



# CloudBEAR

Processor IP product line

# Products



Configurable and extensible 32/64-bit RISC-V cores

## BM Series

**BM-310**  
RV32IMC

- Microcontroller core
- 500MHz@28nm HPC
- 250MHz@40nm LP

IoT SoC  
Sensors  
Smart Meters  
Accelerator control  
Wearables

## BI Series

**BI-350**    **BI-651**    **BI-671**  
RV32IMAC[F]    RV64GC    RV64GC

- Linux capable application cores
- Multi-core support
- Instruction/Data caches
- 1.5 GHz+ @28nm HPC+
- 1 GHz+ @40nm G

Advanced IoT nodes, gateways  
Automotive  
Artificial intelligence  
Industrial automation  
Storage applications  
Networking applications

## BR Series

**BR-x51**  
(planned 2019)

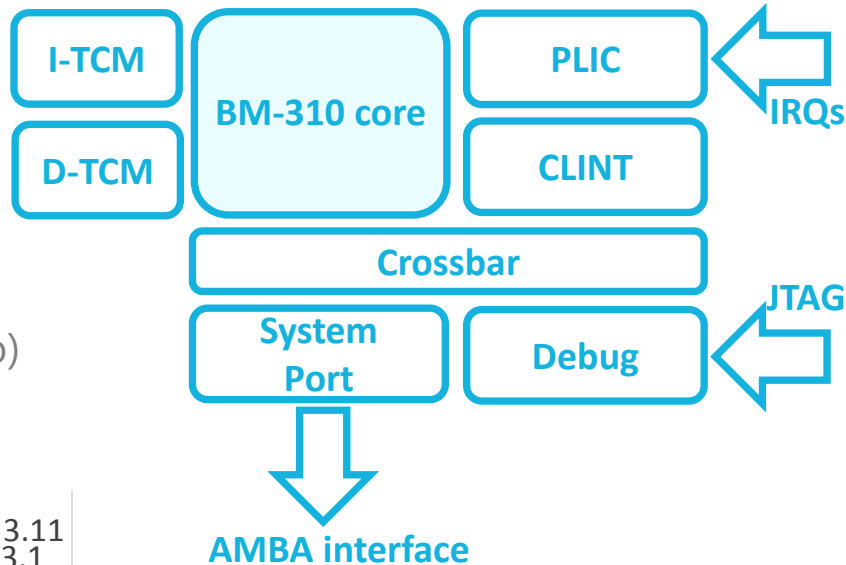
- Compute/real-time cores
- Instruction/Data caches
- I-TCM and D-TCM
- Fast context switch
- 1.5 GHz+ @28nm HPC+

High performance ctrl  
Baseband control  
Modem L2/L3 processing  
Low latency networking  
SSD controllers  
Compute/Accelerator 2

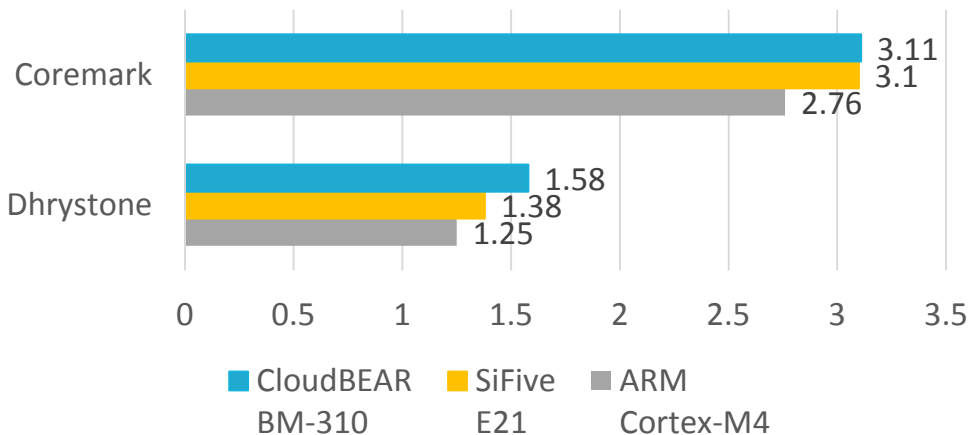
# BM-310

## Embedded microcontroller core

- Small, Low power microcontroller
- RV32IMC
- Machine/User privilege levels
- 3-stage pipeline
- Interrupt controller (default 31 int, 8 prio)

