

Analysis of Major Capex and its Impact on Finance and Operations

With operating cash inflows, the Company funds its major capex with internally generated cash flows.

Investment Policies, Reasons for Profit/Loss, Plans for Improvement, and Future Investment Plan

Taiwan Mobile focuses on making long-term and strategic investments. To become a leader in digital convergence, the Company has positioned itself as an "Internet Technology Company," with diverse investments in the telecom, internet, media & entertainment, and e-commerce industries.

In 2018, on a consolidated basis, TWM's investment income from long-term investments under the equity method amounted to NT\$27,128 thousand as the operations of said investments stabilized. For future investments, TWM will continue to make decisions based on prudent strategic assessments.

Risk Management

Impact of inflation, interest and exchange rate fluctuations, and preventive measures:

1. Impact of interest rate fluctuations

Interest rate fluctuations had a minimal impact on TWM's 2018 short-term bank borrowings, as interest rates remained low and stable. The Company has straight bond issuances and mid-term loan facilities with banks to lock in mid-to-long-term interest rates and minimize impacts from interest rate fluctuations.

2. Impact of exchange rate fluctuations

Only some of the Company's payments are denominated in euros and US dollars. To minimize the impact from foreign exchange rate fluctuations, the Company hedges risks through foreign exchange spot market transactions. Overall, exchange rate fluctuations had an insignificant impact on the Company.

3. Impact of inflation

Inflation had a minor impact on the Company's operating performance in 2018 up to the publication date in 2019.

Investment policy and reasons for gains & losses for high-risk/high-leverage financial products, derivatives, loans to others and guarantees of debts:

1. The Company was not involved in any high-risk, high-leverage financial investment.
2. The Company passed the Rules and Procedures on Lending and Making Endorsement/Guarantees to supervise its financing and endorsement activities. As the counterparties in its loans and guarantees are all its subsidiaries, there is minimal operating risk.
3. Derivatives transaction: None.

Expected benefits and risks from mergers in 2018 up to publication date in 2019: None.

Future research and development plans

Project name	Objective
Personalized video recommendation services	Use AI deep learning algorithms to provide personalized video recommendations.
TAMedia - Mobile advertisement platform	Enrich video advertisement and develop new type of advertisements. Incorporate more third parties' data to improve advertising effectiveness.
myBook	Add web-based interface to improve user experience, expand sales channels to increase revenue and improve recommendation mechanism.
MyMusic	Integrate music service with smart speakers and form partnerships with various companies to develop new business models.

Expected research and development expenses

In 2019, the projected research and development expense amounted to NT\$605,843,000.

Regulatory changes and developments

1. Revision of digital convergence laws and regulations

(1) Status

The draft Digital Communications Act was reviewed by the legislature's Transportation Committee on May 24, 2018, and is awaiting cross-party negotiations. The draft Telecommunications Management Act is also under review by the Committee, and is expected to be passed in the first half of 2019. The proposed Telecommunications Management Act is expected to give operators more flexibility and efficiency in network and spectrum usage.

(2) Countermeasures

The Company is closely monitoring the progress of the two bills and continues to communicate with the Legislative Yuan on related policies and regulations to ensure a favorable regulatory environment for the industry's development.

2. NCC proposes bill to prevent media monopolies and promote diversity

(1) Status

On January 16, 2019, the NCC proposed a bill to promote media diversity and prevent monopolies, including setting the standards for media integration and a media-financial industry separation clause (which will only apply to media integration cases that take effect after the implementation of the Act). The bill is to be submitted to the Executive Yuan for approval.

(2) Countermeasures

The Company is closely monitoring the progress of the proposed bill and continues to communicate with and forward suggestions and recommendations on related policies and regulations to the Executive Yuan and the Legislative Yuan to prevent overregulation that could hinder the industry's development.

3. 3G licenses terminated on December 31, 2018

(1) Status

The NCC terminated 3G licenses on December 31, 2018.

(2) Countermeasures

The Company has transferred the original 3G network to a 4G heterogeneous network and offers preferential programs to encourage 3G users to migrate to 4G services.

