Microsoft Surface

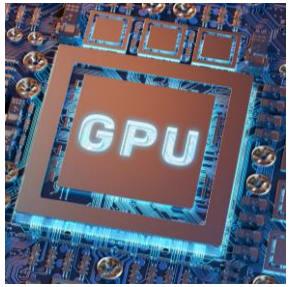
Surface and AI

Microsoft Surface

What's the difference between a CPU, GPU and NPU?

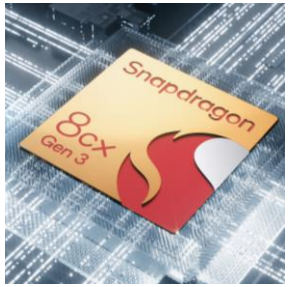
CPU
Central Processing Unit

- Brain of the computer
- Performs basic operations from software instructions, loaded from memory



GPU
Graphics Processing Unit

- Specialized to render 2D and 3D objects
- Can perform operations in parallel, processing vectors of data simultaneously



NPU
Neural Processing Unit

Element of System on Chip (SoC)

- Specific architecture for deep learning
- Integrated as an element of the SoC
- Hardwired matrix without need for memory access, reduced precision
- Trained specifics, Inference operations

Pros	Can execute any line of software	Efficient for repeatable calculations	Audio, Video, Data inspection
Neg	Not efficient at specific operations	Floating Point, not needed for AI	Generic code execution

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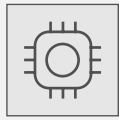
CPU

Scalar
Numbers



3 ⊗ 2 = 6

GPU

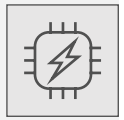
Vector
Array of Numbers

3		1		3
0	⊗	2	=	0
9		5		45

also operations like vector dot product

NPU

Tensors
Array of Numbers



4	3	6		1	3	2		4	9	12
7	0	3	⊗	2	0	3	=	28	0	9
1	8	2		1	4	2		1	32	4

also operations like vector dot product

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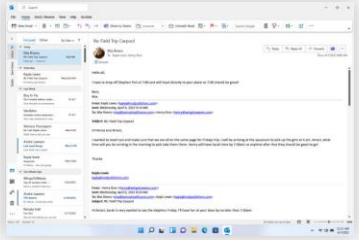
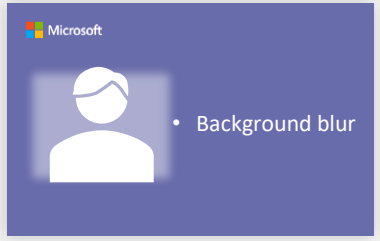
Free your CPU and gain powerful NPU-enabled AI experiences

Without NPU

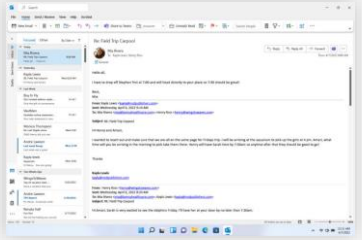


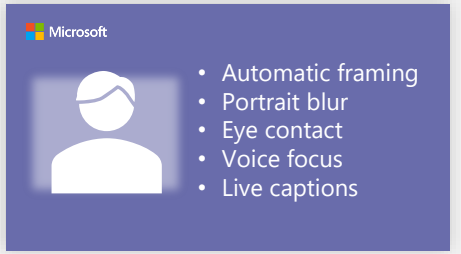


CPU workload

- PowerPoint presentation
- Outlook
- Teams call
- AI video processing

With NPU





CPU workload

- PowerPoint presentation
- Outlook
- Teams call

Power saved

NPU workload

AI video/audio processing workload on NPU

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Concurrently run AI features on Surface Pro 9 with 5G

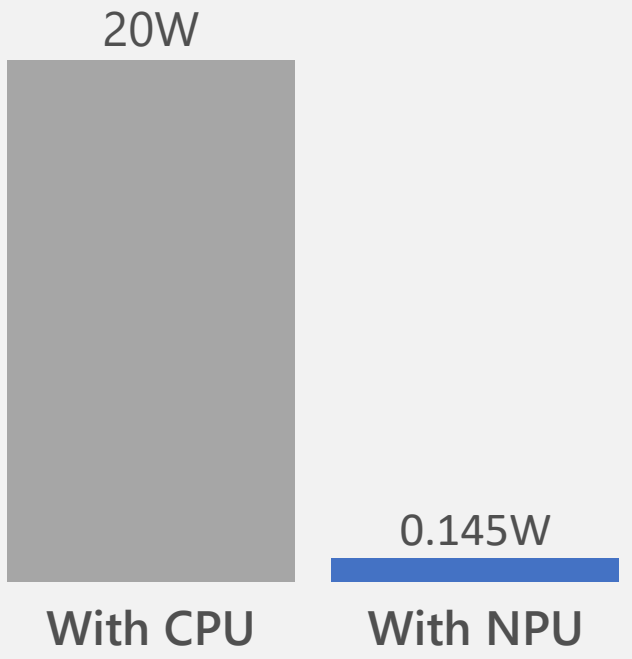
- Automatic framing
- Portrait blur
- Eye contact
- Voice focus
- Live Captions

