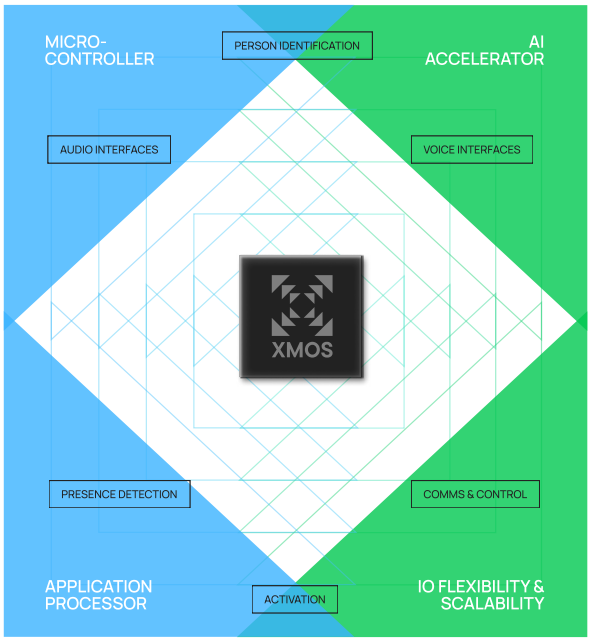
XCORE®.AI

High performance, low latency, multi-purpose processor for the intelligent IoT



Integrating control, IO, DSP and AI in a fully software-configurable SoC enabling fast-to-market product deployment

With its unique multi-threaded micro-architecture, xcore.ai provides low latency with highly deterministic performance, ideal for intelligent IoT applications. Each xcore.ai features 16 logical cores split between 2 multi-threaded processor 'tiles'. Each tile is equipped with 512kB of SRAM and a vector unit providing integer and floating point ALUs. A powerful interprocessor communication infrastructure provides high speed communication between each integrated processor, and multiple xcore.ai SoCs, for ultimate scalability. All this, within a single, homogeneous, and powerful development environment.

FEATURED HIGHLIGHTS

SOFTWARE-DEFINED IO

- Deterministic processing performance
- Precise ns timing accuracy
- Providing fully programmable application specific interfaces
- Embedded PHYs for MIPI, USB and LPDDR

CONTROL PROCESSING

- SMP FreeRTOS across multiple threads C/C++ code development environment for control code integration
- Up to 3200 MIPS of performance available on the 800MHz package options

DSP PERFORMANCE

- 32-bit floating-point scalar pipeline offering up to 1600
- MFLOPS of performance at 800MHz
- 256-bit VPU adds block floating point capabilities up to 12.8 GMACS of performance at 800MHz
- Integrated complex arithmetic and FFT/iFFT support at up to 1 million 256-point FF T/s

AI/ML PERFORMANCE

- 256-bit VPU supports 32-bit, 16-bit, 8-bit and binary vector operations
- Peak AI performance of 51.2GMACC/s at 8-bit with a sustained performance of 40.96GMACC/s at 800MHz
- Homogeneous computing environment for tight integration of AI operators

FLEXIBILITY

Software-defined partitioning of xcore.ai threads provide optimal configuration of IO, control, DSP and AI/ML that perfectly matches the specific requirements of each target application. Scaling of the tile clock frequency to meet exact performance requirements reduces power consumption providing cost and power effectiveintelligent IoT solutions.

