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5G Revolution: Transforming Connected Industries in APAC

Eight case studies showcasing the versatility and impact of 5G technologies

September 2024

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FOREWORD

From 2022 onwards, the Asia-Pacific region has seen a surge in 5G technology deployment, a strategic move expected to revolutionize connectivity and spearhead economic resilience and growth. 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.[1]

In partnership with the GSMA Greater China region, we have curated a collection of case studies from various sectors—including manufacturing, logistics, healthcare, maritime, firefighting, and scientific research—that showcase the significant transformations driven by 5G technology. Each case highlights not only improvements in operational efficiency and safety but also the development of new value chains and service models in industries vital to both regional and global economies.

As these stories unfold, it becomes clear that 5G is more than just an upgrade; it is a crucial enabler of the next digital era. It enhances a wide range of sectors, from emergency services and maritime operations in Hong Kong to advanced manufacturing in Thailand and Malaysia, as well as logistics in Indonesia and healthcare in Singapore. With investments increasing to support a comprehensive 5G rollout, the potential for significant economic impact is becoming increasingly attainable.

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

Julian Gorman
Head of APAC, GSMA

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EXECUTIVE SUMMARY

This collection of case studies showcases the transformative impact of 5G technology across various industries in the Asia-Pacific region. These examples demonstrate that 5G is not just enhancing existing capabilities but fundamentally reshaping industrial landscapes.

The deployment of 5G has led to significant advancements in multiple sectors. In Hong Kong, it has improved operational efficiency in maritime communications and enhanced safety and response times in firefighting operations. In Macau, 5G has elevated user experience and efficiency in scientific research. In Singapore, it is transforming healthcare by increasing surgical precision and improving patient outcomes. In Indonesia, 5G enhances warehouse operations through automated systems, digital twin simulations, automated guided vehicles (AGVs), and AI-powered CCTV. Lastly, in Thailand and Malaysia, it drives digital transformation in manufacturing, achieving remarkable levels of automation and efficiency.

Each narrative showcases the essential role of collaboration among telecom operators, technology providers, and industrial sectors, demonstrating that the successful deployment of 5G technology relies on multi-stakeholder partnerships. These collaborations are crucial for overcoming the complexities of 5G deployment and maximizing its potential benefits.

As 5G infrastructure continues to expand, its capacity to empower industries and transform business models increases, converting challenges into opportunities for innovation and economic growth. The case studies presented offer a forward-looking view of how 5G technology is paving the way for a more connected and efficient future, underscoring its significant impact on economic development in the Asia-Pacific region and beyond.

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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

AIS, Huawei, and China Unicom have deployed Thailand's first commercial dedicated private 5G network at Midea Thailand, revolutionizing manufacturing practices. This state-of-the-art network enhances operational efficiency, integrates AI-driven robotics, and supports Industry 4.0, setting a benchmark for technological innovation in manufacturing.

AIS Business 5G
Your Trusted Smart Digital Partner

Midea

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 180,000 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.

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

Challenges

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 180,000 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 **https://www.ais.th/en/business** Or email us at **business@ais.co.th**

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 30%. 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.

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.
https://www.ais.th/en/business

"The future of manufacturing is here with 5G technology, and it's reshaping how we think about production efficiency and innovation. Our project with Midea Thailand is just the beginning."

"Embracing 5G was not just a technological upgrade for us; it was a strategic transformation essential for our leadership in the global market. We look forward to continuing our journey of innovation with our valued partners."

— Mr.Phupa Akavipat, *Acting Chief Enterprise Business Officer, Advanced Info Service Plc. (AIS)*

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Reshaping Industries: APAC's 5G Revolution in Manufacturing and Smart Cities

AIS and its partners revolutionize manufacturing and smart city infrastructure in Thailand using advanced 5G technology

AIS, NECTEC, and ARV have deployed 5G technology in Thailand's Wangchan Valley, driving innovation in manufacturing and smart city infrastructure. This initiative supports Industry 4.0 practices, enhances global competitiveness, and fosters technological advancements through the 5G AI Autonomous Drone System and Sustainable Manufacturing Center.

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Your Trusted Smart Digital Partner

NECTEC a member of NSTDA

AI AND ROBOTICS VENTURES

Clients/partners involved in this 5G deployment

In the groundbreaking deployment of 5G technology at Wangchan Valley, several key partners collaborate to drive innovation in manufacturing and smart city infrastructure. AIS, the 5G network provider, plays a central role, supported by the National Electronics and Computer Technology Center (NECTEC) and AI and Robotics Ventures (ARV) under PTTEP Group. Located in the Eastern Economic Corridor of Innovation (EECi), Wangchan Valley serves as a Sandbox for fostering new innovations. This initiative, which includes the Sustainable Manufacturing Center (SMC) and the 5G AI AUTONOMOUS INSPECTION UAV WITH SELF-CHARGING STATION (Horrus), is currently operational and advancing towards enhancing global competitiveness and technological leadership.

Innovative 5G Network Deployment at Wangchan Valley

A Comprehensive Overview of AIS's 5G Infrastructure and Capabilities

AIS has established a state-of-the-art 5G Standalone (SA) network architecture in Wangchan Valley, leveraging the 2600 MHz frequency band to support a diverse range of innovative applications. The network incorporates advanced features such as Network Slicing, which allows for tailored network performance for specific use cases, ensuring ultra-low latency and high-speed data transmission. Additionally, a Private Network is utilized to ensure high privacy and security for all operations. The deployment also includes 5G Multi-Access Edge Computing (MEC) to facilitate rapid processing through the network, enhancing efficiency and agility. The AIS Paragon Platform further supports customization of 5G, MEC, and Cloud features, enabling flexible and adaptive network management. This comprehensive 5G infrastructure not only supports autonomous drones and various industrial automation systems but also fosters an environment conducive to research, development, and testing of new technologies, making Wangchan Valley a hub for innovation and technological advancement.

Overcoming Connectivity Challenges in Wangchan Valley

Addressing the Complex Needs of a Dynamic Innovation Hub

The primary challenge in Wangchan Valley was establishing a flexible and comprehensive 5G infrastructure capable of covering the expansive and diverse area. The deployment needed to support aerial robotics ecosystem with pre-planned flight paths that required consistent and reliable network coverage for takeoff, landing, and real-time data transmission. Additionally, the industrial sector's varied network requirements posed significant challenges, such as ensuring low latency and high-speed connections for robotic arms, while maintaining stable network performance for data collection from manufacturing sensors. The integration of various Operational Technology (OT) systems necessitated a highly adaptable network capable of meeting distinct application needs within factories and automated systems. These challenges were critical as they directly impacted the efficiency, productivity, and innovation potential of businesses in Wangchan Valley, ultimately influencing their global competitiveness and ability to adopt Industry 4.0 practices.

Reshaping Industries: APAC's 5G Revolution in Manufacturing and Smart Cities

Driving Technological Advancement with 5G

Objectives of AIS's 5G Deployment in Wangchan Valley

The primary objective of AIS's 5G deployment in Wangchan Valley is to create a comprehensive and flexible network ecosystem that fosters innovation and enhances the competitiveness of Thai enterprises on a global scale. By implementing advanced 5G technology, AIS aims to support the digital transformation of the region's key industries, particularly manufacturing and smart city infrastructure. This involves providing a stable, high-speed, and low-latency network to facilitate the development and testing of new technologies within the Eastern Economic Corridor of Innovation (EECi). Another crucial goal is to ensure that the network can support a wide range of applications, from autonomous drones to industrial automation systems, thereby promoting Industry 4.0 practices. AIS also seeks to drive economic growth by attracting investments and boosting the region's global competitiveness. Ultimately, the deployment aims to establish Wangchan Valley as a leading hub for technological advancement, innovation, and sustainable development, benefiting both the local and broader Asia Pacific region.

Strategic Deployment of 5G Technology in Wangchan Valley

Innovative Solutions to Enhance Connectivity and Automation

AIS's decision to implement a 5G Standalone (SA) network architecture on the 2600 MHz frequency band was driven by the need for a versatile and robust solution to address Wangchan Valley's connectivity challenges. The technology chosen had to support diverse applications, from autonomous drones to industrial automation systems, necessitating features like Network Slicing for customized network performance and 5G Multi-Access Edge Computing (MEC) for rapid data processing. Implementation involved integrating AIS's Paragon Platform to allow flexible customization of 5G, MEC, and Cloud features, ensuring that the network could be tailored to specific client needs. The innovative aspects included the use of an Autonomous Network technology for independent system management, enabling agile research, development, and testing. Additionally, the deployment of a private network ensured high privacy and security, crucial for industrial applications. This strategic and innovative integration of 5G technology not only met the immediate connectivity needs but also positioned Wangchan Valley as a leading hub for technological innovation and Industry 4.0 practices.

Transformative Impact of 5G in Wangchan Valley

Quantifiable Benefits and Strategic Advantages

The implementation of AIS's 5G network in Wangchan Valley has led to significant advancements across multiple sectors. The deployment has enhanced connectivity with ultra-low latency and high-speed internet, crucial for supporting smart manufacturing and industrial automation. Quantitative data indicates a notable improvement in operational efficiency and productivity, driven by the seamless integration of 5G technology in various applications. For instance, the AN AUTONOMOUS INSPECTION UAV WITH SELF-CHARGING STATION , Horrus, has achieved real-time data transmission and 24/7 security surveillance, significantly reducing operational risks and costs. The Sustainable Manufacturing Center (SMC), National Electronics and Computer Technology Center (NECTEC) has reported increased efficiency in connecting automation, robotic solutions, AGVs, and smart farm solutions to 5G, facilitating the transition to Industry 4.0. These technological advancements have not only boosted the global competitiveness of Thai enterprises but have also attracted significant investments, driving economic growth.

Reflections on the 5G Deployment

Key Learnings and Insights from Wangchan Valley

The deployment of 5G technology in Wangchan Valley provided valuable insights and highlighted both successes and areas for improvement. A key lesson learned was the importance of flexibility and adaptability in network infrastructure to meet diverse and evolving needs. The success of integrating 5G with autonomous drones and industrial systems underscored the effectiveness of Network Slicing and MEC in providing tailored solutions with low latency and high-speed performance. However, the project also revealed the challenge of ensuring consistent coverage and connectivity in expansive areas, necessitating ongoing adjustments and enhancements. Collaboration with multiple stakeholders, including government bodies, technology partners, and industry experts, proved vital for overcoming technical and logistical challenges.

Concluding Insights on 5G Deployment

Summary and Future Prospects for Wangchan Valley

The deployment of AIS's 5G technology in Wangchan Valley has successfully addressed critical connectivity challenges, enabling innovative applications in manufacturing and smart city infrastructure. By leveraging advanced features like Network Slicing and MEC, the network provided tailored solutions that enhanced operational efficiency and productivity. The implementation of autonomous drones and industrial automation systems demonstrated significant improvements, reducing operational risks and boosting global competitiveness for Thai enterprises. The collaboration between AIS, NECTEC, and ARV exemplified the power of strategic partnerships in driving technological advancement. This project not only transformed Wangchan Valley into a hub of innovation but also attracted significant investments, fostering economic growth. Looking ahead, AIS aims to continue refining and expanding its 5G solutions, supporting further technological development and digital transformation in the region.

Looking Ahead with 5G

Future Steps and Engagement Opportunities

AIS plans to build on the success of the 5G deployment in Wangchan Valley by expanding its digital infrastructure and developing new solutions tailored to various industries. Future initiatives will focus on integrating 5G technology in healthcare, logistics, and other critical sectors to further enhance productivity and innovation. AIS invites businesses and industry leaders to explore these advancements by contacting our team for more information or to schedule a consultation. Additionally, we encourage interested parties to download our detailed white paper on 5G applications or sign up for upcoming webinars to gain deeper insights into our innovative solutions.

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.
https://www.ais.th/en/business

"The 5G AI AN AUTONOMOUS INSPECTION UAV WITH SELF-CHARGING STATION (Horrus) has achieved significant success and is now being implemented in real-world applications. Wangchan Valley is an ideal location for trials and experimentation, thanks to its special waivers and regulatory relaxations that facilitate scientific tests and innovations in drone technology through the unmanned aerial vehicle (UAV) Regulatory Sandbox."

