

Notices and Disclaimers:

© Intel technologies may require enabled hardware, software or service activation.

No product or component can be absolutely secure.

Your costs and results may vary.

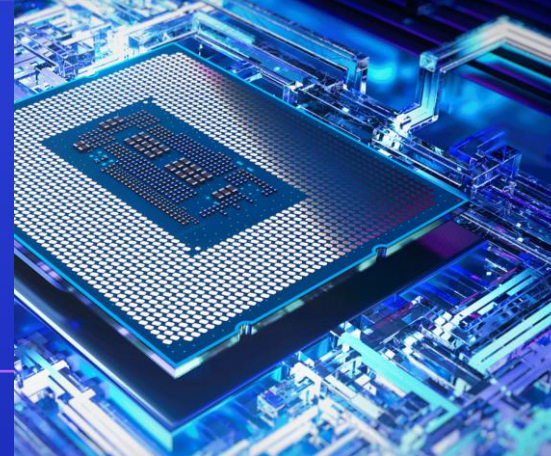
All product plans and roadmaps are subject to change without notice.

Statements in this document that refer to future plans or expectations are forward-looking statements. These statements are based on current expectations and involve many risks and uncertainties that could cause actual results to differ materially from those expressed or implied in such statements. For more information on the factors that could cause actual results to differ materially, see our most recent earnings release and SEC filings at www.intc.com.

© Intel Corporation. Intel, the Intel logo, and other Intel marks are trademarks of Intel Corporation or its subsidiaries. Other names and brands may be claimed as the property of others.

Advanced Packaging Technology

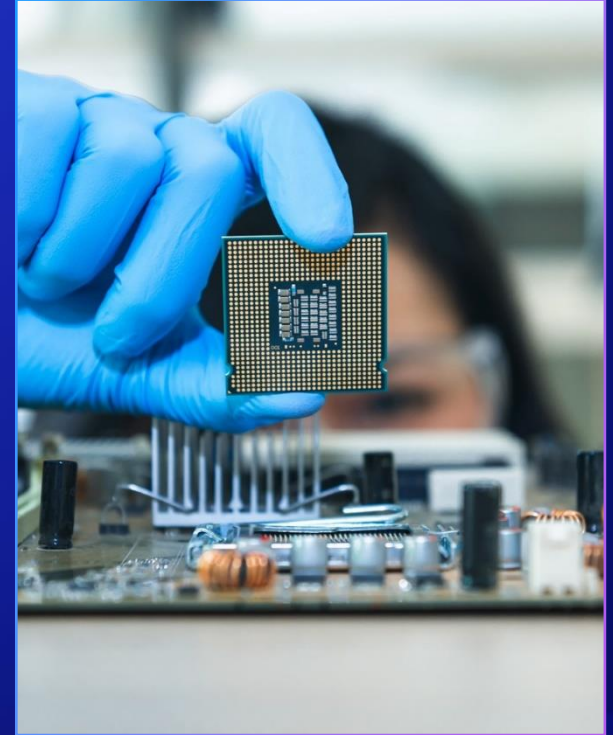
intel®



Agenda

1. Why do we need Advanced Packaging?
2. Advanced Packaging types
3. Future of Advanced Packaging

Why advanced packaging?