4. NCC proposed changes to charge standard of utilization fee of radio frequency on January 11, 2019

(1) Status

In response to the anticipated demand for larger 5G bandwidth, better reflect the value of high and low frequency band, and encourage mobile operators to continue building in rural areas and along important transportation infrastructure, the NCC has proposed adjusting the calculation standards of mobile communication frequency charges including the rural area coverage factor, utilization fee per MHz and frequency band adjustment factor.

(2) Countermeasures

The Company supports the proposed changes in frequency charges and plans to set up high-speed transmission stations in rural areas to create a “win-win” situation that advances rural users’ digital rights, while the Company benefits from lower spectrum usage fees.

5. Reduction of mobile-to-fixed termination rates

(1) Status

The NCC implemented a four-year scheme to lower the mobile-to-fixed termination rate, which reduced the rates for peak hours from NT\$0.4851 to NT\$0.4383 per minute, and off-peak hours from NT\$0.2531 to NT\$0.2148 per minute, effective January 1, 2019 to December 31, 2022.

(2) Countermeasures

The reduction of mobile-to-fixed termination rates should help the Company reduce network interconnection costs.

6. Reduction of wholesale IP peering charges

(1) Status

Using the average price in the Asia-Pacific region as a reference, the NCC approved Chunghwa Telecom’s new wholesale pricing scheme on April 3, 2018, which lowered the IP peering charge by 30% from NT\$170 per Mbps to NT\$119 per Mbps. This scheme took effect retroactively on April 1, 2018.

(2) Countermeasures

This reduction has lowered the Company’s IP peering cost, which is beneficial to the Company as it offers various digital economy services to satisfy clients’ needs.

7. NCC proposes “a la carte” pricing for basic channels

(1) Status

The NCC plans to require system operators to provide at least two sets of basic channel combinations with HD or ultra HD. The first group would include 13 must-carry channels, with the maximum fee set at NT\$200. The second group would be based on the most popular combination of basic channels in the previous year, with the maximum fee set at NT\$600. System operators would also be conditionally allowed to offer basic channel packages priced at more than NT\$600. The NCC pre-announced the above-mentioned draft to the public on February 25, 2019 to collect opinions.

(2) Countermeasures

The implementation of “a la carte” pricing for basic channels is expected to have a significant impact on the cable TV industry. The Company is closely monitoring the progress of the policy and continues to communicate with the NCC in hopes of loosening the regulations to create a more favorable viewing environment for consumers and a regulatory environment for the industry’s development.

Technology changes and development

1. Mobile broadband access network

(1) Status

Major changes in 2018 included:

- a) Increasing popularity of video streaming, AI and big data fueled continued growth of mobile data traffic.
- b) Providing ubiquitous broadband services while utilizing energy-efficient equipment became an important trend toward social responsibility in the telecom industry.
- c) To address the growing demand for connecting low-complexity, lower-power devices to the wide-area mobile network, mobile network operators continued to expand the coverage of NB-IoT networks.
- d) After the release of 5G New Radio specifications, commercial deployment of 5G systems is expected to start taking off around 2020.
- e) 3G licenses expired at the end of 2018, but services under a heterogeneous mobile broadband network continued.

(2) Countermeasures

TWM took advantage of the opportunities as follows:

- a) Deployed more base stations to increase network capacity and small cells to offload traffic in hotspots.
- b) Used LTE relay backhaul architecture in rural areas to expand the reach of its mobile broadband service and enabled LTE intelligent power saving function to reduce base stations' energy consumption during low traffic.
- c) Provided NB-IoT network in 700MHz frequency band to support accessible and stable low-energy consumption IoT services.
- d) Invested in 5G New Radio technology research and signed memorandums of understanding with Nokia and ITRI for cooperation on 5G development.
- e) To improve LTE throughput and capacity, TWM re-farmed 5MHz of 2100 band spectrum used for UMTS to deliver LTE services in 2018.

TWM will continue to focus on providing mobile broadband services with the best speed, coverage and customer experience to maintain its competitive edge.

