DoD and the CHIPS Act – Ensuring National Security Requirements are Part of the Implementation

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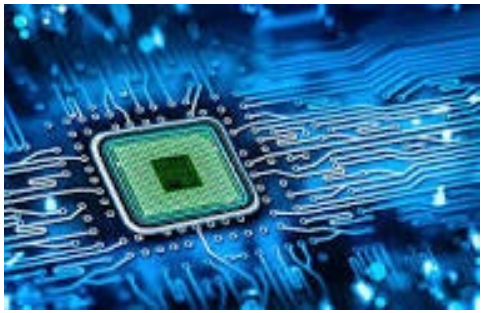

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Agenda

- OUSD (A&S) Microelectronics (ME) Overview
- ME Acquisition Challenges
- Requirements for ME used in DoD applications
- Strategies to Increase Utilization of Modern COTS ME in DoD
- CHIPS Act

OUSD (A&S) Microelectronics Overview

- Emphasis is on sustainment of existing DoD systems
  - More emphasis on State of the Practice (SOTP) and legacy semiconductor technologies
  - State of the Art (SOTA) technology development supported by investment and collaboration within DoD and with industry
  - Technology development is prioritized by OUSD (R&E)

- Leverage DoD investment authorities to resolve critical ME sustainment issues
  - Access to more modern radiation-hardened semiconductor technologies
  - Access to technologies with little commercial viability – SOTP, DoD unique, classified

- Close collaboration with OUSD (R&E) and DMCFT
  - Collaborate with OUSD (R&E) on multiple ME policy initiatives
  - Participation as core members of Defense Microelectronics Cross-Functional Team (DMCFT)

- Close collaboration with interagency on CHIPS Act – particularly Department of Commerce and the National Security Council

Microelectronics Acquisition Challenges

- DoD is a low volume, high mix customer for ME
  - Commercial ME sector is predicated on high volume production
  - Low volume need implies DoD has very limited market presence in ME (<1%) - limited ability to drive change
  - Previous use of dedicated or split fabs not sustainable

- Extended life cycle of DoD Systems
  - DoD systems are often fielded for multiple decades
    - DoD typically designs with SOTA parts, but by the time systems are fielded (10-15 yrs), they're already obsolete
    - Then DoD keeps those systems in the filed for 15-30 yrs
  - Commercial ME technologies change every 2.5 years
  - DoD is out-of-phase and multiple generations behind commercially viable ME technologies
    - It is difficult for DoD to perform technology refreshes on existing systems

- DoD specific ME applications are not commercially sustainable
  - Strategic radiation hardened microelectronics – space, nuclear applications
  - Ultra-High voltage (>25kV) power electronics – switching modules (improves SWaP) and fuze applications (increases stand-off distances)
  - Classified designs

DoD Microelectronics Requirements

- DoD Requires assured, secure ME
  - Most commercial ME components lack provenance, and are manufactured in unsecure environments
  - Majority of these components are manufactured outside the United States

- Harsh environment operation (High temp, Radiation..)
  - COTS ME typically designed to operate in constrained temperature ranges (Typically 0ºC-70ºC for commercial grades)
  - DoD applications often require parts to operate in harsh environments with extended temperature ranges (-55ºC-125ºC), or in irradiated environments (space, nuclear)

- Quantified reliability
  - Many DoD applications are mission and safety-critical
  - Commercial ME reliability data and quantification methods are incomplete, or often completely unknown

Strategies to Increase Use of Commercial Microelectronics

- Develop and implement assurance methodologies that are independent of manufacturer's geographic location
  - Almost all SOTA COTS components are manufactured overseas
  - Need assurance and security strategies that accommodate this
  - Current DoD Trusted Supplier Network does not cover SOTA semiconductor fabrication or OCONUS manufacturing
  - No "one size fits all" solution – DoD requires multiple options / 'tools in the toolbox'

- Develop DoD COTS implementation strategy
  - COTS utilization in DoD critical applications requires a reliability strategy (MQA?)
  - Collaborate with industry to develop standards for commercial ME products used in DoD applications

- Streamline acquisition policies
  - DoD needs to better utilize tools like digital engineering and modular open systems architecture to allow for technology refreshes
  - Allows programs to maintain parity with commercial sector technology

CHIPS Act

DoD has been/is working with Congress, the Department of Commerce, and the National Security Council to shape CHIPS Act language and implementation plans

- Proposed language changed from ‘state-of-the-art semiconductor’ to just ‘semiconductor’ so investments could be made in state-of-the-present/legacy semiconductors
  - Most DoD fielded systems, as well as many commercial applications (automotive, health and medical equipment, critical infrastructure – power, water, communications, etc) use older (45nm and above) semiconductors
- Proposed language changed from $3B per company to $3B per project
- Ensured ‘national security’ needs were included in investment strategy
  - Need to make investments in capability that will benefit unique national security requirements
- Investments not enough - need to understand and solve demand issue so capability is sustainable, otherwise investments will be wasted
  - Not “build it and they will come”
  - Need U.S. companies to be cost competitive
    - Tax incentives – federal, state, local
    - Workforce training credits
    - State and local investments

All included/mandatory in CHIPS Act