Speed up Your Innovation: A Platform Oriented Customer Silicon Solution Provider

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VeriSilicon

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Digital 3.0: Consumer Centric and Mobile Internet

Computing Growth Drivers Over Time, 1960 – 2020E

- **Mainframe Centric** (1960)
- **PC Centric** (1980)
- **Consumer Centric** (2020)

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**Note:** PC installed base reached 100MM in 1993, cellphone / Internet users reached 1B in 2002 / 2005 respectively; Source: ITU, Mark Lipacis, Morgan Stanley Research.

Morgan Stanley

China IC Expo 2011
Design Foundry: From Fabless to Design-lite

- 70’s – US
- 80’s – Japan and Europe
- 90’s – Taiwan and Korea
- 00’s – China and India

Design-lite
- Design Definition
- Design Implementation
- Application Driven Beyond 2000

IDM
- Manufacturing Driven
- 60’s, 70’s and 80’s
- Digital 1.0
  - Mainframe Centric

Fabless
- Design Driven
- 90’s
- Digital 2.0
  - PC Centric

Wafer Foundry
- Fabrication

Design Foundry
- Wafer Foundry
- Fabrication
- Digital 3.0
  - Consumer Centric
“Design-lite” become next trend.
Design outsourcing become more pervasive.
In sourcing: Brand/channel; core technology; spec.; software.
Outsourcing: Design implementation; supply chain management.

Source: Morgan Stanley Research

Source: GSA, 2007
Headquartered in US and China with 350+ employee worldwide.
Primary operation in Shanghai with 260+ employees.
Custom Silicon Solution Provider and Turn Key Service

Tape out one chip per week and ramp up one product per month
Open Platform for Digital 3.0

▲ Open Software Platform for Innovation

▲ Open SoC Hardware Platform for Acceleration
   ► Design-lite

▲ Open IP Platform for Collaboration
   ► IP-lite
Increasing Software Cost

More than half of all design team engineers for advanced products are software engineers.

Source: IBS, 2007
Linux Is A Single Largest Embedded OS in The Market

▲ 27.4% of next projects will use Linux.

Venture Development Corporation 2007/2008 and Mentor Graphics
Android Architecture Overview

- **Applications**
  - Home
  - Contacts
  - Phone
  - Browser
  - ...

- **Application Framework**
  - Activity Manager
  - Window Manager
  - Content Providers
  - View System
  - Notification Manager
  - Package Manager
  - Telephony Manager
  - Resource Manager
  - Location Manager
  - XMPP Service

- **Libraries**
  - Surface Manager
  - OpenGL|ES
  - FreeType
  - SGL
  - Media Framework
  - SQLite
  - WebKit
  - SSL
  - libc

- **Android Runtime**
  - Core Libraries
    - Dalvik Virtual Machine

- **Linux Kernel**
  - Display Driver
  - Camera Driver
  - Bluetooth Driver
  - Flash Memory Driver
  - Binder (IPC) Driver
  - USB Driver
  - Keypad Driver
  - WiFi Driver
  - Audio Drivers
  - Power Management
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Tablet SoC Prototyping Platform
SoC Hardware Platform target for 3 Screens

▲ Android Phone and Smart Phone
▲ Android Pad or Media Tablet
▲ Google TV and Smart TV
▲ Three screens under one cloud
<table>
<thead>
<tr>
<th></th>
<th>Android Phone</th>
<th>Android Tablet</th>
<th>Google TV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>1000 DMIPS-level High Performance CPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory Interface</td>
<td>DDR2/DDR3 Interface</td>
<td></td>
<td></td>
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<tr>
<td>Bus Interface</td>
<td>AXI</td>
<td></td>
<td></td>
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<tr>
<td>De-Mux</td>
<td>MPEG-2 Transport Demux</td>
<td></td>
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<tr>
<td>Video Processor</td>
<td>Multi-standard Full HD Video Decoding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio Processor</td>
<td>Multi-standard Full HD Audio Decoding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display Processor</td>
<td>2D Blitter/Mixer/Scaler/CSC/OSD/etc*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3D Graphic Processor</td>
<td>OpenGL Support*</td>
<td></td>
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<tr>
<td>Legacy Data I/O</td>
<td>I2C/UART/SPI/HPI/SD/MMC/USB/WLAN/etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legacy A/V I/O</td>
<td>NTSC/PAL/CCIR/RGB/CVBS/I2S/SPDIF/etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Data I/O</td>
<td>SATA</td>
<td>SATA/Ethernet</td>
<td></td>
</tr>
<tr>
<td>Specific A/V I/O</td>
<td>MIPI</td>
<td>MIPI</td>
<td>HDMI(rx/tx)</td>
</tr>
</tbody>
</table>

