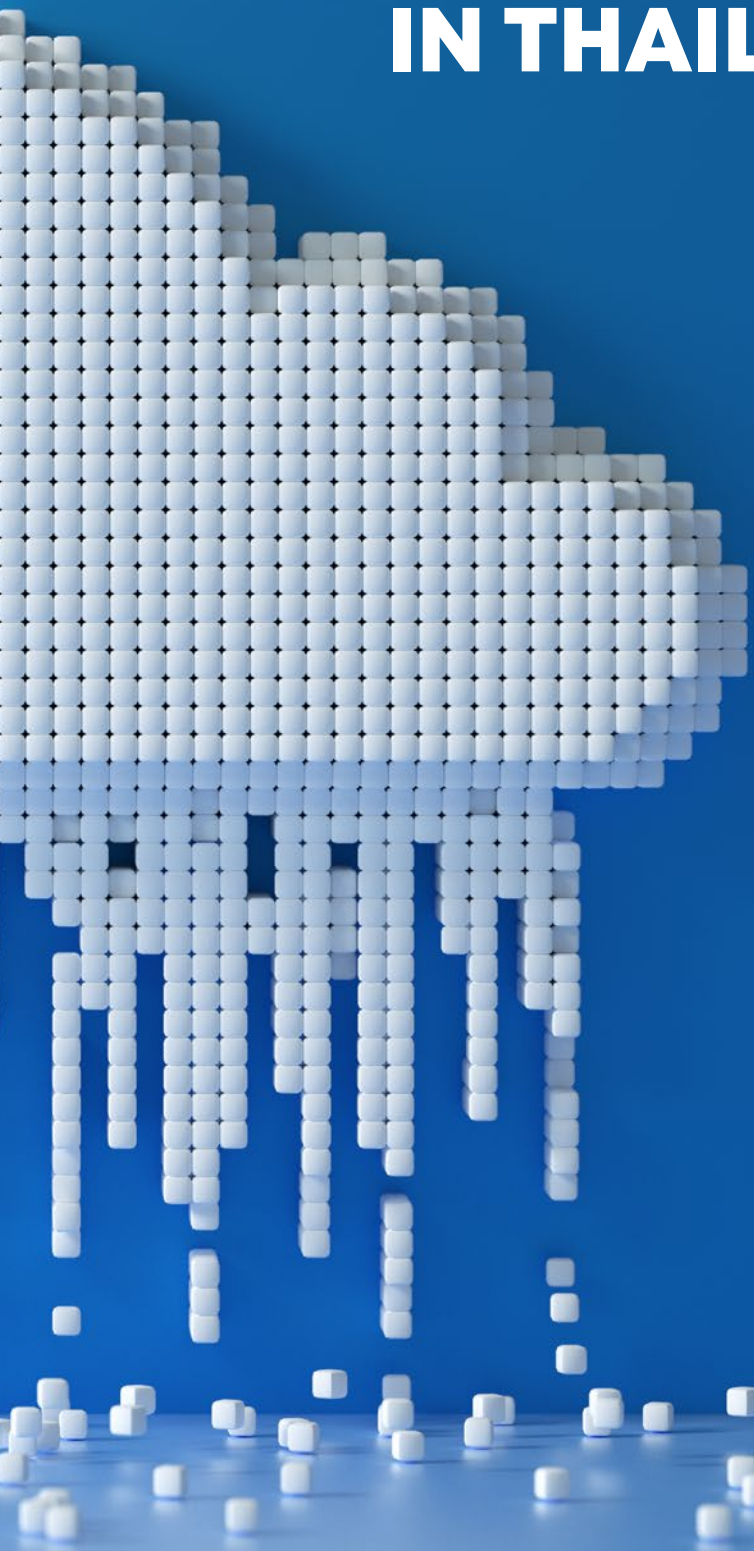
