



# Pushing Data from Edge to Cloud with RISC-V Ecosystem

# IoT Becomes the Main Driver for Top Techs

KPMG study :  
disruptive technologies

Drive the Greatest  
business  
transformation

Enable the next  
indispensable consumer  
technology

Drive the greatest benefit  
to life, society and the  
environment

IoT

17%

17%

14%

AI

13%

13%

12%

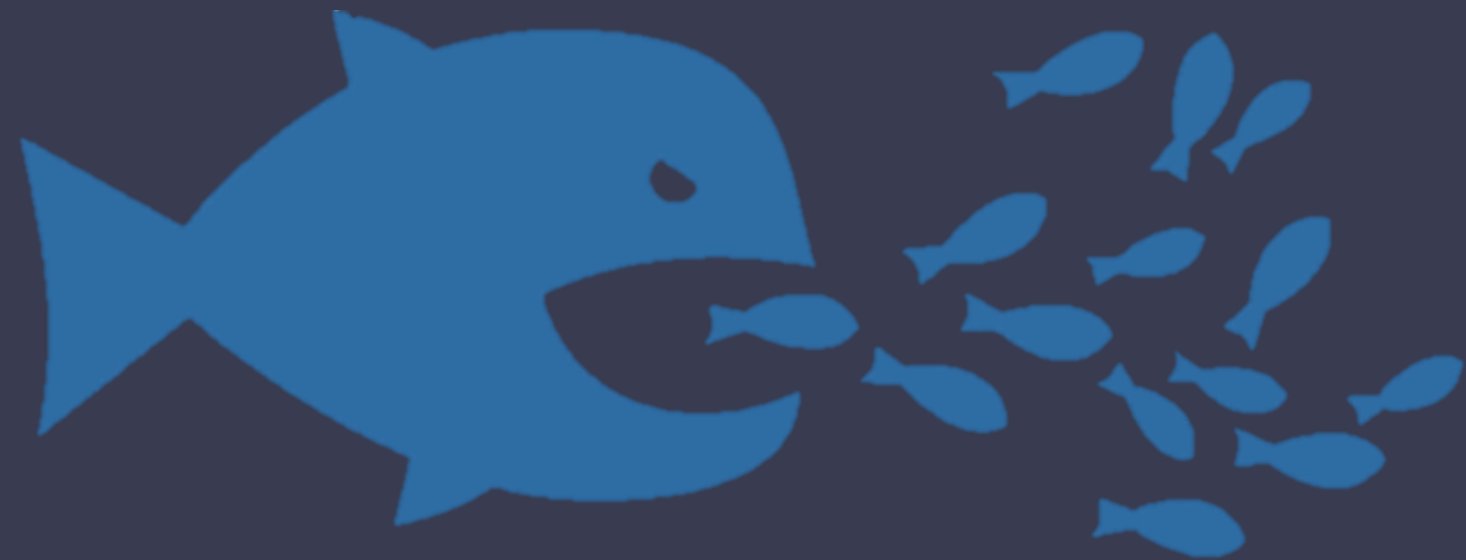
Robotics

10%

8%

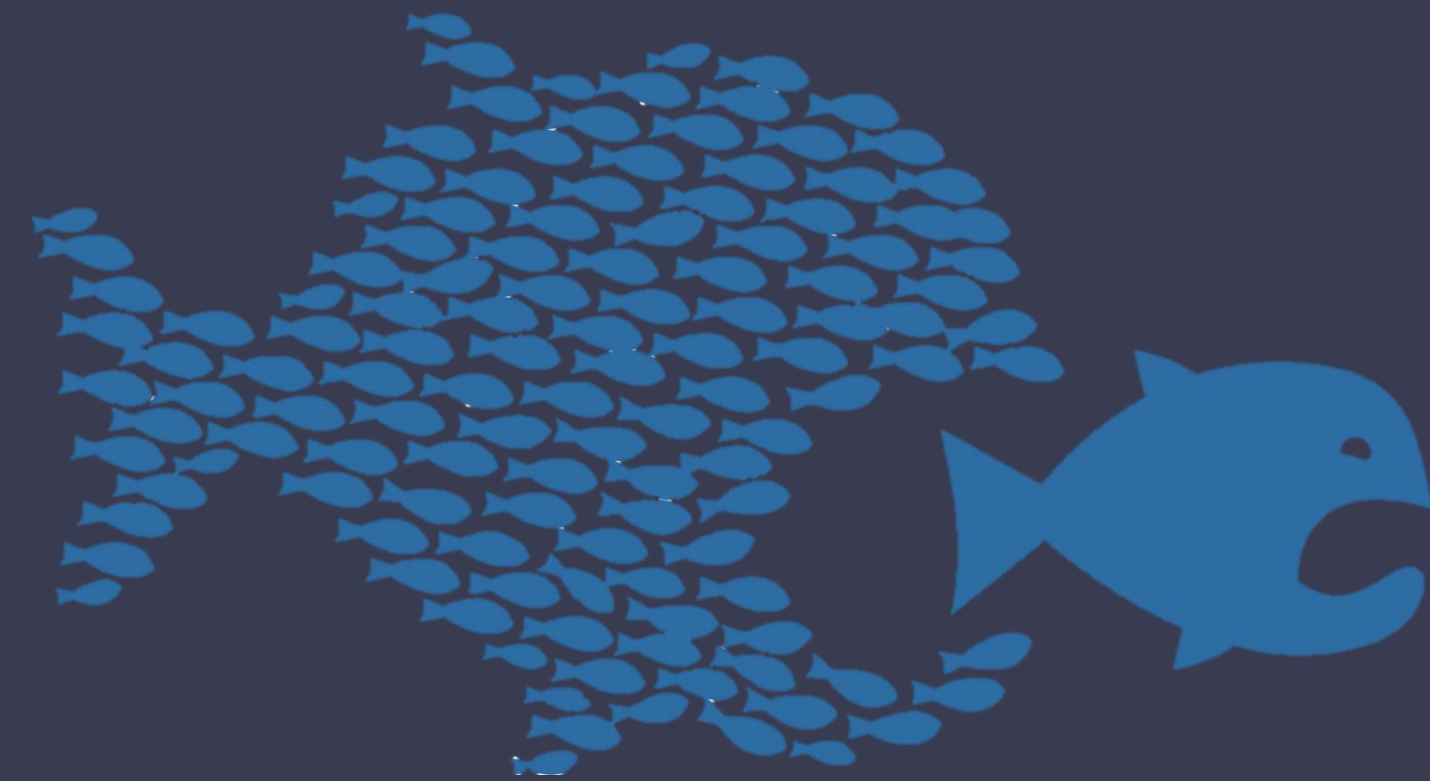
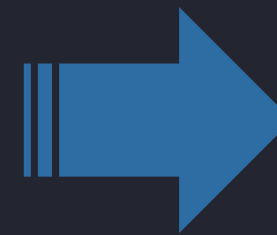
10%

