



# Andes Technology Corporation 4Q19 Investor Conference Report

Driving Innovations™



Stock #: 6533  
2020/03/10

# 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.

# Agenda

- **Overview of Andes Technology Corporation**
- **Operating Results**
- **Product Applications**
- **New Products and Ecosystems**
- **Concluding Remarks**

# Overview of Andes Technology Corporation



## 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)
- A founding member of RISC-V Foundation (2016)
- MCU innovation award by China online press (2018)



## 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

# Operating Results



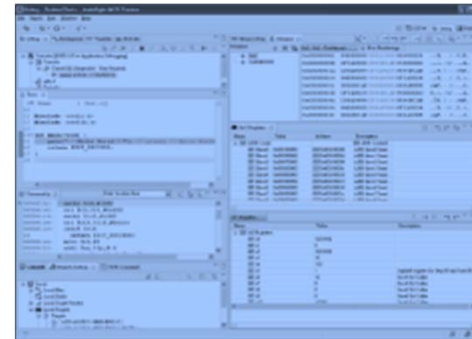
# Business Status Overview



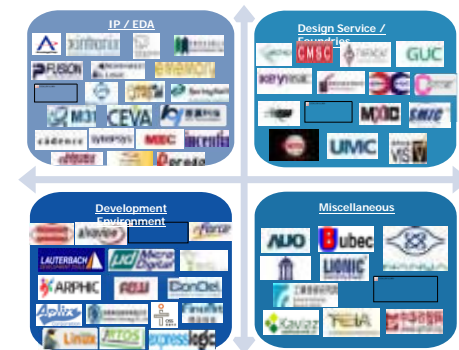
- **>180** commercial licensees
  - Geographically distributed in Taiwan, China, Korea, Japan, Europe, and USA.
  - **>300** license agreements signed
  - 2019 Licensees: **38+103**\*\* (\*\*: On-line Licensees)