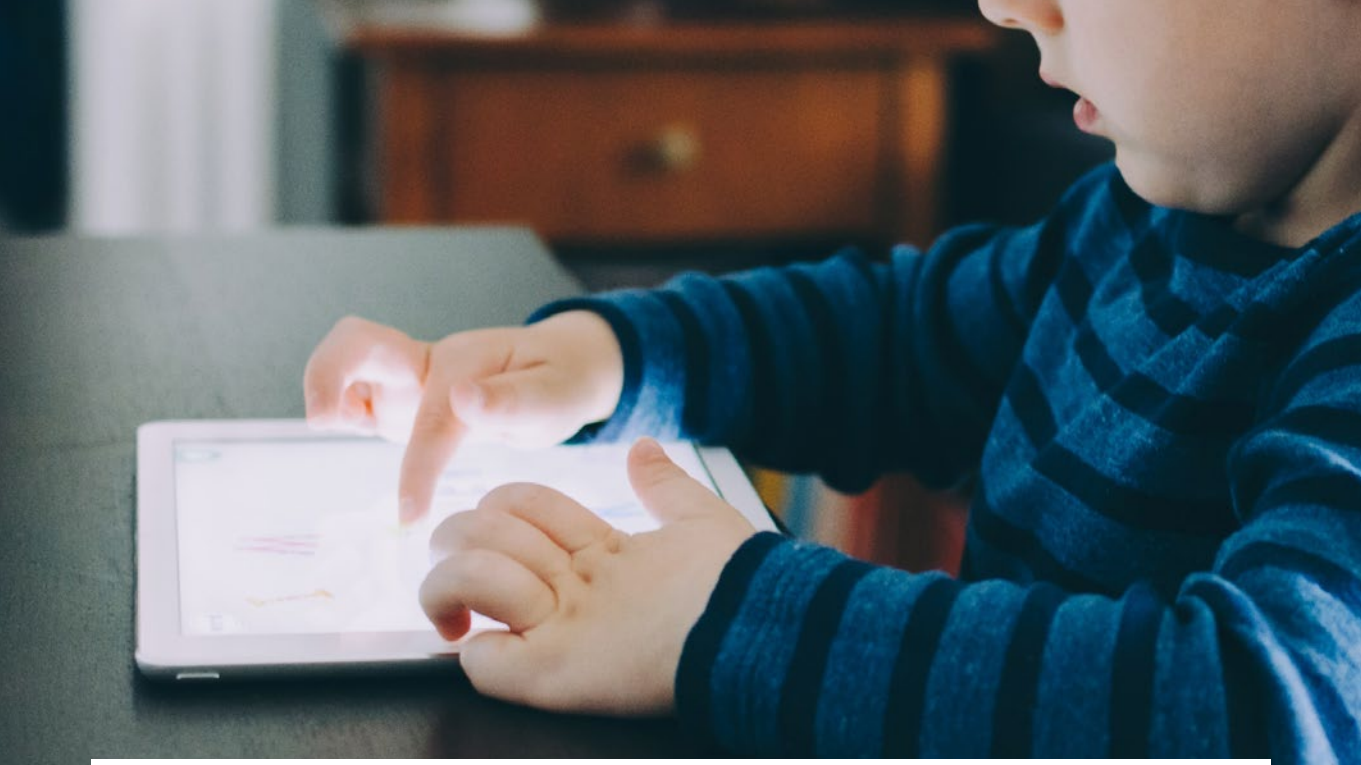
THAILAND BOARD OF INVESTMENT

