e-Commerce and Emerging Digital Trade Agenda

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• What is Digital Trade?
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• The Internet and the Technology
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• ASEAN landscape
• Lessons from Brazilian Government, Australia and Neatherland
Digital Trade

• Enable Physical Goods and Services
• Digital Services (Innovation) – consumed online
Why Internet Development & Broadband?

<table>
<thead>
<tr>
<th>Percentage increase in economic growth per 10 percent increase in penetration, in:</th>
<th>Fixed</th>
<th>Mobile</th>
<th>Internet</th>
<th>Broadband</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-income countries</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Low-income countries</td>
<td>0.7</td>
<td>0.8</td>
<td>1.1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 6: Estimates of the effect on growth of increased telecommunication services penetration
ICT Contribution to %GDP Growth

Figure 1.1  Effect of Various Information and Communication Technologies on GDP Growth in High- and Low-Income Economies, 2000-06

Source: Adapted from Qiang and Rossotto 2009, 45.

Note: Measures the percentage point increase in gross domestic product that is associated with a 10 percent increase in different information and communication technologies.
The Internet

The Applications
What is the Internet?

• Internet is a network of Networks connecting Client and Server network (hierarchy).
• Internet is a network of peer-to-peer connections.
• Internet uses a common language called protocols i.e. TCP/IP.
• Internet is the infrastructure which allows other types of application for communication i.e. email, text messaging, web based application, Internet-of-Things (IoT), Machine-to-machine (M2M), blockchain (open ledger system), etc.
• Internet is not Facebook or the World Wide Web.
• Internet is a new generation of communication technology (stateless, self-healing, non-proprietary protocol based on multistakeholder framework)
Internet Brief History

• 1960s Born in DARPA
• 1970 IPv4 addressing developed (32 bits or 4 bytes); 4.3 billion IP
• 1998 IPv6 developed (1258 bit or 8 bytes); 7.9 X 10^28
• 1989 Launch of the Internet
• 1992 Privatisation of the Internet
• 2005/6 DNSSEC launched
• 1990/1 World Wide Web Launched
• June, 2012 IPv6 Global Launch
• 2007/8 IDNs introduced
• 2008 Seoul Declaration
• 2011 OECD Internet Governance for Open Internet Framework
• 2012 451 Error report code for https to report illegal obstacles (vs. 404 URL not found)
The Internet Standards Ecosystem

- Connectivity: ISPs, Telecom operator, Blue Tooth, OTT providers
- Hardware: ITU, IEEE, IEC, GSA(ICT)
- Software (API): W3c, Google, Huawei, etc.
- Protocol: IETF (6,000 RFCs), IEEE, Open Connectivity Alliance, GSMA, ISO
- Web Services: W3C
- Platform: Google, Facebook, YouTube
- Industry ecosystems: Telecom, Blockchain, IoT Consortiums, Quantum Computing, OTT, AI, etc.
- Internet Policy: WSIS, Internet Governance Forum (IGF), UN SDG 2030 Platform
- Domain Name, IP address: ICANN, IANA,
- Allocation of Domain names and IP address: Regional Internet Registry, Private companies
- Root Servers: Regional Internet Registry, IETF
- Languages: ISO
- Open Data: Open Data Initiative Alliance
Internet Stakeholders

• Infrastructure (Backbone): IAB
• Protocol (SMTP, Email, etc.): IETF
• Cryptography: IETF
• Access provider: Tier 1, Tier 2, Tier 3 (Internet Service Providers)
• Naming: ICANN (GAC, GNSO)
• Numbering: IANA
• Allocation of IP Addresses, ASNs: RIR
• Internet languages (ASCII, Unicode): ISO
• Devices interoperability: IEEE, ISO, ITU,
• Wireless Connection: Spectrum standard (GSMA, IMT, Bluetooth, etc.)
• Applications: Facebook, Skype, Snapchat, WeChat, AliPay, Line, YouTube, ToR
• Telecom Equipment and Standard: ITU, IEEE, ETSI
• Web Standard: W3C Foundation (HTML 5, https, etc.)
• IoT SW Standards: Open Connectivity Foundation, The Thread Group (Alphabet), etc.
Regional Internet Registry
Internet Application Layer

- Email
- Instant Messaging
- World Wide Web (W3C)
- Peer-To-Peer
- e-Commerce
- Over the Top (OTT)
- Internet of Things (IoT) – separate ecosystem
Internet Resources Management and Coordination: ICANN

- Domain Name System (DNS) i.e. .happy, .internet
- Internet Protocol (IP) Address Allocation i.e. IPv4, IPv6
- ASN
- Protocol-Parameter Registry
- Root Server Systems i.e. 13 servers)
- Generic Top-Level Domain Names (gTLD) system management i.e. .org, .com, .biz
- Country-code Top-Level Domain Name (ccTLD) DNS i.e. .cn, .my, .de
- Internalized Domain Name (IDN) i.e.
- Time Zone Database Management
Internet Technical Function

- Internet protocol development: Internet Engineering Task Force (IETF)
- Internet domain name system (gTLD, TLD, ccTLD) and WHOIs management: ICANN
- Internet Root Servers (13): ICANN
- Allocation of IP addressing: IANA and Regional Internet Registry (RIR), APNIC
- Allocation of ASN: Regional Internet Registry
- Internet Architecture: Internet Architecture Board (IAB)
- Research and Future Internet Function: Internet Research Task Force (IRTF)
- Internet backbone (Tier 1, Tier 2, Tier 3): Private Sector
- Internet Governance Policy: Internet Society
- Physical link layer and devices: IEEE, GSMA, ITU
Internet Interconnection

- Peering and Transit (Routing)
- Latency and Speed
- Packet Switching vs. Circuit Switching
- Bandwidth (Broadband, Narrowband)
- Domain Name Servers (DNS)
- Internet Exchange Point
- API
- Net Neutrality
- Internet Chokepoint
The Context
Data is Eating the World!

