

Your Partner for Limitless Connectivity

Anritsu Overview Presentation

Mobile World Congress
February 2020



Company Profile

ANRITSU CORPORATION



5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan

Tel : (046) 223 -1111

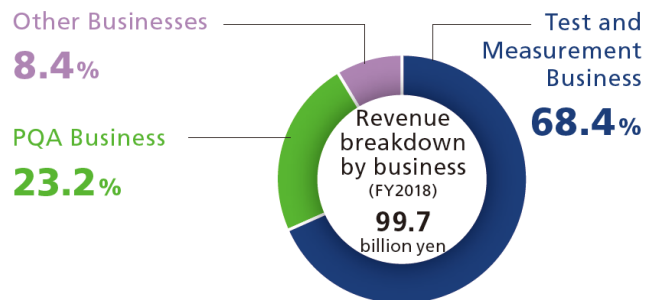
www.anritsu.com

- First founded as Sekisan-sha in 1895.
- Established as Anritsu Electric Corporation on March 17, 1931.

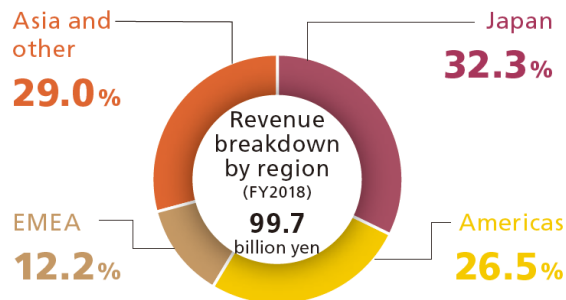
- Sales:
99,659 million yen (consolidated)
(Year ended March 31, 2019)

- Employees:
3,778 (Anritsu Group)
(as of March 31, 2019)

Net Sales by
Business Segment



Net Sales by
Region



*EMEA: Europe, Middle East, Africa

Executive Agenda

1. Key technology strategies
2. Anritsu portfolio
3. Anritsu total solutions and summary
4. Innovation on display at MWC

Industry trends:

- 5G commercial networks and device launches continue globally.
- Range of 5G chipsets and handsets now available, expanding rapidly.
- DSS (for low band) and Stand Alone (option 2) devices and deployments being planned.
- SDN/NFV deployment, Edge Compute and Network Slicing, for new industry verticals (Industry 4.0, Local 5G).
- Preparing technology for Release 16 deployments, e.g. URLLC and NR-U.
- Automotive industry is using wireless technology more widely, telematics, C-V2X and evolution to 5G.
- Field deployment and installation of 5G, as first networks roll out and commercial launch starts.

Anritsu Response:

- 5G-NR device test platform MT8000A/RTD, with both SA and NSA/LTE anchor support.
- Expanding test case coverage for 5G-NR sub 6 GHz and mmW Conformance Test systems, ME7873NR and ME7834NR.
- 5G-NR SmartStudio, for device functional and regression test.
- mmW OTA chambers for device test, Bench Top, Far Field Radiated, and CATR solutions.
- MEC and Network Slicing test bed for new industry verticals.
- V2X and telematics test solutions, such as integrated HILS simulation including 5G.
- 5G Field trials, installation, and spectrum measurements with the MS2090A.
- Transport network precision timing (PTP) and low latency (URLLC), field measurement with MT1000A.

Anritsu Technology & Market Focus Areas



Support the industry in continuous evolution of LTE advanced pro

- Delivering leading edge system simulators for Gigabit LTE.



Development and launch of 5G services enables new use cases

- Delivering cost effective new 5G-NR simulators and OTA test solutions for R&D, Certification and Production.



Data Analytics becomes key for the industry

- Real-time machine learning intelligence
- Award winning eoSight and eoMind solutions



Deliver wide range of solutions for IoT & automotive market such as

- Telematics, ITS, ADAS, C-V2X
- Cat M, NB-IoT.
- Bluetooth 5.x
- 802.11n, ac, ax.