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

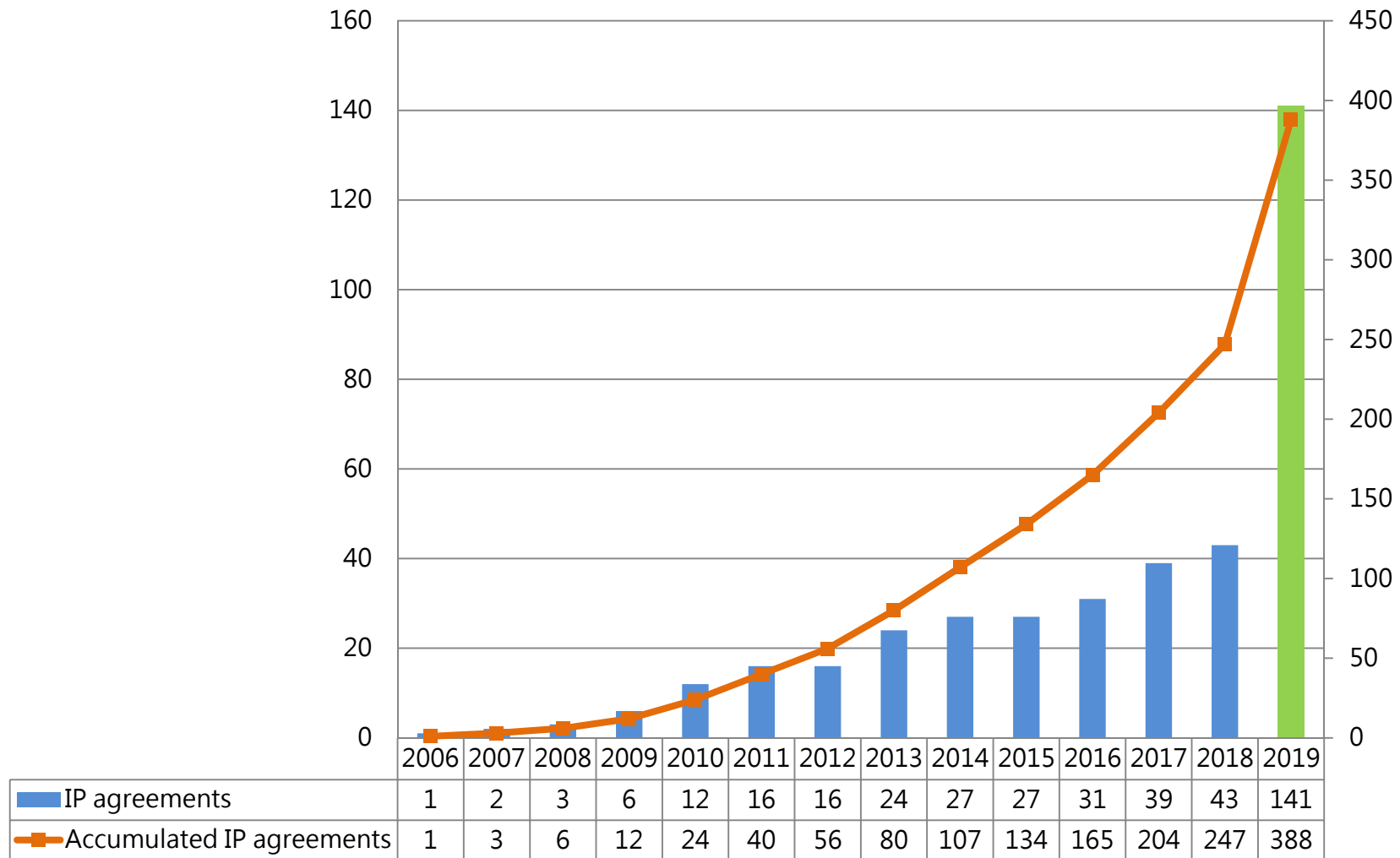


- Eco-system:
  - **>145** partners

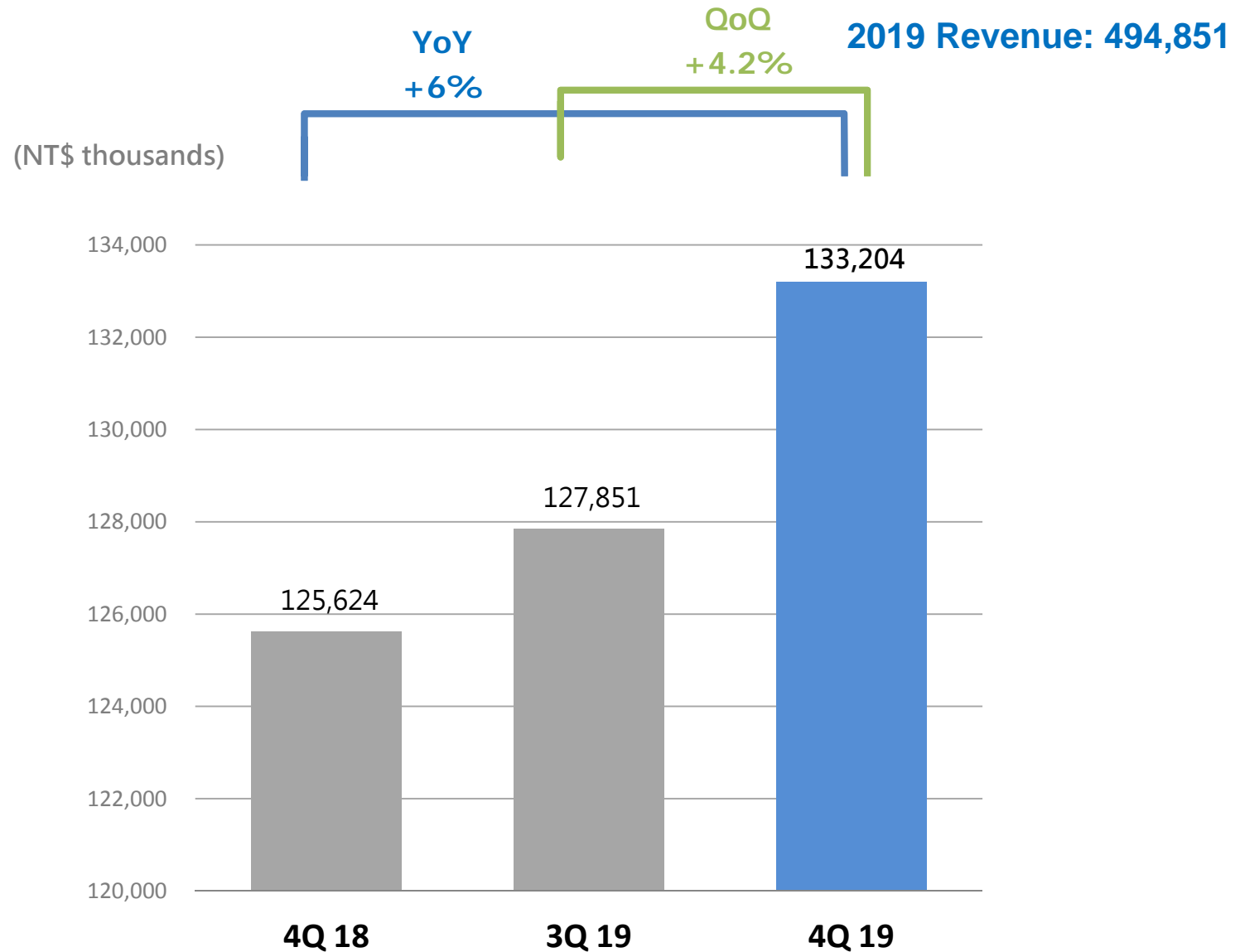


- **>5B** Accumulative SoC Shipped

# Agreement Growth Analysis



# 4Q19 Revenue Analysis



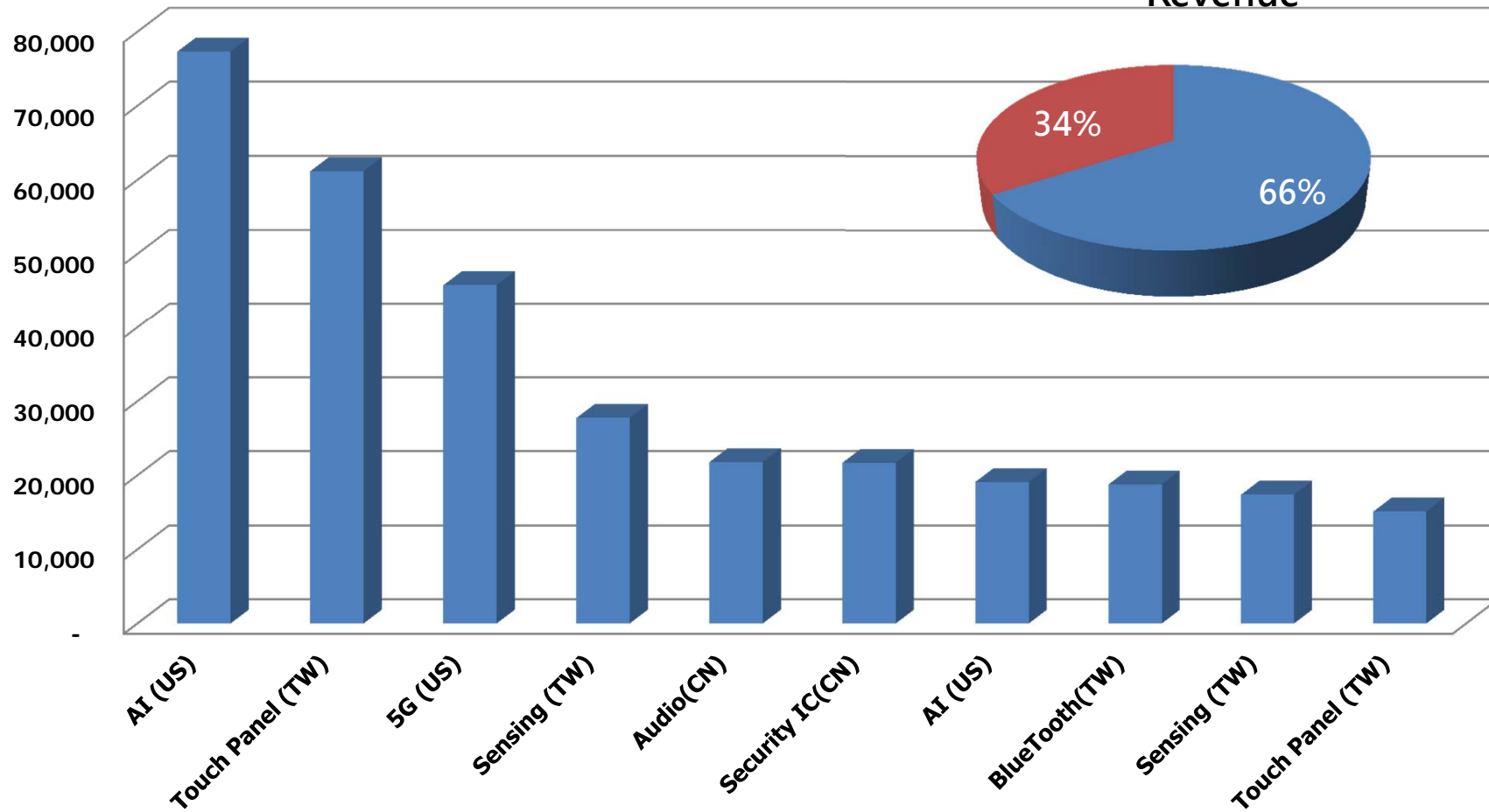


# 2019 Top 10 Customers Analysis by Revenue

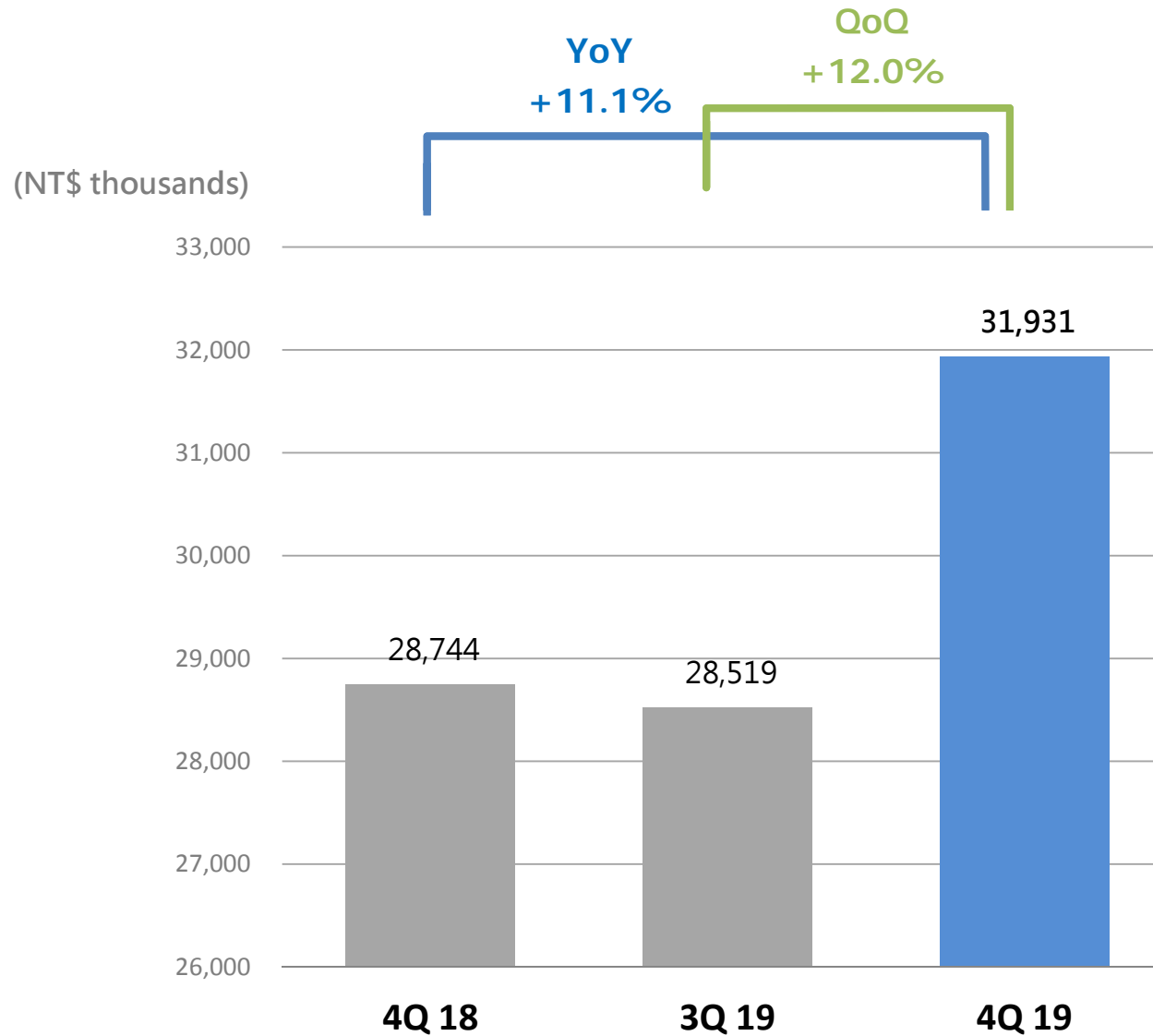


(NT\$ thousands)

Top 10 Customer Contributed 66% Revenue



# 4Q19 Royalty Analysis

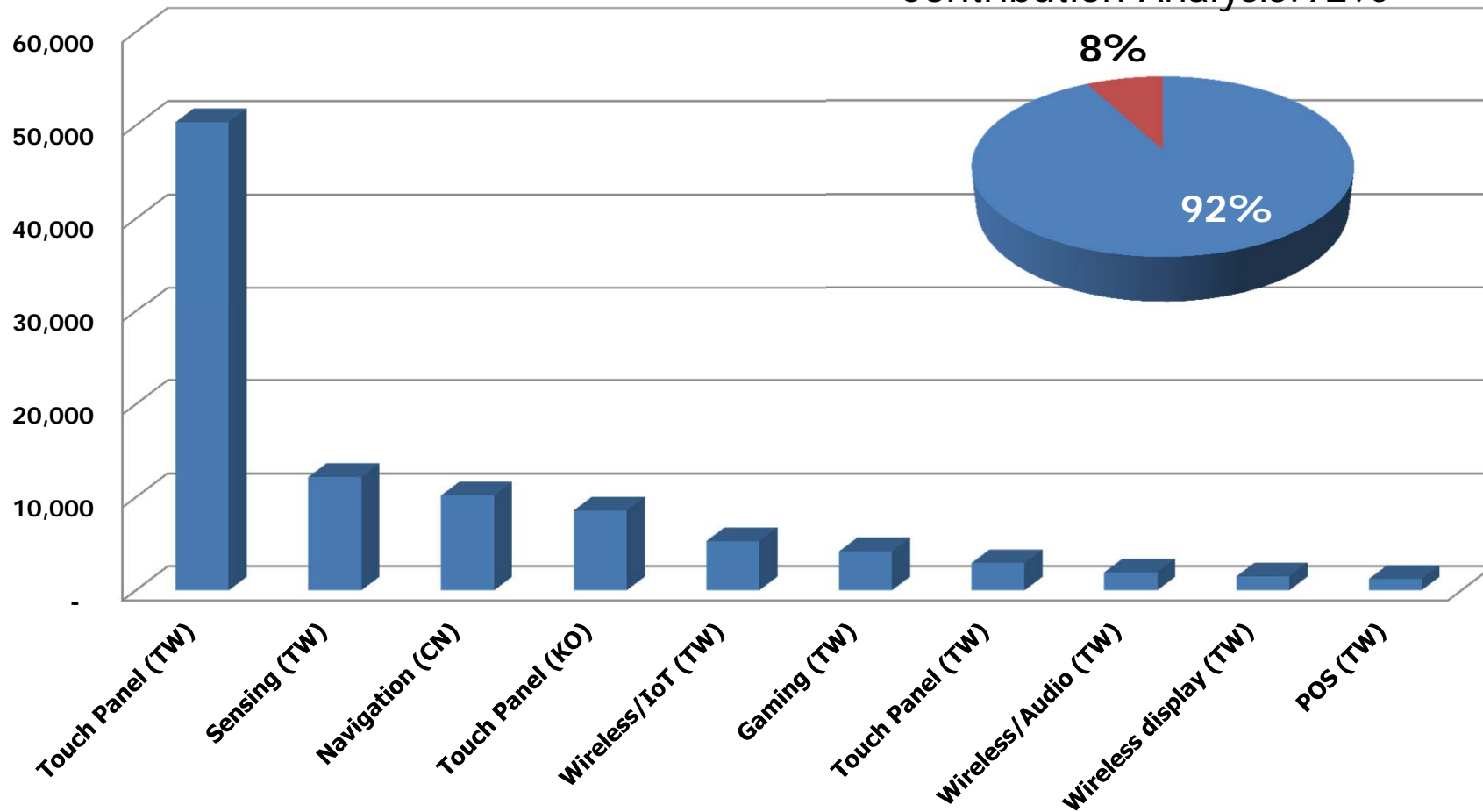


# 2019 Top Ten Royalty Contributors Analysis by Application



(NT\$ thousands)

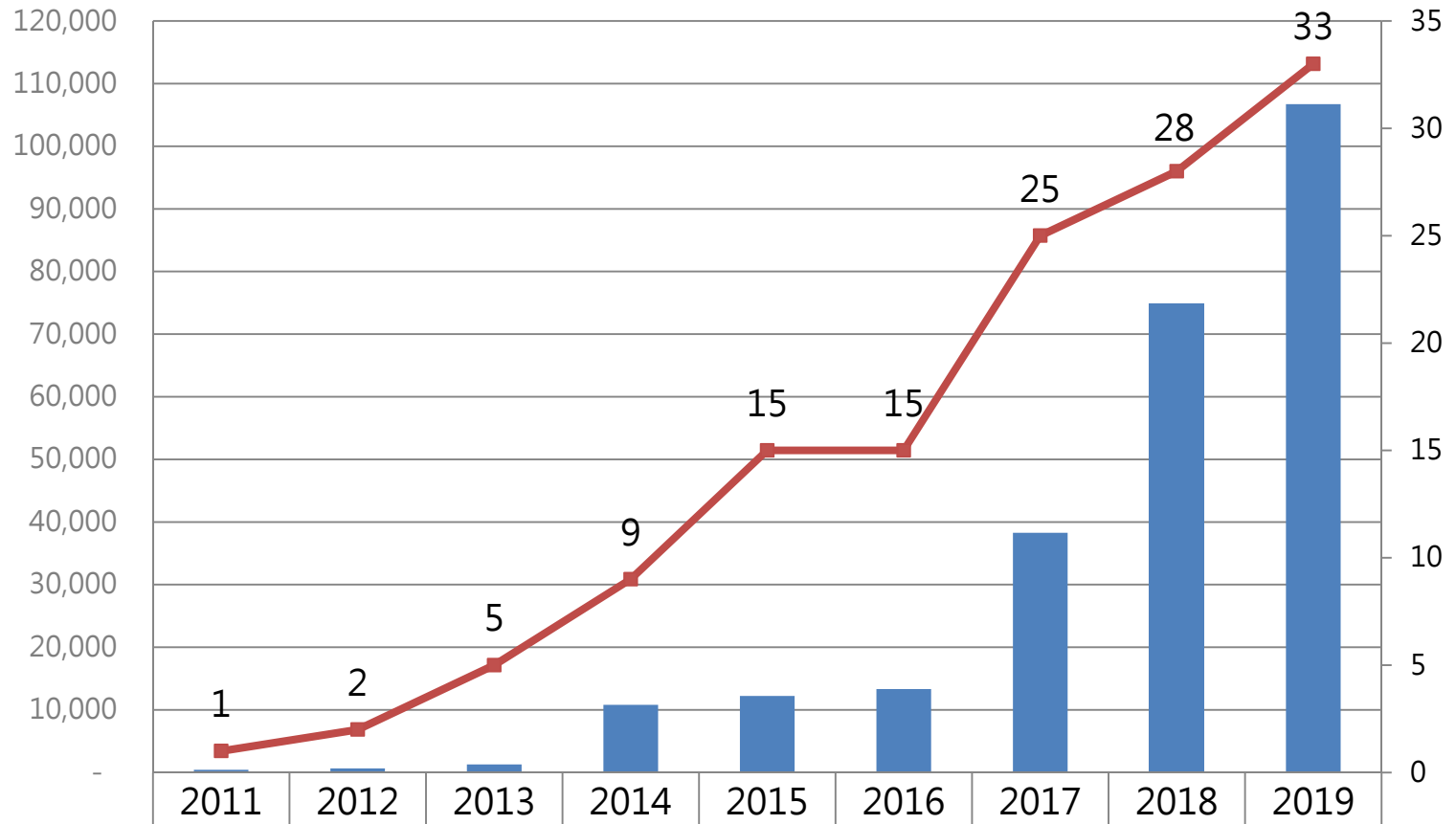
Top 10 Royalty Customers Contribution Analysis: 92%



# Royalty Analysis



(NT\$ thousands)

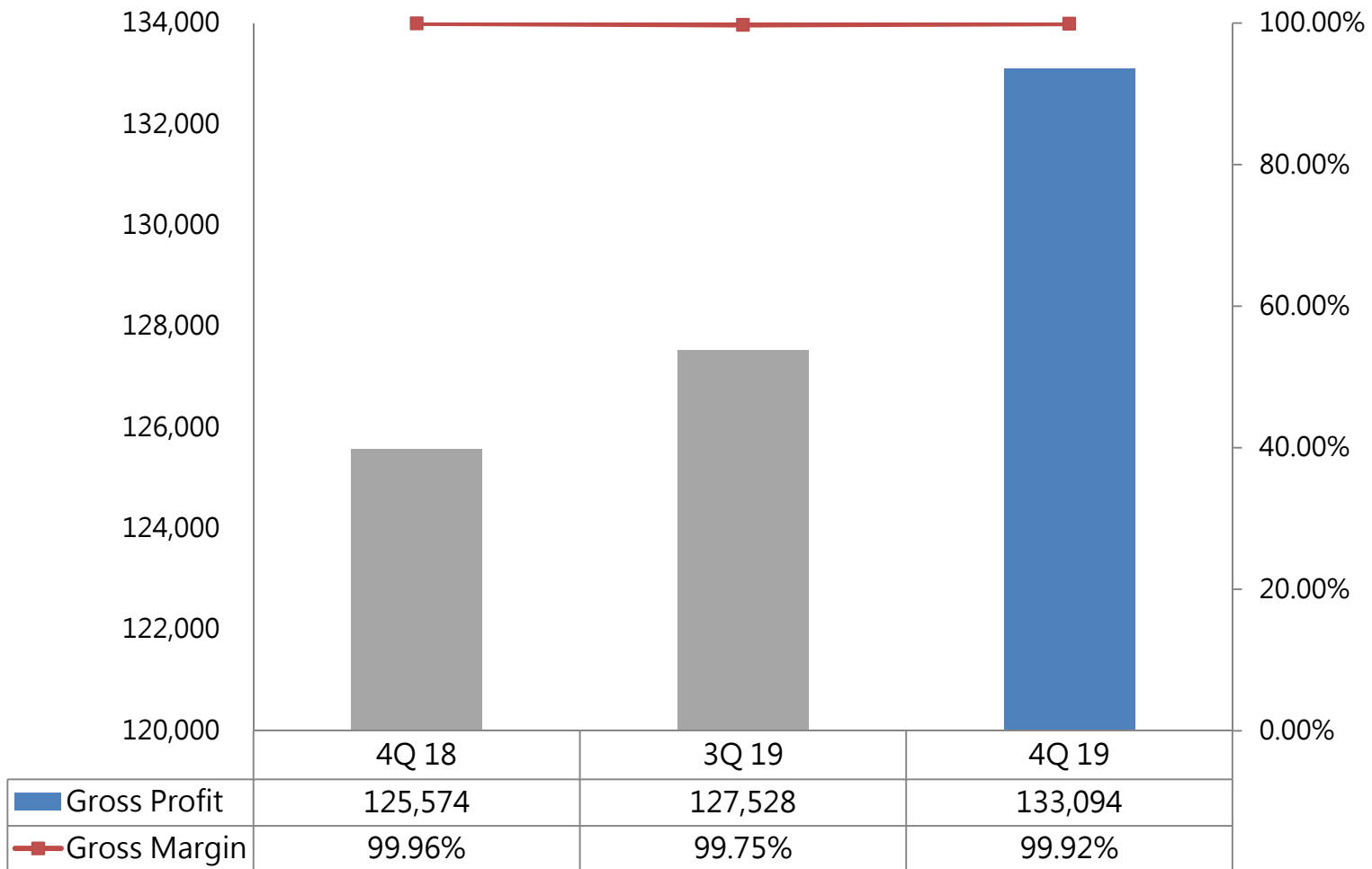


Royalty	445	660	1,285	10,819	12,232	13,320	38,287	74,953	106,716
Customer numbers	1	2	5	9	15	15	25	28	33