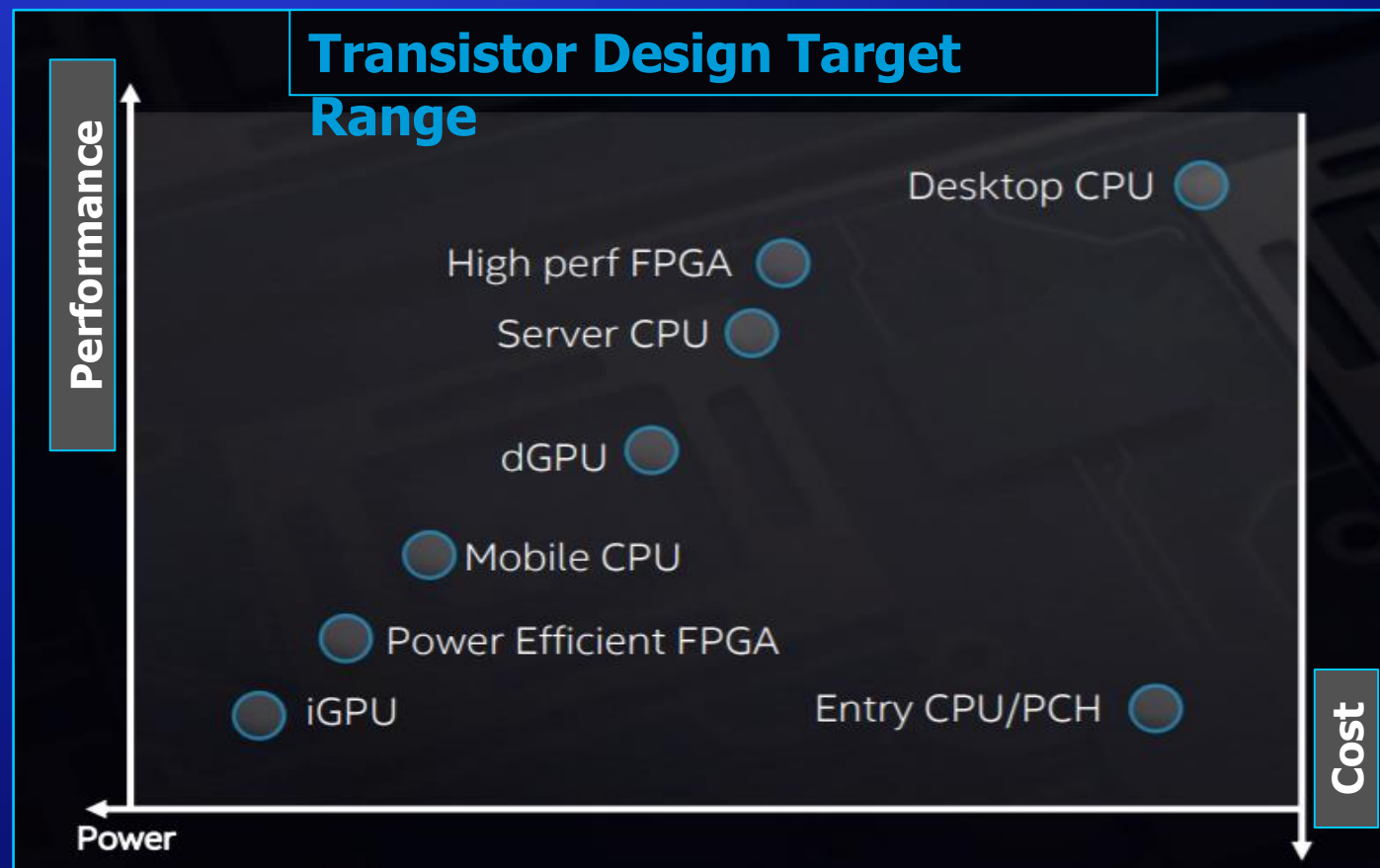
Advanced Technologies need Advanced Packaging

No single technology node is optimized for performance, power and cost.

