

ASEAN DIGITAL HUB

The Telecommunications Association of Thailand under the Royal Patronage



Background

- Networked Readiness Index
- Volume of the global digital content each APAC route
- Thailand's and Singapore's internet uses comparison

Main factors for leading Thailand to be ASEAN Digital Hub

- Local networks development
- Global networks development
- Data center ecosystem development

WORLD ECONOMIC FORUM

NETWORKED READINESS INDEX 2015

From network readiness index ranking by the World Economic Forum Thailand i ranked 67th which is much far from the region's telecommunication center such as Singapore(1), Japan(10) and Hong Kong(14) etc.



Thailand's Poorest Rankings

Rank 113 Effectiveness of lawmaking bodies

With Singapore at the Rank 1

Rank 113 Government procurement of the advanced technology products With Singapore at the Rank 4

HThailand's Best Ranking

<u>Rank 1</u> Mobile network coverage With Singapore at the Rank 66



At present Singapore and Hong Kong are having status quo of the AEC countries' digital hub by location Thailand is at the APAC center.



Thailand's Local Internet Use and Thailand's and Singapore's Internet Uses Comparison



If wants to be APAC digital hub Thailand must plan and take action to take over bandwidth from Singapore.



- ✦If takes no action to be the region's digital hub Thailand will be behind Singapore on global digital content despite its advantage the local internet use is higher than Singapore.
- If wants to be the region's digital hub Thailand must take over at least 50% of Singapore's bandwidth in 10 years time.



- 1) Local Networks Development
- 2) Global Networks Development
- 3) Data Center Ecosystem Development





2) Global Networks Development

3) Data Center Ecosystem Development



The network at present (Fiber Optic Cable)



Thailand's internet network at present is by the government and private sector's more than 310,000 Km. fiber optic cable.

- Government sector OFC 210,000 Km. (TOT, CAT, UniNet, PEA, EGA, MEA)
- Private sector OFC 100,000 Km. (AIS, TrueGIF, DTAC, ASIF) Having an area coverage to 76%¹ of the sub-districts in regions countrywide.



Reference: ICT Ministry's Government Sector Networks Integration Working Group ¹Year 2015 preliminary data from government agency.



The network at present (Cellular Base Station)



Source: NBTC





TCD

Broadband internet access condition

Problem : Less Broadband Access Networks availability with people's inequality to the high speed (broadband) internet access.

Numbers of the persons registered for broadband internet access per 100-person population and 100 households



Types of the connected broadband internet proportion



Remark :

xDSL is dominated by ADSL (upload IM/download 24M).



Cause of the ineffective local networks development over the rights on route

- 1.Each state agency has its law on its right on route <u>which belongs to</u> <u>equality no less than other state agencies</u>.
- 2.<u>Lack of the cooperation to consider the rights on route with each other</u> due to the state agencies' policies restrictions.
- 3.NBTC's laws cannot interfere with the state agencies' laws.
- 4.NBTC's administrative orders are not applicable to the state agencies.
- 5.Cost of the application of the rights on route for access network is high.
- 6.Resources and infrastructures co-use is hindered by the unfair and unreasonable costs.
- 7.Law gaps are employed to hinder the local networks developments.



Guideline for solving the broadband networks development problem

- The ICT Ministry proposes to government to impose a Prime Minister's Office regulation to require all state agencies to promote and support the country's IT and telecommunication operations development including to facilitate the telecommunication networks development rights on route.
- The ICT Ministry proposes to government to require all state agencies to promote both wire and wireless broadband networking to cover the populated areas and all around.
- The ICT Ministry motivates the national broadband policy to implementation (Fiber CO, Tower CO).
- The ICT Ministry proposes to government to require all state agencies to support the effective resource and infrastructure co-use at fair and reasonable costs.
- The ICT Ministry supports and promotes allocating the unused/ineffectively-used frequencies for benefit maximization and fairness.



Example – SMEs digital economy policy motivation with ICT







- 1) Local Networks Development
- 2) Global Networks Development
- 3) Data Center Ecosystem Development



NTT Com JP-US Backbone



The growth rate of Japan-US IP Backbone higher more than 1,070 within a period of 15 years ago. Therefore the estimate average for the growth in each year is 59.2%



International Traffic



International Traffic (Mbps)

TimeLine	Aug-06	Aug-08	Aug-10	Aug-12	Aug-14	Aug-15
Bandwidth (Mbps)	9,316	30,071	158,680	407,816	1,008,655	1,954,083
CAGR (to Aug2015)	81.12%	81.54%	65.23%	68.59%	93.73%	

Future International Traffic (Mbps) (Thailand Only)

TimeLine	Aug-15	Aug-16	Aug-17	Aug-18	Aug-19	Aug-20
Bandwidth (Mbps)	1,954,083	3,539,249	6,410,315	11,610,409	21,028,858	38,087,622
CAGR (%)	81.12%	81.12%	81.12%	81.12%	81.12%	81.12%

Future International Traffic (Mbps) (Thailand + GMS)

TimeLine	Aug-15	Aug-16	Aug-17	Aug-18	Aug-19	Aug-20
Bandwidth (Mbps)	1,954,083	3,908,166	7,816,332	15,632,664	31,265,328	62,530,656
CAGR (%)	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%



All existing Submarine cables (including cable under construction)





Increase the global connecting routes to be sufficient and suitable for both submarine and terrestrial cables.



