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How 5G is Transforming APAC

Ten case studies highlighting the utility and versatility of 5G technologies

September 2023

APAC 5G INDUSTRY COMMUNITY

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FOREWORD

The mobile industry is a major engine of economic growth across the Asia-Pacific region (APAC). Mobile technologies and services added US$810 billion of economic value to the APAC economy in 2022 and that figure is set to rise to almost US$1 trillion by the end of the decade[1].

Those impressive headline numbers mask a multitude of ways in which mobile networks are making a major difference to individuals' daily lives and businesses' everyday operations. As this report shows, the rollout of 5G is amplifying that impact even further. The diversity of the case studies featured in this paper highlights the exceptional versatility of 5G, while the numerous examples of efficiency gains and innovations underline the great value being created by this highly sophisticated cellular technology.

Yet we are only scratching the surface of what is possible. In 2022, 5G accounted for just 4% of mobile connections in the APAC region[2]. That figure is set to rise tenfold by 2030, when 5G will account for 41% of mobile connections in APAC. As this report shows, the widespread adoption of 5G will have a profound impact on productivity and prosperity, and, by extension, the region's economy. Indeed, we anticipate 5G will add more than US$ 133 billion to the APAC economy in 2030[3]. Those gains will be driven in part by the rollout of cloud-native standalone 5G networks, which are delivering many of the socio-economic advances detailed in this report.

Of course, these benefits won't be evenly spread. APAC's connectivity ecosystem is highly nuanced and consists of both pioneering mobile innovators and emerging markets. If we are to fully realise the digitally transformation mobile connectivity can bring, we need to establish a flexible, forward-looking regulatory and policy regime to support mobile network deployment and operations. This includes greater efforts to close the digital divide, particularly for women and vulnerable populations. Policymakers also need to ensure 5G has access to sufficient mid-band and mmWave spectrum.

The GSMA's APAC 5G Industry Community is helping the ecosystem to deliver on this promise and realise the full potential of 5G networks to benefit society. I hope the compelling case studies in this report will inspire stakeholders from across the business and policy communities to maximise the potential of 5G to benefit all of APAC's people.

[1, 2, 3] Source: GSMA Mobile Economy Asia Pacific 2023 Report

Julian Gorman
Head of APAC, GSMA

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EXECUTIVE SUMMARY

As 5G matures and becomes more versatile, it is transforming many different processes across the economy. With the rollout of private 5G networks and standalone 5G, introducing cloud-native core networks, operators are able to provide organisations with the ultra-reliable connectivity required to automate critical operations. At the same time, edge computing is being used to reduce latency and support the real-time usage of image recognition and other AI-based applications, while the deployment of 5G mmWave networks is delivering a step-change in capacity and throughput in demanding locations, such as airports and sports stadiums.

Bringing capacity to crowded places

As this report highlights, 5G is proving to be invaluable in bringing reliable connectivity to places where a large number of people gather, such as transportation hubs. At Hong Kong International Airport, China Mobile Hong Kong and Huawei have implemented a private 5G network, consisting of mid-band indoor radio units, mid-band and mmWave outdoor units, and high-power radio units. This configuration is designed to ensure seamless indoor and outdoor coverage throughout the airport, enhancing operations and providing a better experience for travellers. The network is being used to support the deployment of autonomous vehicles, robotics, and a wide range of IoT applications.

Similarly, at Bangkok's Krung Thep Aphiwat Central Terminal Station, a private 5G network, supported by edge compute, is delivering multiple benefits to hundreds of thousands of rail passengers daily. The network is enhancing operational efficiency, safety and security, and the overall passenger experience. For example, a 5G-based security and safety system captures video images from more than 120 cameras to proactively detect emergencies, incidents, and security threats, leading to prompt responses and improved passenger and staff safety.

Private 5G networks can also support heavy industry. Telekom Malaysia has deployed a private 5G network for oil and gas giant PETRONAS, with guaranteed 99.9% network availability, well ahead of the 95% 'best effort' delivery of public networks. The increased network reliability and stability is vital for critical operations, such as remote live monitoring of operations via high-definition video. At the same time, the 5G network is delivering the broad coverage required to facilitate transmission over large stretches of water, enabling PETRONAS to connect offshore operations. The implementation marks a key step towards enabling unmanned operations in the oil and gas sector, and other potentially hazardous workplaces.

In Singapore, 5G has demonstrated it is capable of reliably delivering smooth mobile video streaming at major international sporting events attended by hundreds of thousands of people. By partitioning its 5G standalone network, Singtel was able to grant specific customers priority access to radio resources, ensuring a smooth mobile streaming experience in crowded areas. Crucially, the radio resource partitioning is sufficiently dynamic to ensure that capacity isn't being wasted at any point in time.

As well as connecting vast numbers of people at major sports events, Singtel is illustrating how a standalone 5G network can support multiple logical networks with different configurations to suit the traffic characteristics of different applications.

Making production more efficient and safer

Manufacturing is another sector where reliability is absolutely crucial – downtime means lost production and revenues. In Thailand, auto parts maker Somboon Advance Technology is using 5G to enable a robot to monitor two camshaft production lines concurrently, improving productivity by 1.25 times, as well as enhancing quality. 5G is also enabling the company to use unmanned automated guided vehicles (AGVs) to transport goods and materials across the factory floor, reducing the risk of accidents and associated costs. The materials delivered to the warehouse by AGVs are now stored automatically by a 5G-enabled system. Somboon says these 5G-enabled solutions have boosted the factory's earnings by 60%, while reducing operational costs by 30%.

Indeed, 5G is being deployed in factories across Asia. LG Uplus, a mobile network operator in South Korea, is seeing strong demand for its 5G-enabled smart factory solution, which is now being used in more than 250 domestic and overseas plants.

To help manufacturers employ 5G to enhance precision and flexibility, ST Engineering, a global technology, defence and engineering group, has developed Heterogeneous Integration (HI), which is designed to provide optimal 5G connectivity in a highly compact footprint. HI solutions are composed of several integrated circuits enclosed in one or more chip carrier packages, connected internally by fine wires bonded to the package, that can be stacked vertically or tiled horizontally.

Making inspections faster and more cost-effective

Supported by edge computing, 5G networks are now responsive enough to relay high-resolution video in real-time wherever it is needed. The use of 5G-enabled drones by Hong Kong Telecommunications to inspect cell towers points to how valuable this capability can be. The telco has found that the combination of 5G and edge compute is two to three times more responsive than 4G connections. The 5G network also provides five to eight times higher uplink bandwidth capacity, which makes it straightforward to relay 4K video from a drone back to the pilot/inspector. The solution has improved the operational efficiency of field service visits by 30%.

In a similar vein, Keppel Offshore & Marine Ltd is using an augmented and virtual reality smart eyewear solution, supported by a 5G standalone network from M1, to make inspections of its shipyard more efficient and effective. The business benefits are substantial: Keppel expects to lower the manual hours required for inspection by 50% from 16,000 to 8,000 each year.

More broadly, 5G devices, equipped with 4K cameras and augmented reality software to provide digital labels, could be used to deliver remote assistance across a wide range of industries, including healthcare, manufacturing, logistics and utilities.

The responsiveness of 5G networks means they are also well suited to supporting self-driving vehicles and robots. In Thailand, the Siam Cement Public Company Limited is using 5G to develop a self-driving system to transport raw materials. Working with AIS, Siam has found that 5G can deliver high speed and low latency connectivity to a vast array of sensors, enabling the system to exercise precise control of vehicles across multiple routes. The self-driving vehicles are supported by a 5G-enabled dispatching system, which employs artificial intelligence to optimise the real-time dispatch of trucks. Siam Cement says the system has boosted operational efficiency by more than 20%, while improving safety.

Major benefits today point to more innovation to come

In conclusion, businesses across Asia-Pacific are harnessing the increasingly sophisticated capabilities of 5G networks across a very wide range of use cases. In combination with other technologies, such as edge compute and artificial intelligence, public and private 5G networks are now delivering very tangible benefits to businesses, employees and consumers.

While standalone 5G networks and 5G mmWave are still in their infancy, early deployments of these new technologies highlight their potential to deliver very flexible and very fast connectivity in a wide range of scenarios. That suggests 5G will prompt another wave of value creation across the economy in Asia-Pacific and beyond.

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5G Catalysing for Digital Revolution in the Cement Industry

The Siam Cement Public Company Limited

In a collaborative initiative, The Siam Cement Public Company Limited, alongside AIS, Huawei, Yutong, and Waytous, is driving forward the development of a self-driving transportation system. The aim of this groundbreaking project is to enhance the transport of raw materials, with a particular focus on improving route planning and ensuring continuous, quick, and safe connections between vehicles.

Leveraging the unparalleled capabilities of 5G technology—including high speed, low latency of under 20ms, and the ability to connect a vast array of sensors—the platform meticulously controls the command signals across Siam Cement's multiple route sites.

Simultaneously, the project highlights the importance of workplace safety, particularly in hazardous jobs, by leveraging advanced 5G-powered self-driving systems. Furthermore, with a commitment to environmental sustainability, the solution utilises precise travel planning technologies and environmentally friendly electric vehicles (EV Trucks), making it a benchmark for industry-wide adoption.

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5G Catalysing for Digital Revolution in the Cement Industry

CHALLENGE:

Mining areas, often situated in remote regions, suffer from a lack of reliable cellular connectivity, making radio communication the primary operational medium. However, this mode of communication is often impractical and ineffective. Moreover, the hazardous nature of mining work has led to a scarcity of skilled workers willing to work in such environments. Furthermore, mining activities heavily rely on fuel, a nonrenewable resource that contributes to air pollution and incurs high costs.

SOLUTION:

The solution leverages 5G technology to improve mining operations, focusing on two main areas. Firstly, the implementation of Autonomous Electric Vehicles (EVs) allows for unmanned transport of raw materials. Equipped with sensors for obstacle and collision detection, these EVs can also automatically navigate to charging stations when their battery levels drop below a set threshold.

Secondly, an intelligent dispatching system harnesses 5G, cloud, and artificial intelligence technologies for optimisation and real-time dispatch of trucks. This boosts efficiency and safety while reducing waiting times through a dynamic assignment system.

IMPACTS AND STATISTICS:

The 5G Smart Autonomous Vehicle solution has shown measurable positive impacts and outcomes. It's enabled fuel cost savings of between 65% and 100% while also reducing carbon dioxide emissions by 35%. In addition to environmental benefits, it has also enhanced safety in the workplace and improved operational efficiency by over 20%.

WIDER IMPLICATIONS:

The success of the 5G Smart Autonomous Vehicles Solution has broader implications and potential opportunities. The collaborative approach between OT, SI, and customers in crafting a solution that meets specific needs has proven effective and could serve as a model for similar initiatives. If adopted more widely or globally, this approach could drive significant changes in production quality and efficiency, pushing industries toward a 4.0 era. This innovation, thus, has strategic importance not only within its initial context but also in a broader industrial and societal sense.

STAKEHOLDERS:

Siam Cement Public Company Limited, AIS, Huawei, Yutong, and Waytous

SOURCES AND FURTHER INFORMATION

Please visit
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Accelerating Autonomous Transportation Goals with 5G

The Necessity and Superiority of 5G in Autonomous Vehicle Operations

5G, with its Ultra-Reliable and Low-Latency Communication (URLLC) capabilities, is a catalyst in the realisation of mission-critical services such as autonomous vehicles. The unparalleled reliability and latency of less than two-digit milliseconds ensure real-time communication between autonomous trucks, corresponding mining equipment, and control systems, bolstering safety and efficiency in transportation.

Moreover, 5G allows for the simultaneous connection and data transmission of a massive number of devices with sustained reliability. This means all autonomous vehicles within the mine can operate concurrently with optimal efficiency, demonstrating why 5G is necessary and unrivalled for this application compared to alternative technologies.

Leveraging Autonomous Vehicles for Efficient and Safer Mining Operations

Implementing a Tech-Driven Approach to Overcome Challenges and Optimise Efficiency

The solution's transformative impact is focused on addressing SCG's pain points and transitioning from human-driven operations to more digital and technology-driven processes. This shift is made possible with the use of unmanned autonomous trucks, which can operate and interact with the intelligent dispatching system, thereby unlocking the limitations imposed by human labour in complex environments. Conditions such as extreme heat or rain do not hinder these trucks, enabling 24-hour, three-shift continuous operations with enhanced safety and efficiency.

The project faced a significant challenge due to the location of operations being in a suburban area with no wireless communication options beyond radio. This problem was solved by setting up a dedicated 5G private network, ensuring all services run smoothly and privately in the mine.

