THAILAND'S INTERNATIONAL INTERNET GATEWAY (IIG): MARKET AND DEVELOPMENT

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ABSTRACT
In Thailand, mobile Internet, big data, the Internet of Things, and cloud technology are modernizing sectors across the economy and drive major productivity improvements. The Internet can pave the way for productivity gains and more efficient delivery of vital services across the country. It is a particularly useful vehicle for overcoming geographical barriers and widening access to information, products, and services for rural populations. Improving competition and investment in the Internet gateway sector can resolve key infrastructure bottlenecks and improve the reach, cost, and quality of Internet services. Increasing demand for connectivity, bandwidth, and speed suggests that competition in the market, investment and upgrading will be required to improve the competitive advantage for the country. A robust Internet infrastructure, including sufficient access to international bandwidth, is one of the most important issues in Thailand to drive the country to the digital economy. The objectives of this paper is to review the International Internet Gateway (IIG) service and market in Thailand. Liberalizing IIG sector and market shares in Thailand are also discussed in this paper.

Key words: IIG, Internet, Gateway, Regulatory, Market, Thailand

http://www.iaeme.com/IJARM/issues.asp?JType=IJARM&VType=7&IType=1

1. INTRODUCTION
The Internet has been available in Thailand since 1990. To date, it has been almost 26 years that Thailand has been enjoying the progressive development of Internet service. The Internet service market is divided into 3 main segments. One is the Internet Service Provider (ISP), which are service providers offering Internet service
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directly to subscribers. Another segment is network providers, which act as a platform for ISPs to deliver their Internet service to subscribers. The last is the International Internet Gateway (IIG) operator, in charge of connections between subscribers in Thailand and the international Internet network, allowing domestic subscribers in Thailand to access websites and information abroad [1].

International Internet Gateways (IIG) can be described as wholesale markets or centers through which domestic Internet service providers are connected to foreign Internet networks, a basic but vital part of their service.

IIG is a vital link to domestic Internet service providers without which subscribers of the later cannot access data on foreign-based websites, restricting them to access only local websites and data. Internet service providers (ISP) serving the domestic retail market are normally linked to a National Internet Exchange (NIX) to access domestic websites and data, and to IIG for accessing those overseas. See Fig 1 [2].

![Diagram of international internet gateway services](image)

**Figure 1** Type of international internet gateway services

In most countries, ISPs are linked to both NIXs and IIGs. In Thailand, IIG operators may have their own or operate on leased networks depending on stipulations attached to telecommunication licenses set by the National Broadcasting and Telecommunications Commission (NBTC). Some operators are both NIX and IIG at the same time which are further linked as backups to other IIGs.

Some big operators may also have other extra connection channels through undersea cables that are more secure, stable and highly efficient which are by themselves huge data centers such as Facebook and Google which in turn provide their subscribers with special access.

In Thailand, links to international Internet networks through IIGs can be broken down into:

1. Links to Thailand-based international exchange gateways, or
2. Links to international private leased circuits (IPLCs)

The makeup of subscribers of IIGs is an important factor in choosing channels for accessing international websites. IIG operators must properly plan links to specific groups of subscribers, e.g. Internet subscribers which are multi-national companies seeking highly secure links to overseas headquarters. Connection speeds may not be as important as link channels such as undersea and land-based lines which affect
quality, security and stability of IIG services [3]. Fig 2 shows the locations of International Direct Dialing (IDD), International Private Leased Circuit (IPLC) and International Internet Gateway (IIG) in Thailand.

![Figure 2 Locations of IDD, IPLC and IIG](image)

**Source:** Office of Licensing Telecommunication Services, NBTC Office

Thailand’s liberalization of Internet services from its beginning when there was only one service provider. Thailand has a long history of launching its Internet services, being among pioneers in South East Asia in this area especially services serving Thai universities. The first commercial Internet service provider was KSC Commercial Internet Co Ltd which initially in 1994 accessed overseas data through its own communication links that incurred heavy expenses partly because most users were relatively small. Moreover, most subscribers did not establish direct local links and their communications had to be looped through overseas centers like Singapore, Hong Kong or the United States, further raising expenses. Finally on July 24, 2001, the Thai cabinet adopted a resolution requiring all Internet service providers to link to a national Internet exchange operated by the Communications Authority of Thailand, which marked the beginning of its monopoly for accessing both local and foreign data.

