Andes Technology Corp. Investor Conference Report

2021/01/07
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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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 210 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**

- **AndesSight™ IDE:**
  - **19,000+ installations**

- **Eco-system:**
  - **160+ partners**

- **~6B Accumulative SoC Shipped**
Agreement Growth Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>IP agreements</th>
<th>Accumulated IP agreements</th>
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<tbody>
<tr>
<td>2006</td>
<td>1</td>
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<tr>
<td>2007</td>
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<td>2008</td>
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<td>2012</td>
<td>16</td>
<td>56</td>
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<td>2013</td>
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<td>2014</td>
<td>27</td>
<td>107</td>
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<td>2015</td>
<td>27</td>
<td>134</td>
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<td>2016</td>
<td>31</td>
<td>165</td>
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<td>2017</td>
<td>39</td>
<td>204</td>
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<td>2018</td>
<td>43</td>
<td>247</td>
</tr>
<tr>
<td>2019</td>
<td>141</td>
<td>388</td>
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<tr>
<td>2020</td>
<td>155</td>
<td>543</td>
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</table>
2020 Revenue Analysis

YoY
+17.4%

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue (NT$ thousands)</th>
</tr>
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<tbody>
<tr>
<td>2019</td>
<td>494,851</td>
</tr>
<tr>
<td>2020</td>
<td>581,012</td>
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</table>

YoY growth: +17.4%
4Q20 Revenue Analysis

YoY +101.6 %
QoQ +156.4 %

(NT$ thousands)

4Q19: 133,204
3Q20: 104,768
4Q20: 268,585

4Q19  3Q20  4Q20
2020 Royalty Analysis

YoY +48.8%

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>106,716</td>
<td>158,792</td>
</tr>
</tbody>
</table>

YoY: Year-over-Year
4Q20 Royalty Analysis

YoY +82.7%
QoQ +57.8%

(NT$ thousands)

31,931 36,969 58,353

4Q19 3Q20 4Q20
Royalty Analysis

(NT$ thousands)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Royalty</td>
<td>445</td>
<td>660</td>
<td>1,285</td>
<td>10,819</td>
<td>12,232</td>
<td>13,320</td>
<td>38,287</td>
<td>74,953</td>
<td>106,716</td>
<td>158,792</td>
</tr>
<tr>
<td>Customer numbers</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>15</td>
<td>15</td>
<td>25</td>
<td>28</td>
<td>33</td>
<td>41</td>
</tr>
</tbody>
</table>

(numbers)
2020 Revenue Analysis by Payment Model

- License Fee: 54%
- Running Royalty: 27%
- Custom Computing Service: 11%
- Maintenance & Others: 8%
2020 Revenue Analysis by Region

- Taiwan: 43%
- USA: 26%
- China: 25%
- Korea: 4%
- Europe: 1%
- Japan: 1%

[Pie chart showing distribution of revenue by region.]
2020 Revenue Analysis - RISC-V

(NT$ thousands)

- **2019**
  - V3: 180,642 (37%)
  - RISC-V: 233,644 (47%)
  - Custom Computing: 80,565 (16%)

- **2020**
  - V3: 242,319 (42%)
  - RISC-V: 269,375 (46%)
  - Custom Computing: 69,318 (12%)
Product Applications

http://www.andestech.com
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
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
New Products and Ecosystems

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

- **AndesCore™ Processors**: Highly optimized design with leading PPA
- **AndeSight™ Tools**: Professional IDE with high code quality
- **AndeSoft™ Stacks**: Extensive SW stacks from bare metal, RTOS to Linux
- **AndeShape™ Platforms**: Handy peripheral IPs to speed up SoC construction

**AndesStar™ Architecture V5**

Best extensions to RISC-V

**AndesEmbedded™**

- **Instr LM Intf**: Instruction Load/Store Interface
- **Data LM Intf**: Data Load/Store Interface
- **Standby & VIC**: Standby or Virtual Interface Controller
- **ITLB**: Instruction Translation Lookaside Buffer (TLB)
- **MMU/MPU**: Memory Management Unit/Processor (MMU)
- **DTLB**: Data Translation Lookaside Buffer
- **ITLB**: Instruction Translation Lookaside Buffer
- **Data Cache**: Data Cache
- **Instr Cache**: Instruction Cache
- **DMA Engine**: Direct Memory Access (DMA) Engine
- **EDM**: Enhanced Data Management

Andes RISC-V Product Overview
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>RV32/64</td>
<td>Leading PPA Embedded Processor</td>
<td>Define custom instruction to handle time critical codes</td>
</tr>
<tr>
<td></td>
<td>IoT, Sensing, Storage, Audio, GPS</td>
<td>Andes Custom Extension</td>
</tr>
<tr>
<td>Andes Extension</td>
<td></td>
<td>Better approach for accelerator /co-processor to do particular jobs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Automation Tool for the generation of toolchain, ISS, partial RTL and verification</td>
</tr>
<tr>
<td><strong>N/D-series</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N22 N(X)25 D25...</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A-series</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A(X)25 A(X)27 A(X)45 Multicore...</td>
<td>High Performance and Power Efficient AP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5G, AI, Datacenter, Video Surveillance, Networking</td>
<td></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

- ADAS, HDR
- > 10 cameras

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

- Data Center
- Automotive
- Mobile AR/VR Surveillance
- Vector CPUs
- D/A-Series CPUs
- N-Series CPUs

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

Real world speedup using P-Extension

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

- RV32P
- RV64P

Speed Up (times)

Increase power efficiency to your DSP applications
NX27V One Vector for All Implementations

- **Cloud Computing – Datacenter, HPC, Server**
- **Edge Computing – 5G, Vision Processing**
- **Endpoint Computing – Natural Language Processing**

NX27V

* 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 *world-leading* supplier shipping the commercial RISC-V cores to market with the support of

- **P-Extension**
  - D25F, A(X)25(MP), A(X)27, A(X)45

- **V-Extension**
  - NX27V, NX45V

- **Custom-Extension**
  - 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
Event Promotion

RISC-V CON series
RISC-V Roadshow & Workshop Series
TSMC symposium & OIP series

RISC-V Summit in San Jose
2020: Diamond Sponsor
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 International new technology development, contributing and leveraging RISC-V eco-system.

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

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