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.
Company Overview
Andes Highlights

- Founded in March 2005 in Hsinchu Science Park, Taiwan, ROC.
- Well-established high technology IPO company
- Over 260 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)
- EE Awards - “Taiwan-Product Award” & ”Asia-Company Award” (2021)

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

❖ 250+ commercial licensees
  ▶ Geographically distributed in Taiwan, China, Korea, Japan, Europe, and USA
  ▶ ~600 license agreements signed

❖ AndeSight™ IDE:
  ▶ 22,000+ installations

❖ Eco-system:
  ▶ 500+ partners

❖ 10B+ Accumulative SoC Shipped
Operation Results
4Q21 Revenue Analysis

YoY +0.2%
QoQ +40%

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>4Q20</th>
<th>3Q21</th>
<th>4Q21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>268,585</td>
<td>192,228</td>
<td>269,054</td>
</tr>
</tbody>
</table>

8
2021 Revenue Analysis

YoY
+41.1%

(NT$ thousands)

20 Q1-Q4: 581,012
21 Q1-Q4: 819,778
2021 Top 10 Customers Analysis by Revenue

(NT$ thousands)

Top 10 Customer Contributed 56% Revenue

- Touch Panel (TW)
- Sensing (TW)
- Wireless/IoT (TW)
- AI (US)
- 5G Modem (CN)
- Storage (US)
- Video/TTDI (CN)
- AI (US)
- MCU(JP)
4Q21 Royalty Analysis

YoY +7.6%
QoQ -4.4%

(NT$ thousands)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Royalty (NT$ thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q20</td>
<td>58,353</td>
</tr>
<tr>
<td>3Q21</td>
<td>65,668</td>
</tr>
<tr>
<td>4Q21</td>
<td>62,772</td>
</tr>
</tbody>
</table>
2021 Royalty Analysis

YoY +47.2%

(NT$ thousands)

20 Q1-Q4: 158,792
21 Q1-Q4: 233,676
Royalty Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Royalty (NT$ thousands)</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</td>
<td>233,676</td>
<td>51</td>
</tr>
</tbody>
</table>
2021 Top 10 Customers Analysis by Royalty

Top 10 Royalty Customers Contribution Analysis: 86%
2021 Revenue Analysis by Payment Model

- License Fee: 60%
- Running Royalty: 28%
- Maintenance & Others: 9%
- Custom Computing Service: 3%
2021 Revenue Analysis by Region

- Taiwan: 34%
- China: 25%
- USA: 3%
- Japan: 2%
- Europe: 2%
- Korea: 34%
2021 Revenue Analysis by Product
4Q21 Revenue Analysis - RISC-V

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>V3</th>
<th>RISC-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q20</td>
<td>105,012</td>
<td>163,573</td>
</tr>
<tr>
<td>3Q21</td>
<td>79,530</td>
<td>112,698</td>
</tr>
<tr>
<td>4Q21</td>
<td>79,614</td>
<td>189,439</td>
</tr>
</tbody>
</table>

- 39% 61%
- 59%
- 30% 70%
2021 Revenue Analysis - RISC-V

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>V3</th>
<th>RISC-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020 Q1-Q4</td>
<td>242,319</td>
<td>338,693</td>
</tr>
<tr>
<td>2021 Q1-Q4</td>
<td>293,604</td>
<td>526,173</td>
</tr>
</tbody>
</table>

V3

RISC-V
History Revenue Analysis

(NT$)

License

Royalty
# 4Q21 Consolidated Gross Margin

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>4Q20</th>
<th>3Q21</th>
<th>4Q21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Profit</td>
<td>268,261</td>
<td>192,022</td>
<td>268,425</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>99.87%</td>
<td>99.89%</td>
<td>99.77%</td>
</tr>
</tbody>
</table>
# 2021 Consolidated Gross Margin

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Profit</td>
<td>579,829</td>
<td>818,307</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>99.80%</td>
<td>99.82%</td>
</tr>
</tbody>
</table>
4Q21 Consolidated Operating Expenses