Submarine Cable Length East to West : via SG and via TH

From Tokyo to Chennai via Singapore : 8,613 km.



Submarine Cable Length East to West : via SG and via TH

From Tokyo to Chennai via Thailand : 7,660 km around 1,000 km. shorter distance.



Image of Submarine Cables Including GMS Land Lines (Image)





Increase the global connecting routes to be sufficient and suitable for both Submarine Cable and Terrestrial cable

International Terrestrial Line

Carriers	Malaysia / SG	Myanmar	Cambodia	Laos
CAT				
ТОТ				
TIG (True)		?		
UIH		?		
Jastel		?		
Symphony				
Interlink		?		
SBN		Х		?



Proposal for the global networks development

 Increase the global connecting routes to be sufficient and suitable for both Submarine Cable and Terrestrial cable Investment may be either by the government sector solely, the private sector solely or both sectors jointly.

Need – The government sector's supports i.e.

- Motivates the state agencies both responsible for terrestrial operations and responsible for submarine operations and NGOs to collaborate including makes understanding with communities and society.
- Provides the investment promotion policy such as 8-year BOI privilege offer etc.
- The government sector supports and motivates enterprises for present landing station and future open internet accesses.
- The connecting service cost is reasonable and fair and competitive with overseas.



- 1) Local Networks Development
- 2) Global Networks Development
- 3) Data Center Ecosystem Development



Large companies' data center investments in Thailand is small at present compared with digital hub countries such as Singapore, Hong Kong, Japan etc. Attracting the large data center companies to invest in Thailand is crucial for local telecommunication industry development.

In addition the government should motivate for data accesses by connecting with several data centers to enhance the local telecommunication's stability.



Source: regulators' websites, data center owners and operators' websites







Google's and Facebook's investment in ASEAN Thailand's goal is to shift from level 1 Cache to Level 2 POP



The benefits to achieve if Thailand can attract large data center companies' investment will be

- Large investments in Thailand.
- Higher control and overseeing to information services.
- No local data exports to overseas.
- Local skilled labor development creation.
- The economic development in overall creation.

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The main factors to support the Data Center Ecosystem Development

1) Availability of global networks particularly the highperformance global networks in the routes to U.S.A., China and India as Thailand's location is at center between China and India.

2) The government sector's supportive policies, law and codes imposed.

3) The government sector's supports for investment provided.



Government sector's supportive policies, laws and codes

Examples of the laws and codes which may delivery negative impacts to the large data center companies' considerations to invest in Thailand.

- 2007 B.E. offence on Computer Act's Section 15 which stipulates <u>a</u> service provider cooperating, allowing or agreeing offence in the computer system under his control shall be penalized same as the offender.
- Draft......B.E. Cyber Security Act which stipulates <u>state officials may</u> <u>legally access communication data/devices for cyber security without</u> <u>prior Court's order</u>.
- Other unclear draft digital economy acts.



Model of the government's investment incentive to attract large data center companies' investments

TAX Incentive	 Thailand offers tax incentive to large data center companies competitive with other countries in the APAC region. The offered tax incentive may be assessed from the country's benefit from investment. 	
Other incentives	 Electricity cost May be discounted for the electricity consumption beyond limit. Land Such as the low- 	
incentives	priced land in some areas etc.	

Example of the data center ecosystem in Singapore

Mostly data centers in Singapore are situated as cluster for infrastructure co-use which helps reduce the initial investment cost remarkably.



Large data center companies' investments will attract other enterprise investments to Thailand. Suitable areas for digital center clusters will be in the East such as Chonburi, Rayong etc. 32

Proposals Summary



1) Local Networks Development

- Impose a Prime Minister's Office regulation to require all state agencies to provide convenience to the right on route applications for networks development.
- Promote both wire and wireless broadband networking to cover the populated areas and all around.
- Motivate the national broadband policy to implementation.
- Support the effective resource and infrastructure co-use at fair costs.
- Promote the unused/ineffectivelyused frequencies auction for their benefits maximization.