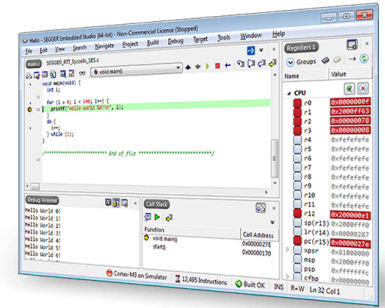
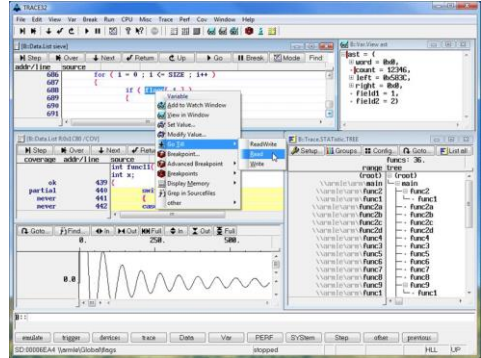


Performance using GCC 8.2 (per MHz)



	TSMC 40LP, 9t
<b>Frequency @ worst</b>	<b>200 MHz</b>
<b>Complex area (w/o TCM)</b>	<b>0.05 mm<sup>2</sup></b>
<b>Worst setup corner</b>	<b>SS, -40C, 0.81V</b>

# Debug tools



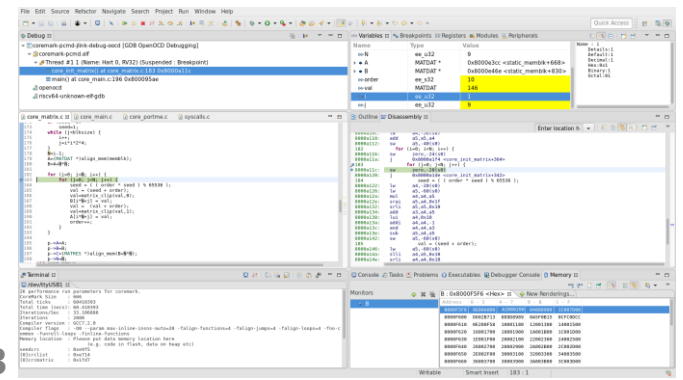
**LAUTERBACH**  
DEVELOPMENT TOOLS



Open-source



Digilent JTAG-HS3



# BI series

Linux capable application cores



## BI-350

RV32IMAC[F]

**32-bit**  
Tiny Linux capable  
core targeting  
IoT applications

Compares with  
ARM A5, A7

## BI-651

RV64GC

**64-bit**  
Linux capable  
core targeting  
high performance in  
power constrained  
environment

Compares with  
ARM A53, A55

## BI-671

RV64GC

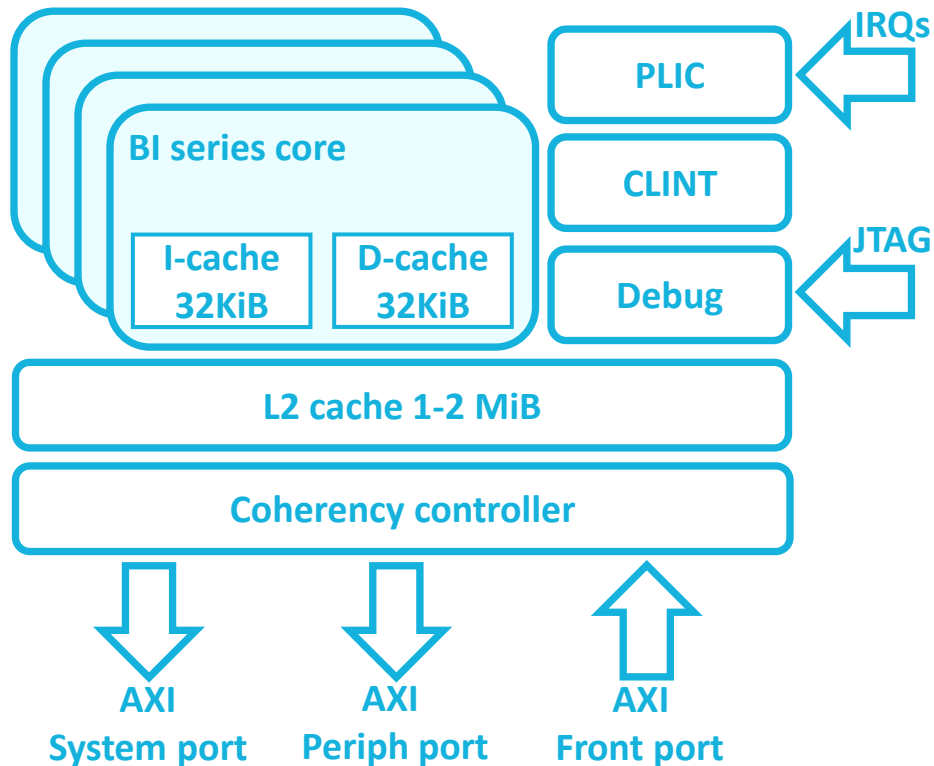
**64-bit**  
Mid-range  
application core for  
maximum single  
thread performance

