



Trusted Microelectronics Joint Working Group

Team 2 Summary

Trustable Access to Leading Edge Technology

July 2017

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Team 2 - Trustable Access to Leading Edge Technology

This team examined the challenges of maintaining access to trusted sources of State-of-the-Art (SOTA) microelectronics and addressed the potential consequences of continued off-shoring of state-of-the-art microelectronics manufacturing, China's anticipated investments, and the economic and national security implications of these developments. The team also addressed possible mitigating actions to sustain the U.S. defense microelectronics industrial base.

The team concluded that there is a serious risk that the USG could completely lose access to trusted sources for SOTA microelectronics, due to the mismatch between commercial business models of the semiconductor industry (particularly SOTA manufacturers) and the USG acquisition process. Without strategic and affirmative action, it is likely that off-shoring of microelectronics manufacturing will continue, increasing this risk to the USG. The USG purchasing power is insufficient to influence today's commercial industry, so access depends both on the presence of domestic SOTA manufacturing and how well USG acquisition is aligned with market practices for access to that base. Without trusted sources for the USG's critical microelectronics needs, dedicated adversaries could steal vital information or manipulate military systems.

Summary of Findings and Recommendations

The team examined several actions that could be taken to counteract the effects of continued off-shoring, ranging from economic, to technical, to educational. The major conclusions detailed in this paper include:

- *Accessing commercially available design intellectual property (IP) and microelectronics design capabilities is key. Creating a database or repository of "Trusted IP" and/or a leading-edge chip design capabilities through a public/private partnerships or consortium would help maintain and assure future design and IP access.*
- *Aggregating demand for trusted, secure microelectronics across government –beyond the national security mission agencies– would increase the government's negotiating power with commercial manufacturers and could possibly streamline the acquisition process for technologies.*
- *Increasing the universe of communities that value hardware security, within the private as well as the public sector would greatly increase the demand for more robust security and authentication measures for SOTA microelectronics. This larger community of interest comprises the utilities and transportation sectors, and numerous commercial industries, including avionics, automotive, Information Technology (IT), medical devices, finance and others.*
- *Expanding the USG's framework of microelectronics Trust (as defined in DoDI 5200.44) to multiple levels of trustworthiness incorporating countermeasures, and expanding it to include assurance for catalog items (Field Programmable Gate Arrays (FPGAs),*

Commercial Off The Shelf (COTS), Government Off The Shelf (GOTS), Military Off The Shelf (MOTS), etc.), would give defense programs more options for building trusted, secure systems. Such an expanded framework should allow programs to better leverage existing hardware security measures for a wider range of microelectronics and thus increase the overall security of the entire system while simultaneously enabling greater access to SOTA at a lower overall cost to the USG.

- *Creating public-private R&D partnerships would improve the USG interface with the semiconductor industry in many ways. Public-private R&D partnerships could foster a robust domestic supply chain for future technologies with earlier USG access. They could also provide the USG with a vehicle to test out new contract mechanisms on small scales, potentially improving the overall acquisition process. Additionally, it would provide a pipeline for training USG engineers in leading edge technologies.*

No single action is a silver bullet for the USG's access problem. Therefore, a comprehensive and coordinated approach is necessary to ensure the availability of trustworthy microelectronics. The primary recommendation of this team is to develop a coordinated, national strategy for ensuring government access to trusted SOTA microelectronics, combining current trust approaches with recommended USG process reforms and broader economic support of the domestic semiconductor industry. Such a national strategy should aim to align government practices with those of the commercial industry, strengthening the industrial base, preserving USG access to the leading edge, and improving hardware and software security more broadly in critical industrial sectors.

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