* The higher resolution support for the larger screen

▲ The **SoC back-bone is mostly re-usable**
▲ **Specific Data I/O & A/V I/O differentiate each 3S SoC platform**
VeriSilicon Value Propositions

▲ From spec to full chip delivery
▲ Multiple CPU Core Selection and core performance optimization
  ► ARM
  ► MIPS
  ► PowerPC
  ► Local CPU
▲ Low level drivers and firmware integration
▲ Advanced back-end capability to support 65nm/55nm/45nm/40nm designs
▲ Rich IP solutions across different foundries and different process nodes
▲ Experienced manufacturing handling ready for high volume mass production
Other Example: PLC Based Platform for Smart Meter

- **HAN**
  - PLC or Wireless
- **WAN**
  - PLC or Wireless

**Metering System and SOC**

- **Sensor**
- **Analog Core**
  - Amp
  - ADC
- **Temp**
- **Power**
- **uC / DSP**
- **Aux Functions**
- **Firmware Software**
Open Platform for Digital 3.0

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Increasing IP Costs

- **12% of total cost**: $2.8
- **16% of total cost**: $4.5
- **23% of total cost**: $9.1
- **31% of total cost**: $18.6

Source: IBS, 2007

*Node (Transistor Count) - Design Cost vs. IP Cost:*

- 0.18um (30M)
- 0.13um (47M)
- 90nm (54M)
- 65nm (60M)
ZSP – Embedded DSP Core

ZSP800

A/V Receivers
Blu-ray players
High-end HDTV
Smartphones
High-end PMP
Camcorders
TVs, DVDs
DPF
Basic PMP
Cellphone

ZSP800M

ZSP400
Marvell’s ARMADA1000 SoC won EDN’s 20th Annual Innovation Awards on April 2010. Broadcom’s BCM7125 SoC was the second on the finalist. VeriSilicon’s ZSP800 powers the audio sub-system in both SoC’s.
## ZSP Based SoC Platforms

<table>
<thead>
<tr>
<th></th>
<th>Multimedia</th>
<th>Wireless</th>
<th>Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G3</strong></td>
<td>High Definition Audio</td>
<td>3G/4G/WiMax</td>
<td>Speech Processing</td>
</tr>
<tr>
<td><strong>G2</strong></td>
<td>PMP, DVD, DTV, 1st gen HD DVD</td>
<td>WCDMA, TD-SCDMA, WiMax</td>
<td>Residential Gateway, Enterprise</td>
</tr>
<tr>
<td><strong>G1</strong></td>
<td>Portable Audio/Video, DTV/DVD</td>
<td>GSM, TDMA, PAS, SCDMA</td>
<td>IP Phone, WiFi Phone, Gateway</td>
</tr>
</tbody>
</table>
What Is WebM?

▲ WebM is an open, royalty-free, media file format designed for the web by Google.
▲ WebM files (based on the Matroska container) consist of
  ▲ Video streams compressed with the VP8 video codec
  ▲ Audio streams compressed with the Vorbis audio codec
VeriSilicon was the only hardware partner in Asia at the WebM announcement.

VeriSilicon is the first, and up to now the only channel partner, to distribute to WebM.

VeriSilicon has been granted modification rights.

VeriSilicon Finland established in Oulu, Finland in the same building complex with Google video R&D on January 1, 2011.
Wayne Dai talked to Eric Schmidt about Android ecosystem in China at The Sierra Venture CIO Summit in Sept. 2010.
VeriSilicon is not just an IP provider.
VeriSilicon is not just a design service - “labor for hire”.

VeriSilicon is a **Custom Silicon Solution** provider.

► Application oriented SoC platforms:
  ■ Virtual SoC prototyping (ESL tools)
  ■ SoC Prototyping (FPGA boards)

► SoC platform based IP portfolio

► Middleware and software stack:
  ■ HD audio
  ■ HD video
  ■ Narrowband/wideband voice (ex. Beamforming)