

F R O S T & S U L L I V A N



中華電信
Chunghwa Telecom

2022 CUSTOMER VALUE LEADER

*TAIWAN
5G SERVICES 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. Chunghwa Telecom excels in many of the criteria in the 5G services space.

| AWARD CRITERIA | |
|------------------------|-------------------------------|
| <i>Business Impact</i> | <i>Customer Impact</i> |
| Financial Performance | Price/Performance Value |
| Customer Acquisition | Customer Purchase Experience |
| Operational Efficiency | Customer Ownership Experience |
| Growth Potential | Customer Service Experience |
| Human Capital | Brand Equity |

Supporting 5G Adoption and Use Cases to Grow the 5G Services Market

The COVID-19 pandemic has accelerated the market trends of remote working and online learning and increased customers' consumption of rich media content for their entertainment needs. These trends have had a profound impact on telecommunications and 5G networks. Not only are communications service providers (CSP) facilitating the smooth running of connected societies, they are themselves undergoing digital transformation to ensure their services are more reliable, personalized, and adaptable to dynamic market conditions. Advanced applications and internet of things (IoT) solutions requiring superior features, such as higher bandwidth, lower latency, and resilient coverage, are increasingly being supported over 5G networks, leading to new growth opportunities for CSPs. In turn, CSPs are aggressively investing in their networks to deliver 5G and realize the full potential of hyperconnectivity. As a result, CSPs have intensified network infrastructure upgrades and investments in 5G network deployment and launched 5G services.

5G represents a fundamental shift in communication network architectures that will stimulate revenue generation through innovative services facilitated by 5G-enabled smartphones, tablets, laptops, and IoT devices. The strong performance of 5G with higher speed, reduced latency, and increased connection density will accelerate the development of new and existing technologies, including network slicing and edge computing. 5G is the first generation of mobile technology where revenue from enterprise or vertical-specific mobile and IoT deployments is expected to rival, and possibly exceed, revenue from consumer mobile and IoT services. However, diverse use cases are required to target different industry

verticals effectively, such as manufacturing, healthcare, and government, with relevant, outcomes-centric wireless enterprise solutions. CSPs have found it essential to build a partner ecosystem to maximize the 5G opportunity by co-creating and offering vertical-specific solutions.

The Taiwan 5G services market shows promising growth as the country's three major CSPs launched 5G services in the second half of 2020. Their 5G penetration rate is similar at about 20% by the end of 2021 and is forecast to reach 30% by the end of 2022. However, the penetration growth rate of 5G is much slower than previous cellular technology as 5G devices and applications are not widely available. CSPs in Taiwan cited that the biggest challenge in the 5G services market is introducing more innovative applications that will attract customers to adopt 5G services.

Customer Acquisition

Chunghwa Telecom is the largest CSP in Taiwan. Established in 1996, it is an integrated provider offering mobile broadband, fixed-line, internet, and information and communications technology services to business-to-consumer (B2C) and business-to-business (B2B) markets. A pioneer in leveraging 5G's

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unique capabilities to support new, meaningful business models across industries, Chunghwa Telecom prioritizes developing new experiences and interactive services for customers. For example, it enhanced customers' viewing of sports and music events on their devices. With its 5G technology, the company can support 4K and high-definition image quality for a multi-viewing experience, providing high-resolution image quality from all viewing angles. Based on Frost & Sullivan's research, immersive viewing experiences and 5G-based content are key use cases that will boost the adoption of 5G services.

The effectiveness of Chunghwa Telecom's 5G growth strategy has resulted in an impressive increase in its 5G business, positioning the company to lead the 5G services market in Taiwan with about 1 million 5G subscribers as of 2021.

Growth Potential

5G presents CSPs with the opportunity to transform business models for B2C and B2B markets. For the B2C market, Chunghwa Telecom drives 5G customer migrations by being the leader in network quality, accelerating 5G deployment at better spectrum locations such as high-traffic business sites and tourist hotspots. The company maintained its market leadership by ending 2021 with more than 12,000 5G stations and a 20% 5G penetration rate in Taiwan. However, the uptake of 5G consumer services in Taiwan is slower than expected, and competitors are not far behind in the 5G race. CSPs must shift focus to enterprise 5G services and identify use cases that offer value-added benefits and attract customers to pay more for network services. Chunghwa Telecom is noteworthy as the first mover to launch private 5G network services in Taiwan. Frost & Sullivan firmly believes that an effective private networking offering is critical for CSPs to compete effectively in the competitive 5G wireless market and commends

Chunghwa Telecom for its trailblazing achievement. In 2021, Chunghwa Telecom expanded its private 5G network business and signed a memorandum of understanding with National Telecom, The WhiteSpace, and Delta Electronics from Thailand for private 5G network development. Chunghwa Telecom can now support enterprises in Thailand, particularly manufacturing and healthcare companies, with high-performance 5G applications integrated with IoT, artificial intelligence, and big data.