- High cost of NRE
- Intricate design flows
- Fragmented IoT market



- Big companies won the market

AIoT

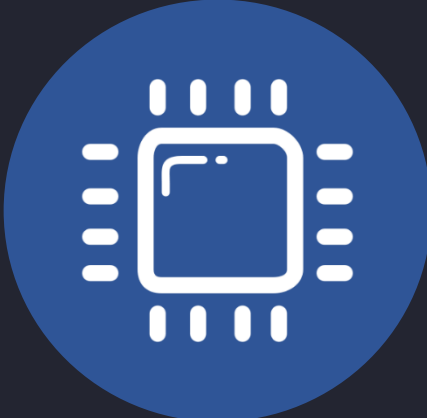


- Efficiency will beat the bigs

- Efficiency translates into market share, profit margin and experience



Infrastructure Provider in the AIoT Era



MCU



Security



Intelligent Computing



...



Industry Control



Memory Control

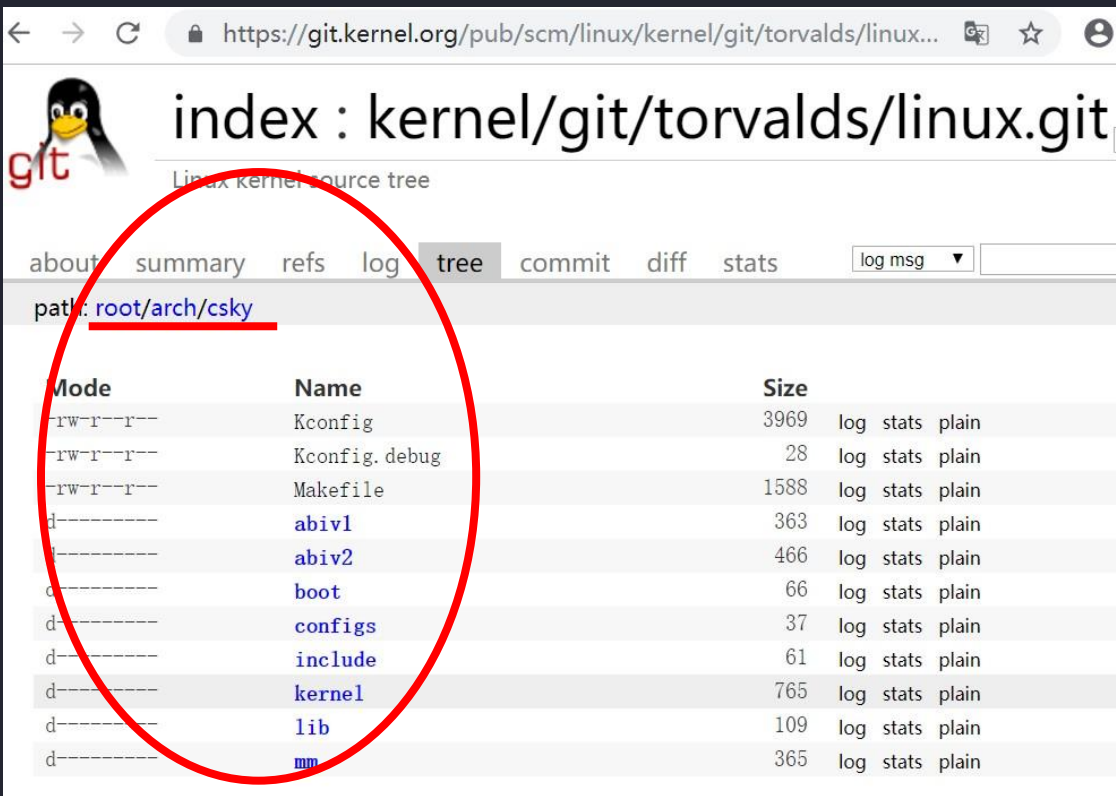
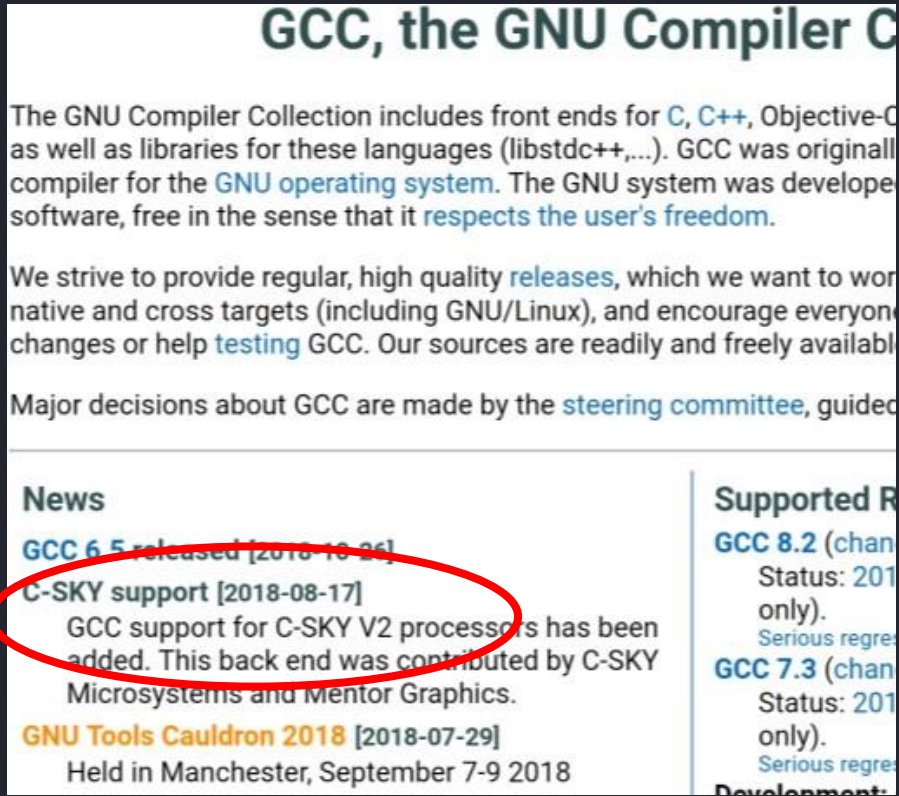
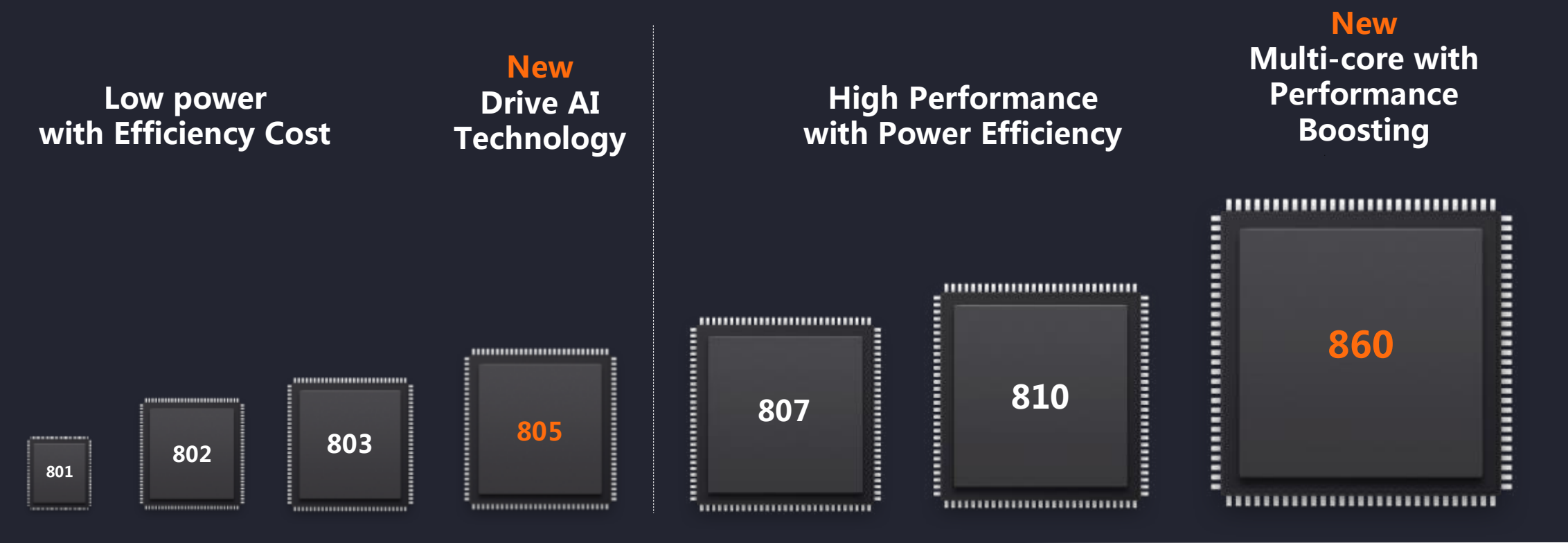
AliOS