YoY +51.3 %
QoQ +27.8 %

(NT$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>R&amp;D expenses</th>
<th>Administration expenses</th>
<th>Selling expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q20</td>
<td>22,904</td>
<td>63,078</td>
<td>56,455</td>
</tr>
<tr>
<td>3Q21</td>
<td>19,684</td>
<td>56,135</td>
<td>92,787</td>
</tr>
<tr>
<td>4Q21</td>
<td>27,478</td>
<td>77,618</td>
<td>110,418</td>
</tr>
</tbody>
</table>
2021 Consolidated Operating Expenses

YoY +21.7%

(NT$ thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D expenses</th>
<th>Administration expenses</th>
<th>Selling expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>237,084</td>
<td>110,313</td>
<td>194,810</td>
</tr>
<tr>
<td>2021</td>
<td>343,835</td>
<td>85,033</td>
<td>230,775</td>
</tr>
</tbody>
</table>
4Q21 Consolidated Operating Income

- **YoY** -58%
- **QoQ** +126%

(NT$ thousands)

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Operating Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q20</td>
<td>125,824</td>
</tr>
<tr>
<td>3Q21</td>
<td>23,416</td>
</tr>
<tr>
<td>4Q21</td>
<td>52,911</td>
</tr>
</tbody>
</table>
2021 Consolidated Operating Income

YoY
+321.7 %

(NT$ thousands)

180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
158,664
37,622
2020
2021
4Q21 Consolidated Operating Margin

YoY: -27.18 PT
QoQ: +7.49 PT

<table>
<thead>
<tr>
<th>Quarter</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q20</td>
<td>46.85%</td>
</tr>
<tr>
<td>3Q21</td>
<td>12.18%</td>
</tr>
<tr>
<td>4Q21</td>
<td>19.67%</td>
</tr>
</tbody>
</table>
2021 Consolidated Operating Margin

2020: 6.48%
2021: 19.36%

Year-over-Year (YoY): +12.88 PT

(%)
4Q21 Consolidated Net Income

YoY -75%
QoQ -31.6%

(NT$ thousands)
140,000
120,018
43,887
30,002

4Q20
3Q21
4Q21
2021 Consolidated Net Income

YoY
+321.7 %

(NT$ thousands)

180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000

-  

161,665
35,142

2020
2021
4Q21 Consolidated Net Profit Margin

YoY
-33.54 PT

QoQ
-11.68 PT

44.69%
22.83%
11.15%

4Q20 3Q21 4Q21

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00% 50.00%
2021 Consolidated Net Profit Margin

YOY
+ 13.67 PT

(%)
4Q21 Consolidated EPS

- YoY: -2.27 $  
- QoQ: -13.22 $
2021 Consolidated EPS

YoY
+2.77 $
Andes Updates

❖ A 17-year-old public CPU IP company
❖ 3B+ Andes-Embedded SoC annually in 2021

❖ 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

GNU Toolchains

RISC-V LLVM Porting Effort
  ● Alex Bradbury is in charge of RISC-V LLVM
    ○ Talks yesterday afternoon
    ○ Poster on Tuesday night
  ● RV32IM[AFJ]D support upstream
  ● Missing hard-float calling convention
  ● Missing 64-bit support
  ● Missing compressed support
  ● Clang, Go, and OpenJDK have run code
    ○ Rust port in progress
    ○ Pointer in Tuesday

LLVM

RISC-V Linux Kernel Port
  ● Linux: January, 2018
    ○ Only RISC-V-based systems
      ○ Drivers are trickling in now

Linux
Andes Embedded in Various Applications

- 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

**AndesShape™** Platforms

- Handy peripheral IPs to speed up SoC construction

**AndeSoft™** Stacks

- Extensive SW stacks from bare metal, RTOS to Linux

**AndeStar™** Architecture V5

- Best extensions to RISC-V

**AndeSight™** Tools

- Professional IDE with high code quality

**Andes Embedded™**

- RISC-V Product Overview
Andes V5 Architecture for All Levels of Computing

AndeStar™ V5 CPUs
- N/D-series: N22 N(X)25 D25...
- A-series: A(X)25 A(X)27 A(X)45 Multicore...
- Vector: NX27V NX45V...

