Singtel

2025 ENABLING TECHNOLOGY LEADER

Leveraging Vital Technology to Enhance Products and Applications

RECOGNIZED FOR BEST PRACTICES IN THE ASIA-PACIFIC 5G AND MULTI-INFRASTRUCTURE AI ORCHESTRATION INDUSTRY

FROST & SULLIVAN

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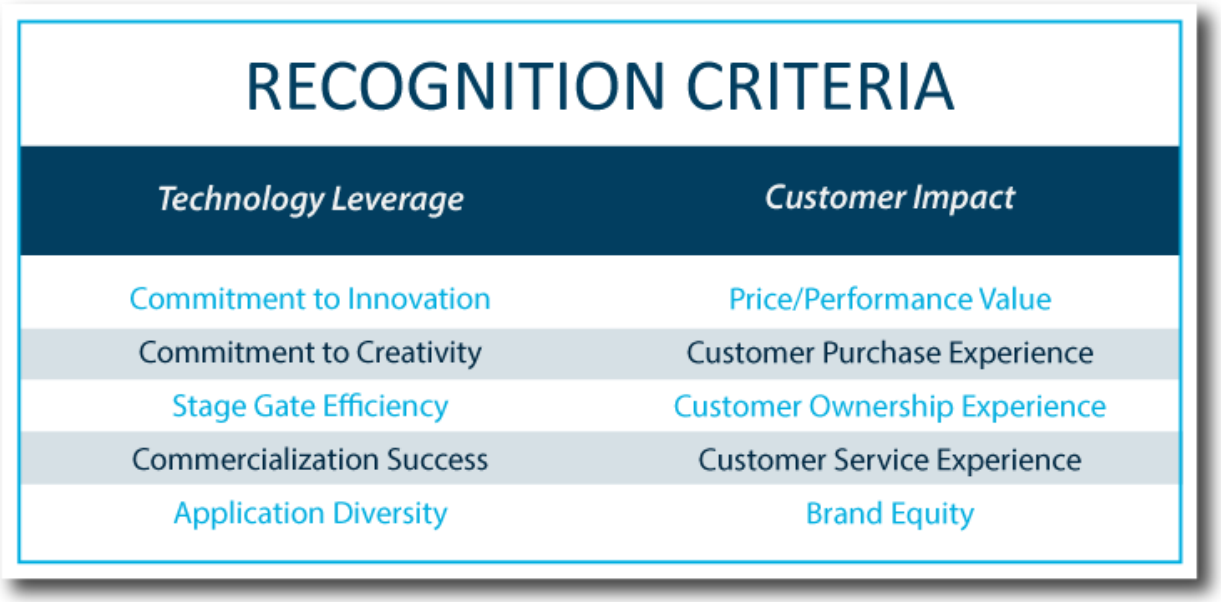
Best Practices Criteria for World-class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each recognition category before determining the final recognition 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 and multi-infrastructure AI orchestration space.



Commitment to Innovation and Creativity

Singtel is Asia-Pacific (APAC)'s leading communications technology group dedicated to continuous innovation, harnessing technology to create new and exciting customer experiences and shaping a more sustainable digital future. With a strong enterprise focus and regional presence, the company offers enterprises workforce mobility solutions, data hosting, cloud services, network infrastructure, analytics, and cybersecurity capabilities. A leader in digital connectivity and innovation, the company is the frontrunner in enterprise solutions with its Paragon platform. It provides a single interface to a self-service portal that reduces complexity and speeds up time to market. Singtel Paragon platform is a patented technology that enables enterprises to orchestrate 5G, edge computing, and cloud services and reap benefits from seamless connectivity at scale and real-time decision-making close to the source.

