

# Group CEO Message



## Practicing the Anritsu Way to Continuing Creating Value

### Hirokazu Hamada

Representative Director, President of Anritsu  
Group CEO  
Measurement Business Group President

Anritsu was founded in 1895, the year of the world's first successful wireless communication experiment, and 2019 will be the 124th year since its original foundation. Throughout our history, we have always been a pioneer in pursuing the latest information and communications technology. Various innovations in telecommunications infrastructure have dramatically revolutionized society and enriched our lives by "connecting" people moving the global society forward. With "measuring" technology as our core competency, Anritsu has supported many advances in the field of information communication, as well as in food and pharmaceuticals. Under our company philosophy of "Sincerity, Harmony, and Enthusiasm" and "Original & High Level," Anritsu will continue to contribute to the development of a society that is safe, secure, and connected. **"envision: ensure"** Please look to Anritsu in the future.

## GLP2020 First Year Review

### The Measurement Business captured initial development demand for 5G chipsets and devices

Specifications for 5G, the next-generation communication system, are being developed at 3GPP. The standardization of 5G NSA-NR was completed in December 2017, while that of 5G SA-NR was completed in June 2018, thereby defining all of the specifications of the major functions related to 5G ultrahigh-speed communication. Specifications for ultra-low latency and multiple simultaneous connections, which are expected to expand use cases, are now being reviewed at 3GPP, and standardization is scheduled for completion in early 2020. As a result, the roadmap for 5G commercial services by major carriers in each country is becoming concrete, and the commercialization schedule is progressing smoothly. In

December 2018, advance rollout of 5G services using mobile routers started in North America and South Korea, and 5G smartphone services also began in April 2019.

Major device vendors in the US and Asia have developed devices for 5G smartphone services, and began releasing them, one after the other, at the MWC2019 trade fair in Barcelona, Spain. Against this backdrop, the Measurement Business Group has focused on developing solutions for capturing development investment demand for 5G and enhancing organizational structures, and has captured initial development demand for 5G chipsets and devices.

### The PQA Business enjoys a robust market and works on strengthening overseas sales

In the PQA Business, there has been increased investment in automation of processed food production lines, and demand for X-ray-based quality assurance for

## Core policy of our medium- to long-term business strategy

Realize profitable, sustainable growth by reliably catching growth drivers

	Market annual average growth rate (Anritsu estimate)	Vision/ Growth Drivers	Medium- to long-term guidelines	
			Sales growth rate	Operating margin
Test and Measurement Business	3-5%	<b>Become a leading company in supporting a 5G/IoT society</b> 1) 5G, LTE-Advanced 2) IoT/Automotive, Connectivity 3) IP Data traffic/Cloud Services	≥7%	≥20%
PQA Business	3-5%	<b>Become a world-class quality assurance solutions partner</b> Expand from contaminant detection to the quality assurance market	≥7%	≥12%
Consolidated	—	—	—	≥18%
ROE	—	—	—	≥15%

contaminants and packaging, etc. has been steadily expanding. In this environment, the PQA Business Group has worked to increase the competitiveness of solutions centered on X-ray technology, and to expand and enhance our overseas sales systems.

### GLP2020 first year exceeds our plan

In the Group's consolidated results for FY2018, which was the first year of GLP2020, both revenue and operating profit exceeded the initial plan. Revenue was 99.7 billion yen against a target of 92.0 billion yen, while the operating profit ratio was 11% against a target of 7%.

## Toward Achievement of GLP2020

### Increased business risk due to external factors

Although the global economy has been on a trend toward recovery, uncertainty regarding the future is growing due to factors such as the UK's exit from the EU, intensified US-China trade friction, and trade confrontations caused by protectionism.

### The Test and Measurement Business aims to become a leading company in the 5G development market in 2019, the initial year of 5G

2019, which is the second year of GLP2020, is regarded as the initial year of 5G, during which pre-services and trials have

## GLP2020: Planned sales and operating profit

		GLP2020			
Indicator		FY2018 (Plan)	FY2018 (Actual)	FY2019	FY2020
Revenue		92.0 billion yen	99.7 billion yen	102.0 billion yen	105.0 billion yen
Operating profit		6.6 billion yen	11.2 billion yen	10.0 billion yen	14.5 billion yen
Operating margin		7%	11%	10%	14%
Profit		5.0 billion yen	9.0 billion yen	7.5 billion yen	11.0 billion yen
ROE		7%	11%	8%	12%
Test and Measurement Business	Revenue	60.0 billion yen	68.2 billion yen	69.0 billion yen	70.0 billion yen
	Operating profit	3.5 billion yen	9.4 billion yen	8.0 billion yen	10.0 billion yen
	Operating margin	6%	14%	12%	14%
PQA Business	Revenue	23.5 billion yen	23.1 billion yen	24.5 billion yen	26.0 billion yen
	Operating profit	2.0 billion yen	1.6 billion yen	2.0 billion yen	3.0 billion yen
	Operating margin	9%	7%	8%	12%

(Reference) Expected exchange rates for GLP2020: 1 USD=105 yen, 1 euro=125 yen

been started around the world. In Japan, 5G pre-service will start in line with the Rugby World Cup in September. Furthermore, the standardization of 3GPP Release 16 is scheduled for completion in March 2020. Release 16 will enable mission-critical applications, with ultra-low latency and multiple simultaneous connections that are characteristic of 5G, and investment in the development of chipsets and devices that are compliant with this standard are expected to start in 2020. Afterwards, preparations for the full-scale commercialization of 5G are expected to accelerate. On the other hand, investment for existing LTE is expected to continue to be constrained or shrink. In this environment, the Measurement Business Group aims to become a leading company in the 5G development market, by providing timely solutions that are closely adapted to commercialization plans in countries around the world.

### The PQA Business to develop overseas markets and become a world-class quality assurance solutions partner

The PQA Business has a vision of becoming a world-class quality assurance solutions partner. The growth driver is expansion of quality assurance needs for the food and pharmaceuticals market. To maintain a high growth rate, the PQA Business will need to maintain its competitive advantage in the Japanese market and increase its presence in overseas markets outside Japan. As immediate measures, we will promote the development of markets



## Group CEO Message

### Basic Policy of Management Strategy

- Prosecure the policy “Continuous profitable growth”
- Make our best to accomplish 2020VISION/GLP2020

★ GLP2020 Plan = FY2018~FY2020



outside Japan putting the focus on the advanced markets in Europe and the US, where demand is expected to grow, with X-ray inspection systems as our key solution. To improve productivity, we will also strengthen investment and improve business processes. With a view toward future growth, we will make a full-scale entry into the European market and the pharmaceuticals market.

By implementing these measures, we aim to achieve revenue of 105 billion yen as well as an operating profit ratio of 14% for the consolidated Group in FY2020.

## Toward “Beyond 2020”

### Aiming for stable growth beyond 2020 with five pillars

“Beyond 2020” was launched to achieve sustainable growth toward 2020 and beyond. The current pillars are “5G communication” for the Test and Measurement business and “food safety” for the PQA Business. Among these, “5G communication” is situated in the mobile business, which is highly volatile and would experience a decline in business performance if future investment were to end. Through “Beyond 2020” we aim to become a stable and highly profitable company by further strengthening “5G communications” and “food safety” while adding focuses on “5G utilized automobiles,” “pharmaceutical safety,” and “non-communication T&M business” to form 5 pillars that

are resistant to the volatility of the mobile market, and can consistently achieve revenue exceeding 100.0 billion yen.

### Toward the realization of new business during the next GLP2023

Our new business field “non-communication measurement business” is not susceptible to the volatility of the mobile market. We will cultivate such business where we can leverage Anritsu’s competencies also taking into account possible tie-ups and M&As. The department responsible for developing this new business has been active since last year, and is planning to present specific details and numerical plans in “GLP2023,” Anritsu’s next three-year plan.

### The mind of a company full of frontier spirit

As “Beyond 2020” starts, we will cultivate a culture that will raise new shoots inside the company. We believe that “Beyond 2020” can be realized by offering full support to employees who try new things, and will provide an environment in which everyone can challenge themselves.

Anritsu is a company with a history spanning more than 120 years. However, we cannot simply stick with tradition. We will stay true to our mind as “a company full of frontier spirit,” by constantly incorporating the latest technologies and taking on new challenges, so that we will build the foundations of the next-generation of Anritsu.

### Set out for Beyond 2020

- Sustainable growth in 2020 and beyond
- Become a highly profitable company.  
Operating margin of 18%
- A company that regularly earns over 100.0 billion yen.



### Resolve social issues by realizing Beyond 2020

## Sustainability Management

### Sustainability management contributing to building a “5G/IoT society” that shares the future vision of the SDGs

Anritsu determined its “Sustainability Policy” in April 2018, and is promoting sustainability management that seeks to improve our corporate value by contributing to the solution of global social issues through sincere corporate activities symbolized by the Anritsu Way. Along with initiatives toward sustainable growth from 2020 and onward, Beyond 2020 includes projects aimed at contributing to the achievement of the SDGs for 2030 through our existing businesses.