Compares with  
MIPS P5600

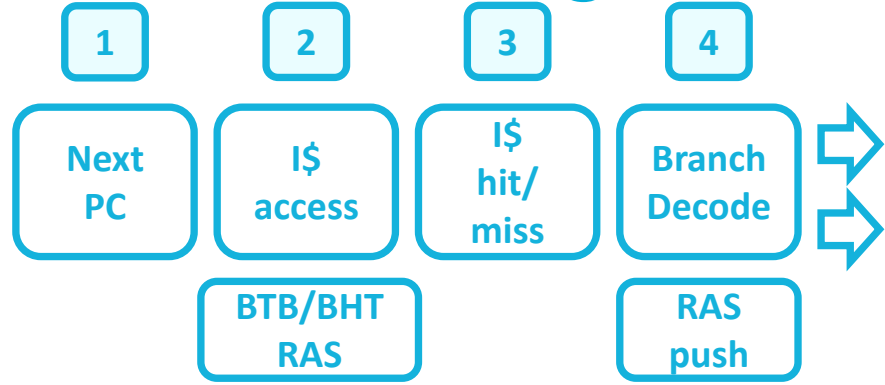
# BI series core complex

Linux capable application cores

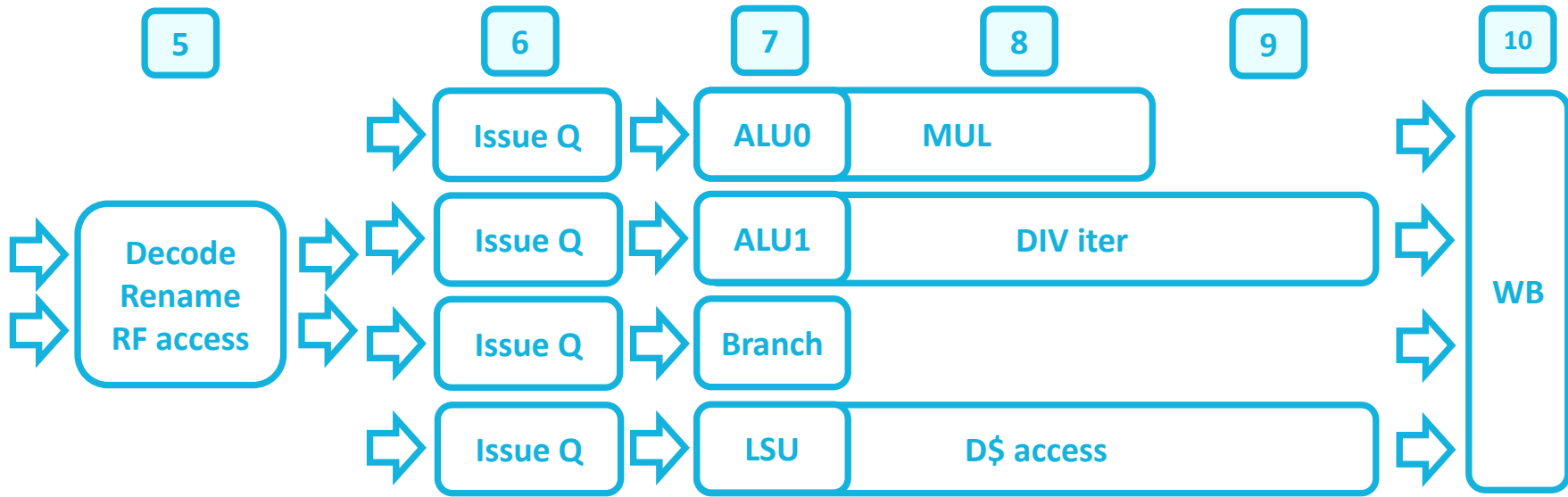
- RV64GC
- 10 stage pipeline
- Multi-core fully coherent configuration
- Machine/User/Supervisor modes
- 32 KiB 8-way I/D caches
- L2 cache 1-2 MiB
- Debug module
- Platform Level Interrupt Controller (default 128 int, 8 prio)
- Coherency controller for maintaining coherency with peripherals and accelerators