> *"By integrating emerging technologies with smart infrastructure to harness their collective and complementary potential and by continually seeking ways to better meet the needs of the enterprise segment, the company facilitates easier enterprise adoption."*
>
> ***– Mei Lee Quah***
> ***Senior Director, ICT Research***

Key capabilities introduced by Singtel's Paragon platform include the ability to manage real-time 5G network slices on demand, manage multi-cloud application deployment, enable edge computing orchestration for applications, support pre-integrated third-party applications via a marketplace carefully curated with global brands. This enables mobile operators to offer differentiated services including demand based, QoS based pricing. For resource orchestration, it supports customers'

needs to manage resources across different cloud computing environments for better performance or cost economics. The platform enables the deployment of artificial intelligence (AI) and machine learning (ML) applications to support a variety of use cases. The company also offers an API catalog for exposing underlying infrastructure capabilities including 5G management and telemetry (service quality analytics), helping customers optimize their performance with external systems.

Singtel was the first in Singapore to launch self-service enablement of network slicing management, which enables enterprises to reserve dedicated network resources for specific applications or use cases. Application developers can select dedicated 5G slices for specific application needs, ensuring optimal performance, reliability, and security for critical scenarios. This ensures consistent performance for mission-critical operations, even during congestion. In partnership with Ericsson, Singtel is now the first in the world to commercially deploy automated radio resource partitioning (ARRP). Unlike traditional slicing, ARRP dynamically adjusts network resources based on real-time demand, eliminating over- or under-provisioning and simplifying network management for enterprises.

With an already solid footing in the enterprise market and a large enterprise segment base, Singtel continues to proactively secure its position as the enterprise provider of choice and introduce new avenues to do more for enterprises and improve on the monetization of its base. An effective solution to overcoming legacy challenges, the platform supports faster deployment of digital solutions, real-time performance assurance, and simplified infrastructure management. Its strategic partnerships with global mobile operators and cloud providers ensure customers are able to build end-to-end global use cases spanning different partners in the ecosystem.

Commercialization

Successfully implementing a service orchestration system integrated into the 5G network management is a significant accomplishment, and this achievement was critical for the success of the Singtel Paragon platform. The carefully curated ecosystem, powered through partnerships with industry players, application developers, and solution providers, supports Singtel's Paragon platform in developing industry-specific 5G use case solutions that are fit for purpose. Singtel's 5G+ network, combined with its Paragon platform, enables capabilities critical for real-time AI applications like autonomous systems, smart factories, and intelligent retail. The addition of an edge cloud reduces latency and improves scalability, which is especially useful for smart city applications, traffic management, and energy optimization.

At the current stage of development, the industry is witnessing an increasing number of commercial deployments that leverage AI and automation, that is, the 2 key elements that have been discussed for years but are only of late becoming a reality. Frost & Sullivan observes this to mean that from 2026, there will be greater business-to-business-to-everything (B2B2X) growth driven by new, innovative, but more importantly, viable business models. Currently and going forward, Singtel's strategy is to target verticals where low-latency capability matters and where edge computing can unlock new efficiencies or experiences, such as mission-critical, manufacturing, and healthcare industries.

In manufacturing, the company is enabling advanced use cases that are driving Industry 4.0 and smart factory transformation. Real-time control and automation at the edge are helping manufacturers digitalize

operations, improve safety, and boost efficiency by reducing downtime through real-time data processing and orchestration across 5G and edge environments. In Singapore, a manufacturer is using Singtel's Paragon platform and 5G campus network to support its smart manufacturing operation by enabling predictive maintenance and process optimization through edge computing and AI. Similarly, an automotive manufacturer in Singapore is leveraging Singtel's Paragon platform to implement digital twin technology at its electric vehicle (EV) manufacturing plant in Singapore to simulate factory operations for planning, troubleshooting, and training as it improves operational accuracy and supports advanced manufacturing workflows.