- Dr. Thana Slanvetpan
General Manager of AI and Robotics Ventures (ARV)

"Digitalization is crucial for establishing a unique business identity. 5G and IoT are key enablers for businesses transitioning to this new realm. AIS, in collaboration with SMC and other strategic and digital technology partners, created the 'Wangchan Valley test bed' in Thailand to help businesses experience and utilize 5G and IoT to enhance innovation, productivity, and sustainability."

- Dr. Panita Pongpaibool,
Deputy Executive Director, National Electronics and Computer Technology Center (NECTEC) and Director of Sustainable Manufacturing Center (SMC)

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5G

5G: Igniting the Digital Transformation in Firefighting

Enhancing Firefighting in Hong Kong with China Mobile's Inertial Navigation and 5G Broadband Communication

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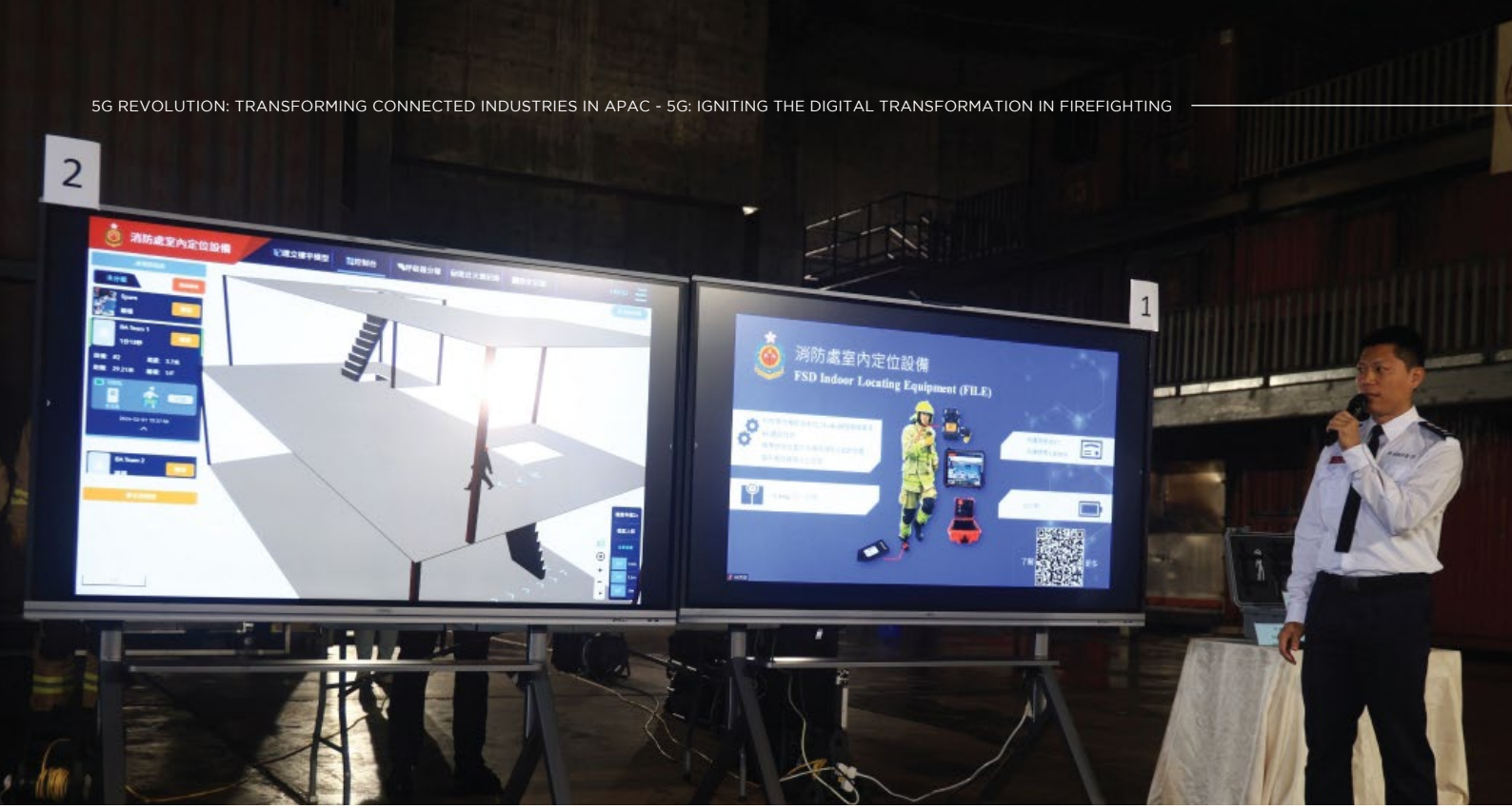
China Mobile Hong Kong (CMHK) partners with the Hong Kong Fire Services Department to enhance firefighting with 5G Inertial Navigation and Broadband Trunking Communication. This deployment improves communication, safety, and efficiency in dense urban environments using the robust 700M frequency band

中國移動
China Mobile



Clients/partners involved in this 5G deployment

In the critical sector of firefighting, China Mobile Hong Kong Company Limited (CMHK) collaborates with the Hong Kong Fire Services Department (HKFSD) to pioneer the implementation of 5G technology in emergency services. Utilizing advanced Inertial Navigation and 5G Broadband Trunking Communication technologies, this partnership aims to enhance firefighting operations within the densely populated urban environment of Hong Kong. This project, which is currently active, focuses on improving the efficiency and safety of firefighters through better communication and precise location tracking during indoor fire scenarios. The deployment showcases a successful integration of 5G in public safety and emergency response, leveraging the robust capabilities of the 700M frequency band and cutting-edge positioning technologies.

Network Architecture and Performance in Smart Firefighting

Optimizing Communication for Enhanced Firefighter Safety with CMHK's Advanced 5G Network

The deployment of China Mobile Hong Kong's (CMHK) 5G technology in firefighting services utilizes a hybrid network approach, combining the robustness of public network capabilities with precise network slicing to cater to specific emergency response needs. This network leverages the 700M frequency band known for its strong penetration abilities, ideal for challenging indoor fire scenarios where conventional communication methods falter due to blocked signals and no satellite coverage. The network's design emphasizes high performance with reliable broadband communication that ensures real-time data transmission from firefighters to command centers. Security is paramount, with stringent measures implemented to safeguard sensitive operational data against potential cyber threats, ensuring that communication remains secure and uninterrupted during critical rescue missions. This sophisticated network infrastructure not only enhances the operational capabilities of the Hong Kong Fire Services Department but also sets a benchmark for future public safety networks

Challenges in Urban Firefighting: Enhancing Communication and Coordination

Addressing Hong Kong's Unique Firefighting Obstacles with Innovative 5G Solutions

Hong Kong's urban environment presents unique challenges for firefighting efforts, primarily due to its extremely high population density and the close proximity of its high-rise buildings. These conditions pose significant obstacles to effective communication and operational coordination during emergencies. Traditionally, firefighters in Hong Kong have relied on walkie-talkies for communication, which are often inadequate in complex and dense urban settings. The internal video feeds and vital information needed by commanders to make strategic decisions frequently fail to reach both frontline and rear commanders, impeding their ability to assess the situation accurately and respond effectively.

These communication challenges are compounded during indoor fire situations where GPS and other conventional tracking technologies fail due to signal obstruction by building materials and smoke, which can also disrupt signal transmission. This inability to track firefighters' precise locations and status in real-time can delay rescue operations, potentially leading to increased danger for the trapped firefighters and hindered emergency response, ultimately affecting the overall safety and efficiency of the operations. This project with CMHK aims to overcome these hurdles by leveraging advanced 5G capabilities to ensure robust and reliable communication and precise location tracking in all firefighting scenarios

5G: Igniting the Digital Transformation in Firefighting

Strategic Objectives for Enhanced Firefighting Operations

Setting Goals for 5G-Enabled Firefighting Innovations in Hong Kong

The primary goal of integrating 5G technology and inertial navigation into Hong Kong's firefighting operations is to substantially improve safety and efficiency during urban fire rescues. This project focuses on establishing a robust and reliable 5G communication network using the 700M frequency band, which allows on-site commanders to maintain real-time contact with firefighters in densely built environments where traditional signals fail. In addition, inertial navigation technology provides precise location tracking of firefighters, overcoming the limitations of GPS in obstructed or indoor settings. By integrating real-time health monitoring, the project swiftly identifies and assists firefighters in distress, enhancing safety. This technological advancement not only addresses immediate operational challenges but also prepares for future developments in public safety and emergency response. Moreover, these technologies are being expanded to various rescue scenarios beyond urban firefighting, broadening the scope and effectiveness of emergency services across Hong Kong.

Advanced Technological Integration for Firefighting Excellence

Implementing Inertial Navigation and 5G Solutions to Transform Firefighting in Hong Kong

The integration of inertial navigation and 5G broadband trunking communication in Hong Kong's firefighting operations was driven by the city's unique challenges, such as dense infrastructure and towering high-rises where traditional technologies often fail. CMHK and HKFSD selected these technologies for their robust performance in environments lacking network coverage and facing physical obstructions. The deployment utilized CMHK's 700M frequency band, ensuring effective penetration in complex indoor settings and maintaining constant communication between commanders and firefighters. This setup incorporated MEMS technology to enhance the portability and functionality of inertial navigation devices, integrating them into firefighters' equipment for better mobility and accuracy. This innovative approach combines advanced tracking and communication, significantly enhancing emergency response effectiveness without increasing the physical burden on firefighters.

Transformative Outcomes: The Impact of 5G on Firefighting in Hong Kong

Enhancing Safety and Efficiency Through Advanced Technology

The collaboration between CMHK and the Hong Kong Fire Services Department (HKFSD) has yielded significant results in enhancing the capabilities of firefighting teams through the integration of 5G technology and inertial navigation. The achievements of this project are impactful as outlined below

Enhanced Communication Efficiency: The implementation of the 700M 5G broadband network has led to improvement in communication reliability during indoor fire rescue operations, ensuring that critical information reaches all team members in real time.

Precision in Navigation: With inertial navigation technologies, the accuracy of locating firefighters within complex environments has improved, reducing the search and rescue times. This precision has been crucial in high-risk scenarios, potentially saving lives by allowing quicker response to firefighters in distress.

Operational Safety Improvements: The real-time health monitoring facilitated by these technologies has decreased the incidence of severe injuries among firefighters, as immediate medical responses can be coordinated as soon as distress signals are detected.

Cost Efficiency: By reducing rescue times and improving safety, the HKFSD has observed a reduction in operational costs related to emergency responses.

Testimonials from HKFSD Officials:

- **IU Pun-yan, HKFSD Divisional Officer:** "The introduction of 5G and inertial navigation technology has revolutionized our approach to firefighting. It has not only enhanced our operational capabilities but also significantly increased the safety of our firefighters."
- **LEE Mun-hoe, HKFSD Assistant Divisional Officer:** "Thanks to this technology, we are now able to conduct rescues more efficiently and with greater precision. This has been a game-changer in our ability to manage indoor fire situations effectively."

These results demonstrate the profound impact that advanced technological integration can have on public safety operations, specifically in environments as challenging as Hong Kong's urban landscape. The project not only showcases significant improvements in operational metrics but also sets a new standard for emergency services worldwide.

Key Learnings from 5G Deployment in Firefighting

Adapting Emergency Response Technologies for Future Challenges

Deploying 5G and inertial navigation in firefighting operations provided pivotal insights:

Successes:

- Enhanced Communication: The 700M frequency band proved effective for reliable communication in complex structures, critical during emergencies.
- Improved Safety: Improved location tracking through inertial navigation significantly sped up response times and increased firefighter safety.

Areas for Improvement:

- Ongoing Adjustments: Continuous updates and technical support are necessary to maintain navigation precision.
- Training Needs: Comprehensive training for all personnel is essential to fully leverage new technologies.
- Scalability Challenges: Adapting technologies to diverse emergency scenarios remains a challenge, emphasizing the need for flexible and scalable solutions.

These learnings highlight the importance of iterative development and training in the effective use of emerging technologies in emergency responses.

Advancing Firefighting: A 5G Revolution in Hong Kong

Concluding Insights on Enhanced Safety and Efficiency through 5G

This case study demonstrated how China Mobile Hong Kong's deployment of 5G technology and inertial navigation has revolutionized firefighting in Hong Kong. By overcoming communication barriers and improving location accuracy, these technologies have significantly enhanced the safety and efficiency of firefighting operations. The successful integration highlights the potential for future applications across other emergency scenarios, ensuring that this innovative approach continues to evolve and expand. Ongoing collaboration with the Hong Kong Fire Services Department will further optimize these solutions, setting new standards in emergency response and public safety.

Next Steps in Firefighting Innovation: Embrace the Future with 5G

Explore Cutting-Edge Safety Enhancements and Strategic Partnerships

We invite all stakeholders interested in the future of public safety and emergency response technologies to engage with us further. To discover more about our pioneering 5G solutions in firefighting, visit our website for detailed case studies, download our latest white papers, or sign up for an upcoming webinar dedicated to 5G applications in emergency services. For direct inquiries or potential collaborations, please contact our dedicated team. Embrace the opportunity to be at the forefront of transforming emergency responses through advanced technology.

"The future of firefighting is here, and it's powered by 5G. We're just scratching the surface of what's possible when we combine cutting-edge technology with critical emergency services."

— IU Pun-yan
HKFSD Divisional Officer.

"Each step forward with 5G brings us closer to a safer, more efficient method of saving lives. We're committed to pushing the boundaries of what emergency services can achieve."

— LEE Mun-hoe
HKFSD Assistant Divisional Officer.

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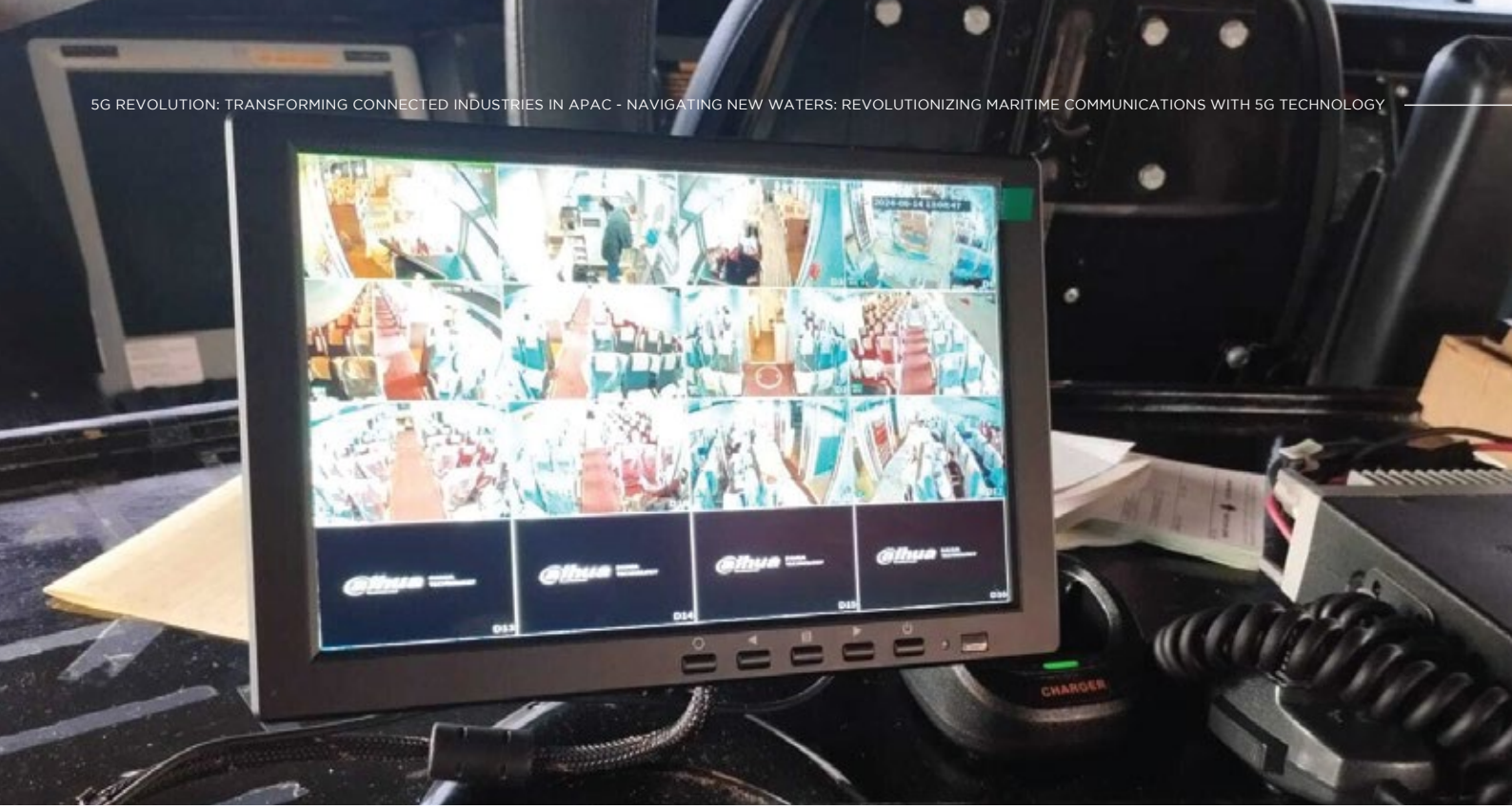
Navigating New Waters: Revolutionizing Maritime Communications with 5G Technology

China Mobile Hong Kong empowers TurboJET with cutting-edge 5G communications, Wi-Fi networks, and CCTV technology

China Mobile Hong Kong (CMHK), in partnership with TurboJET, has revolutionized maritime communications by deploying cutting-edge 5G technology across TurboJET's fleet of high-speed ferries between Hong Kong and Macau. This innovative project enhances digital services on board by integrating 5G communications, Wi-Fi networks, and CCTV technology, addressing the challenges of maintaining stable, high-quality connectivity at sea. CMHK's tailored 5G solutions significantly enhance connectivity, security, and performance, cementing its leadership in maritime technological innovation.

中国移动 China Mobile



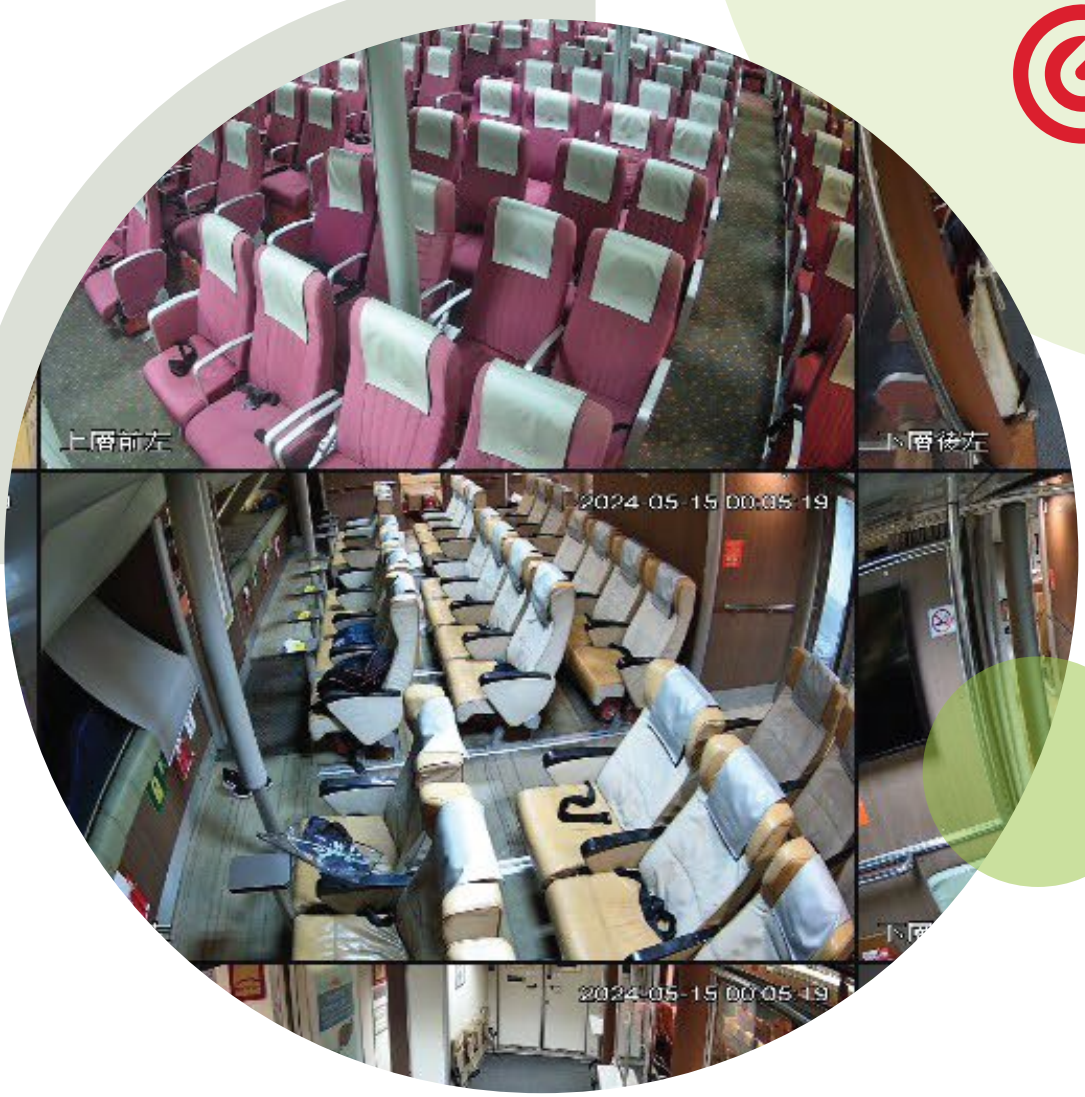
Clients/partners involved in this 5G deployment

In this transformative deployment of 5G technology, China Mobile Hong Kong (CMHK) partners with TurboJET, specializing in high-speed ferry services between Hong Kong and Macau. This project leverages cutting-edge offshore 5G communications, Wi-Fi networks, and CCTV remote monitoring technology to enhance digital transformation efforts for maritime services. The initiative covers TurboJET fleet of 12 high-speed passenger ferries, aiming to significantly improve Internet connectivity and digital services aboard. Currently, this project is actively enhancing maritime communication capabilities and passenger experience across the Greater Bay Area.

Strategic Deployment: Enhancing Maritime Connectivity with Hybrid 5G Networks

Leveraging Advanced Technology for Optimal Performance and Security in Maritime Communications

China Mobile Hong Kong (CMHK) has implemented a hybrid network model to optimize maritime communication solutions for TurboJET ferry services. This network combines public 5G capabilities with specific network slicing to meet the unique demands of maritime environments. The use of low-frequency bands ensures extensive network coverage that extends across the Greater Bay Area, connecting Hong Kong, Macau, and Mainland China. The network is designed to support high-bandwidth applications such as video streaming and large file transfers, crucial for enhancing passenger experience and operational efficiency on board. Moreover, the infrastructure includes advanced security protocols to protect data integrity and ensure stable, reliable communication under various maritime conditions. This strategic approach not only improves connectivity but also bolsters the security and performance of digital services at sea.



Navigating Troubled Waters: Addressing Maritime Communication Challenges

Overcoming Connectivity Barriers for Enhanced Maritime Operations

One of the significant challenges for most cross-boundary maritime transportation operators is maintaining consistent and high-quality Internet connectivity, due to the inherent instability and harsh conditions of the maritime environment. The limitations of satellite communications, characterized by restricted bandwidth and high operational costs, severely hinder the ability to support high-bandwidth applications such as video streaming and large data transfers. As part of its integral commitment to continuously elevating the seamless travel experience, TurboJET endeavors to explore solutions that cater to the growing demand for digital services onboard while simultaneously enhancing overall maritime operations.

Navigating New Waters: Revolutionizing Maritime Communications with 5G Technology

Setting Sail with Ambition: Strategic Objectives for Maritime 5G Connectivity

Harnessing 5G to Propel Maritime Digital Transformation and Global Connectivity

China Mobile Hong Kong (CMHK) has set forth ambitious objectives to revolutionize maritime communications through its 5G deployment with TurboJET. The primary goal is to provide robust global Internet connections that cater to the dynamic and challenging conditions of the maritime environment. CMHK aims to ensure that passengers and crew aboard TurboJET ferries experience stable, high-speed internet access, significantly enhancing the quality of service and passenger satisfaction. This initiative is part of a broader vision to support the digital transformation of maritime operations, promoting more efficient and competitive ferry services. By integrating cutting-edge 5G technology tailored for maritime use, CMHK seeks to not only improve operational efficiencies but also expand its footprint in the global communications market, establishing a new benchmark in maritime digital connectivity.

Charting New Horizons: Implementing Advanced 5G Solutions at Sea

Customizing Maritime Connectivity for Enhanced Digital Transformation

To address the connectivity challenges faced by TurboJET, China Mobile Hong Kong (CMHK) implemented a comprehensive maritime 5G solution tailored to the unique needs of maritime environments. The decision to utilize 5G technology was driven by its high bandwidth and ability to support advanced applications, crucial for improving passenger experience and operational efficiency. CMHK customized the solution by deploying maritime-specific 5G routers equipped with high-gain antennas, ensuring a wide reception range and stable connection even in offshore areas. This innovative approach included automatic antenna switching technology to maintain optimal connectivity amidst the varying conditions at sea. The integration of this technology was meticulously planned to align with TurboJET operational frameworks, thereby transforming the digital landscape of maritime travel within the Greater Bay Area and setting a new standard for maritime communication solutions

Impactful Outcomes of 5G Maritime Solutions

Elevating Maritime Communications to New Heights with Tangible Benefits

The implementation of China Mobile Hong Kong's (CMHK) maritime 5G solutions aboard TurboJET fleet has led to substantial enhancements in connectivity and service quality. This strategic initiative has resulted in a significant reduction in connectivity interruptions, which has improved the overall travel experience for passengers. Notably, the enhanced network capabilities have enabled reliable high-speed internet access, supporting streaming, browsing, and digital transactions seamlessly. These improvements have directly contributed to an increase in customer satisfaction and retention rates. Additionally, TurboJET has seen operational efficiencies through better digital integration, leading to cost savings in maintenance and data management. TurboJET executives have praised the project, noting a marked enhancement in competitive edge and brand reputation in the maritime transport industry, fostering a stronger position in the Greater Bay Area market.

Key Insights from the 5G Maritime Deployment

Learning and Adapting in the Journey Towards Seamless Maritime Connectivity

Throughout the deployment of 5G technology for maritime communications with TurboJET, China Mobile Hong Kong (CMHK) gained valuable insights into both the challenges and triumphs of integrating advanced technology in a complex maritime environment. One significant learning was the importance of customizing technology solutions to withstand the unique physical conditions at sea, such as salt, humidity, and constant motion, which initially posed challenges in maintaining stable connectivity. This experience underscored the need for robust testing and adaptive engineering solutions. Furthermore, the project highlighted the benefits of close collaboration with clients to understand their operational needs and tailor solutions accordingly. As CMHK moves forward, these insights will inform future projects, ensuring that technological deployments are not only innovative but also aligned with the specific needs and conditions of the industries served.

Charting the Future: Concluding Insights on 5G Maritime Solutions

Cementing Technological Advances in Maritime Communications

The partnership between China Mobile Hong Kong (CMHK) and TurboJET has successfully showcased the transformative potential of 5G technology in enhancing maritime communications. This project effectively addressed the significant challenges TurboJET faced, including unstable and insufficient connectivity at sea, by implementing a tailored 5G solution that ensures reliable, high-speed internet access across its fleet. The deployment has not only improved passenger satisfaction through enhanced digital services but also bolstered operational efficiencies, affirming CMHK's role as a leader in technological innovation within the maritime sector. Looking ahead, the insights gained and the successes achieved lay a solid foundation for further innovation. CMHK is poised to continue this trajectory, exploring broader applications of 5G technology to revolutionize maritime operations and other industries, promising a future where digital transformation drives sustained business growth and service excellence.

Exploring New Horizons with CMHK's 5G Solutions

Join Us on the Journey to Next-Generation Maritime Connectivity

As China Mobile Hong Kong (CMHK) continues to lead in the integration of 5G technology across maritime and other industries, we invite you to join us in shaping the future of digital transformation. For those interested in learning more about our pioneering 5G maritime solutions and their impact on industry standards, we encourage you to download our detailed white paper or sign up for our upcoming webinar. These resources provide deeper insights into our technological advancements and strategic initiatives. Furthermore, visit our website to explore further case studies and learn how our innovative solutions can be tailored to meet your specific needs. Let's embark on this journey together to unlock new possibilities in connectivity and digital innovation..

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5G Revolution: Transforming Connected Industries in APAC

Eight case studies showcasing the versatility and impact of 5G technologies

Realizing Smart Cities: CTM's 5G Empowers Macau University of Science and Technology for Innovative Applications

5G private network facilitates advanced planetary magnetic field research

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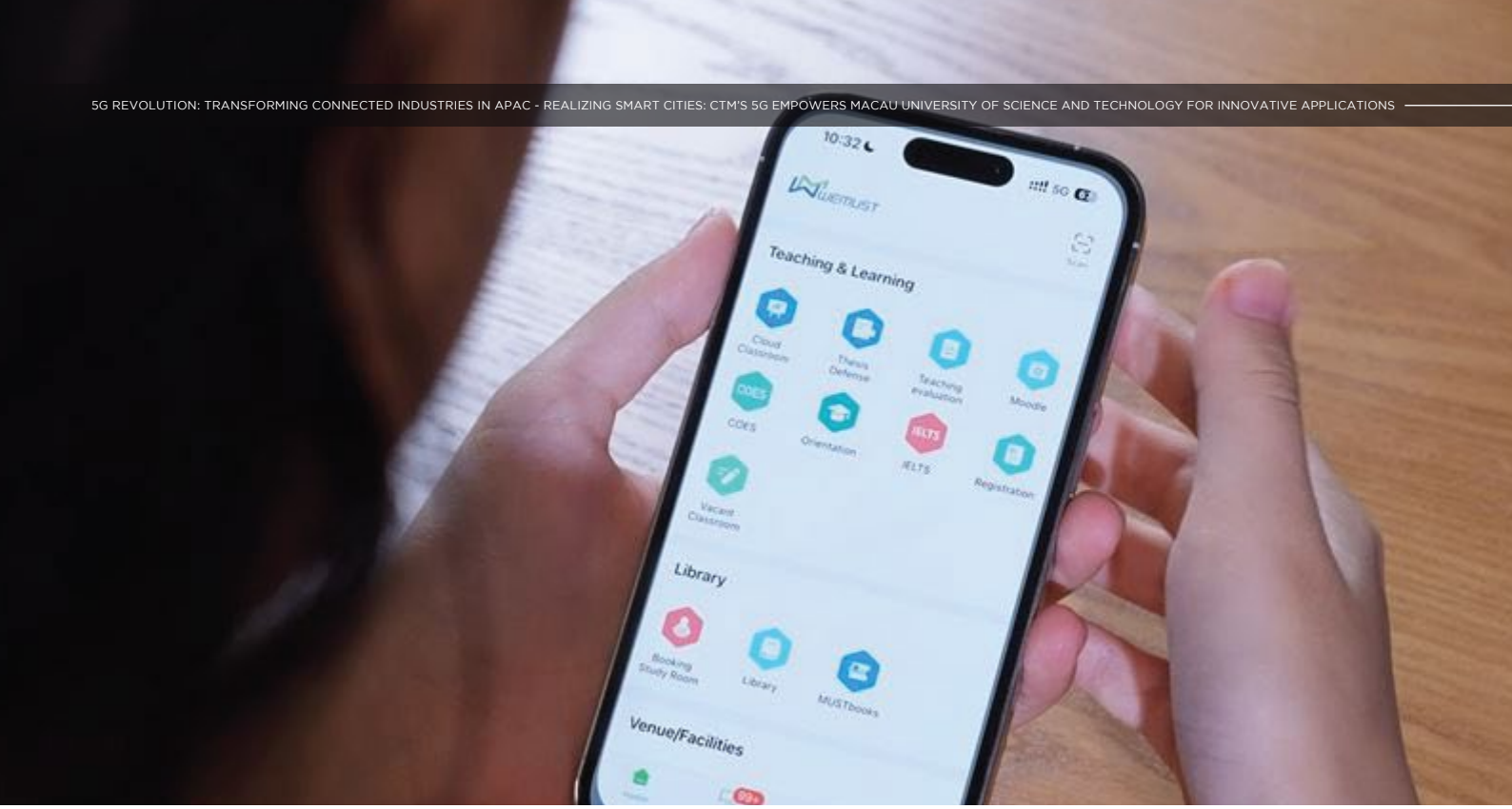
CTM's pioneering 5G deployment at Macau University of Science and Technology (M.U.S.T) has significantly enhanced the university's research capabilities, particularly in planetary magnetic field studies. By implementing a robust 5G private network with advanced 5G+MEC technology, CTM has enabled seamless, secure, and high-speed data access for global collaboration. This network supports the Macau Science Satellite-1 project and has improved user experience, reduced packet loss, and increased research efficiency. Recognized with prestigious awards, this project positions M.U.S.T as a leading research hub and demonstrates the transformative potential of 5G in scientific innovation and smart city development.

CTM 澳門電訊



Clients/partners involved in this 5G deployment

In the pioneering 5G deployment at Macau University of Science and Technology (M.U.S.T), several key partners have come together to enhance scientific research capabilities. The project is jointly organized by the China National Space Administration and the Macau SAR Government, and implemented by the State Key Laboratory of Lunar and Planetary Sciences at M.U.S.T. CTM serves as the 5G network provider, ensuring seamless and secure data access with their 5G private network. This collaboration supports the Macau Science Satellite-1 project, which involves three earth stations in Macau, Xi'an, and Ningbo, China. The project began in 2023 and continues to operate successfully, significantly advancing planetary magnetic field research.

Overview of 5G Network Deployment

CTM's 5G Private Network for Advanced Scientific Research at M.U.S.T

The 5G network deployment at Macau University of Science and Technology (M.U.S.T) utilizes CTM's advanced 5G private network solution. This network adopts the standard NPN (non-public network) solution defined in 3GPP and implements the PNI-NPN mode. The network supports cross-border mobility, including SA, NSA, and international roaming, ensuring global access for users both locally and while roaming. Designed to be evolvable, the CTM 5G private network supports multiple purposes, offers flexible capacity expansion, and allows continuous evolution to meet the diverse service requirements of a smart campus. Security is paramount, with the mobile campus solution built on a 5G+MEC private network, ensuring that critical scientific research data remains within the private network, guaranteeing total information security. The network offers seamless connectivity with password-free access to internal and external networks and direct dual-access to the internet and intranet, providing an excellent user experience with high-speed intranet access anytime and anywhere.

"5G-A IoT spawns new usage scenarios and innovative management models, bringing more possibilities to smart cities, driving efficiency, sustainability and prosperity."

"The convergence of 5G-A IoT and AI/ML in the Asia Pacific region will unlock a new era of connectivity and innovation, transforming industries and moving toward a digital economy and life."