Domain Specific SoC Platforms ( IPs from Partners )

Self Defined CPU+RISC-V Compatible

Domain Specific Architecture

# Accumulated Comprehensive Experience in CPU IPs



## IC Cards

## AI

## GNU & Linux Supported

### Surveillance

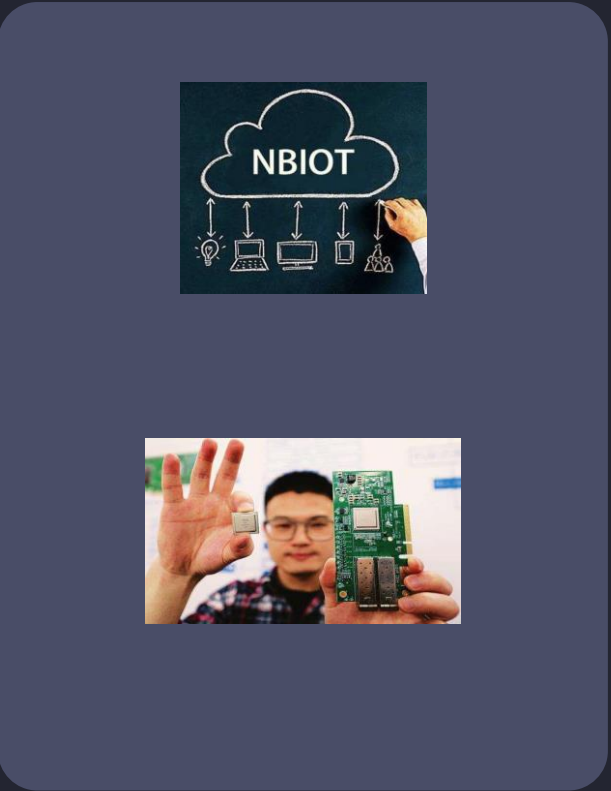
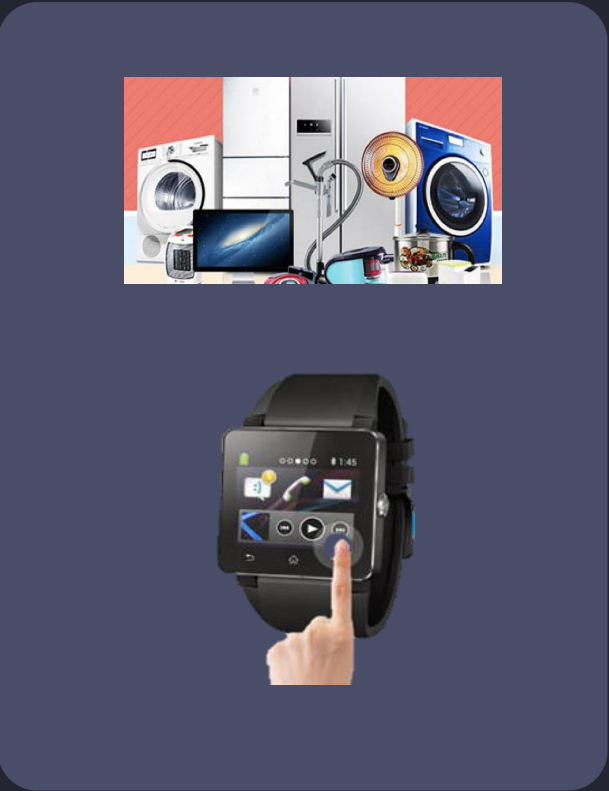
### Printer

