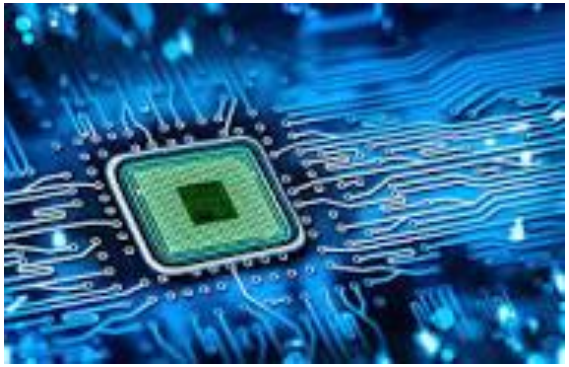
Needs And Requirements for Microelectronics From the Acquisition Community

Office of the Assistant Secretary of Defense for Industrial Base Policy

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



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 National Security Council and Department of Commerce

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

- Develop DoD COTS implementation strategy
  - COTS utilization in DoD critical applications requires a reliability quantification strategy be developed
  - 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