Component Diversity

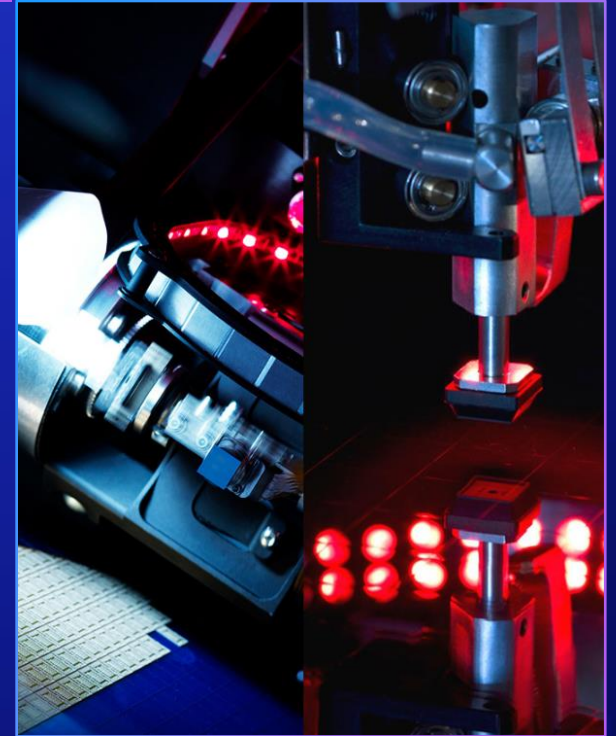
- Logic transistors
- Analog/RF transistors
- High speed memory
- Dense memory
- Non-volatile memory
- High speed I/O
- Configuration memory

The common approach was to put all these components on one chip.



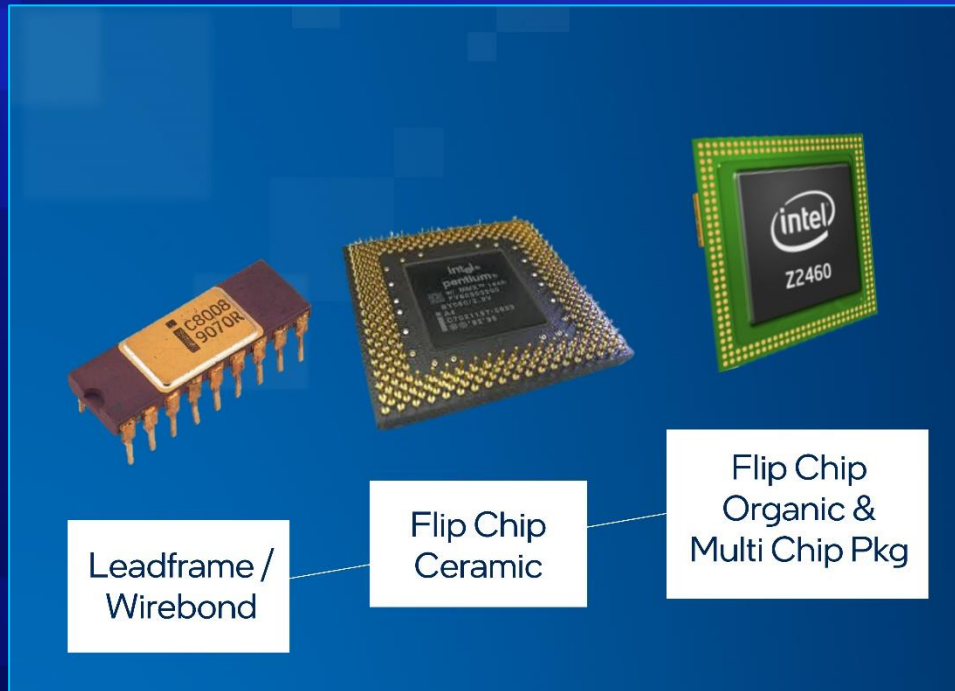
Source: [Intel Architecture Day](#)

