



Q1 2020 Investor Conference

May 13th, 2020

Embedded wisely, Embedded widely

ememory

A hand is shown dropping a coin into a stack of coins. A small green plant with three leaves is growing out of the stack. The background is a soft-focus green and yellow bokeh.

IPR Notice

All rights, titles and interests contained in this information, texts, images, figures, tables or other files herein, including, but not limited to, its ownership and the intellectual property rights, are reserved to eMemory. This information may contain privileged and confidential information. Some contents in this information can be found in Logic Non-Volatile Memory (The NVM solutions from eMemory), published in 2014. Any and all information provided herein shall not be disclosed, copied, distributed, reproduced or used in whole or in part without prior written permission of eMemory Technology Inc.

eMemory, NeoBit, NeoFuse, NeoEE, NeoMTP, NeoROM, EcoBit and NeoPUF are all trademarks and/or service marks of eMemory in Taiwan and/or in other countries.

A hand is shown dropping a coin into a stack of coins. To the left, another stack of coins has a small green plant with three leaves growing out of it. The background is a soft-focus green and yellow.

Cautionary Statement

This presentation contains forward-looking statements, which are subject to risk factors associated with semiconductor and intellectual property business. It is believed that the expectations reflected in these statements are reasonable. But they may be affected by a variety of variables, many of which are beyond our control. These variables could cause actual results or trends to differ materially which include, but are not limited to: wafer price fluctuation, actual demand, rapid technology change, delays or failures of customers' tape-outs into wafer production, our ability to negotiate, monitor and enforce agreements for the determination and payment of royalties, any bug or fault in our technology which leads to significant damage to our technology and reputation, actual or potential litigation, semiconductor industry cycle and general economic conditions. Except as required by law, eMemory undertakes no obligation to update or revise any forward-looking statements, whether as a result of new information, future events, or otherwise.

Contents

1

Review of Operations

2

Future Outlook

3

Q&A

4

Appendix



A hand is shown dropping a coin into a stack of coins. A small green plant with three leaves is growing out of the stack. The background is a warm, golden-yellow color. The image is partially obscured by a white, brush-stroke-like graphic on the right side.

Review of Operations

Q1 2020 Financial Results

The EPS of Q1 2020 was 2.38 NTD, ROE was 39.5%.

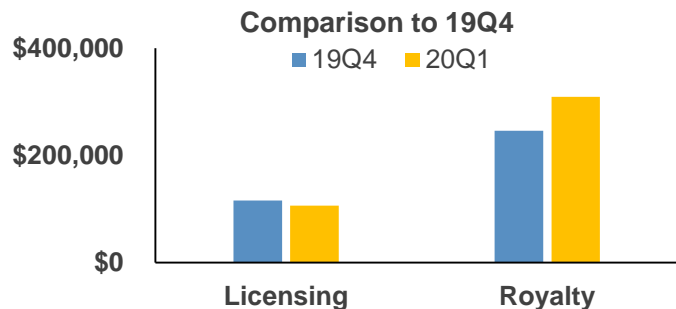
(thousands of NT dollars)

| | Q1 2020 | Q4 2019 | Q1 2019 | Change (QoQ) | Change (YoY) |
|--------------------|---------|---------|---------|--------------|--------------|
| Revenue | 415,436 | 361,896 | 395,061 | 14.8% | 5.2% |
| Gross Margin | 100% | 100% | 100% | - | - |
| Operating Expenses | 221,463 | 202,386 | 201,088 | 9.4% | 10.1% |
| Operating Income | 193,973 | 159,510 | 193,973 | 21.6% | 0.0% |
| Operating Margin | 46.7% | 44.1% | 49.1% | 2.6ppts | -2.4ppts |
| Net Income | 176,758 | 129,653 | 177,151 | 36.3% | -0.2% |
| Net Margin | 42.5% | 35.8% | 44.8% | 6.7ppts | -2.3ppts |
| EPS (Unit: NTD) | 2.38 | 1.74 | 2.39 | 36.8% | -0.4% |
| ROE | 39.5% | 30.2% | 38.9% | 9.3ppts | 0.6ppts |

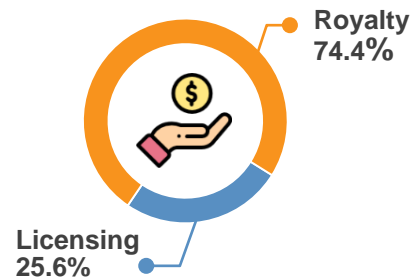
Note: Revenue of Q1 2020 in terms of US\$ is US\$13.9 mil, up 17.2% QoQ, up 8.1% YoY.

Revenue in Different Stream

Revenue up 14.8% QoQ and 5.2% YoY.



Revenue Breakdown



Revenue

| NT\$ Thousands | Q1 2020 | Q4 2019 | Q1 2019 | QoQ | YoY |
|----------------|----------------|----------------|----------------|--------------|-------------|
| Licensing | 106,446 | 115,944 | 105,824 | -8.2% | 0.6% |
| Royalty | 308,990 | 245,952 | 289,237 | 25.6% | 6.8% |
| Total | 415,436 | 361,896 | 395,061 | 14.8% | 5.2% |

| US\$ Thousands | Q1 2020 | Q4 2019 | Q1 2019 | QoQ | YoY |
|----------------|---------------|---------------|---------------|--------------|-------------|
| Licensing | 3,542 | 3,798 | 3,438 | -6.7% | 3.0% |
| Royalty | 10,336 | 8,047 | 9,405 | 28.4% | 9.9% |
| Total | 13,878 | 11,845 | 12,843 | 17.2% | 8.1% |

Q1 Revenue by Technology

The royalty of NeoFuse has a growth of 187.8% YoY.

