muRata SPEAKS

TECHNOLOGY | SOLUTIONS | INNOVATIONS

Murata Speaks - Monthly Webinar Series #27

[Nov 2022]

Today’s Speaker

Thirumoorthy. R

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✉ : thiru.moorthy@murata.com

Over 8 years of experience in Murata Engineering and Sales divisions. Handled multiple segments and manufacturing customers such as global EMS, Automotive, and Network applications and accounts, etc.

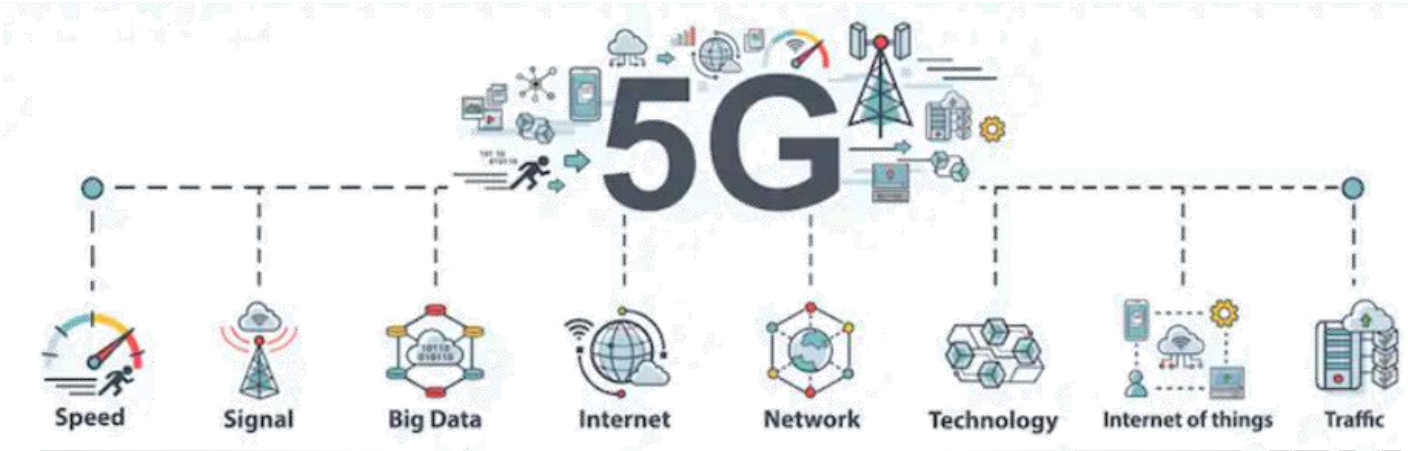
Thiru is open to discuss and support on customers' technical challenges and requirements. In the process of understanding customer's problems and needs, he aims to provide the best solution to resolve any issues upon deep analysis.


muRata SPEAKS
TECHNOLOGY | SOLUTIONS | INNOVATIONS
POWERING
DATA CENTERS OF THE
5G-ENABLED FUTURE
WITH MURATA SOLUTIONS
30th November 2022, Wednesday
11:00 am (IST) | 1:30 pm (SGT)

Today's Agenda

- **Overview of 5G**
- **Data Centers in the 5G-enabled World**
  - Network Infrastructure
  - Data Centers Ecosystem
- **Murata's Products and Solutions for Data Centers**
  - OCP Solution (Power Distribution Unit)
  - RFID Solution for Cable Management (Network)
  - Thermistors for Thermal Management (Server and Storage)
  - Compact, Highly Reliable Components (Server and Storage)
- **How Murata Stacks Up**
- **Moving Beyond 5G…**

What's 5G? What's New?



5G (5th Generation/ New Radio)

- **Next-generation** mobile technology of 4G (4th Generation/ LTE)
- Evolution of **high-speed, high-capacity** communications
- New network solution infrastructure that connects everything

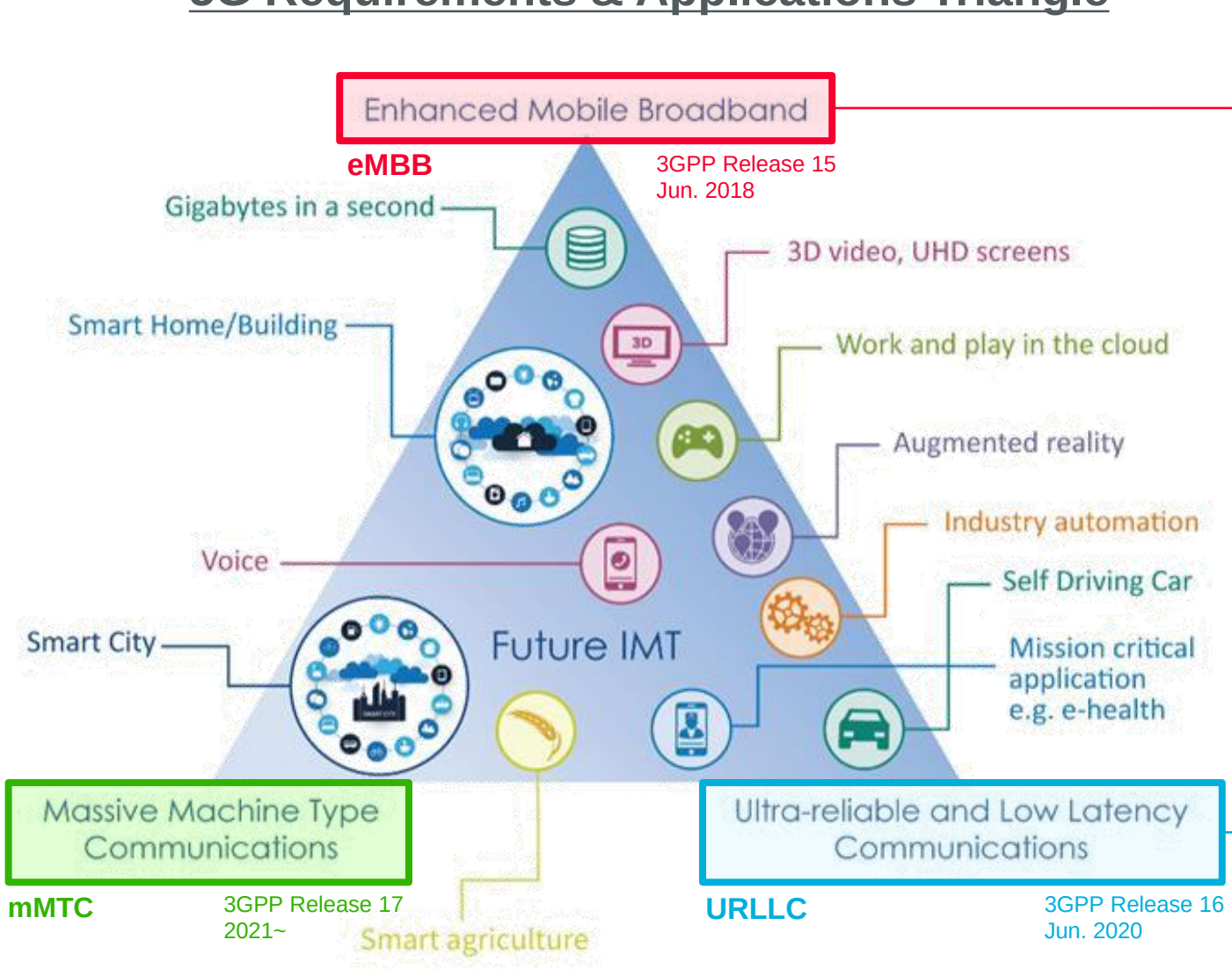
- Aim for **maximum throughput (10 Gbps)** comparable to optical networks
- Utilize **ultra-high frequency (6 GHz or faster)** spectrum

- **Multi access communications** became mainstream due to distinction between **licensed 5G** and **unlicensed** spectrum
- A variety of carriers other than existing carriers can be investors in 5G telecommunication market