Leading edge solutions for network reshaping

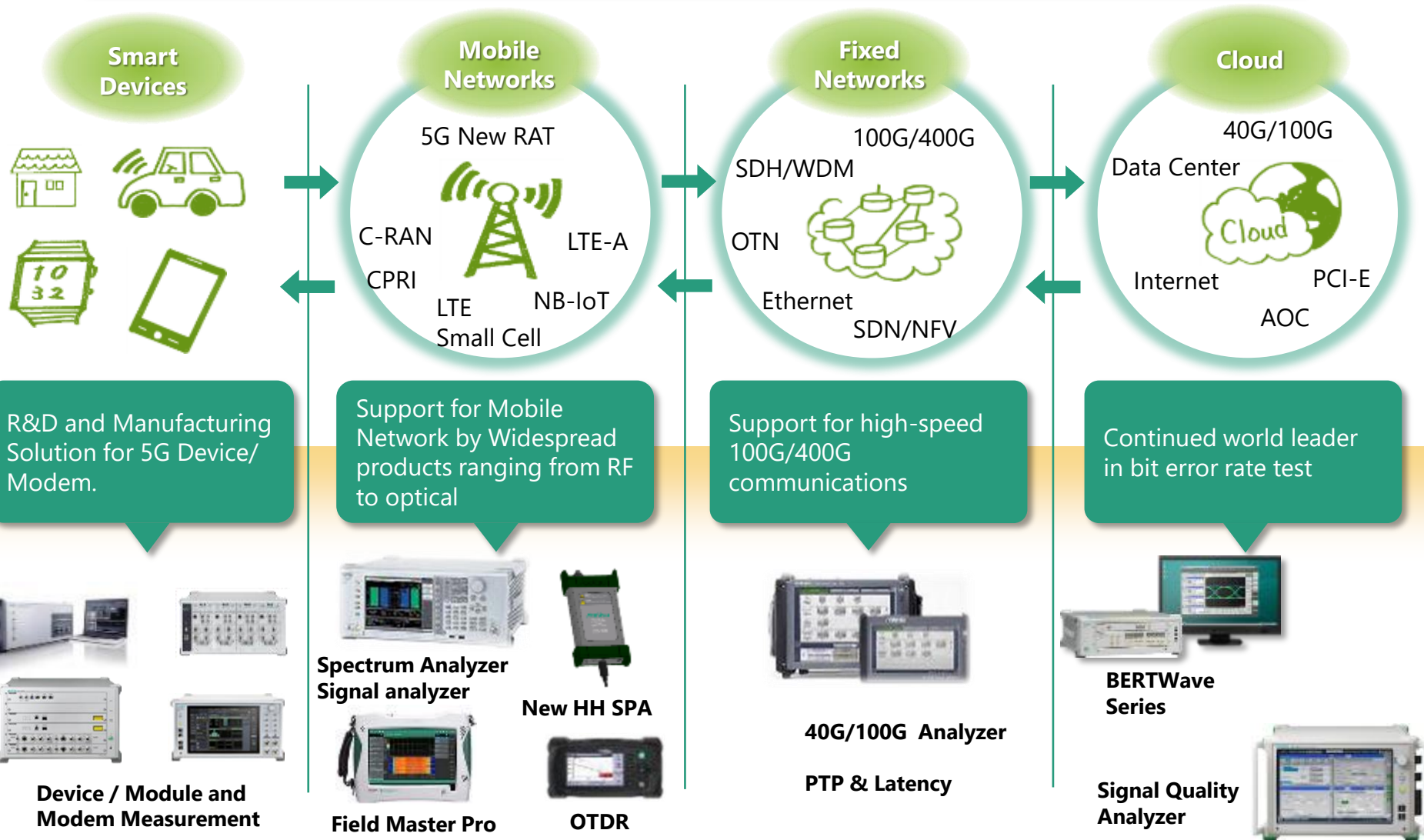
- RF interference management
- CRAN
- Data Center Interconnect
- High speed interface