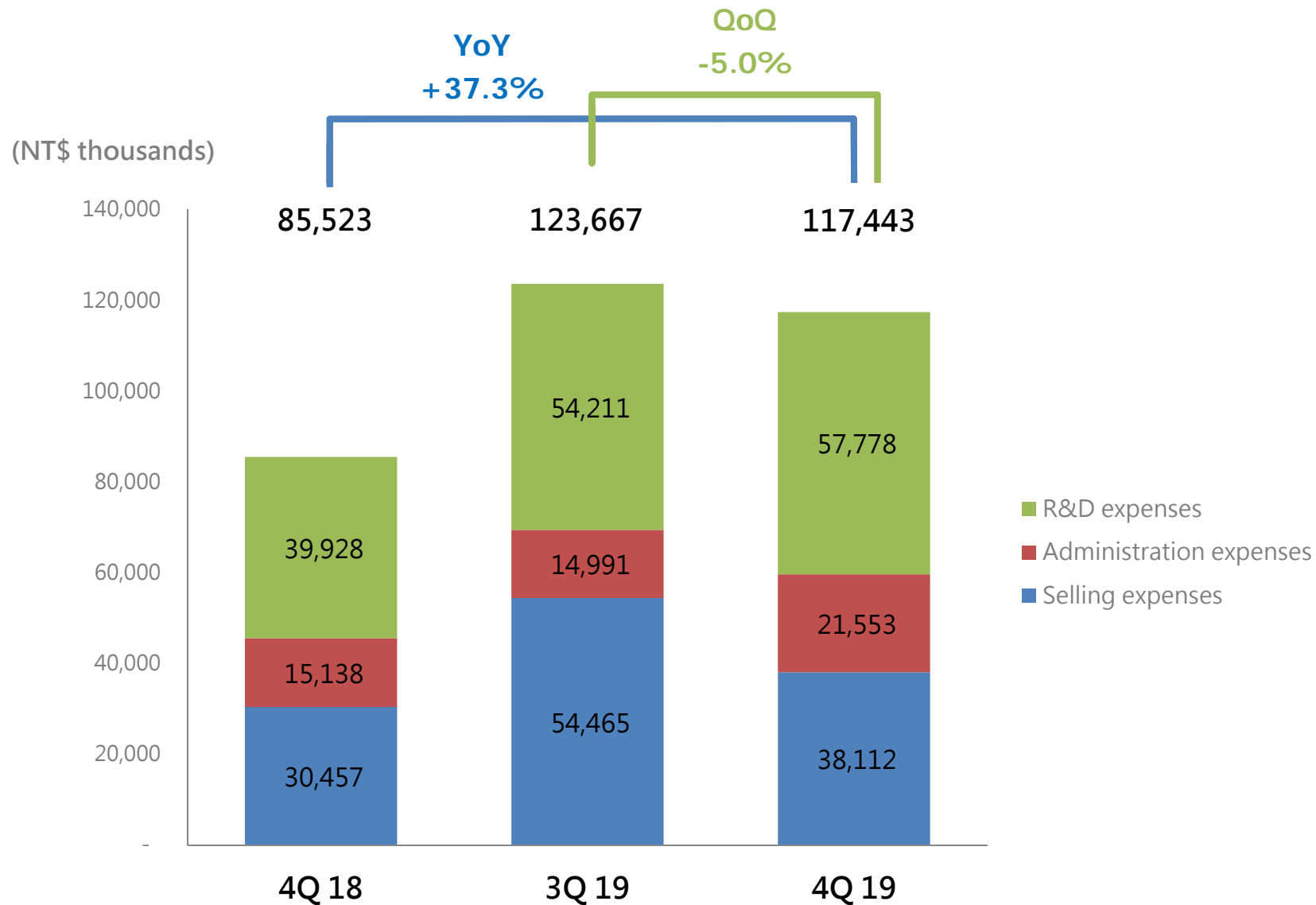
# Consolidated Gross Margin



(NT\$ thousands)

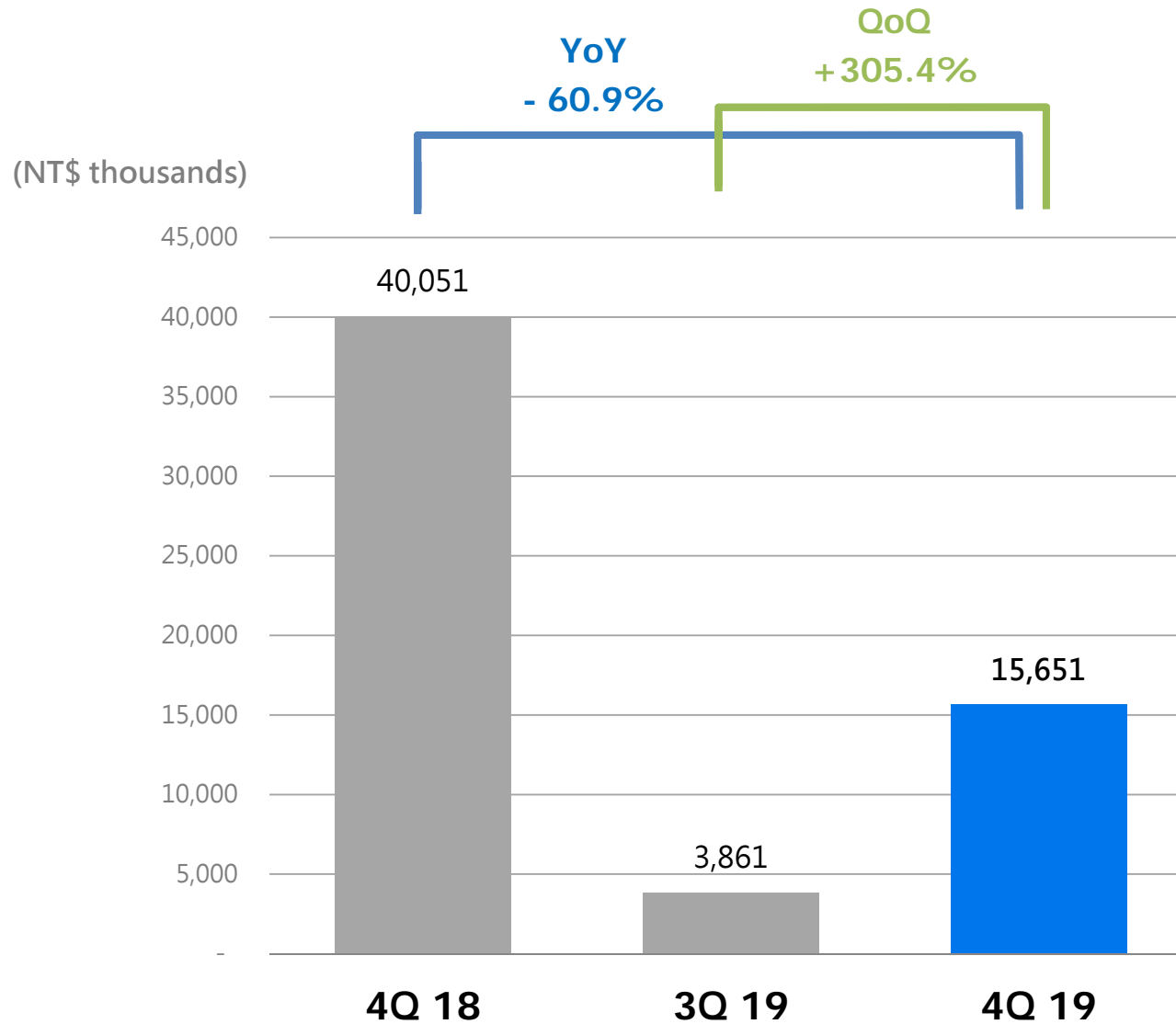


# Consolidated Operating Expenses

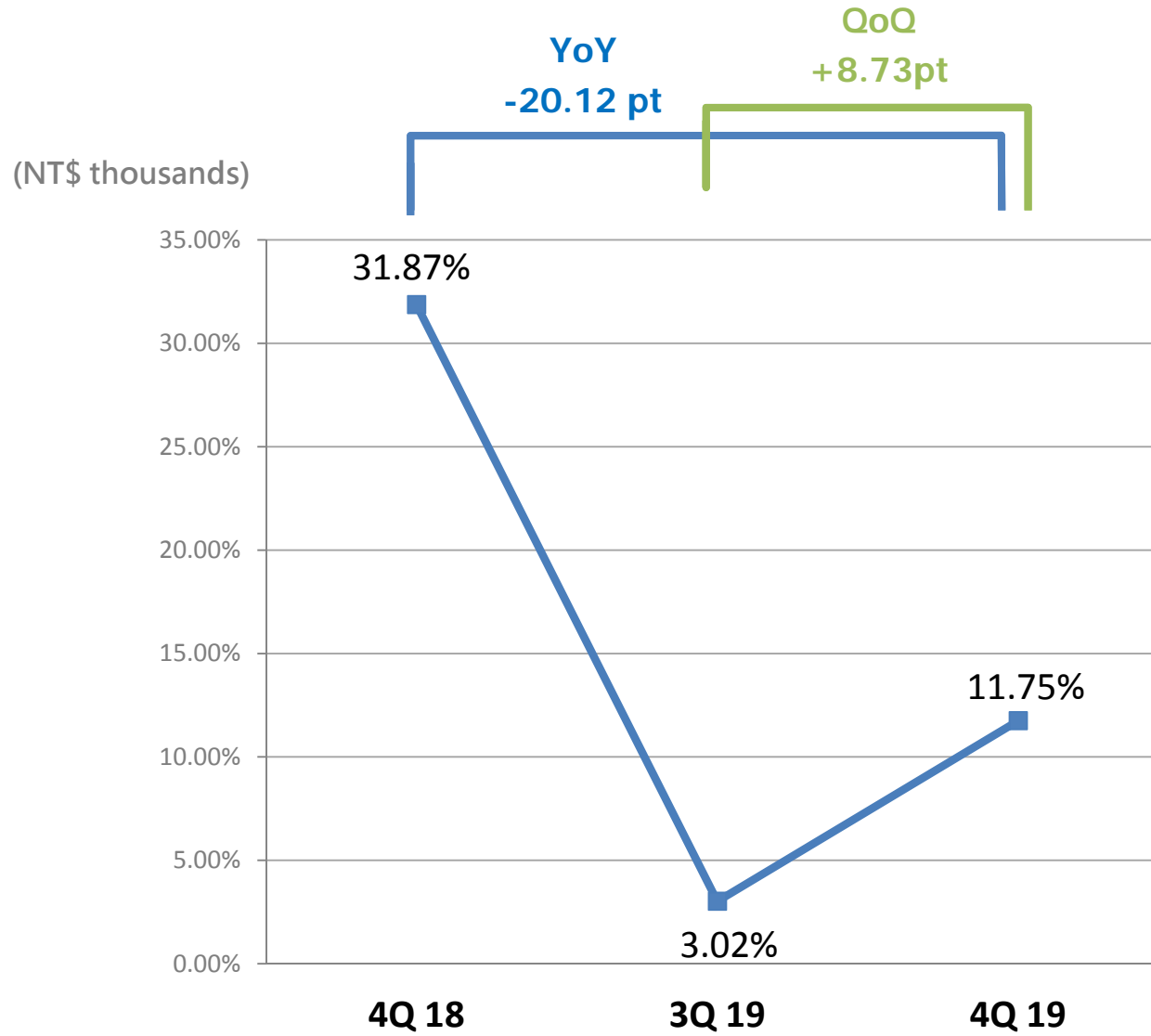




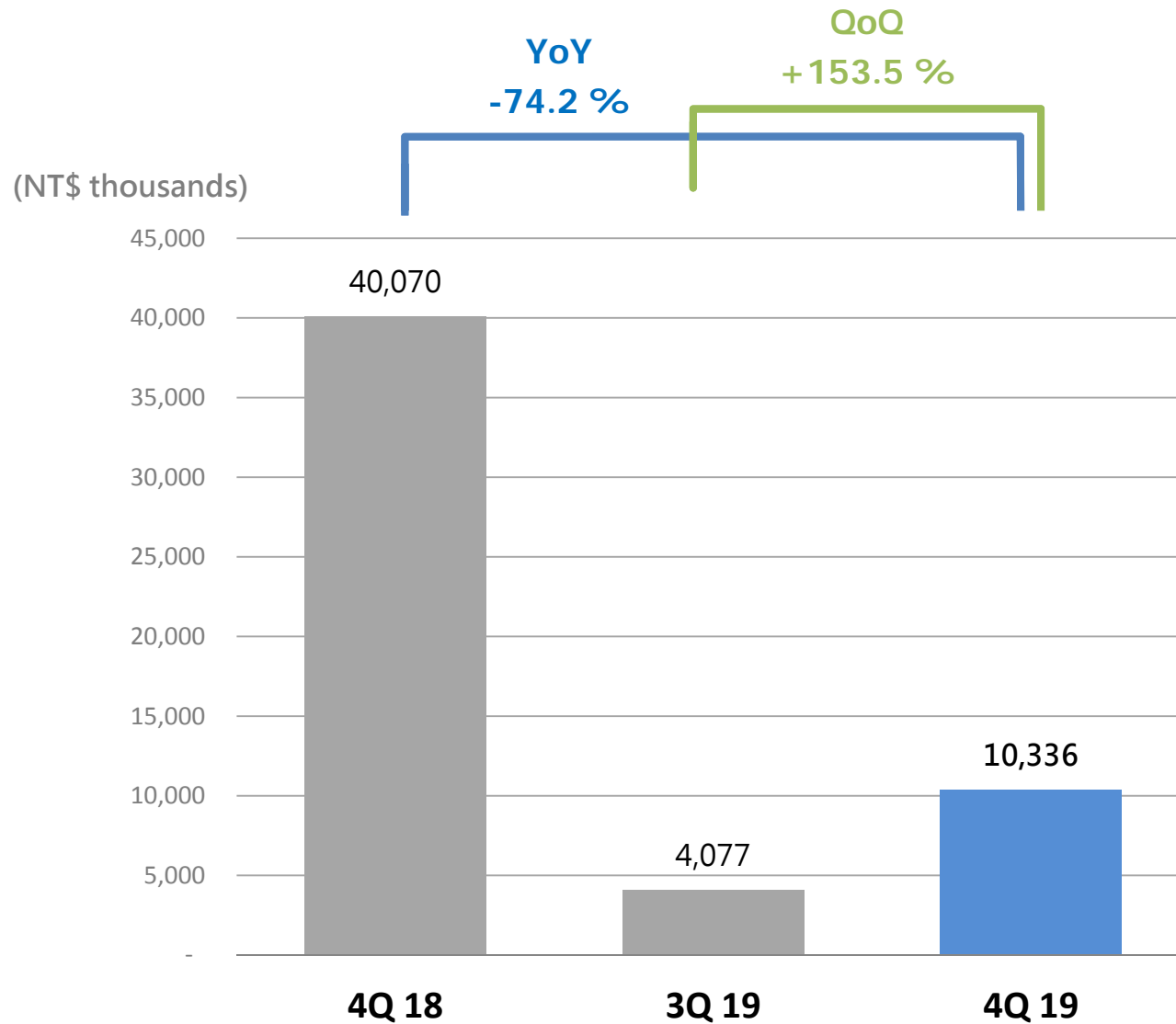
# Consolidated Operating Income (Loss)