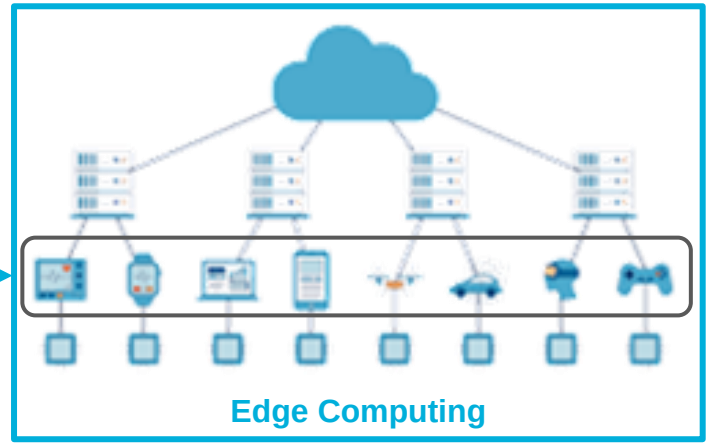
Source from ***S9P4 5G Market Report***

5G Standardization: Three Requirements

5G Requirements & Applications Triangle

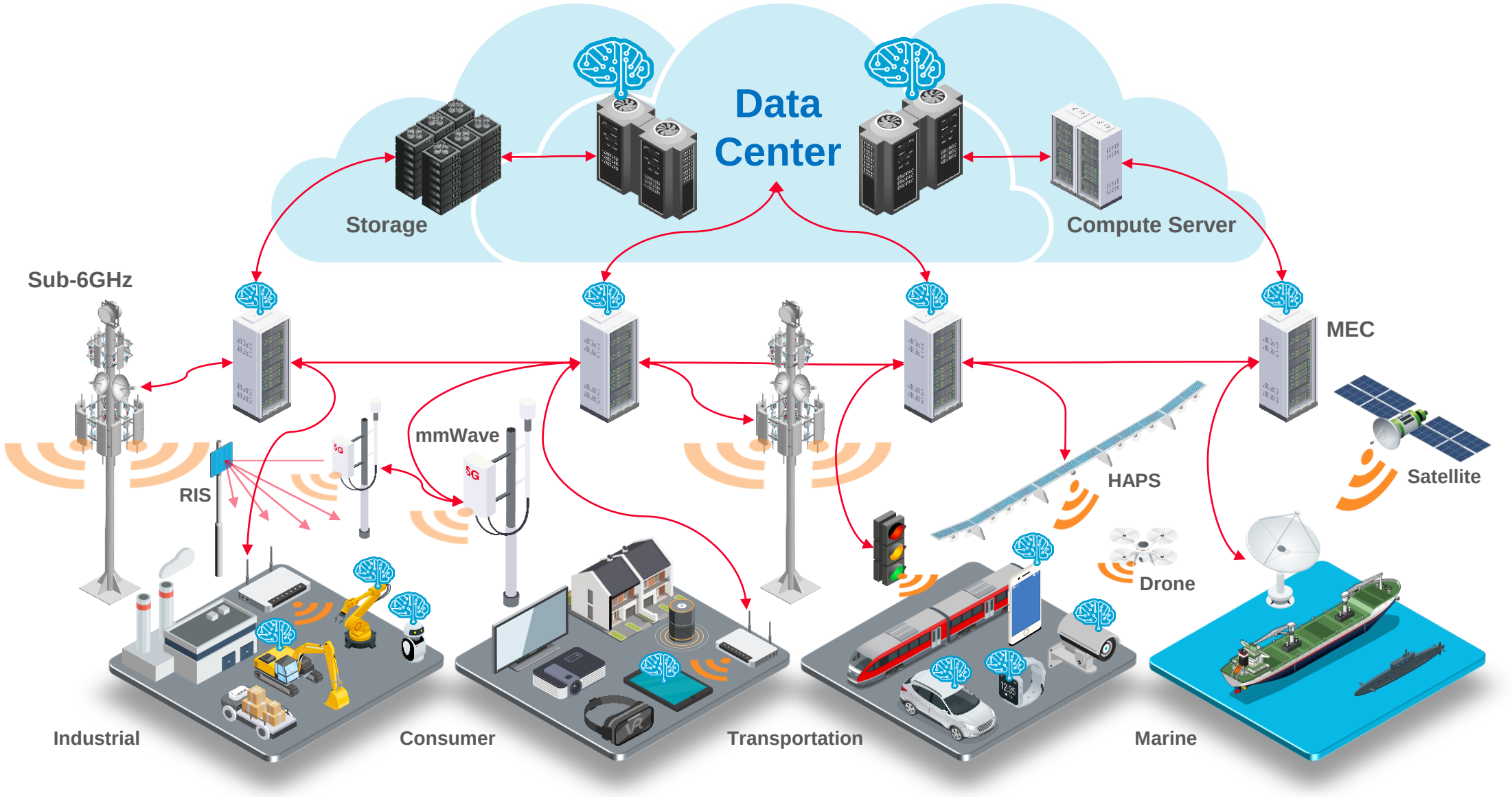


Applications that meet the standardized requirements are starting to form the market

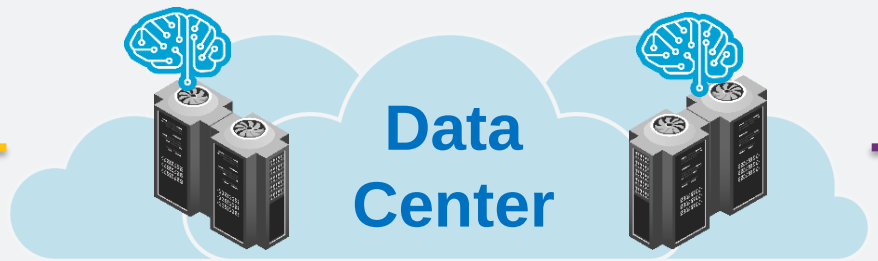


Source: International Telecommunication Union (ITU)

Network Infrastructure



Data Center Ecosystem



IT Infrastructure

Server

- Servers are classified as rack, blade, and tower servers
- Server components include motherboard, Dynamic Random-Access Memory (DRAM), processor (Intel/AMD), hard drives, graphics cards, and network connectivity ports

Storage

- The storage infrastructure in data centers enables a business to store and process application data.
- Storage systems are classified as Storage Area Networking (SAN), Network Attached Storage (NAS), and Direct Attached Storage (DAS)

Network

- Network infrastructure in data centers mainly includes the use of Ethernet switches at three major locations inside the facility: top of the rack, aggregation, and core
- Other examples include FC switches, routers, application delivery controllers (ADC), and WAN optimization applications

Support Infrastructure

Electrical Infrastructure

Electrical infrastructures in a data center include:-

- Uninterruptible power supply (UPS) systems
- Generators
- Transfer switches & switchgear
- Power distribution unit (PDUs)

Mechanical Infrastructure

Mechanical infrastructures in a data center include:-

- Cooling systems
- Racks

General Infrastructure

General construction in a data center include:-

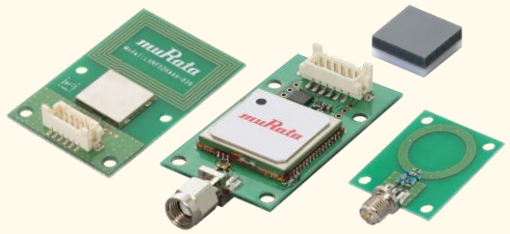
- Fire detection & suppression
- Physical security (CCTV, access control, etc.)
- Building Management Systems
- Energy Management Systems

Source: Industrial Reports, Frost & Sullivan Analysis

Data Center Ecosystem

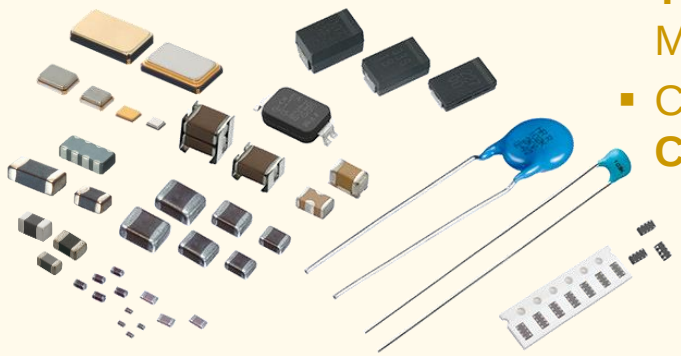
IT Infrastructure

Server | **Storage** | **Network**



- **RFID Solution** for Cable Management

Network

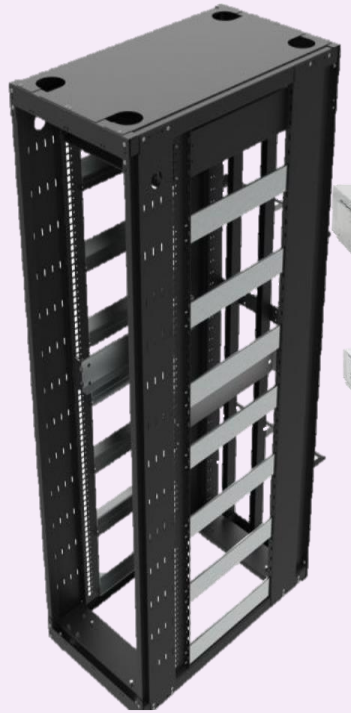


- **Thermistors** for Thermal Management
- Compact, Highly Reliable **Components**

Server and Storage

Support Infrastructure

Electrical Infrastructure | Mechanical Infrastructure | General Infrastructure



- **OCP Solution** for Power Distribution Unit

Electrical Infrastructure

muRata INNOVATOR IN ELECTRONICS

Products and Solutions for Data Centers

Data Center Ecosystem

IT Infrastructure

Server | Storage | Network

- **RFID Solution** for Cable Management

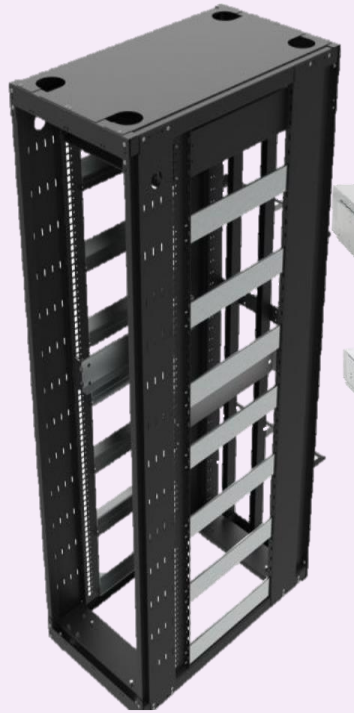
Network

- **Thermistors** for Thermal Management
- Compact, Highly Reliable **Components**

