



# **SINGTEL RECEIVES THE 2023 TECHNOLOGY INNOVATION LEADERSHIP AWARD**

---

*Identified as best in class in the Asia-Pacific 5G  
enterprise industry*

## Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Singtel excels in many of the criteria in the Asia-Pacific 5G Enterprise space.

AWARD CRITERIA	
<i>Technology Leverage</i>	<i>Business Impact</i>
Commitment to Innovation	Financial Performance
Commitment to Creativity	Customer Acquisition
Stage Gate Efficiency	Operational Efficiency
Commercialization Success	Growth Potential
Application Diversity	Human Capital

### Commitment to Innovation

Singapore Telecommunications (Singtel) is a leading 5G enterprise service provider in the Asia-Pacific (APAC) region, with a regional presence through stakeholders, such as Optus, and through regional associates, such as AIS in Thailand, Globe in the Philippines, Telkomsel in Indonesia, and Airtel in India. To date, the company has 52 enterprise offices in 18 countries globally, and more than 65% of its net profit is derived from operations outside of Singapore.

*“Singtel’s successful commercial deployments in Singapore are showcasing the capabilities of 5G in both Singapore and worldwide. Singtel is leading the way for enterprises to experience the innovation and productivity improvements that 5G solutions offer.”*

**- Mei Lee Quah**  
**Director, ICT Research**

With 5G, Singtel can provide enterprises with new capabilities, such as edge infrastructure and network slicing, that simultaneously bring new monetization opportunities as a value add, such as quality of service (QoS). Additionally,

5G can offer better network yield, which can improve profitability.

By being in close touch with enterprises in Singapore, Singtel realized that enterprises needed 5G solutions to serve a wide variety of use cases in an affordable manner, without the long lead time, especially with many enterprises undergoing rapid digitalization and urgently requiring support. The Singtel Paragon platform, which is the company’s strong core product that is unique in the market, can extend the

boundaries for 5G to influence even more industries by enabling 5G solutions for use cases that require more effort and customization. Visibility, performance assurance, and risk mitigation are key value propositions of the Singtel Paragon platform. These value propositions are supplemented with the value generated by staff that relentlessly work to ensure enterprises' needs are met, such as working to sign on new partners that can add value to the enterprise journey, whether through solutions or skillsets; ensuring that multiple enterprises can benefit; and ensuring customers can quickly reap the value add offered by Singtel. As a result, 5G has been well received because enterprises' needs are met with ease through a single pane of glass, within budget and with low risks and overhead.

Additionally, unlike previous generations, such as 2G, 3G and 4G, unique to 5G is the availability of the new millimeter wave (mmWave) spectrum that can support wider bandwidths, including up to 2 Gbps. Through the delicate control of the uplink and downlink throughput, Singtel can facilitate a higher uplink ratio and uplink peak cell throughput with the mmWave spectrum.

In partnership with Ericsson and Qualcomm, Singtel has successfully aggregated four component carriers (4CC) using a test device powered by Qualcomm's Snapdragon X65 5G Modem-RF System, achieving trial upload speeds of greater than 1.5 Gbps, with upside for improvement. This development is crucial and timely because it addresses enterprises' need for faster upload speeds to transfer large volumes of data, such as heavy video streaming, or to process complex applications, such as manufacturing operations and high-precision quality control. Industry 4.0 applications, such as in manufacturing, transportation, healthcare, entertainment, and news production, will benefit the most from this new spectrum; therefore, Singtel, with a majority of its customer base being Industry 4.0 customers, will stand to gain because with faster upload speeds, enterprises can analyze device and network performance in real time, thereby improving their performance monitoring capabilities.

Leveraging multi-access edge computing (MEC) improves latency because the processing capability sits at the edge nearer the data; however, mmWave, in combination with MEC, can potentially offer optimized performance, both in terms of faster uploads and shorter round trips. With mmWave and MEC working together on the Singtel Paragon platform, decision making at the edge can be quicker, which is essential for the low-risk monetization of mission-critical services, autonomous systems, video-rich experiences, and edge artificial intelligence (AI).

The Singtel Paragon platform plays a key role in enabling futuristic concepts that would otherwise not be feasible with 4G. To showcase the difference between 4G and 5G, a demonstration by Solace estimates that location and telemetry information when sent over 5G to the MEC can offer improvements, compared to sending the information over 4G to the cloud. These improvements are estimated at 15% and 50% in latency and message volume, respectively. With the team at Singtel guiding the upgrades to 5G, more enterprises regionally can leverage advancements in technology to meet their needs.

### ***Commitment to Creativity***

To enable more use cases, Singtel has embarked on 5G incubator projects with Intel to drive the commercialization of 5G solutions. The company is aligned with the overall industry in its focus on private networks within the manufacturing sector but is open to enabling all enterprises through its 5G network and Singtel Paragon platform.