2) Global Networks Development

- Promote the investments to build sufficient networks to connect with overseas for both submarine and terrestrial cable networks.
- Motivate enterprises for the present landing station and future open internet accesses.
- Services shall be controlled to be fair and suitable to be completive with overseas.

3) Data Center Ecosystem Development

- Availability of global networks is recommended particularly the high-performance global networks in the routes to U.S.A., China and India as Thailand's location is at center between China and India.
- The government sector's supportive policies, laws and codes are imposed.
- The government sector's supports for investment are provided.

Photo of Seminar



Reference Material

Thailand and major hubs in Asia





Proposal for the Global Networks Development

The networking routes to overseas proposed

1 To Cambodia, Lao, Myanmar and South China	2 To Hong Kong	3 To India	4 To AEC	5 To the more AEC
Thailand's Quick win to be the AEC telecommunication hub	Increase the networking routes to the East.	Increase the networking routes to the West.	Increase the AEC countries networking routes.	Increase the AEC countries networking routes to full potential.
-Increase the capacity for the bandwidths from Cambodia, Lao and Myanmar. -Increase the South China, Chonburi- Songkhla and Songkhla-Singapore networking routes.	-Increase the Songkhla-Hong Kong networking route.	-Increase the Satun- Chennai (India) networking route.	 -Increase the networking routes to Indonesia (Java) Philippines Vietnam Brunei 	 -Increase the networking routes to Indonesia (Sumatra) East Malaysia Myanmar
By 2017	By 2018	By 2020	By 2021	By 2022

ISPs mainly rely on terrestrial connectivity through Malaysia to Singapore

Thailand's existing international connectivity network



Source: Telegeography, TRUE

There are currently 6 international submarine cables (and 4 more planned), which land at 4 cable landing stations (CLS) in Thailand

CAT does not offer access to these cable landing stations and leases submarine cable capacity at very high prices to other ISPs in Thailand, including True

As a result, True and other ISPs in Thailand rely mainly on terrestrial networks to Singapore, though there is likely still plenty of direct submarine cable capacity connecting Thailand and Singapore:



All of the above cables belong to CAT other than AAE-1, which would be owned by TOT $\ensuremath{\mathsf{38}}$

Submarine cable connectivity is complimented by extensive terrestrial fibre networks



Two trans-border terrestrial fibre networks connect Thailand to China and other SEA countries, in particular northern Southeast Asia countries (Laos, Cambodia, Myanmar, and Vietnam):

Trans-border	networks	Countries	TH rep.
China Southeast Asia Cable (CSC)		China, Vietnam, Laos, Thailand, Malaysia, Singapore	CAT
GMS ¹ Informa Superhighway	ation Y	Laos, Cambodia, Thailand, Myanmar, Vietnam, China	CAT
Network	Name of kn	own network/ network owners	
Thailand — Malaysia	Time dotCo	m CPCS ² (N/A), Symphony, EGAT, Interlin	k
Thailand — Myanmar	CAT, Symph	ony, True (planned/ in construction: EGA	T)
Thailand – Laos	CAT (throug construction	h Friendship Bridge II), Symphony, True (n: EGAT)	planned/ in
Thailand — Cambodia	Symphony, (planned/ ir	True, Telcotech/ Ezecom Cambodia (w/ C n construction: TOT, EGAT),	АТ), ТССТ

There is limited information on capacity of international terrestrial fibre networks, though it is easily upgraded to match demand.

Thailand currently has six existing submarine cables

Thailand's undersea connectivity (existing + planned)



There are six existing submarine cables with landing points in Thailand, most of which are owned and operated by CAT Telecom (as part of consortium or in collaboration with other operators globally)

Cable	TH Rep	Landing stations	Route
Asia – America Gateway (AAG)	CAT	Chonburi (Sri Racha)	Trans Pacific
FLAG Europe Asia (FEA)	N/A	Satun, Songkhla	Asia – Europe
SeaMeWe-3	CAT	Satun	Asia – Europe
SeaMeWe-4	CAT	Satun	Asia – Europe
APCN	CAT	Petchaburi	Intra-Asia
Thailand – Indonesia – Singapore (TIS)	CAT	Songkhla	Intra-Asia

Source: Telegeography

three more submarine cables are currently under construction and are expected to be ready for service in 2015 - 2016

Thailand's undersea connectivity (planned, under construction)



There are three submarine cables with landing points in Thailand that are currently under construction:

	Cable	TH representative	Landing stations	RFS
	APG	N/A	Songkhla	2015
	AAE-1	тот	Satun	2016
Dthei	MCT	Symphony	Rayong	2016

above table, there are no other upcoming submarine cables for other northern SEA countries (Laos, Myanmar, Cambodia, Vietnam)

Multiple cables are generally required on popular routes because cables are not deployed in a diverse ring configuration