Server and Storage

Support Infrastructure

Electrical Infrastructure | Mechanical Infrastructure | General Infrastructure



- **OCP Solution** for Power Distribution Unit

Electrical Infrastructure

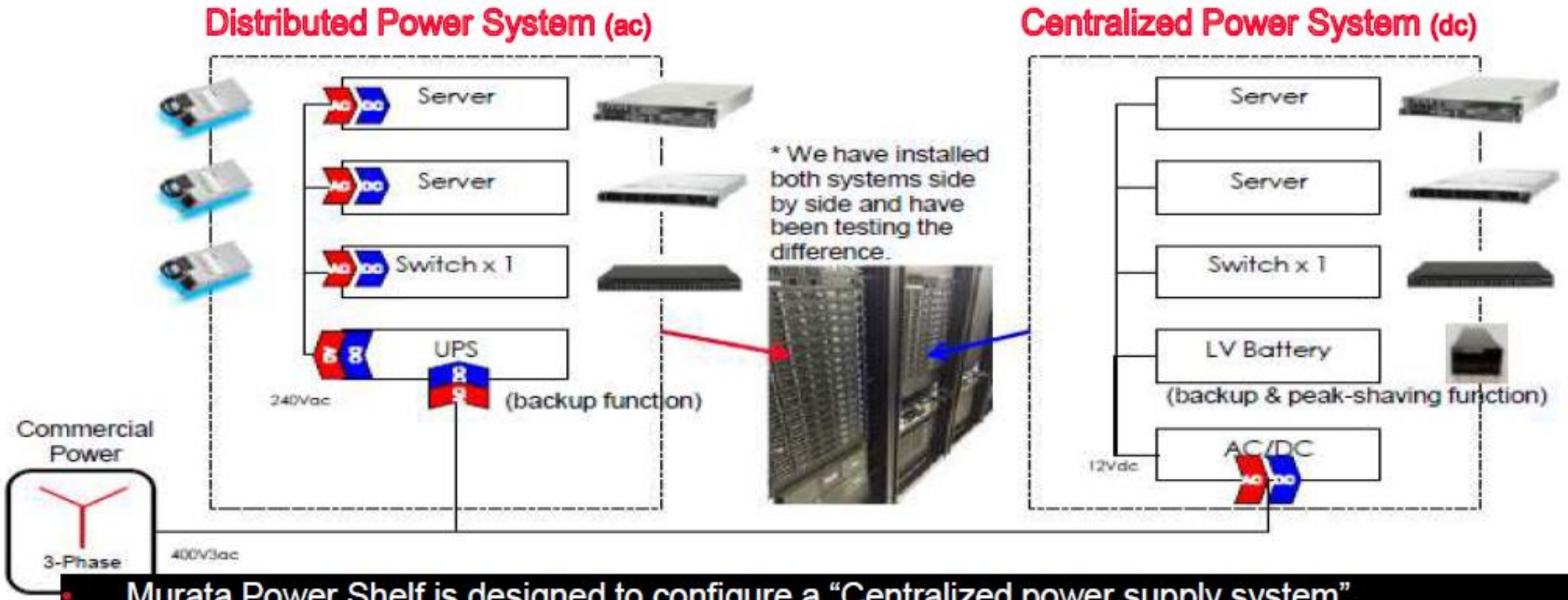
muRata INNOVATOR IN ELECTRONICS

Products and Solutions for Data Centers

OCP Solution

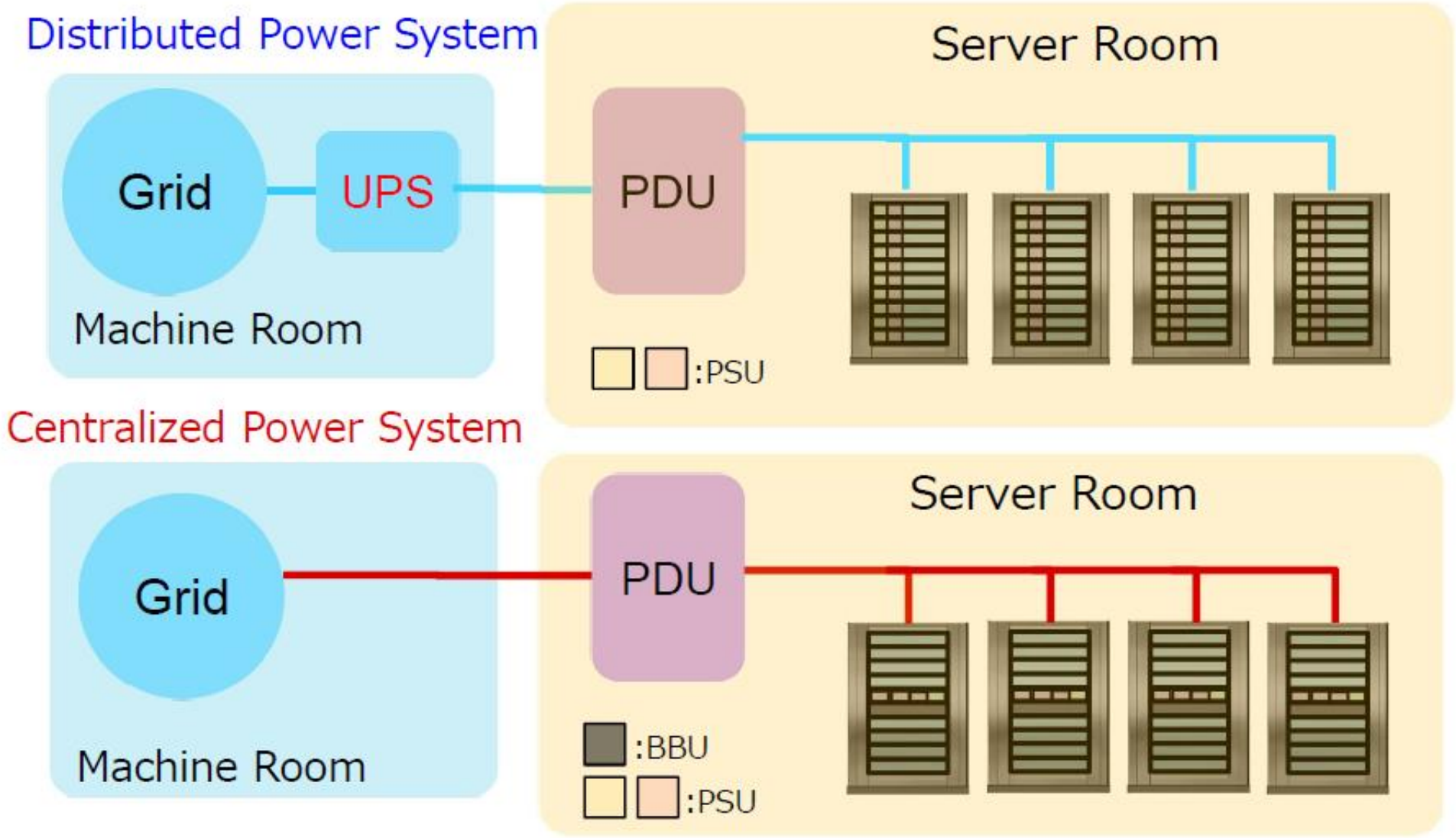
for Power Distribution Unit

Power System: Conventional vs. Centralized



- Murata Power Shelf is designed to configure a “Centralized power supply system”.
- In the Murata System, high power, efficient, redundant Power Shelf provides 12V to all servers, switches and storages in the rack.
- In the Conventional system, each server has its respective build-in power supply..
- The DC-powered rack gives various benefits, such as efficiency, redundancy and cost.

Power System: Conventional vs. Centralized



All racks will be backed up by centralized UPS.

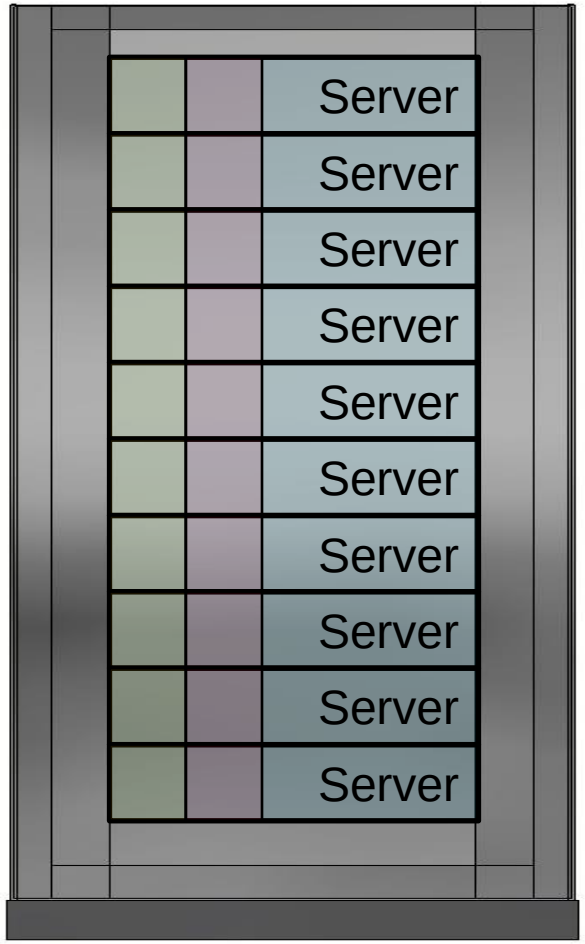
Need to invest for UPS with full capacity at launch a datacenter.