Advanced Packaging types

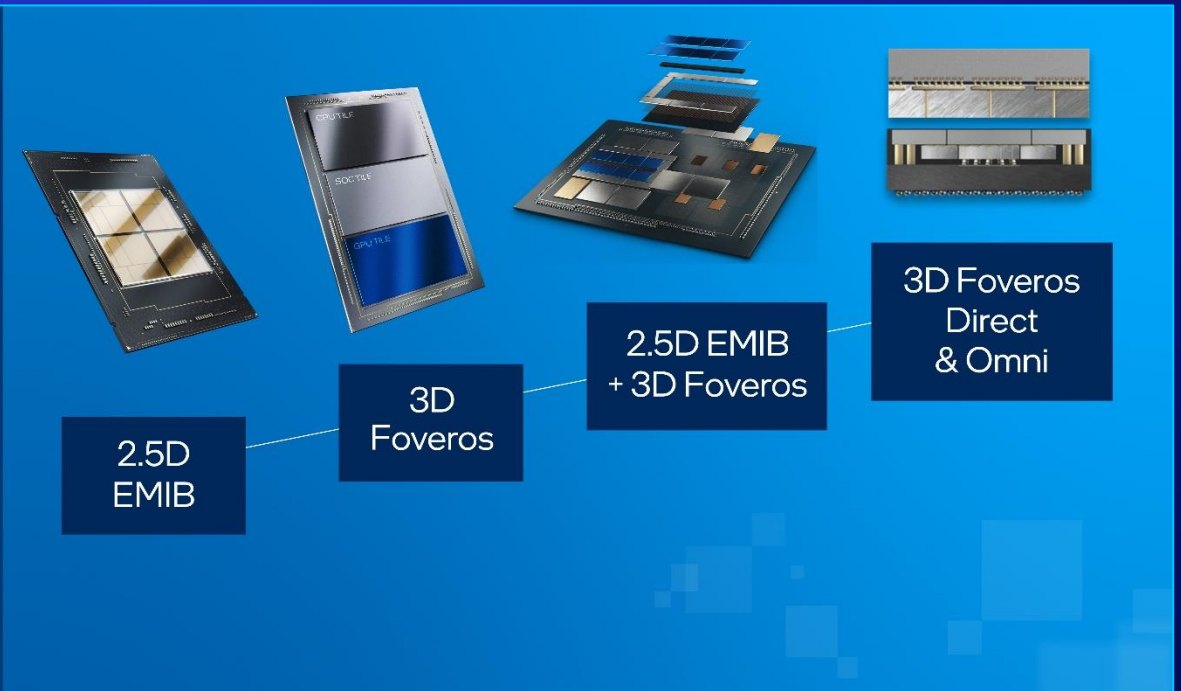


Intel Advanced Packaging roadmap

MONOLITHIC ERA

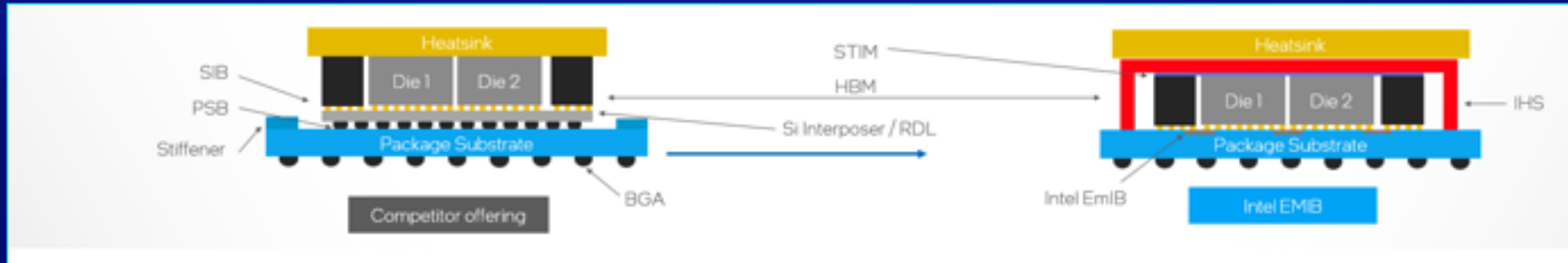


ADVANCED PACKAGING ERA