### Smart Grid

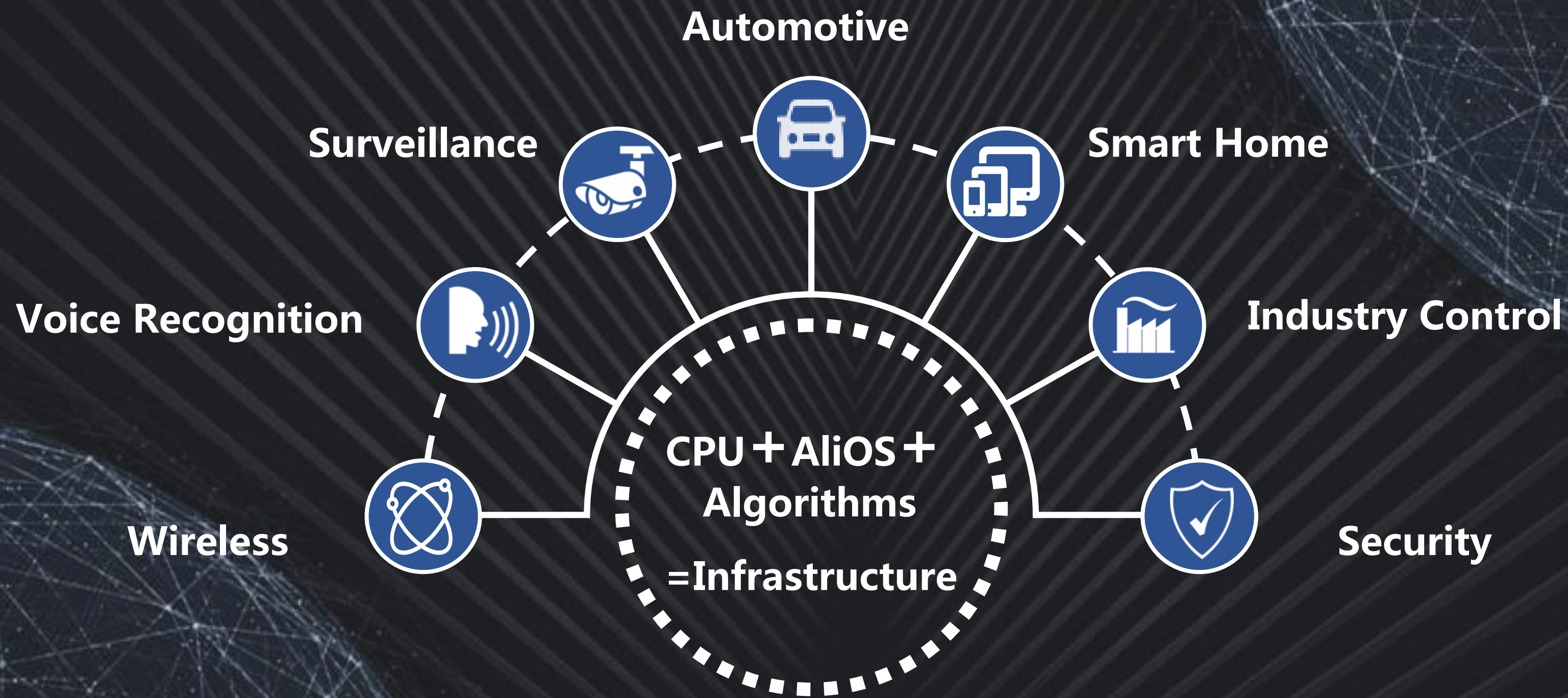
### MCU

### Info Security

### NET&COMM







**Software & Hardware Integrated IoT IC Design Infrastructure**



# RISC-V Processor Roadmap

World's first  