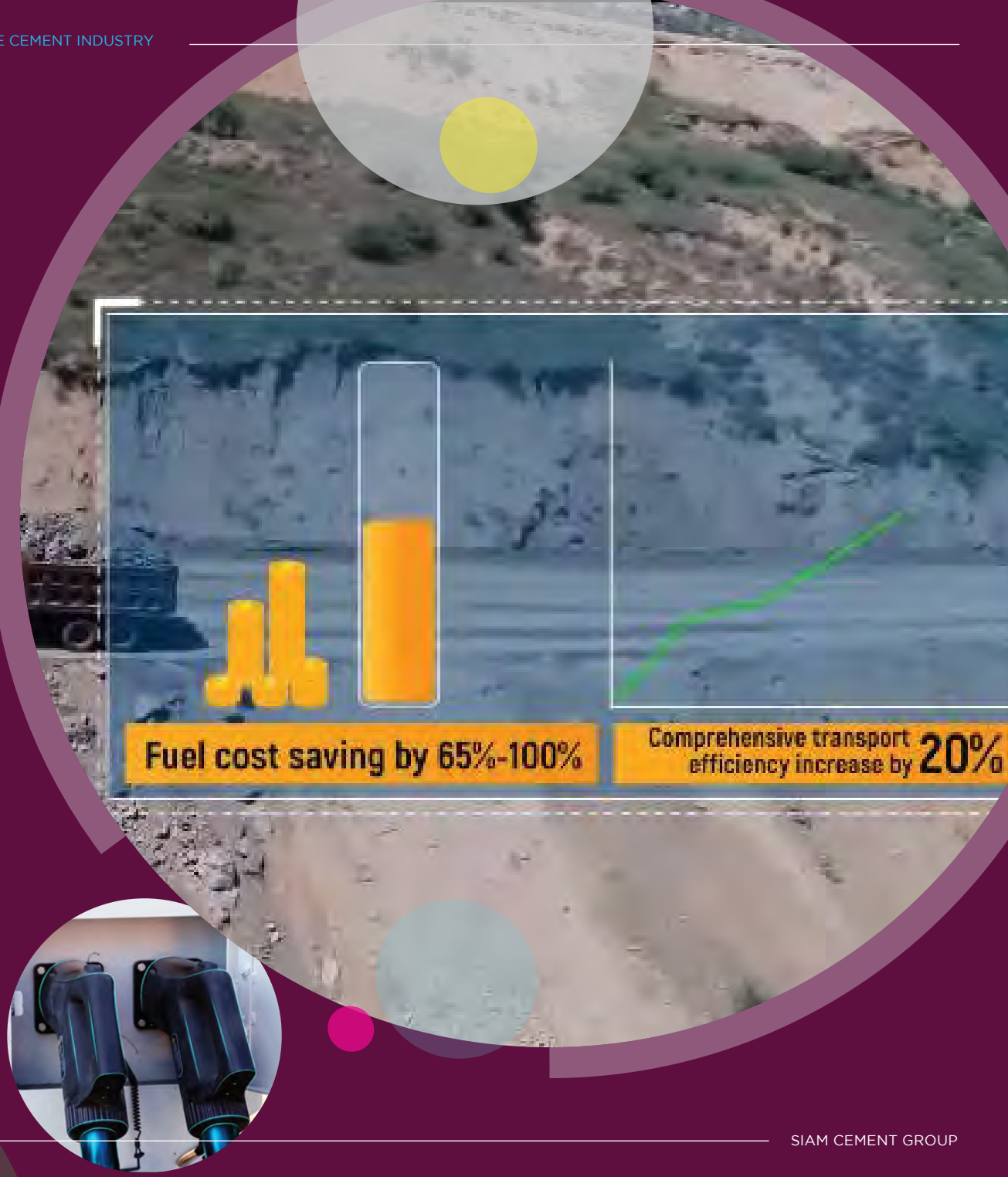
Rising Demand for 5G in Asia Pacific

Exponential Growth and Enterprise Adoption in the Region

Market research firm, Frost & Sullivan, anticipates a significant surge in the 5G sector within the Asia Pacific region. The projections indicate that 5G growth will increase from $2.13 billion in 2020 to an astounding $23.89 billion by 2025, representing an impressive compound annual growth rate (CAGR) of 62.2%.

Observing this trend, we foresee a high rate of 5G adoption among enterprises. This is largely due to the role of 5G technologies, such as network slicing and private networks, in delivering 5G services. A case in point is the transformation of Somboon Advance Technology towards Industry 4.0, a process in which 5G was instrumental.

The trend is not isolated to mining alone; a significant number of enterprises in the region are focused on transitioning into smart factories. The adoption of digital transformation and Industry 4.0 practices are becoming increasingly commonplace, creating a robust demand for 5G in the Asia Pacific region.



Lessons from this 5G Implementation

Ecosystem Building as a Key Success Factor

Through observations of various use cases, it is noticed that building a strong ecosystem is an integral part of project development within the Asia Pacific region. The support of all stakeholders in this ecosystem greatly facilitates the adoption of technology within the business environment.

This can serve as a vital lesson for other regions, emphasising the importance of establishing a collaborative ecosystem when implementing 5G technology. The collective support of all involved parties can significantly accelerate technological adoption, consequently driving business transformation and progress.

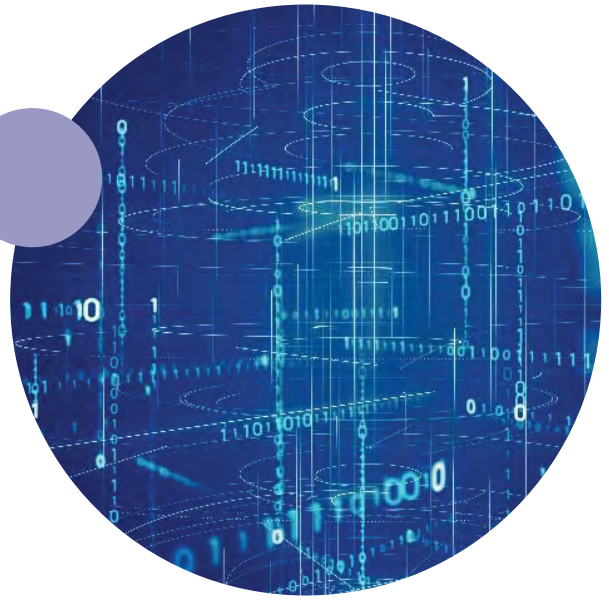
The Future of 5G in Asia Pacific

Emerging Trends and the Impact of Standalone 5G

In the past two to three years, we've observed an increasing awareness amongst both private and public sector organisations about the potential benefits of implementing 5G technology in their operations. Many have embarked on trials with various use cases, from predictive maintenance and autonomous drones to remote training. A number of these use cases have even entered commercial stages, with smart factories and smart green mining being prominent examples.

These success stories have established a blueprint for effective collaboration within the 5G ecosystem, encouraging others to transition from experimental trials to full-scale commercial applications. As such, we anticipate a continued trend of increasing 5G adoption across various sectors in the Asia Pacific region, bolstered by the introduction of standalone 5G and its transformative potential.

"With an anticipated 18% CAGR for smart manufacturing IoT connections between 2021 and 2030, Industry 4.0 and IoT deployments are primed to drive significant industrial transformation."



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Changing Wi-Fi to 5G in the Manufacturing industry

Somboon Advance Technology Public Company Limited

Somboon Advance Technology Public Company Limited, based in Thailand, is a notable name in the automobile industry as the second largest manufacturer of auto parts in the country. The company primarily specialises in the production and distribution of vehicle parts for passenger cars, pickup trucks, trucks, and agricultural machinery. Their product portfolio is comprehensive, comprising axle shafts, disc brakes, drum brakes, exhaust manifolds, leaf springs, stabiliser bars, hot coil springs, and other related items.

It is also the first factory located in the Eastern Economic Corridor (EEC) area (Rayong Province, Thailand) to undergo this change. Currently, Somboon Advance Technology PCL has a market capitalisation of $242 million, a testament to its substantial presence in the auto parts industry in Thailand and beyond.

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Changing Wi-Fi to 5G in the Manufacturing industry.

CHALLENGE:

Somboon Advance Technology Public Company Limited faces some notable challenges in its operation. The efficiency of the production line was hindered due to the manual handling of camshafts and manual driving forklifts for product consignment from warehouses to production lines. Such practices often resulted in diminished productivity, quality, and safety.

The company also struggled with storage management. It relied on manual stacking of materials and a paper-based inventory system, which was not only time-consuming but also prone to inaccuracies.

SOLUTION:

To counter these challenges, Somboon Advance Technology introduced strategic solutions. They integrated a 3D Vision Robot into their production lines. The robot, equipped with an industrial camera and AI capabilities, was tasked with handling camshafts.

In the transport department, the company replaced manual forklifts with Unmanned Automated Guided Vehicles (AGVs). These AGVs, capable of receiving orders via 5G, are now responsible for product transportation within the factory.

Finally, to revamp its storage system, the company implemented an Automated Storage and Retrieval System (AS/RS) Smart Warehouse. Materials delivered to the warehouse by AGVs are now stored automatically following barcode scanning.

IMPACTS AND STATISTICS:

The introduction of advanced solutions has had a transformative impact on the operations of Somboon Advance Technology Public Company Limited, leading to quantifiable improvements.

The 3D Vision Robot has been a game-changer for the company's production lines. It can handle camshafts for two production lines concurrently, improving productivity by 1.25 times as well as enhancing quality, and ultimately leading to a boost in production efficiency.

The implementation of Unmanned Automated Guided Vehicles (AGVs) has significantly improved shipping efficiency and safety. The use of AGVs reduces the risk of accidents and associated costs, contributing to an overall safer and more efficient operational environment.

The Automated Storage and Retrieval System (AS/RS) Smart Warehouse has revolutionised the company's inventory management. This system has dramatically increased the storage capacity by improving shipping efficiency by 12% and the accuracy of retrieval has also been improved resulting in substantial cost savings and reduced material waste.

WIDER IMPLICATIONS:

The aggregate effect of these solutions is best reflected in the company's financial performance. The incorporation of these 5G smart solutions has amplified the earning rate of the factory by 60%. At the same time, operational costs have been reduced by 30%, demonstrating the significant, tangible benefits of these advancements in its operation. This dramatic improvement in earnings and reduction in costs underscores the transformative power of technology in modern manufacturing environments.

STAKEHOLDERS:

Somboon Advance Technology Public Company Limited, in collaboration with its key stakeholders, has successfully implemented the cutting-edge 5G high-speed solution for its advanced technologies. This collaboration involved Network and Infrastructure Provider AIS, Network Vendor Huawei, and AIS's Solution Partner Siasun. Together, they have deployed the 5G technology to empower the 3D Vision Robot, Unmanned AGV, and AS/RS Smart solution in the company's warehouse.

SOURCES AND FURTHER INFORMATION

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Unlocking new possibilities and features with 5G

NUMEROUS ADVANTAGES OF 5G OVER CONVENTIONAL WIRELESS CONNECTIVITY

Using 5G as a reliable alternative to Wi-Fi in smart factories, Somboon Advance Technology Public Company Limited has unlocked new possibilities and features within their manufacturing processes.

SPACE FOR NEW FEATURES

The implementation of digital twinning, which maps out physical assets in a virtual space, allows for highly customisable products and innovative ways to add value. These digital twins, fully connected through 5G, enhance real-time interaction and collaboration between internal and external parties.

INTELLIGENT ROBOTICS

As part of their vision to become an Industry 4.0 facility, Somboon Advance Technology has been actively integrating intelligent robotics into their manufacturing operations. By deploying intelligent sensors to capture workflows and Unmanned Automated Guide Vehicles (AGVs) to manage facilities across different sites, they are moving towards a fully automated and efficient manufacturing environment.

AR/VR

The introduction of mixed reality technologies like augmented reality and virtual reality, made possible by 5G connectivity, has greatly enhanced real-time communication within the company. These technologies support advanced training, remote technical assistance, and collaboration between staff, ultimately improving factory automation and planning decisions. Somboon Advance Technology strives to be a pioneer in achieving a fully autonomous onsite factory within the region as they continue their journey towards Industry 4.0.

5G OFFERS NUMEROUS ADVANTAGES OVER WIRELESS CONNECTIVITY

5G offers numerous advantages over conventional wireless connectivity, such as Wi-Fi. Unlike Wi-Fi, which is prone to interference, congestion issues, and weak signal strengths, 5G provides a more reliable and robust connection. It ensures constant connectivity for machines requiring uninterrupted communication and eliminates the fluctuations in signal strength often experienced with Wi-Fi repeaters.

SMART SENSORS AND VISUAL ANALYTICS

In the pursuit of a smart and automated factory, Somboon Advance Technology recognises the critical role of 5G in enabling smart sensors and visual analytics. By automating complex processes and deploying video analytics and intelligent sensors, they achieve high reliability and efficiency in manufacturing. The use of wireless workstations allows for easy reconfiguration of dynamic production environments, enhancing flexibility and adaptability in their manufacturing processes.