Each racks will be backed up by their own BBU.

High scalability and flexibility.

Centralized Power Supply

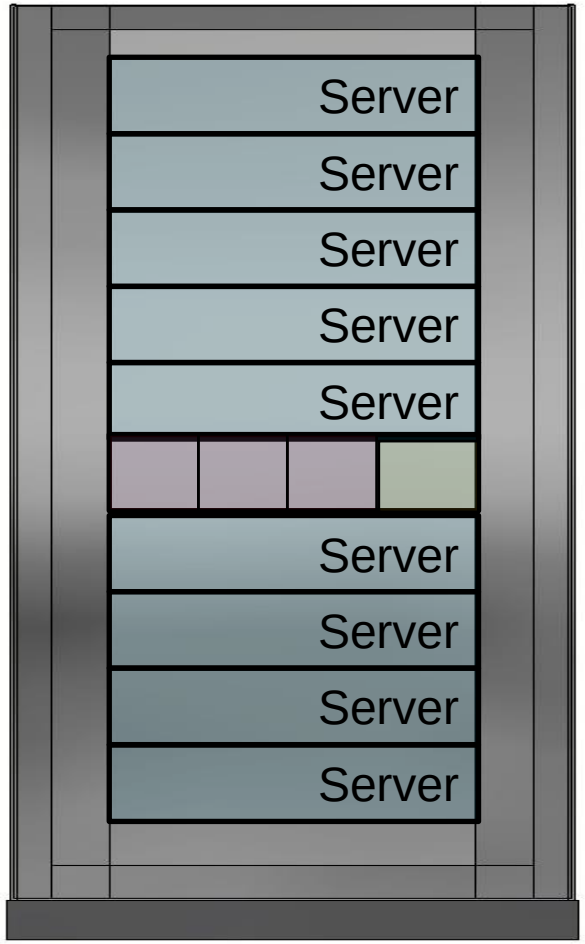
Distributed (Traditional)



- Each server has own PSUs (Needs Npcs redundant PSU for Npcs servers)
- Low Efficiency at PSU because of low load ratio

- Only one PSU by rack is needed for redundancy
- High Efficiency because of high load ratio

Centralized



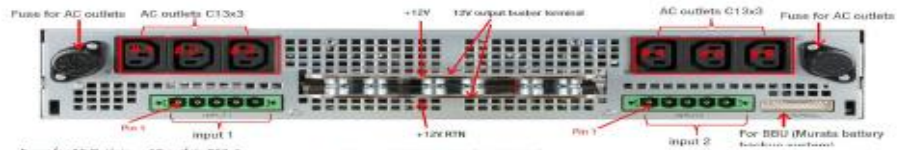
:PSU

OCP Power Shelf: MWOCES-192/ 211 Series

MWOCES-192

Front View

Rear View
MWOCES-192-A,G



Rear View
MWOCES-192-M NEW

- OCP V1 and V2 Open Rack Compliant
- Maximum 15KW (N+ 1) Power Shelf
- Optional ATS Unit Available

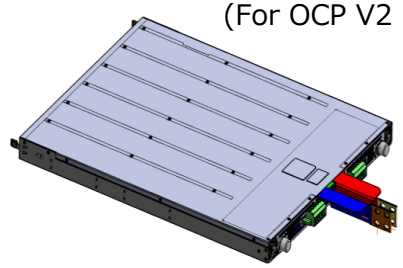
【Feature】

- Provides up to 15KW (N+1) in 2RU height
- Extremely High efficiency 80+Titanium PSU (3KW), Up to 6 PSUs per shelf
- High reliability, redundant design
- ATS (Automated Transfer Switch) unit equipped to support AC Redundancy
- 6 AC Outlets for additional input power to ICT equipment in the rack
- External communication interface RMU (Remote Management Unit) through SNMP
- Hot swappable

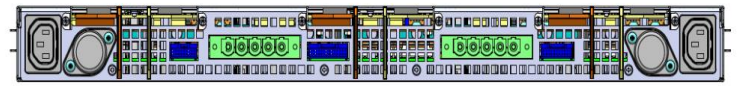
MWOCES- 211

Front View

MWOCES-211-F
(For OCP V2 Rac



Rear View



- OCP V1 and V2 Open Rack Compliant
- Maximum 15KW (N+ 1) Power
- High efficiency PSU design
- Multi AC input configuration

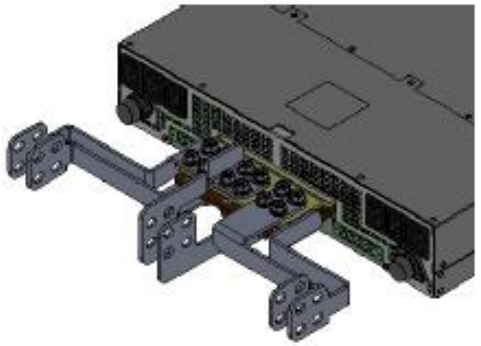
【Feature】

- Provides maximum power of 15KW (N+1) in 1OU Compact Size
- Extremely High efficiency 80+Titanium PSU (3KW) . Up to 6 PSUs per shelf
- High reliability, redundant design
- 2 AC Inputs to shelf, for flexible shelf configurations (N+1, N+N)
- 2 AC Outlets for additional input power to ICT equipment in the rack
- External communication interface RMU (Remote Management Unit) through SNMP
- Hot swappable

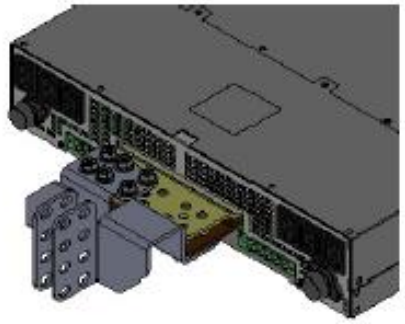
Link Busbars for Multi-Rack Configurations

- Our modular modifiable design allows the same power shelf to be used in either single busbar V2 racks or 3 busbar V1 or V2 racks; and dual or single power zone racks.
- Murata Link Busbar system allows for multi-rack configuration support.

V1 or V2 rack – 3 busbars



V2 rack – 1 busbar



Why Murata OCP Power?

Scalability

By rack solution

You only purchase what you need for your server rack system.

Reliability

By DC connection

Simple is reliable. And redundant promises sustainability.

Efficiency

By less power consumption

Less AC/DC conversions, lower loss and achieve cost reduction.

