Intel Custom Foundry
Competing in today’s fabless eco-system

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Sunit Rikhi
Vice President, Technology & Manufacturing Group
General Manager, Intel Custom Foundry
As a new player in the fabless eco-system,

1. The value we bring to the table
2. How we deliver on platforms of capability and services
3. How we leverage the advantages of being inside the world’s leading Integrated Device Manufacturer (IDM)
4. How we face the challenges of being inside the world’s leading IDM
The value we bring to the table

Leadership silicon technologies
The value of better transistors

Transistor Performance/Generation

Lower Transistor Leakage

- 65nm
- 45nm
- 32nm
- 22nm
- 14nm

Server computing
Client computing
Mobile computing
Mobile always-on circuits

Higher Transistor Performance (Switching Speed)

Performance per watt is the critical enabler for all

Source: Intel
The value of decreasing cost per transistor

Density improvements offset wafer cost trends
The value of time to market

**Intel** has ~3.5 year lead in introducing revolutionary transistor technologies.
The value of confidence in pursuit of Moore’s Law

Future Technology Options

Expect More From Moore

Future options subject to change

Source: Intel
The value we bring to the table summary

Leadership silicon technologies

Better transistors

Decreasing cost per transistor

Time to market

Confidence in pursuit of Moore's Law

Intel Custom Foundry
AGENDA

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# Foundry capabilities & services platforms

|---------------------|------------------------|--------------------|-------------|----------------------|----------------|----------------|--------------------------|-----------------------|-------------------------|-------------------|---------------------|---------------------------|--------------------------|-------------------|-------------------|

**Differentiated value on industry standard platforms**
Prototype Silicon Shuttle Services

22nm started in 2011

14nm started in 2013

10nm will start in 2015

125 prototype designs processed to-date
Foundry capabilities & services platforms multiple flavors

22nm General Purpose

14nm General Purpose

14nm Low Power

Design Flows & Kits
Foundational IP Blocks
Advanced IP Blocks

Design Flows & Kits
Advanced IP Blocks

Prototyping
Wafer & Assembly Mfg.
Wafers & Final Test Dev.
Wafers & Final Test
Wafer & Final Test
Fault Isol. & Failure Analysis
Product Qualification
Production Support
Supply Chain Logistics

Design Enabling Platform
Design Enabling Platform
Design Enabling Platform

Manufacturing Services Platform
Manufacturing Services Platform
Online Services Platform

Online Services Platform
Note: Logos other than Intel’s are properties of their respective companies, and order of logos is in alphabet sequence.
Eco-system collaboration announcements on June 03

**ANSYS**

ANSYS And Intel Collaborate To Deliver Power, EM And Reliability Sign-Off Reference Flow For Customers Of Intel Custom Foundry

**Cadence**

Cadence and Intel Collaborate to Enable a 14nm Tri-gate Design Platform for Customers of Intel Custom Foundry

**Mentor Graphics**

Mentor Graphics Tools Fully Enabled on Intel’s 14nm Processes for Customers of Intel Custom Foundry

**Synopsys**

Synopsys and Intel Collaborate to Enable 14-nm Tri-Gate Design Platform for Use by Customers of Intel Custom Foundry

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How we deliver on platforms of capability & services summary

Broad capability and services offered on industry standard platforms

Multi-flavored platforms

Enabled by eco-system partners
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IDM Advantage: Foundry Plus

A fuller array of co-optimized end-to-end services
“Intel’s end-to-end foundry services dramatically accelerated Achronix’s ability to develop and ship, high-end FPGAs. That experience has already paid off and we have significantly reduced the development time required to build our current 14nm products.”