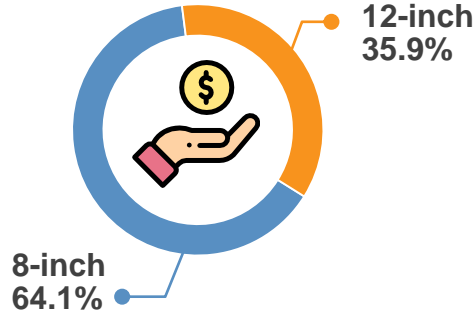
- ✓ The licensing revenue of NeoFuse increased 13.5% QoQ and 15.0% YoY. Its royalty revenue increased 40.8% QoQ and 187.8% YoY.
- ✓ The royalty revenue of NeoBit increased 19.9% QoQ but decreased 17.7% YoY. Its licensing revenue decreased 24.5% QoQ but increased 20.5% YoY.
- ✓ The licensing revenue of MTP (NeoEE+NeoMTP) decreased 49.2% QoQ and 66.1% YoY; while its royalty revenue increased 14.8% QoQ but decreased 12.6% YoY.

| Technology | Q1 2020 | | | | | | | | |
|------------|-----------------|--------------|--------------|-------------------|--------------|--------------|-----------------|--------------|--------------|
| | Total Revenue | | | Licensing Revenue | | | Royalty Revenue | | |
| | % of Q1 Revenue | Change (QoQ) | Change (YoY) | % of Q1 Licensing | Change (QoQ) | Change (YoY) | % of Q1 Royalty | Change (QoQ) | Change (YoY) |
| NeoBit | 53.8% | 12.8% | -14.7% | 22.6% | -24.5% | 20.5% | 64.5% | 19.9% | -17.7% |
| NeoFuse | 41.6% | 27.5% | 74.6% | 70.1% | 13.5% | 15.0% | 31.8% | 40.8% | 187.8% |
| PUF-Based | 0.1% | -85.9% | 100.0% | 0.6% | -85.9% | 100.0% | 0.0% | 0.0% | 0.0% |
| MTP | 4.5% | -22.5% | -45.5% | 6.7% | -49.2% | -66.1% | 3.7% | 14.8% | -12.6% |

Royalty Revenue by Wafer Size

12-inch wafer increased 50.4% QoQ and 13.7% YoY.

Q1 Royalty Breakdown



- ✓ 12-inch wafers contributed 35.9% of royalty, increased 50.4% sequentially and 13.7% YoY.
- ✓ 8-inch wafers contributed 64.1% of royalty, increased 15.0% sequentially and 3.3% YoY.

Royalty

| Wafer Size | Q1 2020 | | |
|------------|---------|--------------|--------------|
| | % of Q1 | Change (QoQ) | Change (YoY) |
| 8-Inch | 64.1% | 15.0% | 3.3% |
| 12-Inch | 35.9% | 50.4% | 13.7% |



Future Outlook

eMemory Embedded Everywhere

eMemory's IP seeks to penetrate across all the applications.

Core Tech



- ✓ **Product Applications:**
eMemory's IP are already applied into different applications, which includes PMIC, LCD driver, Sensors, RFID, OLED Driver, Connectivity IC, DTV, STB, SSD Controller, Bluetooth, TDDI, MCU, Fingerprint Sensor, Smart Meters, Surveillance, ISP, CIS, DRAM, embedded Flash and FPGA.
- ✓ **Future Target:**
AP, GPU, CPU, Flash, IoT, AI, autonomous driving



Security

- ✓ **The Future in Security Chip IP:**
The rapid growth in AIoT and 5G drive the demand for hardware security. OTP and PUF are indispensable for root of trust in hardware security.
- ✓ **PUF-based Security Solutions:**
To satisfy the market needs, eMemory developed a new series of PUF-based security solution, including PUFrt, PUFiot, PUFse and PUFflash.

Our Perspectives

eMemory continue to create value for the industry and our shareholders.

Licensing & Royalty



- ✓ Licensing:
 - NeoFuse and NeoPUF will continue to grow due to increasing advanced technology platforms and more comprehensive PUF-based security IPs.
- ✓ Royalty:
 - 8" wafers – content increase in 5G PMIC, medical demand for MCU, sensors
 - 12" wafers – 249 tape outs from 55nm-7nm in the pipelines ready for productions, applications including OLED, DDI, ISP, CIS, Bluetooth, TWS, Networking related IC, SSD controllers, video processor, STB, DTV, surveillance, and DRAM.

New Application & Technology Development



- ✓ For new applications:
 - PUF-based security IPs adopted by customers in AI, IoT, FPGA, Blockchain, and industrial automation.
 - Security platform cooperation with ARM.
- ✓ For new development:
 - Developed 6nm and 5nm plus (N5P) technology with leading foundry partners; design project tape out of 6nm chip.
 - Developed PUF into embedded flash platform. PUF-based IoT security solution, security elements and hardware security module IPs are under development.
 - Build PUF-based hardware security IP open platform, by integrating OTP, PUF, security-functioned IPs, and cryptographic algorithm IPs to provide total security solutions for AIoT and 5G applications.