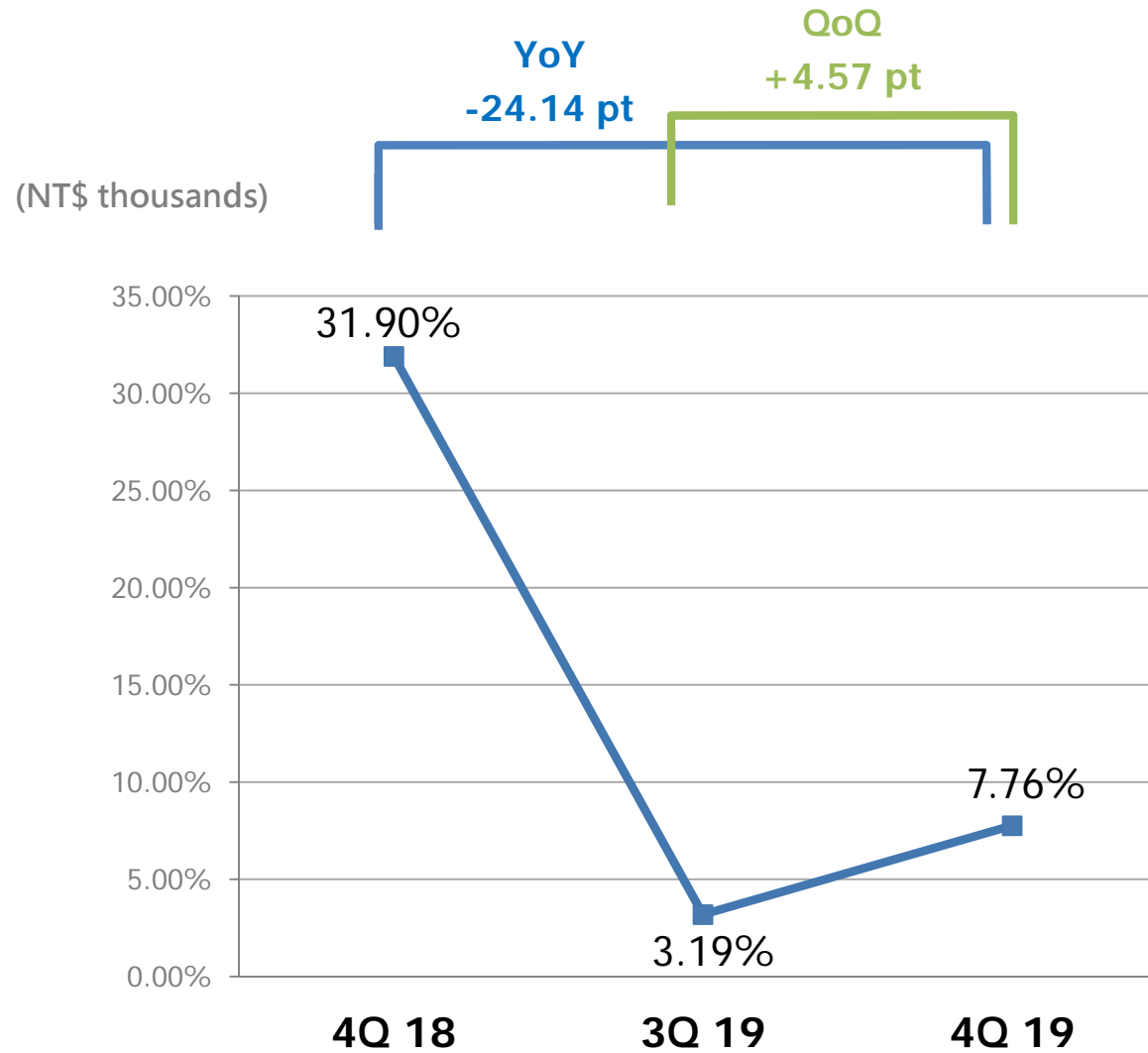
# Consolidated Operating Margin



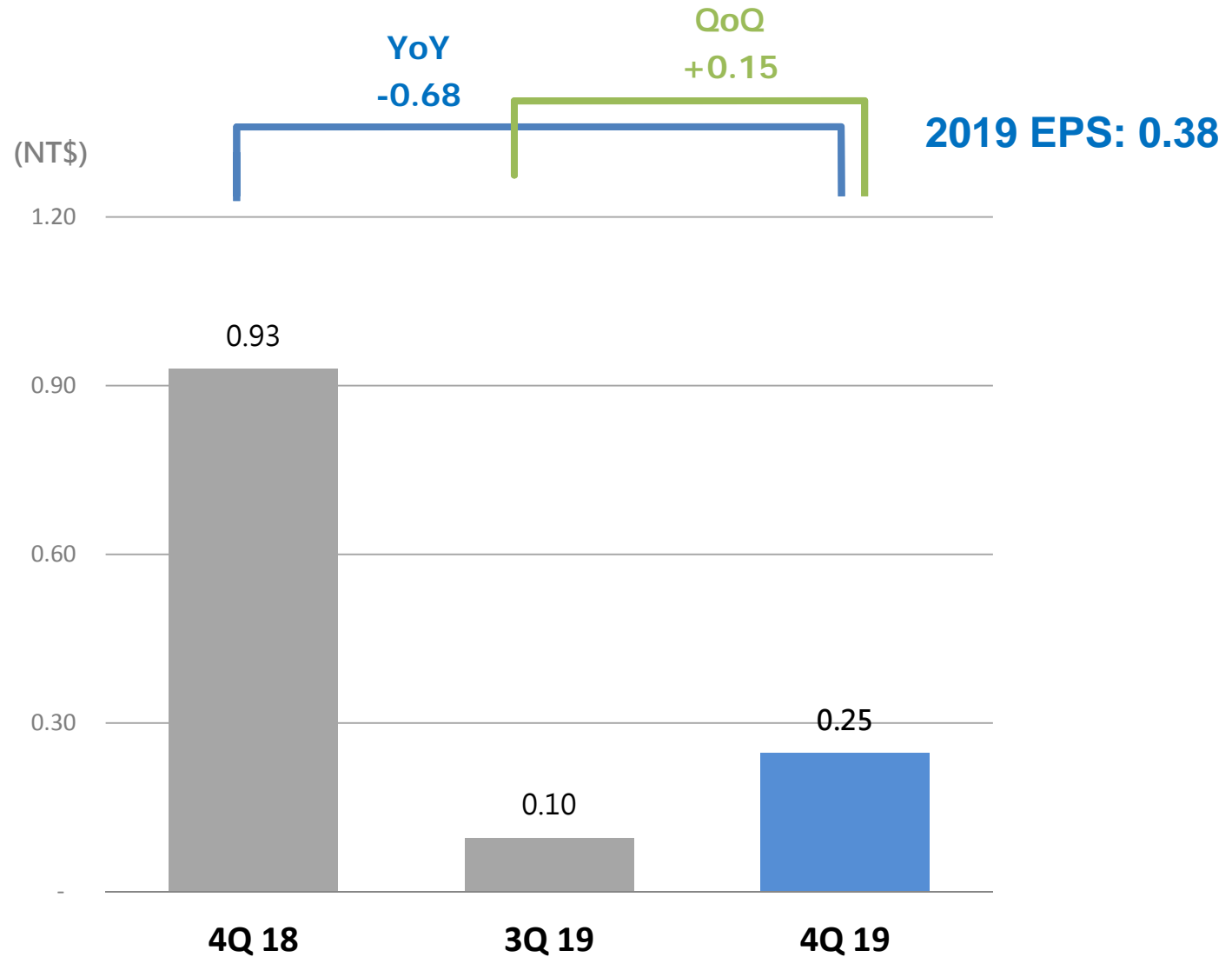
# Consolidated Net Income (Loss)



# Consolidated Net Profit Margin



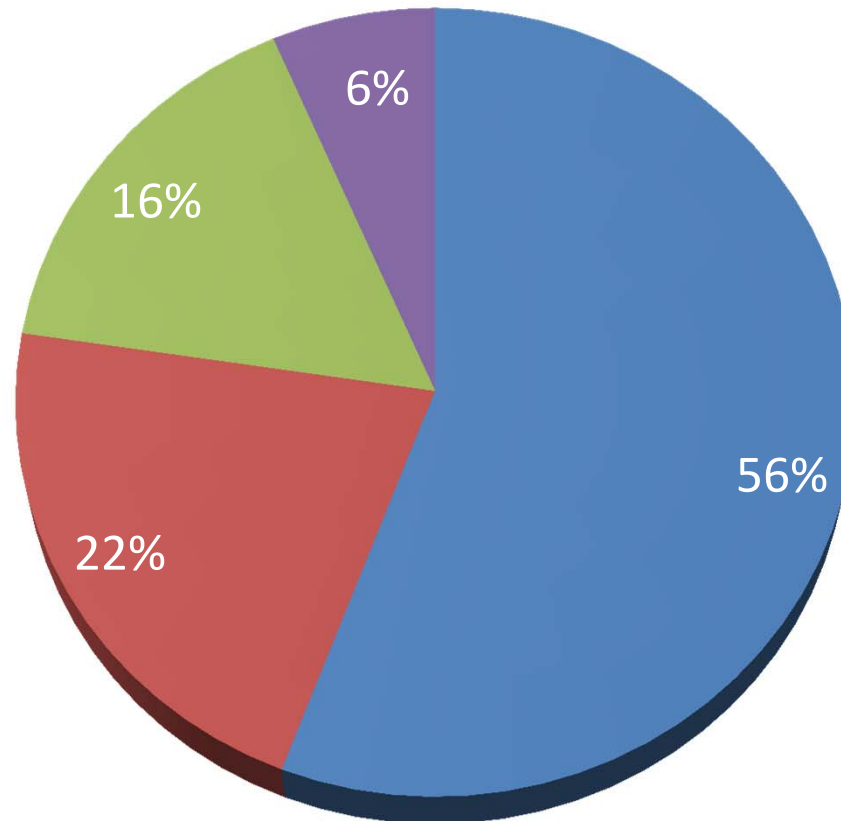
# Consolidated Earnings Per Share



# 2019 Revenue Analysis by Payment Model



■ License Fee ■ Running Royalty ■ Custom Computing Service ■ Maintenance & Others