DATA CENTER AND CLOUD SERVICE IN THAILAND





Why Thailand for Data Center and Cloud Service?

Thailand in the Center of ASEAN, a growing e-business market

The Future of Consumption in Fast-Growth Consumer Markets Report by the World Economic Forum (WEF) and Bain & Company (2021) identified numerous changes in trend for ASEAN consumer habits that will enable Southeast Asia to become the region of growth for e-businesses. Over the next decade, ASEAN will become the fourth largest economy in the world, with a consumer market capitalization of approximately USD 4 trillion. In particular, the COVID-19 pandemic pushes consumers to embrace digital even faster.

The growing middle class will be the key driver of digital businesses. This group of consumers will make more digital purchases and spend more time online as the world progresses to the post-COVID new normal. To highlight some key statistics, total streaming time on mobile devices across the region increased 60% from January 2020 to April 2021 in ASEAN countries including Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam, and consumers spend average time on mobile screens 4.2 hours daily, or 1.2 times the global average.

Thailand is one of the strongest economic countries in ASEAN which is set a goal to be a hub of ASEAN in many ways. As a major production base of agricultural and industrial products in the world is back up Thailand to be one of the strongest economic countries in ASEAN. The country will lead a national development strategy, Thailand 4.0 as sustainability grow, with the digital industry as one of the development strategies. Thailand is one of the high ranks of the internet users. Especially, during the pandemic outbreak digital market is the tend to run the business as well as the adjust life to the new normal of Thai people according to Hootsuite report that the population in Thailand is 69.88 Million Thai people has the users of mobile connection 90.66 million. The number increased from 2020 shows that digital has become one of the parts in the daily life such as the education, groceries, lending benefited, food delivery and online payment and financial etc.

Those things are representing that digital service is the main responsibility to the industry that will support today's ever-growing digital in everyday life Including in the future. Another key factor that must be fully supported in the future is the Data Center and Cloud industry, which will promote the growth of digital industry not just located in Thailand, but also to the countries around the central Thailand such as Myanmar, Cambodia, Laos, and Vietnam.

Thailand as the market of opportunity

The digital economies of ASEAN, and Thailand, especially, are expanding. According to e-Conomy SEA 2020 Report, the total number of internet users in ASEAN grew from 360 to 400 million between 2020. This is compounded by the fact that the COVID-19 pandemic induced a vast number of people to turn to online digital services for the first time. Most importantly, the report highlights that 94 percent of new users will continue to use digital services even after the pandemic. The size of the addressable digital market is enormous in Thailand, as highlighted by the following latest statistics from January 2021 provided by Hootsuite (2021).

- 69.5% percent of the population are internet users, and this figure will continue to grow with the government's internet outreach initiatives.
- 88.1% (of those aged 16 to 64) used online methods to search for products or services.
- 74.2% (of those aged 16 to 64) purchased a product online via mobile phone app.
- E-commerce spending is largest in the category of travel & accommodation, electronics & physical media, and food & personal care (also the highest growth among all category of e-commerce transaction), respectively.

Thailand's digital economy is expected contribute 25 percent of the country's GDP by 2027, driven by the growth of e-commerce, and enabled by high internet and mobile penetration, as well as choices of e-payment systems.

Thailand's Vibrant Digital Ecosystem

Thailand's vibrant digital ecosystem is constantly evolving as digital ecosystem is the creation of an ecosystem that connects multiple systems and services together to create convenience for consumers in multiple applications through a single channel. Thailand is also one of the countries that spending is on platforms online either on smart phones or the websites. Since Thailand is leading in 4G and smartphones in such a part of the internet in the life of people.

The daily use of the Internet is normalized in every part. Service providers in various sectors, including the government, private sectors, and startups, have turned to developing platforms to provide consumers with convenient access to use conveniently. In the future, the country will officially be adopting 5G, the digital ecosystem will be developed and ready to support growth as well. Thailand is currently one of the top online platform users of the ASEAN Community, according to Hootsuite's report that mentioned above. The various platforms that have been developed for ease of sectors include:

1) General banking finance has its own applications as well as various private services that users can complete their transactions without having face to face. Including the payment system that is convenient and fastens, both banks and other private service providers such as e-payment system (Prompt Pay) in Thailand with 39 million registered users.

2) Online Shopping is one of the industries that has been popular and able to access the market in Thailand. Currently, there are applications from many convenient providers such as Shopee, and Lazada, as well as other consumer goods providers with their own applications.

3) There is also a communication application that users will use for entertainment Including being used for business. For example, famous platforms such as LINE, Instagram, Twitter, Facebook etc. Thailand is also bringing digital to facilitate utilities such as government agencies, increasing payment options and contacting agencies through applications such as payment for water, electricity, and complaints.

In addition to the transportation system, during the COVID-19 epidemic, many service sectors often use online platforms to facilitate the delivery of consumer goods, including consumer goods and food delivery to consumers. By changing the to work from home and adopting digital technology to other parts, the ecosystem plays a huge role and Thailand will move towards a fully digital society in the future. This is largely attributed to the availability of strong partnerships with creative companies, groundbreaking ICT entrepreneurs, and high customer demand. During the COVID-19 pandemic, e-businesses in Thailand became an integral part of daily lives and have grown significantly, and other Thai startups have also reached more customers during the lockdown. This most represent that opportunities in data center and cloud service will be one of the part digital growth.