Q&A



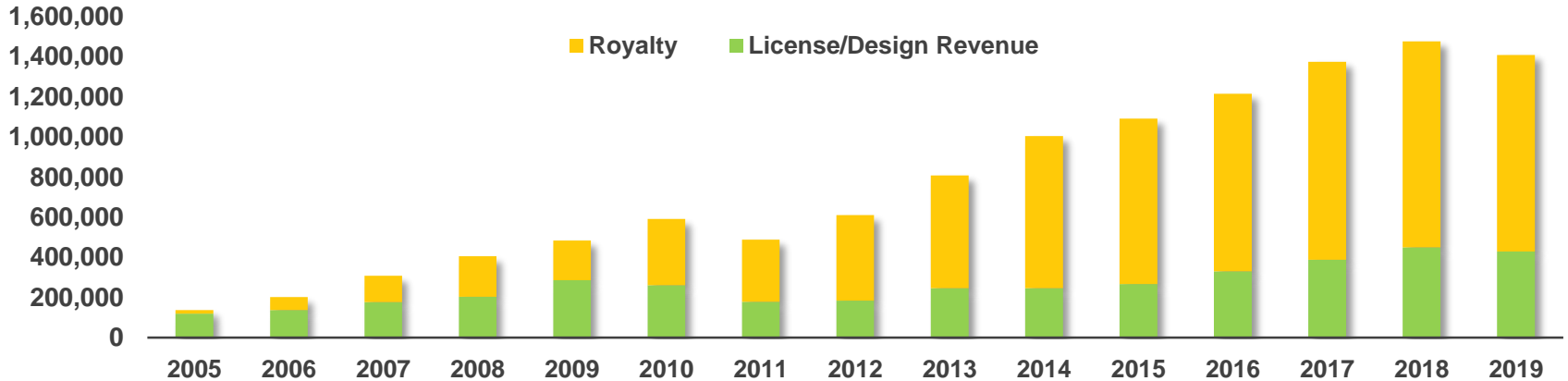
Appendix

Company Overview

eMemory is the global leader of embedded non-volatile memory IP.

Revenue Trend

(Unit: NT\$ 1,000)



**Founded
In 2000**

Based in Hsinchu, Taiwan.
IPO in 2011. Over 28M wafers
shipped.

**700+
Patents Issued**

254 pending patents. 269
employees with 70% R&D
personnel.

**Best IP Partner
With TSMC**

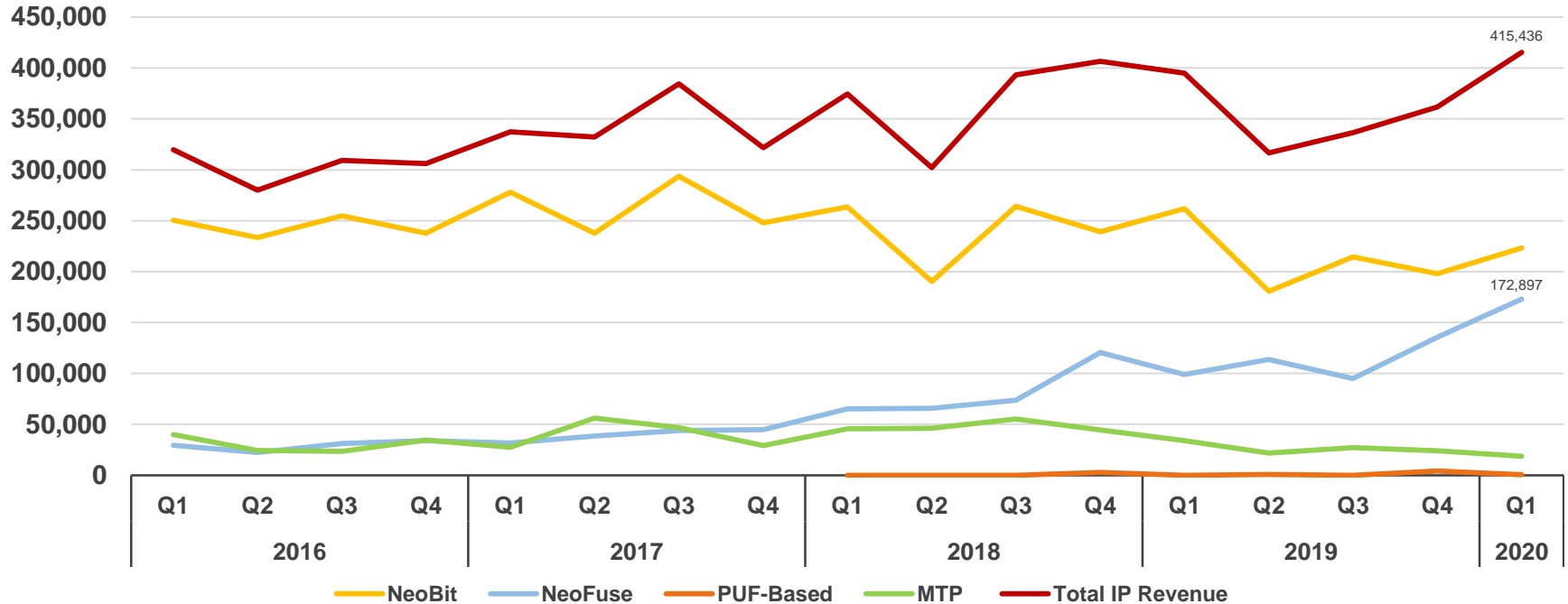
TSMC Best IP Partner Award
since 2010.

Revenue Trend by Product Line

NeoFuse will continue to drive revenue in the future as it is adopted by more advanced nodes.