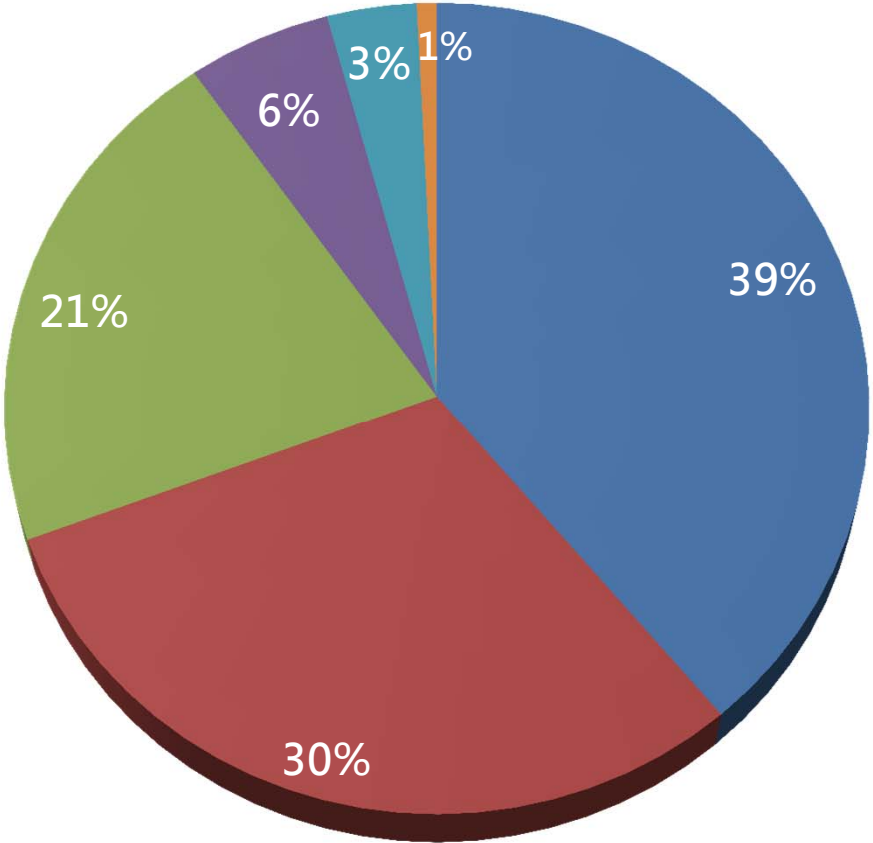




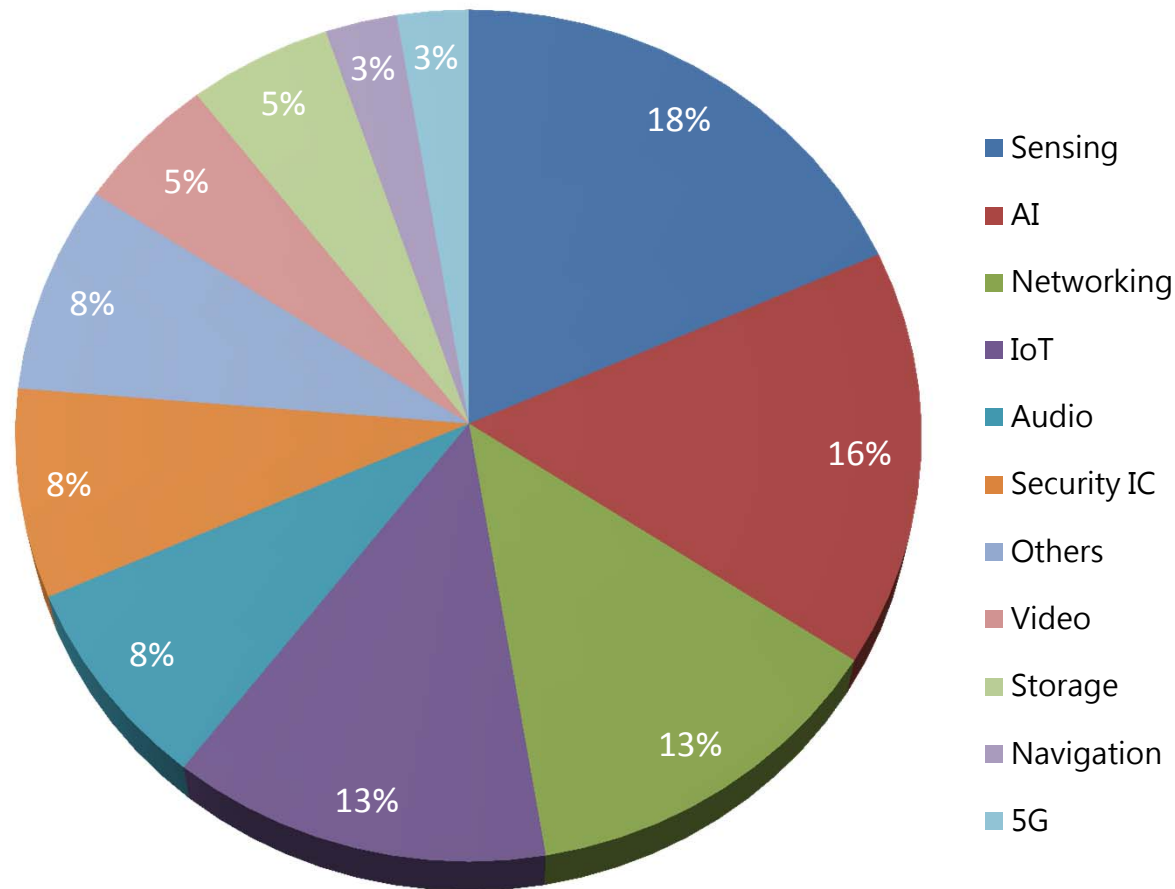
# 2019 Revenue Analysis by Region



■ Taiwan ■ USA ■ China ■ Europe ■ Korea ■ Japan

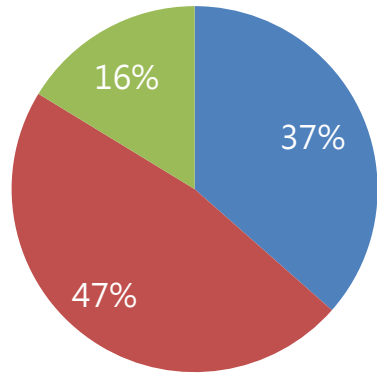


# 2019 Customer Application Analysis

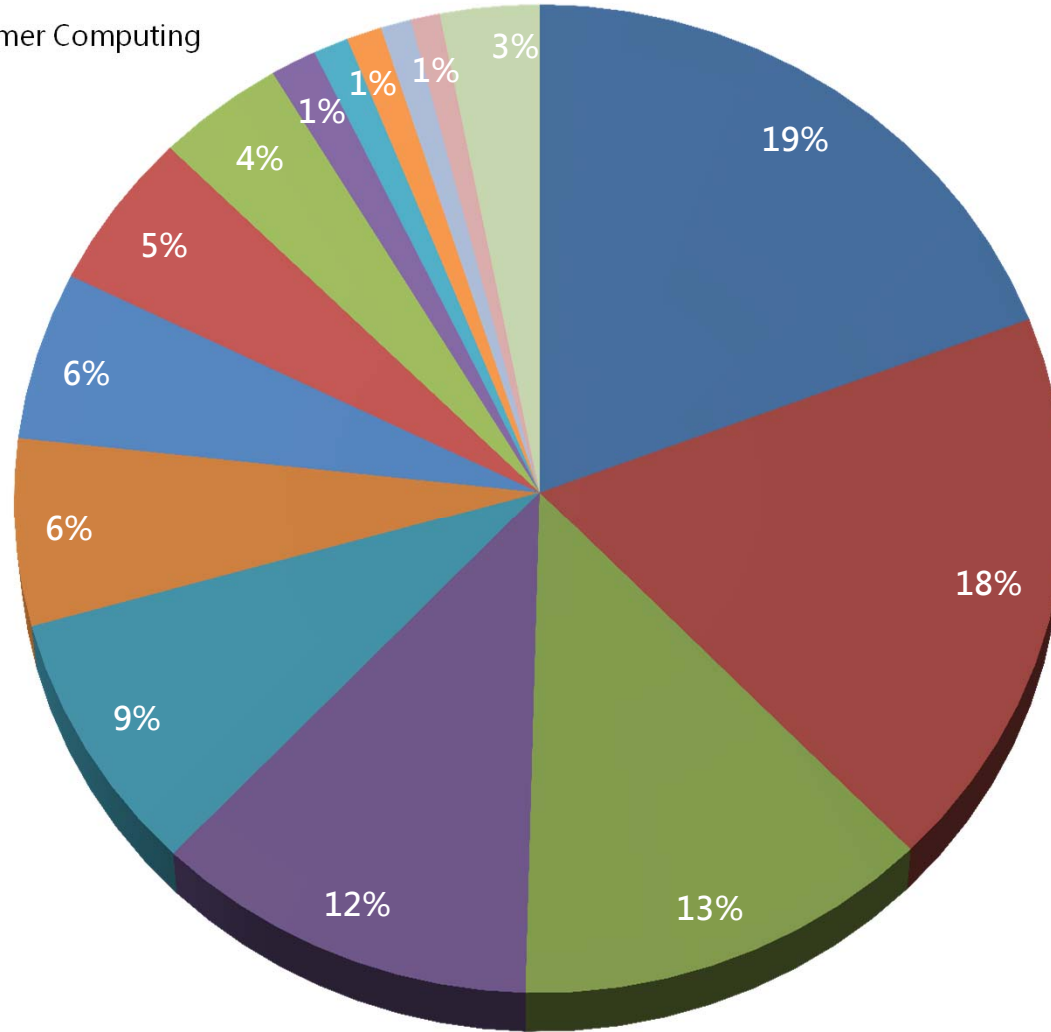


\*Based on agreement number

# 2019 Revenue Analysis by Product



- V3
- RISC-V
- Customer Computing

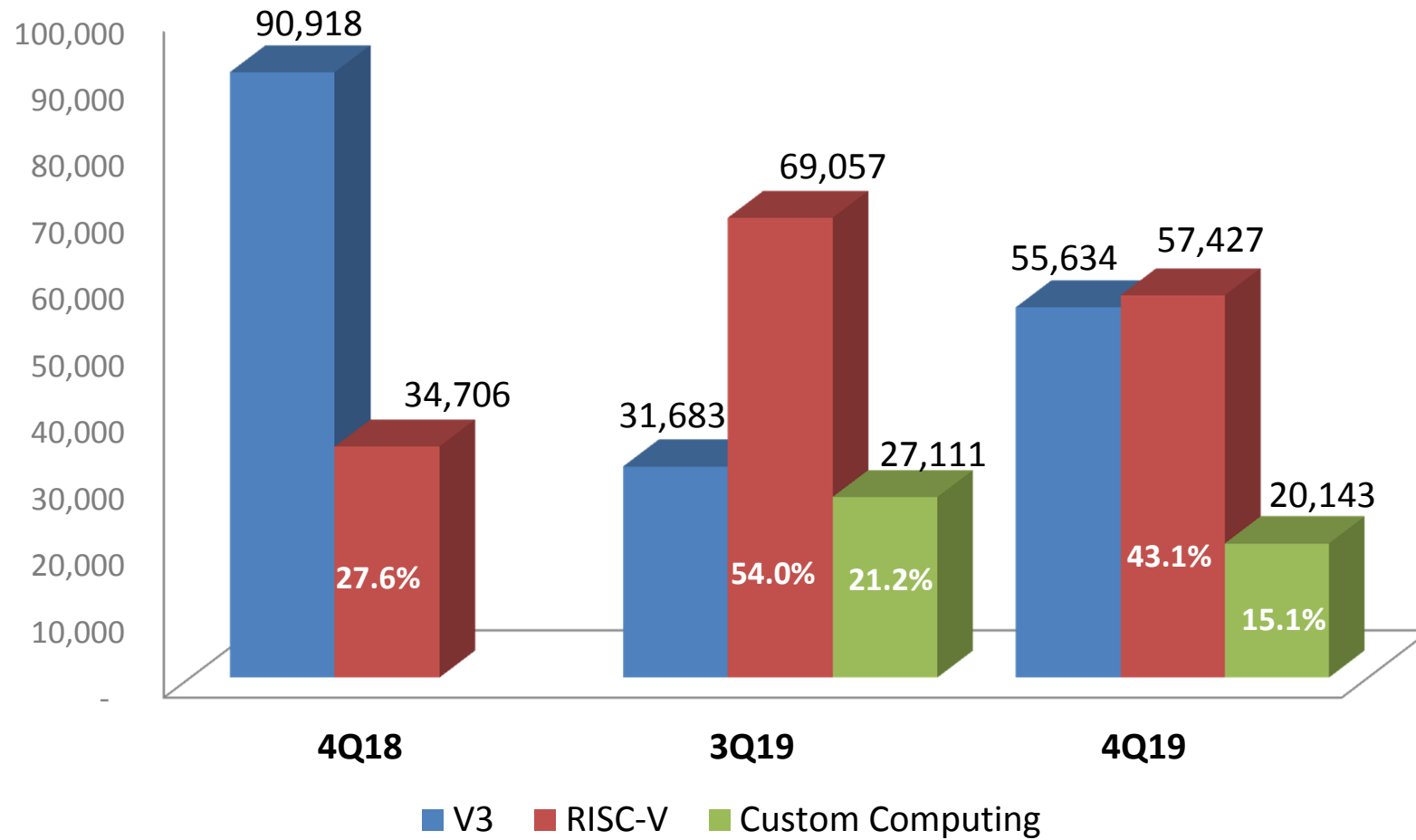


- N8
- N25
- Service
- D25
- N9
- NX25
- AX25
- ACE
- Customized IP
- D10
- S8
- N15
- N7
- N22
- Other

# 4Q19 Revenue Analysis - RISC-V



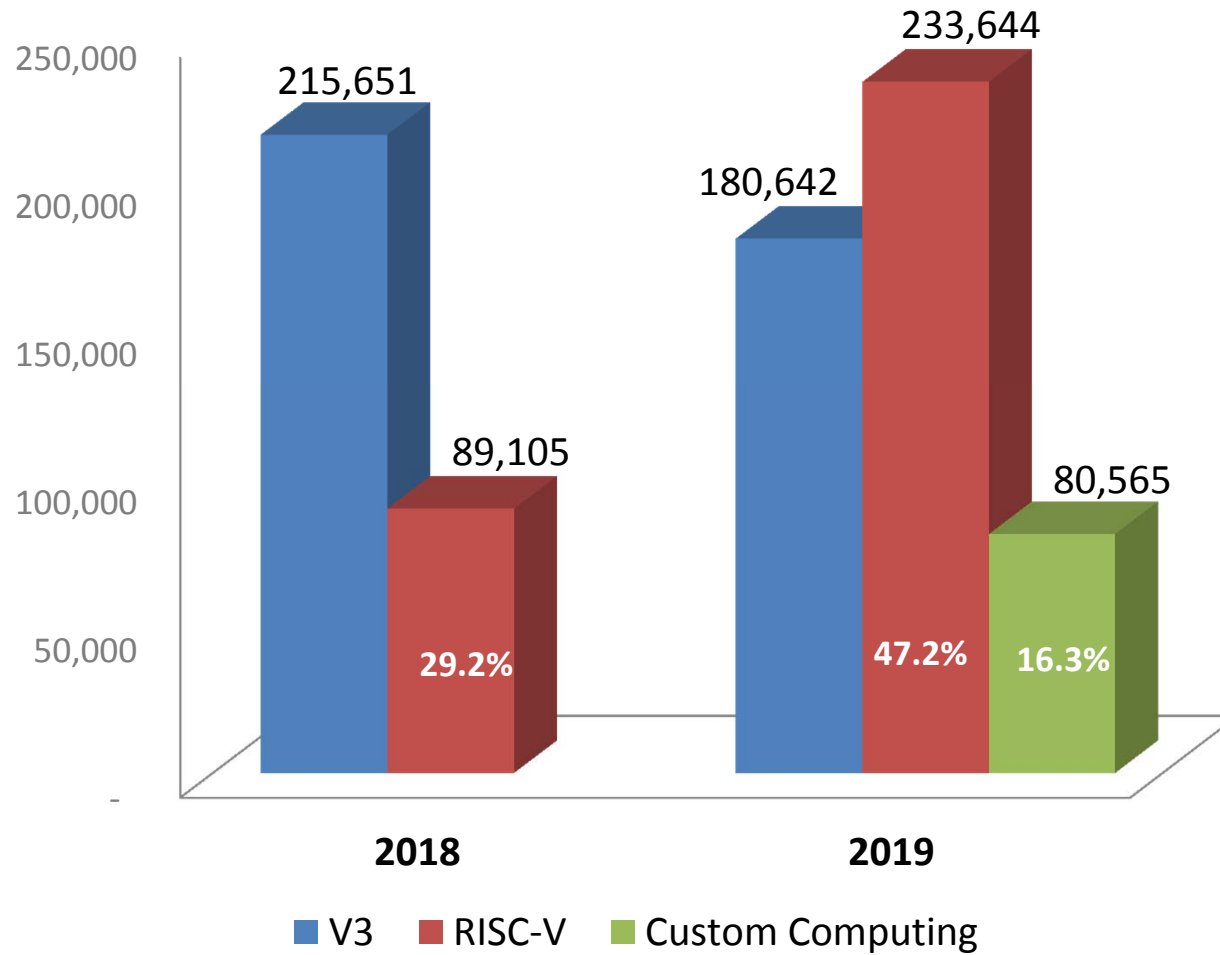
(NT\$ thousands)