Enables automated robotics and inspection

FASTER AND MORE ACCURATE INSPECTION WITH 5G

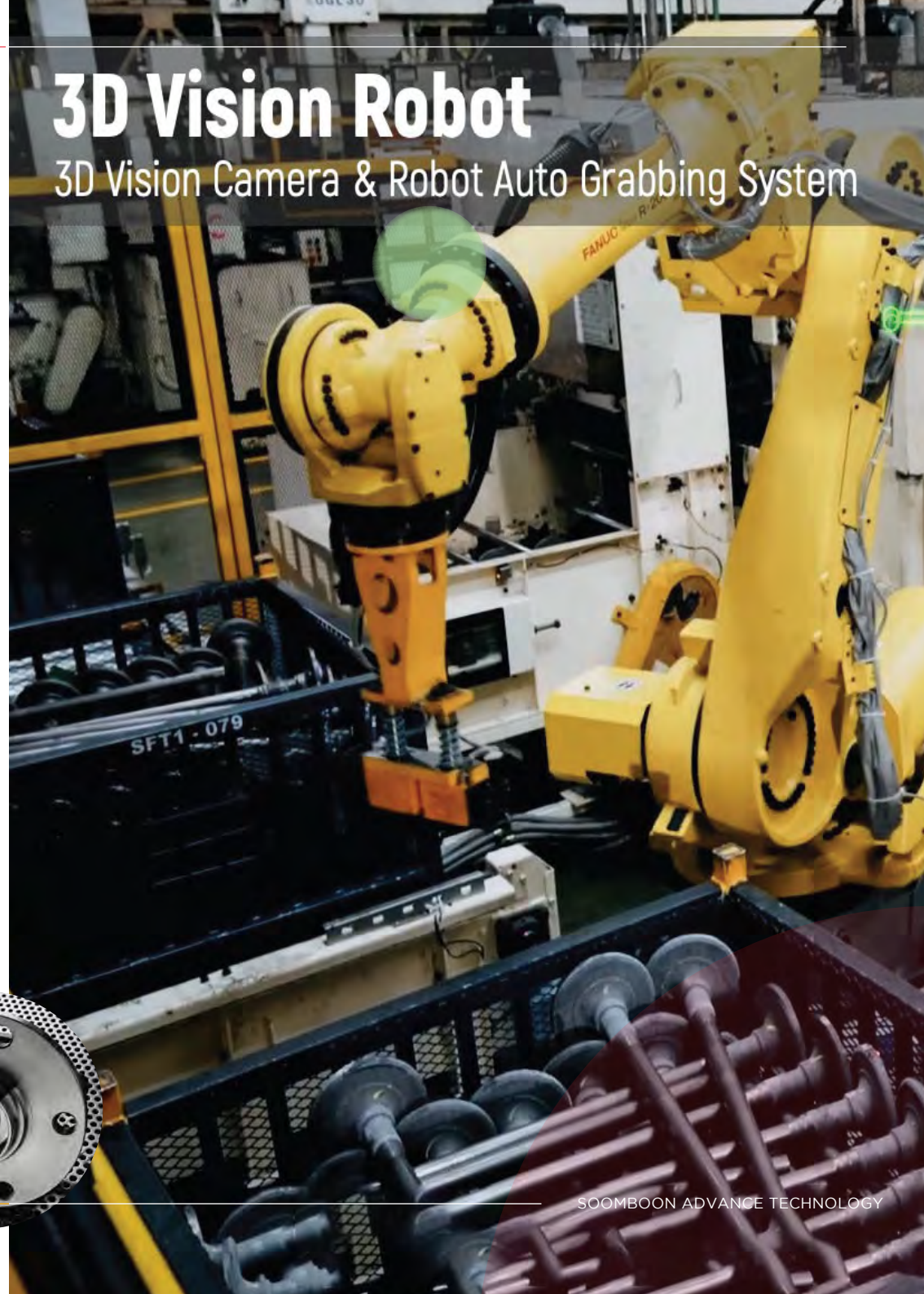
From manual inspection to fully automated inspection

One significant aspect of the solution implemented by Somboon Advance Technology Public Company Limited is enabling automated robotics and inspection through 5G connectivity. This transition has had numerous benefits, including enhanced mobility and reduced errors.

Previously, the plant relied on manual inspection and workstations for tasks such as visual inspection, material handling, and component reading. However, with the integration of 5G-enabled solutions, such as A.I. cameras, the process has shifted from manual inspection to fully automated inspection.

Visual analytics, powered by 5G connectivity, has made the inspection faster and more accurate. Furthermore, the deployment of AI-assisted automation has significantly reduced the need for manual work, thereby minimising the potential for human error.

Another notable improvement is the shift from hand-carrying materials to autonomous mobility robots (AMRs). Previously, materials were manually transported from one workstation to another. However, the introduction of AMRs, facilitated by 5G connectivity, has greatly assisted in the transportation of goods in the warehouse.



Achieving significant improvements in quality and consistency

THE FOUNDATION OF FULLY AUTOMATED PRODUCTION

CONTINUOUS HIGH OUTPUT PRODUCTION AS A CONTINGENCY

The measures and solutions implemented by Somboon Advance Technology Public Company Limited have resulted in significant improvements in quality and consistency, establishing a foundation for continuous and reliable production.

In light of challenges related to labour supply and skill shortages, the company has recognised the need for contingency measures. The scarcity of operators and technicians, exacerbated by the COVID-19 pandemic, has adversely affected production. By adopting fully automated processes, Somboon Advance Technology aims to reduce reliance on manpower and mitigate the impact of labour shortages.

One of the implementation's key benefits is the achievement of higher consistency and quality output. Through increased automation and the integration of advanced technologies, the company expects to improve productivity by 50%. This boost in productivity not only ensures higher output but also enhances consistency, leading to a higher standard of quality across its product range.

Solution offers major advantages to other businesses

The solutions implemented by Somboon Advance Technology Public Company Limited offer significant competitive advantages to other businesses operating in the same industry.

- One major advantage lies in the utilisation of artificial intelligence (AI), machine learning (ML), and analytics to optimise its operational efficiency and quality control processes.
- Automation of processes through the use of robots brings substantial benefits in terms of improved productivity.
- Another advantage is the ability to implement contactless remote operation as a contingency during lockdowns or disruptions. By leveraging remote operation capabilities, businesses can maintain continuity and minimise downtime, even in challenging circumstances.
- Furthermore, these solutions address the challenge of managing tight labour supply and ageing workforces. With the implementation of automation and advanced technologies, companies can overcome labour shortages and skill gaps.
- Ultimately, the implementation of these solutions leads to improved customer satisfaction. By optimising efficiency, enhancing product quality, and ensuring timely delivery, businesses can provide customers with better products and services.

Future plans

Future plans for Somboon Advance Technology Public Company Limited include further advancements in industrial 5G technology and utilising automation systems and IoT in the factory to improve productivity and efficiency on the digital infrastructure of 5G and the platform that already existed.

"5G capability, with its fast response and low latency, enables real-time AI response, allowing for accurate material sorting by robot arms and seamless coordination with the warehouse system. AGVs can effortlessly receive orders from the production line and deliver to their destinations. The instant response and high reliability offered by 5G are unparalleled compared to traditional communication methods like Wi-Fi or previous cellular technology."

"Thanks to the revolutionary 5G technology, including Network Slicing and Private Network, enterprises like Somboon Advance Technology are empowered to embark on their Industry 4.0 transformation journey. These advanced features of 5G play a pivotal role in delivering tailored 5G services, enabling businesses to optimise their operations and embrace the next level of industrial innovation."

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5G Network Solutions for Airport Operations

Hong Kong International Airport

Hong Kong International Airport, in partnership with China Mobile Hong Kong (CMHK) and Huawei, has implemented a private 5G network to enhance its operations and provide a better experience for travellers by leveraging the transformative capabilities of 5G. This pilot project is part of Hong Kong International Airport's strategy to incorporate a multitude of radio equipment, a cloud-based Core Network, and a complex redundant transport network. All this will help in the deployment of technologies such as V2X autonomous vehicles, robotics, and a wide range of IoT applications.

中國移動
China Mobile

5G Network Solutions for airport operations

CHALLENGE:

Previously, the airport relied on a nearly three-decade-old 3G/4G network, which had undergone numerous upgrades, leading to myriad record and drawing formats with no cohesive network or cable map. Moreover, the airport's 24/7 operational schedule imposed strict time constraints on installation activities, presenting additional challenges. In response to these issues, China Mobile Hong Kong (CMHK) deployed approximately 100 workers across the airport, all operating in tandem. The progress of these teams was meticulously monitored remotely, ensuring alignment with the predetermined schedule.

SOLUTION:

China Mobile Hong Kong deployed a secure and highly efficient 5G cloud-based network at Hong Kong International Airport, providing opportunities for the authority to deliver tremendous applications that were previously impossible or not cost-efficient to install. Simultaneously, the system also offered a superior 5G internet experience to passengers and staff using the public network.

IMPACTS AND STATISTICS:

Impact and statistics
The Hong Kong International Airport is anticipated to demonstrate effective management of both public and private networks, as well as the SOC (Security Operations Center) surveillance. Rather than deploying two separate teams, a solitary team is tasked with maintaining a hybrid network, fostering administrative efficiency. The implications of this hybrid network extend to financial advantages, resulting in considerable cost savings. These savings are observed not only in capital expenses but also in operational expenses, thus enhancing overall financial efficiency. Moreover, the Airport Authority is presented with the potential to generate revenue through public networks. This is achieved without compromising the independence and security of the public and private networks. This dual management ensures the protection of sensitive data and mitigates potential risks, thereby maintaining a robust and secure network infrastructure.

WIDER IMPLICATIONS:

The Hong Kong International Airport's recent decision to implement a 5G network has profound implications. This pioneering move has the potential to supersede existing industrial applications and fundamentally transform transportation systems.

More importantly, it could serve as a catalyst for further technological advancements globally. This business model provides an opportunity for global replication, thereby giving a competitive advantage to those capable of emulating this approach. Additionally, this decision is a noteworthy contribution to the development of smart cities and digital transformation initiatives worldwide. Consequently, such a decision is far from being a mere internal improvement, rather it could herald a new paradigm in the broader technological landscape.

STAKEHOLDERS:

Hong Kong International Airport, Huawei, China Mobile Hong Kong (CMHK)

SOURCES AND FURTHER INFORMATION

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Enhanced Connectivity at Hong Kong International Airport: Unveiling the 5G Infrastructure

Delving into the Radio Access Network, Spectrum Architecture, and the Cloud-Based Private Core Network

As part of its ambitious effort to enhance connectivity, the Hong Kong International Airport has unveiled its advanced 5G infrastructure, marking a significant milestone in its technological evolution.

The **radio access network (RAN)** deployed is vast and comprehensive. The system comprises over 4000 C-band indoor radio units, around 500 C-band and mmWave outdoor active antenna units, and 100 high-power radio units. This configuration ensures seamless radio coverage throughout the airport, encompassing all indoor, outdoor, and tunnel areas within the airport island.

Regarding **spectrum and architecture,** the system operates on 400MHz of mmWave Spectrum and 20MHz of C-band spectrum. By supporting both Non-Standalone (NSA) and Standalone (SA) architectures, the system allows for the efficient utilization of available spectrum resources. Moreover, it provides flexibility in network deployment, adapting adeptly to various operational requirements.

Lastly, **the cloud-based 5G private core network** is a significant aspect of this transformation. The solution integrates a cloud-based 5G private core network with geographic redundancy. This design not only ensures a stable and secure private network for the Airport Authority but also leverages the benefits of cloud computing to ensure reliable connectivity.

The unveiling of this 5G infrastructure truly positions the Hong Kong International Airport at the forefront of technological advancement in aviation and beyond.

Transforming Customer Experience and Unlocking Growth:

The Power of 5G at Hong Kong International Airport

Harnessing the Potential of 5G for Enhanced Digital Experience and Technological Advancements

At the Hong Kong International Airport, the power of 5G technology is transforming customer experiences and unlocking significant growth potential. The role of 5G in enhancing digital experiences and fostering technological advancements cannot be understated.

One of the critical outcomes of this transition is the **maximized customer digital experience.** The 5G network infrastructure has enabled a suite of applications that significantly enhance the customer's digital experience. The airport has shifted from traditional private wired or Wi-Fi networks to an enterprise 5G network. This advanced technology helps optimize performance and service quality, taking the customer experience to new heights.

The new infrastructure also plays a crucial role in **unlocking the value of the 5G infrastructure.** With the implementation of the private 5G network, the airport has managed to tap into the full potential and value of 5G. This network revolution has brought improved connectivity, higher data speeds, lower latency, and support for advanced technologies such as the Internet of Things (IoT), autonomous vehicles, and robotics.

Overall, the 5G solution has provided the airport authority with a secure and efficient network, facilitating the deployment of innovative applications, and significantly enhancing the digital experience. More importantly, it has empowered the airport to fully leverage the capabilities of 5G, unlocking new opportunities for growth and optimization. With this move, Hong Kong International Airport is well-positioned to lead the charge in the aviation industry's digital transformation.

The Strategic Advantage of 5G: Catalyzing Achievements and Outperforming Alternatives at the Airport

Understanding the Superiority of 5G and mmWave Technologies in Accelerating Operational Goals

The selection of 5G and mmWave technologies at Hong Kong International Airport is a strategic choice, chosen for their capacity to accelerate the achievement of set operational goals and for their superiority over existing solutions.

One compelling reason to adopt **5G or mmWave technology** is the superior speed, security, and massive connectivity it offers compared to existing Wi-Fi technology. Boasting faster data transfer rates and lower latency, 5G enables more efficient communication and data exchange. This efficiency supports the seamless operation of numerous applications, enhancing the overall user experience.

Moreover, **5G offers broader coverage** than Wi-Fi technology, making it suitable for large areas such as airports. It ensures seamless handover between different indoor, outdoor, and tunnel areas, providing uninterrupted connectivity throughout the airport premises. The addition of SIM-based authentication in 5G introduces an extra layer of security, enabling remote management and ensuring the integrity of the private network.

To conclude, the combination of speed, security, massive connectivity, and low latency makes 5G the superior solution in this situation compared to alternatives. Its advanced capabilities and future-proof nature position it as a catalyst for innovation, enabling the realization of the airport's goals in an efficient and effective manner. The selection of 5G and mmWave technologies is not merely incidental but is a strategic and forward-thinking decision to stay ahead in the aviation industry.

Embracing Transformation with 5G: Navigating Changes, Challenges, and Opportunities in the Airport Industry

Understanding the Value Chain and Technological Challenges of 5G Integration for a Future-ready Airport Infrastructure

The adoption of 5G technology heralds a significant paradigm shift in traditional systems, largely marked by the reduction or elimination of cable installations. The crux of this transition lies in enhanced efficiency, lower infrastructure costs, and amplified flexibility in equipment placement. The narrative dives into the technological platform and value chain applied, throwing light on the journey of navigating technical challenges and creating impactful changes. It further elucidates the positive repercussions and cost-saving opportunities associated with the solution, shedding light on why it's an attractive proposition for other businesses in the industry. The feasibility of expanding and reusing the existing 5G core network for future projects highlights the strategic importance of this digital transformation.