15 Trillion Operations per second (15 TOPS)

Surface Pro 9 with 5G Microsoft SQ® 3's Neural engine

Power consumption optimized with an NPU

(Ex: Face framing)



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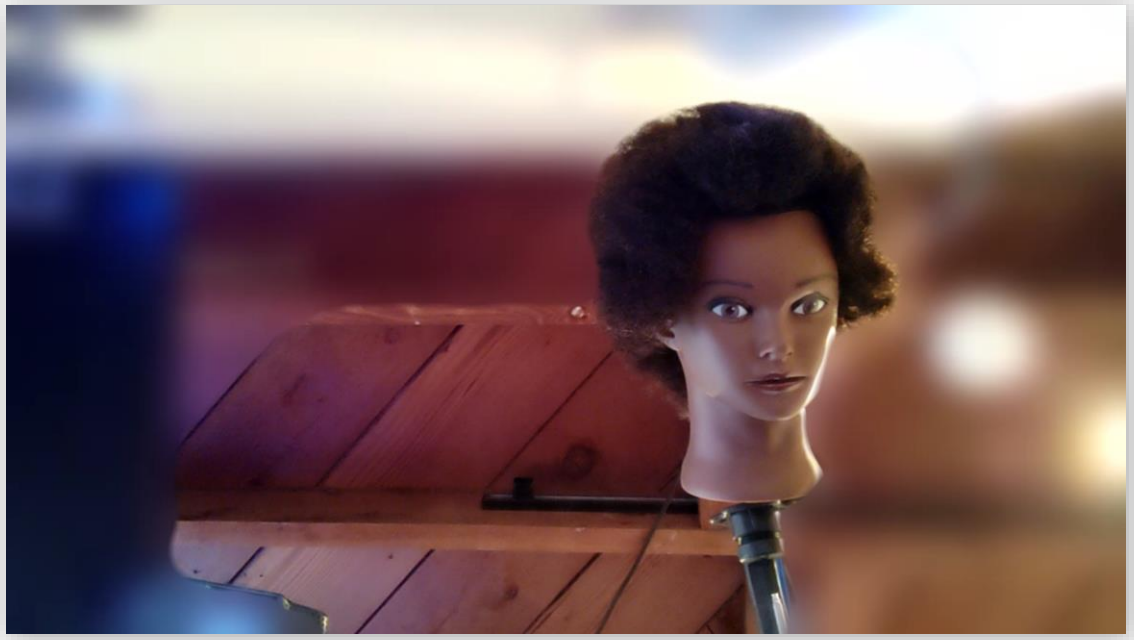
Better background blur with NPU



CPU background blur

Background blur with NPU
(Surface Pro 9 5G)

