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How 5G is Enabling Connected Industries in APAC



Case studies highlighting the utility and versatility of 5G technologies

June 2024

APAC 5G INDUSTRY COMMUNITY

GSMA

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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



REVOLUTIONIZING INDUSTRIES WITH 5G

The realization of 5G technology is driving a profound shift from a consumer-focused internet economy to an industrial internet economy. This leap from 4G to 5G is far more than a simple upgrade; it's a revolution. By enabling rapid digital transformation and integrating advanced technologies like mobile edge computing, cloud computing, digital twins and AI, 5G is reshaping the economic landscape and unlocking unprecedented opportunities for industries.

5G will create massive value for all industries. According to the GSMA's Mobile Economy Asia Pacific 2024 report, 5G is expected to add almost $130 billion to the Asia Pacific economy in 2030, with the manufacturing industry forecast to benefit the most, driven by new 5G-enabed applications including smart factories, smart-grids, and IoT-enabled products.[1] In Asia, the number of enterprises using private mobile networks increased by 28% between 2022 to 2023.[2]

In the Asia-Pacific region, the development of 5GtoB is advancing at an unprecedented pace. We are witnessing large-scale deployment across sectors such as healthcare, mining, oil and gas, and manufacturing. Notably, the evolution of 5G in this region is accelerating from isolated applications to comprehensive systems, and from supporting roles to core production capabilities.

Huawei has been at the forefront of this transformation, collaborating with leading operators in Asia-Pacific to harness the power of 5G technology. Together, we have pioneered several industry benchmark projects featured in this case study booklet. In Thailand, our partnership with the government and operators led to the formation of the Thailand 5G Alliance, promoting the 5G ecosystem and positioning the country as a digital leader in ASEAN. Alongside True in Thailand, we established ASEAN's first 5G smart hospital, Siriraj, where 5G-enabled ambulances have improved patient survival rates and AI-assisted diagnostics have lowered the average time for pathology image diagnoses from 15 minutes to 25 seconds.

In collaboration with AIS, we launched the world's first 5G autonomous driving mining project, SCG, which has liberated miners from harsh working environments and enhanced their well-being. It has also improved safety in the workplace and increased operational efficiency by over 20%. In Hong Kong, our partnership with China Mobile Hong Kong resulted in the development of Asia-Pacific's first 5G smart airport as 5G offers broader coverage than Wi-Fi technology, making it suitable for large areas. It ensures seamless handover between different indoor, outdoor, and tunnel areas, providing uninterrupted connectivity throughout the airport premises. In Malaysia, together with TM, we created the region's first 5G smart oil and gas project, enabling remote operations of offshore platforms.

We hope that these success stories will provide valuable references for governments, enterprises, ecosystem partners and industry owners in the Asia-Pacific region and allow them to better plan and deploy 5G technologies, accelerate digital transformation, and jointly build a smarter society. Huawei will continue to work with partners to promote the wide application of 5G and contribute to the digital development of this dynamic region.

[1] GSMA Intelligence, *The Mobile Economy Asia Pacific 2024, p.20,* https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/asiapacific/

[2] GSA, *Private Mobile Networks,* February 2024, p.12, Table 1.

James Zhang

CMO of ICT,
Huawei Asia Pacific

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Next-Gen Manufacturing: Pioneering the 5G Revolution in APAC

Seamless Integration and Innovation with AIS, Huawei, and China Unicom | 5G Technology | Thailand

Midea Thailand's innovative 5G deployment, enabled by partnerships with AIS, Huawei, and China Unicom, has revolutionized manufacturing through digitalization. This collaboration has facilitated the establishment of Thailand's first commercial private 5G network across three Midea factories, driving operational efficiency and productivity.

Midea

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Clients/partners involved in this 5G deployment

In the innovative deployment of 5G technology at Midea Thailand, several key partners collaborate to revolutionize manufacturing practices through digitalization. AIS, serving as the 5G network provider, alongside Huawei as the network technology provider, and China Unicom acting as the IT and technology integrator, have all played crucial roles. This partnership has facilitated the creation of Thailand's first commercial dedicated private 5G network across three Midea factories, covering over 160,000 square meters. This project, which is at the forefront of leveraging 5G for industrial automation and efficiency, is currently fully operational and demonstrating significant advancements in manufacturing processes.

Overview/Introduction

The 5G network at Midea Thailand represents a sophisticated private network tailored for modern manufacturing. It prioritizes performance, security, and scalability to support a fully connected factory environment. Unlike public networks, this private setup uses a dedicated spectrum to manage network traffic efficiently and includes a Private User Plane Function (UPF) with Multi-access Edge Computing (MEC) on-site. This architecture reduces latency and enhances responsiveness, critical for real-time manufacturing operations like automated guided vehicles (AGV) and AI-driven robotic arms.

The network is engineered for high uplink capacities and features ultra-low latency essential for real-time control systems. Robust security measures ensure that all internal communications and data flows are secure, protecting sensitive operational data and maintaining the integrity of manufacturing processes.



