Safe Harbor Notice

Except for the historical information contained herein, the matters addressed in this presentation are forward-looking statements that involve certain risks and uncertainties that could cause actual results to differ materially, including but not limited to weather, impact of competitive products and pricing, industry-wide shifts in the supply and demand for semiconductor products, rapid technology change, semiconductor industry cycle, and general economic conditions.

Except as required by law, Andes undertake no obligation to update any forward-looking statement, whether as a result of new information, future events or otherwise.
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01 Company Overview
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Company Overview

http://www.andestech.com
Andes Highlights

- Founded in March 2005 in Hsinchu Science Park, Taiwan, ROC.
- Well-established high technology IPO company
- Just over 200 people; 80% are engineers.
- EETimes' Silicon 60 Hot Startups to Watch (2012)
- TSMC OIP Award “Partner of the Year” for New IP (2015)
- Founding Premier membership in the RISC-V International Association (RISC-V Foundation) (2020)
- AI Global Media Award “Most Outstanding Embedded Processor IP Supplier – 2020”

Andes Mission

- Innovate performance-efficient processor solution for low-power SoC

Emerging Opportunities

- Smart and Green electronic devices
- Cloud Computing and Internet of Things and Machine Learning
Business Status Overview

- **200+** commercial licensees
  - Geographically distributed in Taiwan, China, Korea, Japan, Europe, and USA
  - **400+** license agreements signed

- AndeSight™ IDE:
  - **17,000+** installations

- Eco-system:
  - **150+** partners

- **5B+** Accumulative SoC Shipped
Operation Results
Agreement Growth Analysis

Table:

<table>
<thead>
<tr>
<th>Year</th>
<th>IP agreements</th>
<th>Accumulated IP agreements</th>
</tr>
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<tbody>
<tr>
<td>2006</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2007</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2008</td>
<td>3</td>
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<tr>
<td>2009</td>
<td>6</td>
<td>12</td>
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<td>2010</td>
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<td>24</td>
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<td>2011</td>
<td>16</td>
<td>40</td>
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<tr>
<td>2012</td>
<td>16</td>
<td>56</td>
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<td>2013</td>
<td>24</td>
<td>80</td>
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<tr>
<td>2014</td>
<td>27</td>
<td>107</td>
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<tr>
<td>2015</td>
<td>27</td>
<td>134</td>
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<tr>
<td>2016</td>
<td>31</td>
<td>165</td>
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<tr>
<td>2017</td>
<td>39</td>
<td>204</td>
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<tr>
<td>2018</td>
<td>43</td>
<td>247</td>
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<tr>
<td>2019</td>
<td>141</td>
<td>388</td>
</tr>
<tr>
<td>1H20</td>
<td>82</td>
<td>470</td>
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</table>
1H20 Revenue Analysis

YoY -11.2%

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>1H19</th>
<th>1H20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>233,796</td>
<td>207,659</td>
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</tbody>
</table>

1H19 vs. 1H20: YOY -11.2%
1H20 Royalty Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Royalty</th>
<th>Customer numbers</th>
</tr>
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<tbody>
<tr>
<td>2011</td>
<td>445</td>
<td>1</td>
</tr>
<tr>
<td>2012</td>
<td>660</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>1,285</td>
<td>5</td>
</tr>
<tr>
<td>2014</td>
<td>10,819</td>
<td>9</td>
</tr>
<tr>
<td>2015</td>
<td>12,232</td>
<td>15</td>
</tr>
<tr>
<td>2016</td>
<td>13,320</td>
<td>15</td>
</tr>
<tr>
<td>2017</td>
<td>38,287</td>
<td>25</td>
</tr>
<tr>
<td>2018</td>
<td>74,953</td>
<td>28</td>
</tr>
<tr>
<td>2019</td>
<td>106,716</td>
<td>33</td>
</tr>
<tr>
<td>1H20</td>
<td>63,469</td>
<td></td>
</tr>
</tbody>
</table>
1H20 Revenue Analysis by Payment Model

- Running Royalty: 31%
- License Fee: 28%
- Custom Computing Service: 30%
- Maintenance & Others: 11%
1H20 Revenue Analysis by Region

- Taiwan: 40%
- USA: 33%
- China: 21%
- Korea: 4%
- Europe: 1%
- Japan: 1%
1H20 Customer Application Analysis
1H20 Revenue Analysis by Product

- V3: 41%
- RISC-V: 29%
- Custom Computing: 30%

Other categories include:
- Customized IP: 23%
- Service: 20%
- N8: 23%
- D25: 13%
- D10: 9%
- N9: 8%
- N25: 7%
- AX25: 6%
- N10: 4%
- N13: 3%
- N22: 1%
- ACE: 1%
- Platform IP: 1%
- N7: 1%
- OTHERS: 1%

Custom Computing consists of:
- N8
- Customized IP
- D25
- Service
- N25
- D10
- N9
- AX25
- N10
- N13
- N22
- ACE
- Platform IP
- N7
- OTHERS
1H20 Revenue Analysis - RISC-V

<table>
<thead>
<tr>
<th>Quarter</th>
<th>V3</th>
<th>RISC-V</th>
<th>Custom Computing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Q19</td>
<td>53,086</td>
<td>85,584</td>
<td>16,740</td>
</tr>
<tr>
<td>1Q20</td>
<td>46,159</td>
<td>21,099</td>
<td>38,604</td>
</tr>
<tr>
<td>2Q20</td>
<td>38,554</td>
<td>41,894</td>
<td>21,349</td>
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</tbody>
</table>

- 55.1% RISC-V in 2Q19
- 10.8% RISC-V in 1Q20
- 19.9% RISC-V in 2Q20
- 53.2% RISC-V in overall 1H20
1H20 Consolidated Gross Margin

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>1H19</th>
<th>1H20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Profit</td>
<td>233,409</td>
<td>207,391</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>99.83%</td>
<td>99.87%</td>
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</tbody>
</table>
## 1H20 Consolidated Operating Expenses

<table>
<thead>
<tr>
<th></th>
<th>2Q19</th>
<th>1Q20</th>
<th>2Q20</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D expenses</td>
<td>51,883</td>
<td>60,796</td>
<td>58,233</td>
</tr>
<tr>
<td>Administration expenses</td>
<td>18,400</td>
<td>32,836</td>
<td>27,360</td>
</tr>
<tr>
<td>Selling expenses</td>
<td>36,881</td>
<td>51,516</td>
<td>36,881</td>
</tr>
</tbody>
</table>

(NT$ thousands)
Consolidated Operating Income (Loss)

- YoY -189.0%
- QoQ 47.2%

2Q19: 23,393
1Q20: (39,411)
2Q20: (20,820)

(NT$ thousands)
Consolidated Operating Margin

- YoY: -35.49 pt
- QoQ: +16.78 pt

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Margin</th>
</tr>
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<tbody>
<tr>
<td>2Q19</td>
<td>15.04%</td>
</tr>
<tr>
<td>1Q20</td>
<td>-37.23%</td>
</tr>
<tr>
<td>2Q20</td>
<td>-20.45%</td>
</tr>
</tbody>
</table>
Consolidated Net Income (Loss)

<table>
<thead>
<tr>
<th></th>
<th>2Q19</th>
<th>1Q20</th>
<th>2Q20</th>
</tr>
</thead>
<tbody>
<tr>
<td>YoY</td>
<td>-170.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QoQ</td>
<td>53.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(NT$ thousands)</td>
<td>25,209</td>
<td>(37,773)</td>
<td>(17,696)</td>
</tr>
</tbody>
</table>
Consolidated Net Profit Margin

YoY -33.6 pt
QoQ +18.3 pt

16.22%

2Q19 1Q20 2Q20

-35.68%

-17.38%
Consolidated Earnings Per Share

YoY -1.0
QoQ 0.48

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Earnings Per Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2Q19</td>
<td>0.59</td>
</tr>
<tr>
<td>1Q20</td>
<td>(0.41)</td>
</tr>
<tr>
<td>2Q20</td>
<td>(0.89)</td>
</tr>
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</table>

(NT$)
Andes Updates

- A 15-year-old public CPU IP company
- **1.5B+** Andes-Embedded SoC annually in 2019

- A **founding premier** member of the RISC-V International
- An active role in RISC-V International & its extension task groups
  - RISC-V Board Director
  - Vice Chair of Technical Steering Committee
  - RISC-V Ambassador
  - Chair of P-extension (Packed DSP/SIMD) Task Group
  - Co-chair of Fast Interrupt Task Group