However, the Internet service at the time faced bottle-necks and relatively high service fees even though they were somewhat lower than expenses carried by users if they were to attempt establishing their own direct connections to overseas.

Later, TOT Plc. became the second IIG service provider in 2006. In any case, Internet subscription in Thailand’s household and business sectors grew rapidly, resulting in new bottle-necks and high retail subscription fees that inflated costs for businesses using Internet for contacting trading partners or accessing foreign data, due to persisting high expenses of leasing international IPLC circuits either from CAT
Telecommunications Plc or TOT Plc even after replacing the IPLC leasing practice with the Thailand Internet Exchange (THIX). All these problems persisted until the country liberalized the sector by opening up the IIG market.

To achieve the objectives of the research, this paper organizes as follows. Section II describes the liberalizing IIG sector in Thailand. Market shares and bandwidth demand are provided in section III. The conclusion is in the last section.

2. LIBERALIZING IIG SECTOR IN THAILAND

A significant turning point for the IIG market emerged in early 2006 when the National Telecommunication Committee (NTC), established under the 2000 Act for Allocation and Supervision of Radio, Television and Telecommunication Frequencies, an independent body created as an off-shoot of provisions in Article 40 of the 1997 Thai Constitution. Unfortunately for various reasons, the success of this organization was limited.

NTC realized then that free, fair and fully open competition should be a main principle of regulating and supervising this sector in the best interest of all parties concerned, be they service subscribers, consumers, business operators, or telecommunication service providers. It was also an opportunity for both small and big businesses to enter markets easily without regulatory or undue competition constraints, and for the liberalization of Thailand’s Internet service sector to move faster than earlier schedules by opening up the IIG and NIX segments as part of improving and promoting competition in Thai Internet services, through announcements by NTC in the Thai Royal Gazette for the private sector to apply for licenses of operating international Internet gateways and Internet exchanges, which came into effect on January 10, 2006 IIG Licensees are listed in Table 1.

<table>
<thead>
<tr>
<th>Licensees</th>
<th>Details (AttachA)</th>
<th>Year of License</th>
<th>License Date</th>
<th>License Expiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>TrueIntGateway</td>
<td>IIG/NIXwith network</td>
<td>2006</td>
<td>19 May 06</td>
<td>18 May 16</td>
</tr>
<tr>
<td>Adv. DataNetworkComm</td>
<td>IIG/NIXwith network</td>
<td>2006</td>
<td>8 Dec 11</td>
<td>7 Dec 16</td>
</tr>
<tr>
<td>CSLoxinfoPlc</td>
<td>IIG/NIXwith network</td>
<td>2007</td>
<td>26 Apr 12</td>
<td>25 Apr 17</td>
</tr>
<tr>
<td>Super Broadband</td>
<td>IIG/NIXwith network</td>
<td>2007</td>
<td>5 Oct 12</td>
<td>14 Oct 17</td>
</tr>
<tr>
<td>Network</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAT Telecom Plc</td>
<td>IIG/NIXwith network</td>
<td>2008</td>
<td>24 Jan 13</td>
<td>23 Jan 18</td>
</tr>
<tr>
<td>JasTelNetwork</td>
<td>IIG/NIXwith network</td>
<td>2009</td>
<td>30 Mar 09</td>
<td>29 Mar 19</td>
</tr>
<tr>
<td>SymphonyCommPlc</td>
<td>IIG/NIXwith network</td>
<td>2011</td>
<td>10 Jun 11</td>
<td>9 Jun 16</td>
</tr>
<tr>
<td>TOT Plc</td>
<td>IIG/NIXwith network</td>
<td>2012</td>
<td>14 Feb 12</td>
<td>13 Feb 17</td>
</tr>
<tr>
<td>BB Connect</td>
<td>IIG/NIXwith network</td>
<td>2012</td>
<td>31 Jul 12</td>
<td>30 Jul 17</td>
</tr>
<tr>
<td>AmNet</td>
<td>IIG/NIXwith network</td>
<td>2014</td>
<td>4 Dec 14</td>
<td>3 Dec 19</td>
</tr>
<tr>
<td>V Telecom Connector</td>
<td>IIG/NIXwith network</td>
<td>2015</td>
<td>9 Mar 15</td>
<td>8 Mar 20</td>
</tr>
<tr>
<td>DTACTriNet</td>
<td>IIG/NIXwith network</td>
<td>2015</td>
<td>26 Jun 15</td>
<td>25 Jun 20</td>
</tr>
</tbody>
</table>

