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Chunghwa Telecom's XGS-PON rollout provides a strong competitive edge

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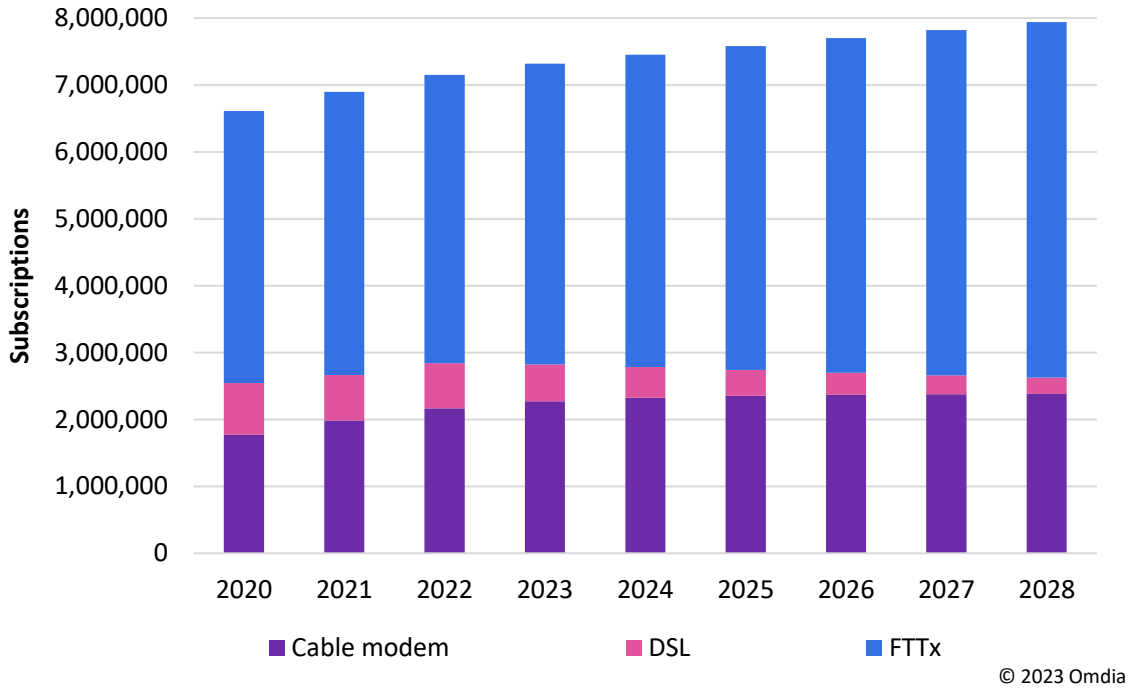
Introduction: Chunghwa Telecom leads the broadband market, despite strong competition from cable operators

Taiwan, home to 24 million people and with an urban population close to 80%, is a highly advanced telecoms market that rapidly adopts new telecoms technologies. For example, the territory was an early adopter of 5G mobile technology and its 5G subscriber base is growing rapidly. Taiwan was also among the first markets to phase out 3G services completely, having done so at the end of 2018.

Chunghwa Telecom Company Ltd. (Chunghwa Telecom) is the largest integrated telecom service provider in Taiwan and is the incumbent operator. By a wide margin, Chunghwa Telecom is the leading FTTP operator in Taiwan, commanding 86% of the FTTP market in 1Q23. However, FTTP represents only 60% of broadband households in Taiwan. Coax cable-based broadband had 31% broadband market share in 1Q23 and, according to Omdia's broadband subscriber by technology forecast, its strong role in the market is not expected to diminish, as shown in **Figure 1**. Consequently, Chunghwa Telecom is rolling out 10 Gigabit Symmetrical Passive Optical Network (XGS-PON) technology to improve its competitive positioning in Taiwan's broadband access market.

Figure 1: Taiwan's broadband subscriptions by technology, 2020–2028



Source: Omdia

In addition, the high speeds and enhanced capacity that XGS-PON can provide are important in reinforcing the value of wireline connections in a market that has been rather cellular centric. Fixed broadband household penetration stands at around 83%, which is lower than some other territories in the region, partly since some households have preferred to rely solely on cellular connectivity for all their data needs (because unlimited mobile data plans have, historically, been available in the market). Although some unlimited mobile data plans permit tethering to connect other devices, there is often a data cap on such usage.