embedded RISC-V core  
with TEE

World's first-class high  
performance RISC-V CPU

2 stage

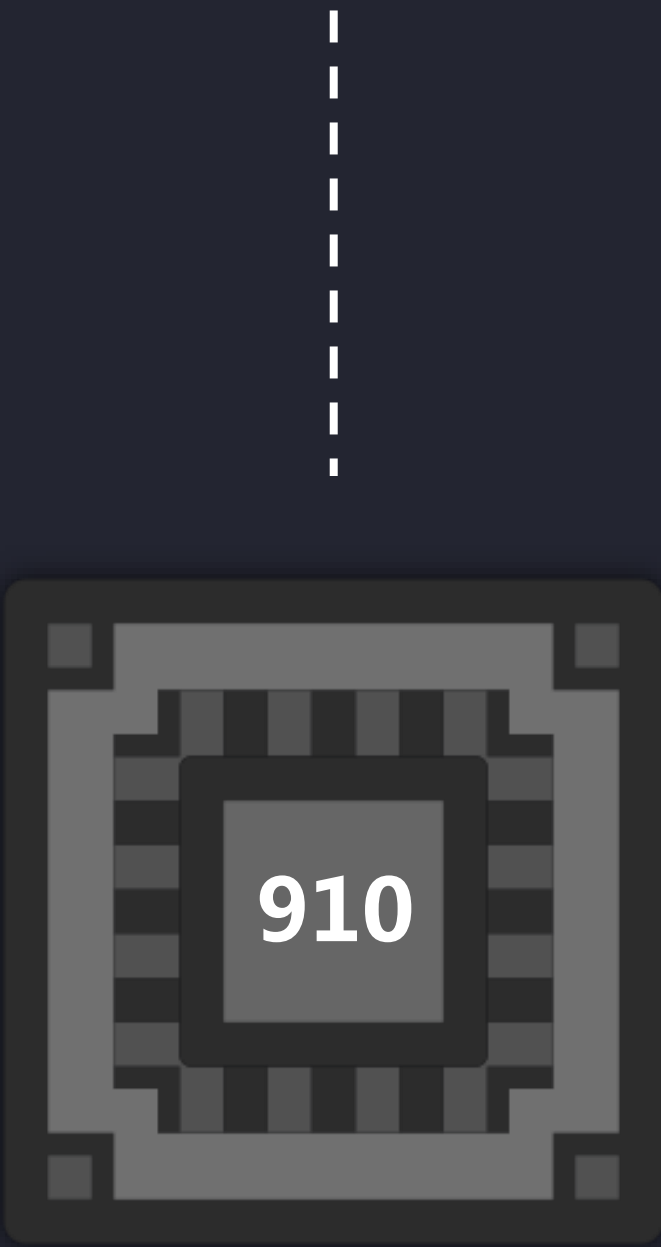
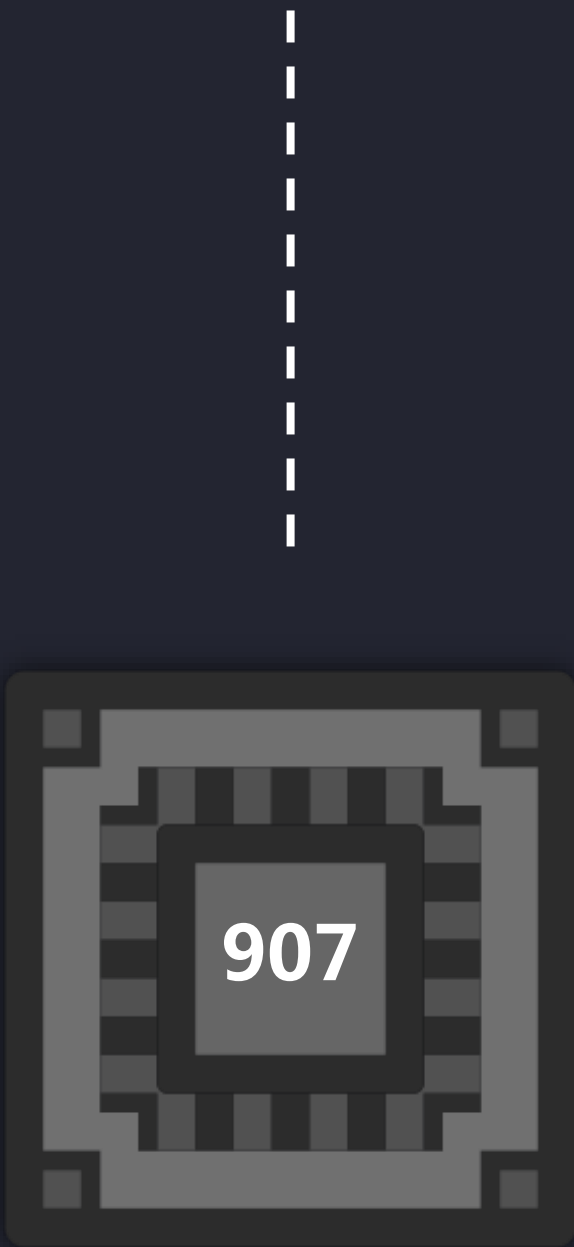
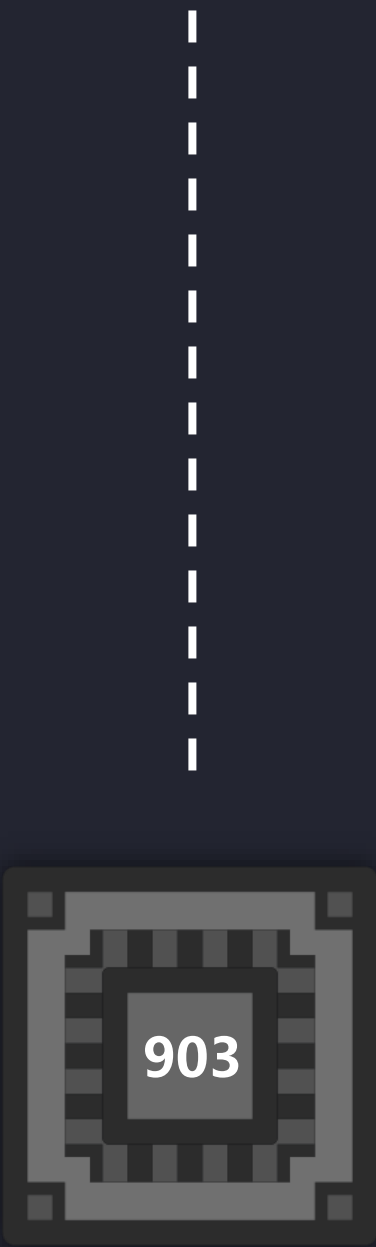
3 stage