With the collaboration with Intel, Singtel is focusing on solutions to deliver high-definition (HD) content, cloud gaming, video analytics, virtual/augmented/mixed reality, and metaverse. Some of these solutions are supported by Singtel's 5G@Sentosa testbed, launched in 2021, in partnership with various government agencies, including the Government Technology Agency and the Sentosa Development Corporation. The number of trials at the testbed has increased from 15 in 2022 to 30 in 2023, with 4 successful commercial deployments.

### **Commercialization Success**

As 5G technology develops and moves beyond the nascent stage, 5G solutions are increasingly impacting businesses and making a difference. Singtel's successful commercial deployments in Singapore, such as with Hyundai Motor Group, Micron Technology, National University Health System (NUHS), and Civil Aviation Authority of Singapore (CAAS), are showcasing the capabilities of 5G in both Singapore and worldwide. Singtel is leading the way for enterprises to experience the innovation and productivity improvements that 5G solutions offer.

In manufacturing, Singtel's collaboration, commenced in 2022, with the Hyundai Motor Group Innovation Centre in Singapore (HMGICS) has led to the commercial deployment of an advanced and future-ready

*"With additional and better tools, Singtel can progressively enable more use cases, and enterprises can introduce more innovation, accelerate digital transformation, and drive business growth."*

**- Mei Lee Quah**  
**Director, ICT Research**

manufacturing facility, with enhanced high-precision quality control across its manufacturing operations. The solution overcomes the limitations of Wi-Fi and ensures that high-quality control of standards is applied across the production of electric vehicles. The combination of Singtel's 5G network, Paragon platform, edge computing management, and services orchestration enables real-time feedback across the manufacturing process. The solution demonstrates how manufacturers can undertake vehicle customization through

new user experience (UX) features and enable the live streaming of cars being manufactured for customers to watch on their smartphones.

In manufacturing, Singtel's collaboration, commenced in 2022, with Micron Technology in Singapore has led to the commercial deployment of a 5G solution to analyze the performance of Micron Technology's devices and networks at its 3D NAND flash memory fabrication plant. The combination of Singtel's 5G network, Singtel GENIE, and a mmWave campus solution with a localized on-premises edge core suitable for Industry 4.0 manufacturing applications enables real-time performance monitoring and feedback capability. The solution demonstrates how manufacturers can leverage a range of Industry 4.0 applications, from automated visual inspections of individual chips to augmented reality (AR), for operations and maintenance and fit-for-purpose solutions. For example, cleanroom operations can leverage an on-premises edge core to use smaller and lighter Internet of Things (IoT) devices that require less computing power and fewer devices so that each device can last longer before requiring another charge.

In healthcare, Singtel's collaboration, commenced in 2021, with the NUHS in Singapore has led to the commercial deployment of a 5G holomedicine mixed reality (MR) solution. The combination of Singtel's 5G network, Paragon platform, and Microsoft Azure enables high-resolution images on Microsoft

HoloLens, an MR headset designed to solve real business problems using intelligent apps. The solution demonstrates how doctors worldwide and not only at NUHS can streamline surgical operations planning, improve patient education and safety, and create more intuitive and immersive environments for surgical training and research.

In airports, Singtel's collaboration, commenced in March 2023, with the Civil Aviation Authority of Singapore (CAAS) has led to the launch of a live 5G Aviation Testbed at Singapore Changi Airport Terminal 3 that will last for two years. The testbed will trial 5G solutions that can boost worker productivity and raise operational capabilities, specifically to increase productivity for critical airside functions, such as aircraft ground operations, ground handling, and line maintenance services. With this solution, airport operators can leverage 5G to improve operational efficiency and the safety of flight operations with reliable communications, thus supporting real-time collaboration and decision making.

### ***Application Diversity***

Singtel's 5G solutions can be expanded in scope, such as to offer workforce management solutions and business transformation solutions, and can be widened to serve other industries, such as retail. In the first instance, with new solutions added to the Paragon Marketplace, Singtel can find a wider audience for its platform, and enterprises can leverage these new solutions served through 5G. Additionally, value add for enterprises can then be achieved through further collaborations between Singtel and its partners to optimize the solutions for 5G and/or develop better capabilities for solutions based on 5G capabilities to transform business and operating models. With additional and better tools, Singtel can progressively enable more use cases, and enterprises can introduce more innovation, accelerate digital transformation, and drive business growth. With an exclusive or early launch of solutions with partners, Singtel can gain from a first-mover advantage with partner solutions.

For example, with the collaboration with Zoom in 2023, Singtel became the first mobile operator in Singapore to launch Zoom's communication solutions to support enterprises' digital transformation. As an initial step, Singtel added Zoom's suite of new innovations, including the Zoom Phone Connector, to its unified communications (UC) portfolio and communication platform-as-a-service (CPaaS) offerings. Subsequently, Singtel and Zoom will be looking to explore high-resolution streaming solutions through the Singtel Paragon platform, and with this move, cloud-based video collaboration conferencing services will be moved closer to the network edge. Moreover, Singtel's partnership with Zoom will unlock new innovations in healthcare, education, and banking, among other sectors.