Revenue Trend

(Unit: NT\$ 1,000)



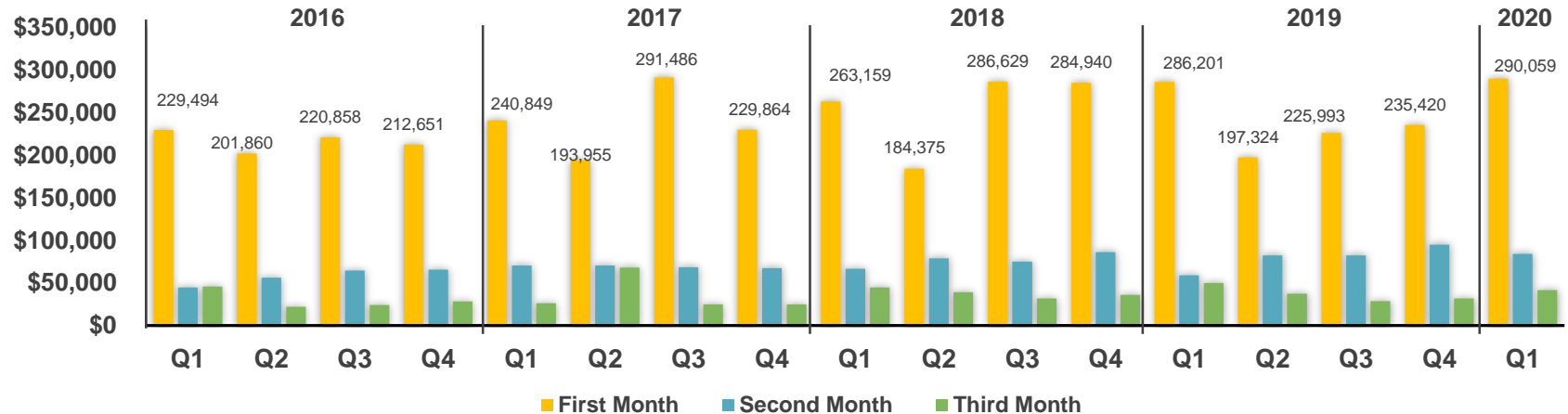
Quarterly Revenue Pattern

eMemory's quarterly revenue pattern.

- ✓ 1st month: Receive **License Fees** of the month and **Royalty** from most foundries on previous quarter's wafer shipments.
- ✓ 2nd month: Receive **License Fees** of the month and **Royalty** from other foundries.
- ✓ 3rd month: **License Fees** Only.

Note: One foundry pay royalty semiannually, reported in Jan and July revenue.

(Unit: NT\$ 1,000)



Worldwide Customers

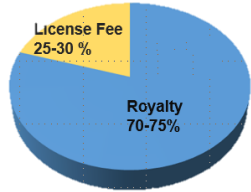
Our IP solutions are adopted by leading foundries, IDMs and fabless worldwide.

| Country | Foundry | IDM | Fabless |
|---------------|---------|-----|---------|
| Taiwan | 4 | 1 | 291 |
| China | 8 | 0 | 744 |
| Korea | 4 | 0 | 84 |
| Japan | 4 | 7 | 61 |
| North America | 1 | 1 | 296 |
| Europe | 2 | 1 | 142 |
| Others | 1 | 0 | 56 |



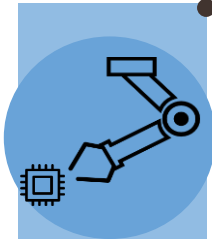
Business Model

Recurring royalty is the backbone of our business.



- ✓ 70-75% revenue are from royalty based on wafer production
- ✓ More adoption = more volume shipment
- ✓ More advanced node wafers = higher ASP per wafer

Revenue Breakdown



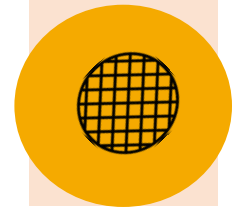
License Fee
Foundries Process
Development

2-3 years



Design License Fee
Fabless Product
Development

2-3 years



Royalty
Wafer Mass Production

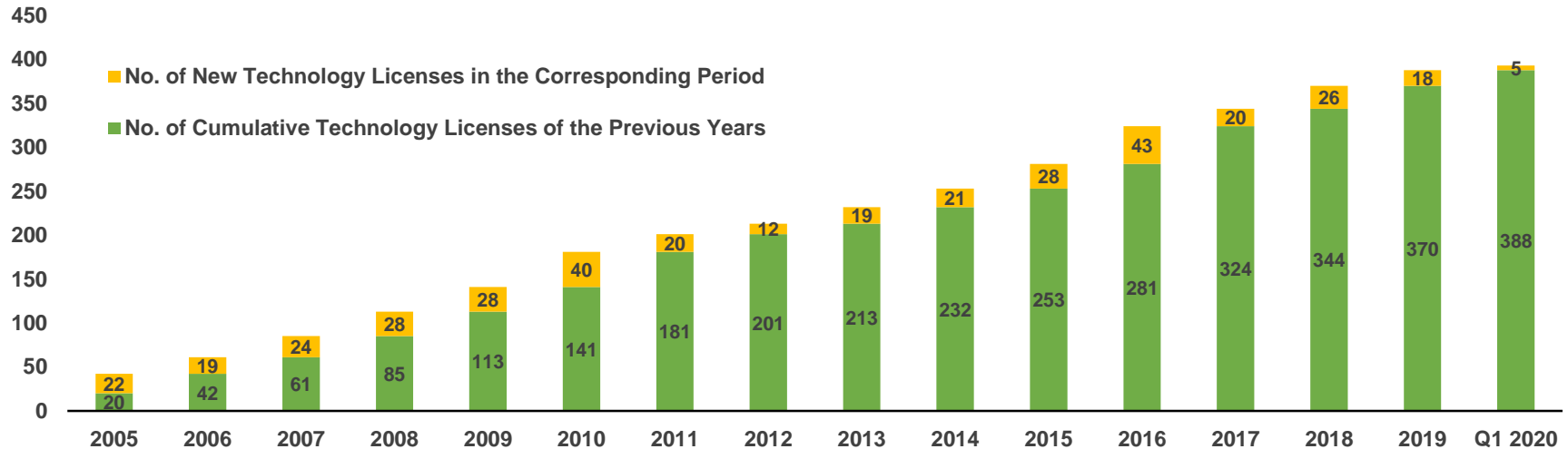
Technology Licenses

Cumulative technology licenses.