Conventional Computing Architecture
- Leading PPA Embedded Processor
  - IoT, Sensing, Storage, Audio, GPS
- High Performance and Power Efficient AP
  - 5G, AI, Datacenter, Video Surveillance, Networking

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

Cray Style, Scalable Vector Processor
- Datacenter, Server, Deep Learning
# Andes RISC-V Product Roadmap

<table>
<thead>
<tr>
<th>RV32/RV64</th>
<th>Vector Ext.</th>
<th>Superscalar</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cache-Coherent 1-8 Cores</td>
<td><strong>27-Series:</strong> Vector Ext. MemBoost</td>
<td><strong>45-Series:</strong> Dual Issue MemBoost</td>
<td>512-bit SIMD raises MobileNet by 66x (CNN for mobile vision)</td>
</tr>
<tr>
<td>Linux with FPU/DSP</td>
<td>NX27V A27/AX27 A27L2/AX27L2 and more.</td>
<td>N45/NX45 D45 A45/AX45 A45MP/AX45MP and more.</td>
<td>boost performance by 50%</td>
</tr>
<tr>
<td>Fast/Compact with FPU/DSP</td>
<td></td>
<td></td>
<td>Raise bandwidth to 3x; Cut latency by 40%</td>
</tr>
<tr>
<td>N22 2-stage (700 MHz)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-stage (1.1 GHz) &gt;3.53 Coremark/MHz</td>
<td></td>
<td>8-stage (1.2 GHz) &gt;5.50 Coremark/MHz</td>
<td></td>
</tr>
</tbody>
</table>

**Benefits**

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

**Leading positions:**

- The first company offering commercial RVP DSP CPU
- The first company offering the most update spec of commercial RVV Vector processor
- Tools for RISC-V custom extension expansion: ACE
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 for 27 & 45-Series

- AI/Deep Learning
- AR/VR
- 5G
- Networking
- Storage
- Video Surveillance
- ADAS
- V2X (Vehicle to Everything)
- IVI (In-Vehicle-Infotainment)
- Metaverse and more…
Andes RISC-V Processors Fit in Emerging Applications

- **Voice trigger**
- **Voice command**
- **Always-on**
- **Face trigger**
- **Object detection**
- **Keyword spotting**
- **Speech to text**
- **Text to speech**
- **Intelligent HMI**
- **Barge-in**
- **Beamforming**
- **Speech to text**
- **Natural language**
- **Audio front-end processing**
- **Natural language processing**
- **Face unlock**
- **Bokeh**
- **Avatar**
- **SLAM**
- **Gesture recognition**
- **Image classification**
- **Image segmentation**
- **Spoof detection**
- **Eye tracking**
- **High resolution**
- **> 1 camera**

**Smart Camera**

**Voice**

**Smart IoT Devices**

**Speech**

**Smart Home**

**Vision Mobile AR/VR**

**Surveillance**

**Any signal Automotive**

- ADAS, HDR
- > 10 cameras
- Sensor fusion with force, pressure, accelerometer, gyro, ampere meter, vibration, temperature, radar/lidar, sonar, ...
- Pattern recognition
- Predictive maintenance
- Healthcare

**Data Center**

- Server
- Switch

**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

❖ Increase power efficiency to your DSP applications

Real world speedup using P-Extension

- MP3 decode: RV32P 2, RV64P 3.7
- AMR voice codec: RV32P 2, RV64P 5.2
- ML-KWS (keyword spotting): RV32P 3.7, RV64P 8.9
- PNET (90% of Face Detection): RV32P 2, RV64P 14
- CIFAR10 (Image Classification): RV32P 2, RV64P 14
Andes Vector Processors: One for All Implementations

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

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

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

NX27V
NX45V

* 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**
  - D25, D45, A(X)25(MP), A(X)27(L2), A(X)45(MP)

- **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
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
Concluding Remarks
A Trusted Computing Expert

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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