NBTC regulates the Internet gateway sector by licensing gateway operators of which the second group has had 13 licensees offering NIX and IIG services, raising the number of service providers in this field and cutting their operating costs by allowing their direct links to overseas, skipping a previous requirement to lease Internet gateways from the local monopoly, thus promoting competition and increasing options of linking to foreign networks, as follows:
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Additionally, there were three Type 3 telecom licensees applying to operate International Private Lease Circuits (IPLCs) and another three Access Network operators, as shown in Table 2.

**Table 2 IPLCs Licensees**

<table>
<thead>
<tr>
<th>Licensee</th>
<th>SvcDetailsCategoryA</th>
<th>LicenseYear</th>
<th>LicenseDate</th>
<th>Expiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>True Int. Gateway</td>
<td>IPLC</td>
<td>2009</td>
<td>11 Nov 09</td>
<td>10 Nov 24</td>
</tr>
<tr>
<td>JasTelNetwork</td>
<td>IPLC</td>
<td>2009</td>
<td>11 Nov 09</td>
<td>10 Nov 24</td>
</tr>
<tr>
<td>TCC Technology</td>
<td>IPLC</td>
<td>2011</td>
<td>20 Apr 11</td>
<td>19 Apr 26</td>
</tr>
<tr>
<td>OtaroWorld Corp</td>
<td>Access Network IPLC and Core Network</td>
<td>2011</td>
<td>6 Jul 11</td>
<td>5 Jul 26</td>
</tr>
<tr>
<td>BB Connect</td>
<td>Access Network IPLC</td>
<td>2011</td>
<td>14 Sept 11</td>
<td>13 Sept 26</td>
</tr>
</tbody>
</table>

Based on results of a research project sponsored jointly by NBTC and the National Scientific and Technological Development Center, the National Electronic and Computer Technology Centre (NECTEC) worked out total international bandwidth fees based on Internet connection speeds with 2 following parties:

1. Connection speeds between IIG and international Internet providers.
2. Connection speeds between ISP and international Internet providers.

Accordingly, the total international bandwidth is the sum of all bandwidth used by Internet service providers to connect to IIGs, as well as ISPs with direct overseas links measured in gigabit per second (Gbps).

Statistics of Internet traffic in Thailand indicated that a sharp traffic in Thailand indicated that a sharp consistent rise in Internet usage during peak hours starting 2 years ago from 462.997 Gbps to the latest total volume (Sept. 2015) of 1982.633 Gbps, or over 4 times in less than 2 years. Thailand’s Internet Bandwidth is illustrated in Fig 3 [4].

![Figure 3 Thailand’s Internet Bandwidth](http://www.iaeme.com/ijrm/index.asp)

**Source:** NBTC, NSTDA, NECTEC
Major service providers of international Internet gateways initially had to be licensed by NBTC for connecting to various Internet exchanges. Details of each of these service providers are as follows:

1. CAT Telecom Plc: CAT-IIG AS4651

CAT has been the first and biggest service provider with the most secure and stable NIX and IIG networks linked to overseas counter-parties through various channels under service names like CAT THIX and CAT NIX via its CAT-IIG with following connections:

1. Twenty four domestic ISP links
2. Two state/government agency links
3. Forty nine international service provider links

CAT THIX connects to foreign Internet networks via international undersea cables linking CAT with large foreign Internet exchanges covering all parts of the world, namely the United States, Europe, and Asia-Pacific countries with diverse routes with Thailand's largest bandwidth of over 10 Gbps as follows:

- Over 3 Gbps bandwidth link with U.S.-based Internet exchange networks
- Over 5 Gbps bandwidth link with Europe-based Internet exchange networks
- Over 2 Gbps bandwidth link with Asia-Pacific-based Internet exchange networks

CAT’s network connection architecture is divided into 2 types:

1. Transit international Internet network linked to Internet backbones for swapping data with counter parties in different continents namely the U.S., Europe and Asia-Pacific with total combined bandwidth of over 10 Gbps that are used for accessing other networks throughout the world with many tier-1 upstream service providers like the U.K. Cable and Wireless, France Telecom, Telecom Italia Sparkie, U.S. Teleglobe & NTT, Japan KDDI, Hong Kong NTT, and Singapore SingTel.