Number of Licenses

| Year | 2016 | 2017 | 2018 | 2019 | Q1 2020 |
|---------|------|------|------|------|---------|
| License | 43 | 20 | 26 | 18 | 5 |

Note: Terms (including number of process platforms and licensing fees) for each technology license are set contractually. Payments are made according to set milestones, and there are no particular seasonal factors involved.



New Technology Under Development

Products in different process nodes.

- ✓ New technologies are being developed for **89** platforms by Q1 2020.
- ✓ **5** licensing contracts were signed.

| Technology | 5/6nm | 7/10nm | 12/16nm | 22/28nm | 40nm | 55/65nm | 80/90nm | 0.11~ 0.13um | 0.15~ 0.18um | >0.25um |
|------------|-------|--------|---------|---------|------|---------|---------|-----------------|-----------------|---------|
| NeoBit | - | - | - | - | - | 1 | 2 | 9 | 5 | 1 |
| NeoFuse | 2 | 1 | 3 | 12 | 4 | 9 | 5 | - | 1 | - |
| NeoPUF | 1 | - | - | 3 | 1 | 1 | - | - | - | - |
| MTP | - | - | - | - | - | 2 | 4 | 11 | 11 | - |

Note: As of Mar 31st, 2020

Technology Development

Developments by process nodes.

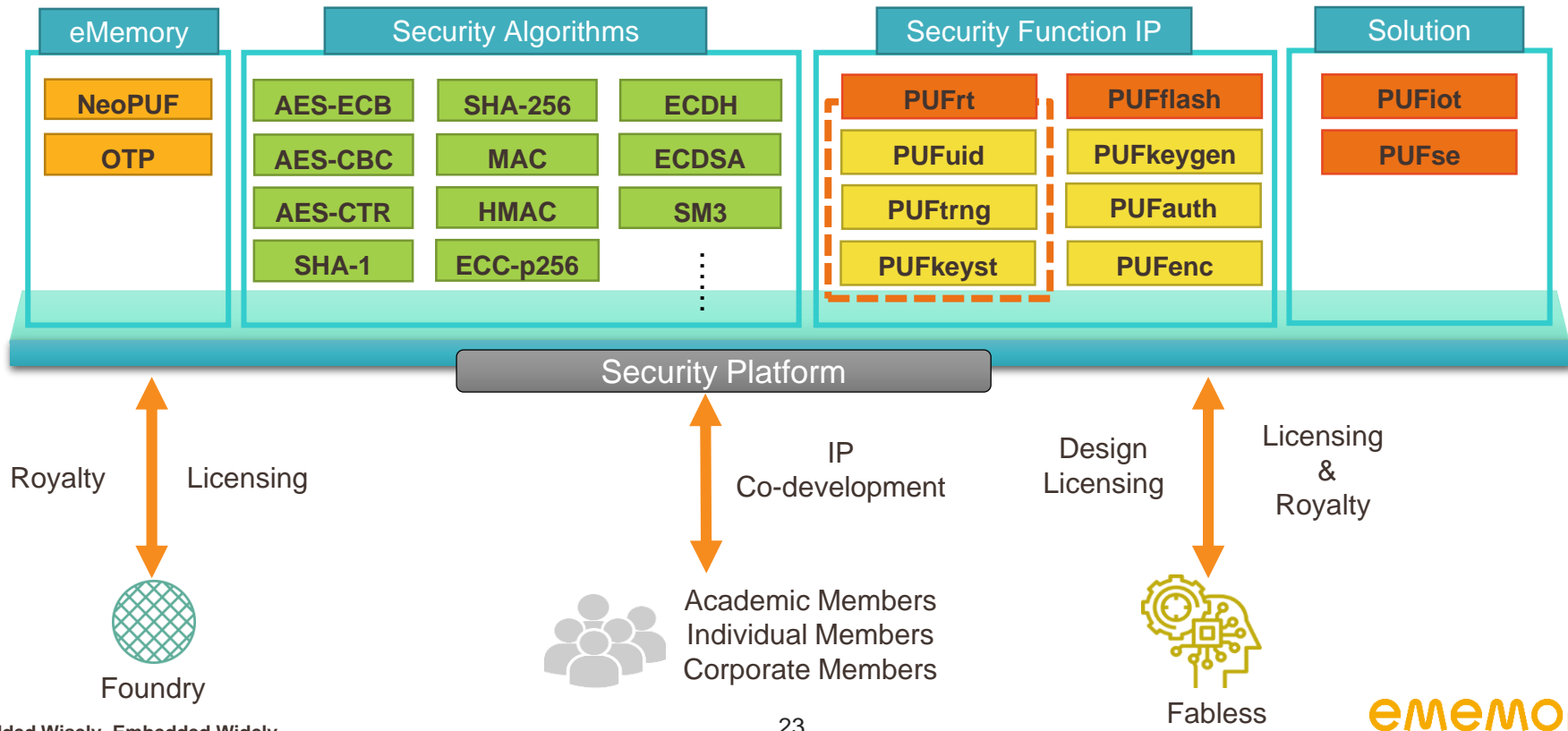
| 12" Fabs | Production | Development | IP Type | Process Type |
|--------------|------------|-------------|---------------|--|
| 5/6nm | 0 | 3 | OTP, PUF | FF |
| 7/10nm | 2 | 1 | OTP, PUF | FF, FF+ |
| 12/16nm | 3 | 3 | OTP | FF, FF+ |
| 22/28nm | 25 | 15 | OTP, PUF | LP/ULP/ULL, HPC/HPC+, HV-OLED, DRAM, SOI |
| 40nm | 14 | 5 | OTP, PUF, MTP | LP/ULP, E-Flash, HV-DDI/OLED |
| 55/65nm | 23 | 13 | OTP, PUF, MTP | LP/ULP, E-Flash, HV-DDI/OLED, DRAM, CIS, BCD, PM |
| 80/90nm | 16 | 10 | OTP, MTP | HV-DDI/OLED, LP, Generic, BCD |
| 0.11/0.13um | 15 | 7 | OTP, MTP | HV-DDI, BCD, Generic |
| 0.18um | 1 | 2 | OTP, MTP | BCD, Generic |
| Total | 99 | 59 | | |