In the future “5G/IoT society” envisioned by Anritsu, all kinds of things would be connected, resulting in the creation of new added-value. This vision of the future, which combines economic advancement with solving social issues is based on “Society 5.0,” the highest evolution of information and communication technology, that is in other words contributing to the sustainability of society while building a society that provides comfortable, vibrant, and high-quality living.

This vision is similar to the future vision of the SDGs, which will transform our world. We believe that sustainability management means the contribution for solving social issues using SDGs as a compass.

### In the mind of Anritsu as “a company full of frontier spirit.”

We introduced the concept of sustainability to our existing operations in FY2018, marking this as the fiscal year in which sustainability began to permeate our company. Regarding CO<sub>2</sub> emissions, which have a major impact on climate change and represent one of the most important issues for a sustainable society, in March 2019 we committed to the initial stage of the process for obtaining SBT\* certification. Although we are still in the process of finalizing the details of our reduction plan, as an investment for the future, we will also be increasing solar power generation for renewable energy from the current fiscal year onwards. In addition, to reduce risks including child labor, human trafficking, and forced labor, we will survey and audit our suppliers in order to promote business activities that respect human rights.

Through communication with all of our stakeholders, and utilizing the mind of “a company full of frontier spirit” in our businesses, Anritsu will continue to contribute to the sustainability of a safe and secure society.

\*SBT (Science Based Targets): Targets for reductions in greenhouse gases that are in line with the science-based knowledge to maintain a global temperature rise of less than 2°C (and more ambitiously, of less than 1.5 °C), compared with pre-industrial temperatures.



# CFO Message



## Achieving “Sustainable Growth with Profit” by Strengthening Strategic Investment and Evolving Cash Flow Management

**Akifumi Kubota**

Director  
Executive Vice President  
CFO

The biggest issues for our GLP 2020 is to: restore growth in our core business; make improvements to operating profit ratio, a key pillar; raise ROE; and conduct investment in growth that is not affected by mobile technology evolutionary cycles. To that end, we conduct our management in a manner that places a high level of importance on capital cost, maximizes cash generation, and enhances corporate value.

### Enhancing Corporate Value

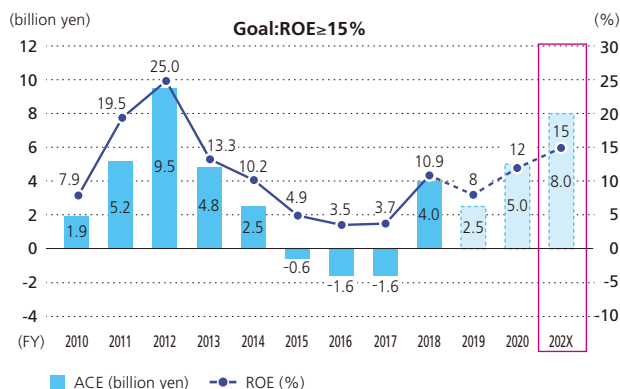
We have set two KPIs as indices for enhancing the measurement of corporate value. As a numerical target, we use ROE, due to its ease of comparability with other companies, while as a quantitative target, we use ACE\*<sup>1</sup> (Anritsu Capital-cost Evaluation), an original index that measures economic added-value. ACE is defined as “after-tax operating profit minus the cost of capital.” Unless a level where “after-tax operating profit exceeds the cost of capital” is achieved, we do not regard the situation as having positive economic added-value; that is, no corporate value will be created. The factors (drivers) and main priority issues for enhancing and increasing ROE and ACE are indicated in the diagram below.

GLP2020 and Beyond 2020 will work towards

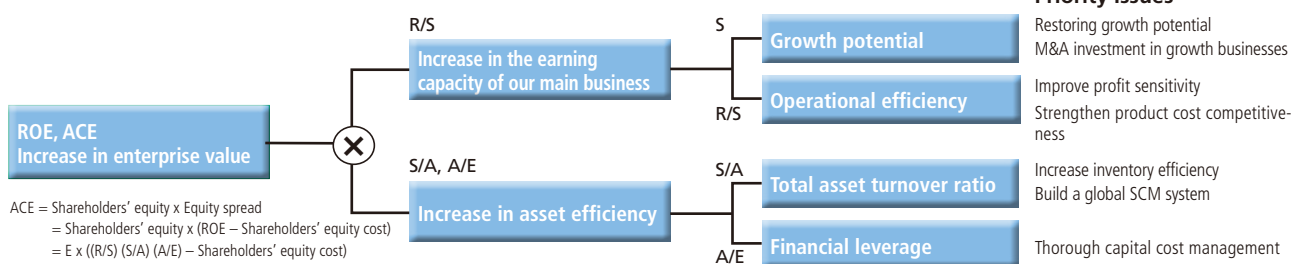
improving each of these factors, with a goal of achieving an ROE of 15%.

\*1 ACE (Anritsu Capital-cost Evaluation): after-tax operating profit - cost of capital

#### ACE and ROE trends and targets



#### ACE Drivers for Corporate Value and Priority Issues



## Aiming for 15% ROE

ROE is analyzed using three factors: "profitability," "efficiency," and "leverage." Our initiatives to target each of these factors are listed below.

### Profitability

#### Investment to realize growth

For the Test and Measurement Business, which is our main strength, we will focus on strengthening 5G competitiveness, while for the PQA Business, we will focus on investments aimed at global business development.

We have adopted development ROI (Return on Investment) as the standard for investment level, and are working to improve investment efficiency, with the goal of the development ROI (gross profit/development investment) of 4.0 or higher.

To improve profitability, we are also actively working to improve our cost structure. For example, we are taking active steps to achieve higher efficiency in our sales activities and improved business processes in our corporate department, by managing and seeking to improve cost per order (CPO) in each sales region, with the goal of reviewing the cost structure in each business segment.

### Efficiency

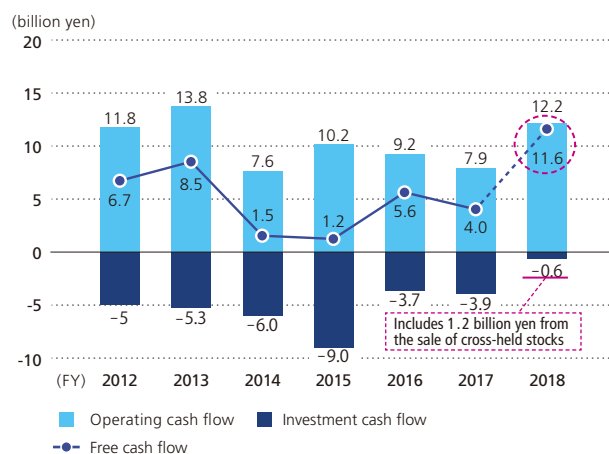
#### Thorough cash flow management

To achieve sustainable growth investment, it is essential to generate more cash flow. Our goal is to improve our operating cash flow margin to 13%, and to raise our CCC<sup>\*2</sup>, which is a cash flow improvement index, to 120 days in the fiscal year ending March 31, 2021. These targets will be realized through improved profitability via cost reductions and more efficient spending, as well as improvements in asset efficiency, such as by reducing inventory and promoting the collection of accounts receivable.

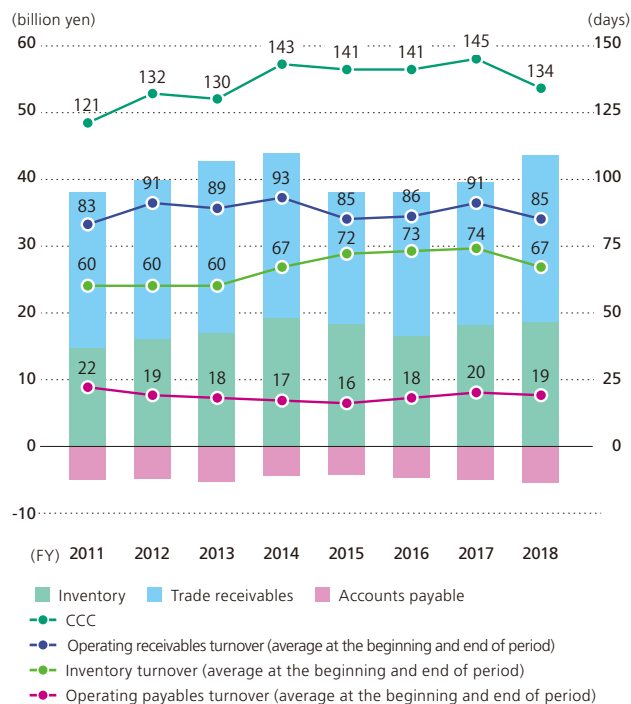
Moreover, as part of our capital cost-conscious management approach, we are also focusing on cash flow management in each division. As specific measures, we have created a balance sheet for each division, and are

working on new management accounting practices, such as visualizing changes in cash and working capital. These measures are aimed at improving capital efficiency management in each division.

