NDIA Trusted Microelectronics Joint Working Group

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There Isn’t One Problem...

- Cost of Design
- Specialty technologies access
- Trusted fab access
- Any fab access
- Globalization of industry
- Supply Chains and Cyber
- Counterfeits, Clones, loss of IP
- Mismatches to commercial; long product cycles
- Over-dependencies that lead to bigger problems
- ...

August 16, 2016
Many Groups Studying the Path Forward for DoD Microelectronics

- Study groups or teams evaluating options:
  - DSB – high level guidance
  - USD AT&L – supply chain requirements in absence of IBM
  - DMEA – matching Trusted supplier base to requirements
  - DMEA/PIPS – tiers of trusted standard or catalog products (non-ASICs)
  - IDA – options to replace IBM’s technology capabilities
  - ODASD(SE) – trustworthy framework development
  - MIBP – voice of industry
  - GPS Wing – technology options study
  - NAS/AF Studies Board – Optimizing AF Acquisition of Secure and Reliable Electronics
  - MEC MWG – A Strategic Framework for Microelectronics
  - NNSA – Microelectronics Fab Analysis of Alternatives
  - ODASD(SE) – FPGA way forward

Limited Industry Involvement . . . Established Trusted Microelectronics Joint Working Group to Connect Industry and Government Perspectives
Chemistry

- This talk is focused on Silicon and basics of semiconductor industry
  - Scene setting intention
- How we got to the point of holding these workshops, forming Joint Working Groups, and the current focus from USG on subject
  - It will leave out a lot of the details
Early Microelectronics

DoD and NASA were primary research sponsors and early customers

Design and manufacturing by small, self-contained teams

Performance; reducing costs key focus

Competitive domestic supplier base for DoD

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Distribution Statement A. Cleared for Public Release.
Today

Distribution of Worldwide Semiconductor Sales By Product Segment 2015

- Logic: $91B, -1.0%
- Memory: $77B, -2.6%
- Analog: $45B, +1.9%
- MPU: $43B, -1.7%
- Opto: $33B, +11.3%
- Discretes: $19B, -7.7%
- MCU: $15B, +1.1%
- Sensor: $9B, +3.7%
- DSP: $3B, -6.5%

Source: SIA Factbook 2016

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Markets and End Uses

- >1.4 billion cell phones sold in 2014
  - (320M Samsung; 225M Apple; 107M Huawei; 72M Lenovo; 65M Xiaomi; 635M everyone else)
- ~288M PC’s sold in 2015 (-8% decline)
- Growth expected in Automotive, Industrial, IoT
DoD Market

Mil/Aero Mkt: $1-1.5B
Mil share =1.5/335*100 = 0.45%


Application Specific Standard Product (ASSP) - an integrated circuit (IC) dedicated to a specific application market and sold to more than one user. A type of IC with embedded programmable logic, combining digital, mixed-signal and analog products. When sold to a single user, such ICs are ASICs (Gartner)
Performance Considerations

![Graph showing energy and area efficiencies for microprocessors, general purpose DSP's, and dedicated designs over chip numbers.](image)

- **Energy Efficiency (MOPS/mW)**
- **Area Efficiency (MOPS/mm²)**

**Legend:**
- Microprocessors
- General Purpose DSP's
- Dedicated Designs
Trusted Microelectronics Providers

Trusted Integrated Circuit Supplier Fabrication Processes

1 Cat IB Captive Foundry process for Unclassified only
2 Back End Metal is Aluminum

As of 12 April 2016
DoD Foundry Needs and Some Considerations

- Based on observations of foundry usage
- Access to both 200mm and 300mm fab technologies for custom/semi-custom chips
  - Specialty technologies, including legacy devices
  - Low power and high performance digital
  - RF/mmwave
  - IP
- Full flow must be trusted (masks, designs, WIP, ASIC/foundry, etc.)
- Specialty packaging

Considerations for some DoD end-uses

- DoDI 5200.44 policy for custom designed application-specific integrated circuits (ASICs) in covered systems (and protection from malicious insertions)
- ITAR/EAR, weapon use considerations, or other military end-uses
- Additional sensitivities of information in designs or related IP
DoD often sponsors R&D at location of greatest impact for innovation and transition

DoD programs are vehicles for acquisition of systems and technologies inside systems
Consolidation of Industrial Base

- Same Story in Equipment and Fabless Sectors
- Globalization
- Access to technologies
NDIA Trusted Microelectronics Joint Working Group Launched in May 2016

- Developed in conjunction with participants from February NDIA Trusted Microelectronics Workshop
- Study teams formed to explore feasible solutions to defense systems microelectronics challenges
  - Team 1: Determining future requirements . . . *what will be needed to maintain military technology advantages?*
  - Team 2: Maintaining access to required technologies . . . *how can we counter shifts in market dynamics that may impact supply?*
  - Team 3: Trustable microelectronics standard products. . . *how can we incorporate technologies and components from suppliers outside defense base?*
  - Team 4: New methods to instill trust in semiconductor fabrication . . . *where will the technology solutions be available?*

*Lots of Experience and Talent Focused on Core Issues*
# NDIA Trusted Microelectronics Joint Working Group Teams: Leaders and Members

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A Support & Integration Team Will Provide Assistance As Needed
NDIA Trusted Microelectronics Joint Working Group : Schedule

- First report out: NDIA Trusted Microelectronics Workshop, today, Crystal City VA
  - Team and topic introductions

  - Preliminary findings

- Final report: Trusted Accredited Supplier Industry Day at GOMACTech 2017, March 20th, Reno NV
  - Findings and recommendations
Summary

- Need to think through new approaches and strategies for future Trusted access ... technology solutions as well as acquisition and policy adjustments

- Options have been studied by government teams. ... need input from industry in interactive discussions

- NDIA Trusted Microelectronics Joint Working Group launched to address key issues ... combines perspectives of industry and government experts to develop inputs on most viable solutions

Level of Participation Has Been Encouraging and Appreciated