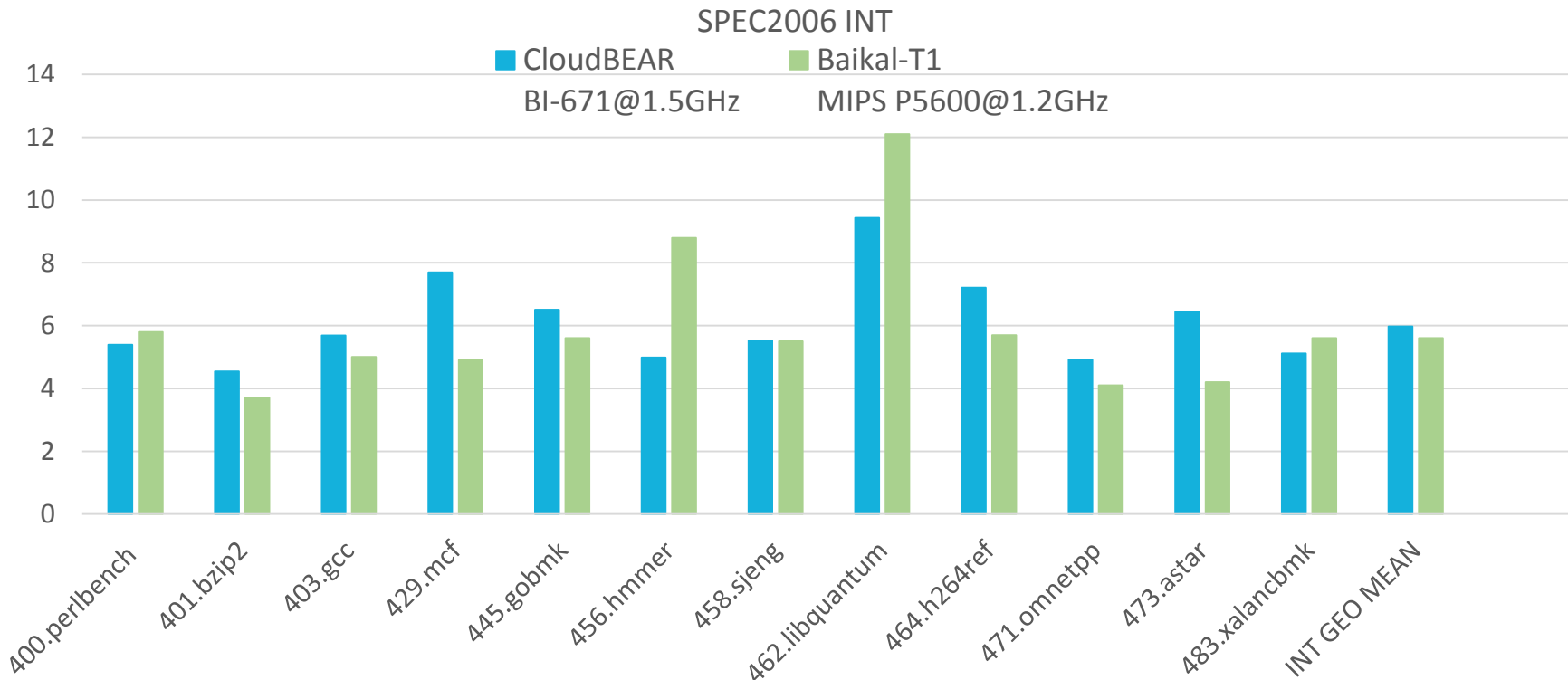
# BI-671 mid-range OoO application core



	TSMC HPC+, 12t
Frequency @ worst SSG	1.5 GHz
Dual core + L2 1 MiB	4.5 mm <sup>2</sup>