From R&D to Production supporting the whole Industry

Key Trend 5G - Contributing to the Establishment of 5G Network Infrastructure



Features of 5G : **1/10×Latency** **100×Peak Data Rate** **100×Capacity**



3GPP Release 16 Motivation and Schedule



REL-15

- Focus on eMBB use cases by introducing a New 5G Radio and some basic support for URLLC

REL-16 Motivations

- Further enhance NR to support higher eMBB requirements
- Add further support in URLLC and mMTC together with network slice and MEC to support vertical industries
- 5G V2X: targeting advanced use cases beyond LTE V2X

REL-16 Features Overview

- Industrial IoT and URLLC enhancements
 - Adding 5G NR capabilities for full wired Ethernet replacement in factories.
 - Time Sensitive networking, etc. with high reliability
- 5G NR operation in unlicensed bands
 - Included both Licensed Assisted Access (LAA) and Stand-alone Unlicensed operation
- System improvements and enhancements
 - Positioning
 - MIMO enhancements
 - Power consumption improvements

Target markets beyond mobile broadband

- Automotive
- Industry 4.0
- Smart Cities
- Smart Healthcare

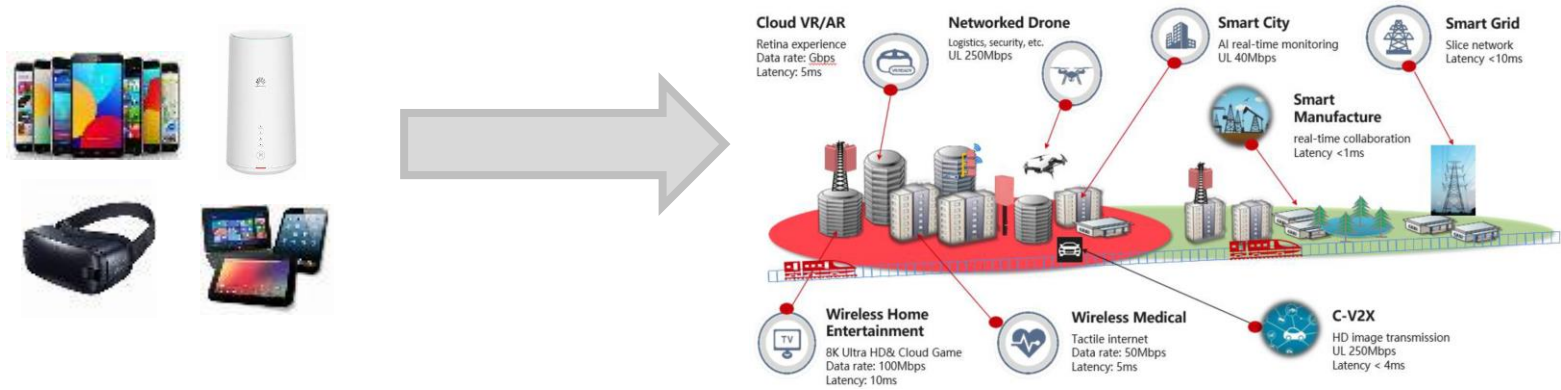
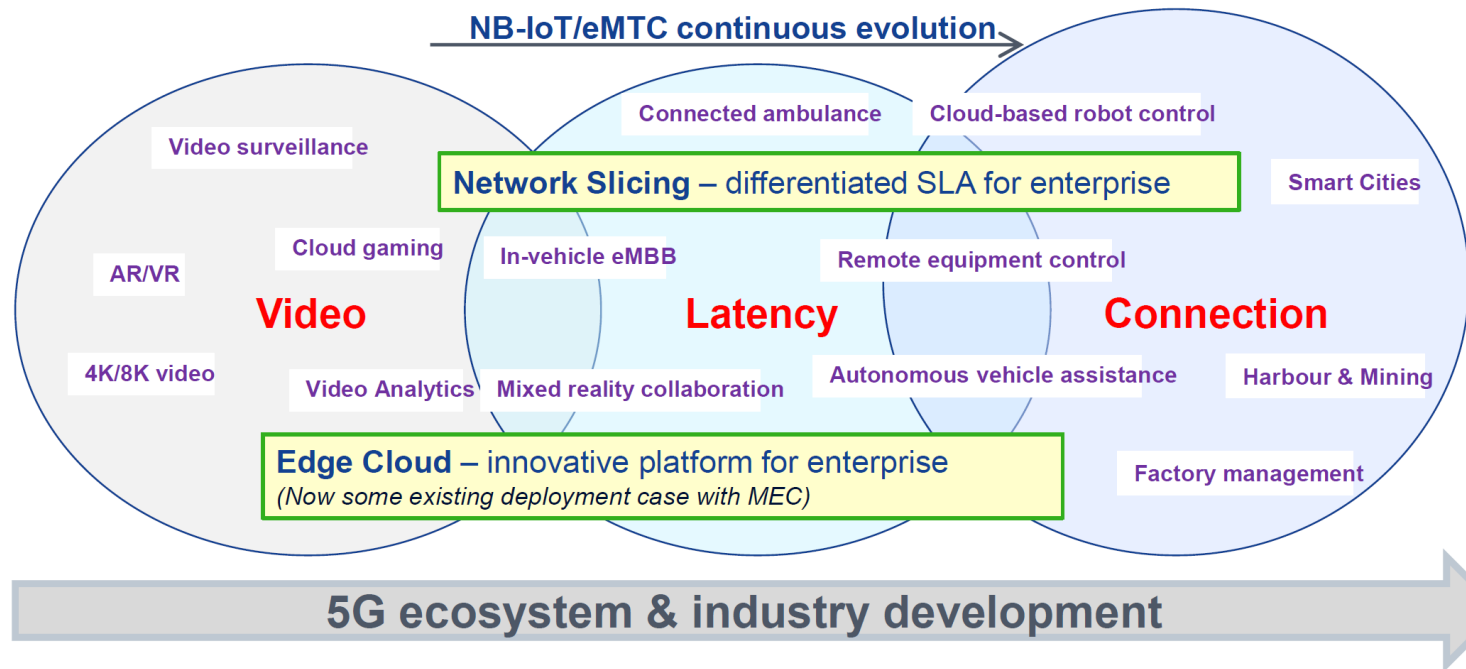
Related technologies from other industries, to augment with 5G to provide integrated solutions