| 8" Fabs | Development | IP Type | Process Type |
|-------------------|-------------|---------------|---|
| 90nm | 1 | OTP | HV-DDI, LL, BCD |
| 0.11/0.13um | 13 | OTP, MTP, PUF | HV/HV-MR, BCD, LP/LL, CIS, Green, Flash, SOI, Generic |
| 0.152/0.16/0.18um | 15 | OTP, MTP | HV/HV-MR, BCD, LP/LL, CIS, Green, Generic |
| 0.25um | 1 | OTP | BCD |
| 0.35um | 0 | OTP | UHV |
| Total | 30 | | |

Note: As of Mar 31st, 2020

Security Function IP Platform

eMemory's security IP blocks enable a wide range of different security functions.



PUF-based Hardware Security IP

NeoPUF provide the foundation for developing eMemory's security function IPs.

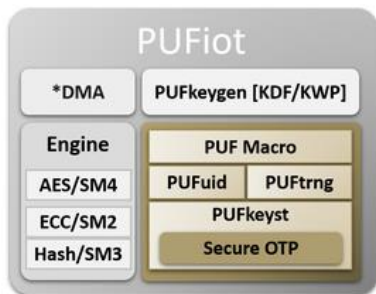
Standard Solution: PUFrt



Feature Highlights:

- ✓ Fast & low-power tRNG
- ✓ Reliable chip ID
- ✓ Advanced OTP read / write protection

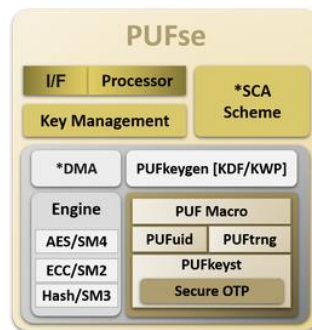
Premium Solution: PUFiot



Feature Highlights:

- ✓ PUFrt integrated
- ✓ OSCCA compliance
- ✓ KDF / KWP NIST compliance
- ✓ BUS & DMA support

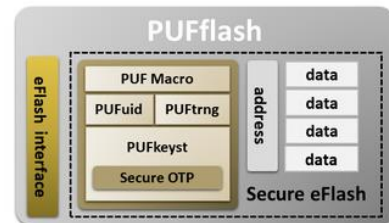
High-End Solution: PUFse



Feature Highlights:

- ✓ PUFiot integrated
- ✓ OTA support
- ✓ Secure boot
- ✓ Side channel attack resistant

Secure Embedded: PUFflash



Feature Highlights:

- ✓ Secure data storage
- ✓ No performance side-effect
- ✓ No extra integration burden

Root of Trust

Root of Trust guarantees a secure system operation.

- ✓ **Root of Trust (RoT)** is a **SOURCE** that can always be trusted within a cryptographic system.
- ✓ **Cryptographic Security** is dependent on **KEYS** to encrypt and decrypt data and perform functions, such as digital signatures.



Always Trusted Keys

Derived from Nature Randomness



PUF

5G – A Connected World

5G facilitates multi-services in diverse application scenarios.

uRLLC (ultra Reliable & Low Latency Communications)



mMTC (massive Machine Type Communications)



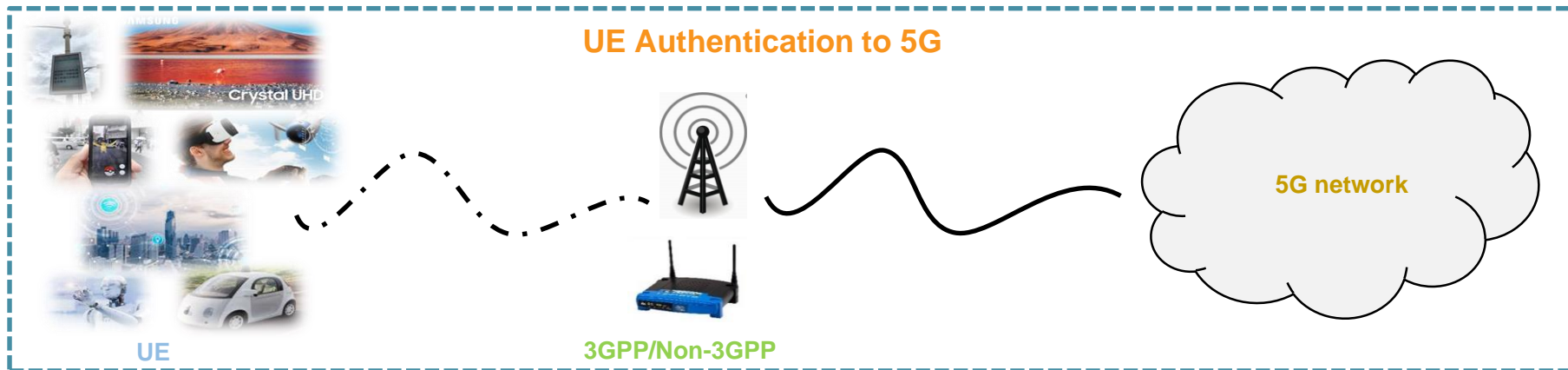
eMBB (enhanced Mobile Broadband)