Lessons for Global Advancements and Future Prospects

Unfolding the Trends, Impacts, and Lessons of the 5G Journey in the Asia-Pacific Region

Asia-Pacific's journey with 5G serves as an essential guide to understanding the symbiotic relationship between a strong 5G network and the success of 5G applications. As we envision the future, the 5G landscape in the Asia Pacific indicates a trajectory of continuous advancement and penetration across diverse industries. Key trends include a surge in customized 5G networks catering to unique needs, bolstered by the deployment of Standalone (SA) 5G networks. These developments collectively underline the immense potential and transformative power of 5G technology in the region.

"Through leveraging the power of 5G technology, Hong Kong International Airport has not only improved operational efficiency but also significantly reduced both capital and operational expenses, demonstrating the transformative potential of this technology in the aviation industry."

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Field Service Augmented by AR and Drone Using 5G with Edge for Reliable Performance

Hong Kong Telecommunications (HKT) Limited

Hong Kong Telecommunications (HKT) Limited, an industry leader in the telecommunications sector, embarked on an innovative initiative to revolutionise its field service operations by harnessing the power of 5G technology, augmented reality (AR), and drones. These technological advancements provide a safer and more efficient approach to the company's operational challenges, specifically in servicing areas that were difficult to access or required specialised personnel. Thus, HKT was able to streamline its field service operations significantly. The case of HKT serves as a pioneering example of how integrating 5G with advanced technology can optimise field operations, boost efficiency, improve safety, and foster effective communication in the telecommunications industry.

HKT

Field Service Augmented by AR and Drone Using 5G with Edge for Reliable Performance

CHALLENGE:

Field service operations in the telecommunications sector face several critical challenges. The inherent dangers of manual field inspections necessitate workers' physical presence in potentially hazardous environments, such as hard-to-reach areas and high-rise platforms. This may result in an potential increase in accidents. The traditional field operation model is also highly time-consuming and resource-intensive. Comprehensive manual surveys of each piece of equipment require significant time and personnel, yet often yield data records that are not sufficiently comprehensive or visualised. In the telecom industry, cell tower inspections entail tower climbing, a skilled task requiring multiple workers, which leads to high labour costs. Furthermore, junior staff unfamiliar with the site tend to expend additional time locating equipment and redoing tasks.

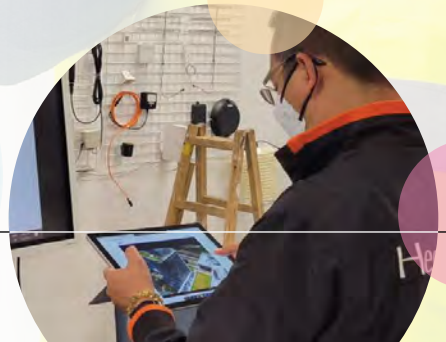
SOLUTION:

The proposed solution leverages drone technology to mitigate the risks associated with field operations. Drones are deployed for dangerous inspection tasks that traditionally required manual labour, reducing workers' exposure to hazardous environments. Drone-based inspection can mitigate risks of aerial works and ensure safer operation for hard-to-reach locations as well as minimise network downtime. Drone inspections, compared to manual methods, are faster, cover a larger area, require less labour, and are less disruptive. They also produce a comprehensive digital archive of precise, visual data accessible at any time. Alongside drones, the solution introduces an AR navigation mobile application that provides precautionary warnings along virtually guided field routes. These make remote expert guidance and field asset tracking possible to reduce errors, reworks, and time spent, enhancing cost-effectiveness.

The integration of 5G, AR, and edge technologies provides real-time on-site navigation and video guidance with remote expert inspection. This efficient, scalable solution allows for effective training of junior field staff while reducing operational risks. Consequently, safety concerns that deter potential industry entrants can be mitigated. Overall, the solution optimises field service operations while prioritising safety.

IMPACTS AND STATISTICS:

The introduction of edge computing with a 5G mobile core network significantly reduced transmission latency, ensuring seamless navigation. This setup demonstrated two to three times superior latency response and five to eight times higher uplink bandwidth capacity than 4G.



The deployment of a 4K ultra-high definition (UHD) camera on 5G phones enabled real-time remote expert video assistance. With the help of AR and drone technologies, an end-to-end field service solution was implemented, improving health and safety measures, reducing operational risks, and facilitating scalable training.

The solution led to a 30-40% time saving compared to using paper maps, thanks to pre-designed and optimised routes. Operational efficiency of field service visits improved by 30%. The Office of the Communications Authority (OFCA) recognised and provided funding support for this impactful project. User satisfaction was high, with the application recommended by all respondents for field operation routing.

WIDER IMPLICATIONS:

The adoption of an edge computer with a 5G mobile core network could significantly enhance user navigation, impacting various sectors such as transportation, logistics, and tourism. The implementation of a 4K UHD camera on 5G phones could improve remote assistance, affecting industries like healthcare and manufacturing. The end-to-end field service solution, if replicated globally, could enhance operational efficiency and safety across sectors like logistics, utilities, and manufacturing.

This project highlights the growing demand for accessible AR applications and sets the stage for the AR+5G+Edge solution as a ready-to-adopt, turnkey industry solution, accelerating market expansion. Moreover, HKT's initiatives have inspired wider cross-industry use cases, from interactive 3D manuals improving fieldwork safety in utilities to real-time route finding and asset tracking, enhancing stock management in warehouses and public facilities.

STAKEHOLDERS:

Mobile phone users, device manufacturers, healthcare providers, utilities, property/venue management, and field service technicians, as well as those involved with aerial works.

SOURCES AND FURTHER INFORMATION

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Why 5G and Key Technologies Are Crucial for Advanced Field Operations

The Role of 5G, AR, and Drones in Enhancing Field Service Solutions

5G's low latency, high capacity, and high bandwidth enable live 4K UHD environment streaming on its uplink, a non-lagging real-time navigation experience, and support for a significantly larger number of connected devices and users.

Key attributes for this use case include 5G, AR, and drones. 5G provides the necessary speed, low latency, high reliability, network slicing, and edge computing capabilities to support the field service solution described in the case study.

AR offers real-time visual interactive indoor navigation with virtual path guidance and location indication of selective field devices, important for field service operations where accurate and timely location information is critical.

Drones enable inspections of difficult-to-reach locations, carried out by specialists in the office, reducing the need for on-site inspections, which can be time-consuming and hazardous.

Utilising 5G/mmWave Technology for Enhanced Field Operations

The Necessity and Superiority of 5G/mmWave in Achieving Set Goals

5G can help achieve the set goal by providing faster data transfer speeds, low latency, high reliability, network slicing, and edge computing capabilities. These capabilities enable real-time applications, such as the AR mobile application used in this case, and support a significantly larger number of connected devices and users. 5G (or mmWave) is necessary and the best answer in this situation because no other technology can match its combination of speed, low latency, reliability, network slicing, and edge computing capabilities. Alternative technologies such as 4G LTE or Wi-Fi do not provide the same level of performance and reliability that 5G or mmWave offers, making them less suitable for this application.

Revolutionising Field Operations: The Impact and Importance of the Innovative Solution

The Technological Platform, Value Chain, and Resolved Challenges in Enhancing Field Service Operations

The solution significantly improves the efficiency and safety of field service operations. It enables remote inspections using drones, real-time visual interactive indoor navigation with virtual path guidance and location indication for select field devices as well as instant communication access between on-site field staff and remote experts via 4K UHD video calling.

The technological platform used involves 5G, AR, drones, edge computing, and 4K UHD video calling. The value chain integrates these technologies to create an end-to-end solution that provides a more efficient and safer approach to field service operations.

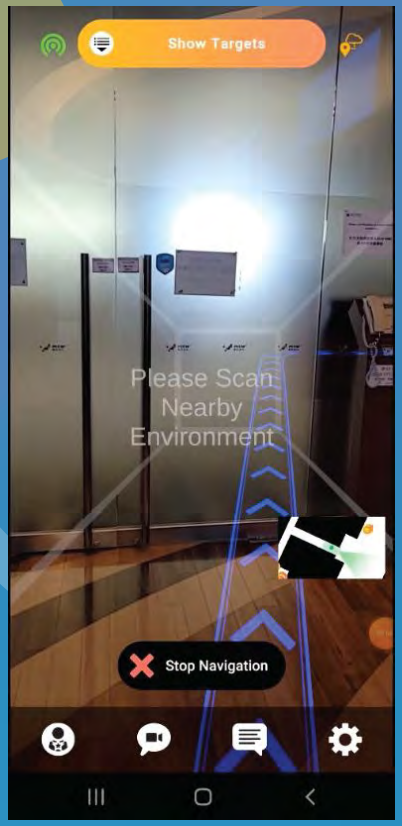
Potential technical challenges during the solution's deployment could include ensuring the safety and regulatory compliance of drone inspections and maintaining the accuracy and real-time availability of location information in the AR mobile application.

The Industry-wide Appeal of the Innovative Field Service Solution

Reasons for Broader Adoption within the Industry

Other businesses in the industry should consider utilising this solution due to the significant improvements it offers for the efficiency and safety of field service operations. It enhances accuracy and reduces the need for repeat visits, presenting a more streamlined approach.

This versatile solution can be customised to cater to specific business needs, offering features such as real-time route finding and asset tracking, interactive 3D manuals for on-site equipment repair, and hazard mapping for increased fieldwork safety. Additionally, the solution's hands-on training and skill development opportunities can aid businesses in attracting and retaining qualified staff.



Future plans

Future plans for the solution involve the integration of AI and ML capabilities for predictive maintenance and automated fault detection. It also includes more advanced sensor and analytics capabilities for comprehensive monitoring of field devices, and the broader application of the solution to industries like gas and electricity plants, manufacturing, transport, logistics, and public areas.

These enhancements can further improve the efficiency and accuracy of field service operations and provide real-time visual guidance and feedback to streamline processes and improve customer satisfaction. The solution's multifaceted benefits and adaptability make it a wise investment for businesses across diverse industries.

"The integration of 5G, AR, and edge technologies in field service operations led to a 30-40% time saving compared to using paper maps, with operational efficiency of field service visits improving by 30%. With the help of drones, dangerous inspection tasks were significantly mitigated. The case of HKT serves as a beacon for the entire industry, demonstrating how the marriage of advanced technologies can revolutionize operations, boost efficiency, and enhance safety in the telecommunications sector."

- Dr NG, Ping Chung, Senior Vice President, HKT Limited.

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Revolutionising the LG Uplus Smart Factory Industry in South Korea with 5G

LG Uplus

The turn of the new decade has seen a remarkable surge in productivity within South Korea's industrial landscape. This surge is largely credited to the implementation of cutting-edge technologies like Artificial Intelligence (AI) and the Internet of Things (IoT). LG Uplus, a leading telecommunications provider and innovator, has been at the forefront of this technology-led transformation. Beginning in 2016, the company launched its U+Smart Factory solution, a comprehensive AI and IoT-based system designed to boost operational efficiency and stability. The U+Smart Factory solution was tested in an array of business facilities, ranging from LG affiliate sites to national power plants and heavy industries.

This case study underscores the potential of AI and IoT as major drivers of industrial productivity. South Korea's success story provides a blueprint for other countries and companies to leverage these technologies in their quest for improved efficiency and performance.

LG유플러스

Revolutionising the LG Uplus Smart Factory Industry in South Korea with 5G

CHALLENGE:

The past decade has seen intensified market competition and cost reduction pressures alongside an ageing frontline workforce, leading to a skilled labour shortage. However, falling device prices and improved machine/computing performance, especially the transition from wired to wireless networks in telecom, have sparked a significant shift. This is the dawn of the 4th Industrial Revolution, a revolution in intelligent information technology that offers a potential path through these industry challenges.

SOLUTION

In South Korea, LG Uplus is steering the new industrial wave with its pioneering smart factory solutions. Harnessing the power of 5G, the company is driving data-centric smart businesses while offering added value through its Digital Transformation (DX) solutions across various sectors, including manufacturing, finance, public, retail, and service.

LG Uplus' Smart Factory delivers a comprehensive suite of 22 tailor-made solutions across five key sectors: network infrastructure (5G/LTE dedicated lines and private 5G), safety, environment, quality control, and supply management. This integration of 5G dedicated lines with an industrial DX solutions platform enables customers to exercise integrated control over their facilities, leading to more systematic and efficient field management.

With an affiliate boasting 76 years of manufacturing history, LG Uplus' Smart Factory stands out for its reliability. As the sole telecom company with a dedicated organisation for smart factory business, LG Uplus has grown its client base from 9 LG affiliates in 35 factories to over 250 domestic and overseas factories across diverse sectors such as power plants, finance, retail, and the public sector.

IMPACTS AND STATISTICS:

LG Uplus' Smart Factory has demonstrated impressive performance, with a 3-year CAGR of 78%. The goal is to generate $74 million in total revenue by 2026. In 2021 alone, the Smart Factory saw a remarkable growth of 77%. Through strategic partnerships with LS Electric and LG Electronics Production Technology Institute, the company introduced additional features such as switchboard inspections, AI vision tests, and intelligent CCTV. These innovative additions have contributed significantly to sales, accounting for 23% of total sales. Marketing efforts under the unified brand "U+ Smart Factory" have led to a 20% increase in unique homepage visitors and a remarkable 150% increase in inbound inquiries.