MIDEA THAILAND

Next-Gen Manufacturing: Pioneering the 5G Revolution in APAC

CHALLENGE:

The deployment of a dedicated 5G network at Midea Thailand's factories was driven by several significant challenges that needed innovative solutions to enhance operational efficiency and meet ambitious business goals. The project encompassed three factory buildings, covering over 160,000 square meters, where traditional network solutions couldn't meet the necessary bandwidth and latency for advanced manufacturing. Achieving consistent and reliable connectivity across this vast area was crucial for integrating 5G-enabled systems and IoT devices seamlessly.

The timeline for deploying the network was exceptionally tight, with only one month available to install the 5G Radio and User Plane Function (UPF). This rapid rollout was essential to minimize downtime and enhance operational efficiency swiftly. The project's innovative aspect also posed challenges, as it was the first commercial application of a fully connected 5G factory in Thailand, requiring the team to adapt proven solutions to the local manufacturing context.

OBJECTIVES

The primary objective of integrating a dedicated 5G network into Midea Thailand's operations was to catalyze a transformative shift towards full digitalization and intelligent manufacturing, aligning with the company's broader strategic goals. The objectives were multifaceted, focusing on enhancing operational efficiency by leveraging the high bandwidth and ultra-low latency of 5G to speed up data transmission, improve IoT device responsiveness, and enable real-time analytics. This was expected to reduce machine downtime, optimize production timelines, and enhance factory throughput. Another goal was to innovate manufacturing processes by integrating cutting-edge technologies such as AI-driven robotic arms, automated guided vehicles (AGVs), and advanced AI inspection systems, facilitated by seamless communication enabled by 5G.

By successfully implementing this project, Midea aimed to position itself as a leader in 5G adoption in manufacturing, setting a regional benchmark that would not only enhance its reputation as an innovator but also encourage other companies to explore similar technologies, thereby driving industrial growth in the region. Through these objectives, the 5G deployment at Midea Thailand aimed to transform its operations and inspire the manufacturing sector towards a new era of digital and intelligent production.

SOLUTION:

The solution to the operational challenges at Midea Thailand involved strategically implementing a dedicated 5G private network, meticulously customized to meet the specific needs of the company's expansive factory operations. The decision to adopt this network was driven by the necessity for a tailored solution that could support advanced manufacturing technologies with high bandwidth, ultra-low latency, and robust security. The implementation included setting up a dedicated Private User Plane Function (UPF) with Multi-access Edge Computing (MEC) at the factory sites, allowing for local data processing and efficient traffic management. This setup covered all three factory buildings, ensuring comprehensive connectivity and attention to the network's high uplink capacity to handle the substantial data volume from IoT devices and machinery.

This project marked a significant technological advancement as the first commercial application of a fully connected 5G factory in . Thailand. The use of a private UPF and MEC in a manufacturing setup was a pioneering move in the region, showcasing several innovative aspects. The network was also designed to be highly scalable, facilitating future expansions and integrations with minimal disruptions. This foresight ensures that Midea's network infrastructure will remain relevant and efficient as new technologies and manufacturing processes are developed, laying the groundwork for future innovations and improvements in manufacturing efficiency and security.

SOURCES AND FURTHER INFORMATION

Please visit
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Achievements/Significance

The implementation of a dedicated 5G network at Midea Thailand's manufacturing facilities has marked significant achievements, showcasing the transformative effects of advanced connectivity on industrial operations. This technology has dramatically enhanced operational efficiency, reduced costs, and spurred innovation in manufacturing processes. Utilizing the 5G private network, Midea Thailand achieved a 15-20% increase in operational efficiency across its manufacturing operations.

The network's ultra-low latency and high bandwidth enabled real-time data processing and faster communication between devices, streamlining production processes and reducing machine downtime. This efficiency boost also led to substantial cost savings, particularly through the integration of AI-driven technologies like robotic arms and automated guided vehicles (AGVs), which allowed for more precise and faster handling of materials.

This precision significantly reduced waste and the need for costly repairs or adjustments, cutting operational costs by approximately 22%. Additionally, the 5G AI inspection systems increased the first-pass yield rate by 4%, reducing defects and reworks. This not only saved costs but also enhanced the brand's reputation for quality.





LESSONS LEARNED

The deployment of a dedicated 5G network at Midea Thailand has provided valuable insights and lessons. The project illustrated the critical importance of cross-functional collaboration among stakeholders including network providers, technology suppliers, and internal teams.

The effective partnership between AIS, Huawei, China Unicom, and Midea Thailand was crucial for overcoming challenges during the deployment, underscoring the importance of communication and collaborative problem-solving. Customization and scalability emerged as essential factors; the network was specifically tailored to meet the operational needs of Midea's extensive production facilities, demonstrating the necessity for flexible and scalable network solutions that can adapt to industry demands.

The project also highlighted the challenges and potential of rapid deployment. Meeting the ambitious deployment schedule required meticulous planning and resource allocation, suggesting future projects might benefit from phased implementations to allow for adjustments without disrupting operations.



CONCLUSION

This case study illustrates the transformative impact of specific technological enhancements, such as high-bandwidth and ultra-low-latency communications, which have significantly improved operational efficiency, reduced costs, and spurred innovation. The collaboration among Midea Thailand, AIS, Huawei, and China Unicom exemplifies the strength of partnerships in technological transformation. The network was deployed successfully within a stringent one-month timeline, enhancing production efficiency by 15-20%, and notably improving product quality and consistency.