#### Trends in cash flow



#### Trends in CCC



\*2 CCC: Cash Conversion Cycle

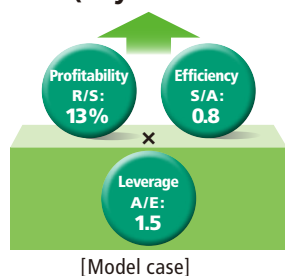
## CFO Message

### Leverage

#### Building a robust financial structure

Our core policy for building a robust financial structure is to maintain a capital adequacy ratio  $\geq 60\%$  and a debt-to-equity ratio (D/E)<sup>\*3</sup>  $\leq 0.3$ . In a rapidly changing market, having a strong financial base that supports medium- to long-term growth is extremely important. Anritsu's robust financial base has been evaluated, and according to the rating by R&I (Rating and Investment Information, Inc.) as of March 31, 2019, our short-term rating is "a-1" and our long-term rating is "A-."

#### 15% ROE (Beyond 2020 Target)



#### ROE target: Factor breakdown

$$\text{ROE} = \frac{\text{Net income}}{\text{Equity}} = \frac{\text{Net income}}{\text{Revenue}} \times \frac{\text{Revenue}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}}$$

Profitability      Efficiency      Leverage

	Profitability	Efficiency	Leverage	ROE
FY2018	9%	0.8	1.5	10.9%
Beyond 2020	13%	0.8	1.5	15%

\*3 Debt-to-equity ratio (D/E): Interest-bearing debt/Equity attributable to owners of the parent company

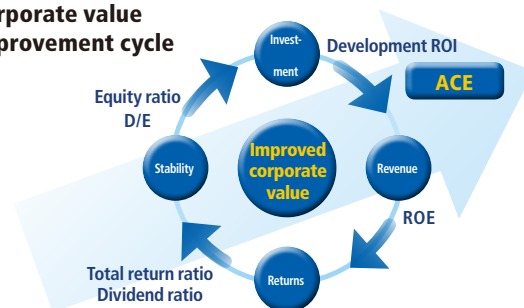
#### FY2018 initiatives and results

In our main Test and Measurement Business, the ROE of the entire company recovered to 10.9% by capturing 5G initial development demand and achieving an operating profit ratio of 14%. We also verified our cross-held stocks in accordance with the principles of the Corporate Governance Code. As a result, in the current fiscal year (FY2018), we sold stocks for which continued ownership was no longer beneficial. By doing so, as of March 31, 2019, the book balance of listed shares related to policy holdings fell to roughly 0.1% of total assets. Going forward, we intend to continue working to reduce cross-held stocks, from the perspective of improving asset efficiency.

## Exploiting the Corporate Value Improvement Cycle

Improving profitability and efficiency, and maximizing cash flow generation are fundamental to improving corporate value. By aggressively investing in new product development and strategic investments including M&As, we will work to strengthen the competitiveness of our solutions and improve our business foundation in order to achieve high returns. By also enhancing shareholder returns and building a robust financial position, we will be able to harness the corporate value improvement cycle.

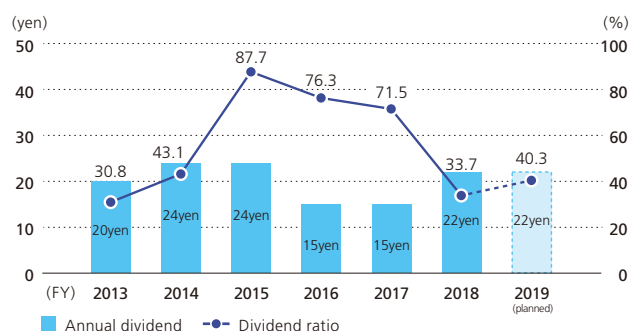
#### Corporate value improvement cycle



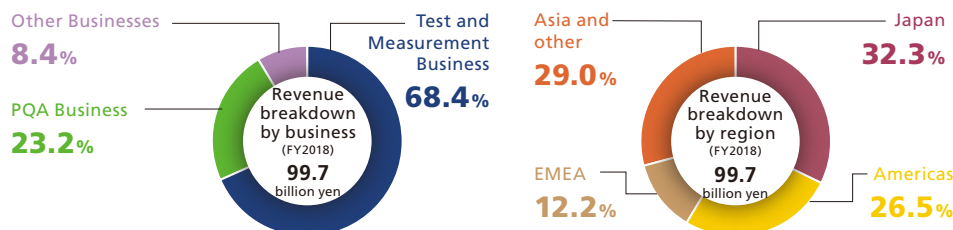
**Shareholder returns**▶ When returning profits to shareholders, our basic policy is to pay dividends with a consolidated payout ratio of 30% or higher, basically by raising the DOE (Dividend On Equity) in response to an increase in consolidated net income, and to also flexibly implement other shareholder return policies that take the total return ratio into account.

Furthermore, we plan to use surpluses for funding requirements for strategic investments (including M&As) for business expansion in industrial fields that employ 5G/IoT, and for business development in the cloud service and other markets. By making further improvements to our corporate value, including these investments in new businesses, we aim to meet the expectations of our shareholders.

#### Dividend forecast trend



# Business Summary



\*EMEA: Europe, Middle East, Africa

Revenue/Operating profit	Field	Main customers
<b>Test and Measurement Business</b>		
<p>(billions of yen) (billions of yen)</p> <p>■ Revenue (left axis) ● Operating profit (right axis)</p>	<p><b>Mobile market</b></p> <ul style="list-style-type: none"> <li>• R&amp;D of mobile communication standards, such as 5G and LTE</li> <li>• R&amp;D of communication chipsets (communication semiconductors embedded in smartphones, etc.)</li> <li>• R&amp;D and manufacturing of mobile devices, such as smartphones and tablets</li> <li>• Communication evaluation in the IoT/Automotive sector</li> </ul> <p><b>Network infrastructure market</b></p> <ul style="list-style-type: none"> <li>• R&amp;D and manufacturing for optical and digital communications</li> <li>• R&amp;D and manufacturing of communication equipment</li> <li>• Construction and maintenance of optical fiber communication networks</li> <li>• Construction and maintenance of wireless base stations</li> <li>• Network quality assurance (fault monitoring)</li> </ul> <p><b>Electronics market</b></p> <ul style="list-style-type: none"> <li>• General-purpose measurement used in a wide range of applications</li> <li>• R&amp;D and manufacturing of communication-related electronic components</li> <li>• R&amp;D and manufacturing of wireless communication devices</li> <li>• R&amp;D and manufacturing of wireless base stations</li> <li>• R&amp;D and manufacturing of smart appliances and vehicle-related equipment, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Smartphone/tablet device manufacturers</li> <li>• EMS (electronics manufacturing services)</li> <li>• Chipset manufacturers</li> <li>• IT service providers</li> <li>• Telecommunications carriers</li> <li>• Manufacturers of automobiles and vehicle-related equipment</li> <li>• Telecommunications carriers</li> <li>• Communication-related construction companies</li> <li>• Communication equipment manufacturers</li> <li>• Electronic device/component manufacturers</li> <li>• Communication equipment manufacturers</li> <li>• Mobile device manufacturers</li> <li>• Electronic equipment manufacturers</li> <li>• Automobile and vehicle-related equipment manufacturers</li> </ul>
<b>PQA Business</b>		
<p>(billions of yen) (billions of yen)</p> <p>■ Revenue (left axis) ● Operating profit (right axis)</p>	<p><b>Quality assurance of food and pharmaceuticals</b></p> <ul style="list-style-type: none"> <li>• Inspecting for contaminants, packaging form, etc.</li> <li>• Detection of metallic contaminants</li> <li>• Weighing and controlling filling weight</li> <li>• Checkweighing</li> </ul>	<ul style="list-style-type: none"> <li>• Food manufacturers (Agricultural products, meat, processed food)</li> <li>• Pharmaceutical/cosmetics manufacturers (Tablets, capsules, liquids, and patches)</li> </ul>
<b>Other Businesses</b>		
<p>(billions of yen) (billions of yen)</p> <p>■ Revenue (left axis) ● Operating profit (right axis)</p>	<p><b>Data communication business</b></p> <ul style="list-style-type: none"> <li>• Monitoring and control systems related to public infrastructure, such as rivers and waterworks</li> <li>• Bandwidth control devices for high-quality networks, such as financial systems and video distribution</li> </ul> <p><b>Device business</b></p> <ul style="list-style-type: none"> <li>• Optical/ultra-high-speed devices for optical communication networks and communication equipment</li> </ul>	<ul style="list-style-type: none"> <li>• National and local governments</li> <li>• Financial institutions</li> <li>• Video distribution companies</li> <li>• Electric equipment manufacturers</li> <li>• Communication equipment manufacturers</li> </ul>

\* The method of allocating headquarters administration and other costs to each business segment was changed in FY2018, and the figures for FY2017 have been reclassified. Figures for FY2014 to FY2016 have not been reclassified.





