



THE ADVANTAGES OF RAPID INDUSTRIAL IOT

In manufacturing, there is a consistent aim of reducing downtime, increasing capacity, optimizing the cost of asset care, and using digital transformation to overcome competition. And, as manufacturing experiences growth and resource challenges, being able to do more at a faster rate is at the forefront of some Industrial Internet of Things (IIoT) providers.

Whether it is related to lean investigative science or securing the integrity of drug development studies, Rapid IIoT (RIIoT) is finding a place in manufacturing, drug discovery, and technology development. In a world of control, security, and restrictions, there still exists a Wild West - where the ability to innovate and pivot without restriction are absolute necessities.

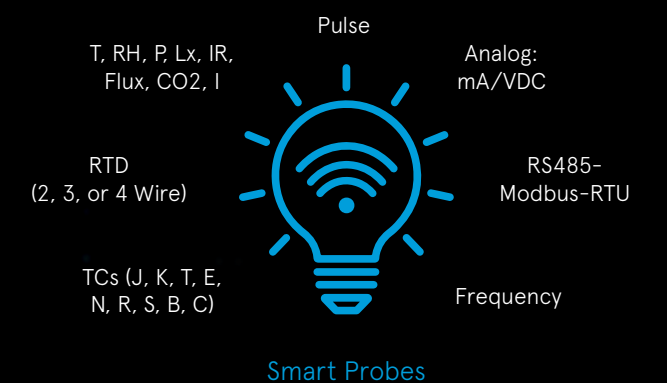
Enter Rapid Industrial IIoT.

AN OVERVIEW OF RAPID IIoT

What's worse than your business wanting 'it' today? Wanting 'it' yesterday. RIIoT becomes an immediate answer to many urgent and critical needs - for practically any market. It all depends on the urgency and the ability to deploy.

In the world of IIoT, we focus on the creation of a digital twin. A digital twin is a virtual representation of a process or a system for the purpose of parametric monitoring, facility testing and integration, and predictive diagnostics for maintenance. This representation has the essence of being part of your business institution.

RIIoT, however, takes the guard rails off and enables rapid deployment of a pre-configured Sub GHz wireless monitoring system that leverages a cellular gateway path to the cloud. The cellular route eliminates the red tape from your IT Department while providing you with data moments after you boot your gateway. Upstream of the gateway, intelligent Sub GHz sensors deliver continuous data in demanding industrial environments.



The parameters of measurement are immediately available:

- Temperature, RH, Barometric, Light Intensity
- Differential, Absolute, and Gauge Pressure
- IR surface temperature sensing
- Vibration and power monitoring of motors
- High Accuracy Non-Invasive (HANI) Temperature sensing
- Scaled 4-20 mA analog input and VDC Inputs
- Modbus – RS485 – RTU – BACnet
- Thermocouple input types J, K, T, E, N, R, S, B, and C
- RTD input types for 2, 3, or 4 wire configurations
- Load Cell, Heat Flux, PWM, Totalizer inputs

Type	Range	Operating Conditions	Accuracy
Frequency (Rate)	0.01 Hz to 100 Hz	T _{PW MIN} = 200 uS	±0.5%
Frequency (Rate)	100 Hz to 1000 Hz	T _{PW MIN} = 200 uS	±1 Hz averaged over 1s
Counter	0 to +8388608	1 kHz Max Rate	±1 count max
Up/Down Counter	-8388608 to +8388608	1 kHz Max Rate	±1 count max
Pulse Width (T _{PW})	200 uS min		±50 uS ±1%
Pulse Width (T _{PW})	200 uS min		±50 uS ±1%
Duty Cycle	1% to 99%	0.01 Hz to 1000 Hz, T _{PW MIN} = 200 uS	±1.5% max

Analog (Process) Input Signals

Type	Range	Resolution	Min	Max	Accuracy	Input Impedance
Current Loop	0-24 mA	±0.1 mA	0 mA	24 mA	±0.2 mA	50 ohm
Voltage	0-1.0 V _{DC}	±10 mV	0 V _{DC}	1.20 V _{DC}	±10 mV	100k ohm
Voltage	0-2.0 V _{DC}	±10 mV	0 V _{DC}	2.50 V _{DC}	±20 mV	100k ohm