A global equipment manufacturer is piloting Paragon in a US factory to validate AI-driven industrial automation to reduce operational risks and enhance productivity. Applications include quality assurance for AI-powered defect detection, workplace safety for real-time monitoring and alerts, and predictive maintenance for AI models to forecast equipment failures. In manufacturing, the Paragon platform supports low-latency control systems for collaborative robotics. This enables safe and efficient interaction between humans and machines on the shop floor. Additionally, the platform promotes sustainable manufacturing by utilizing AI and edge computing to optimize energy consumption and reduce waste, thereby aligning with environmental, social, and governance (ESG) goals.

In healthcare, by combining 5G, edge computing, and MR technologies, use cases are not just enhancing healthcare delivery but also redefining clinical workflows, education, and patient engagement. An example is the use of holomedicine at a local hospital, with use cases including pre-procedure planning, where surgeons use holograms for surgical navigation and implant customization; intra-operative guidance, where real-time holographic overlays assist during surgery; surgical education, where MR enhances anatomy training for medical students; patient education, where 3D simulations help patients understand procedures. Some additional use cases being explored include other areas like point-of-care imaging and diagnostics and AI-powered patient monitoring. Point-of-care imaging and diagnostics use cases include AI-enhanced ultrasound imaging for faster diagnostics and MR-assisted vein mapping for improved venepuncture. AI-powered patient monitoring enables remote monitoring, telemedicine, and diagnostics. Some early use cases, such as smart ambulances, remote surgeries, augmented reality/virtual reality (AR/VR) medical training, pharma supply chain tracking, and secure medical data networks, are still being trialed or have launched but have yet to scale. Meanwhile, a promising area that may experience greater demand in the future lies in the use of autonomous cloud robots, which are robots that assist in hospital logistics and remote care to reduce staff workload and support aging populations, respectively.

For enterprises in general, 5G+ brings an immersive spin to the workplace with training and simulation, guided work, and even collaborative design, leveraging immersive capabilities for increased operational efficiency. Further, with Singtel Paragon orchestration and partner ecosystem capabilities, the platform is impacting vertical industries in different ways. In public safety and smart cities, use cases that leverage real-time analytics and remote operations, including video surveillance, autonomous drones, and robotics, support emergency services and response. In urban planning, use cases that leverage city-wide orchestration of sensors and devices, including traffic management, smart infrastructure, and environmental monitoring, enable responsive urban systems. In financial services, use cases depend on

the platform for secure, compliant, and high-speed data processing for secure data transmission, fraud detection, and compliance tools.

In intelligent retail, use cases including MR shopping, AR/VR customer engagement through AR/VR applications, real-time inventory tracking and management, and immersive and omnichannel customer experiences enhance customer engagement and operational efficiency through edge-enabled applications. In media and entertainment, use cases include media streaming optimization for 360° video that leverages high bandwidths through viewport-adaptive streaming, tiling, and ML for predictive and quality enhancements; content delivery networks that enable AR/VR content delivery; and immersive gaming that offers immersive experiences. In logistics and transportation, use cases include fleet tracking and management, smart warehousing, autonomous delivery systems that leverage real-time data processing (for instance, for traffic and weather information), and analytics at the edge to improve routing through route optimization, safety, and delivery speed. At ports, the platform also boosts operational efficiency. All these use cases are helping build demand in international markets for Singtel.

Application Diversity

Following the successful implementation of Paragon for Telcos for 5G and computing orchestration (Paragon for Telcos/Paragon-T, Paragon for Enterprise/Paragon-E), Singtel has leveraged the platform core capabilities to extend it's capabilities to other technological areas. In 2024, the platform has been extended to support CAMARA based APIs (Paragon-API). This provides mobile operators with the ability to monetize CAMARA based API with platform capabilities supporting key features such as telco finder, consent management, analytics, and billing. The platform has been deployed in Bridge Alliance API Exchange (BAEx) to support regional API aggregation, enabling regional API interest from mobile operators in tapping into mobile networks for identity and fraud management to replace the traditional one-time password (OTP).