Looking ahead, the project's success paves the way for broader applications of 5G technology in manufacturing. The scalability of the network ensures it can accommodate future technological advancements and operational expansions. Ongoing efforts will focus on enhancing network performance and exploring new functionalities, such as advanced AI and robotics, which promise to drive further industry transformation.

"Compared with other technologies, 5G is the only technology allowing network coverage over 160,000 sq.m. covering three production plants. Looking ahead, AIS remains committed to driving innovation and assisting global manufacturers to replicate their smart factory setup in Thailand."

– Mr.Phupa Akavipat

Acting Chief Enterprise Business Officer at Advanced Info Service Plc.(AIS)

ABOUT AIS BUSINESS

AIS Business, the enterprise arm of AIS, aims to level up the operations to a new business standard and become the "Cognitive Tech-Co," providing a comprehensive digital infrastructure, innovative technology solutions and digital platform for businesses in various industries, from large enterprises to SMEs, working side by side with customers as the trusted smart digital partner to enable and accelerate value-for-money digital transformation.
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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

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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.



SIAM CEMENT GROUP

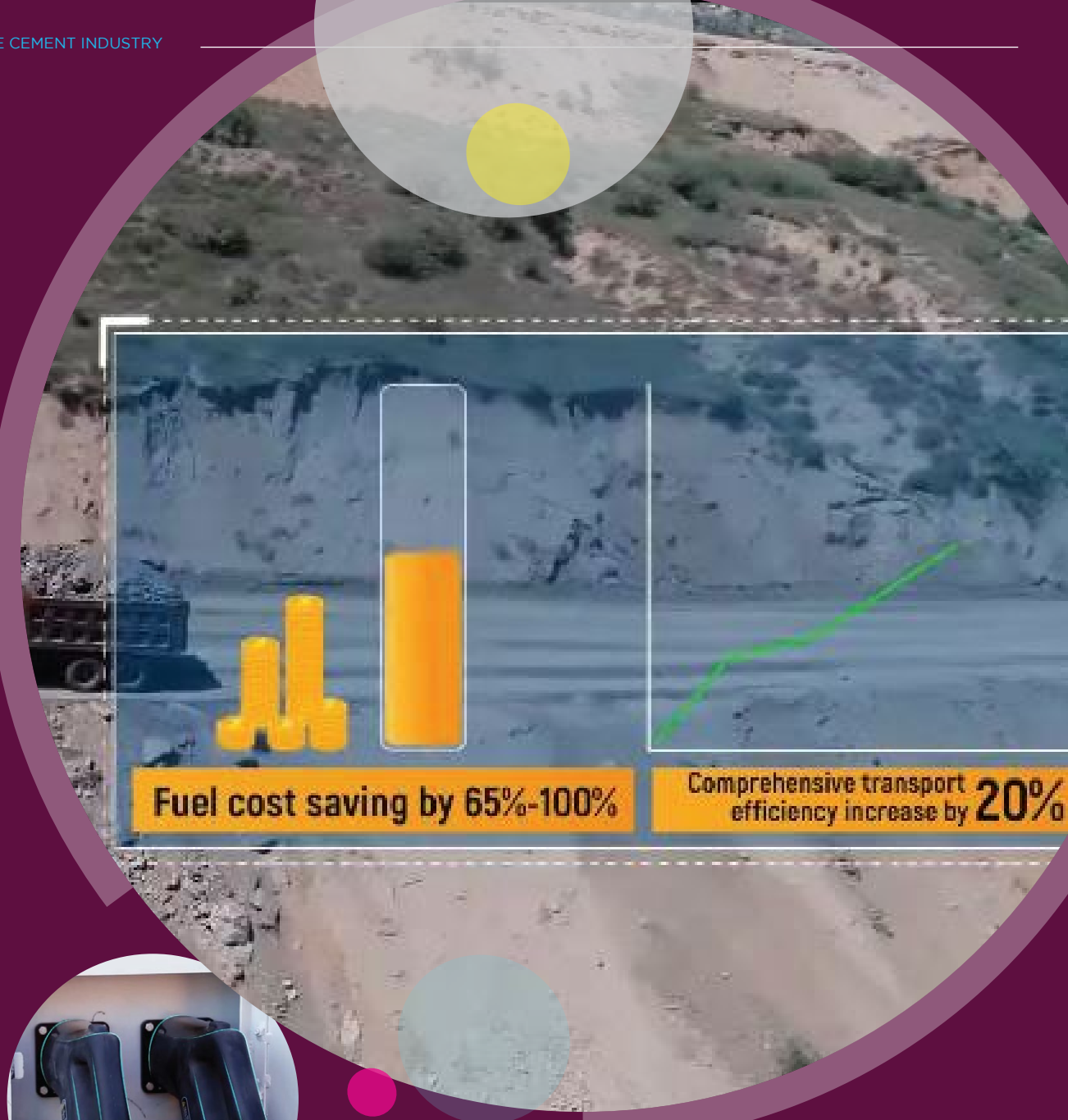
Rising Demand for 5G in Asia Pacific

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.



