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
• Founded in March 2005 in Hsinchu Science Park, Taiwan, ROC.
• Well-established high technology IPO company
• Over 240 people; 80% are engineers.
• 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)
• Hsinchu Science Park Innovation Award - AndesCore™ NX27V (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
  - **500+** license agreements signed

- **AndeSight™ IDE:**
  - **21,000+** installations

- **Eco-system:**
  - **500+** partners

- **8B+** Accumulative SoC Shipped
Operation Results

http://www.andestech.com
3Q21 Revenue Analysis

YoY +83.5%  QoQ -7.3%

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>3Q20</th>
<th>2Q21</th>
<th>3Q21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>104,768</td>
<td>207,370</td>
<td>192,227</td>
</tr>
</tbody>
</table>
21Q1-Q3 Revenue Analysis

YoY
+76.3%

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year/Quarter</th>
<th>Revenue (NT$ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Q1-Q3</td>
<td>312,427</td>
</tr>
<tr>
<td>21 Q1-Q3</td>
<td>550,724</td>
</tr>
</tbody>
</table>
21Q1-Q3 Top 10 Customers Analysis by Revenue

(NT$ thousands)

Top 10 Customer Contributed 61% Revenue
3Q21 Royalty Analysis

(YoY +77.6%  QoQ +29.9%)

(NT$ thousands)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Royalty (NT$ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Q20</td>
<td>36,970</td>
</tr>
<tr>
<td>2Q21</td>
<td>50,569</td>
</tr>
<tr>
<td>3Q21</td>
<td>65,667</td>
</tr>
</tbody>
</table>
21Q1-Q3 Royalty Analysis

Y.o.Y +70.2%

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>20 Q1-Q3</th>
<th>21 Q1-Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>100,439</td>
<td>170,904</td>
</tr>
</tbody>
</table>

YoY Growth: +70.2%
21Q1-Q3 Top 10 Royalty Contributors Analysis by Application

Top 10 Royalty Customers Contribution Analysis: 89%

(NT$ thousands)
Royalty Analysis

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Royalty</th>
<th>Customer numbers</th>
</tr>
</thead>
<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>2020</td>
<td>158,792</td>
<td>41</td>
</tr>
<tr>
<td>2021 Q1-Q3</td>
<td>170,904</td>
<td></td>
</tr>
</tbody>
</table>
21Q1-Q3 Revenue Analysis by Payment Model

- License Fee: 56%
- Running Royalty: 31%
- Maintenance & Others: 9%
- Custom Computing Service: 4%
21Q1-Q3 Revenue Analysis by Region

- Taiwan: 38%
- China: 33%
- USA: 4%
- Japan: 3%
- Europe: 1%
- Korea: 1%
21Q1-Q3 Revenue Analysis by Product

- V3: 39% (61%)
- RISC-V: 18%
- N8
- N25
- AX45
- NX27
- N9
- D25
- N45
- Service
- N10
- N22
- D10
- N13
- A27
- D45
- ACE
- E8
- N7
- NX25
- Other
Andes Updates

- A **16**-year-old public CPU IP company
- **2B+** Andes-Embedded SoC annually in 2020

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

- A major open source maintainer/contributor
Andes Embedded in Various Applications

- 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, WiFi 6/7, 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 5nm**
- **Many in AI**

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

AndesCore™ Processors
- Highly optimized design with leading PPA

AndesStar™ Architecture V5
- Best extensions to RISC-V

AndeSight™ Tools
- Professional IDE with high code quality

AndeShape™ Platforms
- Handy peripheral IPs to speed up SoC construction

AndeSoft™ Stacks
- Extensive SW stacks from bare metal, RTOS to Linux
# Andes V5 Architecture for All Levels of Computing

<table>
<thead>
<tr>
<th>AndesStar™ V5 CPUs</th>
<th>Conventional Computing Architecture</th>
<th>Domain Specific Architecture (DSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV32/64</td>
<td>Andes Extension</td>
<td></td>
</tr>
</tbody>
</table>

### N/D-series
- N22 N(X)25 D25...

### A-series
- A(X)25 A(X)27 A(X)45
- Multicore...

### Vector
- NX27V NX45V...

### High Performance and Power Efficient AP
- 5G, AI, Datacenter, Video Surveillance, Networking

### Leading PPA Embedded Processor
- IoT, Sensing, Storage, Audio, GPS

### Cray Style, Scalable Vector Processor
- Datacenter, Server, Deep Learning

### Andes Custom Extension

### Domain Specific Architecture (DSA)
- Define custom instruction to handle time critical codes
- Better approach for accelerator/co-processor to do particular jobs
- Automation Tool for the generation of toolchain, ISS, partial RTL and verification