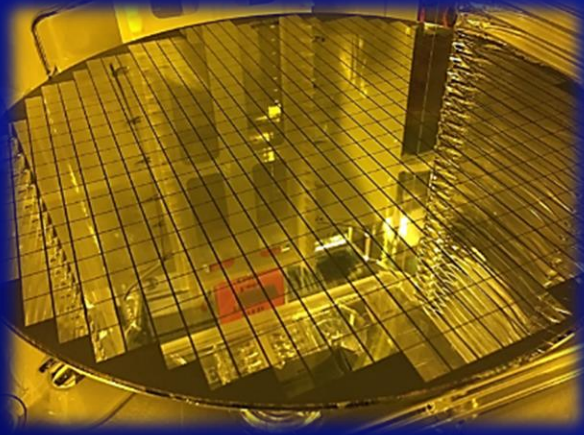


Intel Advanced Packaging - EMIB

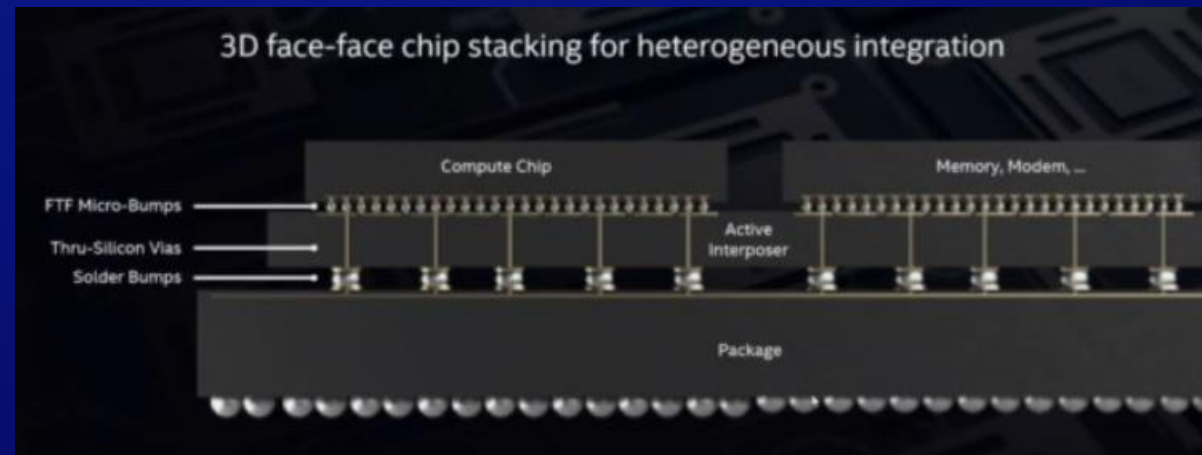
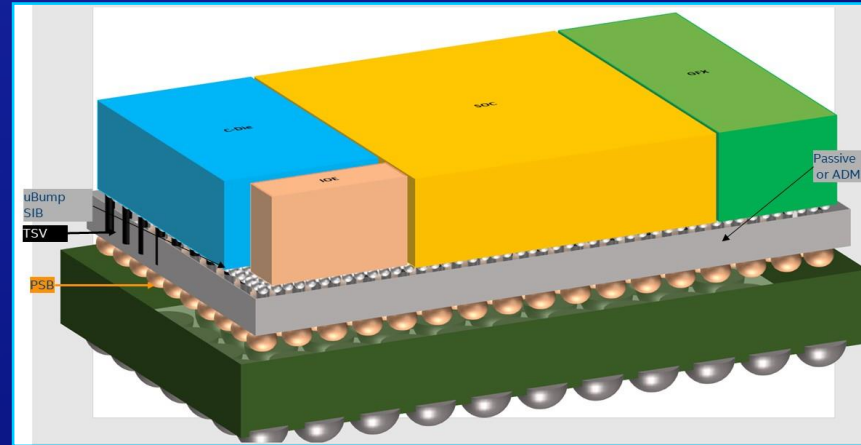
EMIB (Embedded Multi-Die Interconnect Bridge)