- Hudson Lou,
Director, Network & Service Development

Challenges in Advancing Scientific Research

Overcoming Connectivity and Security Barriers at M.U.S.T

The Macau University of Science and Technology (M.U.S.T) faced several significant challenges in advancing their planetary magnetic field research. Traditional VPN solutions presented complex login processes requiring multiple logins from both internal and external networks, which greatly impacted operational efficiency. Indirect access through the internet led to network congestion during peak hours, resulting in slow and poor user experiences. Additionally, transmitting highly confidential research data through traditional VPNs exposed it to security risks. Limited operational access meant that only designated terminals and locations were permitted to access data and research materials, causing inconvenience for remote researchers. On-campus students enjoyed faster and more reliable access via campus broadband/Wi-Fi compared to off-campus students using slower VPN connections. These challenges hindered the seamless and secure collaboration necessary for global research initiatives, influencing the availability and progress of M.U.S.T's scientific advancements

Realizing Smart Cities: CTM's 5G Empowers Macau University of Science and Technology for Innovative Applications

Objectives of the 5G Network Deployment

Enhancing Research and Connectivity at M.U.S.T

The primary objective of implementing CTM's 5G private network at Macau University of Science and Technology (M.U.S.T) was to significantly enhance the efficiency, security, and accessibility of scientific research data. By deploying a state-of-the-art 5G network, the university aimed to overcome the limitations of traditional VPN solutions, which had posed challenges in terms of complex login processes, network congestion, and security risks. The new network sought to provide seamless and secure data access for researchers, enabling them to collaborate effectively across geographical boundaries. Another key objective was to support the Macau Science Satellite-1 project by ensuring reliable communication and data transmission between the earth stations in Macau, Xi'an, and Ningbo, China. The deployment aimed to create a robust and flexible network infrastructure that could evolve to meet future needs, supporting a diversified smart campus environment.

Innovative 5G Solutions for Research Advancement

CTM's Customized 5G Private Network for M.U.S.T

To address the challenges faced by Macau University of Science and Technology (M.U.S.T), CTM implemented a cutting-edge 5G private network solution. The decision to choose CTM's 5G network was driven by the need for a seamless, secure, and efficient connectivity solution that could support the high demands of planetary magnetic field research. The implementation involved adopting the standard NPN (non-public network) solution defined in 3GPP and integrating the PNI-NPN mode for the "Macau First 5G Campus Anywhere" project. This approach ensured cross-border mobility, supporting SA, NSA, and international roaming, thus enabling global access for researchers. The network was customized to provide flexible capacity expansion and continuous evolution to meet diverse service requirements. An innovative aspect of the technology was the integration of 5G+MEC private network to ensure total information security, allowing critical research data to remain within the private network. This password-free access solution enabled seamless connectivity to both internal and external networks, significantly enhancing the user experience with high-speed intranet access anytime and anywhere.

Achievements and Significance

Impact of CTM's 5G Network on M.U.S.T's Research Capabilities

The implementation of CTM's 5G private network at Macau University of Science and Technology (M.U.S.T) has yielded significant achievements and benefits. The network improved user experience more than tenfold, reduced packet loss rate by 30%, and shortened round-trip delay by 30%. The number of users increased by 350%, demonstrating the network's capacity to support a growing research community. This project facilitated seamless global collaboration, allowing researchers from 18 countries to securely access Macau's data center for processed raw data, thereby advancing planetary science research. The project received prestigious accolades, including the "Best International Application Award" at the 6th "Blooming Cup" 5G Application Competition and the "Innovative Award" at the 2024 AICEP Award. Additionally, during the Mobile World Congress 2024 (MWC) in Barcelona, CTM and Huawei featured the project as a leading example of innovative 5G applications.

Valuable Insights and Key Learnings from the 5G Deployment

Reflections on the Implementation of CTM's 5G Network at Macau University of Science and Technology

The deployment of CTM's 5G private network at Macau University of Science and Technology (M.U.S.T) provided valuable insights and reflections. One key lesson was the importance of integrating advanced network solutions like 5G+MEC to ensure data security and seamless connectivity, which proved critical for high-stakes scientific research. The success of the project highlighted the necessity of flexible and scalable network infrastructure to accommodate evolving research needs and user demands. However, the project also underscored areas for continuous enhancement, such as the need for streamlined processes to manage cross-border data access and the importance of maintaining consistent network performance under varying conditions. The project demonstrated the benefits of adopting innovative technologies and the importance of collaboration among international partners to achieve shared goals. Overall, this experience reinforced CTM's commitment to reflective and adaptive approaches, ensuring continuous enhancement of their technology solutions to meet future challenges and opportunities.

Conclusion of the 5G Network Deployment Case Study

Summarizing the Impact and Future Potential of CTM's 5G Solutions at M.U.S.T

The deployment of CTM's 5G private network at Macau University of Science and Technology (M.U.S.T) successfully addressed critical challenges in data security, connectivity, and research efficiency. By integrating advanced 5G+MEC technology, CTM provided a seamless and secure network that significantly enhanced user experience, reduced packet loss, and improved data access speed. This project not only facilitated global research collaboration but also positioned M.U.S.T as a leading hub for planetary magnetic field research. The implementation of this innovative solution has demonstrated substantial benefits, including improved operational efficiency and international recognition through prestigious awards. Moving forward, the success of this deployment suggests the potential for further applications of CTM's 5G technology in other sectors, such as public security, energy, and smart city initiatives. The ongoing partnership between CTM and M.U.S.T will continue to drive advancements in scientific research and digital transformation, reinforcing the value and impact of cutting-edge 5G solutions.

About CTM

CTM is the leading telecom service provider in Macau offering a full range of professional telecommunications services including mobile, fixed telephony, fiber broadband, enterprise solutions and digital transformation solutions. Upholding the vision of creating "Digital Macau", CTM has been dedicating to establish a comprehensive foundation for a smart city.

By July 2024, CTM realized the first-in-Macau 5G-A service, unveiling a new era that outlines the blueprint for "Digital Macau 3.0". By developing the digital foundation of "Cloud, Network, Intelligence, Security", CTM has been continually strengthening the capabilities of cloud platform, integrating the development of AI, IoT, Big Data and smart applications, and enhancing its network security level. CTM facilitates the cultivation of local digital ecosystem, strives to popularize technology applications in Macau as well as facilitating the construction of smart city, boosting the diversified competitiveness of Macau.

www.ctm.net

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5G Revolution: Transforming Connected Industries in APAC

Eight case studies showcasing the versatility and impact of 5G technologies

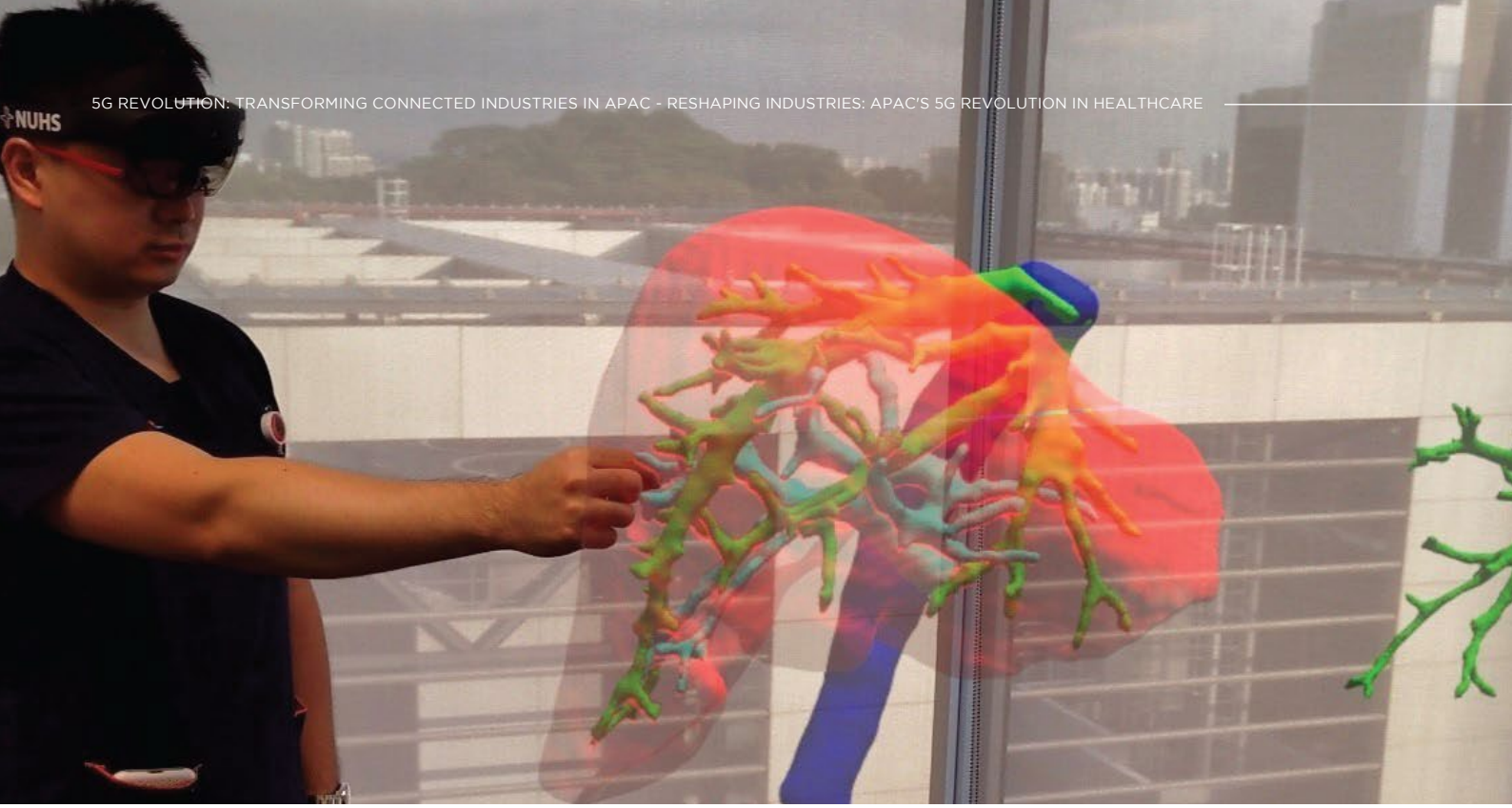
Reshaping Industries: APAC's 5G Revolution in Healthcare

National University Health System's innovative 5G enterprise network transforms healthcare in Singapore

National University Health System (NUHS) in Singapore, in partnership with Singtel and IMDA, has implemented a hybrid 5G enterprise network. This innovation enhances medical capabilities through real-time, high bandwidth connectivity, revolutionizing healthcare with applications like Holomedicine for improved surgical precision and patient outcomes.

Singtel

NUHS National University Health System



Clients/partners involved in this 5G deployment

In the pioneering 5G deployment at the National University Health System (NUHS) in Singapore, several key partners have collaborated to transform healthcare practices through advanced connectivity. Singapore Telecommunications Limited (Singtel) serves as the 5G network provider, and the partnership and collaboration with Infocomm Media Development Authority (IMDA) was crucial in the regulation, deployment, and sustainment of the NUHS 5G network.

Transforming Healthcare with 5G: A Hybrid Network Solution

Advanced Connectivity for Medical Innovation at NUHS, Singapore

The National University Health System (NUHS) in Singapore has implemented an advanced hybrid 5G network to support its pioneering Holomedicine program. This hybrid network, featuring both public and private elements with network slicing, operates on the 5G Standalone (SA) 3.5GHz spectrum, delivering impressive performance metrics with a downlink speed of 1Gbps, uplink speed of 150Mbps, and latency of less than 10ms. These capabilities are critical for applications requiring real-time, high-definition camera streaming and rapid connectivity, such as mixed reality (MR) devices used in surgeries. The network ensures secure and prioritized communication channels, safeguarding medical data and maintaining efficiency even during peak usage or emergency situations. By integrating cloud and edge computing, NUHS can process and analyze data close to the end-user, enhancing the responsiveness and reliability of its medical applications. This comprehensive 5G solution marks a significant leap forward in healthcare innovation, providing a robust foundation for future advancements.

"5G technology has empowered us to deliver advanced healthcare solutions and train the next generation of healthcare professionals with unprecedented precision and reliability."