## CTO Message



## Anritsu Supporting Evolving 5G Moves to Beyond5G

### Hanako Noda

Executive Officer, CTO  
General Manager of Technical Division

**In Japan there has been cooperation between industry, government, and academia in preparation for 5G implementation; using the Tokyo Olympics as the place for its debut. Compared to LTE, 5G promises not only higher communication speeds, but also world-changing innovations. Through measurement technology, Anritsu will support 5G and at the same time we have started preparations for Beyond5G (6G), the next generation to come.**

### Our Changing Environment

How will our world change in the next 20 years? Among megatrends, Anritsu's focus is on demographic changes, the rise of the middle class, and rapid advances in technology. First, regarding demographics, the population is expected to increase by roughly 2.5 billion, mainly in Asia, Africa and the Middle East, while it will decline in advanced countries, where the ratio of aged people will rapidly become larger and a decline in the working population is expected to be a serious problem. The automation of manufacturing is inevitable to supplement the workforce and reduce manufacturing costs. In addition, there is a growing need for self-driving cars as a means of transport for the elderly, especially in areas where transport networks are not well developed. 5G technology is essential for the development of both factory automation and self-driving. Meanwhile, in areas where the population is expanding, the middle-class population will grow, and various new products and services will be created. As the middle class expands, there will be increasing demand in terms of both the quantity and quality of personal consumption. We believe that demand for food inspection will increase further, due to individualized ordering of food and food safety needs. In addition, rapid technological advancements, especially in artificial intelligence (AI), have a high potential for technological disruption in the next decade. It is easy to foresee rapid progress making great changes to our lives in the near future. AI is already being used in a wide variety of fields, making our lives more convenient, and even coming up with better jokes than comedians.

### 5G Changing Lives, Changing the World

5G usage scenarios include ultra-high speed, large capacity communication (eMBB: Enhanced Mobile Broadband), ultra-reliable and low latency communication (URLLC), and massive simultaneous connection communication (mMTC: massive Machine Type Communication). In 3GPP Release 15, which was finalized in 2018, the specification for ultra-high speed, large capacity communication was determined for mobile applications. Advance rollouts of commercial services started in the US and South Korea in December 2018, with the provision of services scheduled to begin in other countries around the world. The specifications for ultra-reliable and low latency communication and multiple simultaneous connection will be determined from Release 16 in March 2020 onwards, with the deployment of commercial services expected from around 2021. Among these, ultra-high reliable and low latency communication promises a digital revolution that will bring significant change to the world.

Ultra-high-speed, large capacity communication relies on the realization of broadband communication and the use of millimeter-wave bands. Use of millimeter waves, such as the 28 GHz band presents the advantage that its frequencies are not as densely allocated as in the legacy 3 GHz frequency bands and below. As a result, wider bands can be allocated, easily realizing large capacity communication. On the other hand, there is the problem of increased propagation loss in space (so-called "free space propagation losses").

A "safe, secure, and prosperous society" realized by 5G/IoT



**Ultrahigh-speed**  
Speed  
Download: 20Gbps  
Upload: 10Gbps  
Downloading a two-hour film in three seconds

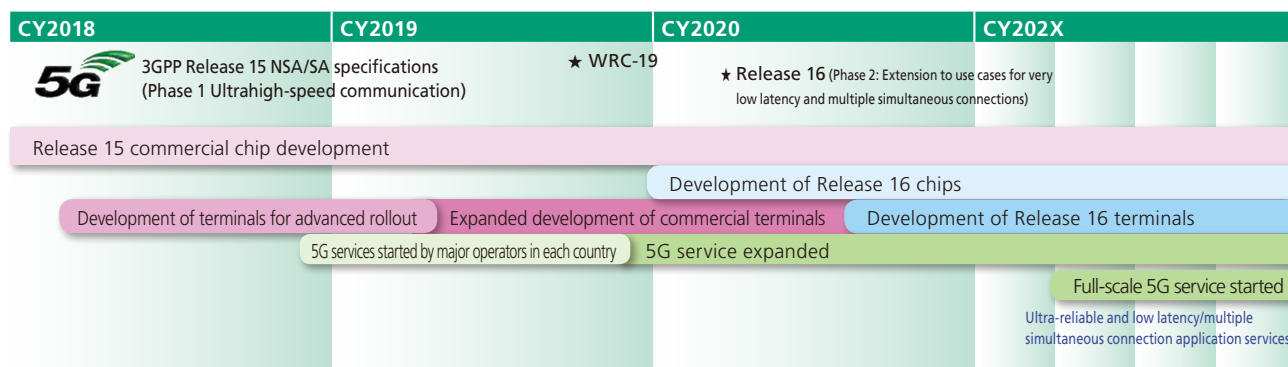
**Very low latency**  
Latency  
1 ms  
Precise operation of remote robots in real time

**Multiple simultaneous connections**  
Number of simultaneous connections  
One million devices per km<sup>2</sup>  
All devices and sensors around you are connected to the network

2019

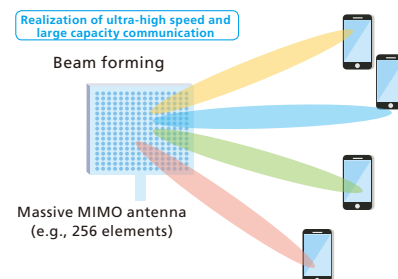
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### 5G service roadmap



Since the loss is proportional to the square of the frequency, the loss at 30 GHz, for example, increases by 100-fold, compared to that at 3 GHz. As a technology to compensate for increased propagation losses in space, Massive MIMO antennas have been introduced as base station antennas for millimeter wave bands. As shown in the diagram on the right, by simultaneously emitting radio waves from each element of a Massive MIMO antenna composed of 16×16 (256) elements toward a single user to form a beam, a high reception power level can be achieved by the user. Massive MIMO antennas can also form beams for multiple users, and simultaneously perform large-capacity communication with multiple users. If this were realized, at the Olympic games, every spectator at the stadium would be able to wear AR glasses and enjoy watching the events from a freely select-

### Massive MIMO antenna



ed viewpoint. A beam forming mechanism is required not only at the base station, but also at the mobile terminal side. When testing mobile terminals up to 4G, mobile terminals and measuring instruments were connected by cables. However, for 5G, especially millimeter waves, it is now necessary to perform testing without cables, but with



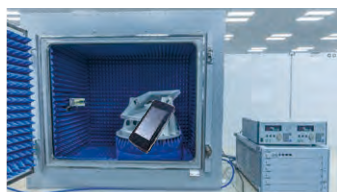
## CTO Message

### Conventional measurement and OTA measurement

~ 4G: Conventional measurement



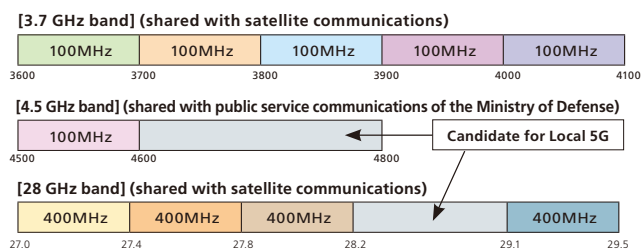
5G: OTA measurement



antennas, as a so-called “OTA (Over The Air) testing.” OTA testing of high-frequency millimeter waves requires very advanced technology. By harnessing our many years of experience in developing technologies for antennas and antenna testing, Anritsu has developed a mobile phone evaluation system that supports OTA testing.

For ultra-reliable and low latency communication, 3GPP has stipulated technical conditions of “a transmission success rate of 99.999% or higher for a data packet size of 32 bytes or more, and a latency of 1 millisecond (1 ms) or less in each wireless section.” Although 1 ms is the latency in a wireless section, in actual use, it is necessary to include processing delays in wired sections, on the Internet, and in application servers. As one example, for usage cases like self-driving and remote control of construction equipment, the latency must be kept to lower than human reaction speed. The time taken for humans to react (i.e., the time between detection of a danger and the initiation of brake operation) is usually regarded to be roughly 200 to 300 ms. It is therefore necessary to limit all of the above-mentioned delays, from the wireless sections to the processing speed of an application server, to less than this value. To achieve low latency, it is

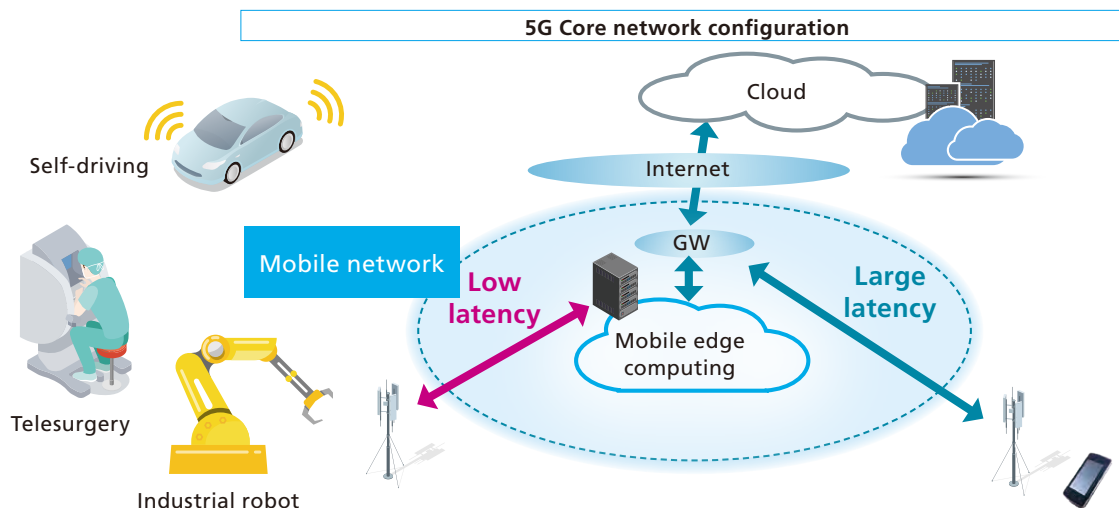
### Frequencies allocated to 5G



necessary to upgrade the core network as well as any wireless sections. To accomplish this, processing systems, so-called “edge devices,” must be deployed immediately behind base stations.