5 stage

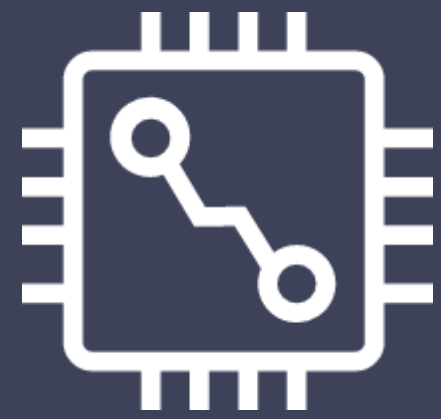
7 stage

10 stage  
out-of-order

10+ stage  
out-of-order



**E**



**EMBEDDED**

**IoT ,  
MCU**

**R**



**REALTIME  
RELIABLE**

**SSD ,  
Industrial control**

**I**



**INTELLIGENCE**

**AI ,  
DSP**

**S**



**SECURITY**

**Info Security ,  
Mobile Payment**

**C**



**COMPUTING**

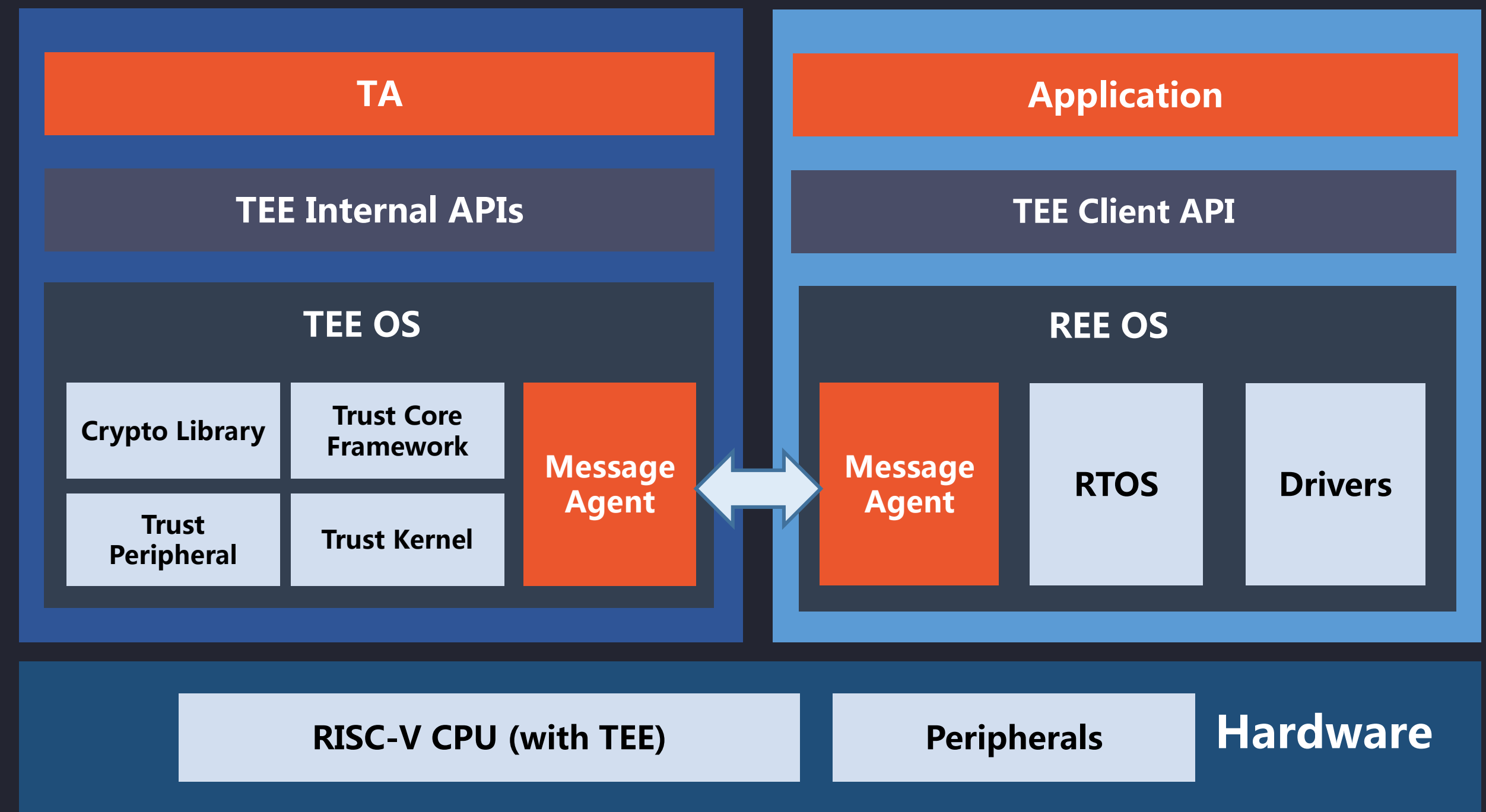
**5G ,  
Smart Surveillance**



## Tech Specs

- Two virtual cores : trusted and untrusted
- Trust state for sensitive code
- Hardware isolation for trusted and untrusted resources
- Non-aligned memory protection: up to 16 continuous spaces
- Trusted interrupt extension
- Trusted debug extension