– Dr. Gao Yujia, *Assistant Group Chief Technology Officer, NUHS*

"The future of 5G in the Asia Pacific region is promising. 5G technology integrated with emerging technologies will continue to drive economic growth, enhance productivity, and improve the quality of life across the region."

– Mohamed Firdaus, *Senior Director, Enterprise 5G, Singtel Singapore*

Overcoming Connectivity Barriers in Advanced Medical Applications

Addressing Critical Needs for Holomedicine at NUHS, Singapore

The National University Health System (NUHS) faced significant challenges in advancing its Holomedicine program, which leverages mixed reality (MR) devices like HoloLens2 for real-time, high-definition holographic imaging during surgeries. The existing 4G and Wi-Fi networks could not meet the stringent requirements for rapid connectivity and low latency, leading to lag and unreliable data transfer. These limitations hindered the effectiveness of MR applications, compromising patient safety and the quality of medical procedures. The need for secure, uninterrupted communication channels to prioritize critical medical traffic over public usage became evident, especially during network congestion or emergencies. Additionally, the demand for robust cloud and edge computing capabilities to process vast amounts of data in real-time was unmet. These challenges significantly impacted NUHS's ability to innovate and improve healthcare delivery, necessitating a comprehensive solution that only a 5G hybrid network could provide.

Reshaping Industries: APAC's 5G Revolution in Healthcare

Enhancing Healthcare through Advanced Connectivity

Strategic Goals for 5G Integration at NUHS, Singapore

The primary objective of implementing the hybrid 5G network at the National University Health System (NUHS) was to revolutionize healthcare delivery through enhanced connectivity and innovative technologies. The goal was to overcome the limitations of existing 4G and Wi-Fi networks, ensuring that critical medical applications, such as Holomedicine, could operate seamlessly with real-time, high-definition data transfer and minimal latency. NUHS aimed to leverage the high bandwidth and low latency of 5G to facilitate the use of mixed reality (MR) devices in surgeries, thereby improving surgical precision and patient outcomes. Another key objective was to establish a secure, prioritized communication channel that would safeguard critical medical data, ensuring efficient operations even during peak network usage or emergencies. Additionally, NUHS sought to integrate cloud and edge computing capabilities to enhance data processing and analytics, providing faster and more accurate medical insights. This strategic initiative aimed to position NUHS at the forefront of medical innovation, setting a new standard for healthcare excellence in Singapore

Integrating 5G for Holomedicine Excellence

Hybrid Network Solutions for NUHS, Singapore

To address the critical connectivity challenges faced by NUHS, a decision was made to implement a hybrid 5G network. This technology was selected due to its ability to provide high bandwidth, low latency, and secure, prioritized communication channels essential for Holomedicine applications. The implementation involved deploying 5G network slicing to ensure prioritized bandwidth for medical data, mitigating congestion issues. The network operates on the 3.5GHz spectrum, offering speeds up to 1Gbps downlink and 150Mbps uplink with less than 10ms latency, meeting the stringent requirements for real-time high-definition streaming and rapid data transfer. Innovative aspects of this implementation included the integration of cloud and edge computing, allowing data to be processed closer to the end-user for faster response times. Customized configurations ensured that MR devices like HoloLens2 could function optimally, enhancing surgical precision and patient safety. This strategic deployment has transformed NUHS's capabilities, enabling cutting-edge medical procedures and innovations.

Transformative Outcomes of 5G Integration

Enhanced Medical Capabilities at NUHS, Singapore

The implementation of the hybrid 5G network at the National University Health System (NUHS) has led to significant advancements in medical capabilities and operational efficiency. The seamless real-time streaming of live surgeries, supported by the 1Gbps downlink and 150Mbps uplink speeds with less than 10ms latency, has become routine in operating theatres equipped with indoor 5G antennas. This has enabled precise, real-time holographic imaging during surgeries, significantly enhancing surgical accuracy and patient outcomes. To date, over 20 surgeries have successfully utilized this technology, with ongoing clinical trials for two additional applications. The high-compute capabilities provided by Multi-access Edge Computing (MEC) have allowed for complex data processing and analytics, previously constrained by traditional networks. NUHS has reported a marked improvement in overall operational efficiency and patient care quality.

Insights from the 5G Healthcare Deployment

Reflective Learning at NUHS, Singapore

The deployment of the hybrid 5G network at NUHS provided several valuable lessons. One key insight was the complexity of integrating 5G technology within an existing hospital infrastructure, particularly due to legacy systems and the need for minimal disruption to ongoing medical services. Sequential installation, while ensuring patient safety and operational continuity, required meticulous coordination with hospital operations and building management teams. Another critical lesson was the importance of user training. Ensuring that medical staff could effectively use the new 5G-enabled devices and applications was essential for maximizing the technology's benefits. Additionally, the project highlighted the necessity of forming an internal team proficient in managing and maintaining the 5G system, underscoring the need for specialized knowledge and skills. The complexity of developing integrated data networks and obtaining regulatory approvals also emerged as significant challenges, emphasizing the importance of early and ongoing engagement with relevant authorities. Overall, the project reinforced the need for a well-coordinated, adaptive approach to successfully implement cutting-edge technology in a healthcare setting.

Revolutionizing Healthcare with 5G

NUHS's Journey Towards Advanced Medical Solutions

The implementation of the hybrid 5G network at the National University Health System (NUHS) in Singapore has fundamentally transformed its medical capabilities. By addressing critical connectivity challenges, the 5G solution enabled seamless real-time data transfer, essential for the innovative Holomedicine program. This advancement has significantly improved surgical precision and patient outcomes, showcasing the profound impact of 5G technology in a healthcare setting. The successful integration of cloud and edge computing further enhanced data processing and analytics, driving operational efficiency and high-quality care. The project also highlighted important lessons in managing complex technological deployments within a hospital environment, reinforcing the need for comprehensive planning

Advancing Healthcare Connectivity

Next Steps for NUHS's 5G Journey

Building on the success of the hybrid 5G network implementation, NUHS plans to expand its 5G capabilities to further enhance healthcare delivery. Future initiatives include the sequential upgrading of 5G infrastructure to support new medical applications, such as the 5G Cloud Robotics Program and remote patient monitoring through wearable sensors. Additionally, NUHS aims to leverage the 5G network for remote proctoring and training of healthcare professionals globally, fostering a collaborative and innovative medical community.

About Singtel

Singtel is a leading Asian communications technology group, operating next-generation connectivity, digital infrastructure and digital businesses including regional data centre arm Nxera and regional IT services arm NCS. The Group has presence in Asia, Australia and Africa and reaches over 780 million mobile customers in 21 countries.

For consumers, Singtel delivers a complete and integrated suite of services, including mobile, broadband and TV. For enterprises, Singtel offers a complementary array of workforce mobility solutions, data hosting, cloud, network infrastructure, analytics and cyber security capabilities.

Singtel is dedicated to continuous innovation, harnessing technology to create new and exciting customer experiences, support enterprises in their digital transformation and shape a more sustainable, digital future.

For more information, visit **www.singtel.com.**

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5G Revolution: Transforming Connected Industries in APAC

Eight case studies showcasing the versatility and impact of 5G technologies

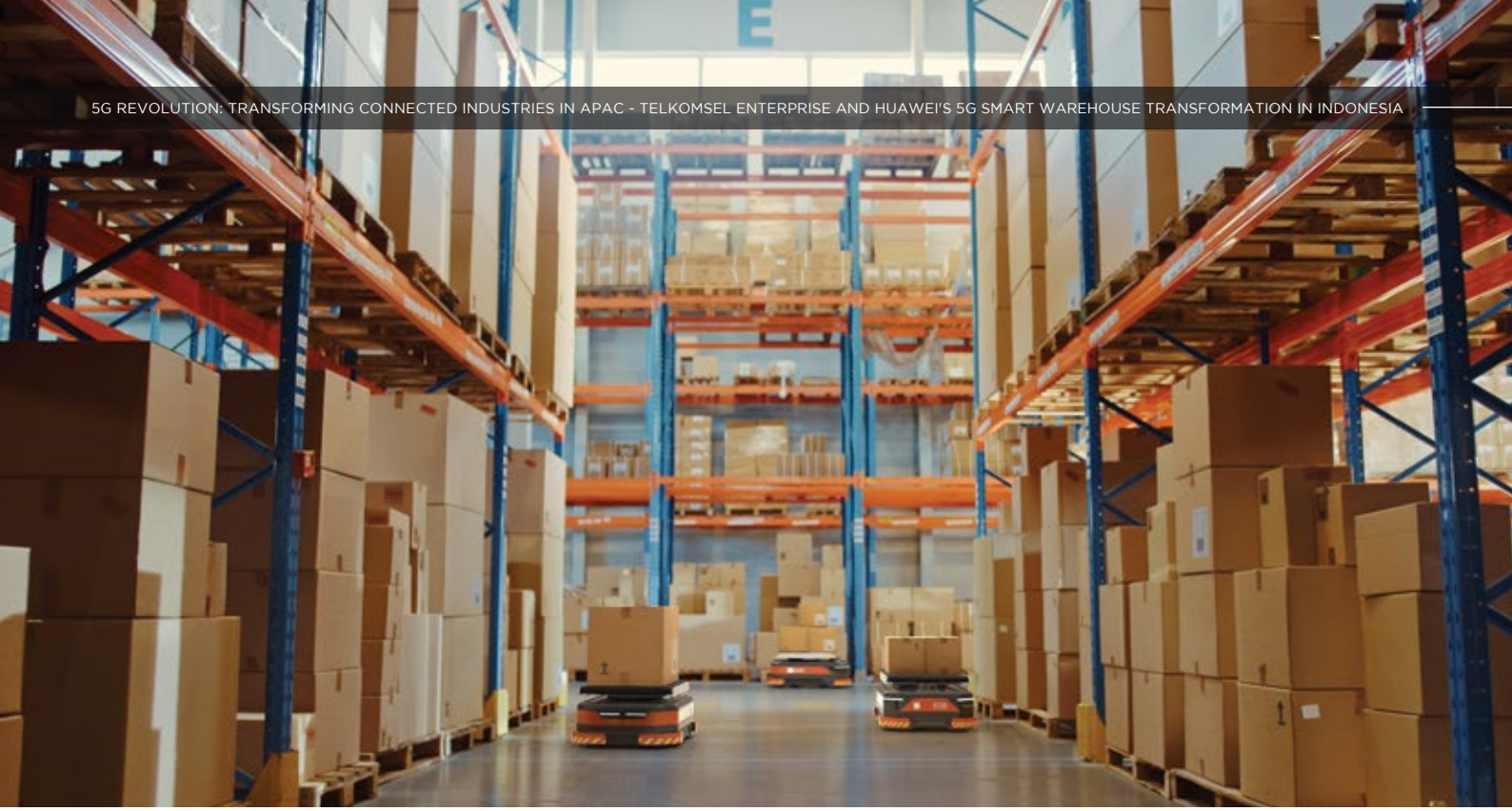
Telkomsel Enterprise and Huawei's 5G Smart Warehouse Transformation in Indonesia

Increasing Performance Through 5G Technology and Innovative Solutions in the Indonesian Logistics Industry

Telkomsel and Huawei have launched Indonesia's first 5G Smart Warehouse, enhancing operational efficiency with automated systems, Digital Twin Warehouse Simulation, AGVs, and AI-powered CCTV. This innovative deployment has optimized logistics, reduced errors, and improved resource utilization.

Telkomsel ENTERPRISE

HUAWEI



Clients/partners involved in this 5G deployment

In the transformative deployment of 5G technology for the logistics industry in Indonesia, key partners Telkomsel Enterprise and Huawei have collaborated to create a groundbreaking 5G Smart Warehouse. Telkomsel, the largest telecom company in Indonesia, serves as the 5G network provider, while Huawei contributes its expertise as a leading ICT infrastructure and smart devices provider. This initiative focuses on optimizing warehouse operations through automation and advanced industrial solutions. Located in Indonesia, the project aims to enhance operational efficiency and accuracy.