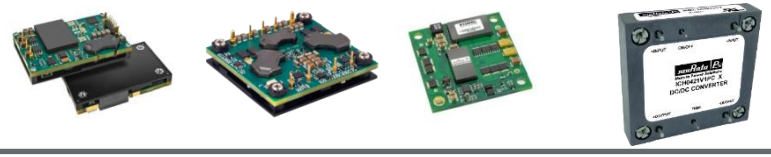
Flexibility

By Power Shelf

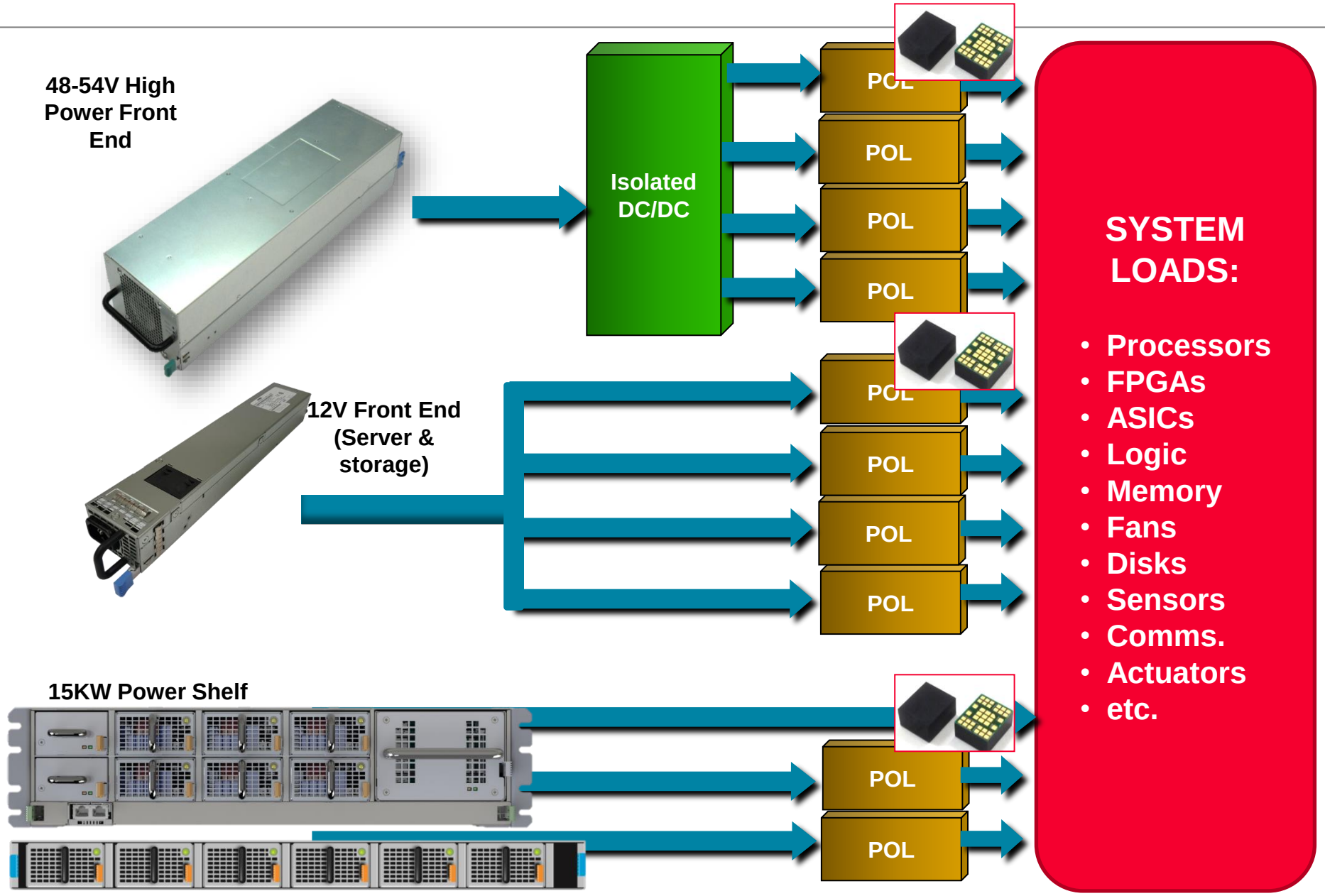
Configurable, support Single Phase AC, 3Phase AC and HVDC.

Powering Data Center:
Murata Power Modules

Murata Power Technologies

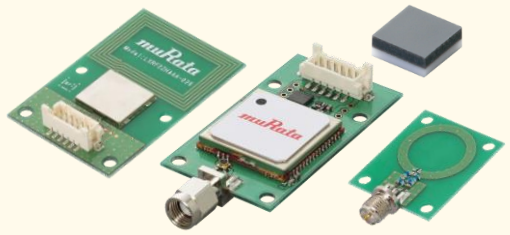
AC-DC Power Supplies (250W~650W)		Medical, Telecom, Industrial
AC-DC Power Supplies (460W~7000W)		Datacom, Telecom, Industrial
DC-DC Power Converters (<1W~25W)		Medical, Industrial
DC-DC Power Converters (15W~200W)		Telecom, Industrial
DC-DC Power Converters (200W~1000W)		Telecom, Industrial

AC to IC Power Conversion Solutions



IT Infrastructure

Server | **Storage** | **Network**



- **RFID Solution** for Cable Management

Network

- **Thermistors** for Thermal Management
- Compact, Highly Reliable **Components**

Server and Storage

Support Infrastructure

Electrical Infrastructure | Mechanical Infrastructure | General Infrastructure

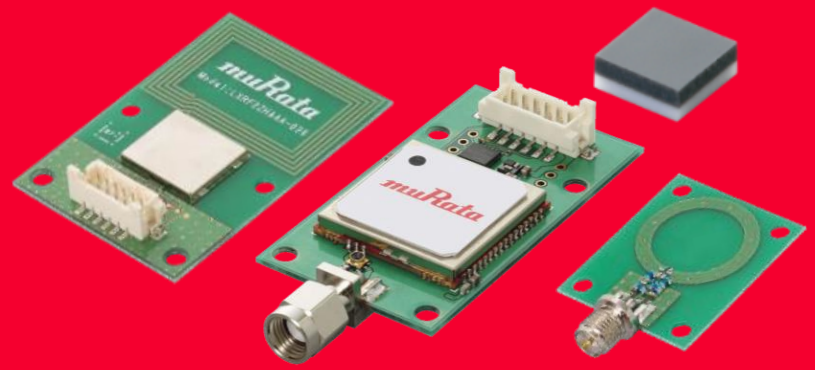
- **OCP Solution** for Power Distribution Unit

Electrical Infrastructure

Products and Solutions for Data Centers

RFID Solution

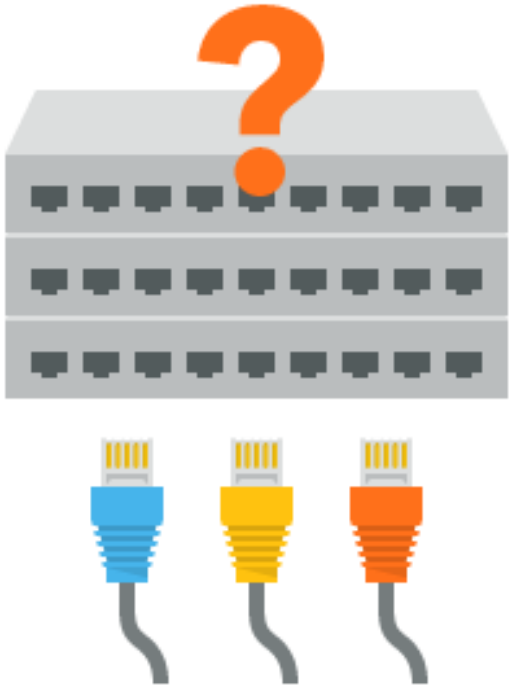
for Cable Management



Cable Management Challenge

Installation

The wiring takes time, as it is difficult to insert the right cable into the right port.



System might stop due to misfeed
Significant losses would be incurred.

Tracking

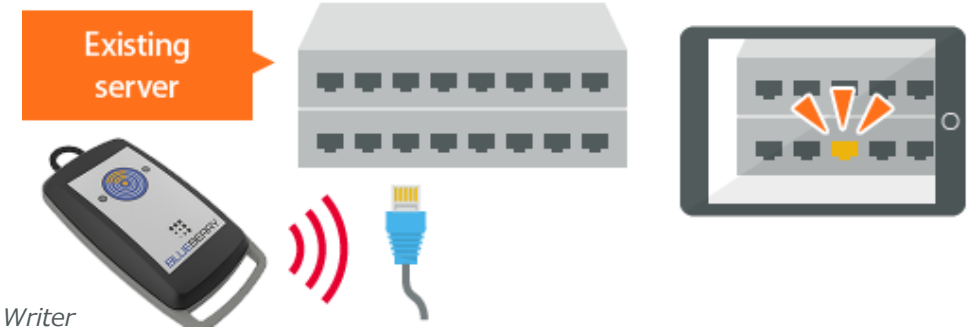
handwriting or manual input

or

Implementing RFID Solution

Installation

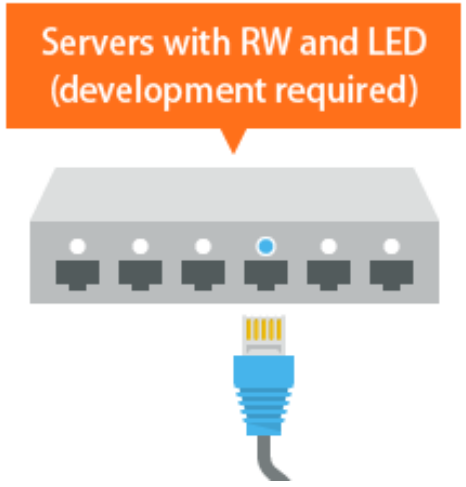
By reading the cable with hand-held RW, the insertion point is identified in the application.



**RW: Reader Writer*

or

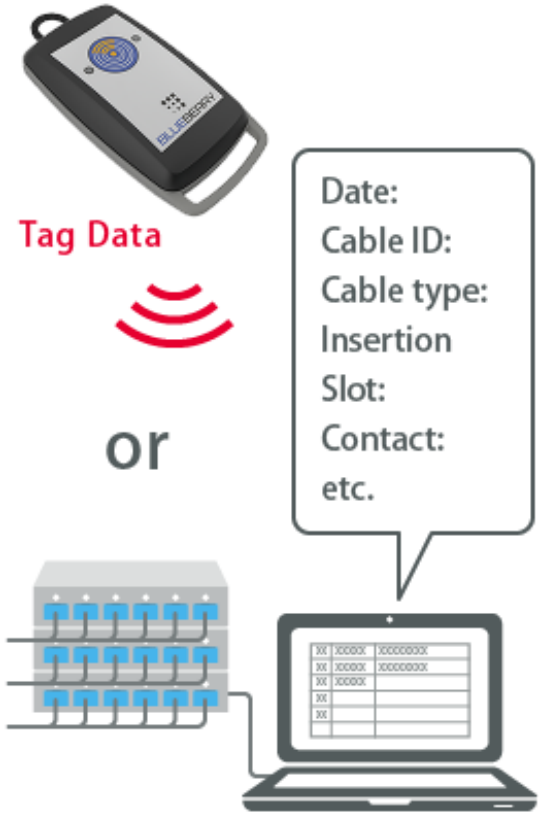
By reading the cable with RW, LED light indicates where to insert.