Furthermore, “Local 5G” is also attracting attention as a new 5G application. Local 5G is an arrangement in which a regular business is assigned a frequency in a limited area, and is allowed to use 5G as a private network. In addition to the normal features of 5G, local 5G is highly promising, because its area can be designed for high security and in accordance with the user’s needs. Promising applications of local 5G include factory automation, the handling of personal information including large-capacity data such as CT images at medical sites, remote control of construction machinery, and real-time video distribution at stadiums and other locations. In Japan, plans are underway to allocate a bandwidth of 200 MHz in the 4.5 GHz band, and a bandwidth of 900 MHz in the 28 GHz band to local 5G. Similar developments are expected in Germany, with its Industry 4.0 strategy, where local 5G will be used in smart factories, etc.

### Mobile edge computing for ultra-reliable and low latency communication



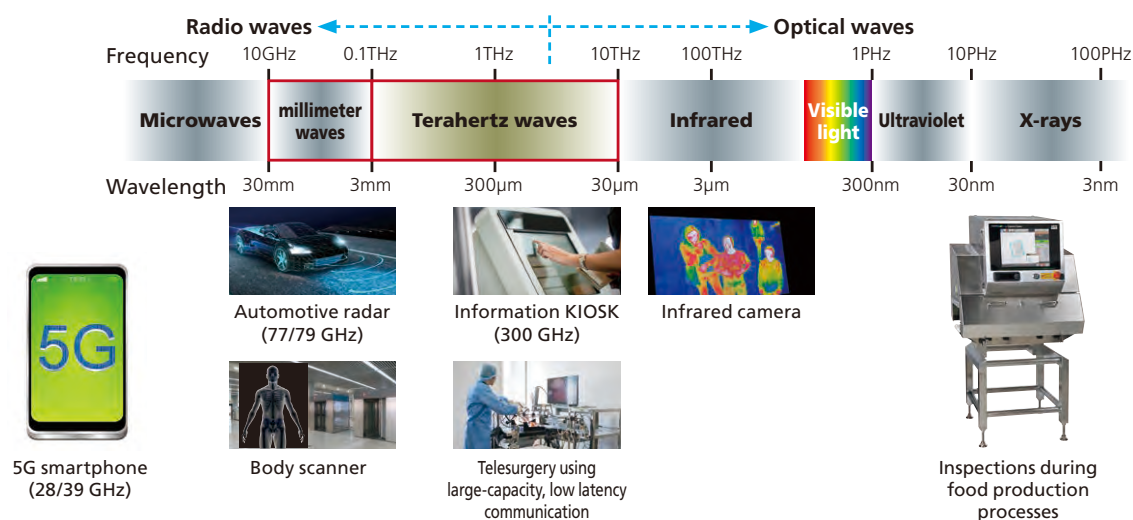
## Toward Beyond5G

5G will continue to evolve, and research and development into Beyond5G has already begun aiming for implementation in 2030, which is 10 years from now. Although there is no clear definition of Beyond5G, the effective use of frequencies has been a perennial issue for wireless communication, and it is believed that research in this area will continue even for Beyond5G. Based on how communication has evolved thus far, it is natural to expect further increases in communication capacity. This is because transmitted video will become a 3D distribution due to the spread of xR (the general term for VR: virtual reality, AR: augmented reality, and MR: mixed reality), and the communication capacity will increase for all types of devices, including unmanned aircraft such as drones and self-driving systems. The frequency range of millimeter and smaller waves enables large-capacity communication, which facilitates use for high-capacity communications, such as Beyond5G. The higher the frequency, the shorter the wavelength and the higher the resolution, and for this reason, utilization of the millimeter band is progressing in various industrial fields, such as imaging and inspection for contaminants. In March 2019, the Federal Communications Commission (FCC) established a new rule to license 95 GHz to 3 THz for 10 years for experimental use, as long as there is no interference with space research or atmospheric observations. This is very encouraging for the practical application of millimeter and terahertz waves. On the other hand, the higher the frequen-

cy, the greater the losses within communication devices and along propagation paths. Since greater miniaturization is also required, there are technical difficulties that accompany the use of high frequencies. Anritsu has developed measurement technology in anticipation of the use of millimeter waves. Going forward, we will continue to study technologies related to the use of millimeter and terahertz waves for sensing. We will also promote research and development related to Beyond5G, which we began working on in 2019.

In addition, AI technology is approaching the peak of its third boom, and many AI tools are available. In the future, as 5G evolves, edge computing will be introduced to reduce latency for self-driving, VR, and AR, and AI technology will be introduced into edge devices. As one example, at a smart factory, there are hopes for AI to detect abnormalities and predict failures, as well as visualizing processes by edge processing of huge amounts of data, such as data from acceleration sensors worn by workers, temperature/humidity/vibration sensors, and test data. By combining edge processing with image processing, a specialty of AI technology, Anritsu is working to improve contaminant detection during food inspections. In the future, we hope to provide intelligent and highly sensitive measurement and inspection solutions that combine 5G and AI technologies. We will strive to develop sensing technologies that support “measuring” and data analysis technologies such as AI to make “measuring” smarter, and by uniting these technologies, contribute to the realization of a safe, secure, and abundant society.

## Future uses of millimeter, terahertz, and optical waves





## Test and Measurement Business



## Contributing to the New Innovation Frontier Opened by 5G

- Supporting Network Evolution and Creating New Growth Drivers in 5G Utilizing Fields -

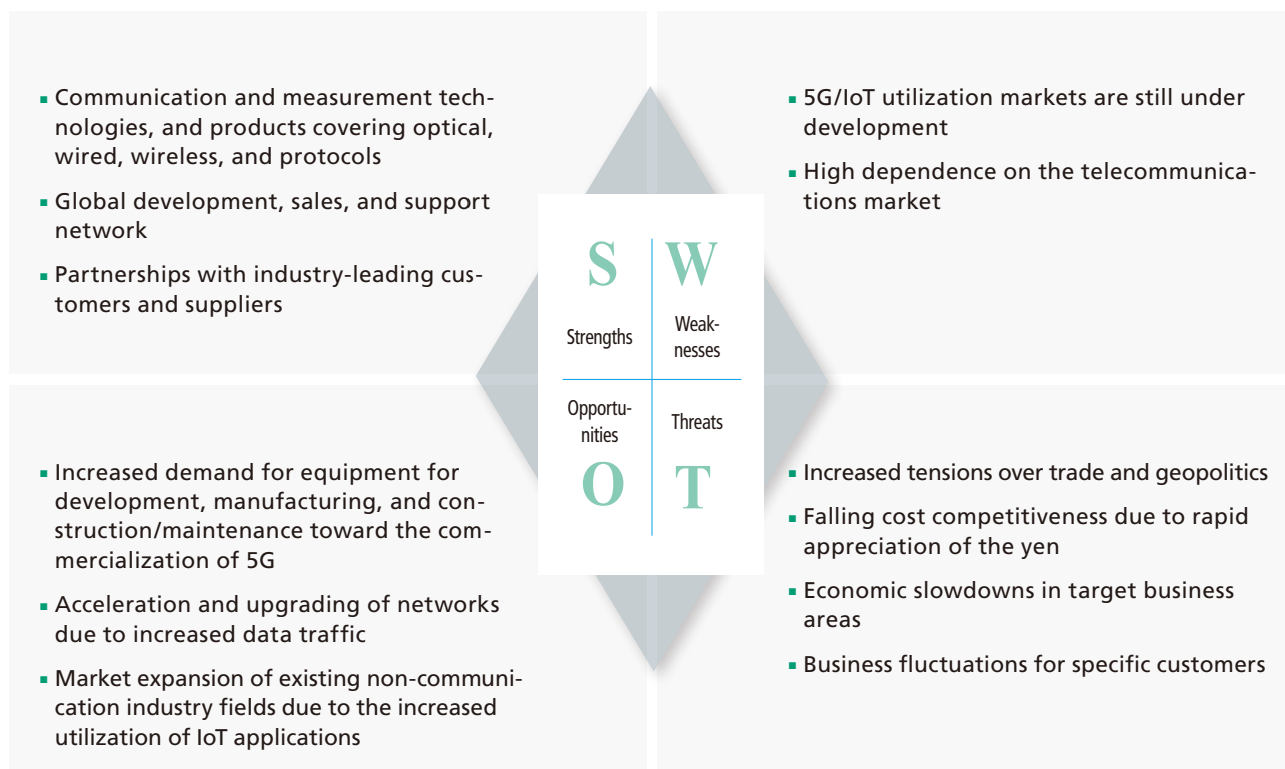
**Tsutomu Tokuke**

Vice President, Chief Measurement Business Officer  
General Manager of Measurement Business Division

Since the digitalization of communication began in the 1980s, advancements including an explosive increase in mobile phone subscribers, the rapid development of the Internet, and the spread of mobile broadband driven by smartphones have brought great changes to both our lives and business. 5G, which carries high expectations as a communication platform for an advanced IoT society, is now poised to enter practical use.