---

**Andes Technology**
Andes RISC-V Product Roadmap

**RV32/RV64**

- **Cache-Coherent 1-4 Cores**
  - A25MP
  - AX25MP

- **Linux with FPU/DSP**
  - A25
  - AX25

- **Fast/Compact with FPU/DSP**
  - N25F
  - D25F
  - NX25F

- **N22**
  - 2-stage (700 MHz)

**Vector Ext.**

**27-Series:**

- Vector Ext. MemBoost
  - NX27V
  - A27/AX27
  - A27L2/AX27L2
  - and more.

- 5-stage (1.1 GHz)

**Superscalar**

**45-Series:**

- Dual Issue MemBoost
  - N45/NX45
  - D45/DX45
  - A45/AX45
  - A45MP/AX45MP
  - and more.

- 8-stage (1.2 GHz)

**Benefits**

- 512-bit SIMD raises MobileNet by 66x (CNN for mobile vision)
- Boost performance by 50%
- Raise bandwidth to 3x; Cut latency by 40%

**Fast/Compact with FPU/DSP**

- **N22**
  - 2-stage (700 MHz)
AndeCore™ 45-Series

32-bit AndesCore™ N45/D45/A45/A45MP

64-bit AndesCore™ NX45/AX45/AX45MP
AndesCore™ 45-Series Overview

- **8-stage In-Order Dual-Issue**
- **AndeStar™ V5 ISA:**
  - RV*GCN (S/D FPU): All Series
  - RV*P-ext (DSP/SIMD): D45/A(X)45
  - MMU for Linux Applications: A(X)45
- **MemBoost memory subsystem**
- **Low power dynamic branch prediction**
- **Unaligned data accesses**
- **Fast or small multiplier**
- **StackSafe™ (Andes Ext.)**
- **CoDense™ (Andes Ext.)**
- **Multi-core support: A(X)45MP**
AndesCore™ 45 vs. 25 Series Performance Enhancement

- > 1.5X Coremark & Dhrystone performance enhancement, compared with single-issue 25 series
AX45 Can Do More (vs. 64bit A-series)

- **A53**
  - 8-stage In-Order Dual Issue
  - Widely adopted by industries in many applications

- **AX45**
  - 8-stage In-Order Dual Issue
  - **Performance is better!**
    - Coremark/MHz: 1.32x
    - Dhrystone/MHz: 1.37x
Target Applications of 27 & 45-Series

- AI/Deep Learning
- AR/VR
- 5G
- Networking
- Storage

- Video Surveillance
- ADAS
- V2X (Vehicle to Everything)
- IVI (In-Vehicle-Infotainment)

... and More!
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

N-Series CPUs
- ~30 MOPS
- ~100 MOPS
- > 1 GOPS

D/A-Series CPUs
- > 1 TOPS

Vector CPUs
- > 10 TOPS
- > 100 TOPS

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

Smart Camera
- ADAS, HDR
- > 10 cameras

Mobile AR/VR Surveillance
- Face unlock
- Barge-in
- Beamforming
- Speech to text
- Natural language

Smart Home
- ADAS, HDR
- > 10 cameras

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

Data Center
- ADAS, HDR
- > 10 cameras

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

32
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

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

- CIFAR10 (Image Classification) speed up: 14 times
NX27V One Vector for All Implementations

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

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

- **Endpoint Computing – Natural Language Processing**
  - *128b*

* Configurable compute data width (VLEN)

[Image of NX27V diagram with 5G, Vision Processing, and Natural Language Processing categories.]
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**
  - D25, D45, A(X)25(MP), A(X)27(L2), A(X)45(MP)

- **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
Contributing hardware architecture extensions

- Chair of the P-extension (Packed SIMD/DSP) Task Group
- Co-chair of Fast Interrupts Task Group
- Vice Chair of TEE 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

1. Complete product portfolio
2. Reliable RISC-V core IP vendor
3. Extreme low power consumption, high computing efficiency
5. 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 Summit, Forum, Workshop & Meetup series
TSMC Symposium & OIP series

RISC-V Summit in San Jose
2020: Diamond Sponsor
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 oppty.

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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