



# **BRI Pulse**

## **Selected 5G AI Ports**

In keeping with our focus on technology advances, we wanted to release a BRI Pulse on a number of 5G/AI ports launched and/or agreements signed during 2021 as digitization is one of the key drivers of the BRI.

It is even more important in the shipping and ports industries, which represent important components within the global economy. Both of these sectors are under financial pressure both longer term and short term. Longer term, the shipping industry has responded by more than doubling the average number of containers carried/ship in the last 10 years to about 20,000; this is set to grow even further by 2025. In addition, the number of ships that pass through the Suez Canal has surpassed 50/day and is also set to increase further. Shorter term, the combination of the effects of the 2020 COVID pandemic and the 2021 Suez Canal blockage markedly affected volume and supply chains. Finally, increasing emissions standards agreed by regulators and governments have added more pressure to this industry.

Ports are the other major component of the maritime cargo transportation value chain. It is true to say that in the past, they have been followers rather than leaders when it came to innovation especially in the container shipping sector. This is clearly evident when it came to investment in the mega (20,000 TEU) plus generation of containerships which put added pressure on competing hub ports to invest in deepening access channels and berths and investing in larger capacity ship-shore cranes and supporting terminal equipment.

Currently, the efficiency of ports and the ongoing need to invest in new technology is brought into sharper focus due to chronic congestion in many container handling ports across the world: congestion which has significantly reduced the effective capacity of the global containership fleet. Ironically, the explosion of growth within e-commerce combined with the supply chain disruption caused by bottlenecks in the movement of cargo through the dock gate have added to congestion at ports. This puts increased pressure on ports management to improve efficiency.

As the world knows, Chinese, which relies on trade, has seen several of its companies/funds actively acquiring both controlling and minority stakes in, investing growth capital in, partnering with and/or assisting in constructing circa 100 ports in over 60 countries. In 2020, following the launch of 5G networks, China is beginning to implement this technology, initially into some of its own ports and then gradually to ports along the BRI. This technology is expected to have the effect of substantially improving operating efficiency – leading to improved financial returns. This *Pulse* tracks 2021 developments at three major Chinese ports, the first MENA/GCC port to use it and the recently signed 5G for use in Russia's largest port.

We exclude Qingdao Port, since in November 2019 it became the world's first 5G hydrogen-powered terminal. The resulting advanced technologies have been designed to assist the entire terminal to achieve zero emissions, while producing increased operational efficiency of 30% and reduced labour demand by 70%.

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### **China Ports**

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#### ***Ningbo-Zhoushan port (May 2021) – 5G***

The Ningbo-Zhoushan port has had the highest cargo throughput worldwide for the last 12 consecutive years; it is also one of the fastest growing cargo shipping ports in the world. Huawei has worked with this port since 2019 towards a 5G network solution – with stable low-latency communication required to control the remote-controlled (RTG)s remotely and make the precise movements needed to grab containers.

The RTGs were adapted so that they could be remote-controlled by drivers in a central office location, thus improving the RTG drivers' working conditions. To achieve this, each RTG was fitted with a programmable logic controller (PLC) and approximately 20 HD cameras. Up to 10 cameras can be used at any one time, resulting in an uplink bandwidth requirement of about 30Mbit/s per crane.

The improved communication and automation that 5G provides quadruples drivers' efficiency, thereby enabling them to control four cranes simultaneously.

#### ***Tianjin Port (October 2021) – 5G and Zero Carbon Emissions***

In May, Tianjin port, China Mobile Tianjin branch and China Mobile (Shanghai) Information and Communication Technology signed a cooperation agreement to jointly develop 5G applications for ports. The three parties have inked the 5G and Beidou Smart Port Joint Laboratory cooperation agreement to establish a closer partnership for promoting 5G and Beidou technology's applications in the port sector, and developing Tianjin to be a world-class port.

The integration of 5G technology and Beidou's Navigation Satellite system—China's answer to GPS—has the potential to greatly increase efficiency in the port sector as it enables the sending and receiving of accurate, real-time location data alongside other information from sensors.