The "Smart Pier Project" exemplifies the competitiveness of U+ Smart Factory. The global automated container terminal market has grown by 204% since 2016, and South Korea is looking to advance in this area due to the lack of full automation in domestic piers and the high rate of on-site accidents. The introduction of the Severe Accident Punishment Act in 2022 has underscored the need for improved field safety management. The application of 5G network technology enables real-time communication and control of high-capacity data, duplex real-time telecommunication, augmented/virtual reality, and the utilisation of various sensors and devices, positioning U+ Smart Factory as a leading player in advancing South Korea's industrial landscape.

WIDER IMPLICATIONS:

LG Uplus' initiatives hold vast implications for industry and society at large, presenting opportunities of strategic significance. While the current focus is on mirroring and monitoring industrial sites with an integrated control platform, future plans involve the application of data analysis for enhanced operational intelligence and predictive analytics. By incorporating AI into these systems, LG Uplus aims to improve the functionality and efficiency of industrial processes. Such improvements, when scaled up or replicated globally, could revolutionise industry operations across the world, setting new standards for safety, productivity, and efficiency. Moreover, the integration of U+5G with Smart Factory solutions has the potential to create a significantly safer society. This advancement highlights the crucial role of technology in addressing contemporary challenges and shaping a more secure, efficient future.

STAKEHOLDERS:

Corporations in various industries such as manufacturing companies, power plants, banks, retailers, and public institutions (Busan Port Authority, etc).

SOURCES AND FURTHER INFORMATION

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Embracing Innovative Safety Solutions: The Core of U+ Smart Factory

Harnessing Digital Technologies for Enhanced Safety Management

LG Uplus has introduced a suite of cutting-edge solutions to enhance safety in industrial operations:

Smart Safety Solutions: These incorporate 5G RTK (real-time kinematic) for tracking the locations and movements of operational equipment. The solutions also include safety vests with smart security alerts, remote crane control, self-driving patrol robots, cameras to prevent vehicle crashes and drowsy driving, and smart watches and helmets equipped with body sensors.

Integrated Safety Control Platform: Operated on the 5G network, this platform is founded on digital twin technology. It digitalises the operational safety status of workers, trucks, and cranes, enabling terminal staff to manage field safety more intelligently. A main dashboard provides real-time status updates on frontline workers and detailed information during emergencies. Staff can monitor the real-time locations and videos of equipment and devices using a detailed map. This platform can also be directly integrated with a Terminal Operating System (TOS), as demonstrated in one use case.

Through these innovative solutions, LG Uplus is setting new safety standards in the industrial sector, leveraging the power of technology to improve both operational efficiency and safety protocols.

Pioneering the New Industrial Wave:

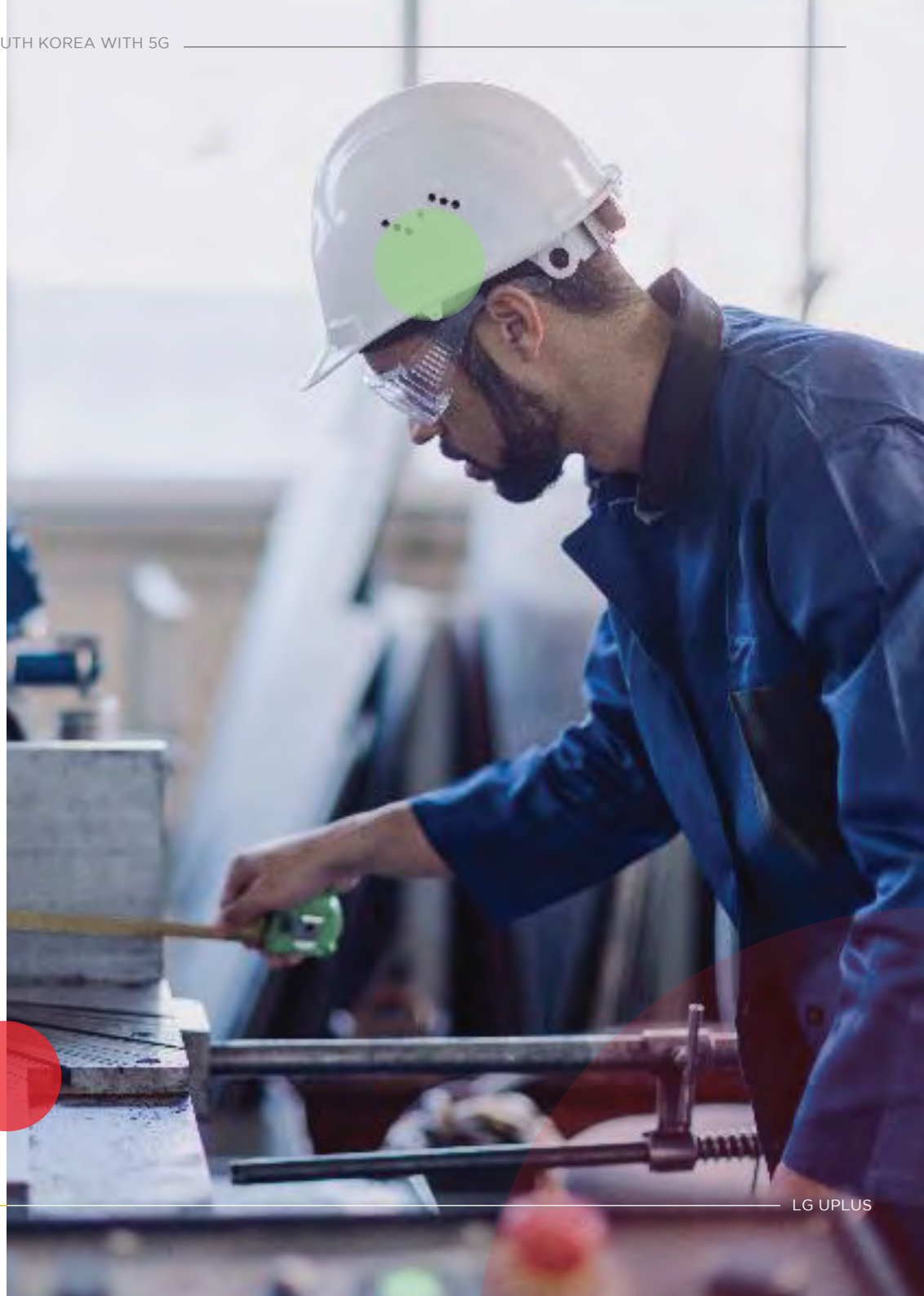
LG Uplus's Smart Factory Solutions

Leveraging 5G and Digital Transformation to Revolutionise Industries

In response to the evolving industrial landscape, LG Uplus has taken a proactive approach, leading the new industrial wave in South Korea with its innovative smart factory solutions. Capitalising on the competitive edge provided by 5G technology, LG Uplus has established itself as a leader in data-driven smart businesses. The company not only offers innovative solutions but also provides value by implementing digital transformation (DX) solutions across multiple sectors, including manufacturing, finance, public, retail, and service industries.

The U+ Smart Factory offers 22 customised solutions across five key areas: network infrastructure, safety, environment, quality control, and supply management. These are all facilitated by the integration of 5G dedicated lines and the industrial DX solutions platform, enabling customers to have centralised control over their facilities. This all-encompassing service has streamlined field management, making it more systematic and efficient.

What distinguishes LG Uplus Smart Factory from other telecom companies is its exceptional reliability. As the only carrier with an affiliate boasting 76 years of manufacturing history and the sole telecom company with a dedicated organisation for smart factory business, LG Uplus stands out in the sector. Beginning with nine LG affiliates across 35 factories, the company now serves over 250 domestic and international factories in various industries such as power plants, finance, retail, and the public sector. This wide-ranging impact is a testament to the effectiveness and adaptability of LG Uplus's smart factory solutions.



The Tangible Impact: A Close Look at U+ Smart Factory's Performance

Harnessing Growth and Enhancing Safety Through Innovation

The U+ Smart Factory has demonstrated significant growth, achieving a 3-year compound annual growth rate (CAGR) of 78%. Their ambitious goal for the future is to reach $74 million in total revenue by 2026. Remarkably, in 2021 alone, the factory witnessed a growth of 77%.

This impressive growth has been fuelled by strategic partnerships and innovation. Partnerships with LS Electric, the leading electric equipment examination company in Korea, and LG Electronics Production Technology Institute have added new facets to the smart factory's solutions, including switchboard inspections, AI vision tests, and intelligent CCTV. These additions have greatly enhanced the factory's offering, accounting for 23% of total sales.

Moreover, the marketing campaign under the unified brand "U+ Smart Factory" has increased web traffic, with a 20% boost in unique visitors and a remarkable 150% rise in inbound inquiries.

The effectiveness of U+ Smart Factory has been most evident in the Smart Pier Project. The global automated container terminal market has grown 204% since 2016, signalling an area ripe for innovation. The domestic context in South Korea has been challenging, with piers not fully automated and a high rate of worker accidents. This has highlighted the importance of safety management, further reinforced by the enforcement of the Severe Accident Punishment Act in 2022.

The application of 5G networking in the Smart Pier Project has allowed for real-time communication, control of high-capacity data, and the use of augmented/virtual reality, various sensors, and devices, demonstrating the power and potential of digital transformation in enhancing safety and efficiency.

Way Forward: Envisioning a Safer, More Efficient Industrial Landscape

Harnessing AI and Predictive Analysis for the Next Industrial Leap

As LG Uplus charts the way forward, the company's focus is clear: to leverage its U+ Smart Factory solutions to push the boundaries of what is achievable in industrial operations. Central to this vision is the company's commitment to capitalising on the opportunities presented by digital transformation and 5G technology.

In the immediate future, the company plans to further enhance its integrated control platform, not just to monitor but also to analyse and predict industrial site operations. The application of AI-based operational intelligence and predictive analysis systems will lead to more effective and efficient industrial processes.

Furthermore, LG Uplus intends to continue expanding the reach of its smart factory solutions, both domestically and overseas. With a clear vision and a robust strategy, LG Uplus is poised to continue driving progress in South Korea's industrial sector and beyond, shaping a future where industry operations are safer, more efficient, and increasingly driven by innovative technologies.

LG Uplus' Visionary Future Plans: Pioneering a Safer, More Efficient Industrial Landscape with 5G and AI

Leveraging Technological Advancements to Lead the 4th Industrial Revolution

In the immediate future, LG Uplus aims to enhance its integrated control platform to not only monitor but also analyze and predict industrial site operations. By incorporating AI-based operational intelligence and predictive analysis systems, the company envisions more effective and efficient industrial processes, leading to increased productivity and safety.

By continuing to forge strategic partnerships and introducing innovative features to its smart factory solutions, LG Uplus aims to stay ahead of the industry curve. The company's remarkable growth rate and revenue projections demonstrate its commitment to staying at the forefront of the 4th Industrial Revolution.

LG Uplus recognizes the potential of 5G technology in creating a safer society, especially in areas like the Smart Pier Project. By utilizing real-time communication, high-capacity data control, and augmented/-virtual reality, the company is addressing safety challenges and enhancing operational efficiency in the industrial landscape.

Looking ahead, LG Uplus envisions a future where AI and predictive analysis will play a central role in industrial operations, allowing for even greater advancements in efficiency and safety. Through its innovative approach to safety and efficiency, the company is not only transforming its own operations but also inspiring change throughout the entire industrial sector.

"LG Uplus's U+ Smart Factory solutions are at the forefront of South Korea's industrial wave, leading a transformative charge across a multitude of sectors. We not only provide smart business solutions but also catalyze the digital transformation of industries through our innovative platform."

"With our unique approach to safety and efficiency, powered by our Integrated Safety Control Platform, we are setting new standards for industrial operations. Our smart safety solutions are driving innovation, not just within our company, but throughout the entire industrial landscape."

"The future of LG Uplus is one of continual growth and innovation. We are committed to utilizing AI and predictive analysis systems, taking our U+ Smart Factory solutions to the next level. We firmly believe that our focus on technological advancement will make our society safer and more efficient."

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5G AR/VR Smart Glass Solution

Keppel Offshore & Marine

Keppel Offshore & Marine Ltd (Keppel O&M), in partnership with Singapore mobile network operator, M1, Keppel Digi and homegrown start-up Hiverlab, has implemented a 5G augmented and virtual reality (AR/VR) smart eyewear solution at its yard in Singapore - the first in Southeast Asia's maritime industry. This pilot project is part of Keppel O&M's strategy to use digitalisation and virtual technology to enhance the efficiency of remote inspections and other operations for its tech-enabled workforce.

5G AR/VR Smart Glass Solution

CHALLENGE:

Following the norm of lockdowns and travel restrictions around the world, Keppel and M1 have sought the ways to use smart glass to ensure business runs smoothly for Keppel, its partners, clients and its customers.

IMPACTS AND STATISTICS:

Keppel is expected to reduce the QC manhours for inspection by 50% from 16000 to 8000 each year. The further project that field engineer efficiency will increase by 40% and equipment downtime will be reduced by 10%.

WIDER IMPLICATIONS:

Following M1's decision to undertake an ambitious multi-year project to provide ubiquitous 5G standalone (SA) offshore coverage for the southern coast of Singapore, this project could spur the application of 5G augmented and virtual reality (AR/VR) solutions for remote operations in the offshore and marine industry and beyond.