# SPEC2006 BI-671



Preliminary data collected on FPGA prototype

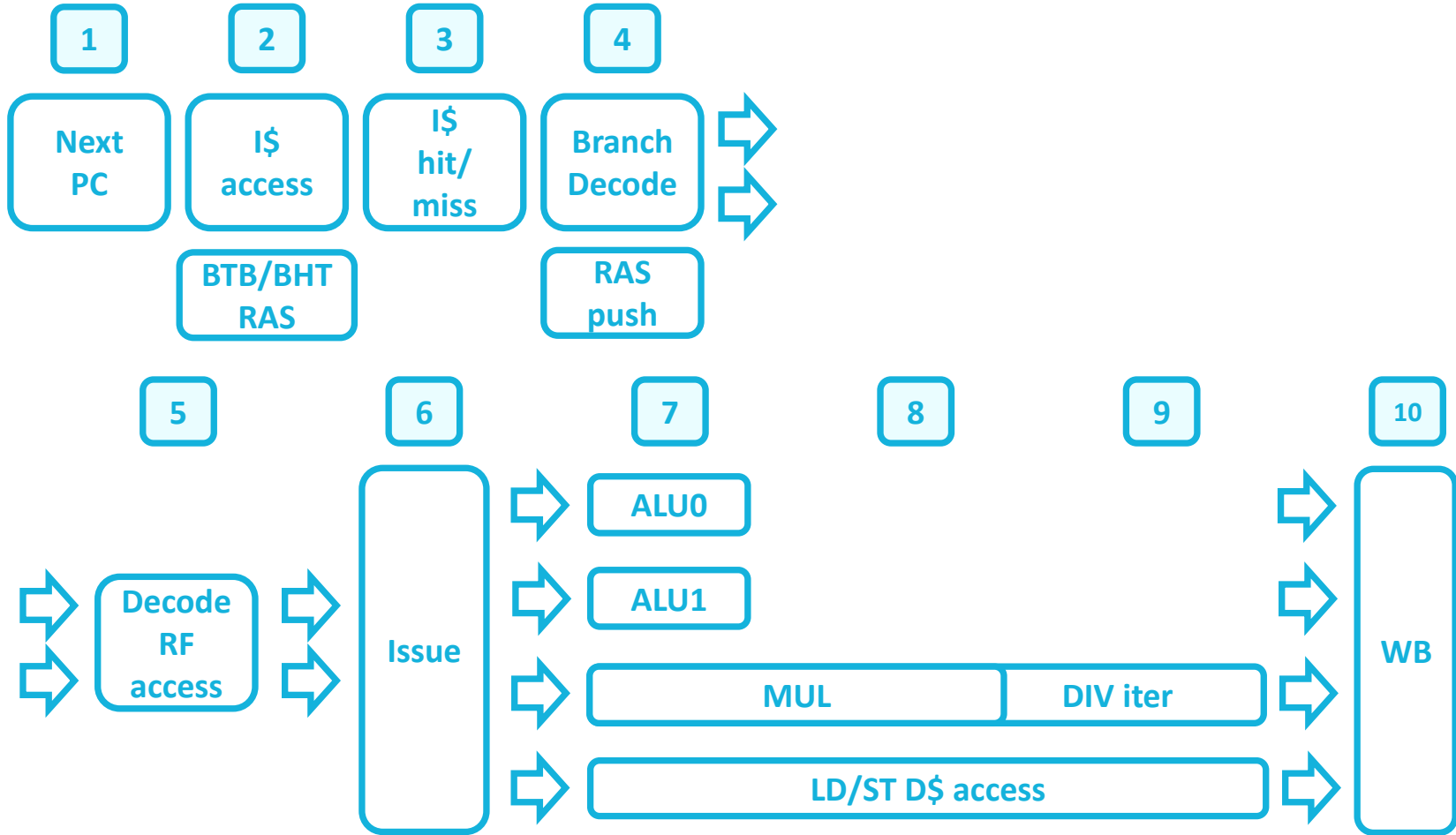


# BI-671 customer design win

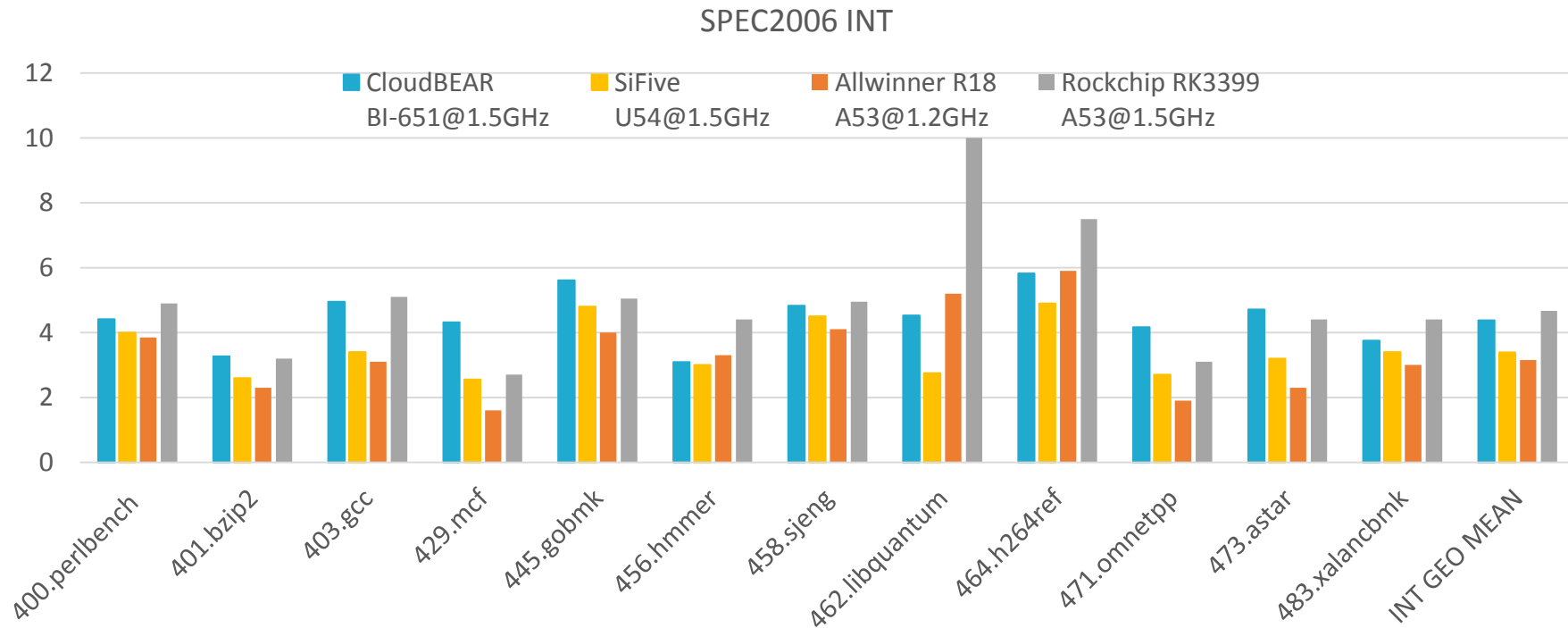


- SoC targets industrial applications and IoT gateways
  - PCIe, Camera, LCD, Eth, CAN, UART, SPI, GPIO, I2C, I2S, NAND
- Optimized for licensed by customer memory compiler and standard cells
- CloudBEAR is providing design services for the customer SoC integration

