NDIA Panel Discussion

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Trusted Microelectronics Workshop
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Commercial IP Market Is Dramatically Expanding

>2X in 5 years!

New Standard Protocols Fuel Demand
More complex, shorter life, narrower markets
Consolidation Creates Expanding Need

Announced Semiconductor M&A Volumes


M&A Objectives:
- Reduced OPEX
- Accelerated TTM
- Greater innovation

Commercial IP aligns with M&A objectives
Business Imperatives for Commercial IP

• Focus limited engineering resources on differentiating technology
  – Apply most valuable resources on highest value-add content
  – Expand technical capabilities beyond current staff, improve OPEX leverage

• Access to new technologies with reduced first-adopter risks
  – Silicon-proven technology in leading-edge nodes
  – Deep engagement and leadership with standards bodies

• Faster time-to-market
  – Established software ecosystem
  – 3rd-party IP integration experience

• Leverage the knowledge of 100s of customers, 1000s of designs
  – Multiple markets exposure, broad interoperability
  – Production-hardened, trusted solution
Five Pillars of Security

Confidentiality
- Protection against access secret data/code via encryption

Integrity
- Protection against modification of data/code/system state

Authentication
- Protection against forged identity in illegal communication or operation

Access Control
- Protection against unauthorized usage of resource or operation

Availability
- Protection against malicious depletion of resource from normal usage
Emerging Needs and Challenges for Secure Silicon

• Secure software engineering process well established in tier-1 companies
  – e.g., Microsoft SDL
• Some segments have established practice due to regulation
  – e.g., smartcard/POS for finance/payment, Common Criteria
• Demand in industry segments handling mission/safety-critical tasks
  – e.g. IoT infrastructure, automotive, aerospace
• No pan-industry standard practice for silicon development
  – Broad range of metric-driven signoff
  – Deeper cycles, high value bugs, increasingly large designs
Combined Security and Safety in Automotive
Secure engineering process similar to ISO 26262 functional safety

Cybersecurity V-Model

SAE J3061 defines security practice V-model similar to ISO 26262 model on safety
Secure Semiconductor Products
Secure silicon = hardware + software + process
Many RTL Signoff Solutions Lack Formal Intelligence

Exploding Complexity  
Extrem TTM Pressure  
Exacting PPA Specs

- Manual violation debug
- Static rule-based checks
- Poor links to D&V flows

RTL rework and delays

- Incomplete checks
- Noisy violations → repeated waivers
- Poor correlation to SoC timing and power

RTL signoff solution based on true formal technology platforms can do much more...
**Trusted, Assured, Secured**
Towards a comprehensive, practical solution

- **Interrelated requirements**
  - Evolving threat vectors
  - No silver bullet
  - Requires coordinated orchestration of multiple methods

- **Cadence: Rich set of foundational assets**
  - Algorithms, heuristics
  - Tools, flows
  - Experience, expertise

- **Innovation progression**
  - Analysis methods
  - Metrics
  - Transformations
  - Optimizations

<table>
<thead>
<tr>
<th>Formal</th>
<th>Semi-Formal</th>
<th>Simulation</th>
<th>Emulation</th>
<th>Prototyping</th>
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</thead>
<tbody>
<tr>
<td>Classic Formal</td>
<td>Cycle Swarm</td>
<td>State Swarm</td>
<td>Guided Search</td>
<td>Simulation</td>
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<td>Exhaustively analyze one cycle at a time</td>
<td>Formal search at advanced cycles</td>
<td>Automatically guide formal search using covers</td>
<td>Manually guide analysis with formal and simulation</td>
<td>Constrained-random walk through states</td>
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**SPECTRUM OF ENGINES**

- **Formal**
  - Classic Formal
  - Cycle Swarm
  - State Swarm
  - Guided Search
  - Simulation

- **Semi-Formal**
  - Classic Formal
  - Cycle Swarm

- **Simulation**
  - State Swarm

- **Emulation**
  - Guided Search

- **Prototyping**
  - Simulation

**• Innovation progression**
JasperGold Apps: Ease-of-Use, High Capacity, and Performance

Best Proof Convergence
Deepest Bounds
Leading Coverage Analysis

Best Usability

Goal: Proof Convergence
Broadest range of formal and semi-formal solvers

Goal: Counter-Example Generation

ProofGrid™ Manager assigns best engine for task
**Tensilica Processor IP**

Leadership scalability, power, performance, and area

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### Highly Efficient, Wide Variety of Applications

IoT, Mobile, Automotive, Storage, Networking, Video/Imaging, Printers, Security…

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<table>
<thead>
<tr>
<th>Targeted Market Vertical DSP Solutions</th>
<th>Custom</th>
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<tbody>
<tr>
<td><strong>IoT, Multi-Purpose</strong> Fusion DSP</td>
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<tr>
<td>- Scalable DSP</td>
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<td>- Always-alert</td>
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<td>- Sensor processing</td>
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<td>- Comms/security</td>
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<tr>
<td><strong>Audio, Voice, Speech</strong> HiFi DSP</td>
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<tr>
<td>- Encode and decode</td>
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<td>- Voice trigger</td>
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<td>- Noise reduction</td>
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<td>- Post-processing</td>
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<td>- 170+ codecs</td>
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<td><strong>Wireless Communications</strong> ConnX DSP</td>
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<td>- Narrow to wide-band LTE/LTE-A, WiFi, Smart Grid</td>
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<td>- Infrastructure and terminals</td>
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<td><strong>Computer Vision, Imaging</strong></td>
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<td><strong>Vision DSP</strong></td>
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<tr>
<td>- Image processing and analytics</td>
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<tr>
<td>- Vision processing</td>
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<tr>
<td>- Convolutional Neural Networks</td>
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<td><strong>Application Specific</strong></td>
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<tr>
<td>- Xtensa</td>
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<tr>
<td>- High performance</td>
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<tr>
<td>- Energy efficient</td>
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<td>- Application-specific data types</td>
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**Tensilica Optimization Platform**

Common Development Tools and Broad 3rd-Party Ecosystem

Thousands of designs

4B+ Cores per Year

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Cadence Design IP Portfolio
Broad and growing set of solutions for your next SoC
Cadence IP – Build the Future Faster
Unleashing your creativity to architect, integrate, and verify leading-edge SoCs

- CNN-, vision-, and audio-optimized solutions
- Low-power embedded DSP platform
- Rapid, verified generation/configuration
- Latest protocol IP, including DDR, PCIe
- Silicon proven in the most popular process nodes
- High quality through multi-dimensional verification
- Consistently first to market with the right protocols
- Complete and comprehensive tools
- Work with any language or methodology

Faster time to market, highly differentiated products