Singtel has introduced an additional variant called Paragon-D, which aims to monetize data center assets with AI cloud infrastructure for Nvidia GPU servers (such as H100, GB200, GB300 GPU servers). This complements the existing platform (Paragon-T, Paragon-E) capabilities which already orchestrate GPUs at the edge enabling AI inferencing on edge computing infrastructure. With Paragon-D, customers will be able to manage high powered GPU servers to enable AI intensive workloads (for both AI training and inference) such as GenAI model training and model fine tuning. Paragon-D supports the management of GPU infrastructure and enables efficient AI workload scheduling, while also powering AI applications and services such as AI-Workspace-as-a-Service. With AI workload scheduling and orchestration, customers are able to better manage their infrastructure and optimize utilization, while applications and services such as AI Workspace-as-a-Service democratize AI for AI scientists and data scientists, making it easier for them to start building their models.

The extension to undertake AI training, for example, GenAI foundation model training, rides on the increasing adoption of AI within enterprises for predictive analytics, automation, and decision-making.

Together, all variants focus on Singtel's longer-term strategy to unlock value for mobile operators, monetize existing infrastructure assets, and tap into new growth areas to help mobile operators expand profitably. The Paragon platform has been deployed in several countries across Asia, including Thailand,

Indonesia, and Taiwan, and in Spain in Europe. Mobile operators also use it to modernize their mobile networks and offer Network-as-a-Service (NaaS). As part of its ST28 strategy, designed to drive sustained value creation, enhance customer experiences, and scale digital infrastructure and services, Singtel is investing in scaling Paragon globally across Asia and Europe as a key growth engine. This includes leveraging capital recycling to fund expansion and innovation, including GPU-as-a-Service (GPUaaS) for AI deployment at scale.

Singtel will scale digital infrastructure, accelerate AI adoption, and transform mobile services globally through key partnerships that will position Paragon as a multi-market, multi-cloud and multi-network orchestration platform that supports rapid deployment of 5G, edge, and AI applications across industries. Singtel has formed strategic alliances with global technology leaders, such as Microsoft, NVIDIA, and Ericsson, to enhance Paragon's capabilities. Microsoft, a cloud and enterprise software partner, enhances Paragon's orchestration capabilities and supports enterprise-grade applications in healthcare, retail, and manufacturing. Intel, a hardware and edge computing partner, provides compute infrastructure for high-throughput, low-latency use cases like video analytics and MR.

Singtel's proactive approach to helping enterprises and telcos accelerate and scale AI through GPU-as-a-Service (GPUaaS) and AI-as-a-Service is delivered through a unified, differentiated stack—RE:AI, Nxera, and Paragon. RE:AI—Singtel's sovereign AI cloud—provides scalable GPUaaS/AIaaS; Nxera supplies the AI-ready, high-density data center fabric across Southeast Asia; and Paragon orchestrates 5G, edge, and multi-cloud workloads with policy-driven automation. This stack is supported by an ecosystem that includes Nvidia (accelerated compute platforms, frameworks, and tooling) and Mistral (state-of-the-art models), enabling high-performance training and inference. Regionally, Singtel's partnership with the Bridge Alliance (~35 operators) extends accelerated AI infrastructure into markets such as Indonesia, Malaysia, and Thailand, giving enterprises compliance-aligned deployment paths. To broaden global reach, the collaboration with Nscale expands access to GPU capacity in Europe (and augments capacity in Southeast Asia), letting customers tap a consistent operating model across regions—compute via RE:AI, hosted and scaled on Nxera's AI-optimized facilities, and orchestrated at the edge through Paragon for real-time, industry-grade AI outcomes.