The enhanced capacity that XGS-PON provides, and its ability to keep pace with growing data traffic levels, helps to demonstrate the value of an FTTP connection. Moreover, the higher speeds that XGS-PON can deliver will also help reinforce the value of FTTP for 5G. The goal is to create a single network to converge all services and reduce the cost of network overlay construction by using FTTP for 5G transport. This will enable Chunghwa Telecom to compete better with both fixed and mobile services. For example, Taiwanese mobile operators are advertising 5G plans with data speeds up to more than 1Gbps (gigabit) whereas XGS-PON can deliver multi-gigabit access and is also able to consistently deliver such speeds— unlike cellular speeds, which are much more variable because they depend on network conditions. On the other hand, FTTP will enable more cost-efficient delivery of 5G services.

Chunghwa Telecom's XGS-PON strategy: key adoption drivers

Chunghwa began its XGS-PON tender process in 2020, seeking a next-generation PON technology that would provide the following:

- Enable bandwidth tiering, leading to higher ARPU
- Meet NCC's (National Communications Commission) guidance for 100% coverage with 2G fixed broadband by 2025
- Reduce TCO (total cost of ownership) compared to broadband competition
- Support convergence of broadband access networks among different subscribers and applications, including residential, enterprise, and mobile transport

XGS-PON provides opportunities to continue growing ARPU

Chunghwa Telecom has developed bandwidth-tiered packages to attract residential subscribers to higher speeds, thereby leading to higher ARPU. **Figure 2** provides a summary of Chunghwa Telecom's HiNet FTTx offerings.

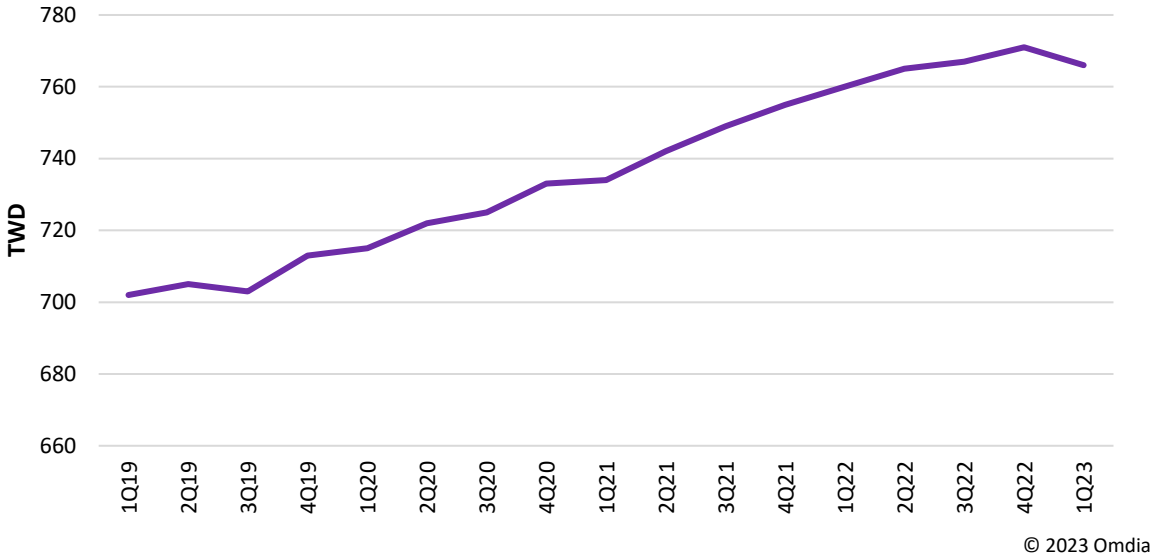
Figure 2: Chunghwa Telecom's HiNet FTTx—selected offerings