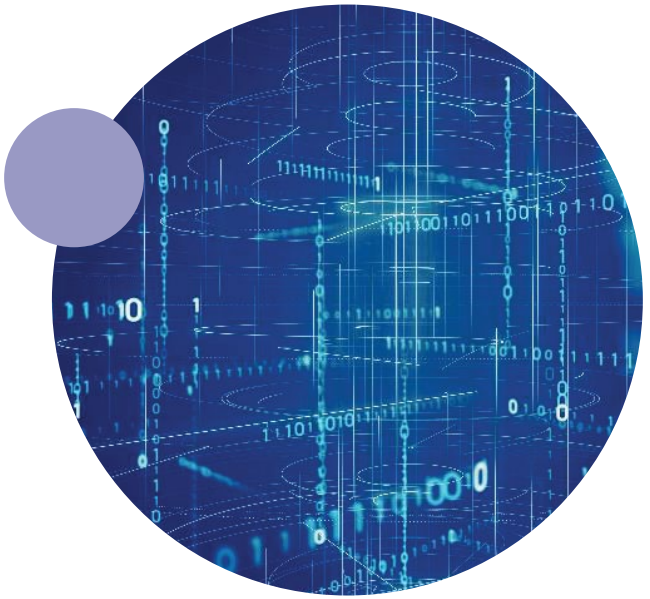
The Future of 5G in Asia Pacific

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

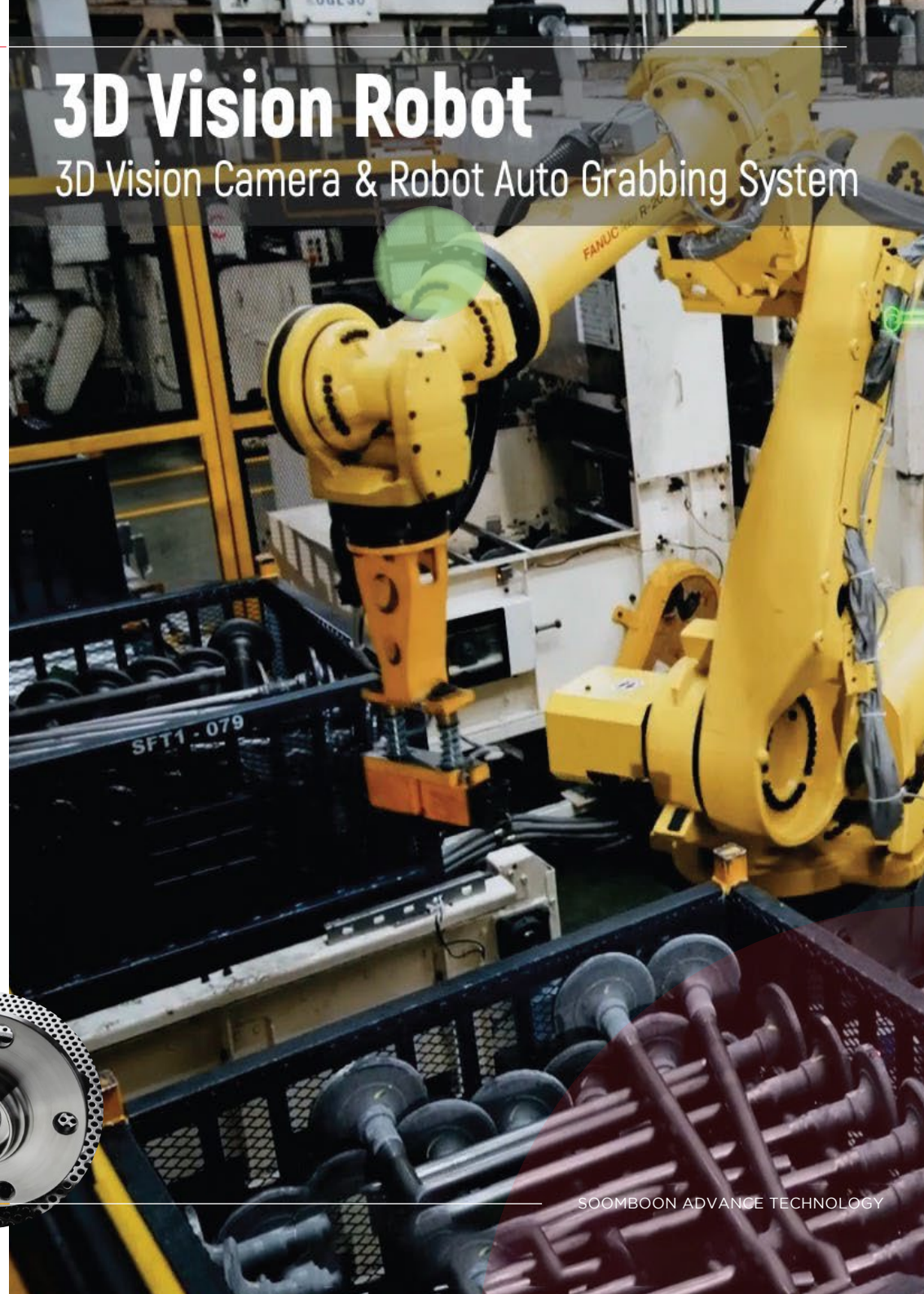
From manual inspection to fully automated inspection

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

Johnson Zhang
Managing Director
China Mobile Hong Kong Company Limited
johnsonzhang@hk.chinamobile.com

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

Dr NG Ping-chung
Senior Vice President,
pc.ng@pccw.com

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.