> *"Singtel's initiatives are enhancing customer experiences, raising operational efficiency, and delivering customized, scalable, and secure AI-driven solutions tailored to support enterprise digital success."*
>
> ***– Mei Lee Quah***
> ***Senior Director, ICT Research***

Price/Performance Value

With 5G nationwide coverage since 2022, Singtel's 5G has been driving digitalization and digital transformation in Singapore with platforms that were built to address the challenges and complexities faced by enterprises, which include managing multiple networks, for example, for connectivity and cloud application lifecycle management, both at the edge and in their centers, while facing resource limitations and a lack of know-how. The company excels at offering superior network quality enhanced by network slicing and differentiated 5G and customer experience. Its Paragon platform enables the deployment of services like Network-as-a-Service, edge computing, GPUaaS and AI-driven solutions. Singtel's initiatives

are enhancing customer experiences, raising operational efficiency, and delivering customized, scalable, and secure AI-driven solutions tailored to support enterprise digital success. With the additional boost to its 5G network reliability and quality with the deployment of its 700 MHz spectrum in February 2025, which provides up to 40% better coverage in high-rise buildings, indoor, underground, and remote areas, it is offering enterprises even better value now while reducing operational and cost overheads.

Singtel's newly launched 5G+ service delivers faster speeds, seamless connectivity, and robust security, even while roaming, and is enabled by the nationwide deployment of network slicing for all customers. This means that the customer's specific needs will be served by a slice of the mobile network in real time. Based on an advanced network slicing technology known as User Equipment Route Selection Policy (URSP), this capability enables enhanced connectivity by prioritizing data traffic and allocating dedicated network resources. It is particularly beneficial for users of applications that require better data performance, consistent bandwidth, and lower latency, such as those for workplace productivity and enterprise communications (for example, Microsoft Teams, Zoom, FaceTime, and WhatsApp). With the shift towards a mobile-only workforce, network slicing will be crucial for business continuity, collaboration, and communication.

Singtel is the first mobile operator in the region to offer network slicing to boost the performance of business applications for enterprise users on supported iPhone and iPad models. Enterprises can benefit from a fit-for-purpose slice of Singtel's 5G network when they use applications that leverage Apple's traffic categories, such as streaming and communication, or are managed through a supported mobile device management (MDM). Enterprise Mobile Protect also extends real-time threat protection to all customers, including those roaming overseas. Enhanced security includes 24/7 advanced detection and blocking against cyber threats and malicious content. This development paves the way for broader adoption, e.g., better support for business-critical and mission-critical applications, and unlocks more 5G network capabilities, for instance, 'security as a slice' and targeted deployment not only to devices but also to specific locations, applications, and even individuals. It is a step up from the previous benchmark, where the technology was used by enterprises to overcome congestion and achieve high speeds for critical applications.

Understanding the customer value choice, alongside its 5G+ network, the company will continue to offer reliable 4G experience with extensive coverage and affordable access to ensure dependable connectivity for all. Going to this extent with its proactive approach in Singapore is setting the company apart from the competition and offering superior value compared to similar market offerings.

Brand Equity

The company's brand value has grown by 2% to USD 4.1 billion largely due to its strategic investments in digital services, AI, and data centers, as well as a string of technological firsts and breakthroughs with partners. The innovative Paragon platform positions Singtel as a technology partner to digitally ambitious and technology-driven enterprises, which is helping shift its brand image from that of a telecoms company to a technology company (techco). The shift is crucial for mobile operators, as operating as a techco means that the company has evolved from providing commoditized connectivity to being capable of offering a portfolio of innovative, customer-centric digital services.

The fact that Singtel has attracted industry-leading global enterprises to Singapore to rethink and transform their businesses with the help of its Paragon platform shows that the company is considered an indispensable business partner that shares a keen interest in helping enterprises succeed in their plans and achieve their desired outcomes. With a branded ecosystem for 5G, edge computing, and cloud orchestration, enterprises can more easily achieve their business goals and/or make new connections to customers and partners of their own to facilitate growth of their connections in the Singtel branded ecosystem. The company has also proven to be a key enabler of digital transformation for many mobile operators in the region, which not only comprise its subsidiary Optus (Australia) and regional associates Telkomsel (Indonesia), AIS (Thailand), and Globe (Philippines), but also other mobile operators including but not limited to Chunghwa, Taiwan Mobile, and FET (Taiwan); HKT (Hong Kong); and Maxis (Malaysia).