- Artificial Intelligence (AI)
- Virtual Reality (VR) and Augmented Reality (AR)
- Robotics.
- Machine Learning

5G Network Transformation

- Virtualisation, SDN/NFV.
- Network Slicing and MEC.
- Front haul and mid-haul architectures

Industry 5G Use Cases for New 'Industry Verticals'



Key Trend 5G - Anritsu Product Portfolio



Components
Transmitter

Chipset
Device R&D

Certification
Acceptance

Production

Vector Network Analyzer



5G NR Device
Protocol & RF Test



MT8000A

RF
Conformance



ME7873NR

Production Test
(Sub-6GHz)



MT8870A

Signal Analyzer



MS2850A

NSA-NR LTE Anchor



Protocol
Conformance
Carrier
Acceptance

Production Test
(mmWave)



MT8000A

Field Master Pro



MS2090A

OTA Chamber/Shield Box



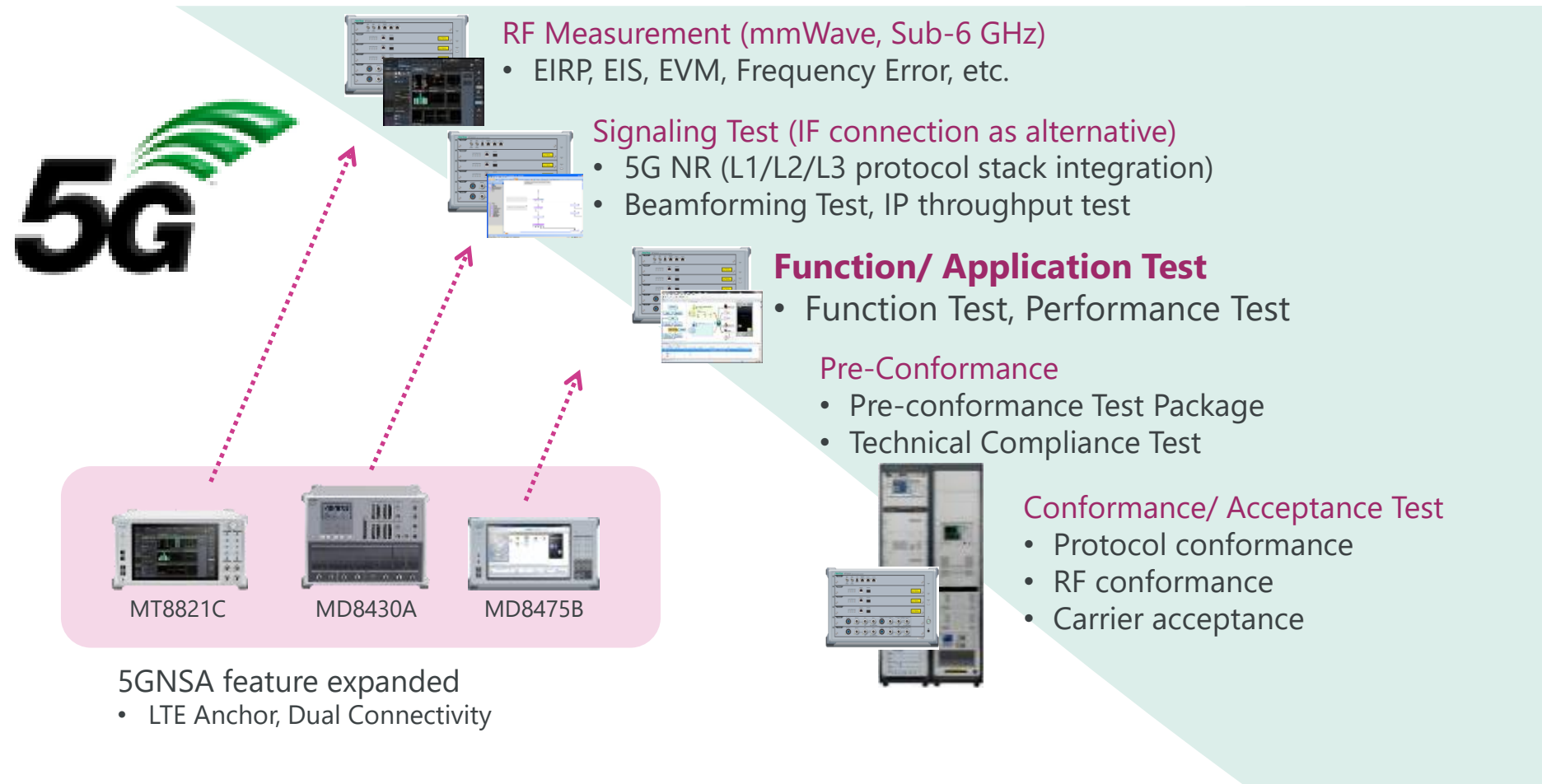
ME7834NR



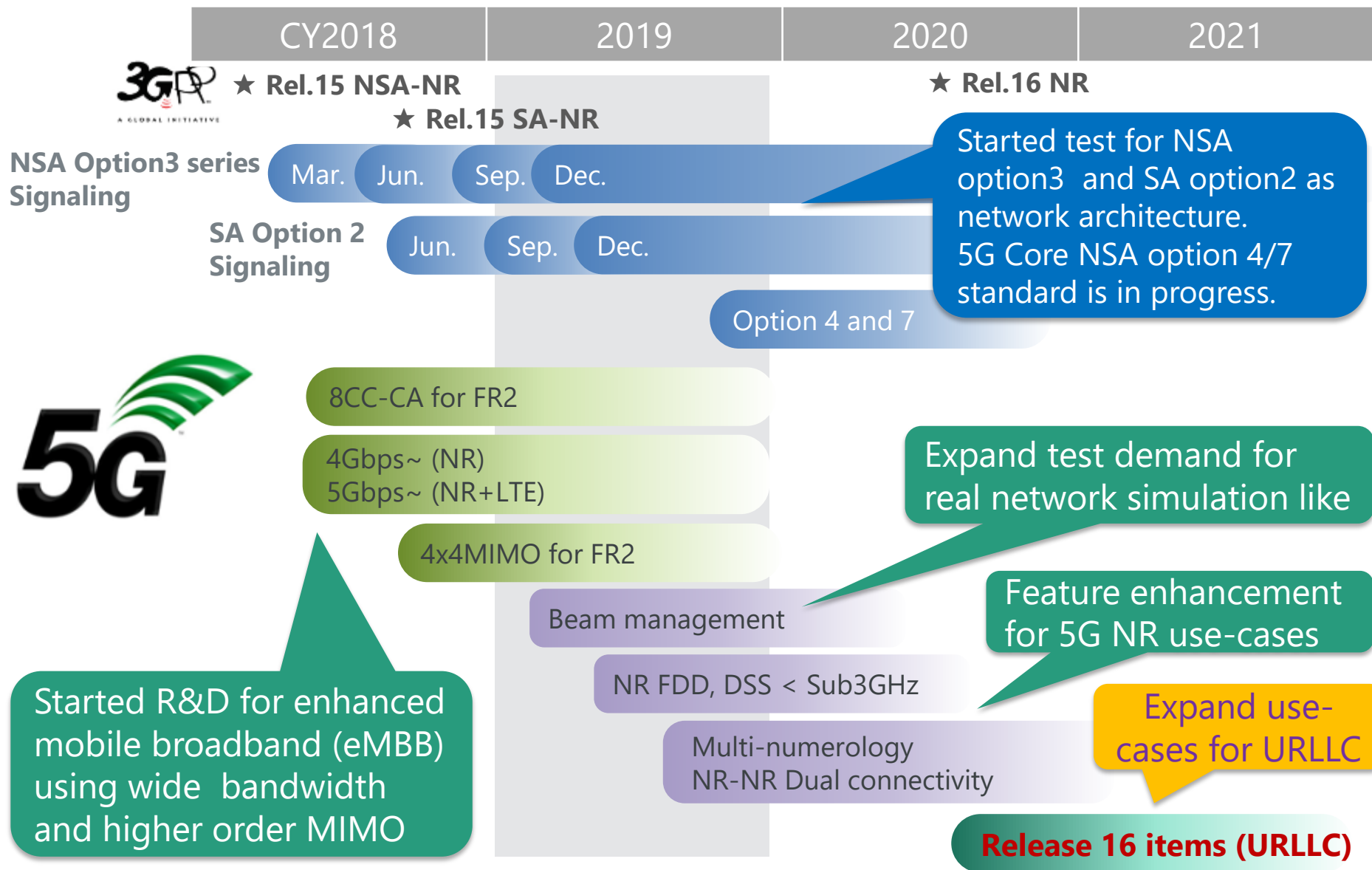
5G Solution Well Established in the Industry