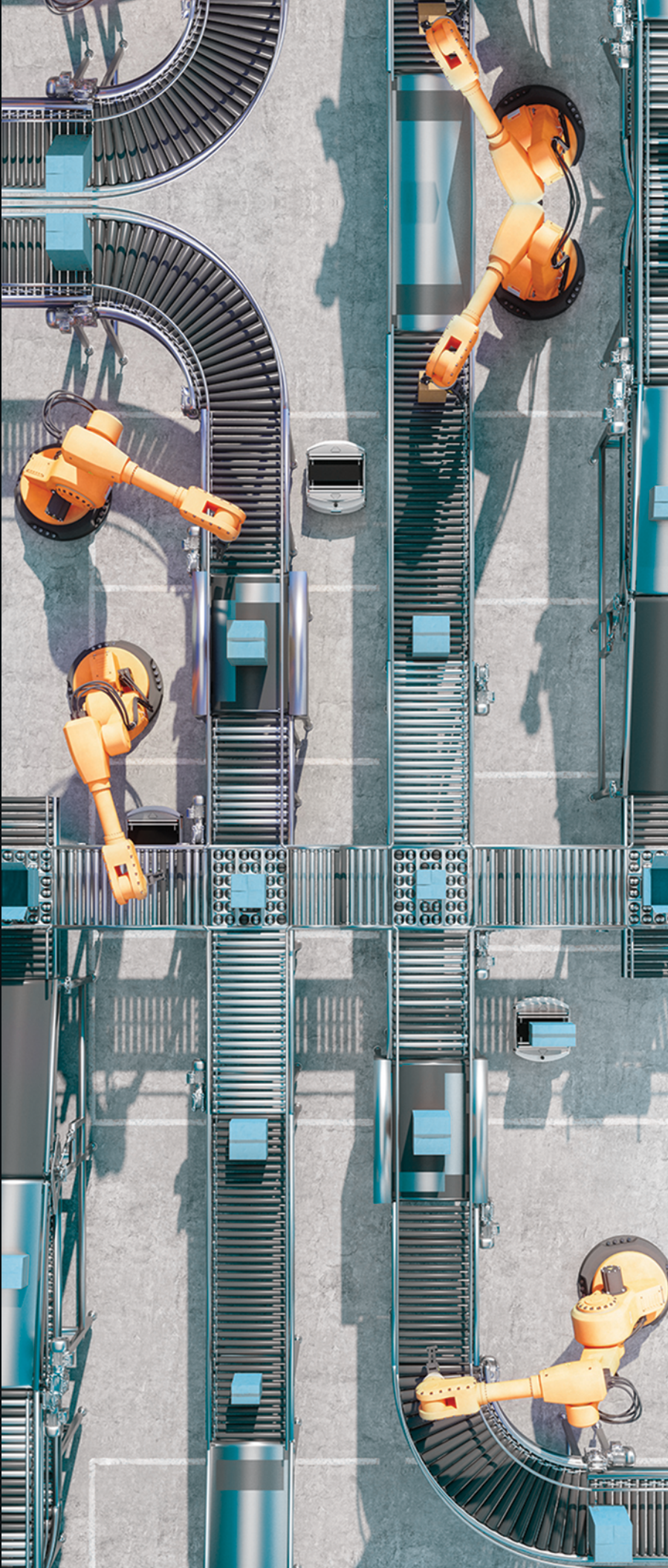
WHAT'S THE STRATEGIC RATIONALE FOR THIS?

To start, let's take a look at how fast the IoT market is growing. This does not necessarily mean that you need to become an IoT champion, but it should reflect how the world around you and your competitors are leveraging this technology to improve productivity, quality, expansion, and reduce downtime.

The barriers of entry for IIoT components at any facility are getting approval from IT, becoming qualified, writing an SOP, and, perhaps, being limited to a single network drop. In the world of Rapid IIoT, limited is a four-letter word.

Some examples to consider:

- Drug Discovery



The cold chain procedures at many facilities have an antiquated twice daily min/max temperature reading that does not reflect the intermittent variations required for temperature control of vaccine refrigerator/freezers. For some vaccines, as an example, the exposure to light becomes a risk to the efficacy of the drug development and trials, as well. High time resolution measurements of multi-zone temperatures and light exposure can provide critical data traceable to NIST for such purposes.

- Process Equipment



When considering the critical areas where you are challenged to reduce downtime to gain insight into maintenance intervals, having knowledge of vibrational patterns, power consumption, or an ability to connect to any existing thermocouple – as well as the ability to do so quickly and on the fly with wireless sensing – enables facility personnel to get the answers they require sooner rather than later. Case in point – glycol jacket circulation pumps. Failure of such pumps happens suddenly and can waste large volumes or value (or both) of product – ranging from breweries to bioproduction. Many service engineers get removed from the naughty list and become revered as an oracle who can foretell the future – that's the value of knowing when something is about to break.

- Automotive Research

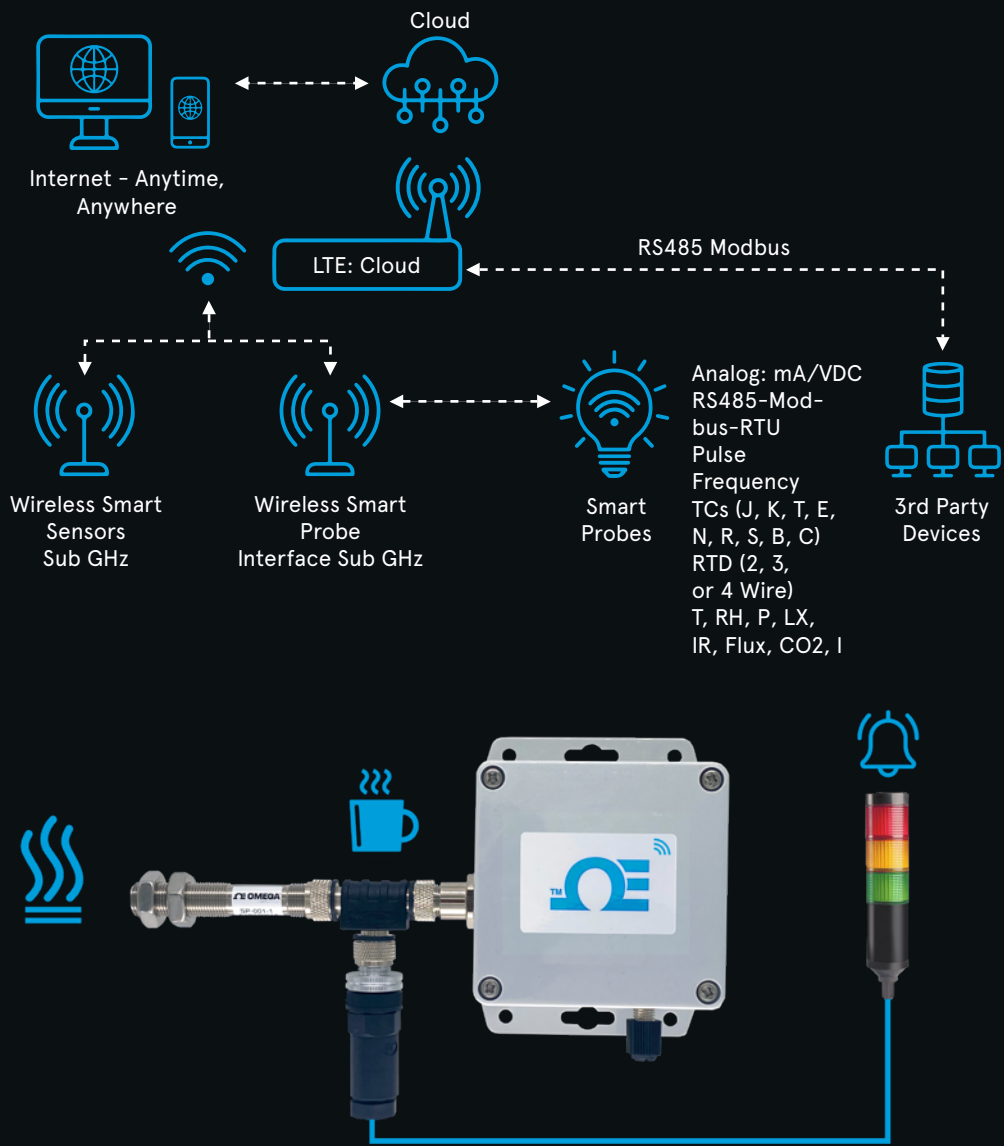


Before entering into production of a new commercial model or a new manufacturing process, qualifying a solution under development in this fast-paced industry is now more important than ever – especially within the electric vehicle market. Again, we see that the ability for researchers to tap into or introduce wireless sensing into their process creates an ability for rapid deployment and data gathering they never had before. With a centralized wireless-cellular gateway speaking to sensing points and the cloud simultaneously, data is being made visible faster than ever. With all this data available on the cloud, there is no need to VPN into a network. Rapid IIoT means rapid data, rapid analysis, and rapid solutions which are all meant to enable the pivot to occur.

CAPABILITY

It should also come to no surprise that these RIIoT devices can not only monitor and alert on data limits, but in some cases can also offer local control and visual and/or audible alarms without the need for enterprise software or reliance on interaction with the cloud. RIIoT is not only for monitoring; autonomous pre-configured control also enables creativity to local alerts and control in a deployment.

Rapid IIoT



WHAT IS THE VALUE?

Let's first consider the total IoT market has been estimated to be \$462 billion in 2022 and will grow to \$1.3 trillion by 2026. This suggests a 28% cumulative annual growth rate of which 46% is attributed to hardware purchases and 36% to associates services - with the remainder spread across platform and software integration.

The value of recognizing the market trend is to be aware and involved in what your business is doing to maintain a competitive edge. Furthermore, predictive systems are estimated to save up to 12% over scheduled repairs, reduce overall maintenance costs up to 30%, and eliminate breakdowns up to 70%.

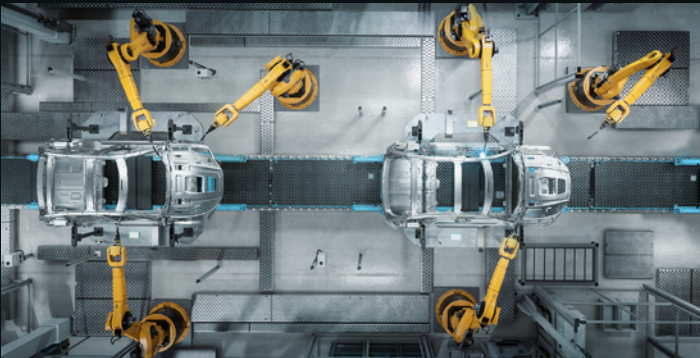
RIIoT for innovative solutions or to pilot by RIIoT is the new trend to taking acceptable risks before committing to a larger system. It is as easy as taking a test drive - without risk of time or security.

WHAT IS MY TACTICAL PLAN?

In highly innovative industries, the need for RIIoT becomes part of the culture of flexibility to deploy and gather data without restraint. RIIoT are for the engineers that need to live a little in that unlimited wild west space of innovation and with a "now" mentality. It is also for the business of piloting a system free of risk while evaluating the fit. A RIIoT system that uses an LTE Gateway can be expanded and contracted as needed for ongoing innovative development.



It's no surprise that a shrinking workforce and consumer demand for more agility has required manufacturers to embrace new ways of thinking and producing. Yet, the number of companies implementing digital strategies dropped more than 40% during the pandemic, hitting numbers closer to those seen in 2017. The two main factors preventing companies from implementing IoT practices are revenue and worker shortages, which only serves to highlight just how important digital transformation is in the first place.



CONCLUSION

Common industry problems – unplanned downtime, need for increased output, high asset-care costs, and gaining an edge over competitors – can all be addressed by leveraging predictive technologies already available to manufacturers. These challenges can all be met through initiating RIIoT. Failure to fully implement digital transformation compounds the very issues that it's meant to solve.

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