Comprehensive Overview of the 5G Smart Warehouse Network

Integrating Advanced Technologies for Optimal Performance and Security

The 5G Smart Warehouse in Indonesia, a collaborative effort between Telkomsel Enterprise and Huawei, utilizes a hybrid 5G network to achieve unparalleled efficiency and accuracy in logistics. This network combines both private and public elements, leveraging Telkomsel's 5G NSA (Non-Standalone) deployment and utilizing frequencies such as 5G NR 2300 and 4G LTE 1800. The use of Radio Access Network (RAN) sharing ensures efficient resource management. Indoor lampsite technology, alongside a dedicated private core network, provides robust and seamless connectivity within the warehouse. The deployment includes advanced industrial solutions such as a Digital Twin Warehouse Simulation, Automated Guided Vehicles (AGVs), and AI-powered CCTV for intelligent security. Stringent data security measures are in place to protect sensitive information, with both public and private data solutions ensuring secure data sharing and internal circulation. This comprehensive integration of 5G technology underscores the importance of performance and security in revolutionizing warehouse operations.

Overcoming Operational Hurdles with 5G Technology

Addressing Critical Challenges in Traditional Warehouse Operations

In the fast-paced world of modern commerce, efficient logistics is crucial for meeting the growing demands for speed and accuracy. For many companies in Indonesia, traditional warehouse operations posed significant challenges, characterized by manual processes prone to errors and delays. These inefficiencies hindered the ability to fulfill orders promptly and manage inventory effectively. Huawei faced these very issues, as their warehouses struggled to keep pace with market demands due to outdated manual operations. The lack of automation led to slower processes, higher error rates, and suboptimal resource utilization. These challenges significantly impacted Huawei's operational efficiency and business goals, creating an urgent need for a transformative solution. By teaming up with Telkomsel Enterprise, Huawei aimed to tackle these issues head-on through the implementation of a 5G-enabled Smart Warehouse. This innovative approach promised to enhance operational speed, accuracy, and overall efficiency, addressing the core problems that had long plagued their logistics operations.

Telkomsel Enterprise and Huawei's 5G Smart Warehouse Transformation in Indonesia

Driving Transformation in Warehouse Operations

Strategic Objectives of the 5G Smart Warehouse Initiative

The primary objective of the 5G Smart Warehouse initiative was to revolutionize warehouse operations by leveraging cutting-edge 5G technology. By transitioning from manual processes to automated systems, the goal was to significantly enhance operational speed, accuracy, and efficiency. This transformation aimed to address the persistent challenges of errors, delays, and suboptimal resource utilization that had hindered traditional warehouse operations.

A crucial objective was to integrate advanced industrial solutions, such as Digital Twin Warehouse Simulation, Automated Guided Vehicles (AGVs), and AI-powered CCTV, to streamline and optimize various logistical processes. Another key goal was to ensure robust and secure connectivity within the warehouse through the deployment of a hybrid 5G network, utilizing both public and private elements. Furthermore, the initiative sought to reduce environmental impact by decreasing paper usage and minimizing the carbon footprint through efficient and accurate robotic operations.

Innovative 5G Solutions for Modern Warehouse Challenges

Tailored Technology and Strategic Implementation for Optimal Results

To address the significant challenges of traditional warehouse operations, Huawei and Telkomsel Enterprise collaborated to develop a 5G-enabled Smart Warehouse, leveraging advanced technology for transformative results. The decision to choose 5G technology stemmed from its potential to provide high-speed, low-latency connectivity essential for real-time automation and monitoring. The implementation involved a hybrid 5G network with both private and public elements, integrating Telkomsel's 5G NSA deployment and frequencies like 5G NR 2300 and 4G LTE 1800. Indoor lampsite technology and a dedicated private core network ensured robust connectivity. The warehouse was equipped with a Digital Twin Warehouse Simulation for real-time monitoring, Automated Guided Vehicles (AGVs) for intelligent material transfer, and AI-powered CCTV for enhanced security. This integration not only automated distribution and receiving processes but also significantly improved operational efficiency and data security.

Remarkable Achievements and Impact of the 5G Smart Warehouse

Quantifiable Benefits and Transformative Results in Logistics

The implementation of the 5G Smart Warehouse has led to impressive outcomes, significantly enhancing operational efficiency and sustainability. Quantitatively, picking performance increased by 25%, while preparation times were reduced from four hours to three. Material usage was optimized by 80%, leading to a substantial reduction in waste and costs. The transition to digital systems decreased paper usage by 40%, contributing to a lower environmental impact. The accuracy and speed of robotic operations minimized errors and reduced the warehouse's carbon footprint. Employee roles shifted from repetitive manual tasks to overseeing automated processes, improving job satisfaction and productivity. Customers experienced faster and more reliable order fulfillment, enhancing their overall satisfaction.

Key Insights and Reflections from the 5G Smart Warehouse Project

Learning from Successes and Identifying Areas for Improvement

The implementation of the 5G Smart Warehouse by Telkomsel Enterprise and Huawei has provided valuable insights into the integration of advanced technologies in logistics. One of the key successes was the significant improvement in operational efficiency and accuracy, showcasing the transformative power of 5G technology. The project highlighted the importance of a robust and secure hybrid network, combining private and public elements to ensure seamless connectivity.

However, the journey was not without challenges. The transition from manual to automated processes required extensive staff training and adaptation to new technologies. This underscored the need for continuous employee development and support during technological transformations. Additionally, while the reduction in paper usage and carbon footprint was a major achievement, maintaining data security and managing the integration of various advanced systems were complex tasks that required meticulous planning and execution.

Transformative Impact of the 5G Smart Warehouse

Revolutionizing Logistics and Setting a New Benchmark

The 5G Smart Warehouse initiative, a collaboration between Telkomsel Enterprise and Huawei, has successfully addressed the critical challenges of traditional warehouse operations in Indonesia. By integrating advanced 5G technology and innovative industrial solutions, the project significantly enhanced operational speed, accuracy, and efficiency. Key technological implementations, such as the Digital Twin Warehouse Simulation, Automated Guided Vehicles (AGVs), and AI-powered CCTV, transformed manual processes into streamlined automated operations, resulting in a 25% increase in picking performance and a 40% reduction in paper usage.

The hybrid 5G network ensured robust and secure connectivity, supporting real-time monitoring and data security. This comprehensive solution not only optimized resource utilization but also minimized environmental impact, demonstrating the value of 5G technology in logistics. The success of this project sets a new benchmark for smart warehouses globally, paving the way for future innovations. Moving forward, the ongoing collaboration between Telkomsel and Huawei promises to explore further applications of 5G technology, continually advancing the digital transformation of industrial operations.

About Telkomsel

Telkomsel is a leading digital telecommunication company in the region, committed to empowering the Indonesian people to achieve greater competitiveness and create a brighter future. Telkomsel serves as the nation's largest convergence provider, consistently expanding our 4G network, pioneering 5G technology, and implementing cutting-edge fixed broadband solutions to enhance customer experience.

One of Telkomsel business unit, Telkomsel Enterprise, is a product factory that offers a comprehensive suite of digital solutions for B2B segment in accelerating its business growth, such as Digital Enterprise Solutions, Internet of Things, Digital Advertising, and Data Insight Solutions that can be customized according to business needs.

With 29 years of unwavering commitment, Telkomsel now boasts over 257,300 BTS towers, catering to more than 159.7 million mobile customers, over 8.9 million fixed broadband customers across the archipelago, and more than 40K enterprise customers. As a responsible corporate citizen, Telkomsel adheres to ESG principles to ensure a positive impact on our ecosystem.

Take a courageous step for your digital transformation journey here: telkomsel.com/enterprise

"Our 5G Smart Warehouse is a testament to how 5G can revolutionize industrial practices, aligning with our goal to lead in digital transformation."

– Hanang Setiohargo, *Vice President Enterprise Product Enablement and Solutions, Telkomsel.*

"The 5G Smart Warehouse is a testament to the value that 5G technology can bring to traditional industries in Indonesia, aligning with our commitment to supporting the government and industry players to unlock Indonesia's digital opportunity."

– Mr. Long, *CEO, Huawei Indonesia.*

GSMA

5G Revolution: Transforming Connected Industries in APAC

Eight case studies showcasing the versatility and impact of 5G technologies

Revolutionizing Manufacturing: APAC's Leap into Smart Industry with 5G

Empowering Digital Transformation through Advanced Connectivity in Malaysia

The deployment of 5G technology at Clarion Malaysia, powered by YTL Communications and Cnergenz Berhad, has revolutionized the manufacturing process by enhancing efficiency, accuracy, and operational agility. This initiative introduced a private 5G network that enabled real-time automation, reduced manual errors by 100%, and increased material handling efficiency by 80%. The integration of smart devices and automated systems not only optimized production processes but also set a new standard for manufacturing excellence in Malaysia.

yes Enterprise Solutions

Clarion Malaysia

CNERGENZ

Background

YTL Communications, the company behind the 'Yes' mobile network, has a firm belief in the transformative power of 5G. As a result of the foresight of having built a fully virtualised core network ahead of others, Yes has a proud history of numerous industry firsts: first to launch 4G nationwide in Malaysia (2010), first to launch VoLTE (2016), and now, as the first telco in Malaysia to launch 5G services – 9 months ahead of other telcos.

Yes is the clear pioneer of 5G in the country and is now taking the lead to drive industrial digitization by introducing advanced 5G capabilities with unmatched performance, ultra-low latency, and industrial-grade reliability. The significant lead in launching 5G service has afforded invaluable real-world experience and opportunities for service optimization, resulting in Yes being recognised as the fastest network in Malaysia (across all technologies) by OOKLA for two consecutive years (2022 and 2023).

In May 2024, Yes unveiled a first-in-Malaysia AI and Robotics-based Advanced Manufacturing deployment at Clarion Malaysia, powered by the Yes 5G Private Network. In collaboration with Cnergenz, an expert in advanced manufacturing, they developed a tailor-made solution to help Clarion Malaysia improve production efficiency and quality using robotics and AI, powered by an advanced 5G SA (standalone) Private Network, effectively lifting the bar in operational excellence in manufacturing and automation.

Challenges:

Identifying Key Operational Hurdles in the Path to Enhanced Manufacturing Efficiency

Like many other advancing manufacturing clients, Clarion Malaysia is constantly looking for new ways to improve efficiency, productivity, and quality. A robust end-to-end production process analysis uncovered several challenges that directly impacted its overall business goals:

Materials Receiving and Parts Picking: Extensive reliance on manual data entry for material receiving and picking led to frequent errors and delays, which compromised the accuracy and speed of inventory management.

Leftover Materials Reporting: Traditional methods for counting leftover materials involved slow and error-prone visual inspections, further complicating inventory accuracy, leading to numerous operational inefficiencies and wastage.

Out-of-Sync Material Movement: Manual movement of materials between machines was inefficient and at times, not in sync with production job flow, reducing productivity of the production line and worst yet, product quality.

Connectivity and Cybersecurity Risks: The existing Wi-Fi network cannot support Quality of Service, mobility and latency requirements to enable AI and robotics, while posing considerable security risks. Furthermore, the legacy structured wiring has limited bandwidth and severely limits the ability to instrument the production line for digitisation.

Resolving these challenges will enable Clarion Malaysia to optimize operations and adapt efficiently to changing market demands, enhancing their competitive edge and ability to innovate.

Since these challenges are representative of many such manufacturing facilities, this project serves as an important blueprint to help the country's manufacturing sector transform by enhancing productivity and operational agility.

Solution:

To tackle these challenges, Yes deployed a dedicated Private 5G SA Network on the factory floor. The always-on 5G network provided pervasive coverage and enabled our automation partner, Cnergenz, to incorporate 5G-connected smart racks that automatically gather material data and update the ERP system to enhance material picking accuracy, removing the possibilities of human errors. An automated 5G-connected X-ray counter enabled Clarion Malaysia to revamp the process of counting leftover materials, improving accuracy and boosting efficiency.

Additionally, 5G-connected Automated Mobile Robots (AMRs) streamlined material movement across the factory to enable just-in-time delivery of materials to ensure maximum productivity for the manufacturing line.