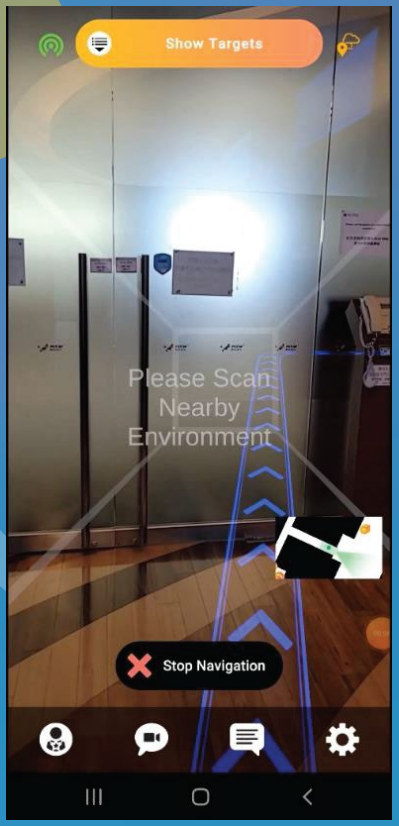
The Industry-wide Appeal of the Innovative Field Service Solution

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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How 5G is enabling Smart Hospitals

HKT and CUHKMC harness 5G for remote consultations, remote training and tele-medicine

In Hong Kong, CUHK Medical Centre (CUHKMC) is using HKT's high throughput and low latency 5G to support innovative medical applications, such as remote consultation, remote training, tele-medicine, and potentially treatment guided by augmented reality (AR) services. HKT has built full 5G coverage across the entire CUHKMC hospital, which has 28 operating rooms, 49 consultation rooms and 516 beds for in-patients.

HKT 香港中文大學醫院 CUHK Medical Centre

How 5G can **boost industrial productivity**

CASE STUDY LEAD: **HKT**

CHALLENGE

In cases where patients need specialist advice and help, front-line medics have historically referred them to an expert in the relevant field of medicine for both consultations and treatment, such as surgery. In-person consultations and operations with specialists can take time to arrange, delaying treatment, and can be expensive. Similarly, in-person training of medics can be both expensive and time-consuming.

SOLUTION

CUHKMC operating theatres are fully covered with 5G, which is used to transmit multiple 4K video streams of the surgery as well as images captured by medical equipment, such as an endoscope. Viewed on a mobile device or PC, these visuals can help the remote specialist provide expert opinion on the surgery. Leveraging 5G connectivity, CUHKMC can also provide a virtual follow-up consultation for patients, reducing the need for them to revisit the hospital. At the same time, the 5G connectivity is used to enable remote clinical training for medical students and to support international medical conferences.

IMPACT & STATISTICS

According to mobile operator HKT, its 5G network is able to support speeds of over 1Gbps with latency of less than 10ms. Such connections are fast and responsive enough to support very high quality 4K video, 3D imaging, virtual reality (VR), AR and multi-camera views, thereby providing a fully immersive experience for remote clinicians and students. For example, 5G can transfer 4K ultra high definition medical videos and images, such as those obtained from operating theatres and endoscopy centres, for real-time review by remote specialist clinicians.







WIDER IMPLICATIONS

Reliable high-speed 5G connectivity could transform healthcare by enabling smart hospitals to improve the patient journey and overall operational efficiency. As 5G connectivity could support a wide array of smart hospital applications such as remote consultation (doctor-to-doctor), remote training (doctor-to-student) and telemedicine (doctor-to-patient), resources in the hospital can be optimised and patients can receive the best possible care.

STAKEHOLDERS

CUHK Medical Centre (CUHKMC) and HKT

SOURCES & FURTHER INFORMATION

Dr. Henry Wong, Head of Wireless Strategic Development, HKT
Mr. Michael Fung, Chief Information Officer, CUHKMC

How 5G is Enabling Smart Hospitals

HKT and CUHKMC harness 5G for remote consultations, remote training and tele-medicine

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In Hong Kong, CUHK Medical Centre (CUHKMC) is using HKT's high throughput and low latency 5G to support innovative medical applications, such as remote consultation, remote training, tele-medicine, and treatments guided by AR services. HKT has built full 5G coverage across the entire CUHKMC hospital. Wholly owned by The Chinese University of Hong Kong, CUHKMC has 28 operating rooms, 49 consultation rooms and 516 beds for in-patients.

CUHKMC is using 5G technology to speed up consultation, diagnosis and treatment. In cases where patients need specialist advice and help, front-line medics have historically referred them to an expert in the relevant field of medicine. Such referrals can take time to arrange, delaying treatment. Now, CUHKMC is using 5G to enable real-time remote consultation with specialists, eliminating the need for a separate appointment. An on-site doctor can promptly seek a second opinion from a remote specialist, thereby speeding up critical decision-making.

"Through the innovative use of 5G technology to support a wide array of smart hospital applications such as remote consultation (doctor-to-doctor), remote training (doctor-to-student) and telemedicine (doctor-to-patient), resources in the hospital can be optimised and patients can receive the best possible care," explains Tom Chan, Managing Director of Commercial Group of HKT. "5G also supports other innovative applications such as the Internet of Medical Things (IoMT) and robotics to better serve the Hong Kong public."