Overview of Thailand's Readiness to Accommodate Data Center and Cloud Service

Overview of Cloud Service

For organizations or businesses that use the Private Cloud, most are organizations that require high security and data security, such as government organizations, security related agencies or private sector organizations that require to secure their information secret at a high level, etc.

For small to medium-sized enterprises or businesses that are seeking to reduce costs, will choose Public Cloud as if concerned about data leakage or it is necessary to keep some information confidential, often choose

to use Hybrid Cloud because the storage can be chosen. Also, in terms of flexibility and help save costs.

Each organization has a system that has a variety of tasks, which will be suitable for different types of Cloud systems, for example.

SaaS (Software as a Service)

This system has a ready-to-use application for the given capabilities with the advantages that the service provider takes care of everything. Both in terms of software, debugging, as well as data storage tend to pay for the fees based on the number of users or the amount of work used:

1. Email system such as Microsoft Exchange, Google Gmail
2. Office Automation systems such as Microsoft Office 365, Google Apps.
3. A CRM system such as Salesforce.com
4. Personnel management systems such as Workday

PaaS (Platform as a Service)

Hybrid App system or a newly created application (New System). Its purpose is to support a large number of users, perhaps hundreds or even millions. This could be a Web Application or a Mobile Application. This type of system is especially suitable to run on the cloud because the cloud has more scalability. It is also more appropriate in terms of investment:

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1. Analytics and Big Data systems such as Microsoft HDInsight, Amazon Elastic MapReduce.

2. Data Management systems such as Amazon RDS, Amazon Redshift, Microsoft Azure Database.

3. Mobile Services systems such as Microsoft Mobile Services, Amazon Cognito.

4. Application Service systems such as Microsoft Cloud Services, Pivotal Cloud Foundry.

IaaS (Infrastructure as a Service)

The system uses a virtual machine, also known as a VM, on the cloud with the aim of enabling fast and low-cost hardware acquisition:

1. Microsoft Azure or Amazon AWS

2. Disaster Recovery is necessary. But many agencies may not have enough space or budget. Can bring the Cloud system to be used as a DR site

3. Software Development system that requires either a server or storage device from the development phase to testing and QA.

Data Center in Thailand

As technology and digital platforms has become one of the key factors in the fight against COVID-19. The number of online users has increased considerably. As a result, the demand for space to build a data center around the world has greatly increased including Thailand and expected that Data Center Market of ASEAN in 2024 will be worth up to 5.4 billion dollars.

China is the center of the largest data center market in the Asia Pacific region. But there are other key players, including Singapore, Japan, and Hong Kong, although neighboring countries, Singapore and Hong Kong have had the credibility of providing data center business over the few years. But these countries are facing land restrictions in land development problems. This such an ability for Thailand to promote with tax incentives and other special non-tax incentives by the Board of Investment (BOI), it will help investors make informed decisions. The central location in Thailand, it is possible to expand data center service to the surrounding countries. It is also located 30 kilometers from the undersea cable and is more than 100 meters above sea level, reducing the risk of flooding. 5G technology will be used in the near future, which will pave the way for Internet of Thing (IoT) infrastructure in Thailand and enabling 5G will lead to the transformation of the data center in both areas and applications with space design to support 5G frequency.

In the present the Thai government has taken the digital economy seriously with the aim of pushing Thailand to become a “ASEAN’s Digital Hub”, aims to develop large data centers (big data) to meet international standards. Big data must be stored in “Data center” with high standards and security, human resource development for the digital labor market with expertise in electrical, engineering and IT with the potential and readiness of Thailand today, It can be confident that in the near future, Thailand It will be able to create regional digital business growth, similar to Singapore and Indonesia.

World Class Internet Infrastructure

According to the popular website speedtest.net, Thailand has the world’s 2nd fastest average download speed for fixed broadband access. Domestically, there are currently 10 international internet gateways, 11 internet exchange points, and more than 200 Internet Service Providers (ISP). As the basis of these operating infrastructure, the country is connected to 13 submarine cable networks with 3 landing station.

submarine cable networks. Most crucially, Thailand is connected to the AAE-1 international submarine cable, which is one of the world's most important and newest cables connecting countries from East Asia to Europe. CAT is also connected with 6 international submarine cable systems capable of delivering 54 terabits per second transmission speeds. These include the FLAG (Fiber-Optic Link Around the Globe) cable, the SEA-ME-WE 3 (Southeast Asia-Middle East- Western Europe 3), the TIS (Thailand-Indonesia-Singapore), the SEA-ME-WE 4 (Southeast Asia - Middle East - Western Europe 4), the AAG cable systems (Asia-America Gateway) and APG (Asia Pacific Gateway).