Internet speed (bps) downstream/upstream	2Gb/1Gb	1Gb/600Mb	500Mb/500Mb	300Mb/300Mb	100Mb/40Mb	60Mb/20Mb
Internet service fee	$1,219	$845	$622	$576	$466	$459
Line circuit fee	$1,850	$1,054	$677	$623	$442	$389
Total monthly fee	$3,069	$1,899	$1,299	$1,199	$908	$848

Source: Chunghwa Telecom - https://www.cht.com.tw/en/home/cht/about-cht/products-and-services/broadband

The launch of XGS-PON will enable Chunghwa Telecom to continue the positive trend it has been showing in growing broadband ARPU, which has increased year-on-year for 14 consecutive quarters (see **Figure 3**). There is still plenty of scope for the operator to grow ARPU through the sale of higher speed packages. For example, at year-end 2022, Chunghwa Telecom had close to one million broadband subscribers with subscriptions of 300Mbps and higher, and this represented an increase of almost 52% compared to the year before.

Figure 3: Chunghwa Telecom broadband ARPU, 1Q19–1Q23



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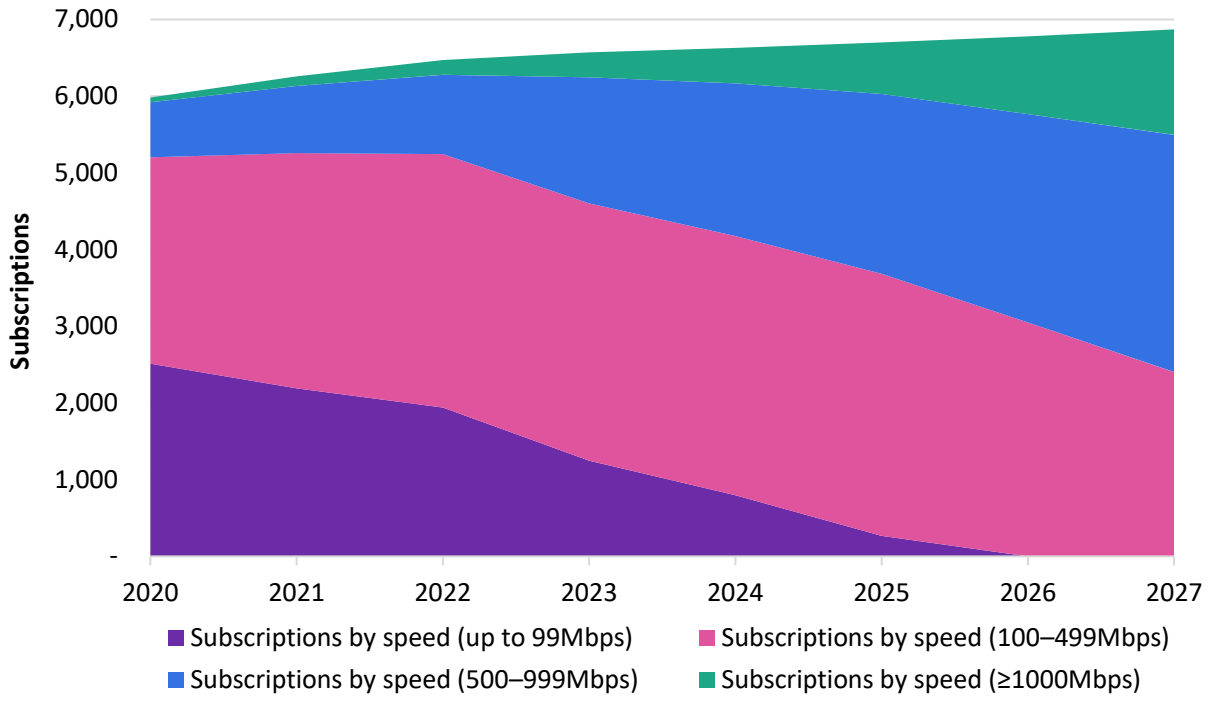
Symmetrical bandwidth is attractive to many residential subscribers and XGS-PON can easily support equal downstream and upstream speeds. XGS-PON allows operators to offer symmetrical speeds and multi-gigabit speeds, which delivers an important competitive advantage. Taiwan's cable operators are constrained regarding symmetrical speeds unless they move to Full Duplex DOCSIS 4.0, which they have yet to announce plans to adopt. Symmetrical speeds are a particularly strong differentiator for Chunghwa Telecom, since the cable operators are offering highly asymmetric plans. For example, cable operators, such as Taiwan Broadband Communications, are only offering gigabit downstream speeds. Symmetrical speeds and multi-gigabit speeds are also an important differentiator versus Chunghwa Telecom's own VDSL plans. In this way the rollout of XGS-PON can further highlight the advantages of FTTP and encourage existing Chunghwa Telecom VDSL subscribers to migrate to more expensive and higher-speed FTTP plans.