Its strategic alliances have transformed the Paragon platform into a globally competitive, vertically integrated, and technologically advanced platform. Its capabilities are unmatched in APAC, and this has been recognized by industry participants, including Frost & Sullivan and enterprise customers. The Singtel Paragon platform has been awarded as the platinum winner for Best Network Orchestration Solution in Telco at the Future Digital Awards 2025, the Platform Award at the World Communication Awards 2024, and the Innovation in Digital Transformation (Telecommunications Industries) award at the Asia-Pacific Stevie® Awards.

Conclusion

The capabilities of Singtel's Paragon platform are clearly unmatched in the Asia-Pacific. The company has established its leading position in the market by constantly striving to improve how it meets the needs of the enterprise segment, driving enterprise digital success. As a key growth engine under Singtel's ST28, Frost & Sullivan expects greater growth of the Paragon platform in the coming years.

With its strong overall performance, Singtel earns Frost & Sullivan's 2025 Asia-Pacific Enabling Technology Leadership Recognition in the 5G and multi-infrastructure AI orchestration industry.

What You Need to Know about the Enabling Technology Leadership Recognition

Frost & Sullivan's Enabling Technology Leadership Recognition is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

Best Practices Recognition Analysis

For the Enabling Technology Leadership Recognition, 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: 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

Customer Impact

Price/Performance Value: Products or services offer the best ROI and superior value compared to similar market offerings

Customer Purchase Experience: Purchase experience with minimal friction and high transparency assures customers that they are buying the optimal solution to address both their needs and constraints

Customer Ownership Excellence: Products and solutions evolve continuously in sync with the customers' own growth journeys, engendering pride of ownership and enhanced customer experience

Customer Service Experience: Customer service is readily accessible and stress-free, and delivered with high quality, high availability, and fast response time

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty, which is regularly measured and confirmed through a high Net Promoter Score®

Best Practices Recognition Analytics Methodology

Inspire the World to Support True Leaders

This long-term process spans 12 months, beginning with the prioritization of the sector. It involves a rigorous approach that includes comprehensive scanning and analytics to identify key best practice trends. A dedicated team of analysts, advisors, coaches, and experts collaborates closely, ensuring thorough review and input. The goal is to maximize the company's long-term value by leveraging unique perspectives to support each Best Practice Recognition and identify meaningful transformation and impact.

		VALUE IMPACT	
STEP		WHAT	WHY
1	**Opportunity Universe**	Identify Sectors with the Greatest Impact on the Global Economy	Value to Economic Development
2	**Transformational Model**	Analyze Strategic Imperatives That Drive Transformation	Understand and Create a Winning Strategy
3	**Ecosystem**	Map Critical Value Chains	Comprehensive Community that Shapes the Sector
4	**Growth Generator**	Data Foundation That Provides Decision Support System	Spark Opportunities and Accelerate Decision-making
5	**Growth Opportunities**	Identify Opportunities Generated by Companies	Drive the Transformation of the Industry
6	**Frost Radar**	Benchmark Companies on Future Growth Potential	Identify Most Powerful Companies to Action
7	**Best Practices**	Identify Companies Achieving Best Practices in All Critical Perspectives	Inspire the World
8	**Companies to Action**	Tell Your Story to the World (BICEP*)	Ecosystem Community Supporting Future Success

*Board of Directors, Investors, Customers, Employees, Partners

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The Growth Pipeline Generator™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

Learn more.

Key Impacts:

- **Growth Pipeline:** *Continuous Flow of Growth Opportunities*
- **Growth Strategies:** *Proven Best Practices*
- **Innovation Culture:** *Optimized Customer Experience*
- **ROI & Margin:** *Implementation Excellence*
- **Transformational Growth:** *Industry Leadership*

The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Megatrend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)