# 2019 Revenue Analysis - RISC-V



(NT\$ thousands)



# Product Application



# Andes Updates



- ❖ A 15-year-old public CPU IP company



- ❖ A founding & platinum member of the RISC-V Foundation
- ❖ A major open source maintainer/contributor
- ❖ Active involvement in standard extensions
  - Chair of P-extension (Packed DSP/SIMD) Task Group
  - Co-chair of Fast Interrupt Task Group

**GNU-Based Toolchains**

- binutils, GCC: May, 2017
- glibc: February, 2018
  - only supports rv64i-based ISAs
- newlib: August, 2017
- "Probably not a compiler bug"

**SiFive**  
**bluespec**  
**redhat**  
**ANDES TECHNOLOGY**

**GNU Toolchains**

**RISC-V LLVM Porting Effort**

- Alex Bradbury is in charge of RISC-V LLVM
  - Talk yesterday afternoon
  - Poster on Tuesday night
- RV32IM[A]FD support upstream
  - Missing hard-float calling convention
  - Missing 64-bit support
  - Missing compressed support
- Clang, Go, and OpenDK have run code
  - Rust port in progress
  - Poster on Tuesday

**ANDES TECHNOLOGY**  
**lowRISC**  
**Berkeley**

**LLVM**

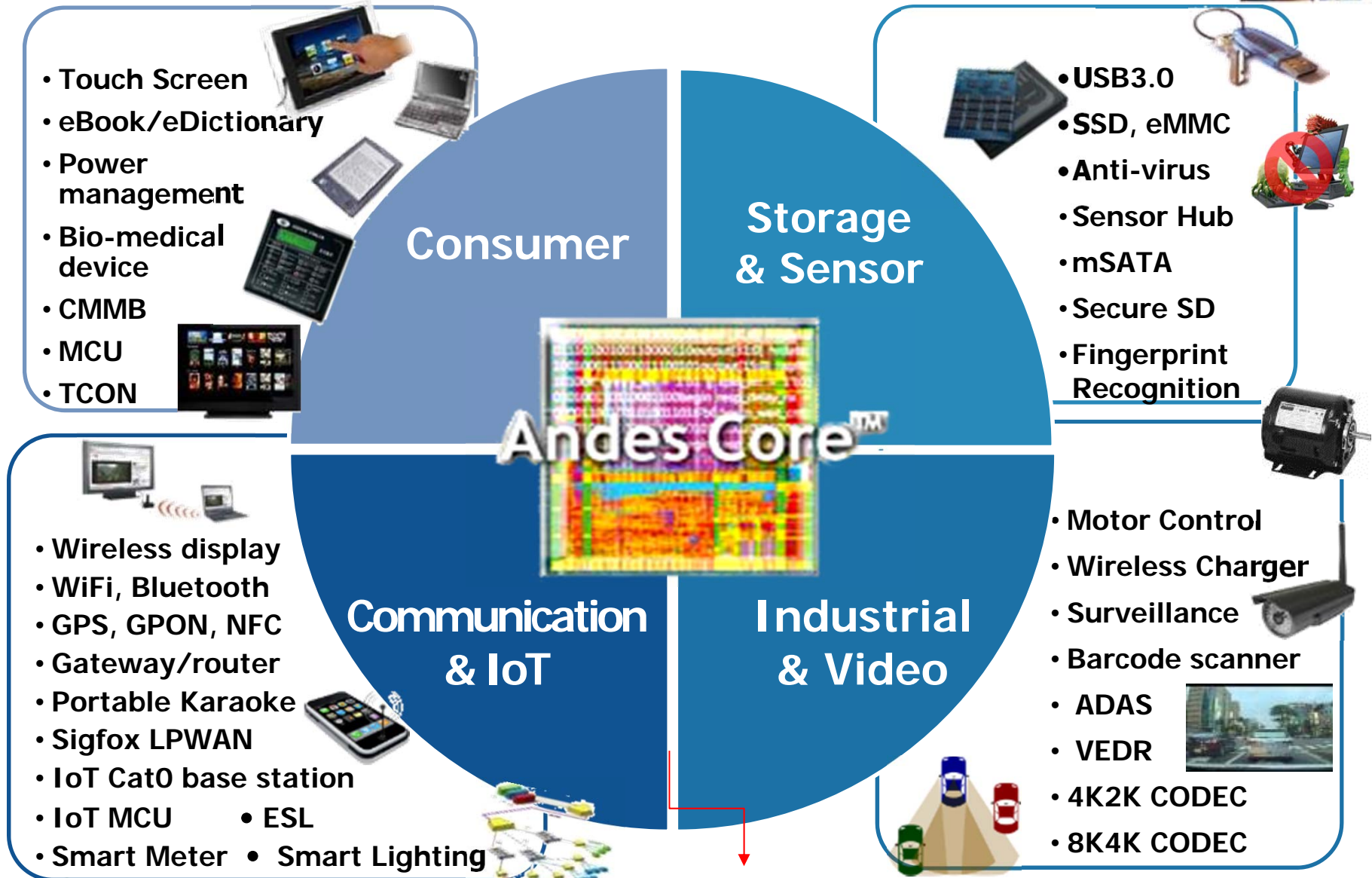
**RISC-V Linux Kernel Port**

- Linux: January, 2018
  - Only RV64i-based systems
  - Drivers are trickling in now

**Berkeley**  
**SiFive**  
**ANDES TECHNOLOGY**

**Linux**

# Example Applications of Andes-Embedded SoC



and more.....

# IoT Application - 1



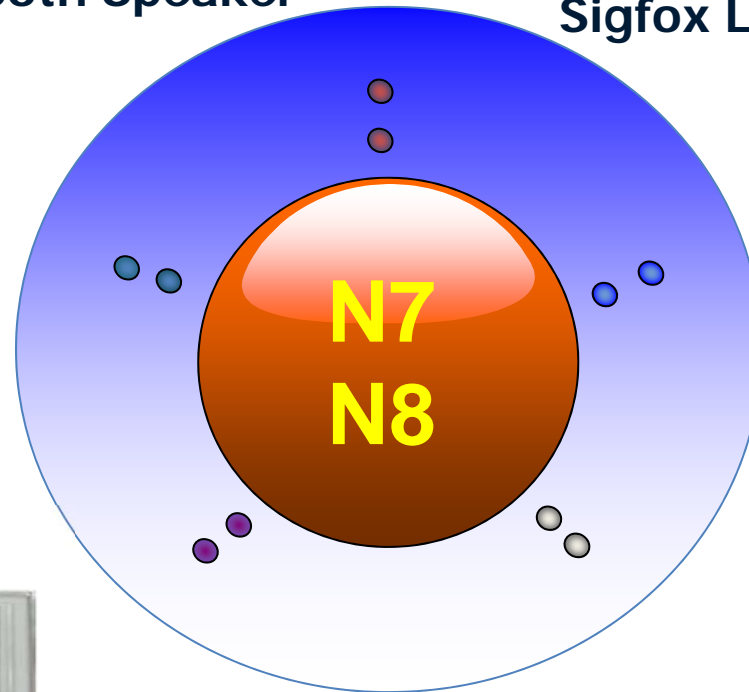
Bluetooth Speaker



Sigfox LPWAN



Healthcare device



Wearable device



Electronic price tags



Sensor Hub

# IoT Application -2



Wearable devices



Drone



Portable Karaoke



WiFi/GPS/FM/Bluetooth  
combo



GPS/Beido in shared bikes

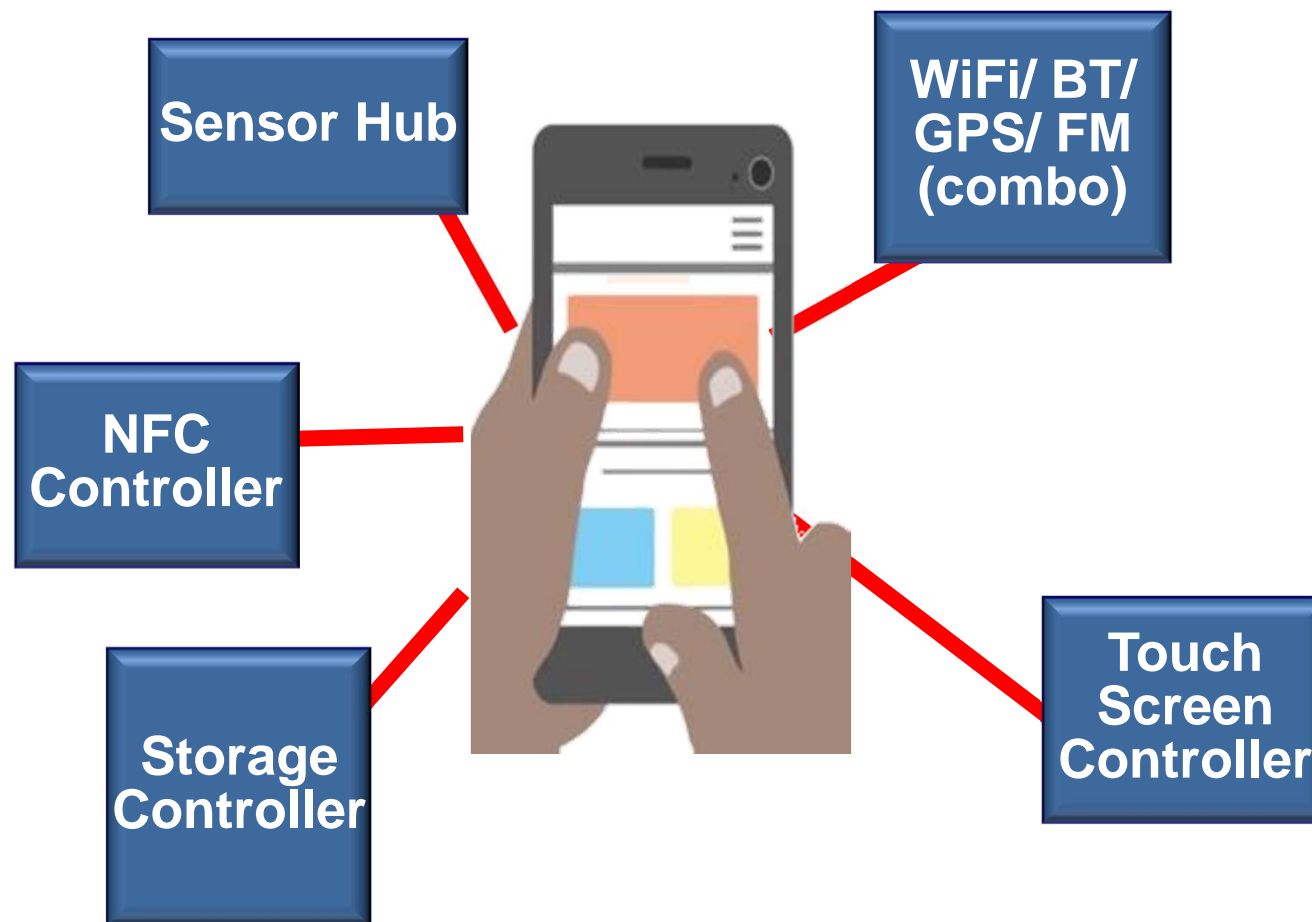


Contactless payment  
(NFC)

# Andes Embedded in Smart Phones



**1 in 5 Smart Phones are with Andes Embedded**





# Andes Embedded in Consumer Devices, Cars and Datacenters



**Switch:**  
**MXIC Flash Ctrl**



**Echo Dot2:**  
**Mediatek WiFi IoT**



**Bike Sharing:**  
**GPS Ctrl**



**X-Trail:**  
**ADAS Ctrl**



- ❖ In leading machine learning computers for datacenter
- ❖ In tier-one switch routers for datacenter

- ❖ Recent applications: 5G networking, 802.11ax, machine learning processors (using Andes Custom Extension, ACE)