Supporting surgery and **follow-up consultations**

CUHKMC operating theatres are fully covered with 5G, which is used to transmit multiple 4K video streams of the surgery as well as images captured by medical equipment, such as an endoscope. Where appropriate, multiple video streams are combined into a single view to give the remote clinician an immersive experience of the surgery. Viewed on a mobile device or PC, these visuals can help the remote specialist provide expert opinion on the surgery.

Leveraging 5G connectivity, CUHKMC can provide virtual follow-up consultation for patients, reducing the need for them to revisit the hospital. The quality of diagnosis can be further improved by harnessing the IoMT. For example, a connected blood pressure monitor could track the progress of recovering patients, both in the hospital and after discharge.



Keeping staff and students **connected**

At the same time, the 5G network ensures reliable connectivity for CUHKMC staff and devices, such as cameras, iPads and medical equipment in operating theatres, endoscopy rooms, patient wards, and the multi-function auditorium, which is used as a training venue for broadcasting live streams of medical procedures. The 5G connectivity is also used to enable remote clinical training for medical students and to support international medical conferences hosted by CUHKMC, with participants physically located in the Greater Bay Area and overseas.

In the face of COVID-19, 5G's capacity for transmitting videos and images to auditorium and students' mobile devices helps ensure the continuance of large-scale clinical training and seminars even during a pandemic outbreak. It can even broadcast high-definition footage of surgical processes to global medical conferences, further strengthening the international standing of Hong Kong's healthcare industry.





Harnessing AR in healthcare

5G infrastructure is also used to support very bandwidth-intensive applications, such as AR and VR services. Today, clinicians use two-dimensional multi-slice images, such as those from a CT scan, to make a diagnosis; in future, 5G could offer them a three-dimensional model of scan results.

Through a 5G-connected headset, such as a HoloLens, medics will be able to view a detailed 3D model of the scan from multiple angles. Even bi-directional communication between two HoloLens is possible, allowing clinicians to simultaneously view and annotate on the same 3D model. In clinical training, a 3D model can be a very useful tool for professors giving lectures to medical students.

"The focus of our smart hospital is to improve the patient journey by delivering optimal treatment and enhancing medical safety," said Dr. Fung Hong, Chief Executive Officer of CUHKMC. "Through our partnership with HKT on 5G technology and applications, the digital transformation of CUHKMC is accelerated, thus improving the overall effectiveness and efficiency of the hospital."

> The focus of our smart hospital is to improve the patient journey by delivering optimal treatment and enhancing medical safety,
>
> **Dr. Fung Hong** - Chief Executive Officer of CUHKMC

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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

Anuar M Isa
Principal Engineer, Telecommunication, PETRONAS

M Razzif Farazan Ali
Staff Engineer, Telecommunication, PETRONAS

Nor Hisham Md Nordin
GM Mobile & Wireless, TM One.

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.



GSMA

GSMA 5G TRANSFORMATION HUB

The world's most innovative 5G solutions

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



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."



KRUNG THEP APHIWAT CENTRAL TERMINAL STATION



GSMA 5G TRANSFORMATION HUB
The world's most innovative 5G solutions

How 5G is Transforming Healthcare

The introduction of 5G has improved the survival rate of emergency patients

Thai mobile operator True and Huawei have deployed a standalone 5G network and mobile edge computing (MEC) to enable Siriraj Hospital in Bangkok to dramatically improve the efficiency and effectiveness of healthcare. The 5G connectivity is being used in conjunction with artificial intelligence to accelerate a range of medical processes, including emergency interventions and pathological diagnosis.



How 5G is Transforming Healthcare

CASE STUDY LEAD: **TRUE AND HUAWEI**

CHALLENGE

In Thailand and many other countries, an aging population means healthcare systems are under strain. Moreover, medical resources are unevenly distributed – this is especially true in rural areas, where there are less than two doctors for every 10,000 people. In emergency situations, people need to be treated as fast as possible - one-third of critically ill patients die in an ambulance on the way to a hospital.

SOLUTION

5G connectivity is being used to relay information about a patient travelling in an ambulance to medics in the hospital so they can prepare ahead of the patient's arrival at the emergency room. It can also be used to enable remote consultations with experts to provide real-time and comprehensive first aid treatment. Further, 5G connectivity within the hospital is enabling the emergency department to closely monitor in-patients' conditions and alert physicians, as necessary. The hospital is also employing 5G and artificial intelligence to improve pathological diagnosis systems.

IMPACT & STATISTICS

Since the 5G technology was put into use in late 2021, the survival rate of emergency patients has been greatly improved, according to Visit Vamvanij, Director of Siriraj Hospital, Thailand's largest public hospital. "Saving time means saving lives," he told the Xinhua news service in March 2022. "As soon as the patient arrives at the hospital, everybody knows what to do." Moreover, the introduction of AI has lowered the average time taken to obtain pathological diagnoses results from 15 minutes to 25 seconds per case.

WIDER IMPLICATIONS

The Siriraj 5G Smart Hospital project could serve as a blueprint for more smart hospitals in Thailand and elsewhere. Over time, the 5G-enabled processes being implemented in Siriraj Hospital could be deployed more widely, helping to address the pain points in the Thai healthcare system. As well as reducing the number of deaths in ambulances, the solution could help healthcare providers serve many more people.