2. Peer-to-peer international Internet networks directly linked Internet gateways of various countries through the shortest routes to swap indigenous Thai data with those of other countries. Over 25 overseas Internet service providers, including data center operators like Google and Microsoft, were linked to Thailand.

CAT NIX is a domestic Internet gateway, serving as a domestic data exchange center that can help save time and costs previously incurred from looping links to foreign vendors through overseas channels before returning to Thailand. With CAT NIX’s links to other big networks, it has attracted almost all retail Internet service providers in Thailand to link up at the 1 Gbps level, totalling more than 90 Gpbs which makes it the biggest in Thailand.

2. TOT Plc (TOT): IIG A538040

TOT provides international gateway facilities (TOT IIG) for Internet service providers in the domestic retail market, other telecom service providers and various organizations requiring telecom networks for their own businesses. TOT offers a minimum 2 Mbp committed/fixed/burstable bandwidth. It has its main international Internet gateways which are large land-based and undersea optic-fiber cable networks linking to domestic and overseas networks that are compatible with either electrical or optical SDH and Ethernet telecom signals. It also provides PoP (Point of Presence) in 5 countries charged with connecting IP Ports, Peering and Internet exchanges (IX) for Internet service providers in the U.S., Singapore, Hong Kong, Britain and Japan.
TOT IIG has following links:

1. One IIG link
2. Four domestic ISP links
3. Two state/government agency links
4. Twenty nine international provider links

TOT-IIG bases its gateway link centers at its Krung Kasem and Hatyai offices that provide global IP transit and international IP VPN facilities.

3. True Internet Gateway (TIG):

IIG (TRUE) AS38082 is affiliated with True Corp Plc, has operated diverse IIG services since 2007 and is still expanding rapidly. Its international transit service caters to retail Internet service providers that connect to its gateway located at the True Building in central Bangkok and at Muang Thong Thani with a total capacity of 10 Gbps marketed at very competitive pricing that offers POP connections to PAIX in Palo Alto, California, USA, LINK in London, UK, 2 POPs with Global Switch and Equinix in Singapore, and POP at Mega-I Advantage in Hong Kong.

Domestic Internet Exchange or national Internet exchange can be linked to other IIG namely CAT, TOT, CSL etc.

International IP VPN service is a virtual network linked to IPLC for business organizations seeking modestly priced links dedicated to connecting with clients or their own foreign branches.

4. TIG International IP VPN connection

International Private Leased Circuit Service serves subscribers of retail Internet services seeking access to quality high-speed and broad bandwidth Internet on separate traffic to link specifically with key destinations like Malaysia, Singapore and Hong Kong. International gateway links for TIG-IIG are as follows:

1. Fourteen domestic ISPs
2. Twenty two international providers

TCC Technology Co Ltd (TCCT): IIG AS58430 is affiliated with the Charoen Corporation Group (TCC Group) that operates server hosting and data center services for the private business sector by developing and linking to internal or external data networks. TCCT operates big data centers at the Empire Tower Complex in Bangkok and in Bangna Trad area that offer both NIX and IIG facilities. It is a strategic partner of Equinix Inc of the U.S. for building hosting service infrastructure as part of the current biggest global data network operated by Equinix Inc of the U.S.

TCCT-IIG has the following links:

1. 1. Link to another IIG
2. 2. Two domestic ISP links
3. 3. Two international service provider links

5. CS Loxinfo Plc (CSL):IIG AS7568

It is a company providing Internet access for retail household and business sectors. For the latter, it hosts virtual networks, data centers and various forms of solutions. Moreover, its NIX and IIG services focus on clients that are business affiliates, and operate out of data centers located at CyberWorld and in Bang Rak.

