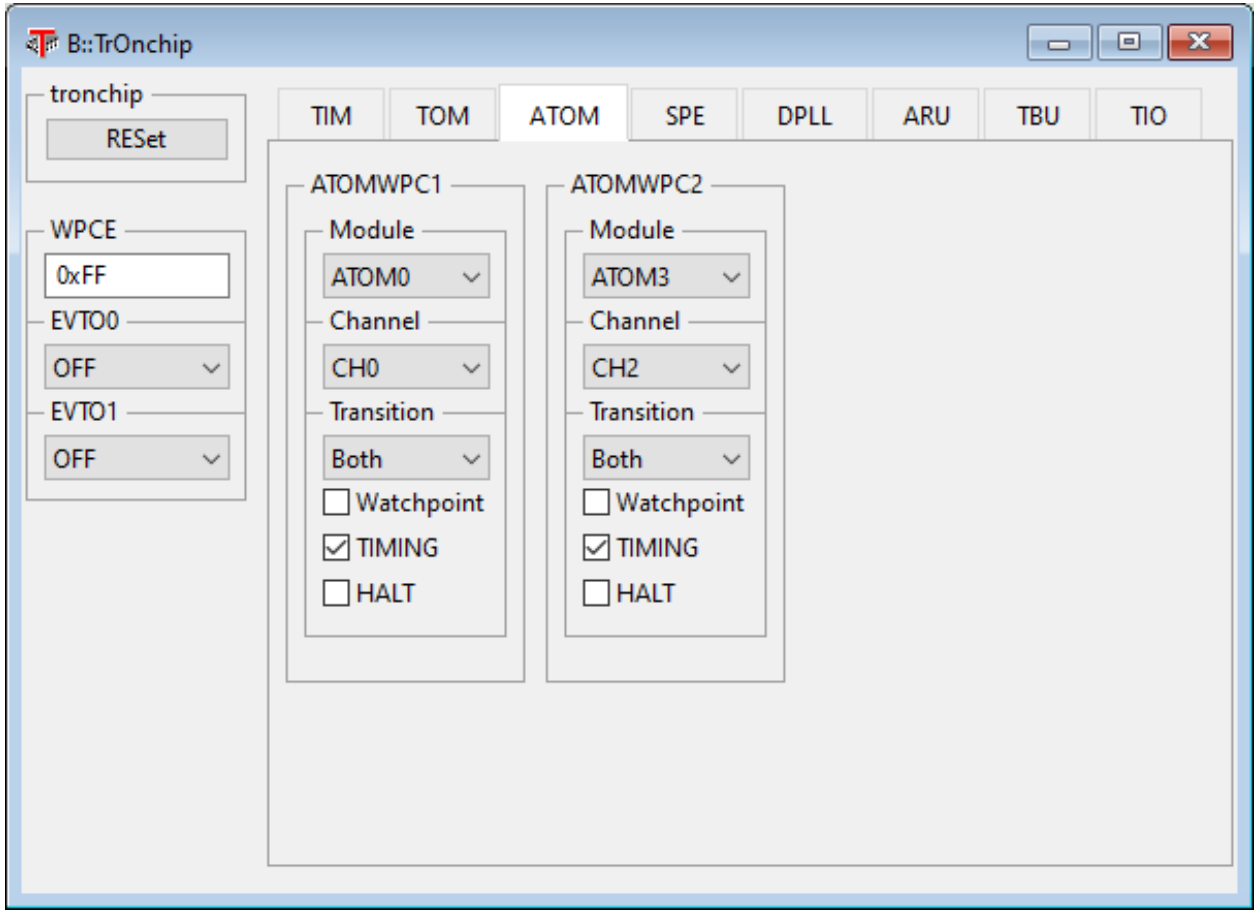


GTM Tracing

- Multi Channel Sequencer (MCS)
- Advanced Routing Unit (ARU)
- I/O Channels (TIM, TOM, ATOM and TIO)
- Digital PLL Module (DPLL)
- Sensor Pattern Evaluation (SPE)
- Time Base Unit (TBU)