STAKEHOLDERS

True, Huawei, Siriraj Hospital in Bangkok

SOURCES & FURTHER INFORMATION



How 5G is Transforming Healthcare

The introduction of 5G has improved the survival rate of emergency patients

Thai mobile operator True and Huawei have deployed a standalone 5G network and edge computing to enable Siriraj Hospital in Bangkok to dramatically improve the efficiency and effectiveness of healthcare.

The 5G is being used to relay real-time information about a patient travelling in an ambulance to medics in the hospital so they can prepare ahead of the patient's arrival at the emergency room. That information could include vital signs, video images and medical records.

Since the 5G technology was deployed in late 2021, the survival rate of emergency patients has been greatly improved, according to Visit Vamvanij, Director of Siriraj Hospital, Thailand's largest public hospital. "Saving time means saving lives," he told the Xinhua news service in March 2022. "As soon as the patient arrives at the hospital, everybody knows what to do."

The 5G connectivity on board the ambulance can also be used to enable remote consultations with experts to provide real-time and comprehensive first aid treatment. That's very important because one-third of critically-ill patients die in an ambulance on the way to the hospital, according to Prof. Dr. Prasit Watanapa, Dean of the Faculty of Medicine for Siriraj Hospital at Mahidol University. "5G-connected ambulances provide timely emergency treatment based on 5G HD cameras and AR (augmented reality) glasses," Dr. Watanapa told Huawei's Lighting Up the Future summit at MWC 2022 in Barcelona in February 2022.

The 5G connectivity within the hospital also provides the emergency department with an advanced system to closely monitor in-patients' conditions and alert physicians, as necessary. "In the hospital you have a smart ER (emergency room), with 5G mobile trolleys making mobile ward rounds, and conducting consultation and examination," Dr. Watanapa told the summit.

> 5G-connected ambulances provide timely emergency treatment based on 5G HD cameras and AR (augmented reality) glasses

Dr. Prasit Watanapa - Dean of the Faculty of Medicine for Siriraj Hospital at Mahidol University





Siriraj Hospital is also using 5G connectivity to help it harness artificial intelligence (AI) to achieve further improvements in patient outcomes. For example, the introduction of AI has seen the time take to deliver pathological diagnoses results fall from 15 minutes to 25 seconds per case, Dr. Watanapa told the Xinhua news service. The high-speed 5G connectivity can also be used to provide remote surgery instruction via real-time HD and AR displays, he explained at the summit. “And post-hospital, we have 5G-connected remote consultation, which can be done at home or in a local community hospital.”

Patients with chronic conditions, such as diabetes, could also benefit from the digitisation of healthcare. By drawing on the data collected by 5G-connected devices, AI could support the monitoring, assessment and notification for patients with non-communicable diseases. Dr. Watanapa notes that connected wearable devices, such as smart watches, can facilitate the collection of health data and healthcare analytics.

Integrated into a hybrid public-private 5G network, Siriraj Hospital’s new edge facility enables hospital staff to also use 5G to access the on-site data centre directly without exposing potentially sensitive data traffic to a public network. “Cloud computing makes information storage and sharing easier. Big data helps doctors and management make better decisions,” Dr. Watanapa told the Huawei Summit at MWC. “And AI improves the speed, efficiency and precision of medical imaging. So new ICT technologies are making healthcare more intelligent, convenient and efficient.”

> In the hospital you have a smart ER (emergency room), with 5G mobile trolleys making mobile ward rounds, and conducting consultation and examination. And post-hospital, we have 5G-connected remote consultation, which can be done at home or in a local community hospital.

Dr. Prasit Watanapa - Dean of the Faculty of Medicine for Siriraj Hospital at Mahidol University



Exploring many **more 5G applications**

The Faculty of Medicine Siriraj Hospital, Mahidol University and Huawei have established a Joint Innovation Lab to incubate innovative 5G applications. It expects to research and develop 30 5G medical applications in 2022. These will include using a blockchain for electronic health records – a solution that is designed to enable high-speed access and entry of patients' data – and a smart system to optimise pharmacy inventory and supply chain management.

Moreover, Siriraj Hospital is trialing the use of 5G to enable unmanned vehicles to support logistics. Equipped with 5G, a self-driving car can deliver medicines and medical equipment from the pharmaceutical department to other hospital buildings. True says the combination of 5G and edge compute enables the vehicles to operate automatically or be controlled and monitored via secure, low latency connectivity. Siriraj Hospital is also piloting 5G portable medical boxes, 5G medical carts and 5G smart hospital beds.

Crucially, 5G has the bandwidth and responsiveness to support audio-visual communications in 4K resolution, enabling clear medical and remote and online consultation. "5G made this a reality as it provides a high-speed network with low latency, which increases the overall efficiency of data transfers, patient monitoring, data collection and analytics, as well as remote medical care, " Dr. Watanapa told the Xinhua news service.

Huawei says that 5G technology will optimise healthcare experience for both providers and patients by an unprecedented level of connectivity, while boosting the precision and efficiency of medical treatment. Thailand claims to have the best 5G coverage of the 10 countries in ASEAN (the Association of Southeast Asian Nations).