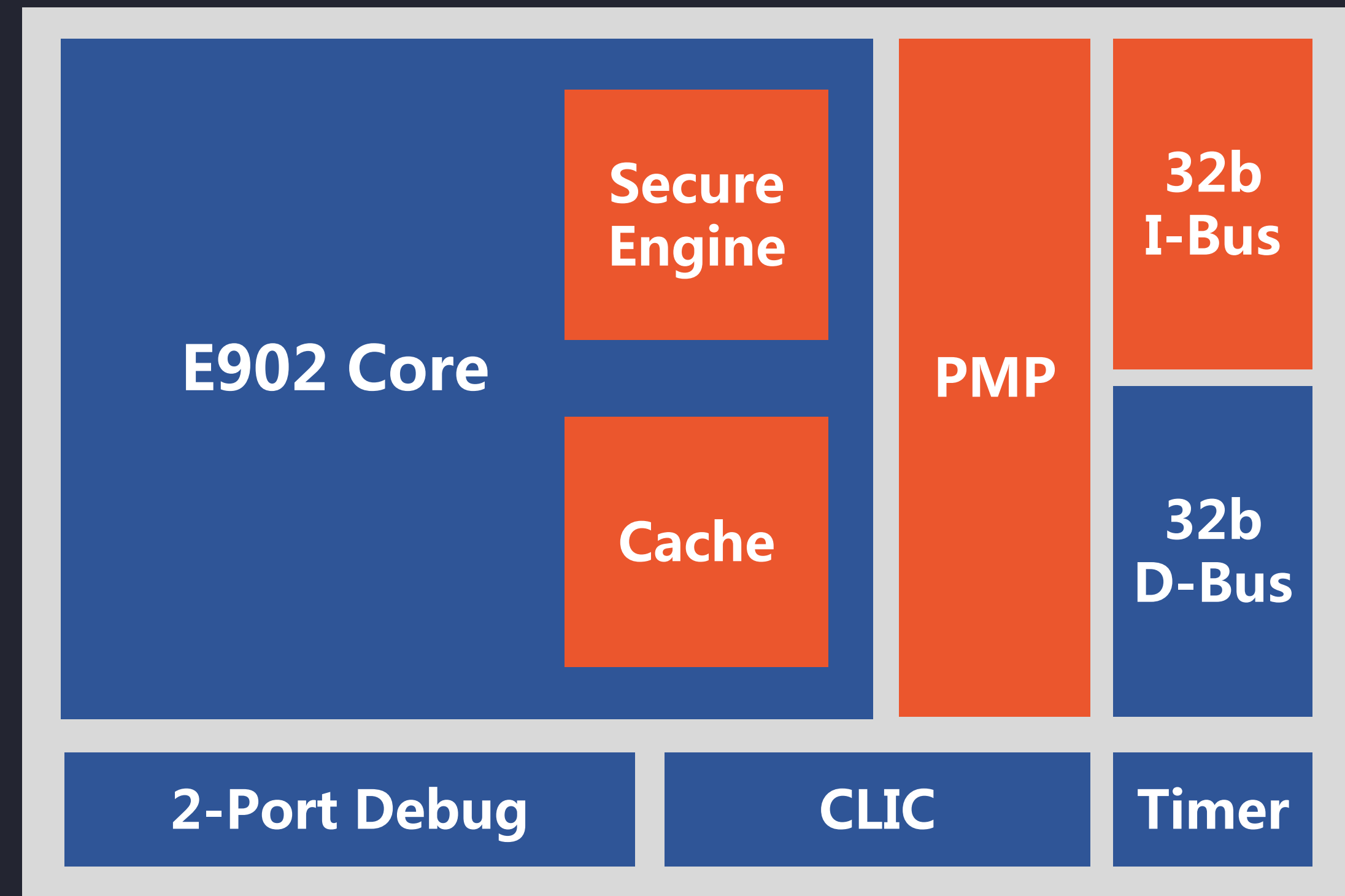
## Supported by AliOS



## Tech Specs

- RISC-V RV32EMC ;
- 2 stage in-order pipeline ;
- Machine and user mode support ;
- Configurable hardware multiplier ;
- Configurable tightly coupled IP ;
- Configurable cache ;
- 10K EQG for minimum configuration

## Low Cost, Low Power



3.8 uW/MHz per @ TSMC40LP, 9-track, typical corner



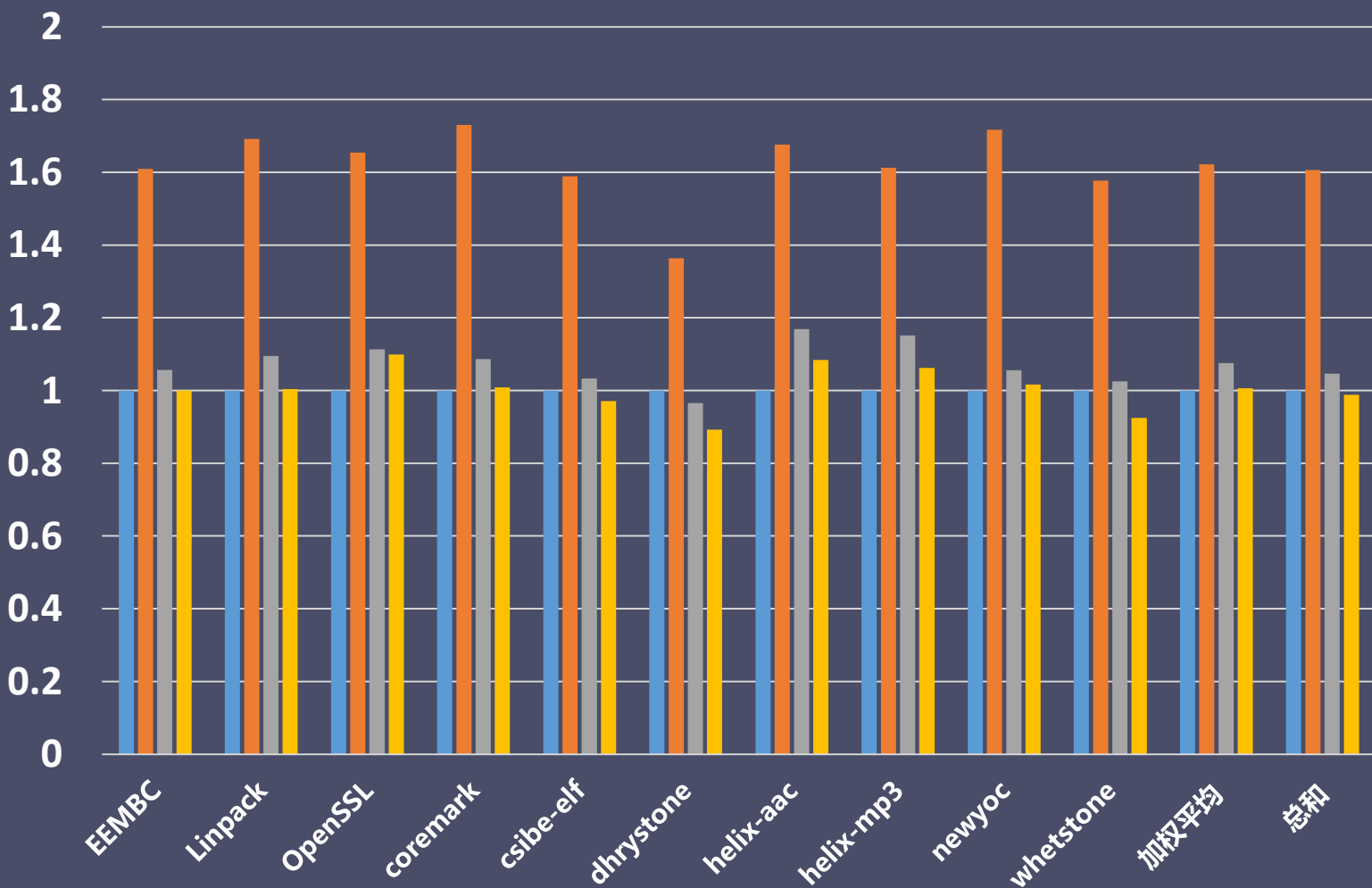
## ISA (Description Language )