STAKEHOLDERS:

Keppel O&M, M1, Keppel Digi, Hiverlab, IDMA

SOLUTION:

M1 deployed a 5G standalone network at Keppel's yards to support the deployment of smart glass headsets. Through these partnerships with IMDA, M1 and technology experts, Keppel overcame some remote working and other issues in the marine industry such as labour shortages and operational inefficiencies.

SOURCES AND FURTHER INFORMATION

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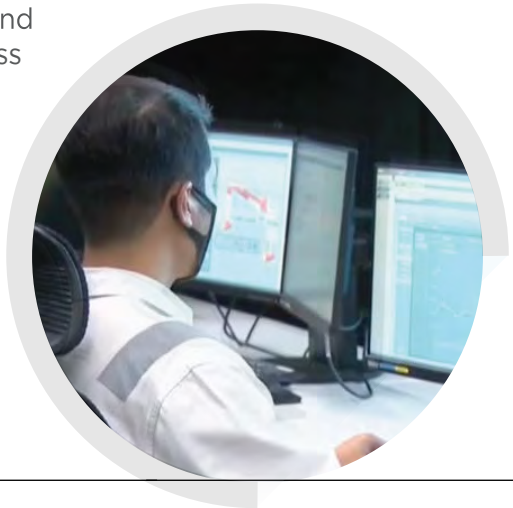
How 5G is enabling smart eyewear for the maritime industry

5G-SMART GLASSES ARE HELPING KEPPEL OVERCOME CHALLENGES BOTH OLD AND NEW

As part of Keppel O&M's Yard of the Future initiative - which uses digitalisation and IoT to transform products, services, and operations - Keppel and its partners worked to test-bed applications for inspections via smart eyewear. By using M1's 5G high-speed and low-latency connectivity, immersive AR/VR environments, highly detailed representations and real-time information can be relayed to users and control centres. The successful introduction of the smart glasses solution at Keppel is a useful test case that can be scaled and replicated to boost operational efficiency and safety across businesses and industries.



Keppel's smart glass remote inspection already benefits from a 4G network, which in itself already provides significant advantages over a Wi-Fi system. There are three key areas of daily operations, however, that are solved by 5G connectivity alone:

IMAGING QUALITY

are solved by 5G connectivity alone: Imaging quality - 5G can increase the fidelity of video streaming across the entire visual inspection process. This is a vast improvement on using only in-person inspections and can enable automatic detection of micro-defects such as welding seam undercuts.

SEAMLESS CONNECTIVITY

5G provides the ultra-fast low-latency connectivity required to ensure smooth communication between the wearer and the remote inspection witnesses. This is vital to the next step of the smart glass implementation

involves digital document management, such as engineering 3D visualisations, models and drawings. These will be transmitted directly to the smart glass headset in real-time, thus eliminating the need to bring physical copies of drawings to the site and allowing any discrepancies between the product to be inspected and flagged immediately. Conventional connectivity often results in stuttering frames - large volumes of data streaming can only be reliably serviced by a 5G connection.

STAKEHOLDER CONFIDENCE

5G boosts the confidence level of remote inspection adoption compared to the current industry standard, which involves the uncertainties inherent in inspection via lower-quality connectivity.

5G is changing the very nature of on-site inspection

COLLABORATION SMOOTHED DEPLOYMENT AND INCREASED EFFECTIVENESS

5G enables a new standard for on-site inspection and accelerates the tech-enabled workforce in maritime environment to enhance productivity, capability, quality and safety. Remote inspection has enabled Keppel to work around conventional, physical-based inspection which requires on-site personnel.

There were, however, technical challenges – which is why Keppel collaborated with the three major marine classification societies (ABS, DNV and BV) with the common goal of revolutionising remote quality inspections. This began a lengthy trial process, which involved ironing out the key issues of image and video streaming quality. Keppel's close and ongoing partnership with the marine societies has enabled them to chart the way forward for both safety and innovation.

Through these and other partnerships with IMDA, M1 and technology experts, Keppel is developing AR-enabled digital twins which field engineers can use to receive real-time remote guidance. By overlaying sensor data onto their field of vision, they gain significant understanding of real-time critical issues and conditions during operations.

Smart glasses are also being used to conduct remote virtual walkthroughs of vessels – allowing Keppel engineers, clients, and classification societies to perform pre-construction feasibility assessments simultaneously – enabling potential engineering design issues to be identified earlier. Engineers can use smart glasses to validate that the project is being constructed to the correct specifications across different yards and locations where various vessel components are manufactured.

5G-enabled eyewear delivered ROI

5G-SMART GLASSES ARE HELPING KEPPEL OVERCOME CHALLENGES BOTH OLD AND NEW

Since implementing smart glass remote inspection in 2019, there has been a great reduction in potential risk of bacteria and virus transmission for clients participating in the various yard inspection processes. What's more, they now have assurance that inspections are able to continue remotely using the smart glasses even when personnel are unable to attend the site.

In addition, the operations and commissioning team have benefitted from the remote expert function that's used to assist and train the staff in real time. By conducting the inspections remotely, processes have been streamlined, and inspection time has been cut down significantly. Keppel expects to reduce the QC manhours for inspection by 50%, from 16000 manhours to 8000 each year. They further project that field engineer efficiency will increase by 40%, and equipment downtime will be reduced by 10%.

With the 5G AR/VR smart glass solution, the need for manual processing of documents is also greatly reduced, resulting in higher efficiency and less environmental waste. Engineers and onshore teams are able to communicate more seamlessly with the offshore team via virtual platforms to troubleshoot issues relating to asset health monitoring. For clients, vendors and customers, remote collaboration has enabled closer collaboration throughout different phases of each project.

Keppel shows the value of smart eyewear for all to see

ACROSS THE INDUSTRY, KEPPEL DEMONSTRATES THE VALUE OF 5G-ENABLED REMOTE INSPECTION

Keppel is the first company in Southeast Asia's maritime industry to pilot 5G AR/VR solutions. The remote operation applications they have implemented are ideal for many other industries such as construction, engineering, oil and gas industries, and any other organisation which practices product and equipment inspection.

As industries face constraints on resources such as manpower, this 5G-enabled smart glass is a perfect opportunity to transform operations and reduce expenditure in the long run.

Inspection-as-a-service

PROJECT GIVES COMPANY VISION FOR THE FUTURE

Keppel envisions an inspection-as-a-service model to emerge from this virtual platform for remote inspection, survey, audit and collaboration. This will enable them to offer value-added services to maritime customers - both locally and internationally.

Keppel envisions an inspection-as-a-service model to emerge from this virtual platform for remote inspection, survey, audit and collaboration

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5G

The Private 5G Network for the Oil and Gas Industry

Petroliam Nasional Berhad (PETRONAS) & Telekom Malaysia Berhad

In this rapidly innovating digital era, the implementation of advanced technological solutions for industrial processes has become a necessary paradigm shift to ensure enhanced operational efficiency, workforce safety, and environmental sustainability. This case study delves into a pioneering endeavour by PETRONAS, a global energy group: the deployment of a private 5G network infrastructure to enable transformative solutions.

These private 5G networks are not only instrumental in ensuring uninterrupted connectivity, but they also serve as a robust technological foundation that would enable the deployment of sophisticated solutions. Specifically, this case study will explore the use of inspection robots, inspection drones, and augmented reality (AR) / virtual reality (VR) goggles; all made operable by the 5G Enhanced Mobile Broadband (eMBB). These solutions not only improve the efficiency and reliability of inspection and monitoring processes, but they also minimise the risks associated with human interventions, particularly in challenging offshore environments.

PETRONAS

TM ONE

The Private 5G Network for the Oil and Gas Industry

CHALLENGE:

In advancing reliability and sustainability of energy supplies amid energy transition, PETRONAS is driving a digital transformation that encompasses, among others, digitally optimised operations and greater visibility across the value chain. Achieving notable improvements in connectivity speed, latency, stability, and security necessitates the adoption of an advanced wireless technology. In this context, 5G wireless technology emerges as the optimal choice to effectively address these requirements.

SOLUTION:

PETRONAS and Telekom Malaysia (TM) have taken up the challenge and successfully delivered the first oil & gas private 5G network deployment for PETRONAS and its group of companies, marking a significant stride forward in the region's telecommunications landscape. Implemented in December 2022, this solution highlighted several distinct attributes and advantages offered by private 5G networks compared to their public counterparts.

a) Segregation from Public 5G Networks: The private network implemented by TM is wholly segregated from public 5G networks. This distinction offers a myriad of benefits from enhanced security measures to the provision of high-availability services that cater to specific sections or areas within the deployed zone.

b) High Service Level Availability: The private 5G network guarantees an impressive 99.9% network availability per Service Level Agreement (SLA), outpacing the 'best effort' delivery of public networks, typically capped at 95%. This higher SLA translates into increased network reliability and stability, vital for critical operations such as remote operations, high-definition and live monitoring.

c) Enhanced Security and Stability: The private 5G network adds a layer of protection by including 5G as a backup Fiber Optic backbone, which was devised from an engineering partnership between PETRONAS and TM. It incorporates security features that ensure only authorized devices can connect to the network, enhancing network security against any invasions or disturbances. Furthermore, it ensures high-speed, high-availability service, which is critical for the smooth execution of numerous tasks.

d) On-Premise Solution: The design of the private 5G network is based on an on-premise solution. This arrangement provides greater control over network operations and maintenance, ensuring high service levels and moving towards becoming a critical enabler for PETRONAS's production and operational excellence.

e) Leveraging High Upload Throughput: Another key benefit of the 5G technology is its high upload throughput, which PETRONAS has leveraged in their use cases. This capability is a crucial factor in the successful implementation of high-data demand applications, such as live HD video streaming for remote monitoring.

f) Wider Coverage for Transmission: The broader coverage provided by the 5G network has been used to facilitate transmission, both point-to-point and point-to-multi-point, over water. This advantage is of particular importance in offshore operations, enhancing communication capabilities and operational efficiency.

IMPACTS AND STATISTICS:

The deployment of the private 5G network for PETRONAS and its group of companies has resulted in tangible and significant impacts on business operations and socio-economic aspects.

a) Unmanned Operations and Cost Reduction: One of the key opportunities presented by the deployment of private 5G networks is its potential to pave the way for increased utilization of autonomous operations. This new way of working not only significantly mitigates the risks linked with human involvement in such zones but could also cut costs related to workforce logistics, insurance, and potential recompense for occupational hazards.

b) Improved Machine Performance and Safety: 5G enabled devices connected through the private 5G network can perform tasks faster, more accurately, and more reliably than their human counterparts. This improvement leads to the increased of operational efficiency and productivity, and most importantly, the minimisation of errors that could lead to serious incidents in these hazardous environments.

The Private 5G Network for the Oil and Gas Industry

c) Value Generation and Return on Investment (ROI): The private 5G network, despite its upfront costs, is anticipated to generate a high benefit-over-cost ratio in the long run. By fostering an environment conducive to digital innovation and enhanced operational efficiency, the network could lead to significant savings and value generation. Additionally, the network would serve as a foundation for future technologies, further improving the ROI over time.

d) Socio-Economic Benefits: Beyond the direct operational benefits, the private 5G network implementation also has significant socio-economic advantages. By reducing the need for human intervention in hazardous environments, it contributes to workplace safety and welfare, aligning with the UN's Sustainable Development Goals. Moreover, the pioneering initiative sets a benchmark for other industries, potentially encouraging similar technological adoption and fostering a more digital, innovative, and safer industrial landscape.

WIDER IMPLICATIONS:

The successful implementation of a private 5G network by PETRONAS and its group of companies marks a notable transformation in the field of oil and gas, setting a benchmark for the industry. By shifting towards a more digitalised and connected working model, this endeavour could inspire significant improvements in operational efficiency, risk mitigation, and cost savings if replicated globally across other industries, operating in similar conditions.

A crucial milestone achieved with this implementation is the progression towards remote autonomous operations. The ability to have fully unmanned offshore operations presents a groundbreaking possibility within the industry, which could potentially extend to other sectors seeking to automate hazardous tasks. This transition could redefine numerous industries, enhancing safety and efficiency on a large scale.

Alongside the direct industry benefits, the societal implications are far-reaching. The reduction of human transportation to and from these sites due to unmanned operations substantially reduces the carbon footprint associated with these activities. In effect, it aligns with global sustainability goals, making significant strides towards combating climate change.
In essence, while the deployment of the private 5G network offers immediate operational benefits for PETRONAS, the wider implications and future opportunities are substantial. They signify the dawn of a digital revolution in the industry, heralding a future of safer, more efficient, and more sustainable operations. This transformation has the potential to greatly contribute to societal well-being and global sustainability goals, defining a promising future for industries worldwide.

STAKEHOLDERS:

Petroliam Nasional Berhad (Petronas) & Telekom Malaysia Berhad

SOURCES AND FURTHER INFORMATION

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Efficiency through 5G:
The Case of PETRONAS

LEVERAGING 5G TECHNOLOGY FOR REMOTE AUTONOMOUS OPERATIONS

The implementation of 5G technology, particularly the Enhanced Mobile Broadband (eMBB) has been pivotal in achieving PETRONAS' set goals of operational efficiency and safety. This case study explores why these technologies were necessary and why they were considered the best solution for PETRONAS' specific needs.

In comparison to alternative technologies such as LTE or Wi-Fi, 5G eMBB offer superior speed, capacity, and mobility, which enable a high-quality internet access, even in challenging offshore environments.