On Thailand's part, the government continues to expand the capacity of digital infrastructure in every ways, such as expanding high-speed internet networks in various villages nationwide, providing free Wi-Fi at 50,000 locations under "Smart Sign On" policy, including non-formal and informal schools, border patrol police schools and digital community centers, doubling International bandwidth to meet the demands of growing economic activities, and setting up digital Thailand Infrastructure Fund. These efforts will play part in expanding the size of the addressable market in the future.

Figure 1: Network of Submarine Cables Connected to Thailand

Source: www.submarinecablemap.com

Investment Opportunities

Data center and cloud services are one the most essential driver of the global digital economy. It provides basic infrastructure to a vast range of services, from the least to the most complex ones. Demand for these services will stem from existing digital services, such as e-commerce, e-payment, and digital content streaming, as well as novel and soon to be widely adopted services such as the Internet of Things. Furthermore, their sources are both consumer and industrial driven. As mentioned earlier, the Thai and ASEAN consumers are inducing more and more service digitization. At the same time, businesses and industries are also massively digitally transforming themselves, and so will increase the demand for data storage and cloud-based digital services.

To investing the business in Data Center and Cloud service in Thailand, can consider utilities such as water, electricity, and location in the business operations. Thailand has a policy in the Eastern Economic Corridor (EEC) to support such investments. Including agencies serving the government sector in requesting water, electricity, support from the Office of the Board of Investment. Paying taxes are simple and easy. Including the readiness of humans with the knowledge and capability of more than 259,878 graduates in 2020, able to support investors to be confident in conducting data center and cloud service businesses in Thailand.

The followings are the list existing data centers and cloud service providers currently operating in Thailand. It shows the country's capacity to accommodate investment in these categories. However, more is always needed to prepare for future growth.

SUPERNAP (Thailand) offers data center services to large companies, multinationals, government and cloud service providers, whose IT needs are mission-critical for operations.

INET's services span from Cloud Solutions service, full internet connection service and the provision of INET Data Operations Center (INET-IDC) for those looking for efficient services in international standards.

(TOT + CAT) collaborate to reduce redundancy in both investment and eliminate overlapping problems of some types of services.

CSL has the greatest number of data centers in Thailand.

Cloud HM Company Limited: a leading Cloud Services provider in Thailand. Providing services covering both Domestic Cloud, Global Cloud, and IT as a Service, with 24-hour Service First service in conjunction with SUPERNAP (Thailand)

MFEC: the company is Thailand's listed leading System Integrator. One-stop service provider on the cloud Consists of cloud consulting, designing, building and administration.

NTT Global Data Centers (Thailand) Limited: NTT operates 98 data centers across the Asia Pacific region with 182,000 m^2 of data center. The comprehensive NTT platform can deliver a variety of technology solutions in addition to data center products.

BOI Support

BOI Incentives

The Thailand Board of Investment offers many highly attractive investment incentives, which, among others, include exemption of import duties on machinery, exemption of import duties on raw materials used in production for export, and other non-tax incentives such as BOI business facilitation services. Both investment in data centers and cloud services may be granted 8 years of corporate income tax exemption without limit of maximum exemptible CIT.

Government Support

The following agencies are key government stakeholders in Thailand's digital ecosystem. They will work to ensure the success of Thailand's digital economy by providing an array of supports.

Digital Economy Promotion Agency (Public Organization): supports the development of the digital industry through innovation and digital technology. Its fund offerings include digital manpower fund, digital manpower executive, digital transformation fund, digital Infrastructures and digital RDI Fund.

National Science and Technology Development Agency (NSTDA): a key driver of national science and technology capabilities providing support for R&D in five core areas, namely agriculture and food, energy and environment, health and medicines, bio-resources and communities, and manufacturing and service industries.