Abbreviation:

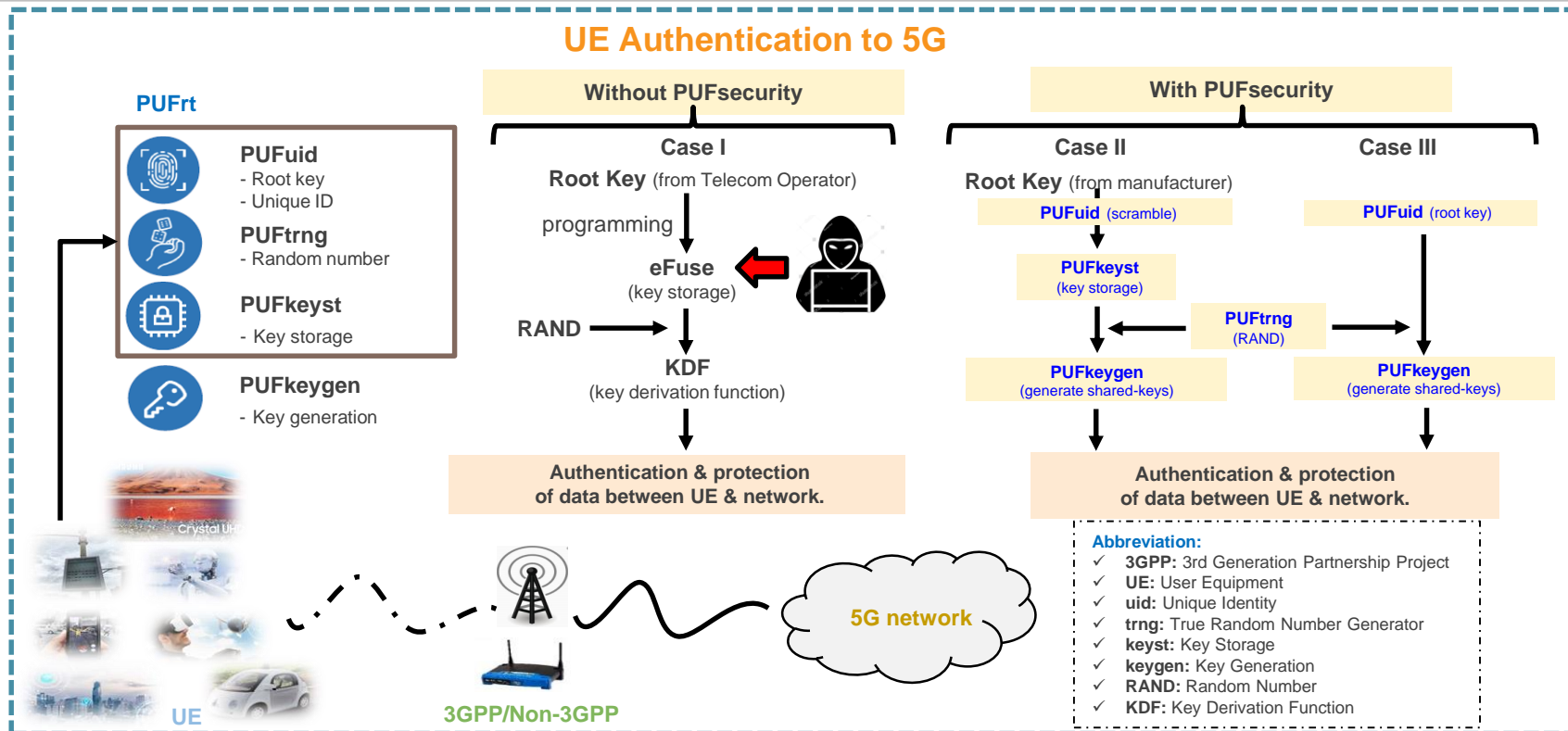
- ✓ **3GPP**: 3rd Generation Partnership Project
- ✓ **UE**: User Equipment