2. Network technology development

(1) Status

- a) Internet Protocol Version 4 (IPv4) has been used for internet connectivity since the 1970s and has become the most widely used communication protocol today. But with mobile phones, PDAs, vehicles, appliances and other devices with internet connectivity continuing to consume IPv4 addresses, many network operators are facing the problem of IPv4 address exhaustion.
- b) Internet of Things (IoT) provides applications, services, data and analytics through M2M services. Its flexibility, and extensibility should be greatly enhanced by virtualization. Network functions virtualization (NFV) is a standard IT virtualization technology that aims to decouple network functions from proprietary hardware, and allow heterogeneous IoT elements to be connected and managed in a more scalable and flexible manner. NFV has become an important trend in the future 5G network architecture.

c) Traditional network infrastructure equipment merely provided information exchange and computing functions. However, in response to the trends toward massive data processing and decentralized management of applications, computing network architecture started to adopt virtualization technology, allowing networks to provide more dynamic and scalable services with shared hardware and software resources.

(2) Countermeasures

a) At the end of 2018, TWM deployed IPv6 to support an enormous number of applications and services, such as smart meters, vehicle positioning systems and home security. TWM is striving to provide a better customer experience and be ready for the future 5G network.

b) As the first operator to support NFV network equipment for enterprises in Taiwan, TWM deployed an NB-IoT network with virtualization architecture in 2018. The virtualized core network supports a large number of IoT applications with low power consumption and transmission capacity. The services include smart street lights, smart meters and medical applications. In the future, more cloud technology will be incorporated to improve the flexibility of network deployment.

c) To achieve flexible services and agile service development, TWM plans to use network automation as the foundation for a more orchestrated approach to deploying and managing its entire service portfolio.

3. IDC and cloud related services

(1) Status

Based on an Uptime Institute Research report on data center trends in 2019, the accelerating demands of big cloud operators for more data center capacity are straining the ecosystem. Security vulnerabilities also drove more stringent requirements on data centers. Organizations will need to adopt more policies regarding data center equipment, services, contractors, suppliers and staff. Climate change also forced a fresh review of resiliency planning. Economics will eventually drive a wider acceptance of AI applications. A Gartner report projects that the worldwide public cloud services market would grow 17.3% in 2019. Gartner expects more organizations to adopt and purchase public cloud services.

(2) Countermeasures

To satisfy the demand for tightened data center security, TWM's infrastructure as a service (IaaS) received ISO 27018 certification for personal information security. TWM also developed a resiliency plan to address the threat of climate change. Its cloud data center received not only ISO 14001 certification for environmental management, but also the Green Grid PUE silver certification for achieving a power usage effectiveness (PUE) of 1.5. TWM's strategy is to cooperate with world-class public cloud vendors and deliver a complete portfolio of public cloud services to enterprises. TWM is also developing AI solutions, continues to enhance its information security, service quality and cloud services, and complements them with a world-class cloud IDC infrastructure.

Impact of changes in brand image on the Company's risk management policies in 2018 up to publication date in 2019:

None. The Company has built up a sound reputation among investors and customers for its continuing efforts to enhance corporate governance, network communication quality and customer service, as well as to fulfill its corporate social responsibility. These efforts won numerous recognitions and awards in 2018 (please refer to Chapter 1) and should aid the Company in preventing, controlling and managing latent risks that it might face and help it maintain its good corporate image.

Expected benefits and risks from mergers in 2018 up to publication date in 2019:

None.

Expected benefits and risks related to plant facility expansions in 2018 up to publication date in 2019: Not applicable as the Company is not a manufacturer.

Risks from supplier and buyer concentration in 2018 up to publication date in 2019:

The Company has minimal risks from supplier and buyer concentration (please refer to Chapter 4).

Significant changes in shareholdings of directors and major shareholders in 2018 up to publication date in 2019: None.

Changes in management controls in 2018 up to publication date in 2019: None.