The overall planning and layout of docks has also been upgraded in accordance with the latest technologies, and the terminal makes use of an intelligent horizontal transportation system equipped with sensors, including laser radars, cameras and millimetre-wave radars. During Q1-Q3, Tianjin Port handled a record 351 million tons of cargo, up by 4.5% y-o-y. During this period, it ranked 8<sup>th</sup> among the world's largest ports in terms of total container handling capacity.

In mid-October, Tianjin Port unveiled what it says is the world's first zero carbon emissions terminal. The terminal is powered by wind and solar energy, achieving zero-carbon emissions for energy consumption and production. Located in the C Area of Beijing port's intelligent container dock zone, it has three berths, each with a loading capacity of 200,000 metric tons and a length of 1,100 meters. It can berth two vessels weighing 200,000 tons simultaneously or two vessels weighing 100,000 tons and a third weighing 70,000 tons. Container handling capacity is estimated at 2.5 million TEUs/ year.

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The state-of-the-art zero carbon technologies are the result of 76 patents and 13 world-level breakthroughs, and they have boosted innovation for the upgrading of container terminals elsewhere. “By coordinating all factors in the area in real-time based on AI technology, the terminal's 'brain' can automatically create optimized loading and unloading plans. This leads to 20% higher efficiency compared to traditional terminals,” said the deputy head of the information department for the Tianjin Port Group's No 2 Container Terminal.

### ***Mawan Smart Port – Greater Bay Area's first 5G smart port opened (November 2021)***

On November 14, China Merchants Port held the opening ceremony of Mawan Smart Port, which is the first 5G smart port to be built in the Guangdong-Hong Kong-Macao Greater Bay Area. After more than 3 years of overall upgrading and construction, the original 4 bulk cargo berths in Mawan Port have been upgraded to 2 special berths for 200,000 dwt containers.

The transformed port area covers an area of 983,600 sqm<sup>2</sup>, with a total berth coastline length of 1,930 meters, 5 berths, and a designed throughput capacity of over 3 million TEUs. According to calculations, the comprehensive construction cost of Mawan Smart Port has been reduced by 37%.

In terms of the single-machine operation capacity of the quay crane, the remote control semi-automatic operation is 28 containers/hour, and the remote control full manual operation is 35 containers/hour. The average achieved efficiency of quay cranes is 29.34 containers/hour.

To date, the efficiency of terminal operations has been greatly improved compared with that before the reconstruction and the carbon emission reduced by 90%.

### ***MENA/GCC Port***

Omantel along with Hutchison Ports Sohar and Huawei completed the first 5G smart port PoC in Middle East.

In line with the MoU signed on March 10, Omantel along with Hutchison Ports Sohar and Huawei launched the first 5G smart port PoC demonstration to showcase the result of first stage, aiming to provide highly reliable communication services and improve operational efficiency, accuracy, time management, and security, among other services.

Under the first PoC, 6 functions were successfully tested by utilizing 5G with artificial intelligence (AI). This will allow real-time surveillance of many parts of the port's operations, such as white/black list recognition, intrusion detection/loitering, crowd density and 4K monitoring. Other benefits include leveraging AI for HSE compliance and meeting future cost optimization goals. These technologies can also be deployed in other port operation management scenarios and crane management.

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Hutchison Ports is the world's leading port investor, developer and operator with a network of port operations in 52 ports spanning 26 countries throughout Asia, the Middle East, Africa, Europe, the Americas and Australasia. One of Hutchison Ports Sohar's strategic aims is to become fully automated. This is a creative start to combine 5G and AI technologies with Omani industry. And it is the first 5G smart Port POC in the Middle East." said Hutchison Ports Sohar's CEO.

Omantel, the leading integrated telecommunications services provider in the Sultanate, has embarked upon a new package of smart ICT solutions that leverage the company's 5G capabilities and have the ability to revolutionize operations in Oman's oil and gas, logistics and transport sectors, which are vital for the country's sustainable economic growth. Omantel will use this PoC as a springboard to further build and diversify its 5G capacities. The launch is a demonstration of Omantel's commitment towards its enterprise customers for enabling them to embrace Industry 4.0.