In the near future, the roles of massive Machine Type Communications (mMTC) and Ultra-Reliable Low Latency Communications (uRLLC) are expected to become increasingly important. mMTC will enable a more extensive range of 5G native Internet of Things (IoT) devices and sensors to be deployed, further enhancing the capabilities and efficiency of remote autonomous operations.

Similarly, uRLLC, which offers low-latency solutions, will be integral to ensuring real-time communication and control for these operations. This characteristic is vital for executing tasks that require instant feedback, allowing quicker decision-making and more efficient operations.

Embracing 5G: A Significant Leap in Connectivity Technologies

5G CONNECTIVITY: A NEW FRONTIER IN OPERATIONAL EFFICIENCY AND INNOVATION

5G, the latest generation of wireless communication technology, holds a distinct position within PETRONAS' digital connectivity strategies. With its faster data speeds, lower latency, and greater capacity, 5G represents a significant leap forward from previous technologies such as 2G, 3G, and 4G LTE. Moreover, as a licensed spectrum technology, 5G offers enhanced reliability and security, thereby ensuring a guaranteed quality of service.

5G is poised to play a critical role in PETRONAS' digital transformation journey. This revolutionary technology is expected to unlock an array of new and innovative applications that require high-speed and low-latency connectivity. Furthermore, it can support the burgeoning demand for mobile data services, especially in densely populated urban areas where network congestion is a considerable challenge.

However, the implementation of 5G does not signal the end for other connectivity technologies like LoRa and Wi-Fi, which continue to play important roles in certain scenarios. As such, while 5G represents a significant milestone, it is one piece of a complex connectivity ecosystem that PETRONAS continues to strategically evolve and optimise.

PETROLIAM NASIONAL BERHAD (PETRONAS) & TELEKOM MALAYSIA BERHAD

Gleaning Insights from Asia Pacific's 5G Approach

LEARNING FROM THE ASIA PACIFIC'S 5G BLUEPRINT: THE CRUCIAL ROLE OF GOVERNMENT SUPPORT

The strategic approach to 5G implementation in the Asia Pacific region provides valuable insights for other regions. A key lesson from the Asia Pacific journey is the pivotal role of government support in establishing the policy landscape for 5G deployment, catering to the needs of both consumers and enterprises.

Governments in the Asia Pacific region have actively championed the development and deployment of 5G and IoT technologies. This commitment has manifested in investment in research and development, the formulation of conducive regulatory frameworks, and the financing of essential infrastructure. These concerted efforts have facilitated a swift and efficient rollout of 5G across the region, paving the way for innovation and growth.

The lessons derived from Asia Pacific's 5G trajectory underscore the vital role of supportive governmental policies and proactive involvement in accelerating the uptake of advanced connectivity technologies. These insights can serve as a strategic blueprint for other regions seeking to build a robust 5G ecosystem and leverage the transformative potential this technology offers.

Future Plans and Expansion Opportunities

CHARTING THE PATH FORWARD: COST-EFFECTIVE EXPANSION AND INNOVATIVE OPPORTUNITIES

With the successful implementation of the private 5G network, PETRONAS is now set to explore the expansion possibilities offered by this digital platform. Recognising the importance of cost-effectiveness in scaling up, the company is committed to finding efficient design solutions to make the 5G network more accessible and advantageous, not just within their existing operations but also extending its benefits across diverse areas of business.

Plans are underway to optimise the network's reach and capacity, enhancing its performance while concurrently reducing the costs associated with its deployment and operation. In addition to this, the introduction of more features tailored to serve the specific needs of the oil and gas industry is being considered. This strategy also takes into account the potential for catering to the requirements of other industries, making the 5G network a versatile platform for a wide array of applications, from remote monitoring and autonomous operations to high-definition video streaming and real-time data analysis.

In shaping its future, PETRONAS aims to reinforce its position as a digital innovator within the oil and gas industry. The company is actively contributing to the broader adoption and development of 5G technology, with its endeavours setting the stage for a new era of industrial operations marked by efficiency, safety, and sustainability.

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The world's most innovative 5G solutions

5G-Enabled factory of the future

ST Engineering

To realise the potential of 5G connectivity to enhance precision and flexibility in smart manufacturing, primarily via AI-driven analytics capabilities, ST Engineering, a global technology, defence and engineering group, has developed Heterogeneous Integration (HI). HIs are composed of several integrated circuits enclosed in one or more chip carrier packages, connected internally by fine wires bonded to the package, that can be stacked vertically or tiled horizontally - capable of delivering optimal 5G connectivity performance in a highly compact footprint and enabling numerous advanced connected solutions smart factory settings.

5G-Enabled factory of the future

CHALLENGE:

Most current manufacturing processes are extremely resource intensive and time consuming, often consisting of operation `islands' and tightly coupled with intensive manual visual inspections, and 24/7 operation is generally not feasible. Prevalent network bandwidth limitations and latency response times, however, place considerable limitations on the ability to automate these processes effectively or to reallocate human duties to connected machines.

SOLUTION:

Autonomous mobile 5G robots are used to seamlessly chain the series of operations required to produce HIs with maximum efficiency. Build-to-print HIs can be ensured that material kitting and tool changing can be constantly serviced, while build-to-spec HIs can be guarded against errors during manufacturing. Machine vision can be used for rapid decisions; computer vision for quality scoring, with video analytics (VA) and machine learning (ML); intelligent automation (IA) for materials orchestration and tool loading without human intervention; and augmented reality (AR) for collaboration and training. Factory and machine sensors can be managed via an IoT platform based on 5G and MEC.

IMPACTS AND STATISTICS:

Intelligent automation (IA) via 5G pivot aims to attain first-pass yield rates of 95% or higher. Waste from the rejection of mishandled processes is greatly reduced via precision robotics. Production throughput stands to increase by threefold, with full machine utilisation and overall equipment effectiveness maintaining at a high level. Manpower can be redeployed towards higher-skill requirements, supported by highly customisable, reconfigurable and connected work cells.

WIDER IMPLICATIONS:

This use case has the potential for adoption beyond manufacturing, with the potential to be applied across healthcare, transportation, and logistics. ST Engineering is also looking into expanding its global footprint, by bringing its 5G-Enabled Lights-Out Factory of the Future to other parts of the region, as well as other ST Engineering business units, which is likely to result in greater efficiencies across their global manufacturing capability.

STAKEHOLDERS:

Government and industry partners

SOURCES AND FURTHER INFORMATION

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Using 5G as an alternative to Wi-Fi in smart factories

5G OFFERS NUMEROUS ADVANTAGES OVER CONVENTIONAL WIRELESS CONNECTIVITY

Wi-Fi is unlicensed and open to interference, and can suffer from congestion issues when large data transfers occur and user numbers increase. It is also prone to creating spaces with weak signal strengths that cannot be used for machines requiring constant connectivity, and Wi-Fi repeaters are not reliable as the signal strengths tend to fluctuate. 5G helps achieve the goal of a smart factory:

SMART SENSORS AND VISUAL ANALYTICS

5G will play an essential role in the automation of the highly complex process of Heterogeneous Integration (HI), including traditional PCB manufacturing processes, thereby achieving high reliability and high output efficiency with lights-out operations. To achieve a fully smart and automated factory, ST Engineering needs a high degree of flexibility in its manufacturing processes. This is enabled through wireless workstations, which facilitate easy reconfiguration of dynamic production environments, and future factories will deploy video analytics and intelligent sensors to optimise and orchestrate these end-to-end processes for manufacturing.

DIGITAL TWINS

The added flexibility of digital twinning allows ST Engineering to add and test new features and provide this as a service to customers and suppliers - mapping out their physical assets in a virtual space enables highly customisable products and numerous other ways to add value. Being fully connected, these digital twins enhance real-time interaction between internal and external parties.

INTELLIGENT ROBOTICS

ST Engineering's vision is to transform its current manufacturing into an Industry 4.0 facility with an advanced 5G network, they continue to implement intelligent sensors that capture workflows, and autonomous mobile robots (AMR) to manage facilities across two different sites.

AR/VR

Mixed reality technologies like AR/VR are an example of the transformation made possible by 5G to help realtime communication become seamless, easier and more effective. This supports advanced training and remote technical assistance as well as collaboration between staff to improve factory automation and planning decisions. In ST Engineering's journey towards Industry 4.0, it aims to be the first to achieve a fully autonomous (i.e. unmanned onsite) factory within the region.

Enabling automated robotics and inspection

5G ACCELERATES MOBILITY AND REDUCES ERROR

FROM MANUAL INSPECTION TO FULLY AUTOMATED INSPECTION

The plant is currently semi-automated, with workstations like visual inspection, material handling and component reading done manually.

A.I. cameras can be used to detect defects in HIs. The very small size of HI structures present significant challenges for manual inspections - the process is both time-consuming and labour-intensive.

With visual analytics, the inspection of HIs becomes much faster and more accurate, while deploying of AI-assisted automation also greatly reduces manual work and human error.

FROM HAND CARRY TO AUTONOMOUS MOBILITY ROBOT

Materials are often carried by hand from one workstation to another so the introduction of AMRs will greatly assist in the transportation of goods in the plant, which will be critical in a dynamic manufacturing environment.

Achieving higher quality and greater consistency

THE FOUNDATIONS OF CONTINUOUS AND CONSISTENT PRODUCTION

CONTINUOUS PRODUCTION AS A CONTINGENCY

Tight labour supply has always made hiring operators and technicians difficult. This lack of labour and skill has been made even more severe by the covid pandemic, affecting production. With fully automated processes, ST Engineering can become less reliant on manpower.

HIGH CONSISTENCY AND QUALITY OUTPUT

- With the implementation, ST Engineering hopes to achieve higher productivity of 50% with increased automation
- There are also other intangible outcomes from this implementation, e.g. ST Engineering will also train and upskill operators to perform higher-value tasks such as fleet monitoring and basic analytics for early prevention and intervention in the breakdown of machinery

Solution offers major advantages to other businesses

The project has shown a number of applications that can be applied to other organisations:

- Optimise efficiency and quality with AI/ML and analytics
- Automation of processes with robots for improved productivity
- Contactless remote operation as a contingency during lockdown or disruptions
- Managing tight labour supply and aging workforces
- Improved customer satisfaction

Future plans

ONLY THE BEGINNING FOR INDUSTRIAL 5G

Enhancement of digital twin model

The digital twin model can be developed to simulate a real-time factory setup for various different requirements – it will be extended to serve needs not only within the organisation, but also those of customers, to help ST Engineering better understand and interact with the people their products serve.

AR glasses to support future collaboration

AR smart glasses also open opportunities for closer collaboration with overseas manufacturers and customers, helping to increase customer acquisition and retention. Through more complex yet flexible manufacturing processes, ST Engineering can engage with customers earlier to design and simulate products, allowing them to visualise and dynamically reconfigure the manufacturing plant and processes accordingly.

"ST Engineering can engage with customers earlier to design and simulate products, allowing them to visualise and dynamically reconfigure the manufacturing plant and processes accordingly"

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Enabling seamless connectivity at large-scale consumer events with Singtel standalone 5G network

Singtel

As smartphones advance in capability, consumers increasingly use them to watch live sports, other events, as well as produce and stream high-definition content across online platforms from anywhere.

Enabling seamless connectivity at large-scale consumer events with Singtel standalone 5G network

CHALLENGE:

In the case of sporting events, like F1 and World Cup, hundreds of thousands of people can be there in person. As spectators try to stream footage of the event at the same time, this can put a strain on the network and leading to video buffering.

SOLUTION

Anticipating these needs, Singtel invested in 5G infrastructure and capabilities to deliver seamless connectivity to consumers, especially in high participation activities like global sporting events by leveraging network slicing which creates a logically separated, self-contained slice of the network, offering differentiated service performance with prioritised assurance on speed, latency, and reliability.

WIDER IMPLICATIONS:

Singtel sees the provisioning of network slices for streaming live events as the first step towards a 5G network that supports multiple logical networks with different configurations to suit the traffic characteristics of different applications and provide service level assurances for a wide range of industrial and government applications.

Providing seamless connectivity at large scale events

Singtel, a leading telco in Asia, has invested heavily in 5G infrastructure and in 2022, achieved 95% 5G standalone outdoor coverage, three years ahead of regulatory targets. Since the nationwide deployment, Singtel has been working on exploiting the technology for commercial use, namely in network slicing.

Network slicing enables multiple virtual networks to be created, with efficient usage and management of the network resources to provide differentiated services at scale. Each “slice” or portion of the network can be tailored to the specific needs of the application or use case.

As well as enabling operators to provide a differentiated experience, network slicing enables them to better manage the network resources and tailor the connectivity precisely to the use case.

This was successfully applied to deliver smooth mobile video streaming for two major international sporting events in the second half of 2022: the Formula 1 Singapore Grand Prix and the FIFA World Cup Qatar 2022. More than 300,000 spectators attended the Formula 1 Singapore Grand Prix in October 2022 with many simultaneously accessing their mobile network for general usage, uploading content and livestreaming the event on various digital platforms, causing network congestion and inconsistent connectivity. Broadcasters relying on mobile networks will also have to compete with the spectators for bandwidth.

It is business-critical for broadcasters to deliver every second of the event or viewers at home and around the world will have a poor viewing experience and miss out on critical moments.

But with network slicing, Singtel was able to deliver consistent seamless connectivity ensuring no one missed the action at these events.

In addition to the two major international sporting events, Singtel applied network slicing at the 2022 New Year countdown, enabling a smooth live broadcast of the event as well live streaming by the audience, so that everyone enjoyed a pleasant viewing experience.

