

Value Added is Our mission



WHAT IS DIGITAL TRANSFORMATION?



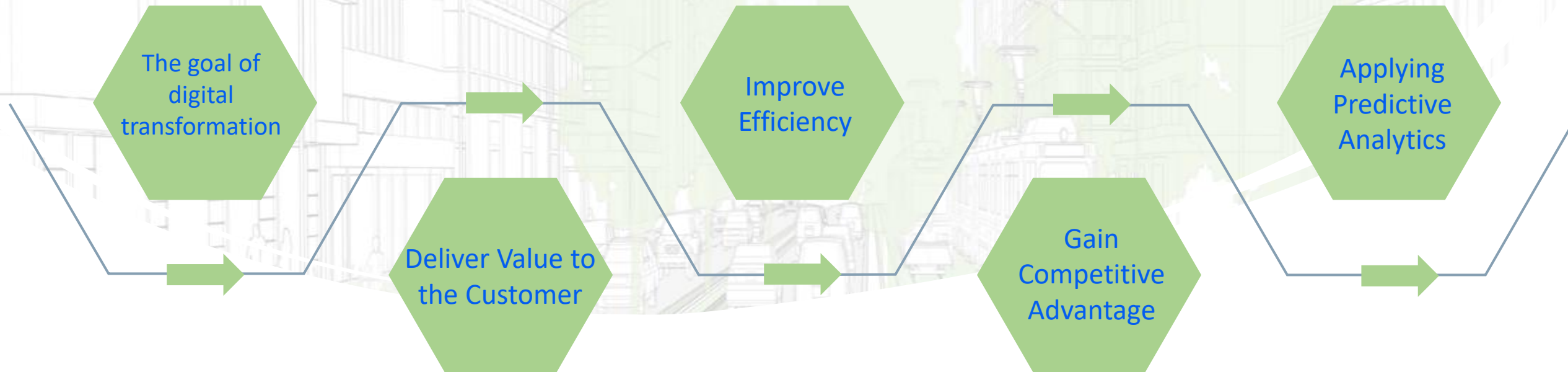
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DIGITAL TRANSFORMATION

is a **culture shift** that transforms the **operation team**
By using digital technologies to create new or modify existing assets
from process equipment, Static assets & services.