National Electronics and Computer Technology Center (NECTEC): has the primary mandate to support research and development opportunities for electronics and computer technologies. It also provides a unique linkage between research communities and industries.

National Innovation Agency (NIA) (Public Organization): operating under the auspices of the Ministry of Science and Technology, the NIA is mandated to conduct and promote activities that fast-track innovations in industry, business, and government sectors. The NIA also frequently partners with the private sector. One example of which is the Bangkok Cyber Tech District, which is a startup park launched in collaboration with True Digital Park.

Regulatory and Business Setup Process

Key regulatory process of data center investment in Thailand is the application of permit granted for internet service provision by the National Broadcasting and Telecommunications Commission (NBTC). The overall process can be conducted simultaneously; however, we recommend that you start the process by first applying for investment incentive at the BOI. Our investor facilitation services are ready to help and guide you on what to do next.

Apply for BOI incentives	Submit the application for investment promotion from Board of Investment
Register your entity	Register your business at the Department of Business Development, Ministry of Commerce
Get the certificate of investment promotion	Obtain the certificate of investment incentive from the BOI

Operationalize your Site

Dealing with Construction Permits	Building Permit and Occupancy Permit: apply at the Civil Works department of the area of your establishment
	Telephone: connect with the TOT Public Company Limited
	Water: apply at the Provincial or Metropolitan Waterworks Authority depending on your lo
Getting Electricity	Connect with the Metropolitan Electricity Authority or the Provincial Electricity Authority depending on your location
Registering Property	Submit your documents at the Land Office, Department of Lands.
Recruitment	Understand Thai labor laws and business incentives for skill upgrading / training

Obtain the Telecommunication Business License (NBTC)

Type 1:
Not operating own telecommunication network

Type 2:
Operation **has no** impact on the competition

Type 3:
Operating own telecommunication network

Operation **has** impact on the competition.

+ See below for additional information regarding the application and required documentation
+ For type III licensee, financial project, business and marketing plan must be provided accompanying the application.

How to Operationalize Your Business Operation

Per above illustration, apart from obtaining the BOI incentives and certificates, allow the BOI to assist you on the following processes.

Process	Details and Contact Point
Dealing with Construction Permits	• **Building Permit and Occupancy Permit:** submit building permit application at the Civil Works department of the area you are building your establishment. • **Telephone:** TOT Public Company Limited • **Water:** connect with Provincial or Metropolitan Waterworks Authority depending on your location
Getting Electricity	• Connect with the Metropolitan Electricity Authority or the Provincial Electricity Authority depending on your location
Registering Property	• Submit your documents at the Land Office, Department of Lands. • All corporate documents used in this process must be certified copies.
Recruitment	• **Key takeaways** in understanding labor laws in Thailand: protections, hours and holiday, compensation, social security, cessation of operation, termination, and minimum wage • Understand incentives for labor skill training

Source: BOI OSOS Investment Center

Data Center- and Cloud Service-Specific Regulatory Process

In regard to the NBTC permit, The Telecommunications Business Act B.E. 2544 (2001) identifies three distinct types of licenses. Differentiation between each of them depends on whether the operator operates its own telecommunication network, and how impactful it is to the overall competition environment.

- **Type I** License is exclusively issued for operators who do not operates its own telecommunication network.
- **Type II** License is issued for private networks or networks whose presences have no impact on the overall competitive environment, regardless of the ownership status of the telecommunication network.
- **Type III** License is issued for operators who operates its own telecommunication network and whose presences can impact the overall competitive environment.

To apply for the Telecommunication Business License, submit the application, along with the associated evidence and document, to the NBTC. The entire process takes around 10 days. The following documents and information must be presented as a part of the application process.

1) Corporate documents: certificate of incorporation, memorandum of association, and list of shareholders

2) Additional information about corporate entity: corporate profile of the parent company, as well as subsidiary; corporate and ownership structure; business model; names of the directors; and organization charts

3) Operations: types and areas of service being offered, target customers, and other relevant information

4) Technical information: general summary, network diagram, network deployment (route and international exchange used), point of interconnection, and list of associated equipment

5) Business plan:

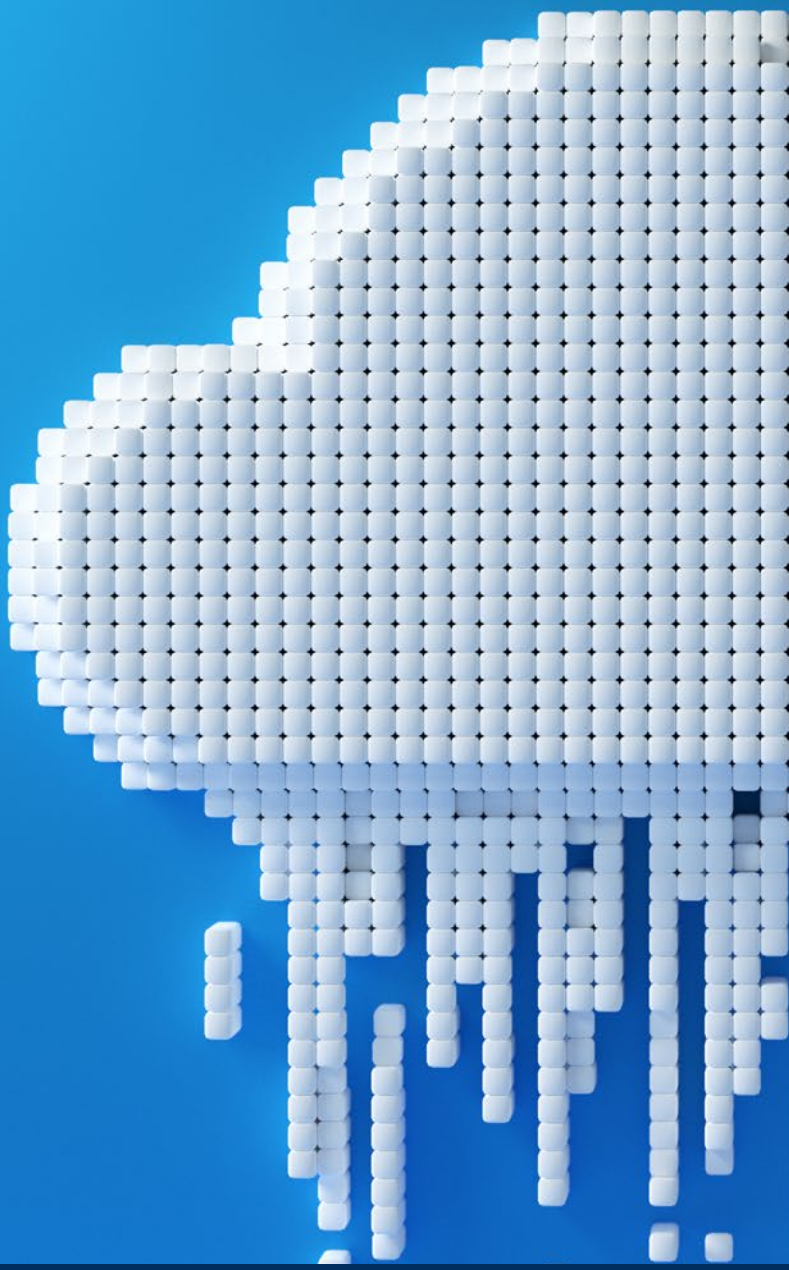
- Financial projection*: funding, investment plan and estimated ROI for the initial 5 years (10 for Type III applicant), projected NPV, IRR, and estimated payback period
- Market analysis and marketing strategy
- Plans of service provision for the next 5 years (10 for Type III applicant)
- System security plan, network security plan**, network reliability plan**, emergency and disaster plan**, and consumer protection plan**

* Applicable for type II and III application only
** Applicable for type II and III application with telecommunication network ownership only

Privacy and Data Protection Laws

According to an article by Suwanprateep (2020) published in Data Guidance, the Personal Data Protection Act (PDPA) 2019, which takes full effect on 1 June 2021, is Thailand's first full-fledge personal data protection law. The key points are summarized as follows.

- The main regulator of the PDPA is the Personal Data Protection Committee, which is due to be established.
- The PDPA outlines key provisions regarding consent, data sensitivity, public interest, and basis of legal action upon violation.
- As a data controller and processor, the PDPA outlines requirement for processing notification, data records, impact assessment, appointment of data protection officers, breach notification, retention, and treatment of data belonging to sensitive subjects.



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