UE Authentication to 5G



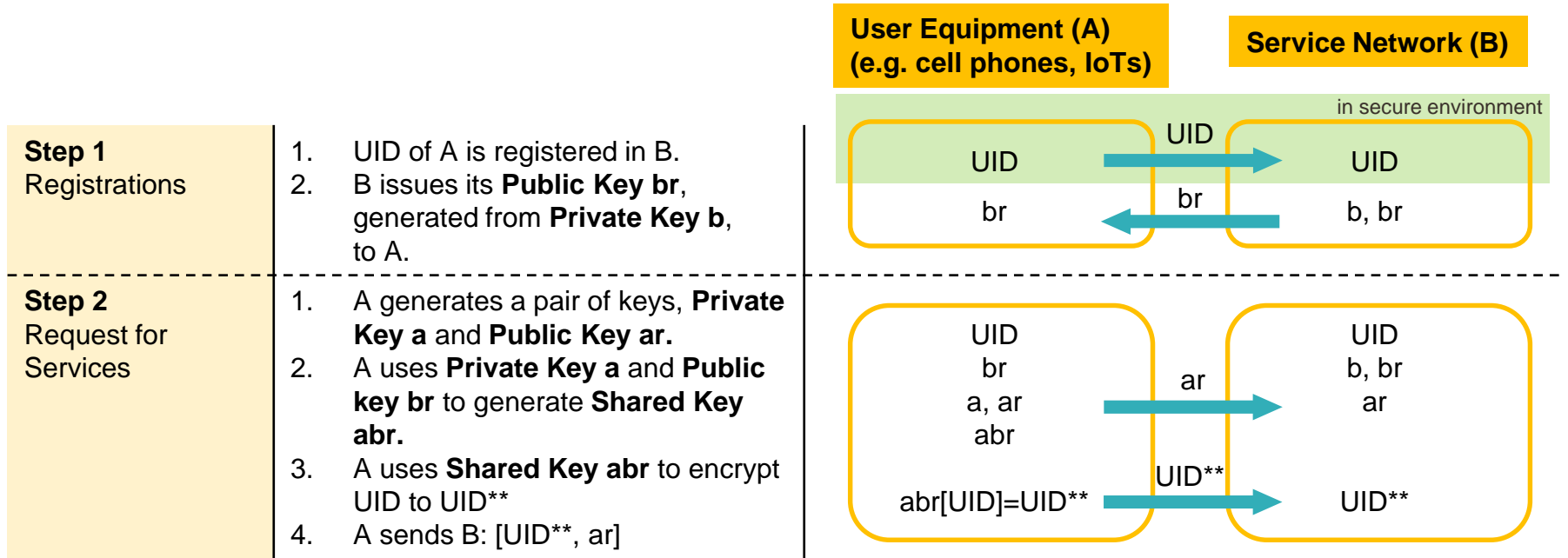
PUFsecurity Application in 5G

PUFsecurity enables secure authentication & data protection between UE & network.



Authentication in 5G

Unique IDs play a critical role in 5G authentication.

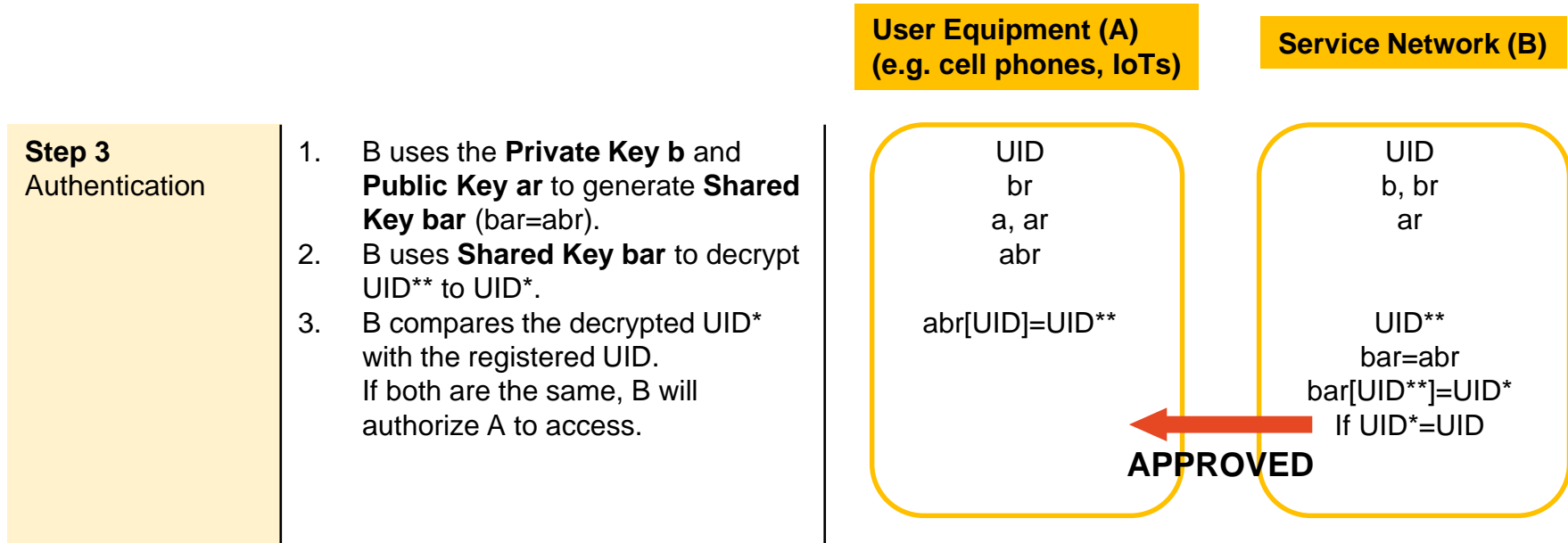


Note:

1. If UID is created by PUF_{UID}, it does not need to be done in secure environment.
2. UID stored in PUF_{rt} is much more secure than stored in e-fuse.
3. For every access, the user equipment needs to create a new pair of keys by a key generator, e.g. PUFkeygen.

Authentication in 5G – cont.

Unique IDs play a critical role in 5G authentication.



Note:

1. During the authentication process, only user's Public Key and encrypted UID are exposed.
2. Hackers do not have B's Private Key, therefore, UID cannot be decrypted by hackers.

A hand is shown dropping a coin into a stack of coins. A small plant with three leaves is growing out of the stack. The background is a warm, golden-yellow color. The image is framed by a white, brush-stroke-like border on the right and bottom.

THANKS

Embedded wisely, Embedded widely