Microsoft Surface

As we look to the future of computing

Arm SoC—All in one, with a powerful CPU, NPU, mobile network, and much more

Next-gen CPU

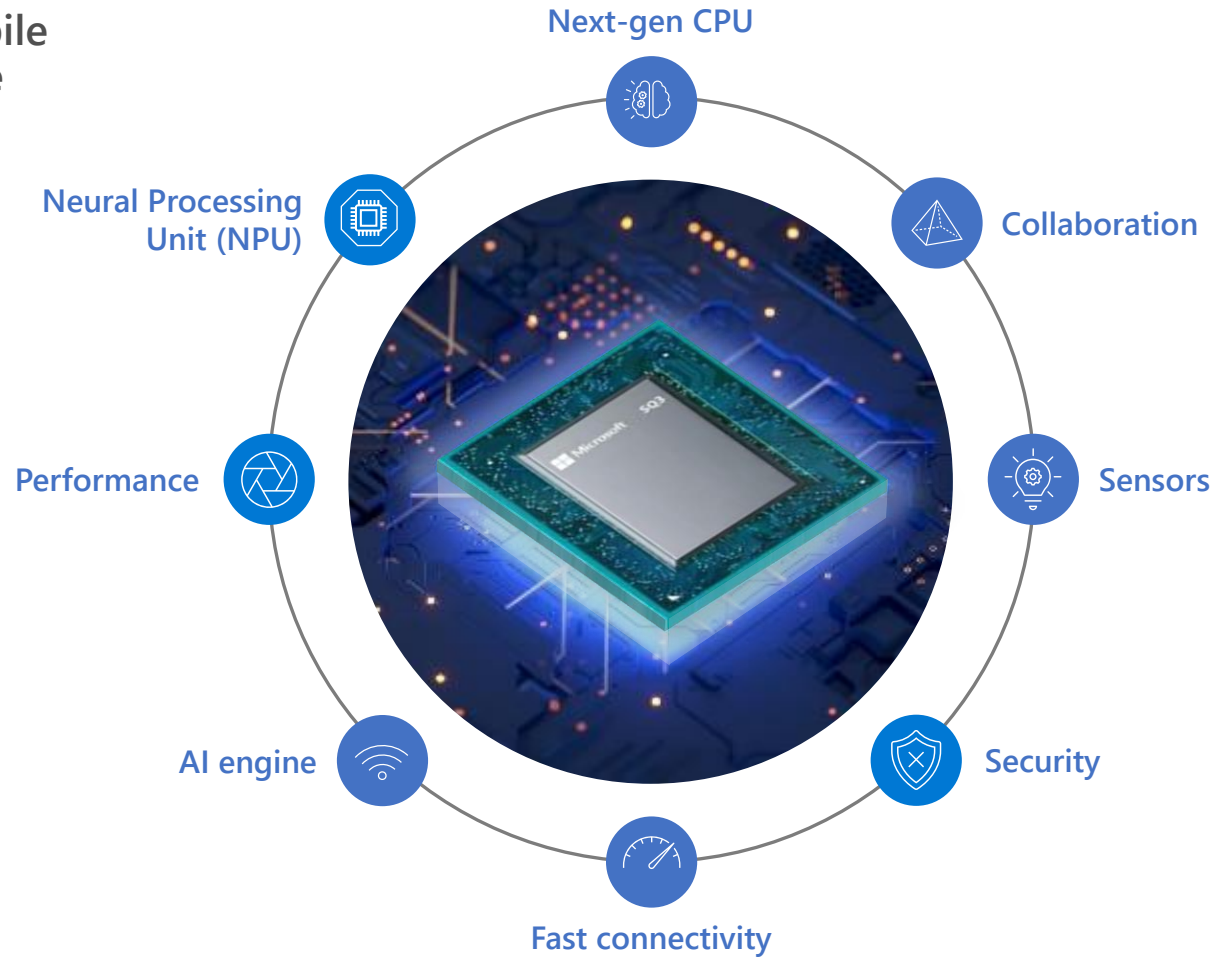
Designed to deliver great power efficiency