APPLICATIONS

Smart speaker
Audio visual applications
Lighting/security
Smart home

Health
Fitness
Care & diagnostics
monitoring

Traffic & parking
Environmental
Public safety monitoring

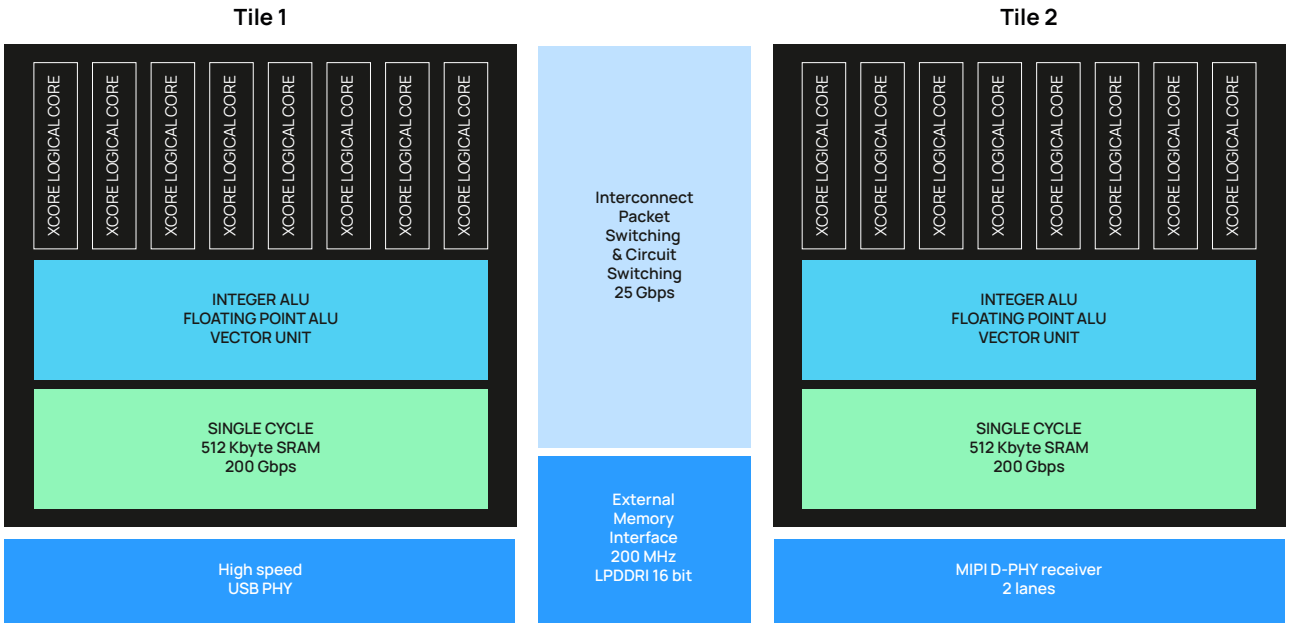
Safety
Tracking
Predictive maintenance
Energy management
Industrial ethernet

Asset tracking
Predictive care
People tracking
Vehicle security

Edge AI

Motor control

BLOCK DIAGRAM



DEVELOPMENT TOOLS

STANDARD PROGRAMMING TOOLS

- RISC-V compliant LLVM tool chain
- GNU debugger
- Make for building

BESPOKE TOOLS INCLUDE

- Mapper to link code and eliminate unused codechain
- Global optimiser I Programmer for Flash, OTP and volume programmingMake for building
- AI-Tools – a comprehensive tool to map an AI model

XCORE.AI PACKAGE OPTIONS

xcore.ai is available in a range of package options that optimise on cost, performance and size.

PART	PACKAGE	FREQUENCY	TEMPERATURE	I/O VOLTAGE	GPIO	USB	MIPI	PART
XU316-1024-QF60A-C24/I24	60 pin QFN (7x7 mm)	600MHz	Commercial / Industrial	1v8	34	Yes	No	No
XU316-1024-QF60B-C24/I24	60 pin QFN (7x7 mm)			3v3				
XU316-1024-FB265-C24/I24	265 pin FBGA (14x14 mm)			1v8/3v3	128		Single / dual lane	LPDDR1
XU316-1024-TQ128-C24/I24	128 pin TQFP (14x14 mm)			1v8/3v3	78			No
XU316-1024-QF60A-C32/I32	60 pin QFN (7x7 mm)			1v8	34		No	No
XU316-1024-QF60B-C32/I32	60 pin QFN (7x7 mm)	800MHz		3v3				
XU316-1024-FB265-C32/I32	265 pin FBGA (14x14 mm)			1v8/3v3	128		Single / dual lane	LPDDR1