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## Evaluation System



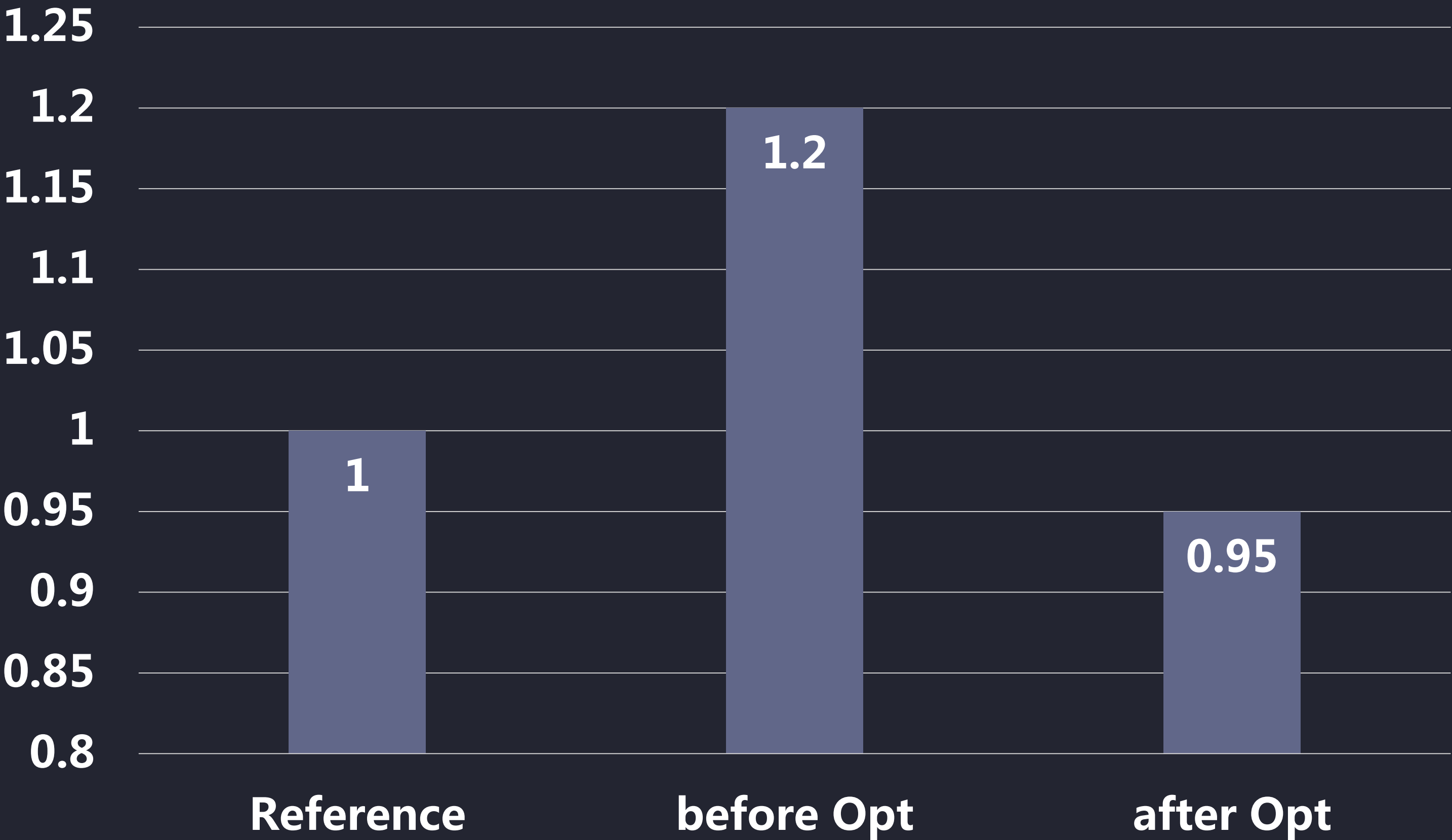
## Code Density



# Highly Improved Code Density

## Benchmark List

- EEMBC
- Linpack
- OpenSSL
- Coremark
- Dhrystone
- Helix
- Newyoc
- Whetstone



20.3% to -4.9%



Security Solution	Linux	Software Tools	EABI	
<ul style="list-style-type: none"><li>Trust execution environment</li><li>Mitigation attack solution</li><li>Trust IoT stack</li><li>Secure YoC platform</li></ul>	<ul style="list-style-type: none"><li>Perf supported</li><li>Memory usage efficiency ( IOMMU )</li><li>Memory model optimization</li></ul>	<ul style="list-style-type: none"><li>First IDE supporting profiling</li><li>Trace supported on simulator</li><li>High performance instruction subsets</li></ul>	<ul style="list-style-type: none"><li>Definition of param-register</li><li>Redefinition of register usage</li><li>Quantitative data on the impact of code density</li></ul>	<ul style="list-style-type: none"><li>...</li></ul>



- Edge-to-Cloud Infrastructure
- Algorithmic Ability

## Customer

- Scenario Definition
- Application Algorithms



Enable customers to deliver competitive products with high efficiency





# THANKS

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