Many of the world’s major ports have been in operation for decades. They are now faced with the challenge of aging, mobile-limited network infrastructure in an environment more dynamic and demanding than ever before. Emerging technologies, such as 5G, bring next-generation connectivity capabilities and offer promises to revolutionize port operations. However, this new paradigm of hyper-interconnectivity between mission-critical operational assets carries with it many risks. For port operators to usher in a connected ‘Port of Things’ to meet demands, they will need a wireless solution designed to cater to its unique requirements.

Ensuring higher bandwidth and decreased latency, technology plays a fundamental part in enabling the Industrial Internet of Things (IIoT), a market set to reach $1,083 billion by 2025 and offers enhanced productivity and safety benefits for critical industries.

EMBRACING 5G AND M2M TECHNOLOGY IN PORTS

The explosion of IIoT devices, autonomous equipment and robotics platforms offer further opportunities for port terminals to achieve transformative productivity and efficiency gains. However, to take advantage of such applications, they must rapidly modernize their largely wired networks.

For many sectors, having wireless connectivity capabilities that offer greater

EMBRACING THE RIGHT TECHNOLOGY FOR PORT OPERATIONAL PROSPERITY

Sagar Chandra, VP of Business Development - Latin America, Rajant Corporation
CONTINUOUS CONNECTIVITY REQUIRED
Ports are busy environments with container ships, vehicles, and staff constantly on the move throughout the day. If operators deploy Wi-Fi, it brings the benefit of high-speeds and the capacity to support an increasing concentration of mobile devices. However, this land technology is most suited to indoor environments where the clients are mostly stationary. As multiple access points are added to keep sprawling outdoor operations covered, this makes the network difficult to design for optimum performance. With Wi-Fi deployments, operators aren’t able to work around interference, which means coverage drops are common.

Furthermore, a Long-Term Evolution (LTE) network for an ever-moving environment with obstructions is not practical as LTE relies on fixed infrastructure. Many operators may opt for LTE as 4G towers can disperse signals over infrastructure obstructions for wide area coverage. However, an autonomous container truck, for example, will not be able to move across the site as the RF signal cannot move through common industrial obstructions. If a blockage causes coverage to break, even momentarily, it could cause the truck to grind to a halt. Therefore, it requires continuous connectivity to run.

RAJANT CAN HOLD THE ANSWER
The only wireless network to enable M2M connections is Rajant Corporation Kinetic Mesh®, with BreadCrumb® wireless nodes and InstaMesh® networking protocol software. It is an ideal solution for any port operators looking to extend the range of LTE and enable fully mobile coverage without the infrastructure. Rajant’s multi-transceiver redundancy eliminates any single point of failure for mission-critical reliability to enhance LTE as well as Wi-Fi.

InstaMesh intelligently orchestrates traffic over the industrial connections. If faced with a signal blockage, it redirects traffic over the next available path, which allows the network to self-optimize and ensures continuous data flow. Compared to LTE, which has an active, designated point of communication, Rajant’s network has multiple active, persistent connections. Compared to an increase of latency involved with an LTE handoff, Rajant offers enhanced flexibility, ease of deployment, lower cost, and is not reliant on a centralized and fixed architecture, which could go down at any time.

The nodes can be fixed or mobile, functioning peer-to-peer. They can be deployed easily and rapidly anywhere, on any asset, to extend or enhance operational coverage in port-wide IIoT environments. With the capacity to expand and create networks where they did not exist before, Kinetic Mesh expansion does not cripple connectivity. Rather, Kinetic Mesh strengthens as it grows with low-latency, high-throughput, and secure military-grade encryption options for a variety of data, voice, video, and autonomous applications. Offering a full spectrum of sizes, Rajant supports all types of drone autonomy and drone swarms for applications like mapping over vast areas in real-time.
allocated to one tower over the other if two
were to go down.

Whereas, with private LTE networks, the
customer owns and administers this by
using unlicensed frequencies or renting a
licensed frequency from a cellular carrier
or buying from a regulatory agency. Com-
pared to carrier-based LTE, operators can
hold onto the network and own the main-
tenance to control the coverage. Private
LTE provides the ability to decide how to
utilize the bandwidth as it can be split to
50% uplink and 50% downlink. It can also
be deployed across different premises and
takes advantage of strong receiver sensi-
tivity as it can go 40x stronger than Wi-Fi
receiver sensitivity. Whether it is licensed
or unlicensed, unfortunately, the infrastruc-
ture can be cost-prohibitive. The availability
of licensed bands can be difficult to source,
and if deployed into an unlicensed band,
where it’s not expecting to deal with resid-
ual noise, the advantages are lost.

In addition, configuring Private LTE net-
works is not easy without the advanced
technical networking qualifications, and
whilst it may show real savings when first
deployed, costs may rise significantly for
licensing and features in the future. Opera-
tors want a solution they can deploy, main-
tain, and support for many years, but with
rapidly evolving technology always chang-
ing, this can prove a formidable challenge.
Private LTE uses the same network architec-
ture as the first cellular networks deployed,
which holds fundamental weaknesses.

For high bandwidth applications, such as
autonomous vehicles using video, it means
operators may have a very constrained
throughput. LTE speeds are dedicated to
downstream access, which means LTE lacks
the upstream speed needed by industrial
operations to run multiple mission-critical
applications such as CCTV and real-time
machine guidance. Neither carrier-based
or private LTE may be the sensible choice
in expansive and ever-moving port environ-
ments.

FILLING THE COVERAGE GAP
As carrier-based or private LTE drains
the capacity of the single network resource, it
can mean the budget on network capacity
rollout can be defeated. Turning to a solu-
tion that allows you to build on what you
have, offers the best of all worlds and fills
the gap with pervasive, mission-critical cov-
erage, and added M2M communications to
work around dense obstructions is the only
option for Industrial IoT networking.

ABOUT THE AUTHOR
Sagar Chandra is Vice President of
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cluding GM, North America.

ABOUT THE ORGANIZATION
Rajant Corporation is the exclusive pro-
vider of private wireless networks pow-
ered by the patented Kinetic Mesh net-
work, BreadCrumb wireless nodes, and
InstaMesh networking software. With
Rajant, customers can rapidly deploy a
highly adaptable and scalable network
that leverages the power of real-time
data to deliver on-demand, mission-
critical business intelligence. Rajant is
headquartered in Malvern, Pennsylva-
nia, with additional facilities and offices
in Arizona, Kentucky, and Alabama.