Performance

Arm devices provides great performance on device

AI engine

NPU processor with best inference performance



5G

World's best modem-RF system with superior energy efficiency

Wi-Fi and Bluetooth location scanning

Comprehensive connectivity

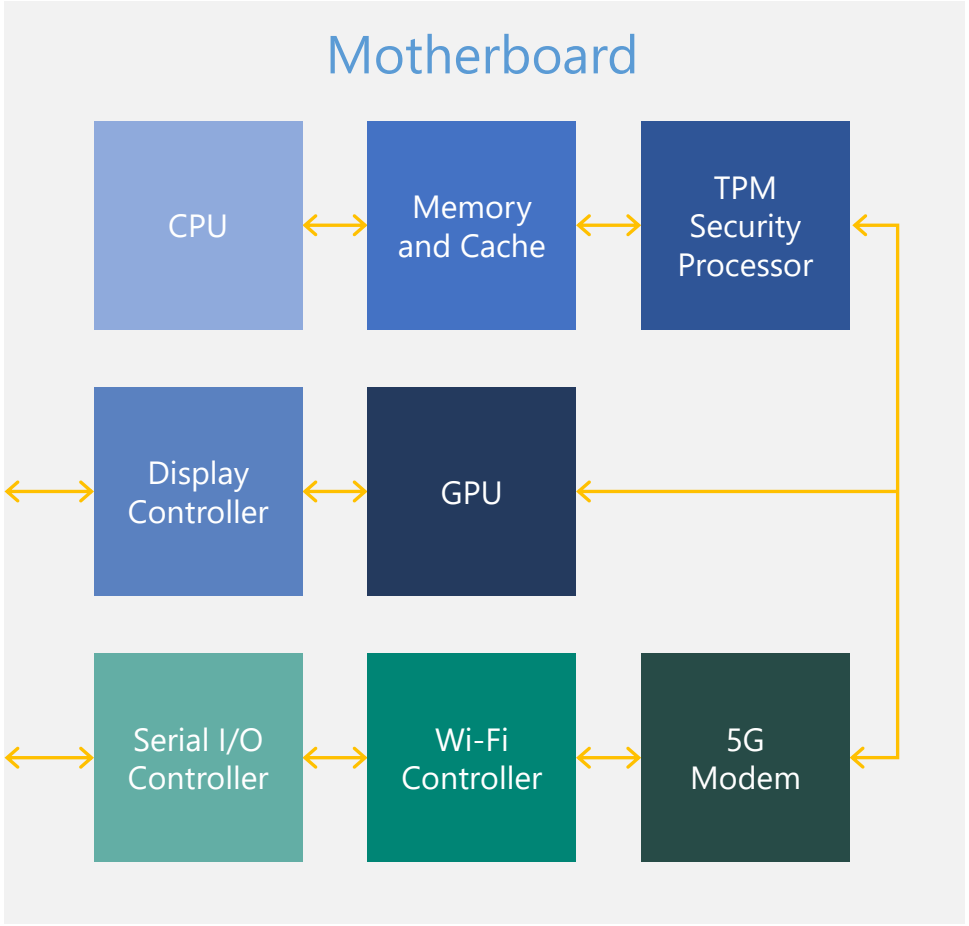
Camera and audio

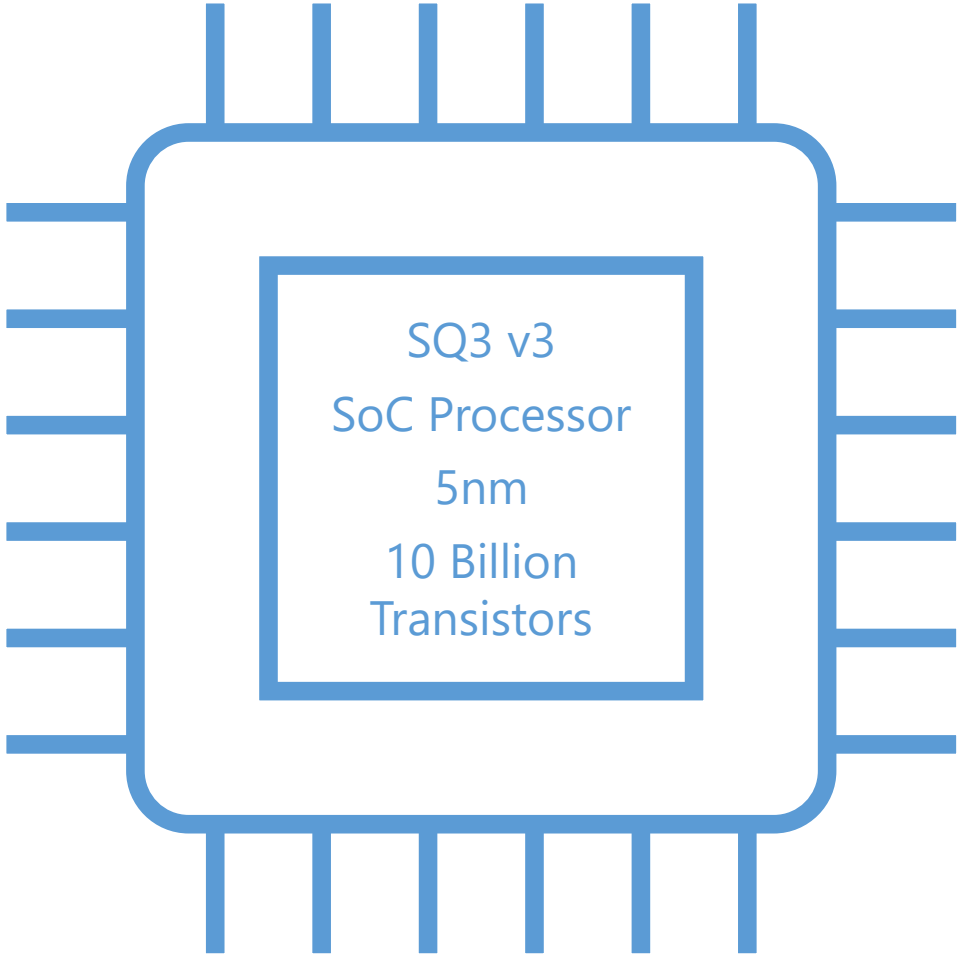
Leading image quality and advanced audio features