- A major open source maintainer/contributor

![GNU Toolchains](image1)

![LLVM](image2)

![Linux](image3)
Andes Embedded in Various Applications

- Sensor Hub
- WiFi/ BT/ GPS/ FM (combo)
- NFC Controller
- Storage Controller
- Touch Screen Controller
- Smart Speakers: WiFi IoT
- Bike Sharing: GPS Ctrl
- X-Trail: ADAS Ctrl
- Switch: Game Flash Ctrl

- In leading **machine learning computers** for datacenter
- In tier-one **switch routers** for datacenter
- Recent applications: **5G networking, 802.11ax, AI processors** (using Andes Custom Extension, ACE)
V5 Adoptions: From MCU to Datacenters

- **Edge to Cloud**
  - ADAS
  - AIoT
  - Blockchain
  - FPGA
  - MCU
  - Multimedia
  - Security
  - Wireless (BT/WiFi)

- **40nm to 7nm**

- **Many in AI**
  - Datacenter AI accelerators
  - SSD: enterprise (& consumer)
  - 5G macro/small cells

---

ANDES TECHNOLOGY
Andes RISC-V Cores Adopted in SoC

- Single core
- 2-8 cores
- > 30 cores
- > 100 cores
- > 1000 cores
New Products and Ecosystems

http://www.andestech.com
Andes RISC-V Product Overview

**AndeStar™** Architecture V5

**AndeCore™** Processors
- Highly optimized design with leading PPA
- Handy peripheral IPs to speed up SoC construction

**AndeSight™** Tools
- Professional IDE with high code quality
- Extensive SW stacks from bare metal, RTOS to Linux

**AndeSoft™** Stacks

**AndeShape™** Platforms

Best extensions to RISC-V
Product Lines
Andes RISC-V Product Roadmap

27-Series:
- Vector Ext. MemBoost
- NX27V
- A27/AX27
- and more.

5-stage (1.1 GHz)

45-Series:
- Dual Issue MemBoost
- N45/NX45
- D45/DX45
- A45/AX45
- and more.

8-stage (1.2 GHz)

Benefits:
- 512-bit SIMD raises MobileNet by 30x (CNN for mobile vision)
- Boost performance by 50%
- Raise bandwidth to 3x; Cut latency by 40%

Applications:
- AIOT, Comm., ML/DL, Multimedia, Networking, Storage
- For data processing as well as control processing
# Andes V5 Architecture for All Levels of Computing

<table>
<thead>
<tr>
<th>AndeStar™ V5 CPUs</th>
<th>Conventional Computing Architecture</th>
<th>Domain Specific Architecture (DSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N/D-series</strong></td>
<td>Leading PPA Embedded Processor</td>
<td>Define custom instruction to handle time critical codes</td>
</tr>
<tr>
<td>N22 N(X)25 D25...</td>
<td>IoT, Sensing, Storage, Audio, GPS</td>
<td>Andes Custom Extension</td>
</tr>
<tr>
<td><strong>A-series</strong></td>
<td>High Performance and Power Efficient AP</td>
<td>Better approach for accelerator /co-processor to do particular jobs</td>
</tr>
<tr>
<td>A(X)25 A(X)27 A(X)45 Multicore...</td>
<td>5G, AI, Datacenter, Video Surveillance, Networking</td>
<td>Automation Tool for the generation of toolchain, ISS, partial RTL and verification</td>
</tr>
<tr>
<td><strong>Vector</strong></td>
<td>Cray Style, Scalable Vector Processor</td>
<td></td>
</tr>
<tr>
<td>NX27V, NX45V...</td>
<td>Datacenter, Server, Deep Learning</td>
<td></td>
</tr>
</tbody>
</table>
Andes Processors to Fit Your AI

- Voice trigger
- Voice command
- Always-on
- Face trigger
- Object detection
- Intelligent HMI
- Barge-in
- Beamforming
- Speech to text
- Natural language

- Face unlock
- Bokeh
- Avatar
- SLAM
- Gesture recognition
- High resolution
- > 1 camera

- ADAS, HDR
- > 10 cameras

- ~30 MOPS
- ~100 MOPS
- > 1 GOPS
- >1 TOPS
- >10 TOPS
- >100 TOPS

Smart Camera
Smart IoT Devices
Smart Home
Mobile AR/VR Surveillance
Automotive
Data Center