- Robert Blake, Achronix CEO
Achronix Silicon Shipped Q1 2013

Achronix Speedster22i - High-End FPGAs

- Achronix Industry “firsts”
  - Intel’s first foundry customer
  - First to ship high-end FPGAs on advanced 3-D Tri-Gate production process
  - First to embed extensive hard IP for communications applications
  - First to receive PCI-SIG PCI Express compliance for 22nm Tri-Gate advanced process
<table>
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<tr>
<th>IDM Advantage: Packaging technology</th>
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- **Reduced Form Factor**
  - Today: Intel Atom Package on Package
  - Tomorrow: 3D Chip Stacking

- **Performance Boost**
  - Today: Intel Core w/Iris Pro Graphics Heterogeneous Integration CPU + eDRAM
  - Tomorrow: High Density Interconnects

- **Increased Functionality**
  - Today: Intel Core i7 Logic Integration CPU + PCH
  - Tomorrow: System in Package

**Building better products through multi-component integration**
Altera and Intel extend manufacturing partnership to include development of multi-die devices

3/26/2014

"Leveraging Intel's advanced manufacturing and chip packaging capabilities will allow Altera to deliver system-in-a-package solutions that have been identified as critical to meeting overall performance requirements."

Brad Howe,
Senior VP of R&D at Altera
IDM Advantage:
Flexible business models

- Front-end Design
- Physical Design
- Masks
- Wafer Manufacturing
- Packaging and Test

Customer Owned Tooling

Full Service (ASIC Model)
Flexible business model (ASIC)

“Netronome's latest fully featured 200Gbps Network Flow Processor fully exploits the power/area/performance advantages of Intel's 22nm process. Intel's Foundry team provided back-end design services to deliver fully functional silicon”

- Niel Viljoen, Netronome Founder and CEO
Shipping functional silicon to Netronome

**NFP-6xxx**
Netronome Flow Processor
Built on Intel 22nm tri-gate transistor technology
IDM Advantage: Intel’s lead product clears the way
Starting high on the yield learning curve

HVM Yield Level
Follow-on Products
Intel Lead Product
Technology Development and Certification Vehicles

Time
“The Tabula team is delivering advanced systems solutions demonstrating industry leading capability and performance. Significantly, this is achieved with 1st silicon shipments; an outstanding example of design-team and foundry collaboration plus the design-for-manufacturability prowess Intel is known for.”

- Dennis Segers, CEO Tabula Inc.
ABAX² – P1 Programmable Logic Family
- Built on Intel 22nm

- Industry’s highest performance PLD
  - Up to 2 GHz performance

- 23.3 Mbytes on-chip RAM
  - 104 Tb/s throughput (Industry’s highest)

- State-of-the-art hard IP blocks
  - 10/40/100G EMACs and DDR3 controllers

- Unmatched system performance
  - 4 x 100G L2-L4 switch: a PLD 1st
  - Highest performance RegEx acceleration

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Advantages of IDM summary

- Co-optimized
- Product proven
- End-to-end

**Capability and Services**
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IDM Challenge:
Developing the insights, culture & expertise

.. to serve the needs of an expanded marketplace which includes the traditional Intel Business Units and the new Intel Foundry Customers
Response:
Reflect the marketplace in our workforce and maintain a learning & serving environment

Sources of Intel Custom Foundry Workforce:

- Intel Technology & Manufacturing Group
- Foundry-Fabless Eco-system
- Intel Business Units
IDM Challenge: High-mix-low-volume Configuration

Response: Configuration optimization in tooling & set up

A/T cost per unit

Before Optimization
After Optimization

80%
IDM Challenge:
Separation of Intel Business Unit & customer IP

Response: Separation by infrastructure design
IDM Challenge: Managing customers’ priority and capacity

Response: Separate priority and planning process
Challenges of IDM summary

Marketplace insight & expertise

Operational Optimization

IP separation

Priority and capacity planning

There is an effective response for every challenge
Intel Custom Foundry announced customers

Note: This list of customers does not include those did not disclose relationship with Intel. Logos other than Intel’s are properties of their respective companies, and order of logos is in alphabet sequence.
Intel Custom Foundry’s Newest Customer

“Intel’s 14nm Tri-Gate process technology is very important to develop the next generation SoCs. We will deliver highly improved performance and power advantages with next generation SoCs by leveraging Intel’s 14nm tri-gate process technology through our collaboration.”

- Yoshifumi Okamoto
  Director, SLSI Business Division
  Panasonic Corporation
Summary of this talk

Our Value: Leadership silicon technologies

Delivered on: Industry standard platforms

Enhanced by: our IDM advantages

While responding to: Our IDM challenges

Growth ahead!
Thank you
Risk Factors

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