Display and video

Best-in-class picture quality

System on Chip (SoC) – Motherboard to SoC

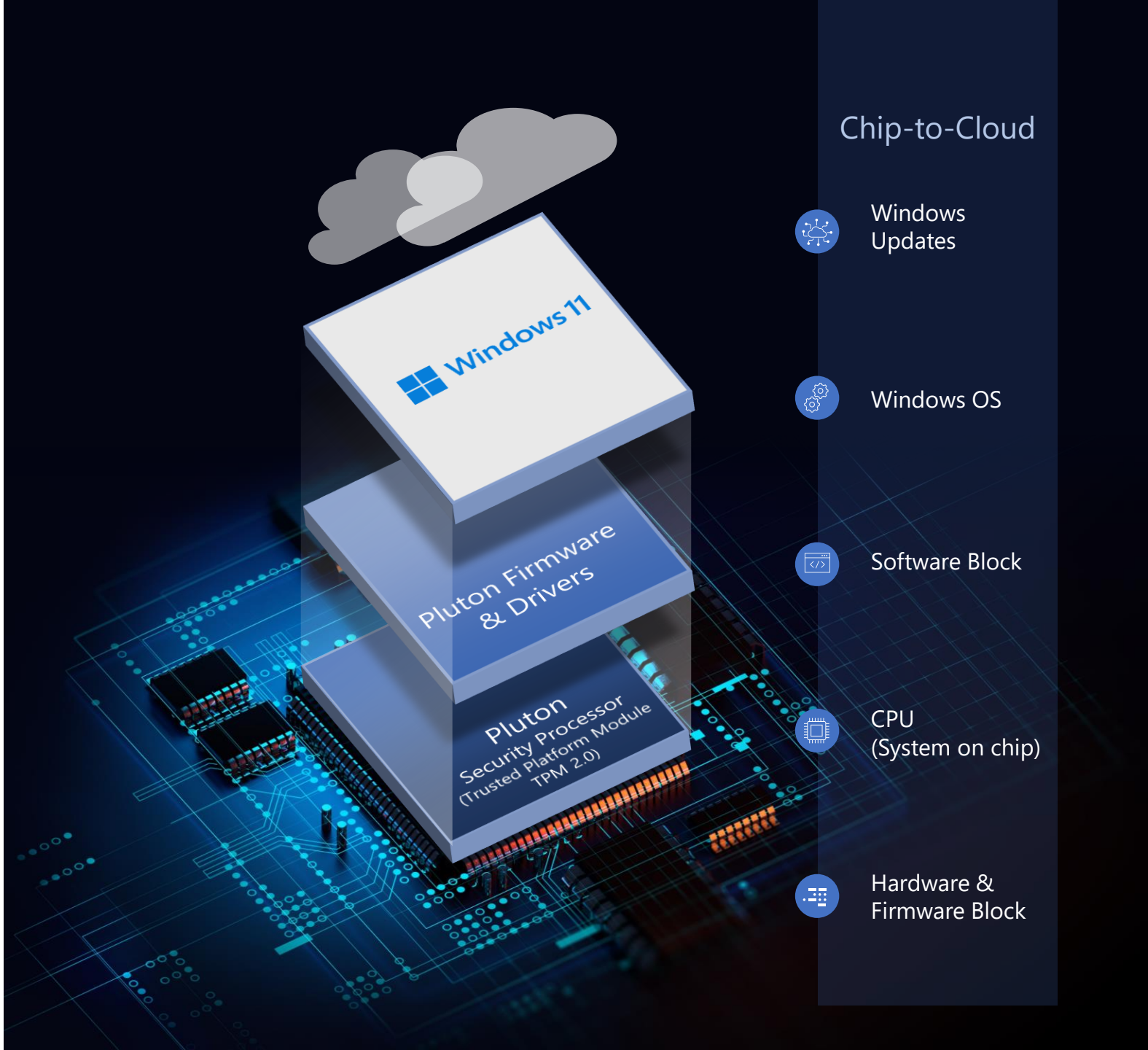




Microsoft Surface

Microsoft Pluton Security Processor

The security chip designed for the future of Windows PCs

Available on Surface Pro 9 with 5G devices, Pluton puts secure crypto-processor security measures directly into the CPU, removing the potential communication CPU to TPM bus interface vulnerability.

- Hardware-based root of trust
- Secure identity
- Chip-to-cloud
- A specialized NPU for Security Processing