The LED light warns the user when they insert the wrong cable.

Tracking

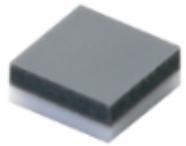
Data is transferred from RW

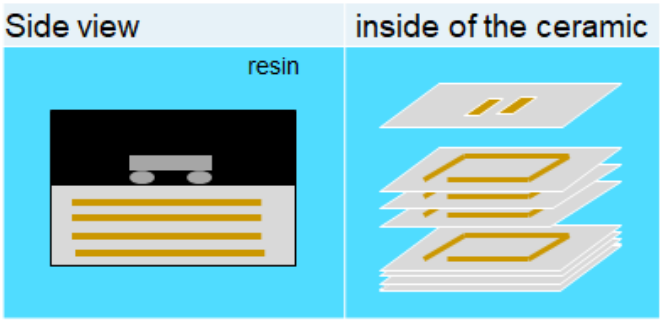


Why Murata RFID?

With RFID technology Murata supports seamless communication

- With compact and robust feature, Murata small RFID tag can be embedded in plastic, which enables it to be attached to the LAN cable/optical cable connector





- Murata can support reader writer integration and antenna design as well as RFID tag

For more information, please visit: https://www.murata.com/en-sg/products/rfid

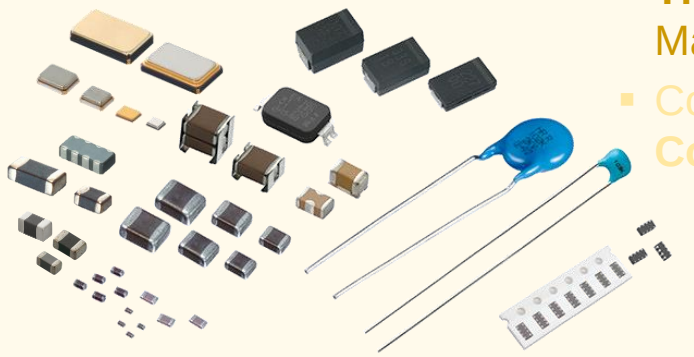
Data Center Ecosystem

IT Infrastructure

Server | **Storage** | **Network**

- **RFID Solution** for Cable Management

Network



- **Thermistors** for Thermal Management
- Compact, Highly Reliable **Components**

Server and Storage

Support Infrastructure

Electrical Infrastructure | **Mechanical Infrastructure** | **General Infrastructure**

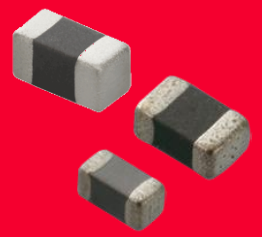
- **OCP Solution** for Power Distribution Unit

Electrical Infrastructure

Products and Solutions for Data Centers

Thermistor

for Thermal Management

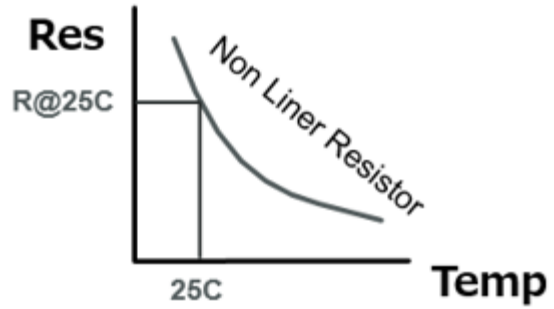


Thermistor for Temperature Monitoring

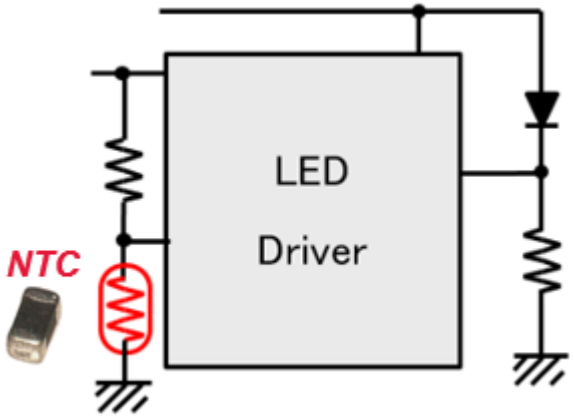
What is NTC Thermistor?

Temperature sensing

by identifying resistance value



Where Thermistor put on circuit?



Murata Product Family

NCP-series (for general consumer application)

Recommended Part Number

Size (inch)	Murata P/N	Resistance (at 25℃)	B-constant (25/50℃)
0402	NCP15XH103F03RC	10kohm+/-1%	3380K +/- 1%
0603	NCP18XH103F03RB	10kohm+/-1%	3380K +/- 1%

**Ask Murata to provide preferred characteristic*

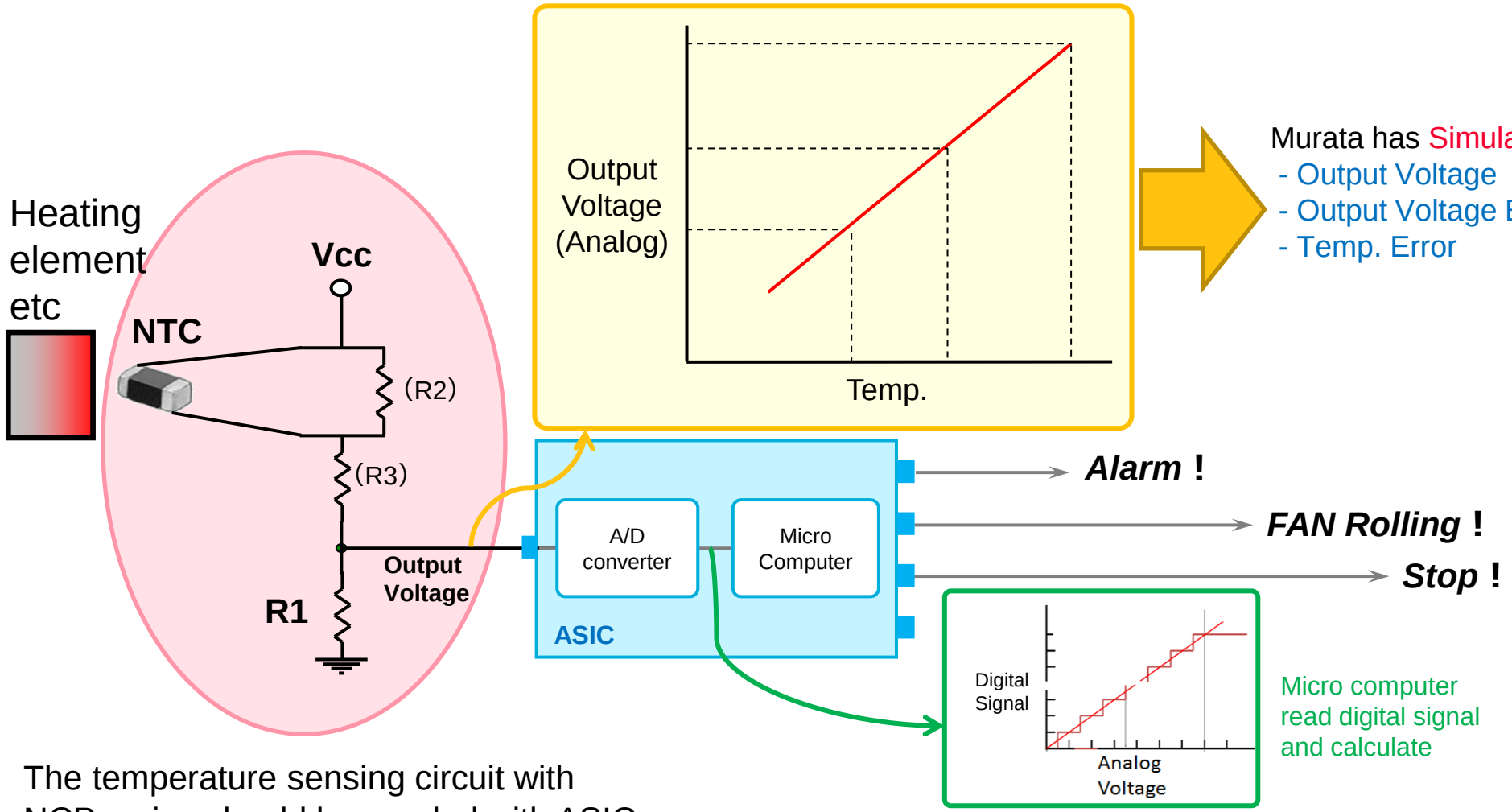
Murata Thermistor Features

- The Highest standard QCDS from Various Line up
- High Accuracy
  (R Tolerance : +/- 1%, +/- 0.5%)
- Good Reliability to be available in Automotive/Industrial market.
- UL / cUL Approved

Circuit Example (Temperature Sensing)

How NTC can be used for temperature sensing

Resistance of NTC changes due to change in temperature



Murata has Simulation Tool on web:
- Output Voltage
- Output Voltage Error
- Temp. Error

The temperature sensing circuit with NCP series should be needed with ASIC

Why Murata NTC Thermistor?