By partitioning its 5G standalone network, Singtel was able to grant specific customers priority usage to radio resources. This ensures a lag-free mobile streaming experience in crowded areas, differentiating Singtel’s offering from other broadcasters providing the same content.

Airing the show via a reliable mobile network that can guarantee high throughput and low latency performance ensures that viewers do not miss any of key moments.

Ensuring consistent high-speed connectivity for best user experience

Singtel leverages network slicing through its nationwide 5G SA coverage in Singapore. By allocating 10% of its network with radio resource partitioning for its 5G subscribers and broadcasters, users of Singtel Cast, Singtel TV Go and its other online streaming platforms enjoyed uninterrupted mobile streaming of the Formula 1 Singapore Grand Prix, even at high traffic areas of the Marina Bay Street Circuit.

The dynamic nature of radio resource partitioning also allowed the sharing of dedicated radio resources when not fully utilised by other 5G customers at the event. This means that underutilised bandwidth could be channelled to other users who may need it, such as the broadcasters, thus avoiding a waste of radio resources.

This ensures its subscribers have priority usage of radio resources anywhere on the island and can even tap into underutilised bandwidth by other 5G customers. The solution requires users to minimally have a 5G SA handset (3GPP Release-15), 5G SIM and 5G subscription to be entitled for the event slice.

Further advantages of 5G and network slicing

With network slicing, Singtel is able to offer new innovative services to its customers in Singapore. It can be applied to diverse use cases in the consumer segment such as AR/VR, TV/media for sports event streaming and cloud gaming. It can also offer a complete end-to-end security slice, starting from the mobile device - securing the entire connectivity and application.

Singtel's 5G network with edge cloud and network slicing capabilities can also support real-time computing, data storage, data analytics and AI services at the edge – bringing to life more mission-critical enterprise applications where the need for a timely response and swift message broadcast is critical for business operations, such as automated quality inspection in factories, connected self-driving vehicles, video-assisted remote operations, smart cities, and applications for Industry 4.0.

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5G Delivers Smoother Travel in Bangkok

Krung Thep Aphiwat Central Terminal Station

Krung Thep Aphiwat Central Terminal Station has deployed a private 5G network, supported by edge compute, to improve operational efficiency, safety and security, and enhance the passenger experience. For example, the 5G network is supporting customer service robots, automated wheelchairs and real-time image recognition to enhance safety and security.

true

5G Delivers Smoother Travel in Bangkok

CHALLENGE:

Serving hundreds of thousands of passengers daily, the new station needed reliable high capacity wireless connectivity both to support its operations and to enable travellers to easily access information and entertainment services. Conventional wireless networks couldn't meet the station's latency and security requirements – the stakeholders didn't want to transmit confidential local data over the Internet.

SOLUTION

True says the station's 5G network, which is supported by edge compute, enables high-definition video streaming, robotics, artificial intelligence, and location-based automated wheelchair services. For example, the 5G-based security and safety system captures video images from more than 120 cameras to proactively detect emergencies, incidents, and security threats, leading to prompt responses and improved passenger and staff safety. Image recognition software is used to detect suspicious objects that pose a risk to passengers and property, while the system can send alarm signals to notify authorities to provide assistance or stop trains in case of emergencies.

IMPACTS AND STATISTICS:

The new 5G network provides coverage throughout Krung Thep Aphiwat Central Terminal Station, which is more than three times larger than old Bangkok station of Hua Lamphong at nearly 300,000 square meters. From January 2023, regional rail services, involving 56 trains a day, switched from Hua Lamphong to Krung Thep Aphiwat Central Terminal Station. Built between 2013 and 2019 with a budget of 34.14 billion baht (about US$1 billion), the new station has 24 platforms – compared with Hua Lamphong's 14 – and capacity to serve more than 600,000 passengers daily.

WIDER IMPLICATIONS:

Thailand's Ministry of Transport is aiming to develop Krung Thep Aphiwat Central Terminal Station into a transportation hub equivalent to the world's leading railway stations and a central axis for travel, encompassing all modes of transport, including land, water, and air. The focus is on providing convenient, fast, and safe services to the public, facilitating travel to every destination. To that end, the ministry recognises the potential of 5G to efficiently enhance public services, and benefit citizens and Thailand as a whole.

STAKEHOLDERS:

Krung Thep Aphiwat Central Terminal Station, Ministry of Transport, Office of the National Digital Economy and Society Commission, True Corporation Plc.

SOURCES AND FURTHER INFORMATION

https://truebusiness.truecorp.co.th/en/home

KRUNG THEP APHIWAT CENTRAL TERMINAL STATION

Dedicated 5G Delivers Smoother Travel in Bangkok

5G PROVIDES HIGH-SPEED, LOW LATENCY COVERAGE ACROSS A NEW 300,000 SQUARE METER STATION

A dedicated 5G network is helping Krung Thep Aphiwat Central Terminal Station serve hundreds of thousands of passengers every day. Deployed by mobile operator True, the 5G network underpins the Smart Station Pilot Project, which aims to enhance the overall efficiency, connectivity and passenger experience within this major new transport hub.

True says the 5G network, which is supported by edge compute, delivers high-speed, low-latency connectivity, enabling seamless data exchange and coordination among different transport systems, optimising resource allocation, minimising downtime, improving overall productivity and leading to smoother passenger flows. In particular, the 5G connectivity is supporting high-definition video streaming, robotics, artificial intelligence and location-based automated wheelchair services.

The new 5G network provides coverage throughout the 300,000 square meters of Krung Thep Aphiwat Central Terminal Station, which is more than three times larger than the old Bangkok station of Hua Lamphong. From January 2023, regional rail services, involving 56 trains a day, switched from Hua Lamphong to Krung Thep Aphiwat Central Terminal Station. Built between 2013 and 2019 with a budget of 34.14 billion baht (about US$1 billion), the new station has 24 platforms – compared with Hua Lamphong's 14 – and capacity to serve more than 600,000 passengers daily.

Following the installation of 5G, travellers are greeted by connected service robots that can communicate in both Thai and English. The robots can provide passengers with travel information, recommendations on attractions, and basic assistance, such as guiding them to the right platform if they lose their way. They can also alert their human colleagues when extra help if needed.

With 5G coverage throughout the station, passengers can use their handsets to access high-speed internet, communication services, and entertainment options. They can take advantage of personalised information, interactive maps, and real-time updates on schedules, delays, and other relevant travel information. True says this enhanced passenger experience contributes to increased customer satisfaction and loyalty.

Krung Thep Aphiwat Central Terminal Station is also equipped with 5G-connected wheelchairs, designed to transport infirm passengers around the station. Disabled and elderly passengers can choose an automatic wheelchair that will automatically move to the target area, after the user specifies a destination. It can then return to the home or another service point. Alternatively, users can choose a semi-automatic wheelchair, which suggests a route to the chosen destination, but the user controls the travel themselves.

The station's 5G network enhances safety and security by enabling real-time monitoring and video surveillance. It is designed to proactively detect emergencies, incidents, and security threats, leading to prompt responses and improved passenger and staff safety. The security system uses 5G to capture video from more than 120 security cameras, which are monitored via artificial intelligence. The system can issue alerts in real-time, so staff can rush to help passengers in the event of an emergency or if they stray into dangerous zones. For example, the system can detect individuals walking on the yellow warning lines or falling onto the track and then send real-time alerts to the station staff. Image recognition software is used to detect suspicious objects that pose a risk to passengers and property, while the system can send alarm signals to call for assistance or to stop trains in case of emergencies.

More broadly, True notes the Smart Station Pilot Project is creating new experiences and learning opportunities for the public through the widespread use of 5G technology, while showcasing Thailand's technological capabilities.

5G delivers a step change in capabilities

The deployment of a dedicated 5G network was the optimum way to meet Krung Thep Aphiwat Central Terminal Station's connectivity needs, according to True. Manat Manavutiveth, CEO of True, says that 5G's advanced capabilities enable seamless integration of smart sensors, cameras, and other devices throughout the transportation hub. "In comparison to alternatives, such as previous generations of cellular networks or Wi-Fi, 5G stands out due to its unmatched speed, capacity, reliability, and suitability for supporting a wide range of advanced applications and services," he adds. "It provides the necessary foundation to fully leverage the potential of emerging technologies and ensure a seamless, connected, and technologically advanced transportation hub."

To ensure reliable coverage of 5G signals throughout the station, True and its partners had to manage network congestion, optimise signal propagation in the relatively high-frequency 2600 MHz band, and deliver seamless handover between 5G cells.

Compared to unlicensed technologies, such as LoRa, Sigfox, and Wi-Fi 6, which operate in specific frequency bands and have a relatively short range, 5G provides broader coverage and supports more diverse use cases. Unlicensed technologies are typically suitable for applications with lower data requirements and shorter-range connectivity, while 5G is designed to deliver high-speed, low-latency connectivity across a wide range of applications and industries, according to True.

By providing cloud computing capabilities and an IT service environment at the edge of the cellular network, the station's edge compute capacity is designed to lower latency and protect privacy by keeping passenger data local: the station's 5G wireless devices can access their related servers in the local data centre. True notes that traditional 4G networks cannot provide adequate latency and security for accessing confidential local data over the Internet.

KRUNG THEP APHIWAT CENTRAL TERMINAL STATION

A future proof platform for broader collaboration

As 5G technology is designed to be highly-scalable, it is well-suited to accommodating increasing data demands, emerging services, and evolving customer needs, enabling Bangkok's new smart station to continue to meet the changing needs of passengers, and remain at the forefront of technological advances in the transportation sector. Future enhancements may involve deploying additional small cells and improving network density, to ensure comprehensive coverage within the station and its surrounding areas.

The Smart Station Pilot Project is intended to foster collaboration among various industry stakeholders, including transportation companies, technology providers, start-ups, and research institutions, to drive innovation, co-create new services, and enhance the overall ecosystem within the transportation industry. "Overall, adopting the solution at the 5G Smart Station provides businesses in the transportation industry with opportunities to enhance operations, improve customer experience, access innovative technologies, foster collaborations, and future-proof their services," explains Manat Manavutiveth. "It enables them to stay competitive, attract more customers, and drive growth in an increasingly digital and connected world."

A future proof platform for broader collaboration

With the 5G network in place, the station can collaborate with third parties to offer new services, such as e-commerce integration, smart parking solutions or mobility-as-a-service platforms. True notes that the Smart Station Pilot Project could be integrated with other urban infrastructure and services through collaborations with local government agencies and stakeholders to implement smart transportation systems, smart energy management, and intelligent public safety solutions. By becoming a key component of a smart city ecosystem, the station would contribute to the overall sustainability and efficiency of Bangkok.

Thailand's Ministry of Transport is aiming to develop Krung Thep Aphiwat Central Terminal Station into a transportation hub equivalent to the world's leading railway stations and a central axis for travel, encompassing all modes of transportation, including land, water, and air. The focus is on providing convenient, fast, and safe services to the public, facilitating travel to every destination. The ministry recognises the potential of 5G technology to efficiently enhance public services, and benefit citizens and Thailand as a whole.

A future proof platform for broader collaboration

Indeed, Bangkok's Smart Station Pilot Project is a good example of how governments in the Asia Pacific region are collaborating with industry stakeholders to create an enabling environment for 5G development. Indeed, the region "has witnessed successful public-private partnerships in deploying 5G networks and driving use case development. These partnerships leverage the strengths and resources of both public and private sectors to accelerate 5G adoption," True notes.

There is also potential for Krung Thep Aphiwat Central Terminal Station to explore partnerships and collaborations with international transportation hubs and networks to provide seamless travel experiences for passengers traveling between different countries, while facilitating international connectivity and cross-border collaboration in customs, immigration, and security.

Looking ahead, the station plans to leverage advances in artificial intelligence, blockchain, and edge computing to further optimise its operations, improve passenger experiences, and enhance security and safety measures. "The development of 5G technology in the Asia Pacific region will be characterized by increased network coverage, the emergence of standalone 5G, industry-specific applications, edge computing, digital transformation, and collaboration," concludes Manat Manavutiveth. "These trends will pave the way for transformative changes across industries, driving economic growth, innovation, and improved connectivity experiences for individuals and businesses."

About the GSMA

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at gsma.com

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GSMA 5G Transformation Hub

The GSMA 5G Transformation Hub is a source of information on some of the most innovative 5G solutions in the world. This portal contains case studies detailing design, benefits, key players, measured value and the future impact of scaling up these 5G solutions worldwide. The 5G Era is now firmly established and this family of standardised GSM technologies, including mmWave, are being rolled out successfully across the globe. The GSMA 5G Transformation Hub, launched at MWC Barcelona in 2022, provides details of how 5G is best placed to deliver real value for a range of key sectors including manufacturing, energy, transportation, media and live entertainment, smart cities and construction... Many more case studies will be added, in the coming months, covering even more industries and the GSMA is asking Members to nominate innovative 5G case studies to add to this global digital showcase. The 5G Transformation Hub and this particular Case Study are both sponsored by Qualcomm.

www.gsma.com/5GHub

GSMA APAC 5G Industry Community

Launched at the Mobile 360 Asia Pacific 2021, the APAC 5G Industry Community is a forum for people to learn and advocate 5G benefits to industries and enterprises. The Community has been designed for stakeholders across the value chain including government and agencies, industry associations, mobile network providers, enterprises and industry players, solution providers, analysts, and consultants. It serves as a collaboration platform to support 5G industry innovation, application and business opportunities, and to unlock the power of 5G connectivity so that people, industries and society thrive.

www.gsma.com/asia-pacific/communities/ap5gic/

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