GTM Trace Sources

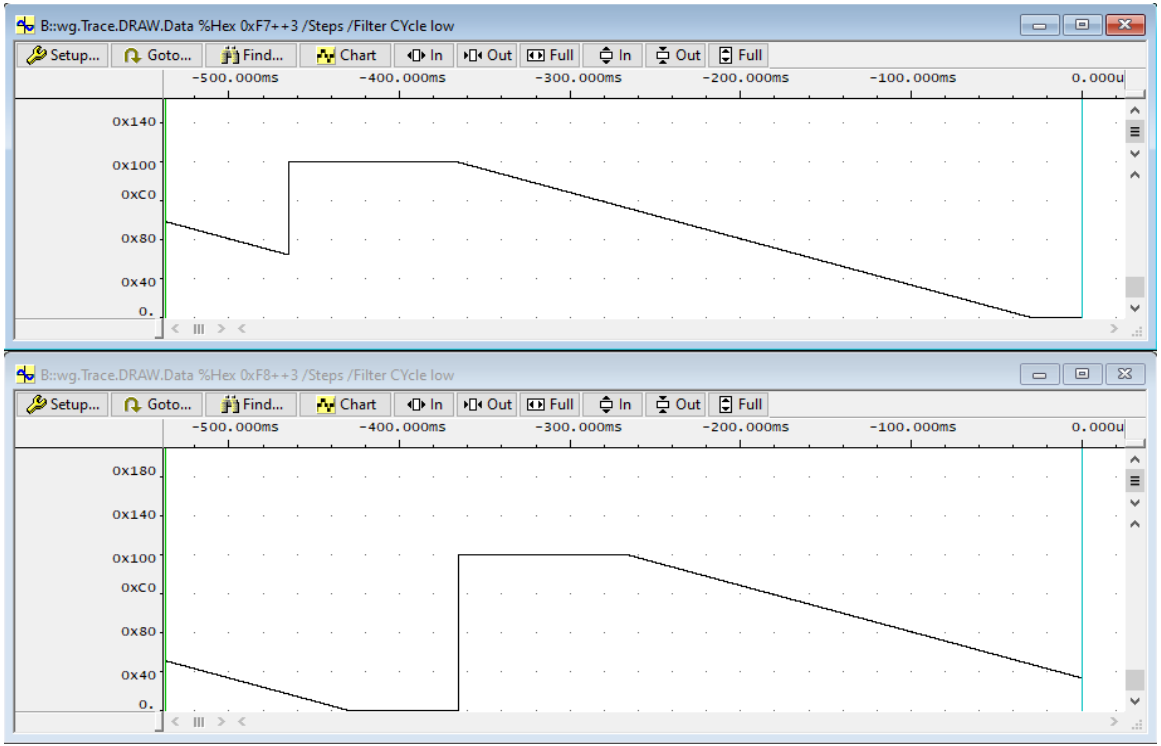


Advanced Routing Unit (ARU)