Significant lawsuits and non-litigious matters in 2018 up to publication date in 2019

1. The Company:

(1) Spectrum dispute between Far EastOne Telecommunications Co., Ltd. ("FET") and Taiwan Mobile ("the Company")

Parties Involved: FET is the plaintiff and the Company is the defendant.

Grounds for Lawsuit:

FET filed a lawsuit claiming that the Company should: (a) file an immediate application to return the spectrum block 1748.7-1754.9/ 1843.7-1849.9 MHz (hereinafter referred to as "C4 spectrum block") to the National Communications Commission ("NCC"); (b) be prohibited from using the C4 spectrum block in any way, (c) stop using the spectrum block 1715.1-1721.3/1810.1-1816.3 MHz (hereinafter referred to as "C1 spectrum block") until it has returned the C4 spectrum block to the NCC, and (d) pay FET NT\$1,005,800,000.

Status:

In May 2016, the Taiwan Taipei District Court ("District Court") ruled that: (i) the Company received unfavorable judgment on the claims stated in sections (a) to (c); (ii) FET received unfavorable judgment on the claim stated in section (d); and (iii) FET may file a provisional execution with a collateral of NT\$320,630,000 to the favorable portion of the judgment, and the Company may provide a counter security of NT\$961,913,313 to be exempted from, or to move for revocation of FET's provisional execution. FET has provided the collateral to apply for the provisional execution. The Company has provided a counter security of NT\$962,000,000 to be exempted from the provisional execution. The Company and FET filed appeals with the Taiwan High Court ("High Court").

The High Court on January 16, 2018 ruled as follows:

- (1) The District Court judgment in connection with the following items was dismissed:
 - (i) "the Company shall apply to return the C4 spectrum block to the NCC immediately," "the Company shall not use the C4 spectrum block in any way," "the Company shall not use the C1 spectrum block before the C4 spectrum block has been returned to the NCC," and the corresponding portion that FET claimed provisional execution; and
 - (ii) the portion of judgment that "rejected the Company paying FET NT\$1,005,800,000," the corresponding portion of provisional execution, and litigation expenses.
- (2) For the dismissed portion stated in section 1(i), FET's claim and the motion of provisional execution in the first instance were rejected.
- (3) For the dismissed portion stated in section 1(ii), the Company shall pay FET NT\$765,779,233, as well as an annual interest of 5% for the period starting from September 5, 2015 to the payment date, on NT\$152,583,658 of the above amount.
- (4) The rest of FET's appeals were rejected.

- (5) Regarding the portion of the ruling on the Company's payment, FET may file a provisional execution with a collateral of NT\$255,260,000; and the Company may provide a counter security of NT\$765,779,233 to be exempted from FET's provisional execution.
- (6) The Company and FET shall each bear half of the litigation expenses.
- (7) The rest of FET's motions of provisional execution and appeal were rejected.

The Company and FET have filed an appeal with the Supreme Court respectively.

2. The Company's directors, general manager, executives, major shareholder holding more than 10 percent of the Company's shares: None.

3. The Company's subsidiaries: None

Other major risks and countermeasures

In terms of information security and privacy protection, the telecommunications industry has a massive trove of personal privacy information. Any accidental leaks would be the legal responsibility of and would seriously damage the reputation of a company.

Countermeasures:

TWM in 2004 implemented the ISO 27001 "Information Security Management System (ISMS)" standard requirements, and subsequently passed the new version of BS 10012 and ISO/IEC 29100 Privacy Protection Framework Standard 2-in-1 certification. The Company integrated those requirements into its business processes and has continuously improved its security mechanisms, such as controlling personal data breaches, to allow customers to enjoy its services with peace of mind.

The Company has adopted the following to protect personal and confidential data:

1. Stopping external hackers: installing an intrusion prevention system, network segmentation, firewalls, web firewalls, etc.
2. Preventing internal leaks: adopting data leakage prevention/detection and loophole reduction measures
3. System planning and development: incorporating system development security specifications and executing code weakness scanning among others.
4. Operation and maintenance monitoring: establishing an information security monitoring center, checking and analyzing system records, and reporting and tracking if abnormal conditions are found.

Other significant items: None