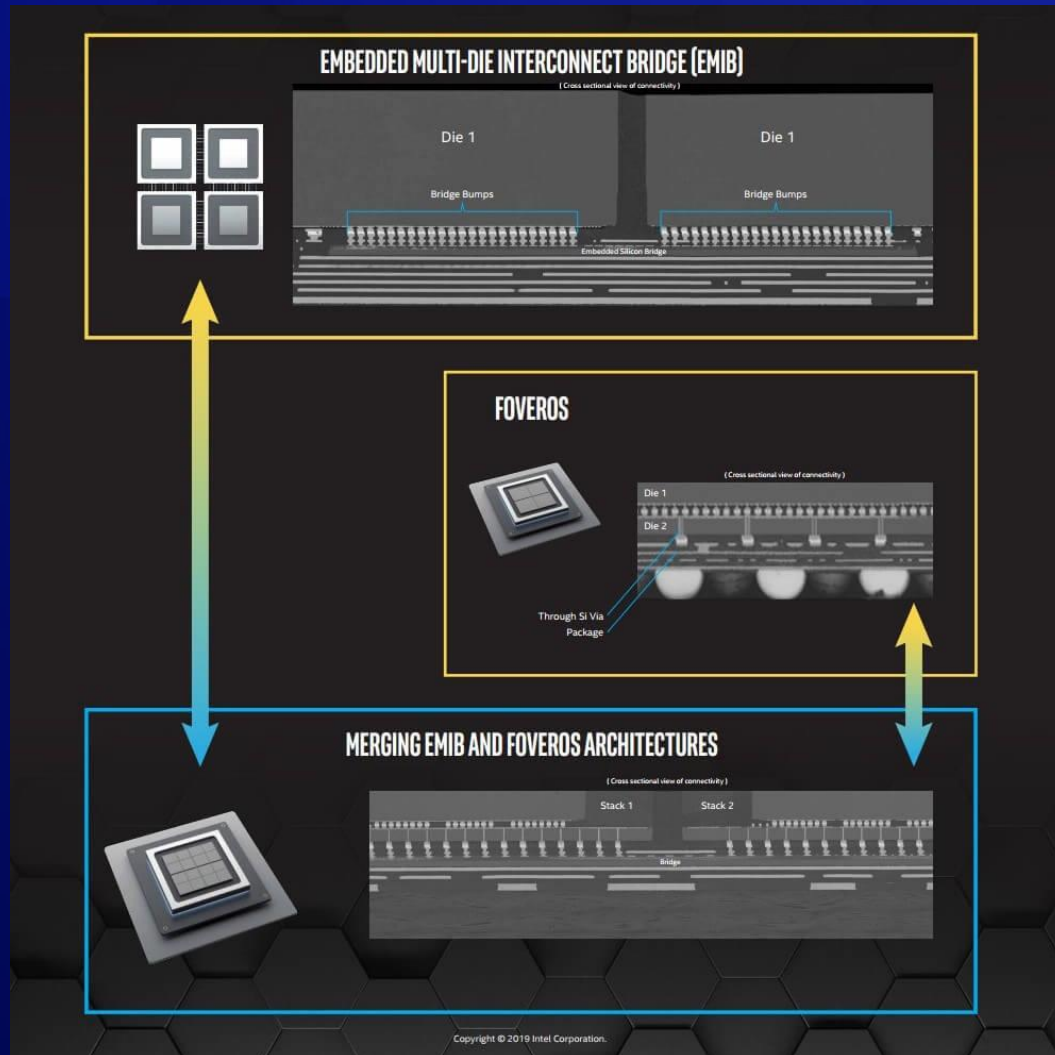
Intel Advanced Packaging - FOVEROS



Foveros 3D packaging is Intel's active interposer technology.