Financial Performance

Despite operating in a challenging market, Chunghwa Telecom's total revenue recorded a year-on-year (YoY) growth of 1.4% to generate NT\$120.48 billion (\$4.16 billion)¹ in 2021, driven by revenue growth from its mobile services business. Impressively, Chunghwa Telecom's mobile services revenue rose by 5.6% to NT\$95.25 billion (\$3.28 billion) in 2021 because of the company's extensive network development and launch of 5G services. As a clear indication of its 5G leadership, Chunghwa Telecom also recorded an increase of 39% in average revenue per user in monthly fees as more customers adopted its 5G services. Chunghwa Telecom further validates its market leadership and pioneering status in 5G services in Taiwan with its private 5G network business valued at NT\$1 billion (\$34.5 million) in 2021. Chunghwa Telecom has shown constant efforts to improve private 5G network services by partnering with leading industry ecosystem participants, such as network equipment providers and system integrators. Frost & Sullivan applauds Chunghwa Telecom for staying ahead of its competitors and driving the 5G services market.

Customer Purchase Experience

Advanced 5G connectivity and vertical applications are critical for the ongoing digital transformation revolution across industry verticals in Taiwan. Enterprises prefer private wireless networks to address their connectivity needs, but face challenges in building, operating, and maintaining them. Chunghwa Telecom is well-positioned to meet enterprise needs with its in-house multi-access edge computing solution and comprehensive services portfolio that ranges from advisory services to on-site

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investigations to the network's design, build, and maintenance. These solutions and services facilitate and expedite private 5G network deployment. In 2021, Chunghwa Telecom developed private 5G networks for semiconductors, media, entertainment, and power generation industries in Taiwan, reflecting its growth strategy of collaborating with leading companies in industry verticals to establish successful 5G use cases. As an integrated solution provider, Chunghwa Telecom delivers expanded value to customers by catering to enterprise needs. Through strategic partnerships, it can also enter new markets.

¹ \$1.00=NT\$28.99, 14 April 2022 (source: xe.com)

Customer Ownership Experience

Robust connectivity across countries and regions becomes necessary as digital services usage increases. In 2021, Chunghwa Telecom announced a joint agreement to build a high-performance 12,000 kilometer submarine cable by 2024, linking Taiwan, Singapore, Japan, Indonesia, Guam, and the Philippines. The company established the APRICOT consortium, which comprises other market participants, to develop the subsea cable utilizing advanced optical transmission technology. The subsea cable will provide a capacity of more than 190 terabits per second, enabling Chunghwa Telecom to offer high-speed and stable 5G networks, IoT, augmented and virtual reality, and cloud services. Frost & Sullivan lauds Chunghwa Telecom's strategy of investing in alternative network capabilities for ultra-capacity to drive the high speed, low latency, and massive connectivity of 5G and expand its international business plan in Asia-Pacific.

Brand Equity

While new, highly immersive, and interactive use cases are being offered over 5G, network speed, responsiveness, and availability remain the key differentiators for CSPs to achieve revenue and subscriber growth. In 2021, Chunghwa Telecom recorded the best 5G download and upload speeds and 5G games and video experiences among its competitors. According to Opensignal's Taiwan 5G Experience Report December 2021, Chunghwa Telecom registered a download speed of 456.6 megabits per second, an upload speed of 60.6 megabits per second, and games and video experiences scores of 85.9 and 84.1, respectively, surpassing the performance of competitors.² These results reflect the robustness of Chunghwa Telecom's 5G services in providing customers with a seamless network experience, reaffirming the company's strong brand equity and market leadership in customer value.

Conclusion

Chunghwa Telecom is a leading pioneer in Taiwan's 5G services market, offering solutions that prioritize customer value. The company leads in network quality through its continuous upgrades in 5G network infrastructure and exploration of network alternatives to drive 5G services and improve the customer experience. It has successfully identified consumer-centric business models and developed innovative and value-added 5G services, such as 5G-enabled content and private 5G networks, to propel B2C and B2B market adoption of 5G in Taiwan. The company has established a robust 5G partner ecosystem to accelerate the country's 5G services market growth.

With its strong overall performance, Chunghwa Telecom earns Frost & Sullivan's 2022 Taiwan Customer Value Leadership Award in the 5G services industry.

² <https://www.opensignal.com/reports/2021/12/taiwan/mobile-network-experience-5G>

What You Need to Know about the Customer Value Leadership Recognition

Frost & Sullivan's Customer Value Leadership Award recognizes the company that offers products or services customers find superior for the overall price, performance, and quality.

Best Practices Award Analysis

For the Customer Value Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

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

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

About Frost & Sullivan

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The Growth Pipeline Engine™

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

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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:

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