Vector CPUs
D/A-Series CPUs
N-Series CPUs

Andes Technology
RISC-V DSP Extension

- Andes contributed market-proven DSP(SIMD) as P-Extension
- Designed to accelerate slow video, audio/voice and low data rate DSP workloads

Increase power efficiency to your DSP applications

Real world speedup using P-Extension

- CIFAR10 (Image Classification)
- PNET (90% of Face Detection)
- ML-KWS (keyword spotting)
- AMR voice codec
- MP3 decode

<table>
<thead>
<tr>
<th>Application</th>
<th>RV32P</th>
<th>RV64P</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIFAR10</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>PNET (90% of Face Detection)</td>
<td>3.7</td>
<td>8.9</td>
</tr>
<tr>
<td>ML-KWS (keyword spotting)</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>AMR voice codec</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MP3 decode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Speed Up (times)
NX27V One Vector for All Implementations

*512b
- Cloud Computing – Datacenter, HPC, Server

*256b
- Edge Computing – 5G, Vision Processing

*128b
- Endpoint Computing – Natural Language Processing

* Configurable compute data width (VLEN)
Andes Custom Extension

- ACE unlocks RISC-V’s Potential of DSA
  - Define ACE instruction to handle time critical codes
  - Another approach to co-processor or accelerators

- All-in-one COPILOT development environment
  - Automation tool and ease of use
  - Extensions are easy to re-use, can be used as a library
Taking RISC-V Cores to Next Level

- Andes is the leading supplier shipping the commercial RISC-V cores to market with
- **P-Extension**
  - D25F, A(X)25(MP), A(X)27, A(X)45
- **V-Extension**
  - NX27V, NX45V
- **Custom-Extension (w/ ACE* support)**
  - Entire 25, 27, 45 series

*: Andes Custom Extension
Bring Andes Strength to RISC-V Cores

**Performance & Extensibility**
- Leading PPA and code size
- Rich data processing in P, V, and ACE

**Configurability**
- Flexible configurations for rich features

**Maturity**
- Compiler optimizations, and SW stacks
- Comprehensive features in Andesight IDE
Aggressive in RISC-V Community

Foundation Task Groups (partial list)

- Contributing hardware architecture extensions
  - Chair of the P-extension (Packed SIMD/DSP) Task Group
  - Co-chair of Fast Interrupts Task Group
  - Closely reviewing activities of other Task Groups
Andes Helps Strengthen RISC-V Ecosystem

- More choices for customers are good
- Andes works closely with partners to grow RISC-V ecosystem
Andes Position in RISC-V

- Complete product portfolio
- Reliable RISC-V core IP vendor
- Extreme low power consumption, high computing efficiency
- World’s leading P-, V- and Custom-Ext. Capable RISC-V cores
- Professional custom computing service
Two Ecosystems: Andes and Knect.me
Knect.me™ Ecosystem

- Built up the community to help developing IoT products
  - To knect solutions for silicon IP’s, SW stacks, tools, applications, systems and products
  - Including
    - SoC IP Platforms
    - Software Stack
    - Development Boards
    - Development Tools

- Forms a IoT League
  - To knect chip vendors, partners, application developers, system vendors
FreeStart Program

- **FreeStart Evaluation Program (FSEP)**
  - For all RISC-V enthusiasms and educator/researcher
  - Fixed-Configuration N22 RTL
  - Sign simple evaluation agreement directly on website

- **FreeStart Mass-production Program (FSMP)**
  - For industrial and academy mass production
  - Full-configuration N22 RTL
  - License fee: $0; only running royalty is required when mass production

**Support Package (FSSP)**

- For all
- $20K for 1st year, including
  - 1 year e-service
  - FreeStart AE250 RTL
  - Corvette F1 FPGA board

For more info., please visit www.andestech.com
Concluding Remarks
Andes Technology

Successfully rolled out new series of RISC-V cores (w/ leading P-, V- and Custom-Ext.), custom computing service and FreeStart program to extend more oppy.

Aggressively involved in RISC-V Foundation new technology development, contributing and leveraging RISC-V eco-system.

Becoming a technology contributor, market promoter, and sales leader in the RISC-V industry

A Trusted Computing Expert
Thank You

http://www.andestech.com

+886-3-5726533