### **Russian Port**

#### ***Russia's Vladivostok Commercial Sea Port to become smart port (September 2021)***

The Vladivostok Commercial Sea Port, which is a part of the Fesco Group, is thought to be the biggest port in the Russian Far East. With an annual cargo turnover of more than 11.5 million tonnes, this port functions as the centre of economic ties between Asia and Europe for both rail and sea routes.

As part of the port's transformation, Fesco Transportation Group, Binom and NtechLab signed a trilateral agreement of intent to develop a smart shipping port at that port during the Eastern Economic Forum (EEF). Several technologies will be deployed to automate operations, including artificial intelligence (AI), big data, Internet of Things (IoT) and blockchain. NtechLab agreed to deliver a unified video analytics system that will oversee labour, transport safety and the port's operational procedures in real time. This solution will also provide remote systems access.

The port is expected to see an increase in its productivity and environmental sustainability. NtechLab CEO Andrei Telenkov said: "One aspect of NtechLab's systems is the ability to manage the access control to the enterprises with far greater efficiency by using biometrics. The platform will also be able to identify vehicles and to read container numbers during loading and unloading to compare and confirm the accuracy of shipping and cargo information". Vehicles are monitored, in real time, from control rooms.

This news followed the August launch of a new intermodal rail connection linking Asian-Pacific ports with Finland via Vladivostok called The Finland Bridge. On its inaugural trip in August, containers were first carried by sea from the Chinese ports of Shanghai, Ningbo and Qingdao to Vladivostok when they were then onboarded onto the Trans-Siberian (TSR) rail route before reaching Finland.

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This route is expected to make 3-4 roundtrips per month with a transit time of 25 days, 1.5 X faster than the Suez Canal alternative.

FESCO Transportation Group, RZD Logistics and Nurminen Logistics launched the new intermodal service jointly. FESCO is responsible for the connection between Asian ports and Vladivostok. RZD logistics undertakes the rail transport leg between Vladivostok and Helsinki in Finland, while Nurminen Logistics provides the cargo base and logistics operations in Finland and Scandinavia.

### ***Future Value Uplift via 5G technology***

#### ***China has already demonstrated operational success in restructuring ports in which it has invested.***

In Sri Lanka, China Merchants Port Holdings (CMPH) operates four container berths in Colombo's International Container Terminals (CICT), and four multi-purpose berths, two oil berths and four container berths in Hambantota's International Port Group (HIPG). In September, CMPH reported that H1 2021 profits from these businesses nearly trebled over 2020 despite the fact that Hambantota Port is not expected to be a fully-functional multi-purpose port until 2022. These strong profits led CMPH to declare a dividend of Rs. 1.05 billion to the Sri Lanka Port Authority (SLPA).

In Greece, COSCO Shipping (COSCO) continues to invest in restructuring and growing Piraeus Port. In November 2019, COSCO agreed to invest an additional \$660 million in the port before 2022, to continue the restructuring it started since its initial investment, as well as to enable it to acquire an additional 16% stake, which closed in October. Even with the restructurings, the shares doubled between 2017 and 2019 and are still 50% above the price when COSCO acquired its 51% stake.

In September, Huawei launched its Smart Port solution during the Huawei CONNECT 2021 forum.

In light of the above examples, and the resulting improvements in operations, it would not be surprising to see China rollout both 5G/AI technology as well as carbon neutrality across the circa 100 ports it controls around the world over the next few years. As this occurs, investors might consider investing in publicly-listed ports where Chinese investors previously acquired an equity stake (most likely as prices not reflecting 5G/AI capabilities) in order to participate in the upside in the shares.

We see this as yet another very clever move by China to use their own technology as a key mechanism to uplift values for the investment stake(s) in the ports in which they previously invested while receiving the operational benefits.

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