For temperature sensing and compensation, Murata NTC thermistors employ elements featuring high precision and good thermal response

- No.1 share in SMD-type NTC
- Huge capacity in production
- Experience in Mobile/ Automotive/ Industrial
- World smallest package size

For more information, please visit: https://www.murata.com/en-global/products/thermistor/ntc/overview/lineup/ncu

INNOVATOR IN ELECTRONICS

Murata Core Competency

CORE

- **Materials** — Materials Design
- **Front-end process** — Laminating & Stacking
- **Product design** — High Frequency Design
- **Back-end process** — Packaging
- **Analytical** — Materials Characterization

COMPREHENSIVE PRODUCT PORTFOLIO

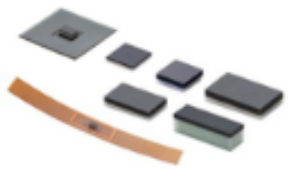
Capacitors

Inductors

Sensors

Timing Devices

(MEMS Resonator / Crystal Unit / Ceramic Resonator / Oscillator)



RFID Products

Power Products

Batteries

Wireless Communication

and many more…

SOLUTION PROVIDER *(*include numerous collaborations with major market/technology leaders)*

and many more…

Data Center Ecosystem

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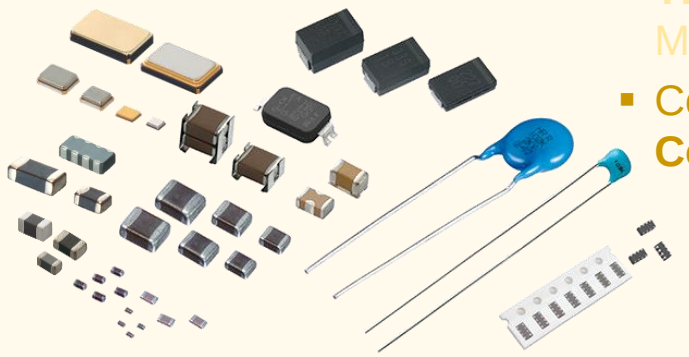
- **RFID Solution** for Cable Management

Network



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- Compact, Highly Reliable **Components**

Server and Storage

Support Infrastructure

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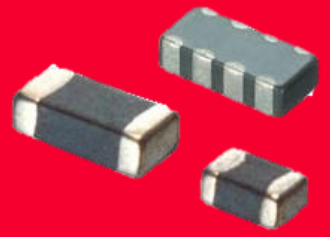
Electrical Infrastructure

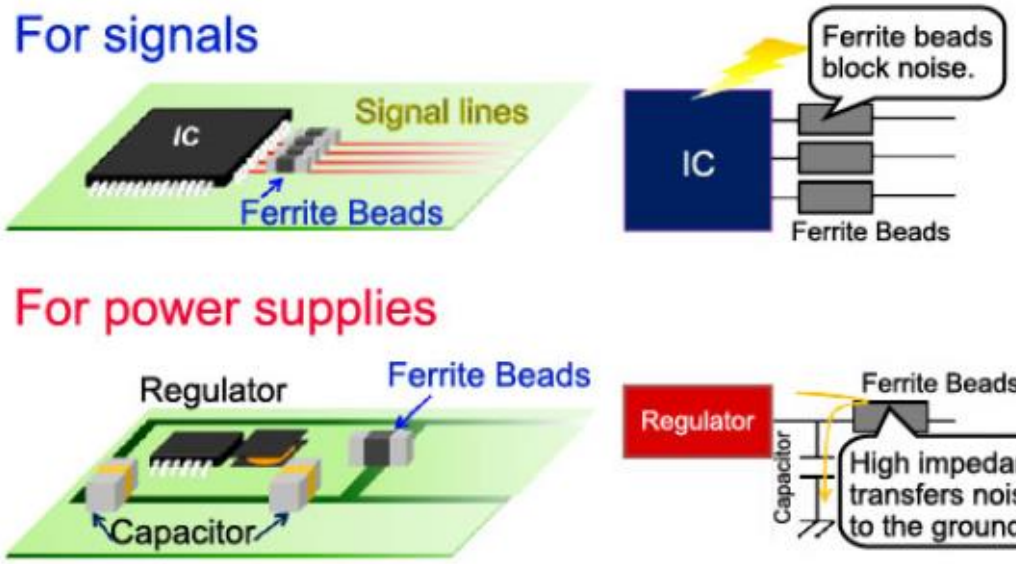
muRata INNOVATOR IN ELECTRONICS Products and Solutions for Data Centers

Compact, Highly Reliable Components:

Ferrite Bead

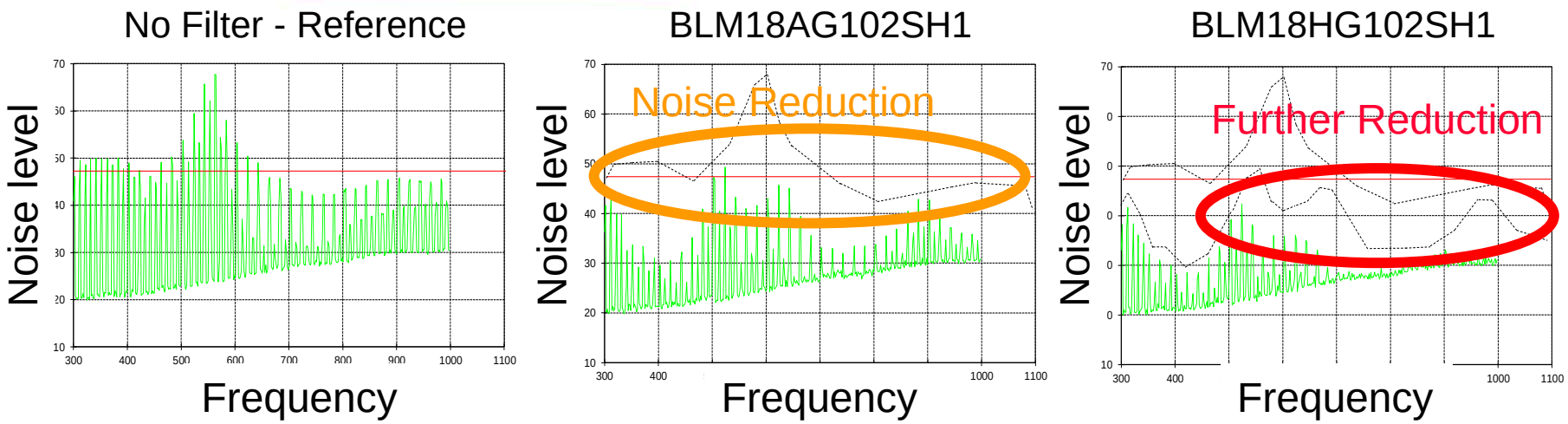


Murata Ferrite Bead



Key features

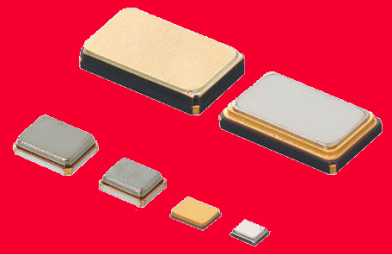
- Small size
- High performance
- Wide temperature range
- Extensive product range



Ferrite Beads can suppress Noise!!

Compact, Highly Reliable Components:

Timing Device



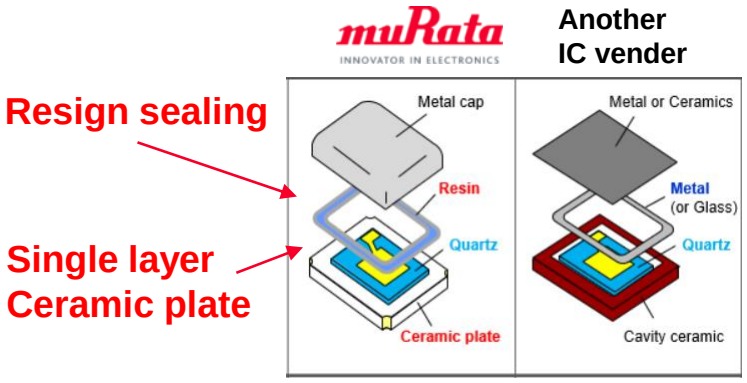
Murata Crystal Unit

Self Growth of Synthetic Quartz

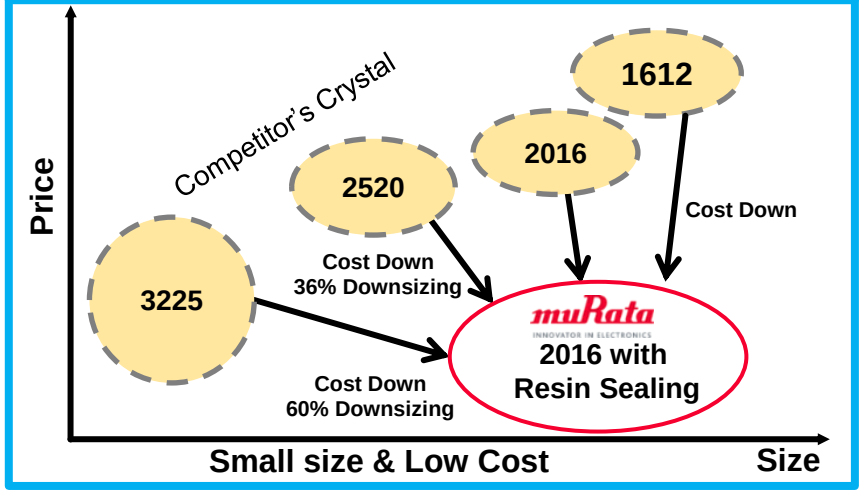
- Leading technology of **miniaturized crystal devices**
- Manufacturing process from **synthetic quartz** through final products