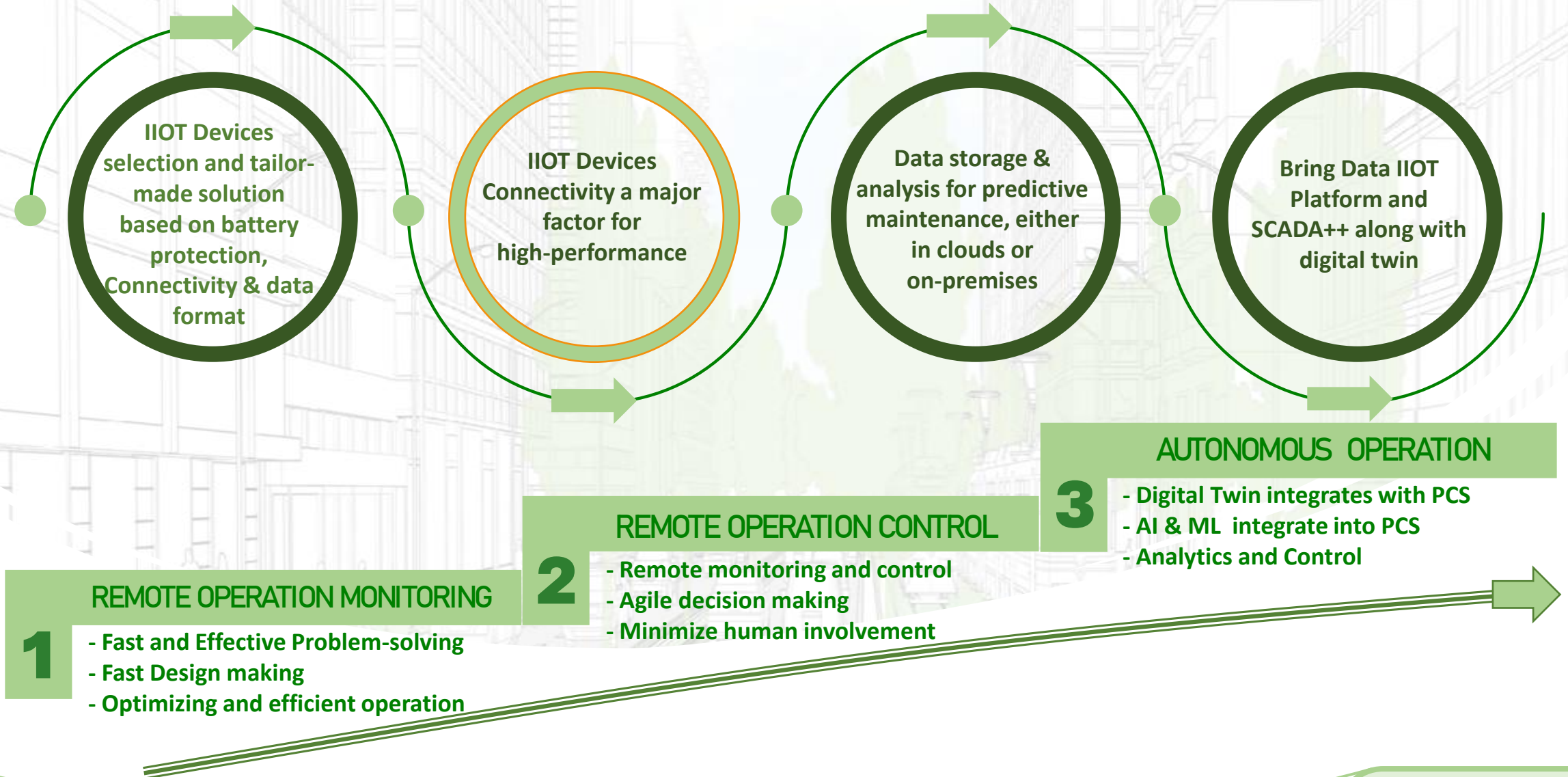


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DIGITAL TRANSFORMATION



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$$\text{Wired} + \text{Wireless} = \text{IOT}$$


Without using Wireless for remote monitoring,
you cannot have comprehensive info for data-driven decisions
to reach predictive maintenance & Mature level of operation



LORAWAN FUNDAMENTALS



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COMMUNICATION AUTOMATION & IOT PROTOCOLS

Wireless Network Protocol

MQTT

Communication between gateways, edge devices & central systems

LoRa

Long-range communication in industrial applications and smart city

DNP3

Communication between SCADA system and RTUs & IEDs.