- the high cost of deploying submarine cables is prohibitive to diverse routes exclusively used for redundancy
- transit connectivity relies on backup capacity on competing cables for route diversity

Source: Telegeography

Number and diversity of submarine cables in Thailand vs. major hubs

Route	Thailand	Singapore	Hong Kong	Japan
Trans Pacific	+ AAG	✤ N/A	+ AAG	 + CHUS + JUS + TGN- Pacific + TPE + Unity + Arctic Fibre (RFS: 2016) + FASTER (RFS: 2016) + NCP (RFS: 2017)
Intra – Asia	 + APCN + TIS + APG (RFS: 2015) + MCT (RFS: 2016) 	 + APCN + APCN-2 + EAC-C2C + I2icn + TIS + Tata Indicom + MCS + MIC-1 + BSCS + JAKABARE + TGN-IA + PGASCO M + ASE/ Cahaya Malaysia + B3JS + SJC + APG (RFS: 2015) 	 APCN APCN-2 EAC-C2C FNAL/ RNAL TGN-IA ASE/ Cahaya Malaysia SJC APG (RFS: 2015) 	 APCN APCN-2 EAC-C2C FNAL/ RNAL ASE/ Cahaya Malaysia GOKI SJC APG (RFS: 2015)
Asia – Europe – Africa	 FEA SeaMeWe-3 SeaMeWe-4 AAE-1 (RFS: 2016) 	 SeaMeWe-3 SeaMeWe-4 SeaMeWe-5 (RFS: 2016) AAE-1 (RFS: 2016) 	 FEA SeaMeWe-3 AAE-1 (RFS: 2016) 	 + FEA + SeaMeWe-3 + RJCN
Asia – Australia	+ N/A	+ APX – West (RFS: 2016) + ASC (RFS: 2016)	+ N/A	+ AJC
	6 existing cables 3 planned cables	17 existing cables 5 planned cables	10 existing cables 2 planned cables	17 existing cables 4 planned cables 4

No. of cable landing stations in Thailand vs. major hubs

Country	No. of CLS	Location of CLS	Owner of CLS
	1	+Songkhla	CAT
Thailand	4 existing ¹	+Satun	CAT
	(Z near Banakok)	+Chonburi	CAT
	Бипукокј	+Petchaburi	CAT
		+Changi (4 CLS)	SingTel, StarHub, PacNet, Matrix
<u></u>		+Tuas	SingTel
Singapore	8 existing	+Tanah Merah	SingTel
		+Katong	SingTel
		+Jurong Island	PGASCOM
		+Tseung Kwan O (2 CLS)	Pacnet
		+Lantau Island	Reach
llowe Kowe		+Chung Hom Kok	Pacnet
Hong Kong	7 existing	+Cape D'Aguilar	Reach
		+Deep Water Bay	Reach
		+ Tong Fuk	Reach
		+Chikura	KDDI
		+Maruyama	Softbank
Japan	15 existing	+Emi	Tata Communications
	(6 near Tokyo)	+Miura	KDDI
		+ Ninomiya	KDDI
		+Wada	Reliance/ Reach

CAT does not allow direct access to its CLS and submarine cable capacity. ISPs other than CAT may lease capacity by connecting to CAT's PoP

Owners of CLS in Singapore, Hong Kong, and Japan typically offer access for both CLS facility co-location and submarine cable capacity to all operators

Note: 1) There are 2 more CLS in Chumporn and Samui, which are currently used only for CAT's domestic submarine cable network Source: Telegeography, regulators' websites, submarinecablenetworks.com

Regulation on access to the CLS and industry practice in Singapore, Hong Kong, Japan, UK, and US

	Singapore	Hong Kong	UK	US
Any regulation on access to CLS?	Yes	Νο	Νο	No
Regulation on access to CLS	Singapore regulates access to CLS owned by Singtel, the dominant operator, via Telecom Competition Code SingTel is required to offer co-location access and connections to submarine cables at CLS on a fair, reasonable, and non-discriminatory basis	In 2000, Hong Kong regulated the access to the CLS owned by Reach, the dominant operator However, in 2002, OFTA formed the view that Reach was no longer dominant and removed the regulation	Access to CLS has been left unregulated by OFCOM since 2003 as there was an adequate number of operators in the sector, allowing for market forces to determine pricing of services	Access to CLS has been left unregulated since 1985 as FCC concluded that there were no dominant operators in the market, allowing for market forces to determine pricing of services
Current practice in the industry	In addition, other operators have reported operational restrictions in obtaining access to SingTel's CLS, incl. delays, lengthy admin processes, etc.	Access to cable landing sta sufficient competition (i.e.	ations are fully open and com there are multiple CLS owner these countries)	petitive in practice due to d by multiple operators in

Thank you