Anritsu's Measurement Business provides the global market with measuring instruments and test systems, which are essential tools for the establishment and spread of communication technologies. In addition to supporting the commercialization and development of 5G, from networks to terminals, we will contribute to the creation of new use cases and the solution of social issues, through the use of 5G in various industrial fields.

### SWOT Analysis



## Business Areas

Over the 120 years of our history, Anritsu has exhibited its DNA as a pioneer who has opened up the future of information and communication, and supported the evolution and development of communication technology at the cutting edge. Our Test and Measurement Business provides the global market with a variety of measuring instruments and test systems that are essential for the functional and performance testing and quality assurance of communication facilities, equipment, and networks.

- Providing test solutions for all phases such as chipset development, device development, conformance testing, and manufacturing inspection in the mobile communications market, as represented by smartphones.
- Providing measuring instruments for performance evaluations for network interfaces and bus interfaces, which are becoming ever faster due to the spread of cloud computing, as well as measuring instruments for optical module inspections.
- Providing measuring instruments for startup tests and maintenance/repair of IP networks that support the Internet, and measuring instruments for manufacturing and construction/maintenance of mobile communication base stations. In addition, providing a set of measuring instruments necessary for the construction/maintenance of optical fiber cables that extend throughout the world, from the underseas to homes.
- Providing measuring instruments and test systems required for evaluation and assurance of the connectivity quality required for the spread of connected cars and the introduc-

tion of IoT into home appliances and industrial equipment.

- Providing monitoring solutions that contribute to network failure analysis and improvements in customer experience by visualizing the network operational status of telecommunications carriers.

## Market Environment and Business Opportunities

### ■ Start of 5G Commercial Service

The introduction of 5G, which carries high expectations as a communication platform for IoT in various industries, will start in 2019. In addition to chipset development, where demand for testing has been strong since the communication standards were established, there will be expanding 5G business opportunities for the development of commercial devices, conformance testing, carrier acceptance testing, and calibration inspections in production lines. The introduction of 5G is also expected to increase the demand for measuring instruments required for construction and maintenance across networks, such as the upgrading of communication equipment to realize high speed and low latency, and the introduction of base station equipment that supports high frequencies.

### ■ Data Center Expansion and Network Evolution

Data traffic is steadily increasing due to services such as SNS and video sharing. In the future, this trend is expected to strengthen further due to AR/VR applications and utilization of AI, among other factors. This situation is expected to promote increases in the scale of data centers as well as

### Business areas of the Test and Measurement Business



Mobile communication 2G, 3G, 4G & 5G



Automotive IoT connectivity



High-speed buses for cloud computing



Network Construction/ Maintenance



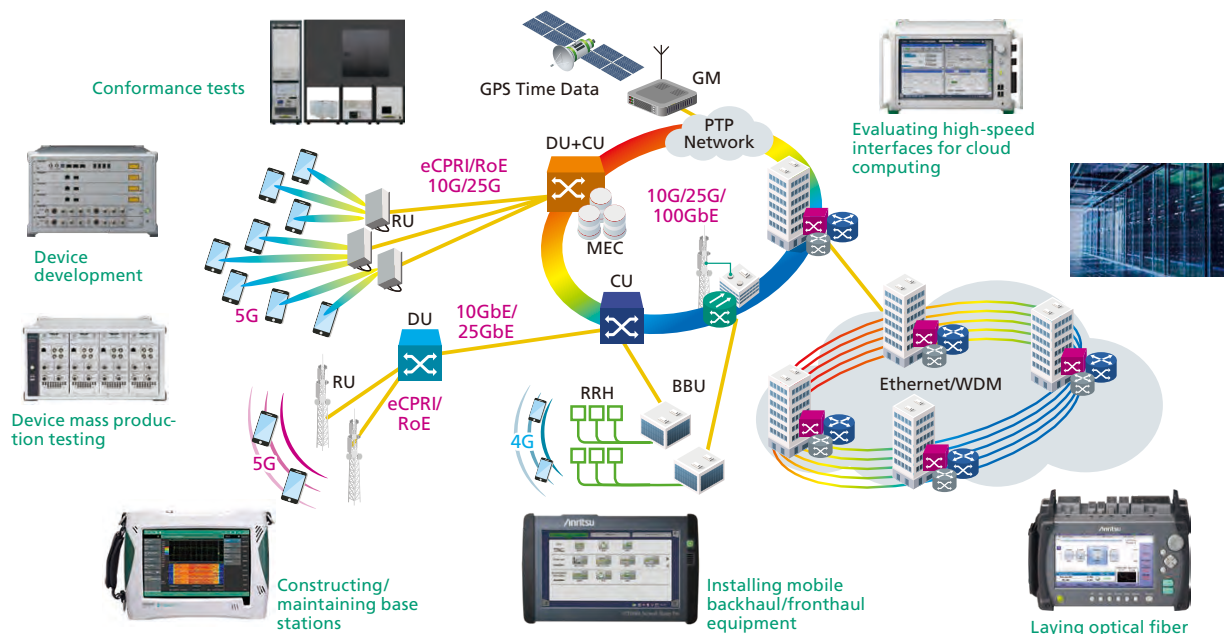
RF & micro/mmWave devices/ components



Telecom network monitoring

## Test and Measurement Business

### Anritsu solutions that support 5G networks



increased network speeds, and an increase in the introduction of 100G Ethernet equipment, which is already in widespread use. In 2019, 400G Ethernet employing a new optical transceiver technology called “PAM4” is about to be introduced, which is expected to create more new business opportunities.

### Expanding Use Cases for IoT

The expansion of the market for IoT, where devices and services are connected to a network, offers new growth opportunities for Anritsu. Test technologies cultivated in the mobile market has been leveraged for verification of connected cars, and demand is increasing as the market expands. Anritsu has a large variety of connectivity quality evaluation solutions required by IoT applications, such as 4G, 5G, wireless LAN, Bluetooth, and Cellular IoT, and we will continue to make proposals for various industry segments.

## Growth Strategy

### GLP2020 Core Policy

Under our Mid-Term Business Plan GLP2020, we have identified the three areas such as (1) 5G, LTE-Advanced, (2) IoT/Automotive, Connectivity, and (3) IP Data Traffic, Cloud Service, as growth drivers for realizing sustainable growth with profits. Among these, the 5G business plays the central role in our growth strategy. To establish a position as a leading company in the global market, we are working to enhance our solution lineups, establish an efficient development framework, and strengthen our support systems.