NB-IOT

Smart City, communication between devices & in IOT application

Field Protocol

Modbus

Connecting various devices like sensors, actuators, & controllers

PROFINET

Fast and reliable communication For automation applications

HART

Connecting Various devices of sensors to the controller wired and wireless

EtherCAT

Communication with synchronization like robotics and motion control

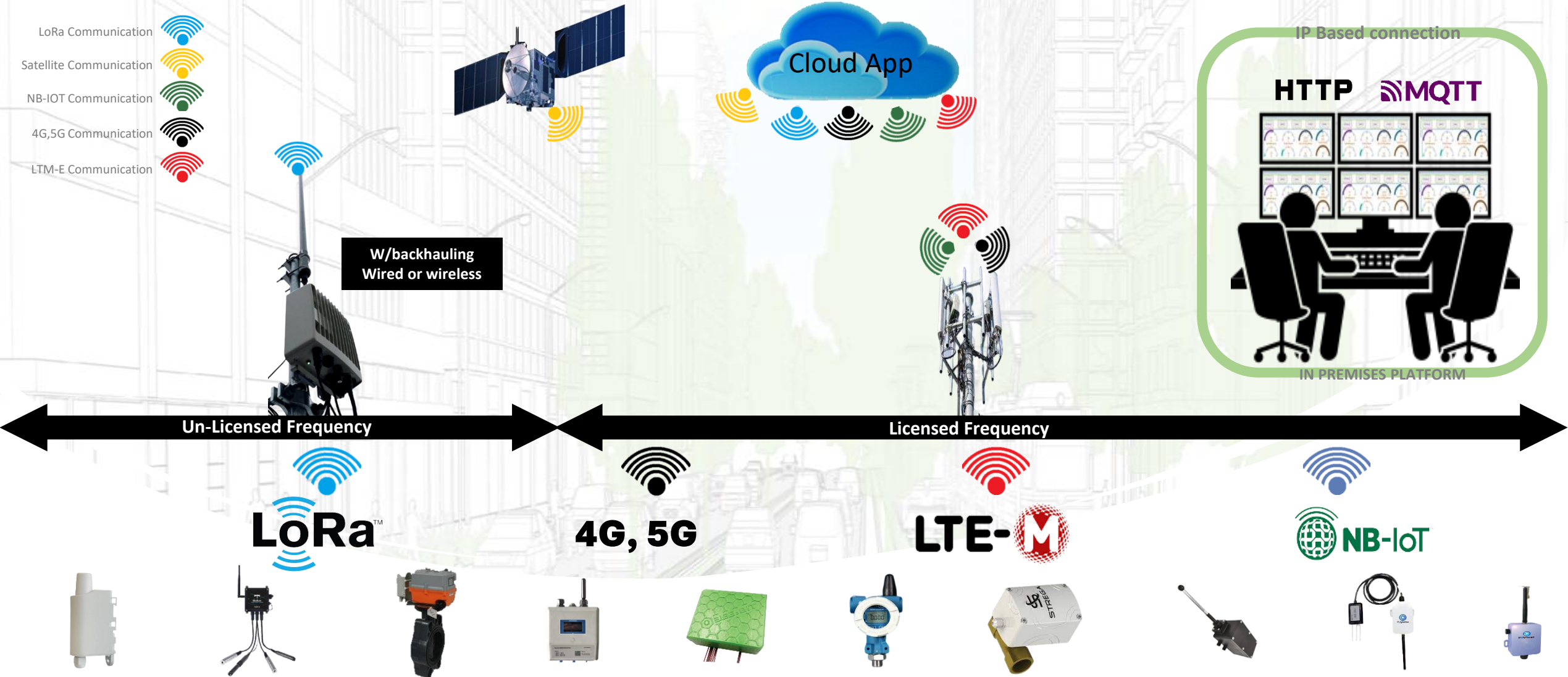


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IIoT WIRELESS NETWORK PROTOCOLS