Impacts and Statistics:

The 5G Smart Factory Solution has revolutionized Clarion Malaysia's manufacturing operations:

- Intelligent scanners have reduced errors by 2x improving inventory utilisation and traceability while stamping out the risks of misplaced materials;
- 5G smart racks have boosted picking efficiency by 80%, optimizing production workflow and reducing material waste;
- X-ray automated counters have eliminated manual inspection and sped up material return lead time by 13x while ensuring real-time inventory updates to the ERP and PLM systems;
- AMRs have reduced manual labour by 4x, making material movement more efficient; and
- The flexibility to have anytime anywhere connectivity has enabled instrumentation throughout the production line where the application of advanced analytics and predictive maintenance have minimized unplanned downtime by 90%. Resultantly, the OEE (Overall Equipment Effectiveness) at Clarion Malaysia has improved by a whopping 70% thanks to the implementation of Smart Factory powered by Yes 5G Private Network.

Wider Implications:

The successful implementation of the Yes 5G Private Network and Cnergenz's Smart Factory Solutions at Clarion Malaysia underscore the transformative power of Advanced 5G technology. The impressive metrics should inspire the adoption of Private 5G across industry sectors. One can envision the efficiency gains from AI and robotics-based automation can easily be extended to healthcare, transportation, logistics, and other industries. But it is worth noting that without Private 5G (P5G) – and its unique capabilities of an ultra-low latency, high capacity and secured wireless connectivity fabric - is required to unlock next generation pervasive and integrated digitisation powered by AI.

In a healthcare setting, P5G can facilitate advanced holomedicine services allowing experts from different discipline to collaborate real-time on operations planning to improve operations success and reduce patient recovery time. In the areas of container ports and logistics, the deployment of P5G can enable autonomous vehicles, traffic management systems, and deep insights from inventory movement, leading to increased efficiency and reduced operational costs.

Stakeholders:

This collaborative effort is powered the Yes Private 5G Network from YTL Communications together with manufacturing automation provider Cnergenz Berhad and Dassault Systèmes with their world class Enterprise Resource Planning (ERP) and Product Lifecycle Management (PLM) system.

Implementing 5G to Transform Manufacturing at Clarion Malaysia

Leveraging Cutting-Edge Technology for Operational Excellence

To tackle operational challenges at Clarion Malaysia, Yes and Cnergenz deployed a private 5G network, chosen for its high-speed, reliable, and secure connectivity essential for real-time data processing and automation. The integration process seamlessly connected the 5G network with ERP & PLM systems and manufacturing setups, optimizing operations without disrupting ongoing activities, providing advanced analytics and predictive maintenance which minimized unplanned downtime by 90% and achieved an impressive OEE (Overall Equipment Effectiveness) of 70%.

Key innovations included 5G-enabled smart scanners and automated mobile robots (AMRs), which automated material handling and inventory management, drastically reducing manual errors. These devices updated the ERP system in real-time, enhancing inventory accuracy and reducing waste. Additionally, automated X-ray counters replaced manual counting, speeding up material assessments and increasing accuracy.

This approach not only resolved Clarion Malaysia's immediate issues but also laid a foundation for future technological upgrades, enhancing overall manufacturing efficiency. Additionally, the use of 5G-enabled smart devices was intended to boost production quality through real-time data connectivity and process optimization. The flexible and scalable network infrastructure was designed to allow Clarion Malaysia to adapt quickly to changing market demands and technological advancements, while also enhancing data security within the manufacturing environment. These objectives were set to not only overcome current challenges but also to position Clarion Malaysia as a leader in the digital transformation of the manufacturing sector.

"The benefits of Private 5G Network are clearly self-evident from this successful deployment. We'd like to thank Clarion Malaysia and our partners to help realise this shared vision. Importantly, we hope this success story could be replicated to bring forth a new generation of connected industries to help uplift economies and improve lives throughout the region."

- Wing K. Lee, *CEO, YTL Communications*

Architecting the Future: Building a Resilient 5G Network

Exploring the Technical Foundations and Security Enhancements of Yes's Private 5G Network

The network at the core of Clarion Malaysia's digital transformation is the Yes 5G Private Network, designed specifically to meet the high demands of modern smart manufacturing. Adhering to the 3GPP global standards for 5G SA (Standalone) and Network Security Assurance Scheme (NESAS), the network ensures a tailored, secure, and highly efficient connectivity solution. Performance is optimized with speeds exceeding 880 Mbps and ultra-low latency of 10-12ms, crucial for real-time automation and data processing. The security framework is robust, featuring strongly encrypted private SIM cards and end-to-end security measures to safeguard sensitive industrial data. This private network architecture not only enhances performance and reliability but also provides the flexibility needed to scale and adapt to varied industrial needs, making it an ideal backbone for demanding environments where precision and uptime are critical.

Measurable Outcomes from 5G Deployment at Clarion Malaysia

Quantifying Success in Smart Manufacturing Enhancement

The deployment of 5G technology at Clarion Malaysia has enabled significant improvements in manufacturing operations, as proven by quantitative data. The integration of 5G-enabled smart devices and automated systems has led to a 100% reduction in errors during material handling, significantly enhancing inventory accuracy. Automated processes have improved operational efficiency, with material picking efficiency increased by 80%, and manual labour reduced by 300%. Furthermore, the introduction of automated X-ray counters has accelerated material return processes by twelve times, ensuring real-time updates and eliminating delays.

These results underscore the transformative impact of 5G technology on manufacturing, making operations not only faster and more efficient but also more adaptable to changing demands. The positive outcomes have cemented Clarion Malaysia's position as a leader in manufacturing excellence, setting a benchmark for future technological advancements in the industry.

Harnessing 5G for Future-Ready Manufacturing at Clarion Malaysia

Summarizing Breakthroughs and Envisioning Next Steps

The deployment of 5G technology at Clarion Malaysia has been a pivotal step in transforming its manufacturing operations into a model of digital excellence. By integrating 5G-enabled smart devices and automation, significant challenges such as manual errors, inefficiencies, and connectivity issues were successfully addressed, enhancing overall operational efficiency and production quality. The project not only reduced manual labour by 300% and increased material handling accuracy but also set a new standard in manufacturing adaptability and security.

The positive outcomes from this implementation suggest vast potential for future applications across other sectors and further collaborations. Moving forward, Yes is positioned to continue its work with Clarion Malaysia, exploring wider applications of 5G technology to drive innovation and efficiency in more complex manufacturing scenarios and other industries.

Yes's 5G Solutions offers major advantages to other businesses

The Private 5G solution provided by Yes offer significant competitive advantages to various industries.

Industrial Grade Wireless Connectivity: For the first time in wireless network evolution, we now have the technology capability to deliver secured connectivity with fibre-level capacity and latency and with the freedom and flexibility enabled by wireless.

Unparallel Flexibility: The flexibility afforded by Private 5G enables automation anytime anywhere. This is particularly crucial in supporting the mobility requirements of AGV and robotics along with the ever evolving need to instrument AI and automation throughout the entire production line. Yes's 5G Private Network connectivity enables seamless operation of these automated systems with a high degree of security and resiliency demanded by OT environments.

Adoption of Advanced Technologies: A key advantage lies in the integration of artificial intelligence (AI), machine learning (ML), and the Internet of Things (IoT) to enhance operational efficiency and productivity. These technologies, when combined with Yes's 5G Private Network, enable businesses to optimize their processes and achieve higher accuracy in their operations.

Long-Term Vision

YTL Communications is committed to enabling digital transformation across Malaysia by making 5G affordable and accessible for SME and industries with some of the most competitive offerings in the industry.

Through our Group's Digital Bank partnership with Sea Limited (which owns Shopee and Garena), Yes is bringing a new level of financial inclusion, providing banking services and digital commerce to bring the benefits of digital economy to all Malaysians.

Yes is also committed to sustainable practices, exemplified by the development of Malaysia's largest Green Data Center Park, powered by 100% renewable energy. This initiative not only reflects YTL's dedication to environmental stewardship but also offers businesses sustainable solutions that align with global eco-friendly standards. These innovations provide businesses with efficient, secure, and accessible financial solutions, streamlining financial management and operations.

In collaboration with Nvidia, YTL Communications is delivering an AI-cloud built using Nvidia GB-200 superchips. At 300 exaflops, this AI-cloud will be one of the world's fastest supercomputers. Combined with the national 5G and 4G footprint from Yes, this will help enable equal access to world class AI to industries and consumers alike.

YTL Communications is taking a holistic approach toward digital infrastructure to make a substantial and sustainable impact to establish Malaysia as a leading hub for digital innovation.

Future Plans

Asia Pacific is witnessing a second wave of 5G rollouts with 20 markets commercializing and 5G activities gaining momentum in several new markets, including India since the end of 2022 (GSMA Intelligence). This growth is further emphasized by an 18% CAGR for smart manufacturing IoT connections between 2021 and 2030, driven by Industry 4.0 initiatives and manufacturers deploying IoT to automate production, streamline operations, and increase productivity (GSMA Intelligence).

The number of connected IoT devices is projected to grow by 9%, reaching 12.3 billion globally, with cellular IoT now surpassing 2 billion (IoT Analytics).

About YTL Communications

YTL Communications Sdn Bhd (793634-V) is a subsidiary of YTL Power International Berhad and serves as the communications arm of YTL Corporation Berhad, a leading infrastructure conglomerate in Malaysia. YTL Communications Sdn Bhd is a global frontrunner in telecommunications and operates a mobile network called 'Yes', Malaysia's first nationwide 4G provider. As the youngest operator with 92% population pure 4G coverage, the Yes network is the only network in Malaysia with a modern all-IP architecture. On the back of this advanced architecture, Yes became the first in Malaysia to provide nationwide VoLTE (Voice over LTE) in 2016 —five years ahead of all other telcos. In 2019, Yes successfully made Malaysia the second country in the world and the first in Asia to deploy Terragraph. In 2021, Yes yet again emerged as Malaysia's first 5G service provider to launch 5G and in May 2022, Yes launched Malaysia's first truly uncapped 5G service with the lowest tariff globally in line with the vision of "5G for All". Today, Yes is proud to be the nation's undisputed 5G leader with back-to-back Malaysia's Fastest Mobile Network award wins by Ookla in Q3-Q4 2022 and Q1-Q2 2023. For more information about Yes 5G Enterprise Solutions for your business, please visit https://www.yes.my/business/.

About Clarion Malaysia

In 1970, the late Mr Tan Chuen Hock, a Malaysian entrepreneur, forged a partnership with Clarion Co. Ltd of Japan to establish a company called Clarion Malaysia. This company built its first manufacturing plant in Penang, and it was the first Clarion offshore plant in the world. 54 years later today, Clarion Malaysia has evolved to an integrated manufacturing facility, capable in all aspects of making In-Vehicle-Infotainment systems, from development, manufacturing to marketing and to customer support. Clarion Malaysia truly understands the characteristics of each market and strives to be a trusted partner in bringing the perfect interface between people, sound and information. The sophistication and the demand of today's customers is high. And this motivates us to continue pushing boundaries to achieve the impossible, to be a global leader in the IVI industry. For more information about Clarion Malaysia's products and services, kindly visit http://www.clarion.com.my/.

About Cnergenz

Cnergenz Berhad, incorporated in Malaysia in August 2021, is an investment holding company listed on the Main Market of Bursa Malaysia Securities Berhad. Its subsidiary, SIP Technology (M) Sdn Bhd, specializes in providing surface mount technology manufacturing solutions for the electronics and semiconductor industries. Cnergenz focuses on offering tailored solutions to customers seeking new integrated production lines or automation for their production facilities, particularly in the assembly of advanced semiconductor packaging products and the testing of printed circuit board assembly (PCBAs). The company is aligned with Industry 4.0 principles, contributing to the advancement of smart manufacturing technologies within the electronics and semiconductor sectors. For more information about Cnergenz's solutions, kindly visit https://cnergenz.com/.

GSMA

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

Follow the GSMA on Twitter / X : @GSMA

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/

About this case studies report