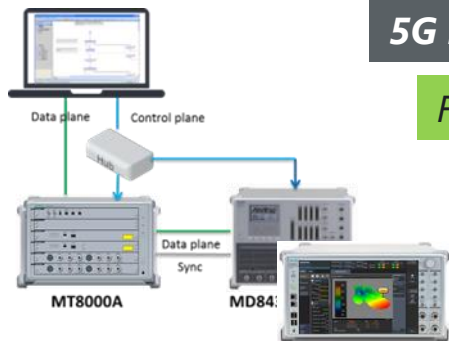
| CY2017 | | CY2018 | | CY2019 | | CY2020+ | |
|--------|----|--------|----|--------|----|---------|----|
| H1 | H2 | H1 | H2 | H1 | H2 | H1 | H2 |



High Level 5G Test Demand Overview



Anritsu 5G NR Contribution Progress Overview



5G NR sub-6G, mmWave RF, Protocol Test System for R&D and Integration Tests

Full-stack 5G NR Test Available Today

Actively working with leading chipset vendors globally

Successfully achieved full-stack NSA 5G call in Sub-6G & mmWave

Progressing high data speed verification to meet 5G NR requirement



5G RF, RRM and Protocol Conformance Test System for GCF and PTCRB

Actively contributing in 3GPP RAN4 & 5 groups to develop conformance tests

Have experts in ETSI TTCN team developing protocol conformance test cases

Conformance test case debugging in started in Q3/2018

Achieved early validation in 2019/Q1



5G Acceptance Tests for operators globally including China Mobile and Docomo

Common hardware with conformance test systems

Actively co-working with leading operators to define scope and test cases

Co-leader with CMCC in GTI 5G Device Certification to drive development

Support AT&T, T-Mobile, Docomo, China Mobile, etc.

Anritsu is leading test and monitoring solutions for 3GPP technology.

- Leading in 5G NR test solutions, signal analysers and network simulators.
- Number 1 in test & certification of devices, most advanced R&D signaling test platform.
- Market leader for network installation and maintenance testing.
- Global provider of monitoring systems for advanced analytics.

We offer the widest range of test solutions to the mobile industry.

- Technology leaders in wireless and optical/Ethernet communications test.
- Close customer partnerships across all parts of the industry
- Global operations with strong local support, and 125 years in the business.

Focus on support and training services.

- To accelerate testing and improve user efficiency.
- Build and maintain strong relationships between customer and supplier.

5G, and future devices and Infrastructure

Industry verticals application test bed - latest MT8000A 5G network simulator for device/chipset R&D testing is integrated with Mobile Edge Compute (MEC) applications server and providing network slicing capability, to enable testing of application environments for new industry verticals.

C-V2X solutions - Anritsu 5G V2X solution together with dSPACE, for vehicle to network testing using Hardware in the Loop (HIL) vehicle simulation technology.

SmartStudio NR - the industry-first state machine base GUI to simulate 5G-NR mobile network, for fast and effective 5G device testing and verification.

5G Conformance Test - the evolution of the ME7873x and ME7834x Anritsu conformance test systems. The ME7873NR supports RF, Performance and radio resource management (RRM) conformance testing of 5G NR non-standalone and standalone devices for both sub-6 GHz and mmWave. The ME7834NR systems support protocol conformance testing of 5G NR non-standalone and standalone devices for both sub-6 GHz and mmWave.

MS2090A Field Master Pro – The leading 5G NR field measurement tool, featuring both advanced 5G demodulation/analysis functions and Real Time Spectrum Analyser.

MT1000A Network Master Pro - a portable easy to use test solution with 10G, 25G and 100G interfaces which accurately measures and analyzes critical network performance parameters. These include PTP, timing accuracy and latency, which allows 5G operators to ensure URLLC performance and be confident in the end-to-end quality of service.

Service Assurance

With the growing complexity of infrastructure networks comes an increasing need for service assurance using 'Big Data' customer experience analytics. Anritsu will be demonstrating their leadership in [Customer Experience Analytics](#), including displays in real-time, network virtualisation and insight delivery.

Please see all these technologies on display on our booth.

THANK YOU