Its NIX and IIG services have following links:
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1. One domestic ISP
2. Thirty one international service providers

6. BB Connect Co Ltd: IIG AS45796

It is affiliated with the Jindapol Group that operates telecom services. It provides both NIX and IIG services mainly for affiliated companies and other businesses, operates both IP transit and IP-VPN services, and connects to overseas destinations via a global data switch center in Singapore. For its domestic network, it adopts an efficient, high-speed united data highway covering the entire country with speeds starting at 256 Kbt/sec to 10 Gbt running on SDH, Ethernet or Ethernet over SDH circuits, enabling foreign corporate entities to link with diverse format destinations in Thailand.

BB Connect-IIG operates on following links:

1. 1. One domestic ISP
2. 2. Twenty two international ISPs.

7. JasTel Network Ltd (JasTel) : IIG AS45629

It is a domestic and international telecom and Internet service provider affiliated with Jasmine International Plc. (JAS).

JasTel provides telecom leasing facilities and services for both domestic and overseas clients through its network made up of land-based and undersea optic fiber cables and conventional copper cables, being licensed by NBC in November 2006 to operate Category 2 telecom services utilizing its own international gateway. JasTel subsequently sought and obtained additional licensing for undertaking Category 3 telecom services for IIG on top of Categories 2 and 1 obtained earlier.

JasTel provides global IP transit services for large corporate clients, ISPs, and IIGs linking service via JasTel's IP network that links with Tier-1 IP transit operators as well as other world class content providers that enable clients to access quickly voice, visual and video signals, and high-speed Internet, Fast Ethernet and Gigabit Ethernet.

JasTel-IIG has following connections:

1. Six domestic ISPs.
2. Twenty four international service providers.

In addition, there is an on-going study on the FTTx service which is a high-speed communication channel adopting the GPON (Gigabit Passive Optical Network) technology on the same optic-fiber cables already used by the company which can accommodate speeds from 20 Mbps to 1 Gbps at more cost saving service charges suitable for medium and small organizations which can widen the scope of clientele that the company’s services serve, and the FTTx technology for its core products and services could be launched in 2014.

3. MARKET SHARES

Based on the total bandwidth demand of 7,138.70 Gbps from the first quarter of 2014 to the second quarter of 2015 for accessing foreign data through nine service providers, the market shares can be determined as shown in Fig 4 [5]:

http://www.iaeme.com/ijarm/index.asp editor@iaeme.com
The key conclusions derived from “Analysis on the competitiveness of the telecom sector as affected materially by authorized agencies and specific regulatory and supervisory measures” commissioned by the Competitive Criterion Development Department of NBTC show that the so-called wholesale market for IIG which NBTC, as a policy, regards specifically as a sector requiring thorough study to determine the extent of authority dominating the market; and results of the study indicate that in the overall picture, the extent of market competition has clearly improved comparing with a previous tendency to confine the service to a small number of service providers, as reflected in the HHI Index which has declined by almost 20%, and by the fact that no single service provider has managed to garner 25% of market share, which is in line with NBTC’s policy of preventing any party or business to dominate the IIG sector [6].

Moreover, the changing structure of Thailand’s bandwidth market shares testifies to the fact that previous concentration of service providers has eased and that the growth of market shares of major providers has lately been slower than that of smaller rivals which supports the picture of improving competition in the IIG market as smaller service providers have gradually gained in market shares.

In any case, an analysis aimed at creating ex-ante regulatory guidelines in favour of competition and market liberalization needs to be on guard against any attempts to crowd out potential competitors by building technical barriers or controlling infrastructure essential for providing the service.

For example, big service providers which own parts of international undersea cables like CAT, TOT or TIG may choose to resort to limiting bandwidth allocations for small operators which could constrain the latter’s ability and corporate development to serve their clients. Accordingly in the wake of the changing market share structure, it may be advisable to consider expanding available bandwidth to accommodate its rising demand in the retail sector.

4. CONCLUSION
The Internet plays an important role to change the way we work, create and share information. In Thailand, enterprises and national economics have reaped major benefits from the Internet. However, the country raised concerns over the ability to deal with the volume of Internet traffic. Liberalizing International Internet Gateway (IIG) sector in Thailand will make the competition and investment and expand the
capacity of the IIG network to serve the rapid growth of the country’s internet use. This paper discusses the market shares and explains the liberalizing IIG sector in Thailand.

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