# BI-651

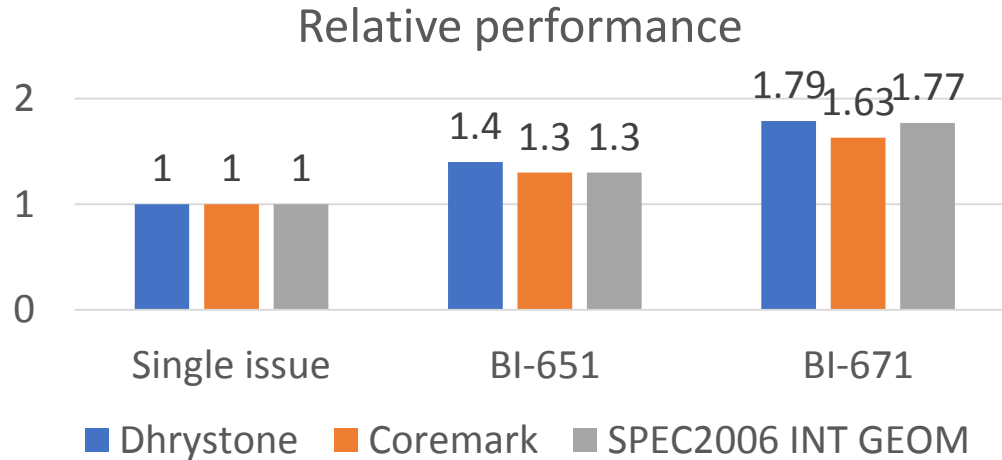
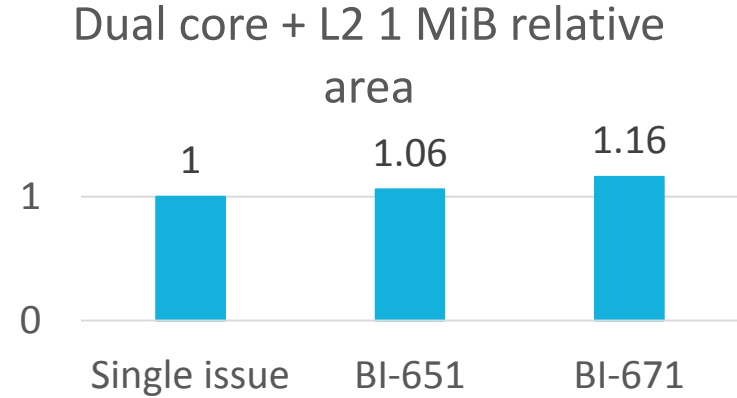
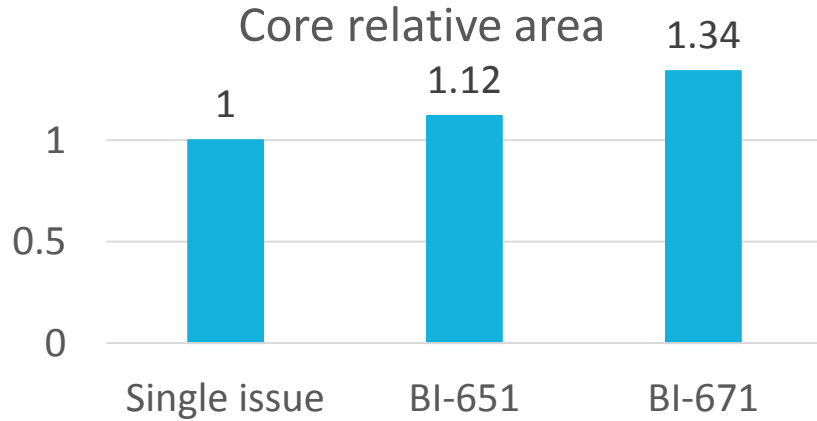


# SPEC2006 BI-651



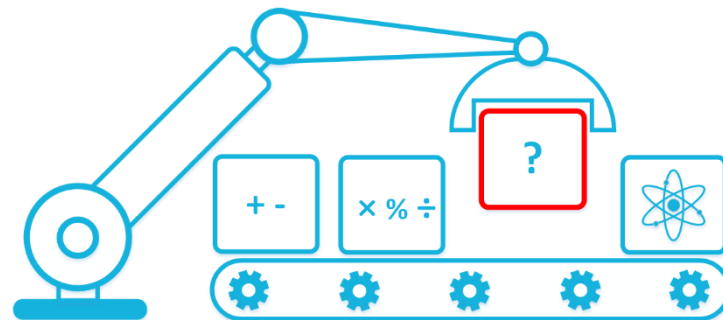
Preliminary data collected on FPGA prototype

# Area efficiency



# Customization and services

- Baseline cores could be customized according to customer needs
- Support SoC integration
- Adding custom instructions to improve performance on specific workload



# Q&A