> 5G made this a reality as it provides a high-speed network with low latency, which increases the overall efficiency of data transfers, patient monitoring, data collection and analytics, as well as remote medical care

Dr. Prasit Watanapa - Dean of the Faculty of Medicine for Siriraj Hospital at Mahidol University





Helping Thailand **cope with rising healthcare costs**

The Siriraj 5G Smart Hospital project, which has been in development since mid-2020, is backed by the National Broadcasting and Telecommunications Commission (NBTC) and the government's Thailand 4.0 initiative to digitally transform the country, one objective of which is "high value healthcare".

Since 2019, Thailand's healthcare costs have exceeded its per capita GDP growth, according to YCP Solidiance, an Asia-focused management consulting firm[1]. Total household healthcare expenditure had significantly grown from 359 billion baht in 2015 to 436 billion baht (US$11.9 billion) in 2019, as the prevalence and severity of chronic diseases is growing along with the elderly population. Thailand has insufficient hospitals to manage the health needs of the country's population, according to YCP Solidiance, which says Thailand has 2.1 hospital beds per 1,000 people, compared with the global average of 2.7.

In his speech at the Summit at MWC, Dr. Watanapa described how the Covid-19 pandemic has sped up the digital transformation of healthcare, spurring greater adoption of wearables, audio visual communication, cloud computing, big data management and AI-assisted medical imaging. "We're going to provide new experiences, a new model, and new operations by using the new technologies, the 5G, the AI, the Internet of Things and also the edge clouds," he said. "We put a lot of effort in doing research in order to improve the effectiveness and the efficiency of healthcare system in the country."

The combination of multi-access edge computing and 5G private networks provides high security and a better network experience, Dr. Watanapa added, noting the potential to "connect virtually everyone and everything together including machine objects and devices, together with the use of cloud technology and artificial intelligence."

The combination of multi-access edge computing and 5G private networks provides high security and a better network experience, Dr. Watanapa added, noting the potential to "connect virtually everyone and everything together including machine objects and devices, together with the use of cloud technology and artificial intelligence."

[3] Source: https://ycpsolidiance.com/white-paper/the-future-of-smart-hospitals-in-thailand

Over time, the smart hospital solution being implemented in Siriraj Hospital could be deployed more widely, helping to address the pain points in the Thai health-care system. “We want to make Siriraj 5G smart hospital a model for the healthcare sector, so as to drive the digital transformation of the entire health industry in Thailand, even in the ASEAN region,” Abel Deng, CEO of Huawei Technologies (Thailand), told the Xinhua news service.

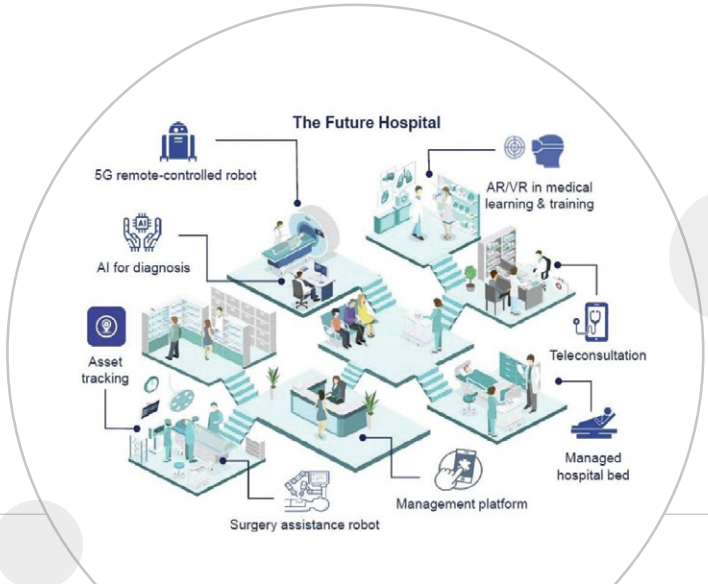
As well as reducing the number of deaths in ambulances, the solution is intended to enable healthcare providers to reach adn serve more people. Today, medical resources are unevenly distributed – this is especially true in rural areas, where there are less than two doctors for every 10,000 people.

“The 5G Siriraj Hospital vision is to improve social well being and enhance the productivity and efficiency in healthcare services,” Dr. Watanapa told the summit at MWC Barcelona. He expects the Siriraj 5G Smart Hospital project to “serve as a model for upgrading Thailand’s public health industry in the future.”

The government of Thailand intends to invest a substantial amount in IT, starting with 50 billion baht (US$1.4 billion) this year, the figure will go up to 1,000 billion baht within 10 years (US$27.4 billion), Dr. Watanapa added. He is looking forward to the “rising prosperity brought by connectivity and digital technologies in the future. Our collaboration between other faculty or medicinal hospital and Huawei will enhance and upgrade the services of the hospital. ... we’ll be able to expand to cover other ASEAN countries and ultimately to enhance the quality of healthcare system in this region of the world.”

The 5G Siriraj Hospital vision is to improve social well being and enhance the productivity and efficiency in healthcare services.

Dr. Prasit Watanapa - Dean of the Faculty of Medicine for Siriraj Hospital at Mahidol University



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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