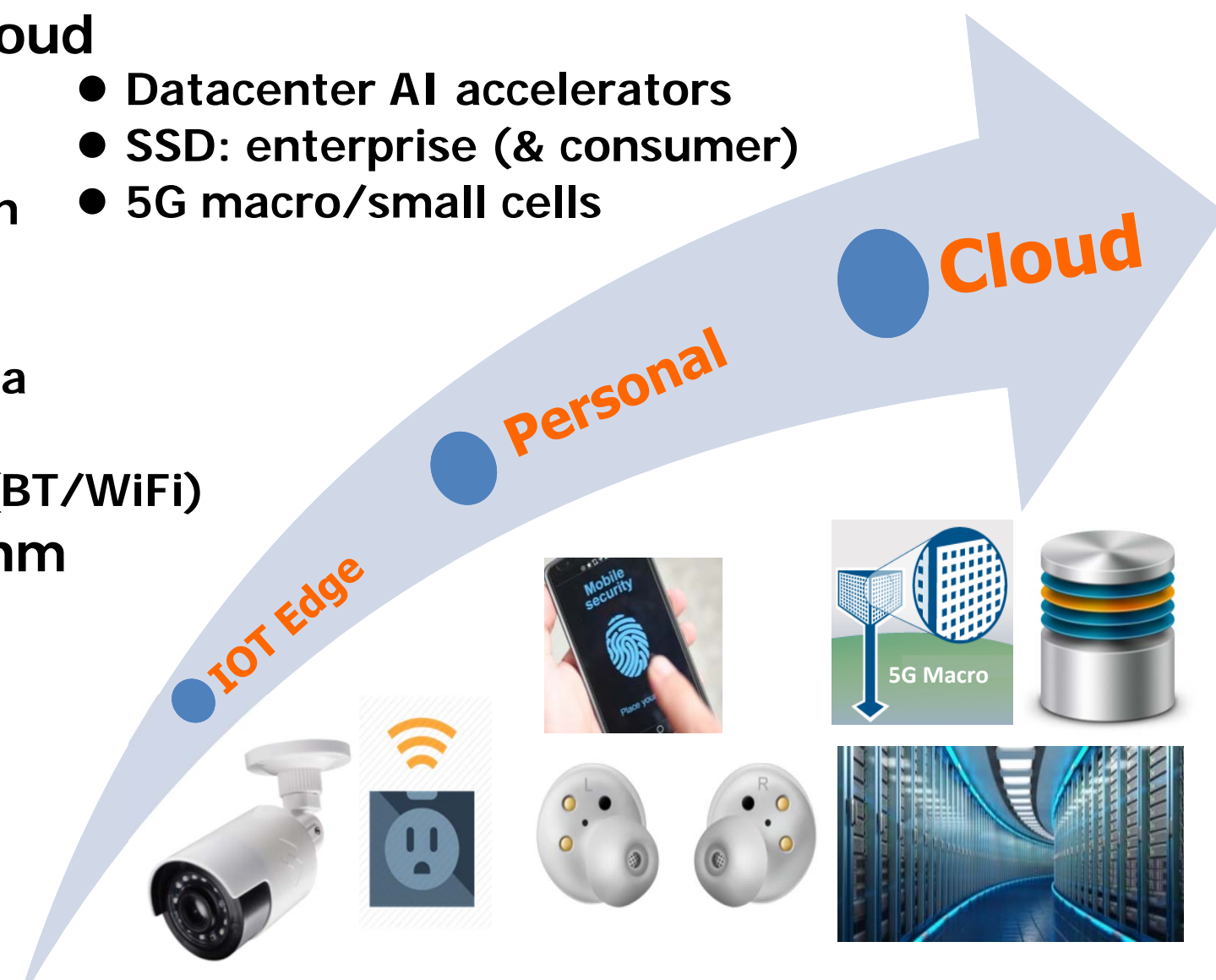
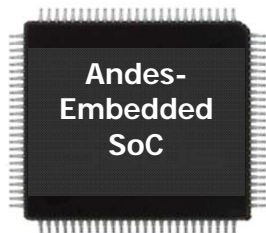
# Andes RISC-V Serving SoC from Edge to Cloud



## ❖ Edge to Cloud

- ADAS
- AIoT
- Blockchain
- FPGA
- MCU
- Multimedia
- Security
- Wireless (BT/WiFi)
- Datacenter AI accelerators
- SSD: enterprise (& consumer)
- 5G macro/small cells

## ❖ 40nm to 7nm



# New Products and Ecosystems



# Andes RISC-V Product Overview



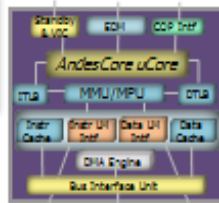
Best extensions to RISC-V

## AndeStar™ Architecture V5



Highly optimized design with leading PPA

### AndeCore™ Processors



```
0x00000000: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x00000004: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x00000008: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x0000000c: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x00000010: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x00000014: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x00000018: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
0x0000001c: 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1, 0x1
```

### AndeSight™ Tools

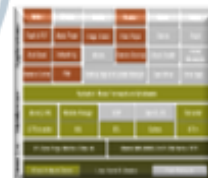


Professional IDE with high code quality

Handy peripheral IPs to speed up SoC construction



### AndeShape™ Platforms



### AndeSoft™ Stacks

Extensive SW stacks from bare metal, RTOS to Linux

# Product Lines



A N D E S

# AndesCore™ V3 Families



## Embedded Controller Solutions:

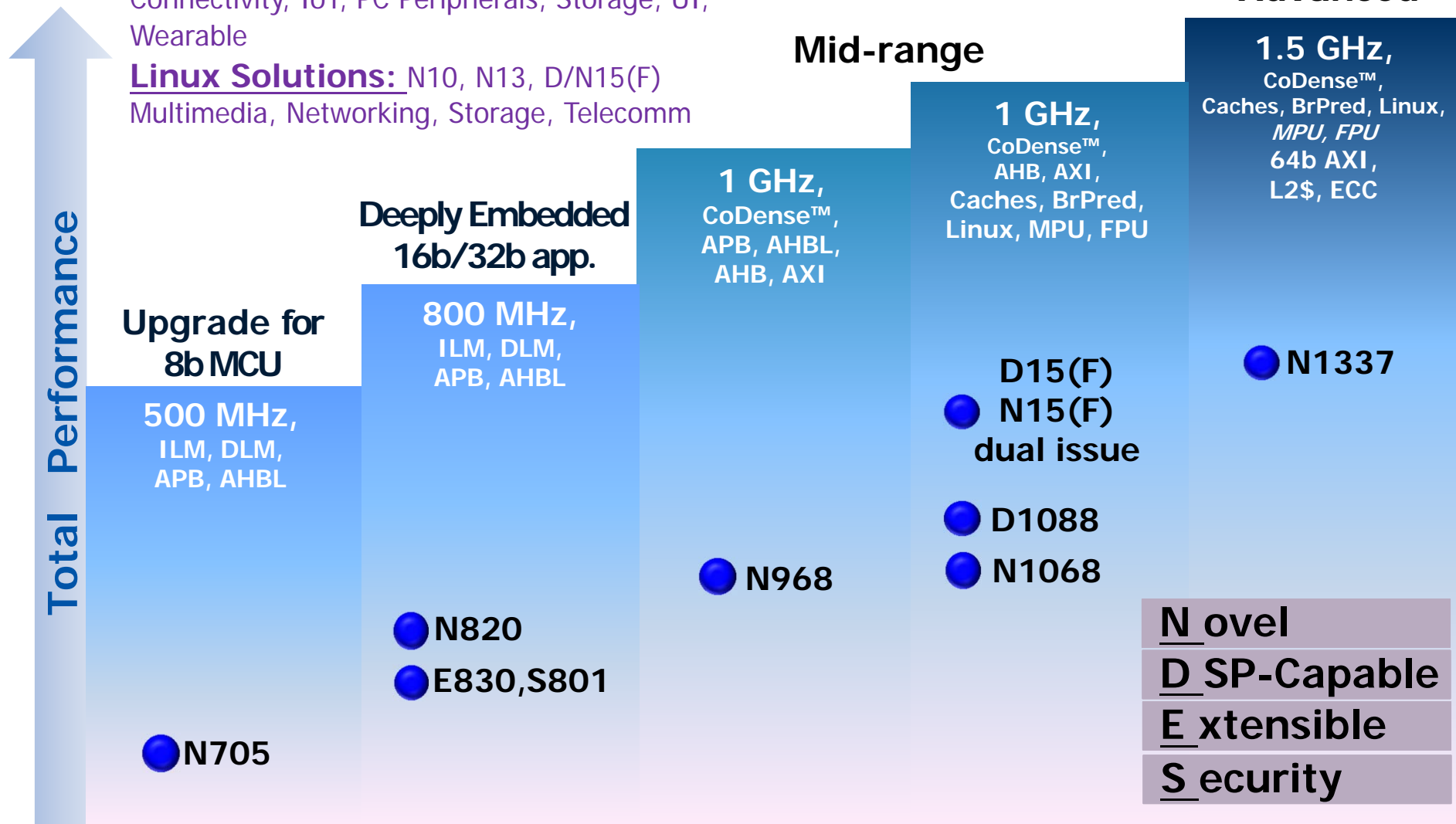
Connectivity, IoT, PC Peripherals, Storage, UI, Wearable