The adoption of XGS-PON also enables competitive differentiation from other integrated operators in Taiwan. Combining mobile with symmetrical gigabit or multi-gigabit broadband enables Chunghwa Telecom to offer unique service-level packages to residential subscribers.

XGS-PON can easily support ever-increasing bandwidth demand. According to Omdia, the average broadband subscription speed was 158Mbps in 2020 and is forecast to reach 749Mbps in 2027, as shown in **Figure 4**. XGS-PON can easily sustain the 2028 forecast for residential subscribers, along with bandwidth availability for non-residential customers as discussed in the next section.

Figure 4: Taiwan—consumer broadband subscriptions by speed, 2020–2027



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Source: Omdia

XGS-PON is helping Chunghwa Telecom meet government broadband speed targets

The launch of XGS-PON is also important for Chunghwa Telecom because it helps the operator meet government broadband speed availability targets. Chunghwa Telecom plans to continue investing in its 2Gbps broadband internet infrastructure, which will help it to meet the NCC's guidance for 90% coverage by 2025. The target is an indication of how governments are increasingly seeing the availability of gigabit and multi-gigabit speeds as a necessity for their citizens.

Chunghwa Telecom launched its 2Gbps broadband internet service in August 2021, with coverage reaching 51.1% at year-end 2022. By then, Chunghwa Telecom's FTTH fiber network coverage was 91.4%, with a ready-to-install rate of 81.4% within a week.

XGS-PON FTTP also offers cost advantages over alternative broadband infrastructures

Furthermore, fiber-based broadband access networks are less costly to operate and maintain compared to coax-fiber networks. This is a major advantage to Chunghwa Telecom. In addition, XGS-PON optical line terminals (OLTs) consume less power per gigabyte than Gigabit Passive Optical Network (GPON) OLTs. Consequently, Chunghwa Telecom's XGS-PON deployments will be able to support more subscribers and more bandwidth without a proportional increase in energy consumption. This is important and fits into Chunghwa Telecom's comprehensive sustainability plan.

XGS-PON enables "beyond-residential": more revenue and lower costs

Chunghwa Telecom's XGS-PON strategy is to align different customer types and applications onto the same fiber-based broadband access network. XGS-PON is enabling Chunghwa Telecom to support enterprise customers and wireless data transport onto the same ODN (optical distribution network). This multi-use approach enables simplified network operations and upgrades, leading to lower TCO and, consequently, improved ROI.

For example, Chunghwa Telecom uses its PON infrastructure to support public Wi-Fi data aggregation. This reuse of infrastructure saves both capital expenditure and operating costs.

In addition, Chunghwa Telecom is using XGS-PON to offer gigabit packages for its enterprise customers. Most enterprise customers are focused on quality of experience (QoE) and service-level agreements (SLAs), rather than the underlying infrastructure. The underlying fiber-based topology does not impact an operator's ability to provide data throughput, latency, jitter, packet loss, and redundancy SLAs.

Smart city applications are becoming a key area of focus for Chunghwa Telecom. XGS-PON infrastructure, along with Chunghwa Telecom's wireless network, enables support for numerous smart city applications, such as surveillance and eParking, along with traffic and street lighting controls. Chunghwa Telecom is well positioned, as an integrated operator, to ensure that bandwidth-intensive and latency-sensitive smart city applications can be supported.

Appendix

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This piece of research was commissioned by Nokia.

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