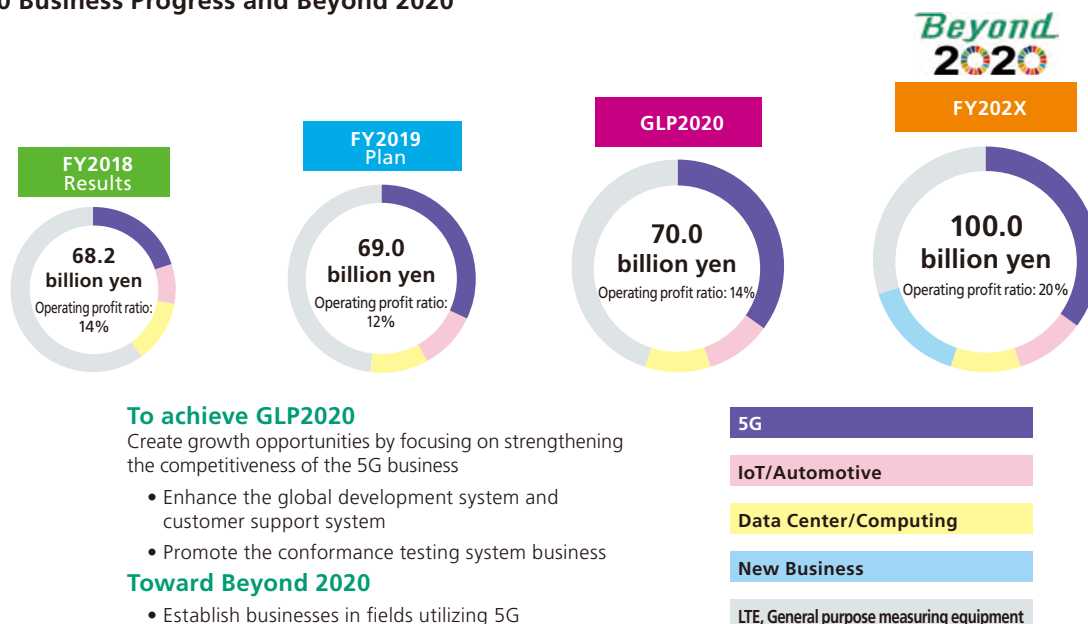
### GLP2020 First Year Results

In FY2018, the first year of GLP2020, by capturing the rise in 5G initial development demand, we greatly exceeded our initial targets of 60.0 billion yen in sales and an operating profit ratio of 6%, achieving sales of 68.2 billion yen and an operating profit ratio of 14%, which represents a strong start toward the realization of GLP2020. We have expanded our lineup of 5G products, from development to manufacturing and maintenance, in readiness for the commercialization of 5G. Although the market for LTE has contracted, as expected, we have maintained our customer base and improved profitability by managing investment with a conscious focus on effectiveness. Our automotive and IoT-related businesses are continuously working to develop new customers, as businesses that will grow gradually over the long term. In 2018, the trend toward an expanded use of IoT has become more prominent, such as mandatory eCall in Europe and the successive launch of Cellular IoT services by the operators of various countries.

### Toward Achievement of the GLP2020 targets

To achieve revenue of 70.0 billion yen and an operating margin ratio of 14%, those are the goals for GL2020, we are accelerating our shift in attention to growing segments in FY2019, and work to expand our customer base. Due to the earlier-than-anticipated commercialization of 5G, we expect demand for testing to continue to switch from 4G to 5G. In addition to increasing the competitiveness of confor-

## GLP2020 Business Progress and Beyond 2020



mance testing systems, which will enjoy increased demand with 5G commercialization, we are aggressively making strategic investments to meet an increase in testing requests, due to many operators starting 5G operations. We will also work on the development of network equipment that will evolve with cloud computing, such as 400G Ethernet, and enhance our products in anticipation of manufacturing demand for optical communication modules.

### Toward Beyond 2020

The introduction of new services that exploit the ultra high-speed and high capacity communication of 5G allowing the use of high-definition video distribution and VR/AR. The new features of ultra-low latency and multiple simultaneous connections are also expected to create use cases in a variety of fields, including industry, agriculture, construction, and healthcare, as well as automobiles. Various experiments and demonstrations are already being actively conducted. By leveraging Anritsu's competencies of "connecting" and "measuring" technologies, we will consider collaborating with companies with a strong presence in various fields, and strengthening our portfolio through M&As, as some of our options for establishing businesses in 5G utilizing fields, in new industries that lie beyond a projection of our existing mobile business. We are also working on creating a system to support further growth. For example, we are strengthening the management of our globally expanding development centers, working to achieve a deeper cooperation with leading customers, and developing sales channels. In terms of improving profitability, we will promote

thorough profitability evaluations of development investment projects, and promote product design and kaizen activities that consider cost control. Through these initiatives, we will achieve concrete results, aiming for sales of 100.0 billion yen and an operating profit ratio of 20%, which are the Beyond 2020 targets for the Test and Measurement Business.

### Solutions for Society (SDG Initiatives)

IoT, which connects all kinds of devices, carries high expectations for solving various social issues toward realization of the sustainability targets listed as the SDGs. In order to create a safe, secure, and comfortable IoT society, the development of a robust network infrastructure is essential. Our Test and Measurement Business contributes to the realization and maintenance of communication quality through various solutions for the communication network development, manufacturing, construction and maintenance, and operation stages. Measuring instruments and test systems that utilize wireless communication technologies, such as WLAN, Bluetooth, Cellular IoT, 4G, and 5G, IP communication, and protocol testing technologies, are not limited to smartphones, and are starting to be introduced in advanced companies in fields including automobiles, home appliances, construction machinery, smart meters, and sensing. We believe that more fields will emerge in which Anritsu has something to offer, and we will continue contributing to the promotion of innovation in various industries, toward the creation of a sustainable society.





## PQA Business



### Becoming a World-Class Quality Assurance Partner

- Becoming the First Company to Call in the Global Market -

Masumi Niimi

Director, Senior Vice President  
PQA Group President

Our PQA Business has ensured a stable revenue base by capturing an industry-leading position in the domestic food market. In the overseas food market, we have continued to grow significantly above the market average, with a strong reputation for X-ray inspection solutions as our strength.

In our Mid-Term Business Plan GLP2020, we are working to build a foundation for expanding our business globally, while increasing the value of the quality assurance solutions that are our focus.

To respond to a variety of requests in diverse food cultures, and provide solutions and amenable services that exceed our customers' expectations, we will invest for the establishment of a supply chain that is optimized for global business.

By fully considering issues related to quality assurance and working to overcome them, we will grow into a quality assurance partner who will be the first one for customers to call.

#### SWOT Analysis

We expect our PQA Business, which has strengths in quality inspection technology for production lines and its ability to adapt to various food manufacturing environments, to expand further due to growing global quality assurance needs for foods and

pharmaceuticals. On the other hand, establishing a sales and maintenance network in overseas markets, and filling out a product lineup that matches the requirements and characteristics of the European and American markets remain as issues.

- High-speed, high-precision, quality inspection technology for production lines
- Engineering capability for adapting inspection equipment to various food manufacturing environments
- Extensive maintenance service system and experienced maintenance engineers in Japan
- Past record and top-class market position in the food inspection market in Japan

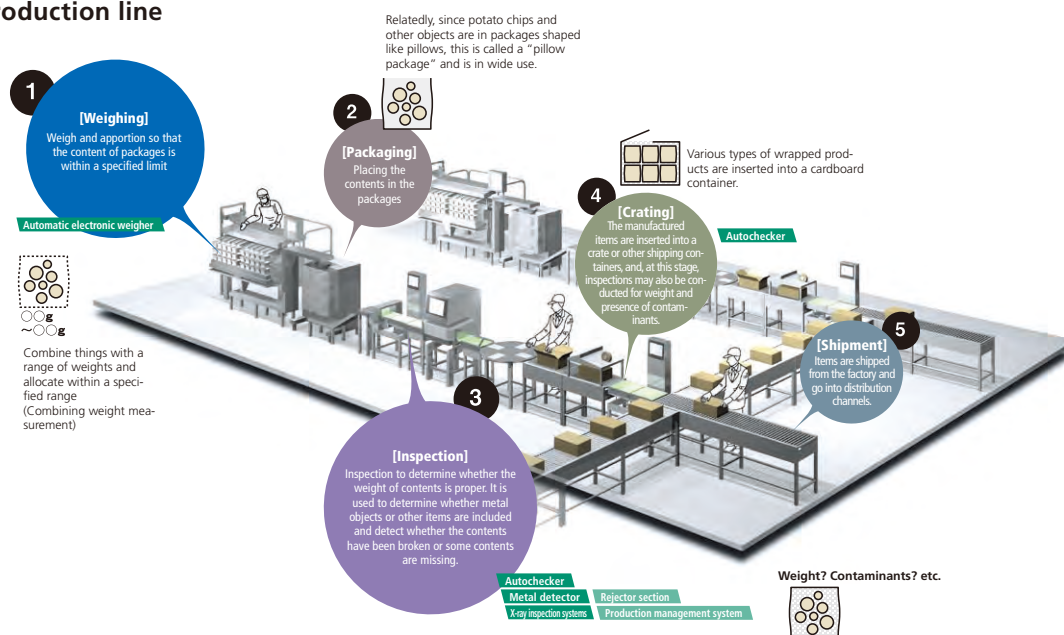
- Growing global demand for a stabilized supply of safe and secure food
- Increasing brand risks to food companies due to quality incidents
- Increased consumption of processed foods due to advances in processing/packaging technologies
- Rapid development of innovative technologies such as AI and IoT
- Expansion into the pharmaceutical manufacturing industry, which demands higher quality assurance
- Increased demand for automation and labor saving on production lines due to labor shortages

<b>S</b> Strengths	<b>W</b> Weaknesses
<b>O</b> Opportunities	<b>T</b> Threats

- Increasing market recognition in large markets such as Europe and America
- Filling out a product lineup that matches the requirements of the European and American markets
- Sales and maintenance network in overseas markets

- Very strong competition in large markets such as Europe and America

## Example production line



The weight inspection is designed to determine whether the items have been weighed properly and are correctly packaged. At the contaminant inspection stage, verification of whether there are metal or plastic contents is conducted and X-ray inspection equipment can detect cracks and defects in such products as cookies. In addition, the production management software "QUICCA" may collaborate in the inspection and weighing stages to monitor production.

## Business Areas

The PQA Business develops, manufactures, sells, and maintains quality inspection systems for production lines. Approximately 80% of revenue in this business are in the food industry.