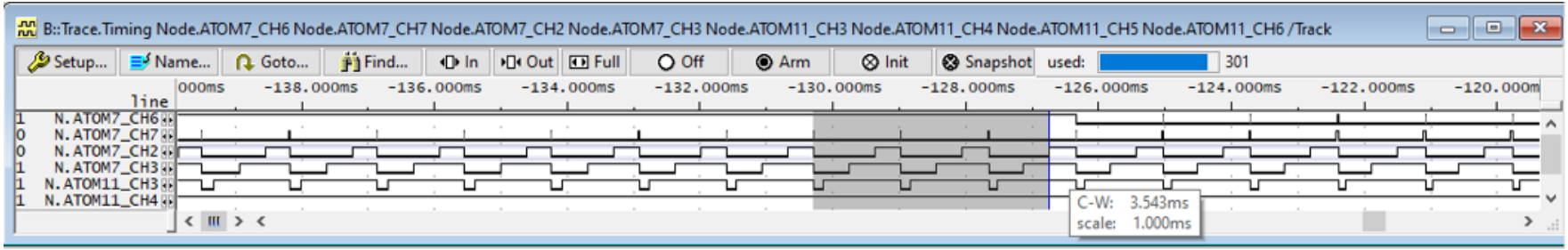
B::Trace.List

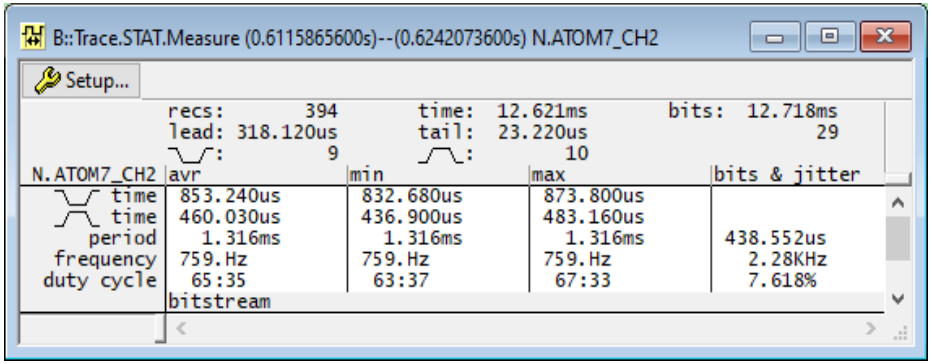
Setup... Config. Goto... Find... Chart Profile MIPS More Less

record	run	address	cycle	data	symbol	ti.back
-001140		ARU:000000F7	low	000000DC		0.020us
-001120		ARU:000000F8	high	00000100		2.580us
-001102		ARU:000000F8	low	00000090		0.020us
-001055		ARU:000000F7	high	00000100		1.313ms
-001036		ARU:000000F7	low	000000DB		0.020us
-001016		ARU:000000F8	high	00000100		2.580us
-000998		ARU:000000F8	low	0000008F		0.020us
-000951		ARU:000000F7	high	00000100		1.313ms
-000932		ARU:000000F7	low	000000DA		0.020us
-000912		ARU:000000F8	high	00000100		2.580us
-000894		ARU:000000F8	low	0000008E		0.020us
-000847		ARU:000000F7	high	00000100		1.313ms
-000828		ARU:000000F7	low	000000D9		0.020us
-000808		ARU:000000F8	high	00000100		2.580us
-000790		ARU:000000F8	low	0000008D		0.020us
-000743		ARU:000000F7	high	00000100		1.313ms
-000721		ARU:000000F7	low	000000D8		0.020us
-000702		ARU:000000F8	high	00000100		2.580us
-000683		ARU:000000F8	low	0000008C		0.020us
-000636		ARU:000000F7	high	00000100		1.313ms
-000617		ARU:000000F7	low	000000D7		0.020us
-000598		ARU:000000F8	high	00000100		2.580us
-000579		ARU:000000F8	low	0000008B		0.020us
-000531		ARU:000000F7	high	00000100		1.313ms
-000512		ARU:000000F7	low	000000D6		0.020us
-000492		ARU:000000F8	high	00000100		2.580us
-000474		ARU:000000F8	low	0000008A		0.020us
-000427		ARU:000000F7	high	00000100		1.313ms
-000408		ARU:000000F7	low	000000D5		0.020us
-000388		ARU:000000F8	high	00000100		2.580us
-000370		ARU:000000F8	low	00000089		0.020us
-000323		ARU:000000F7	high	00000100		1.313ms
-000304		ARU:000000F7	low	000000D4		0.020us
-000284		ARU:000000F8	high	00000100		2.580us
-000266		ARU:000000F8	low	00000088		0.020us
-000219		ARU:000000F7	high	00000100		1.313ms
-000200		ARU:000000F7	low	000000D3		0.020us
-000180		ARU:000000F8	high	00000100		2.580us
-000156		ARU:000000F8	low	00000087		0.020us
-000105		ARU:000000F7	high	00000100		1.313ms
-000083		ARU:000000F7	low	000000D2		0.020us
-000064		ARU:000000F8	high	00000100		2.580us
-000045		ARU:000000F8	low	00000086		0.020us



I/O Channels (TIM, TOM, ATOM and TIO)





Logic analyzer like measurements


Thank You!