

Accelerating the Transition to Intel 18A for Secure National Security Microelectronics

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As federal agencies and defense organizations race to modernize the technologies that underpin national security, the semiconductor industry has entered a new era. Artificial intelligence at the edge, advanced sensing, electronic warfare, secure communications, and real-time data processing all demand unprecedented levels of compute performance and power efficiency.

Meanwhile, growing concerns around supply chain resilience, trusted manufacturing, and access to leading-edge technology have elevated the importance of domestic semiconductor capabilities. As the U.S. government works to strengthen the nation's microelectronics ecosystem through initiatives such as the Department of the Air Force's Secure Enclave, agencies need pathways to adopt advanced-node technologies that deliver significant gains in performance, power efficiency, and integration density without introducing unnecessary risk to already complex development programs.

[Intel 18A](#) delivers those capabilities.

Meeting Mission Requirements with Intel 18A

Intel 18A is built on two foundational innovations: [RibbonFET](#), Intel's gate-all-around transistor architecture, and [PowerVia](#), its backside power delivery technology. Together they represent one of the most significant process advancements in more than a decade.

PowerVia is particularly notable. In traditional designs, power and signal routing compete for space on the same wafer side, a constraint that increases congestion as designs grow more complex. By moving power delivery to the backside of the wafer, PowerVia frees front-side resources for signal routing, enabling denser layouts, improved routing flexibility, reduced IR drop, and more efficient silicon utilization.

For defense agencies and systems integrators developing next-generation mission systems, these capabilities translate into meaningful gains in power, performance, and area (PPA)—within the tight size, weight, and power constraints that mission-critical applications demand—without compromising schedule predictability or program confidence.

A recent collaboration between Intel Foundry, [Cadence Design Systems](#), and a leading defense technology organization demonstrated how these goals can be achieved in practice.



Intel + Cadence: Turning Advanced Technology into Practical Results

Advanced semiconductor nodes often carry a reputation for complexity. New transistor architectures, design rules, and verification requirements can create uncertainty for organizations evaluating a transition from established technologies.

Intel Foundry addressed these challenges by partnering with Cadence, to establish a validated design environment for Intel 18A—combining certified EDA tools, reference flows, implementation methodologies, and sign-off processes optimized for advanced-node development.

By aligning expertise from the outset, teams identified potential issues earlier, minimized late-stage rework, and achieved multiple successful Application Specific Integrated Circuit (ASIC) implementations. The result: greater development predictability and a repeatable framework for Intel 18A adoption.

Shifting Left to Reduce Program Risk

A key lesson from the engagement was the value of addressing implementation considerations early. Rather than surfacing challenges throughout the development cycle, Intel Foundry and Cadence provided upfront visibility into design requirements, resource needs, and potential issues.

This shift-left approach reduced unnecessary iteration, improved planning accuracy, and provided greater confidence in schedule execution. By surfacing potential issues earlier, teams were able to focus more time on innovation and less time on resolving downstream integration challenges.

For federal agencies and labs, as well as Defense Industrial Base companies, this predictability can be as valuable as the technology itself.

Enabling the Future of Mission-Critical Innovation

Access to leading-edge semiconductor technology is increasingly inseparable from the need for trusted, U.S.-based capabilities across the microelectronics lifecycle. The Intel Foundry–Cadence collaboration demonstrates that advanced-node adoption can be both practical and repeatable.

Perhaps the most telling outcome was the customer's own assessment: despite a five-generation leap in process technology and the adoption of backside power delivery, the organization cited Intel 18A's ease of use as a standout benefit. For agencies evaluating their own transition, that feedback carries a clear message: leading-edge innovation does not have to come at the expense of execution confidence.

Intel 18A offers more than a process technology advancement. It provides a proven framework for bringing secure, mission-critical microelectronics into production.