## Linux Solutions: N10, N13, D/N15(F)

Multimedia, Networking, Storage, Telecomm

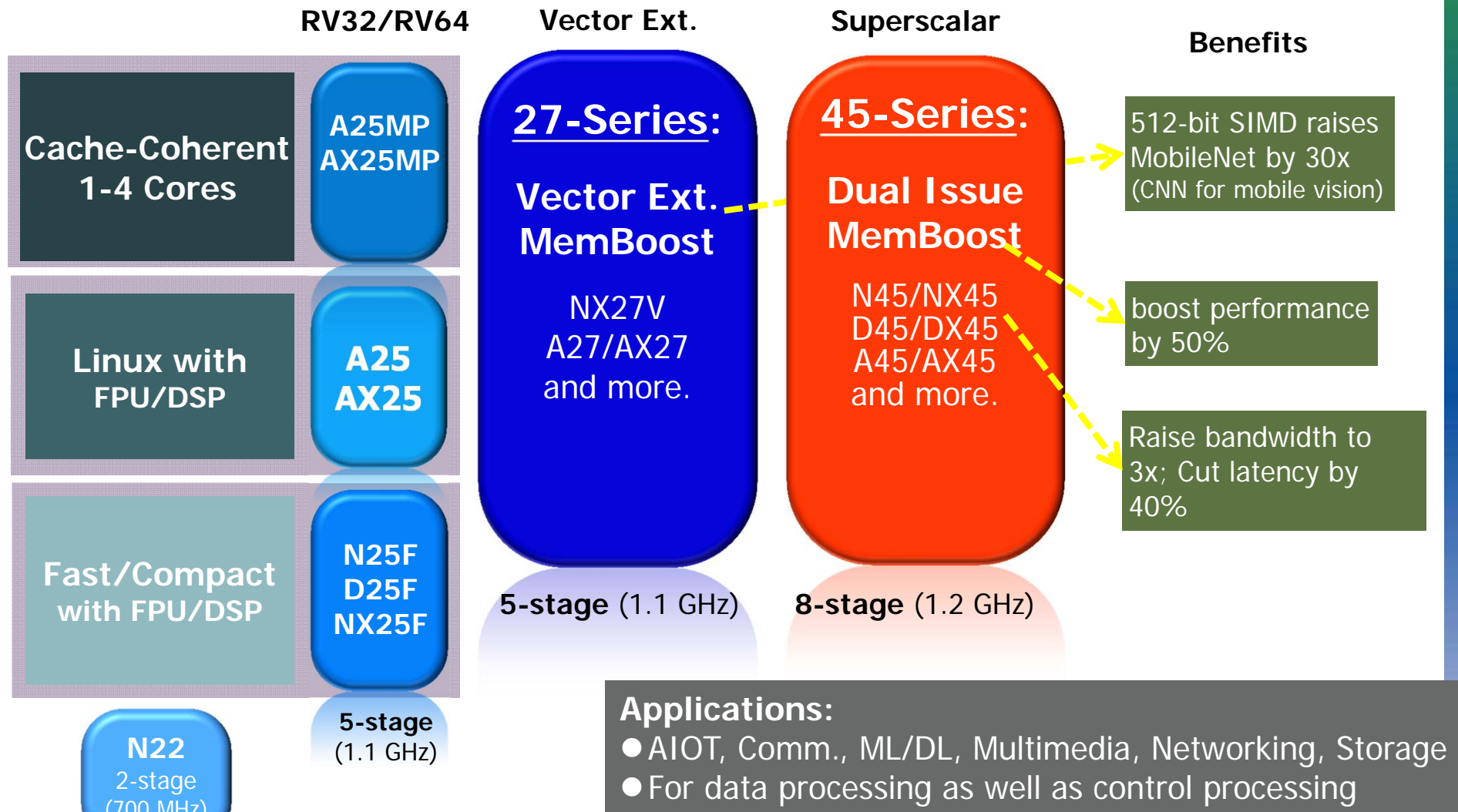
## Advanced

## Mid-range



**Novel  
DSP-Capable  
Extensible  
Security**

# Andes RISC-V Processor Roadmap



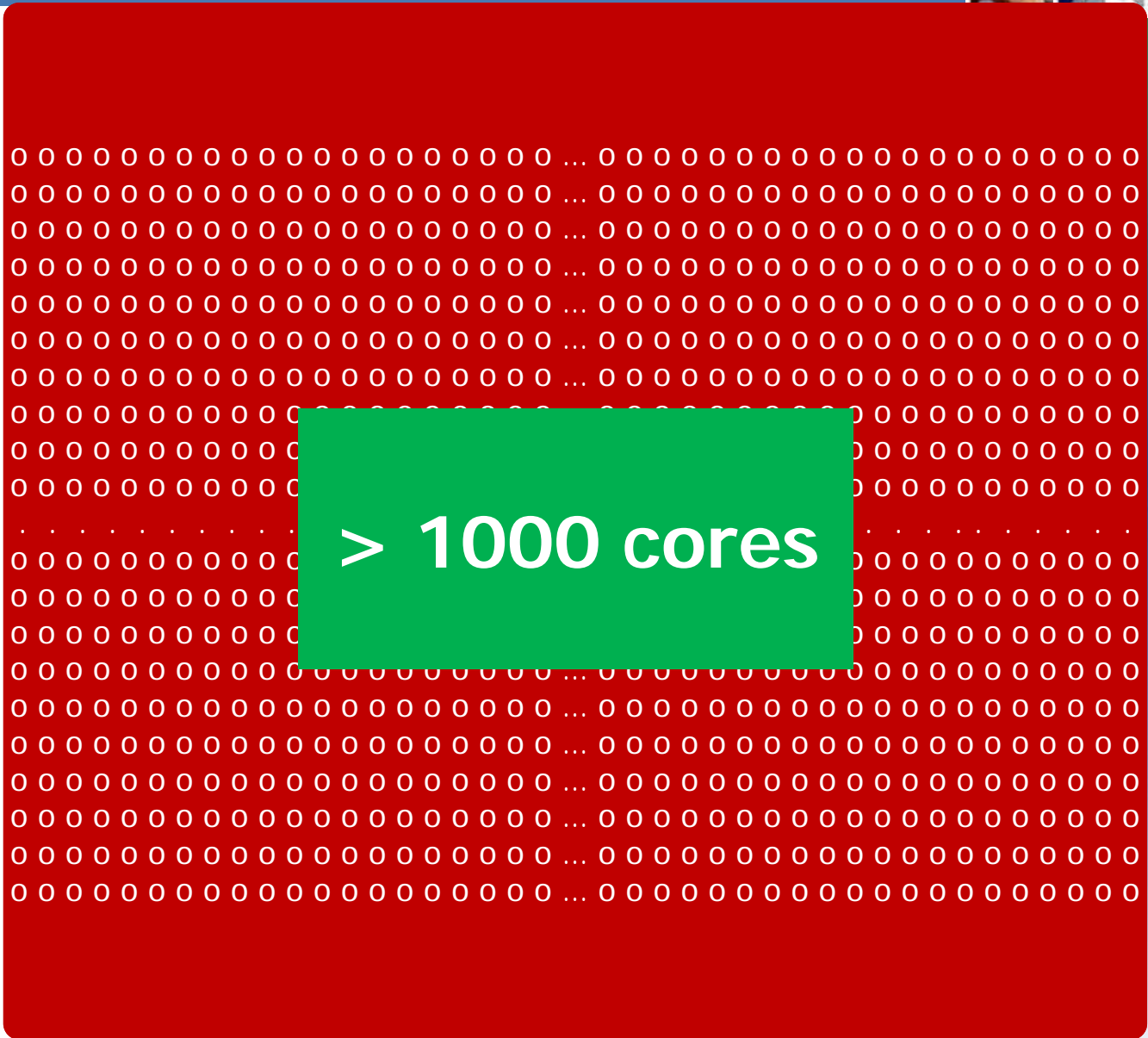
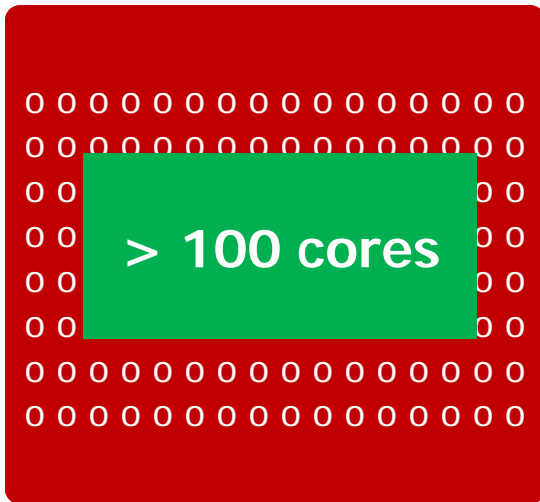
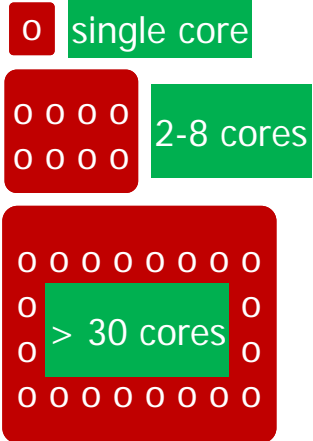
# Advancing RISC-V Cores to Next Level



- ❖ Andes is the industry leading CPU IP vendor to deliver RISC-V cores with
  - P-Extension → *A(X)25(MP), A(X)27, A(X)45, D25F*
  - V-Extension → *NX27V*
  - Custom-Extension (w/ ACE\* support) → *Entire 25, 27, 45 series*

\*: Andes Custom Extension

# Andes RISC-V Adoptions: Cores in SoC



# Bring Andes Strength to RISC-V Core Family



## Performance & Extensibility

- Leading PPA and code size
- Rich data processing in P, V, and ACE

## Configurability

- Flexible configurations for rich features

## Maturity

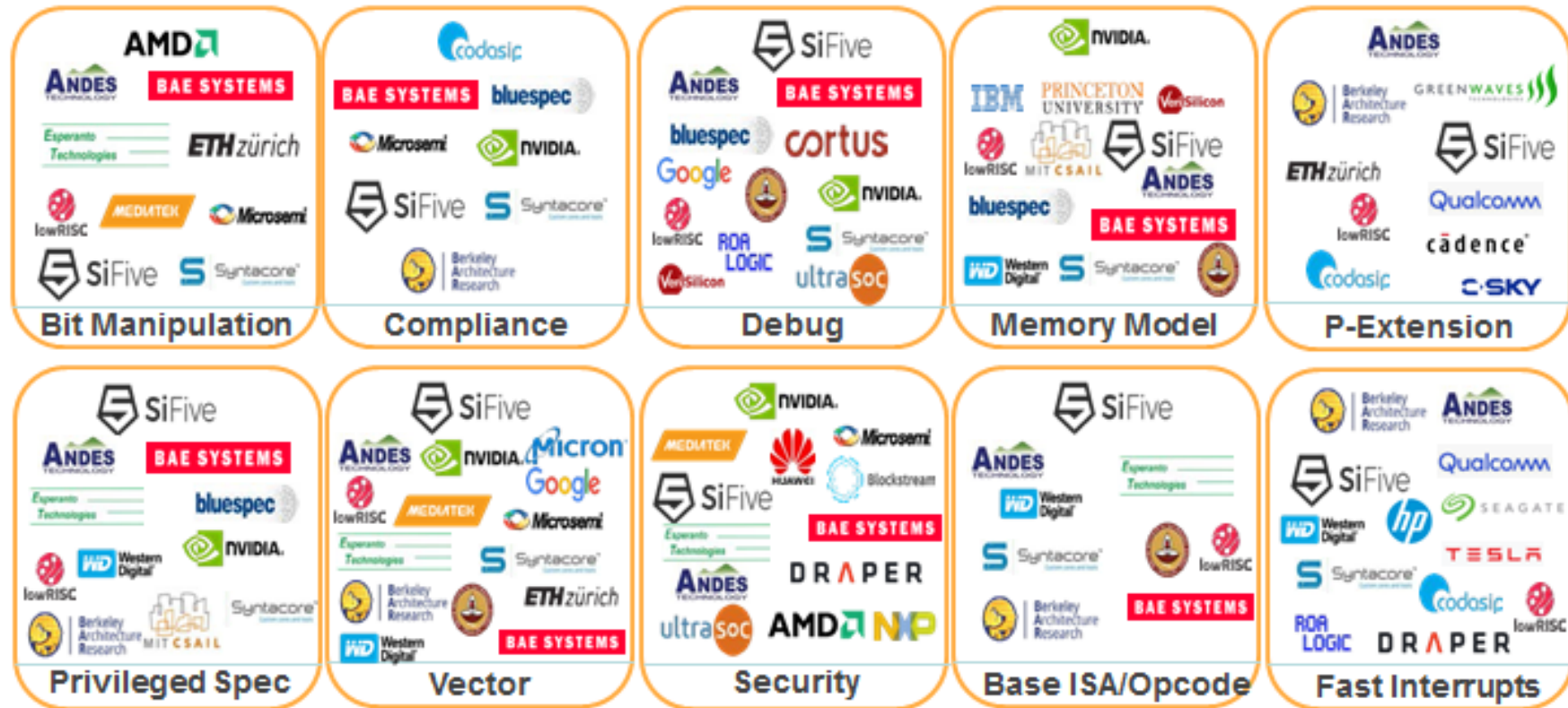
- Compiler optimizations, and SW stacks
- Comprehensive features in AndeSight IDE



# 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 provider**

**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 Ecosystem [knect.me](http://knect.me) to help IoT Developing

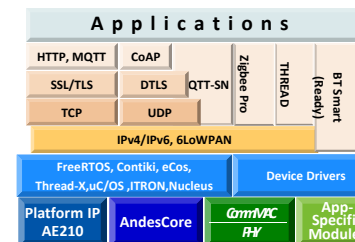
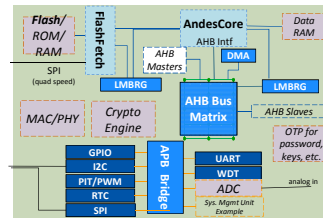
- to **knect** solutions - Silicon IP's, SW stacks, tools, applications, systems and products

## ❖ Includes:

- SoC IP Platforms
- Software Stack
- Development Boards
- Development Tools

## ❖ To Form a IoT League

- to **knect** chip vendors, partners, application developers, system vendors



**ectime™**



# FreeStart Program



## ❖ FreeStart Evaluation Program (FSEP)

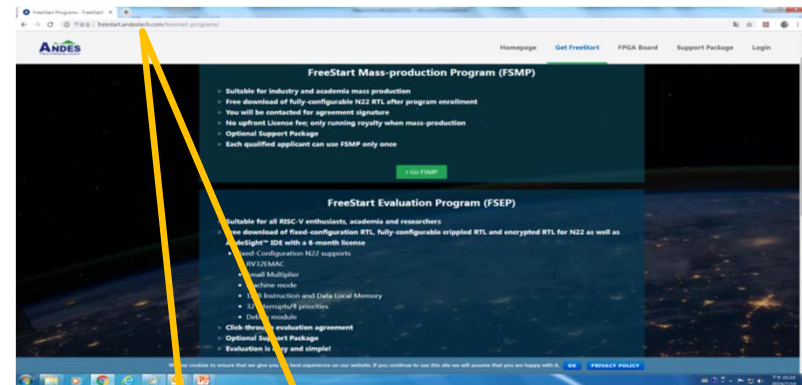
- For all RISC-V enthusiasts and educator/researcher
- Good for N22 evaluation and research project
- Fixed-Configuration N22 RTL
- Sign simple evaluation agreement directly on website

## ❖ 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)

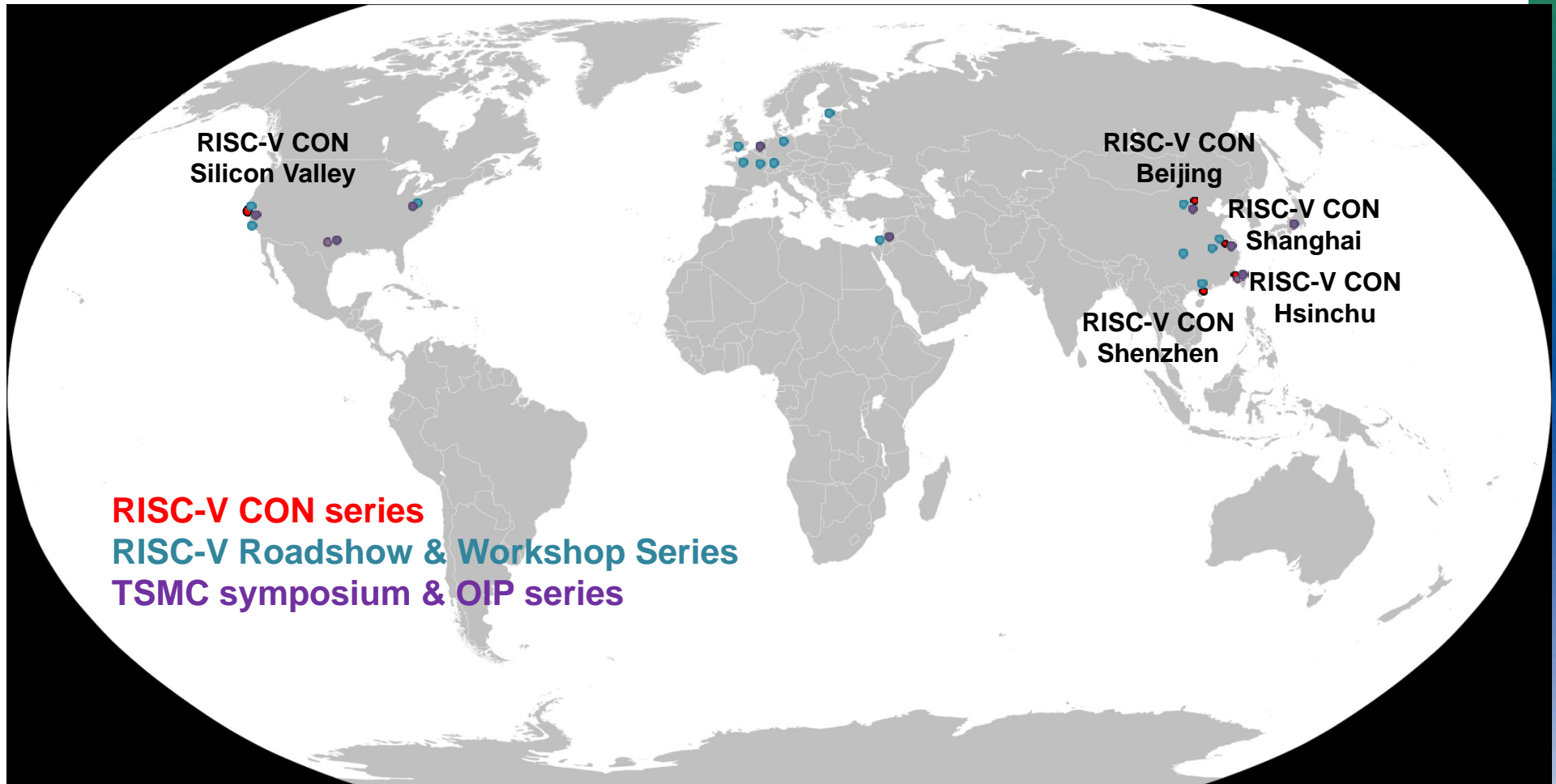
- For all
- \$20K for 1<sup>st</sup> year, including
  - 1 year e-service
  - FreeStart AE250 RTL
  - Corvette F1 FPGA board



For more info., please visit  
[www.andestech.com](http://www.andestech.com)



# 2019 Event Promotion



# Concluding Remarks

# Andes: Trusted Computing Expert



- ❖ Andes successfully rolled out the new series of RISC-V cores (w/ industry leading P-, V- and Custom-Ext. capability), custom computing value service and FreeStart program to extend more opportunities.
- ❖ Andes 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



# Thank You!



Andes Core™

[www.andestech.com](http://www.andestech.com)

# Q&A