Many processed foods sold at stores such as supermarkets and convenience stores are produced in food factories at a very high speed of hundreds of products per minute on a belt conveyor. Our PQA Business products contribute to improvements in productivity and quality, by automating quality inspections that have conventionally been performed by humans on production lines.

At Anritsu, we tackle the endless issues of quality assurance head on, proposing optimal quality inspection methods to individual customers, managing and utilizing quality data, and providing full maintenance services, among other measures. By doing so, we find solutions that offer total support to the quality assurance activities of our customers.

## Market Environment and Business Opportunities

The food processing industry, which is the main customer of our PQA Business, has over 100,000 business sites worldwide. Quality assurance needs, such as weight checking and contaminant inspections, in the food industry are continuing to spread from developed countries to emerging countries, and from major corporations that are global businesses to the industry as a whole.

In the Japanese market, labor shortages are becoming more severe due to a falling birthrate, an aging population, the concentration of population into urban areas, mismatches between labor supply and demand, and other reasons. As a result, there is an increasing need for automation and labor saving on production lines.

Since the 1960s, when supermarkets started to carry a large range of processed foods, we have created a history of "co-creation and development" in the food industry, and earned the trust of many food companies as their quality assurance partner.

In North America, whose food culture is characterized by bread and meat, X-ray inspection has penetrated the market and demand is growing, mainly for the detection of bones left in meat, and inspection of confectionery and cooked foods.

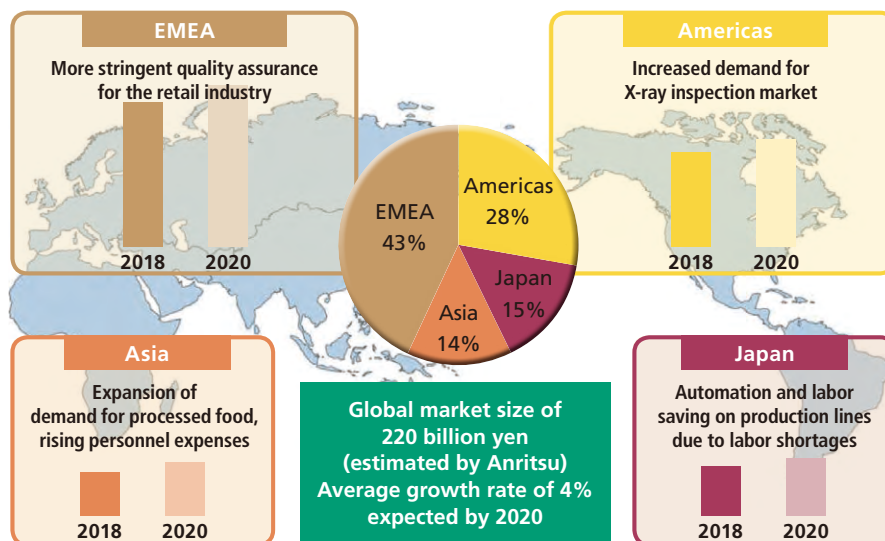
In Europe, whose food processing and packaging industry has the longest history, the quality inspection market has matured, and the standardization of quality control criteria is progressing. Europe has become the most advanced market for food safety and security where many international standards for the quality control of processed foods such as ISO 22000 are organized.

In China and the ASEAN countries, where remarkable economic growth continues, the need for safe food is increasing with the expanded distribution of prepackaged foods. Demand for quality inspections is expected to increase, primarily for high-income consumers.



## PQA Business

### Current Status of the PQA Market and Outlook



## Growth Strategy

### GLP2020 Basic Policy

In GLP2020, Anritsu positions the three years of the plan up until 2020 as an important period of preparation to transform into “a world-class quality assurance solution partner” who will be the first one for customers to call.

### Initiatives Toward GLP2020

To achieve consolidated revenue of 26.0 billion yen, a share of 50% or higher for overseas operations, and an operating profit ratio of 12% as set forth in the 2020VISION, we need to increase consolidated revenue by 3.0 billion yen, mostly in overseas markets, over our FY2018 results, and to increase profitability by providing value to customers and raising our business efficiency.

To achieve these goals, Anritsu is working on “cultivating markets in advanced countries in Europe and the Americas, and the pharmaceutical manufacturing market, with X-ray inspection systems as a key solution” and “responding accurately to market needs through localization and transforming into a global business,” as initiatives for GLP2020.

We are investing in the development of new sensors and R&D into image processing and signal analyzing technologies, such as AI, to produce “Original & High Level,” high value-added solutions. Anritsu is also promoting the devel-

opment of product platforms for successively commercializing new products with high customer value.

In major markets centered on advanced countries in Europe and the Americas, we will further cultivate our global relationships and develop customer response systems, optimize our supply chains on a global basis, and improve services and operational efficiency.

### First Year Results of GLP2020

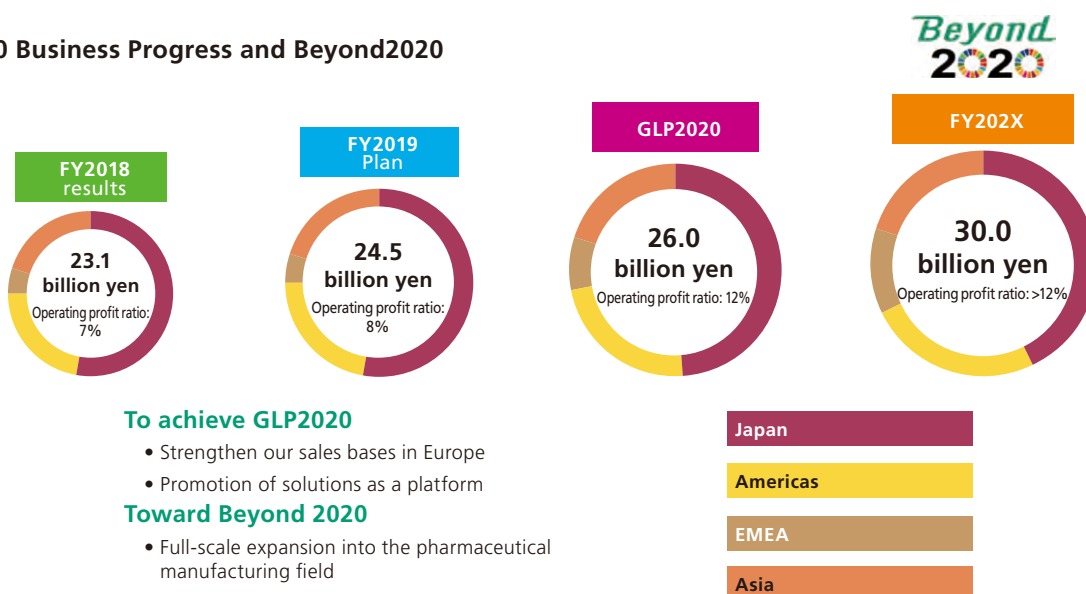
The main achievements of FY2018 are as follows.

- Release of the “XR75 Series X-Ray Inspection System with Dual Energy Sensor,” which adopted a newly developed sensor and image processing algorithm, and development of strategic products aimed at business development in the pharmaceutical market
- Cultivation of global relationships, focusing on North America, and strengthening of local business structures to provide better services
- Improvement of business processes and management infrastructure to achieve more responsive and accurate



XR75 Series X-Ray Inspection System with Dual Energy Sensor

## GLP2020 Business Progress and Beyond2020



management of business that will expand globally. It will take time for these initiatives to produce results, but they are generally progressing so far on schedule.

## Toward Beyond 2020

Guaranteeing product quality is vital for all manufacturing industries. At present, Anritsu provides business solutions mainly to customers in the food industry; however, many challenges still remain in this field.

In addition, the pharmaceutical industry, which is directly related to human health, imposes its own stricter standards, and works on quality assurance day and night.

In the PQA business, we will accelerate business expansion in the food field and full-scale expansion in the pharmaceutical manufacturing field, thereby creating a path to sustainable growth with profits, from 2020 and onwards.

We will increase customer value by studying the latest quality assurance issues and creating unmatched original and high-level quality assurance solutions, and aim for an operating profit ratio of over 12%.

## Solutions for Society (SDG Initiatives)

The SDG Target 12.3 adopted by the United Nations indicates “halve per capita food waste at the retail and consumer level and reduce food losses along production and supply chains” as a concrete goal for achieving sustainable consumption and production patterns.

In response, many food companies are working to reduce food loss, as an issue toward contributing to the SDGs. Processing food at factories and then distributing it to the market is effective in reducing food loss, since it greatly extends the expiry dates of food and allows the secondary use of vegetable waste, etc. as feed and fuel.

Our quality assurance solutions can prevent products with quality problems from reaching the market, and in the unlikely event that some reach distribution channels, wastage losses associated with the collection of those products can be reduced by identifying the offending products and minimizing the scope of collection.

By providing advanced quality assurance solutions, our PQA Business will work together with our customers toward the realization of a sustainable society.