Intel Advanced Packaging Co-EMIB

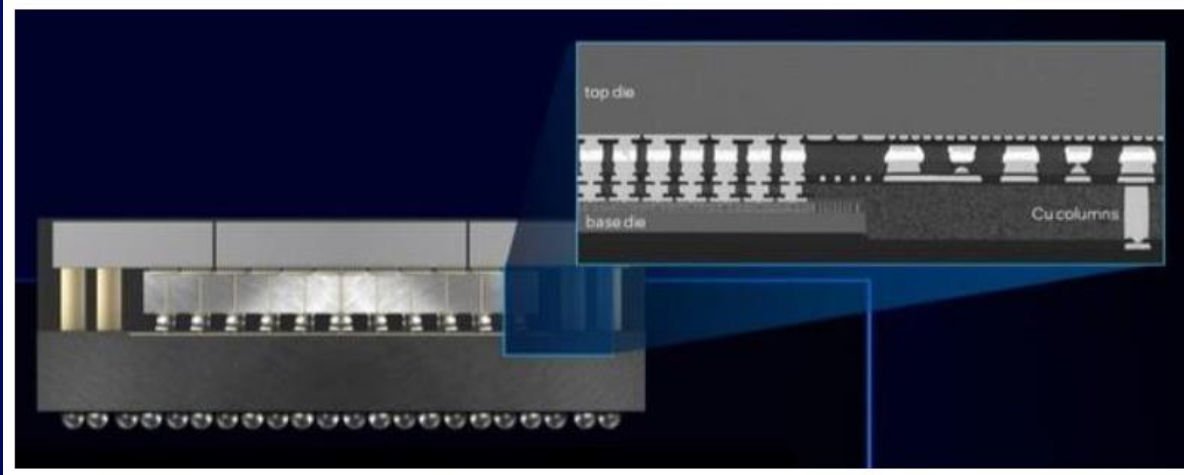
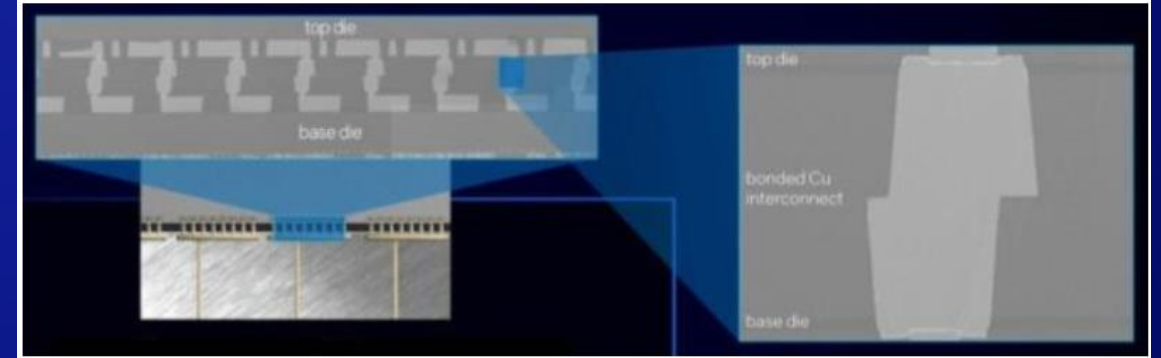


Co-EMIB is the merging of Foveros & EMIB architectures. Co-EMIB technology links even more computing performance and capability together.



Intel Advanced Packaging FOVEROS OMNI & DIRECT

Foveros Omni allows for the connection of multiple disaggregated top tiles with multiple base tiles that can be of mixed fab nodes. It uses TSV and copper column technology. Its bump pitch is about 35 - 25 μm , which gives a bump density of 1,600 per mm sq.

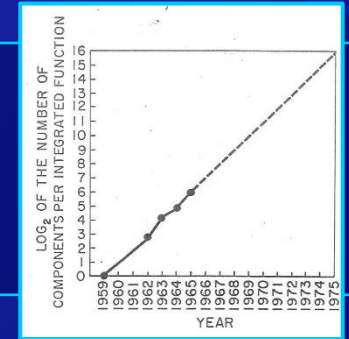


Foveros Direct uses hybrid bonding technology, making possible sub-10 μm bump pitch. It is solderless direct copper-to-copper bonding, resulting in lower resistance interconnects and a bump density of 10K/mm².