Similarly, Singtel was the first to collaborate and work with SAP in Japan to develop an end-to-end Intelligent Edge Aggregator (IEA) solution. The IEA solution will allow enterprises to leverage insights for decision making on time-sensitive business requirements with the integration of SAP software, such as SAP Business Technology Platform (SAP BTP), to its back-end processes at the cloud-based edge. Singtel's partnership with SAP can address the regional need for computer vision and workplace safety applications.

In retail, Singtel's smart retail showcase features technology from Apple's enterprise partners, including SFX, Dabton, Matterport, Zühlke, Scandit, and Eleos, to help enterprises adopt digital technology to meet their changing needs. Retailers need a more innovative means to engage with customers, both online and

in-store, to stay relevant and profitable in the post pandemic era; therefore, Singtel's smart retail showcase unveils a solution that can enhance retail workflows; improve operational productivity and efficiency; and create unique, personalized shopper experiences as an option to achieve business transformation goals. Singtel's solutions leverage Apple products and software that come with built-in features, such as machine learning (ML) and light detection and ranging (LiDAR) technology, to unlock digital capabilities at scale. Developer frameworks, such as Arkit and Core ML, drive augmented reality (AR) and ML capabilities to create lifelike environments, visualization, and shared experiences. In addition, Singtel's partnership with Apple will unlock new innovations in retail applications for computational photography, spatial measurement and real-time operations monitoring, and insights and actions powered by 5G.

### ***Price/Performance Value***

With the Singtel Paragon platform equipped with an application programming interface (API) library, Singtel shortens the customer onboarding and go-to-market timeframe, thus improving operational efficiency. Supplemented with Singtel's staff's effort to add value to the enterprise journey by ensuring enterprise needs are met through solutions or skillsets, the overall Singtel solution lowers barriers to entry, allowing for faster deployment at a low-cost overhead through the creative use of emerging technology.

By overcoming the technological challenges for enterprises, Singtel makes it easy for enterprises to address approval bottlenecks with confidence. Singtel's proven track record of reducing commercialization risks allows enterprises to focus on leveraging technological advancements to drive much-needed innovation. The Singtel Partner Program supports partners in solution validation, commercial structure, Paragon Marketplace onboarding, and joint go to market at scale. Partners can integrate their solutions with the platform through an API to build and deploy their solutions rapidly. By moving the compute and intelligence to the edge, Singtel's partners can reduce device cost and increase solution adoption. The combination of Singtel's technological capability is unique and not comparable in the market, thus offering the best value to enterprises.

### ***Brand Equity***

Singtel has a strong brand image and is well recognized for its technological innovation. In 2023, Brand Finance recognized Singtel as the world's 6th strongest brand in the telecoms sector based on its service quality and customers' positive perception of its technology leadership, such as its seamless mobile network coverage, consistent customer experience, and products and services value. For its 5G Standalone (SA) network, which was launched three years ahead of schedule and now has 100% nationwide coverage, Singtel won (jointly with Ericsson) the Global Telecoms Awards 2022 for advancing 5G SA, the SBR National Business Awards (telecommunications category). Other areas that were acknowledged by industry veterans and observers include the company's achievements with its Singtel Paragon platform and Singtel GENIE.

Singtel will further push its technology support as a value proposition in 2023 by separating its infrastructure business into the Digital InfraCo infrastructure unit to leverage the rising importance of digital infrastructure on a global scale and drive the monetization of its infrastructure. Furthermore,

working in partnership with other strong, well-known global technology brands, such as Microsoft, Apple, Intel, SAP, and Atos, Singtel can further enhance its brand equity and solidify its new identity as a technology company (techco), that is, a company in business to solve enterprise pain points through the use of technology-based solutions, thus taking on a bigger role beyond being only a connectivity provider.

## Conclusion

---

Singtel's 5G solution has been well received by enterprises. Singtel meets enterprises' needs with the Singtel Paragon platform at the core, supplemented by solutions and/or skillsets from strong, well known global technology partner brands, thus increasing the number of commercial deployments. Singtel, therefore, can showcase its 5G capabilities in Singapore, regionally, and globally. The company is already working to expand its scope and industry coverage to reach more enterprises and enable futuristic concepts with 5G technology innovation that would otherwise not be feasible with 4G.

With its strong overall performance, Singtel earns Frost & Sullivan's 2023 APAC Technology Innovation Leadership Award in the 5G enterprise industry.

## What You Need to Know about the Technology Innovation Leadership Recognition

---

Frost & Sullivan's Technology Innovation Leadership Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

### Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

#### *Technology Leverage*

**Commitment to Innovation:** Continuous emerging technology adoption and creation enables new product development and enhances product performance

**Commitment to Creativity:** Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

**Stage Gate Efficiency:** Technology adoption enhances the stage gate process for launching new products and solutions

**Commercialization Success:** Company displays a proven track record of taking new technologies to market with a high success rate

**Application Diversity:** Company develops and/or integrates technology that serves multiple applications and multiple environments

#### *Business Impact*

**Financial Performance:** Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

**Customer Acquisition:** Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

**Operational Efficiency:** Company staff performs assigned tasks productively, quickly, and to a high-quality standard

**Growth Potential:** Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

**Human Capital:** Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention