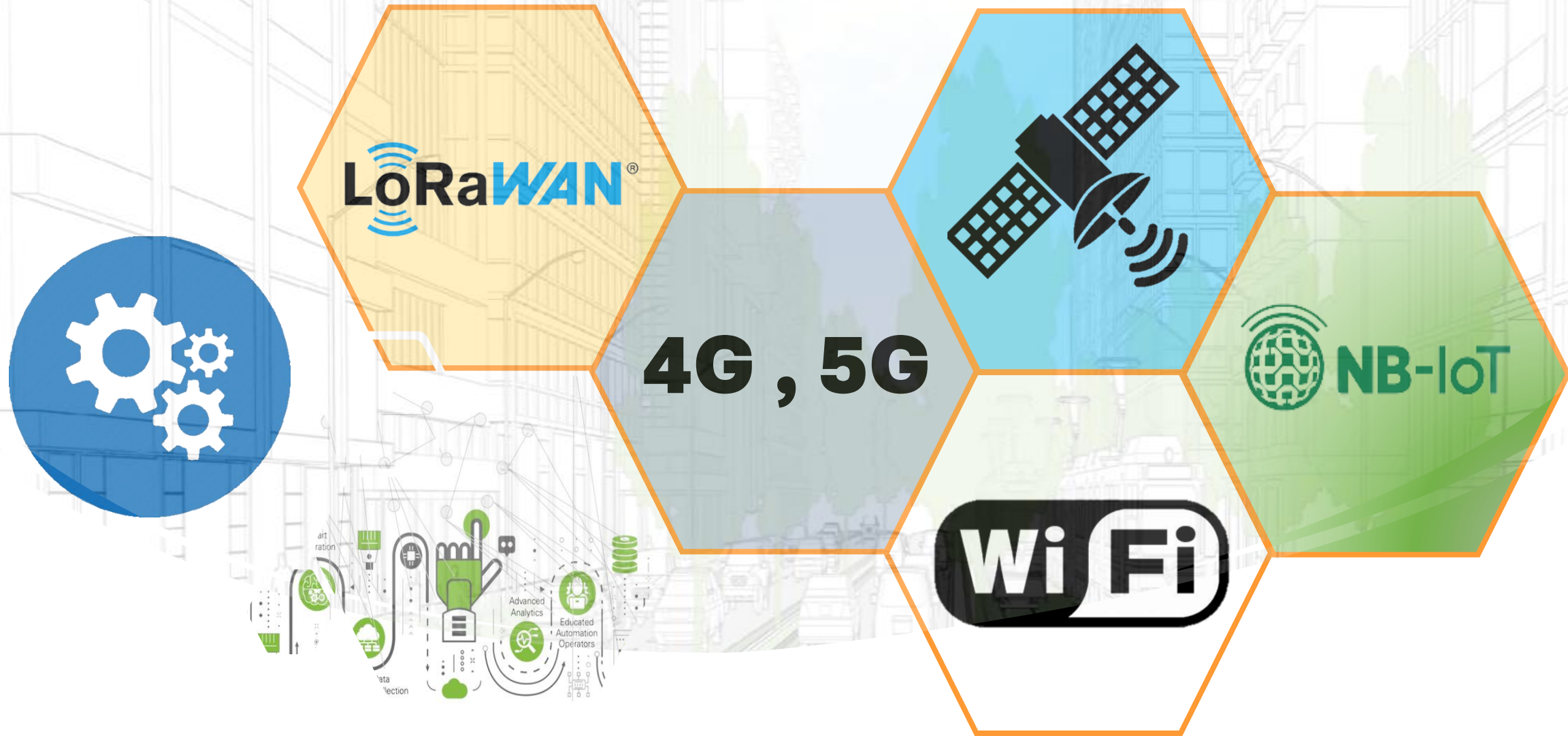


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IIoT wireless Connectivity



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IIoT WIRELESS PROTOCOL

Based On	Technology	Operating Frequency	Maximum Range	Data Rate
LPWAN	LoRa	868 MHz (Europe Band)	5-15 km	0.3-50 kbps
LPWAN	NB-IoT	Cellular bands	1-10 km	159 kbps
LPWAN	LTE-M	Cellular bands	> 11 km	4 Mbps - DL 7 Mbps - UL

IIoT requirements

1. Low Power
2. Long Range
3. Less Cost
4. Secure
5. Easy to Deploy

That is where **LoRa** comes in

LoRa ('Long Range') is a wireless communication technology that combines **ultra-low power consumption** with a typically **5-15km range**.



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LoRaWAN WIRELESS PROTOCOL FEATURES

Modulation Technique

It is a Chirp Spread Spectrum technique operate over long distance and work in various scenario , including precision ranging, location tracking

Unlicensed frequency

It is no need for authority approval along with that , encourage innovation and flexibility, allowing for wide range of applications and devices

Adaptive Data Rates

LoRaWAN network server is the master who set the spread factor SF7-SF12 data rate by increasing or decreasing Time on Air based on distance of device location

Adaptive Power Levels

When a fast transmission is required, the transmitted power is pushed closer to the maximum and vice versa. Thus, battery life is maximized and network capacity maintained.



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WHY DO YOU HAVE TO START DEPLOYING LORAWAN

Low Power Consumption

Compared to 4G, LoRaWAN boasts ultra-low power consumption, whereas 4G lacks low power features. In outdoor settings such as agriculture and forestry, 4G cannot be battery-powered like LoRaWAN.

Wide Coverage Range

Using CSS and ADR, LoRaWAN can communicate with a gateway up to 15 km away in unobstructed open areas or up to 5 km away in urban areas. This means that a single gateway can cover all devices in approximately 78 to 700 square kilometers.

A Free frequency license

LoRaWAN operates on a free public spectrum, available for anyone to use, LoRaWAN networks are deployed on free ISM bands (EU868) in UAE & GCC Countries allowing any enterprise to deploy and operate LoRaWAN networks without a frequency license.

Low Cost

In LoRaWAN, the devices that are usually in greater quantity are the gateways and terminals. Since the gateway only serves as a data forwarder, its price is relatively cost-effective.

Strong Penetration Capability

LoRa wireless modulation technology can penetrate indoor depths, with the ability to reach underground water and gas meter sensors.



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LoRa & LoRaWAN

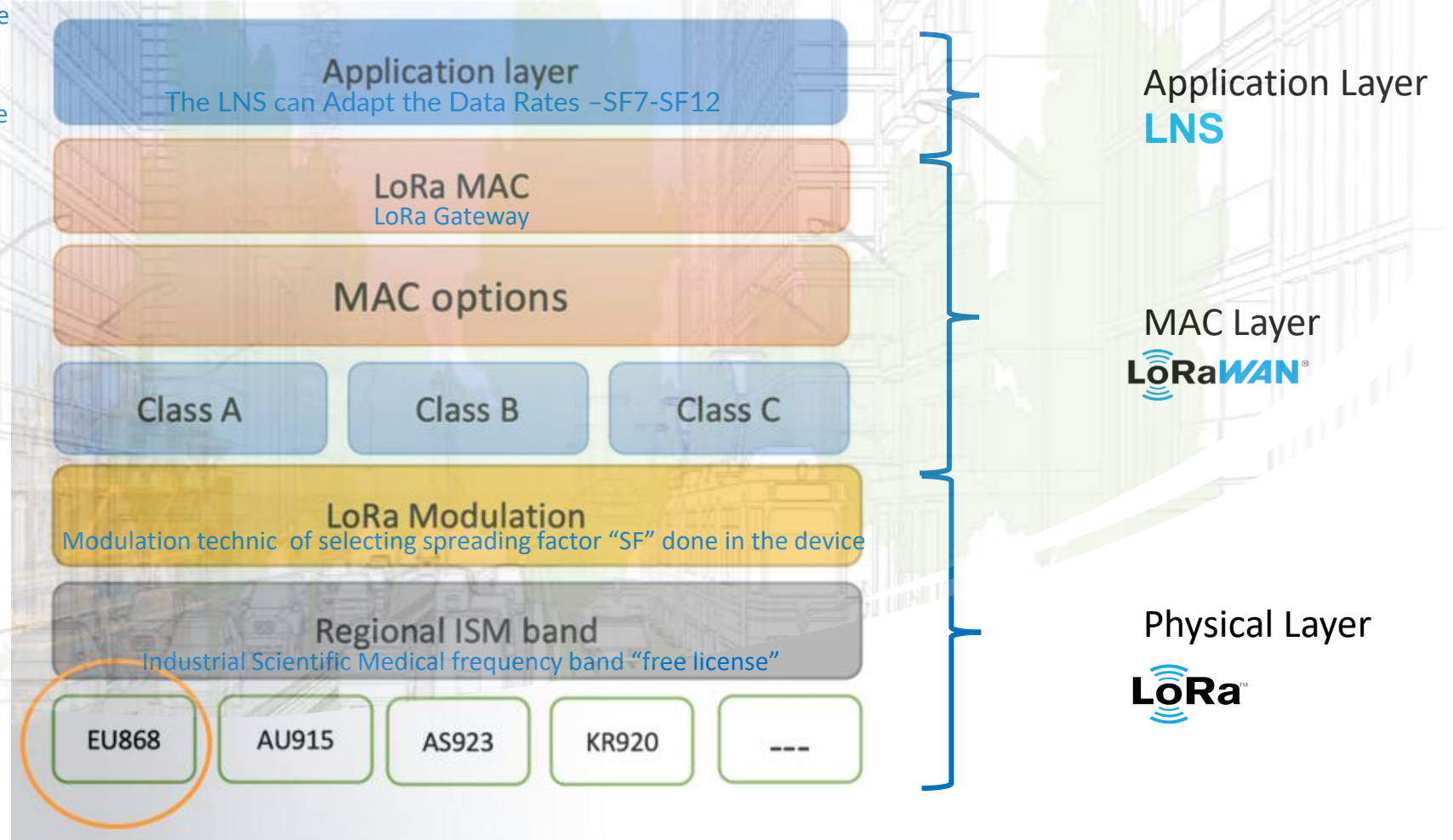
LoRaWAN Protocol Stack

SF7 :The shorter distance the higher data rate

⋮

SF12 : the longer distance the lower data rate

128 bits encryption



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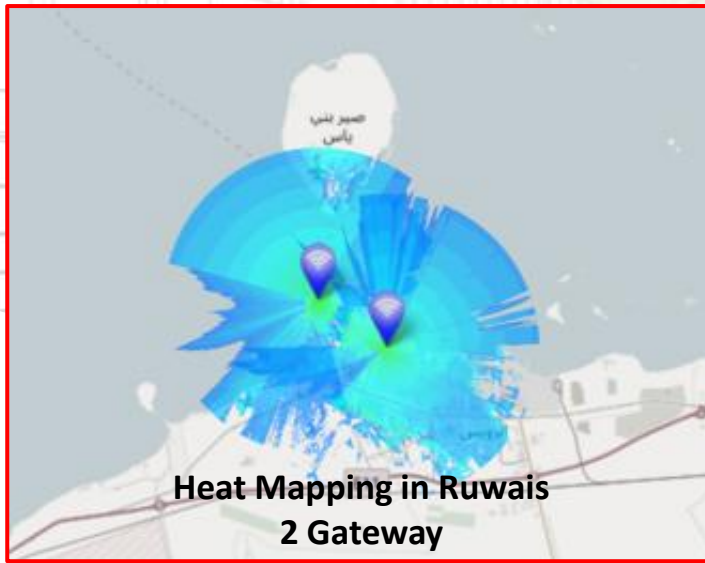
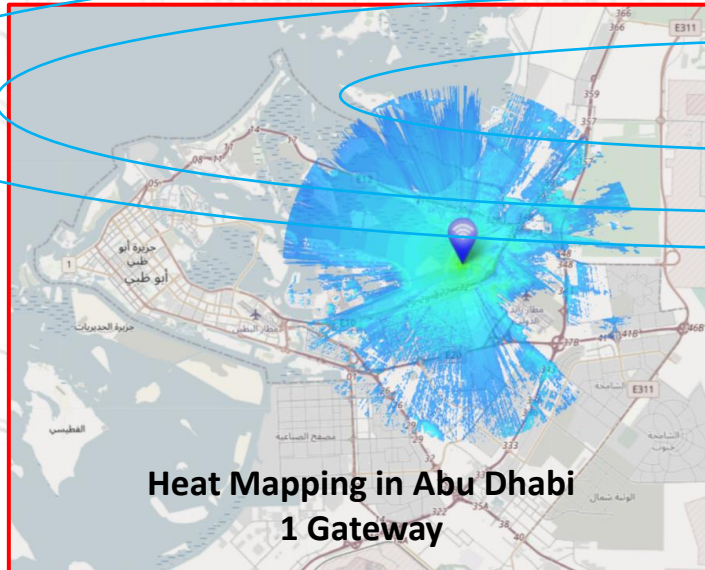
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Heatmap

To visualize the strength and coverage of your wireless network to identify areas with poor signal strength or inference

LoRaWAN®
5 KM – 15 KM



LORAWAN RANGE

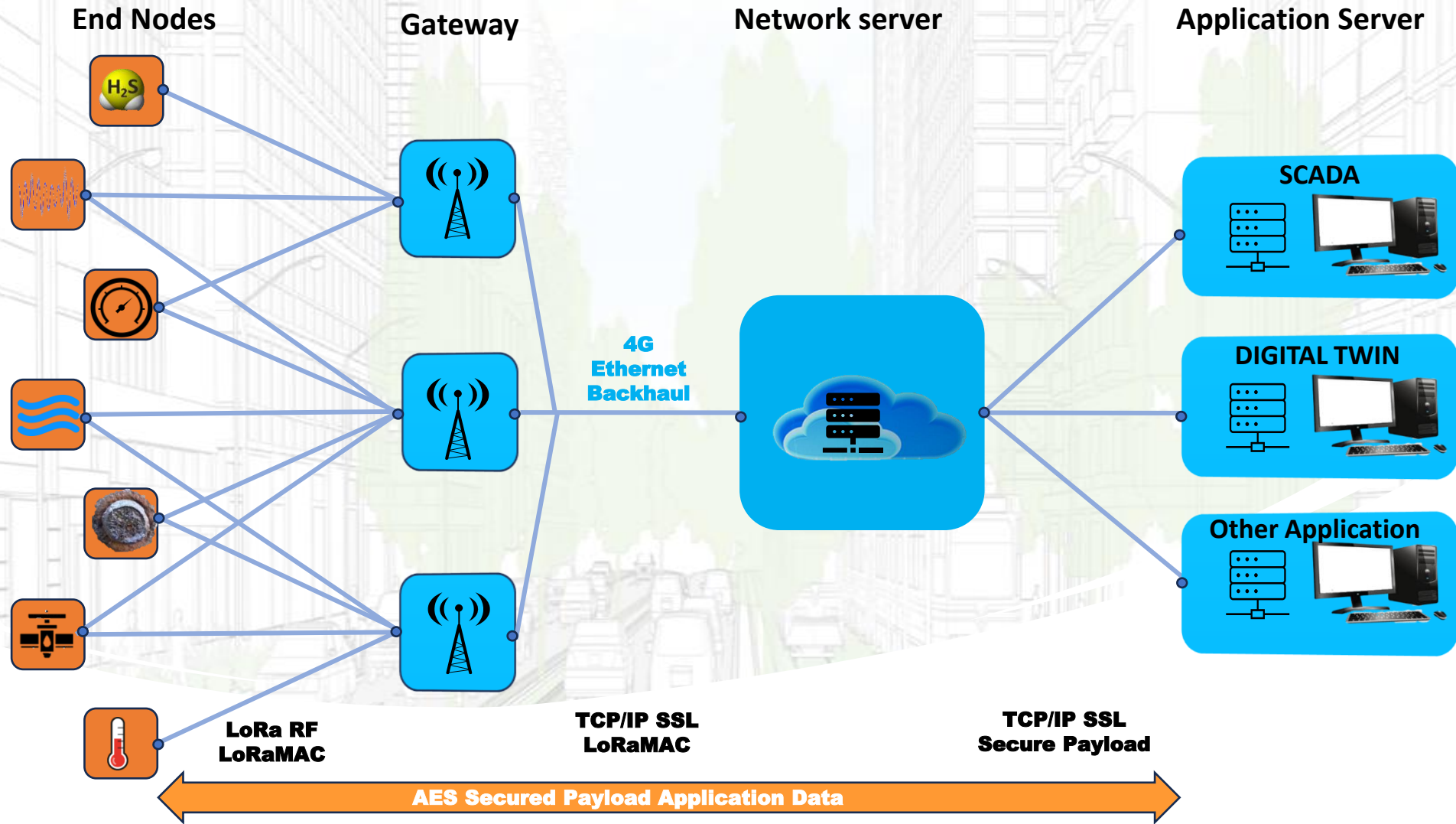


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LORAWAN ARCHITECTURE

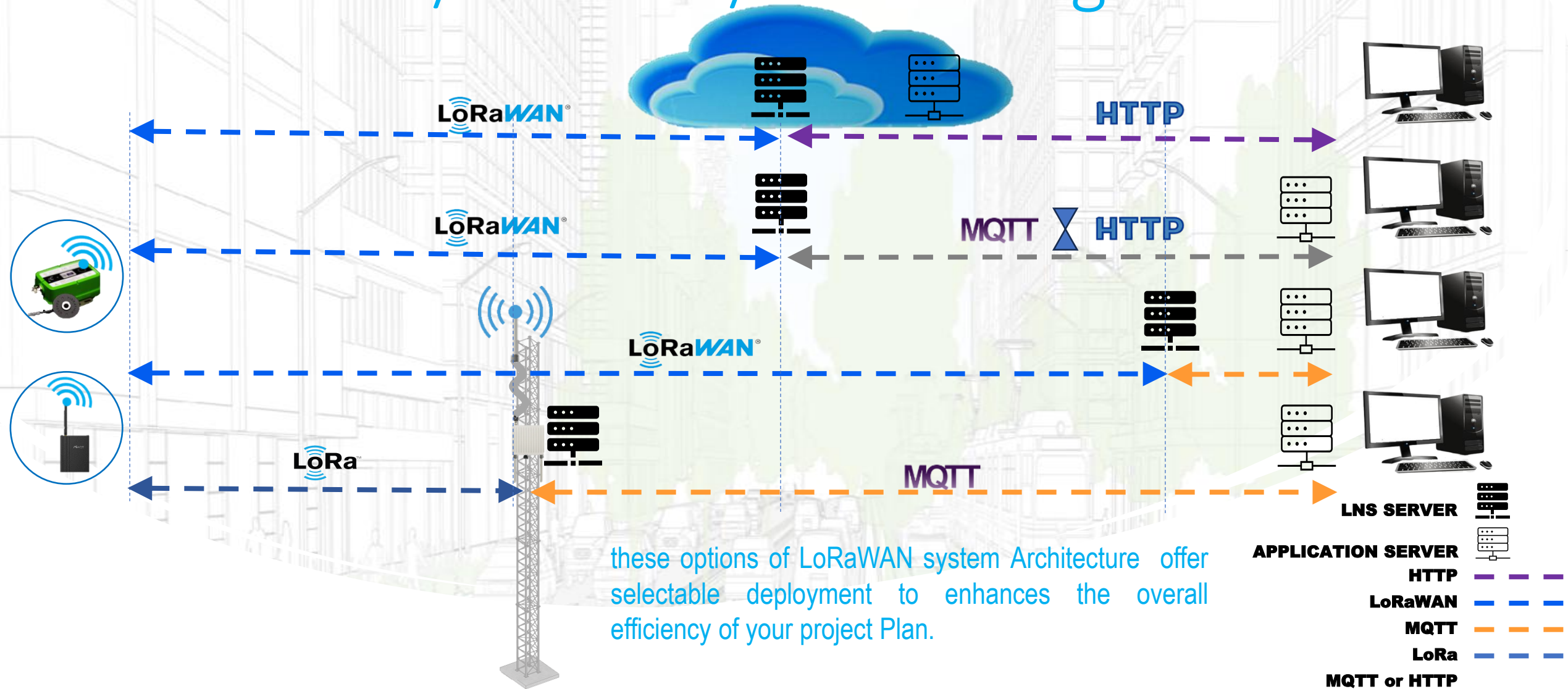


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LNS On-Prem/In-Cloud/At-The-Edge



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END-TO-END
LORAWAN
SOLUTION

**SUSTECH is a
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**Official Certification of Membership
Sustech Integrated Technologies**

The LoRa Alliance Inc. hereby certifies Sustech Integrated Technologies is in good standing of Adopter membership for the May 04, 2024 – December 31, 2024 term.

A handwritten signature in dark ink, appearing to read "D McGinnis", written over a horizontal line.

Debbie McGinnis
Account Director
LoRa Alliance, Inc.

May 04, 2024

Date



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Quality Assurance & Quality Control

QA/QC



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Office 1:
GF Office Accelerator Building,
Masdar City
T : +971 2 621 4995



Office 2:
No. 101, Entrance No. 3
Rabdan Mall
T : +971 2 626 8774

info@sustechme.com www.sustech.ae P.O. Box 7123, Abu Dhabi, United Arab Emirates