Future of Advanced Packaging

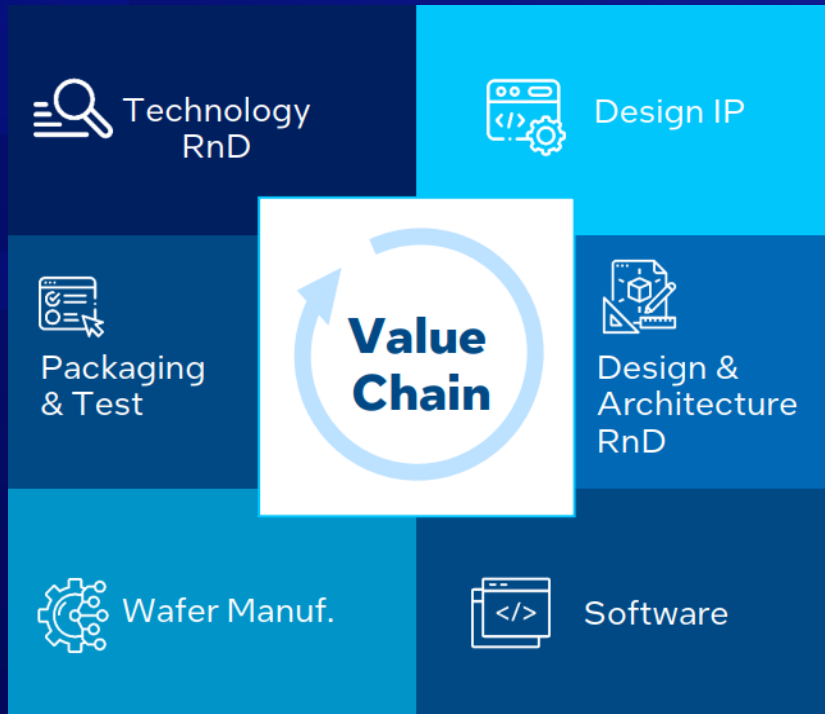
Future of Advanced Packaging

- Advanced Packaging will accelerate Moore's law
- Technology breakthroughs will focus on AP
- Intel Foundry Services available for Customers



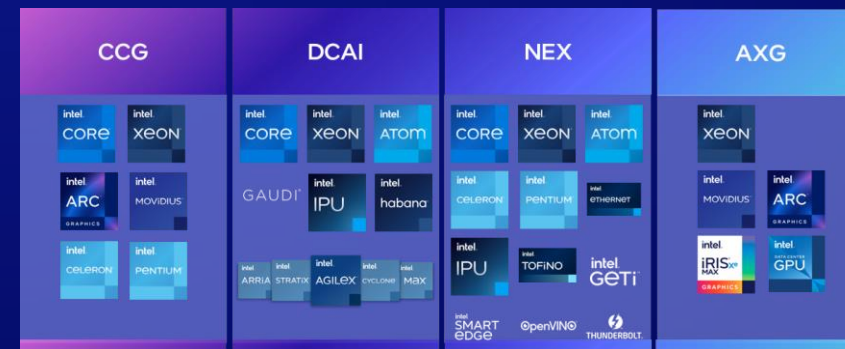
intel
foundry
services

Semiconductors value chain perspective



R&D in Poland, North

The biggest Intel R&D in EUROPE highly specialized in creating high value software putting life into Intel technologies across the entire product portfolio



Since 1999

Thank you

© Intel technologies may require enabled hardware, software or service activation.

No product or component can be absolutely secure.

Your costs and results may vary.

All product plans and roadmaps are subject to change without notice.

Statements in this document that refer to future plans or expectations are forward-looking statements. These statements are based on current expectations and involve many risks and uncertainties that could cause actual results to differ materially from those expressed or implied in such statements. For more information on the factors that could cause actual results to differ materially, see our most recent earnings release and SEC filings at

www.intc.com.

© Intel Corporation. Intel, the Intel logo, and other Intel marks are trademarks of Intel Corporation or its subsidiaries. Other names and brands may be claimed as the property of others.