Stable supply

Using commodity material



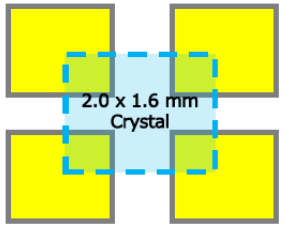
Competitive cost



for Procurement /SCM

for Design-engineer

2016' Footprint Compatibility



PCB layout for
3.2 x 2.5 mm

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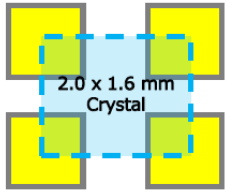
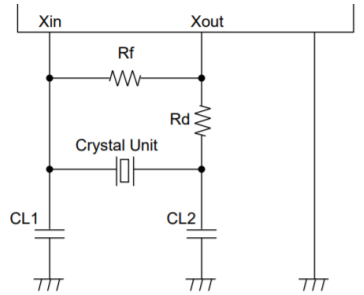
- 2016' Murata Crystal **FIT WELL** in 3225/ 2520 land-pattern



PCB layout for
2.5 x 2.0 mm

IC matching support

✓ **Reference-design from IC vender**

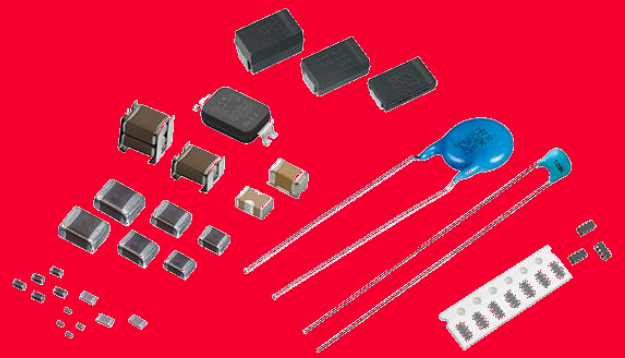


✓ **IC matching service**

- Online: test report database on Murata web.
- Offline: customized evaluation service.

Compact, Highly Reliable Components:

Capacitor



Murata Capacitor

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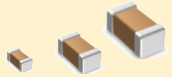
Small, Thin & High-Cap.



Ultra Small Size
(008004, 01005, 015008)

High Capacitance
(~330uF)

Low ESL
(~27uF)

Embedded
(110um~, Cu VIA Connection)

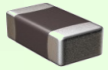
Polymer Electrolysis
(~560uF, 2.5V~25V)

Film Capacitors

High Q
(25V~500V, 1GHz~10GHz)

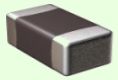
Wire bondable
(0303, ~0.47uF)

High Reliability



Automotive
(ISO9001, AEC-Q200, IATF16949)

Implant Class D

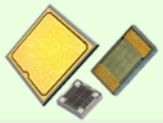


Aerospace

Soft Terminal
(ISO9001, AEC-Q200, IATF16949)

Epoxy Coating
(ISO9001, AEC-Q200, IATF16949)
(~1kV ,~47uF)

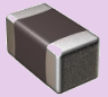
Metal Terminal
(ISO9001, AEC-Q200, IATF16949)
(16V~1kV, ~100uF)



Silicon capacitors

Safety Certified

Anti Acoustic Noise
(0603,~47uF)



High Voltage
(~3.15kV)

Application Specific

Online Design Support Software – SimSurfing

TRY IT NOW!

Access to Murata Simsurfing HERE!

SimSurfing is a *free website design tool* which provides information and data for selecting electronic components.

The functions of the software allow you to *narrow your search* for the component part numbers, display various characteristics, and *perform characteristic calculations.*

How Murata Stacks Up

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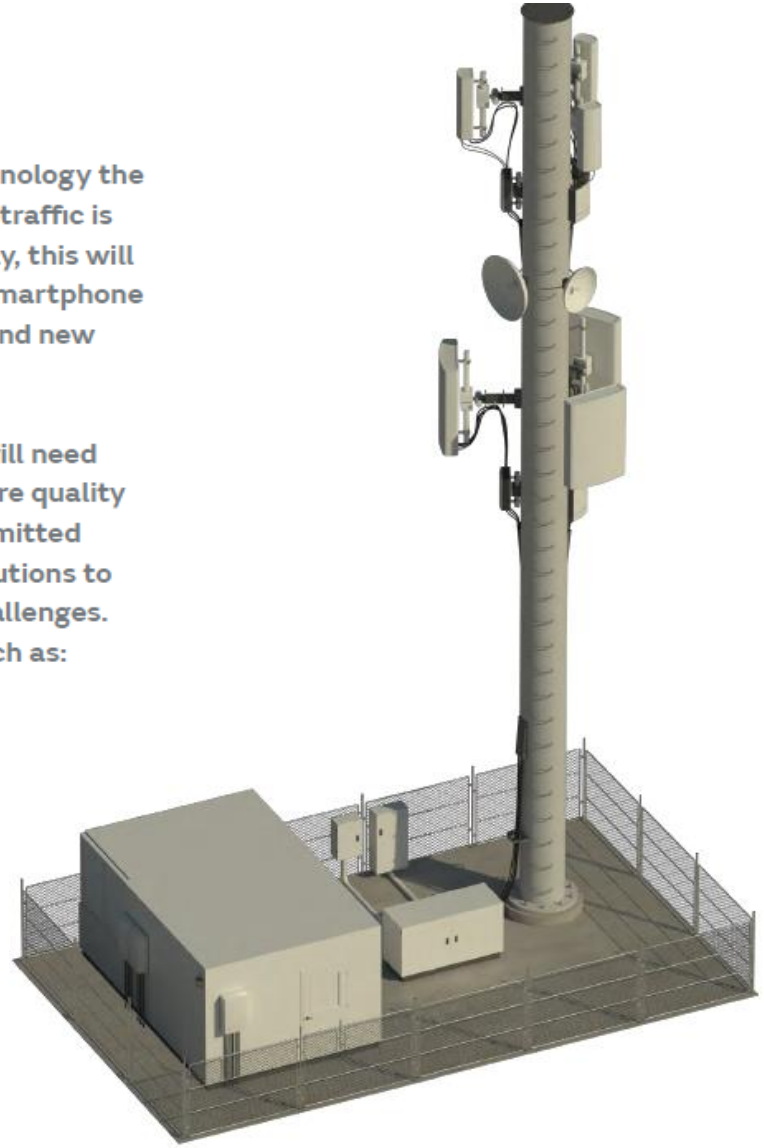
- Tiny Form Factor
- Energy Saving
- High Efficiency
- Comprehensive Portfolio
- Scalable Anytime
- Huge Supply Capability
- Strong Partnerships
- Excellent Support - Online Support Tools

Murata 5G Solution

Applications

With the adoption of 5G technology the volume and variety of mobile traffic is expected to grow dramatically, this will be likely driven primarily by smartphone video or game consumption and new types of connected devices.

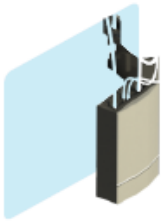
Base station infrastructure will need to significantly adapt to ensure quality of experience. Murata is committed to developing component solutions to support these new device challenges. Especially in critical areas such as:



RRU/AAU

Remote Radio Unit / Active Antenna Unit

Either alongside passive antennas or within active antenna arrays.



PA

Power Amplifier

Power amplifier is inside of RRU. Here, We introduce individually because Murata has specific products here which support high power and efficiency.

BBU/DU/CU

Baseband Unit / Distributed Unit / Centralized Unit

The BBU/DU/CU is placed in the equipment room and connected with the RRU via optical fiber. These are responsible for communication through the physical interface and is in a virtualization trend.

MEC

Multi-access edge computing

Hardware can be located in a number of locations including Distributed Units (DUs), alongside Centralized Units or within an edge datacenter.

Moving Beyond 5G…

Murata Open Innovation

https://www.murata.com/en-eu/s/blog/how-startups-can-collaborate-and-innovate-with-murata.html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Reliable Long-Term
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muRata SPEAKS

TECHNOLOGY | SOLUTIONS | INNOVATIONS

Panelists:

Fujii
Product Manager
(Sensor)

Jeril
Product Engineer
(MLCC & EMC)

Thiru
Engineering Sales

Questions & Answers

Thank You

We will email you with the On-Demand video for today's webinar.

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