- World’s largest taxi company owns no taxis ➔ UBER
- Most popular media creates no content ➔ Facebook
- Largest accommodation provider owns no real estate ➔ AirBnB
- Largest phone companies does not own any telephone infrastructure ➔ Skype, WeChat
- World’s most valuable retailer has no inventory ➔ Alibaba
- Fastest growing banks have no actual money ➔ Society One
- World’s largest movie house owns no cinemas ➔ NetFlix
- Largest software vendor, does not write their apps ➔ Google
- Most popular emerging research firm, has no researchers ➔ HfS Research

Source: HfS Research
Why is Digital Standard Important?

• Relevant to future communication technology (Future Proofing)
• Convergences in services not technology (licensing, broadband applications)
• For infrastructure sharing*
• Content(Data) is King!
• Achieving Digital inclusion

*IP based services and applications, promote “any to any principles of connections.”
What Happens in an Internet Minute?

- 639,800 GB of global IP data transferred
- 61,141 Hours of music
- 583,000 In sales
- 47,000 App downloads
- 204 million Emails sent
- 135 New mobile users
- 1,300 New Wikipedia articles published
- 100+ New LinkedIn accounts
- 277,000 Logins
- 2+ million Search queries
- 6 million Facebook views
- 30 Hours of video uploaded
- 1.3 million Video views
- 3,000 Photo uploads
- 100,000 New tweets
- 320+ New Twitter accounts
- 20 million Photo views
- 20 million

And Future Growth is Staggering

Today, the number of networked devices = the global population
By 2015, the number of networked devices = 2x the global population
In 2015, it would take you 5 years to view all video crossing IP networks each second
### Table 1.2 Upstream and Downstream Speeds Needed for Various Services and Applications

<table>
<thead>
<tr>
<th>500 kbit/s to 1 Mbit/s</th>
<th>5 to 10 Mbit/s</th>
<th>100 Mbit/s to 1 Gbit/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>- VoIP</td>
<td>- Telecommuting (converged services)</td>
<td>- Telemedicine, HD</td>
</tr>
<tr>
<td>- SMS</td>
<td>- File sharing (large)</td>
<td>- Multiple educational services</td>
</tr>
<tr>
<td>- Basic e-mail</td>
<td>- IPTV, SD (multiple channels)</td>
<td>- Broadcast video, full HD</td>
</tr>
<tr>
<td>- Web browsing (simple sites)</td>
<td>- Switched digital video</td>
<td>- Full IPTV channel support</td>
</tr>
<tr>
<td>- Streaming music (caching)</td>
<td>- Video on demand, SD</td>
<td>- Video on demand, HD</td>
</tr>
<tr>
<td>- Low-quality video (highly compressed)</td>
<td>- Broadcast video, SD</td>
<td>- Gaming (immersion)</td>
</tr>
<tr>
<td></td>
<td>- Video streaming (2–3 channels)</td>
<td>- Remote server services for telecommuting</td>
</tr>
<tr>
<td></td>
<td>- Video downloading, HD</td>
<td></td>
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<tr>
<td></td>
<td>- Low-definition telepresence</td>
<td></td>
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<tr>
<td></td>
<td>- Gaming</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Medical file sharing (basic)</td>
<td></td>
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<tr>
<td></td>
<td>- Remote diagnosis (basic)</td>
<td></td>
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<tr>
<td></td>
<td>- Remote education</td>
<td></td>
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<tr>
<td></td>
<td>- Building control and management</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 5 Mbit/s</td>
<td>10 to 100 Mbit/s</td>
<td>1 to 10 Gbit/s</td>
</tr>
<tr>
<td>- Web browsing (complex sites)</td>
<td>- Telemedicine</td>
<td>- Research applications</td>
</tr>
<tr>
<td>- E-mail (larger attachments)</td>
<td>- Educational services</td>
<td>- Telepresence using uncompressed video streams, HD</td>
</tr>
<tr>
<td>- Remote surveillance</td>
<td>- Broadcast video, SD and some HD</td>
<td>- Live event digital cinema streaming</td>
</tr>
<tr>
<td>- IPTV, SD (1–3 channels)</td>
<td>- IPTV, HD</td>
<td>- Telemedicine remote control of scientific or medical instruments</td>
</tr>
<tr>
<td>- File sharing (small, medium)</td>
<td>- Gaming (complex)</td>
<td>- Interactive remote visualization and virtual reality</td>
</tr>
<tr>
<td>- Telecommuting (ordinary)</td>
<td>- Telecommuting (high-quality video)</td>
<td>- Movement of terabyte data sets</td>
</tr>
<tr>
<td>- Digital broadcast video (1 channel)</td>
<td>- High-quality telepresence</td>
<td>- Remote server services for telecommuting</td>
</tr>
<tr>
<td>- Streaming music</td>
<td>- Surveillance, HD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Smart, intelligent building control</td>
<td></td>
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<td></td>
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</tbody>
</table>
Global Internet Connection
Technology behind e-Commerce

• Instant Messaging
• Social Media
• The Web
• Payment and Settlement system
De Minimis Threshold?
Digital Trade Related Issues

- Digital Goods and Services definition (WCIT, GATT, UNCITRAL, OECD, G20, APEC)
- ICT goods and services (classification)
- ITA (member countries, trade barriers)
- E-Commerce Framework (OECD, APEC, ASEAN, GATT)
- De minimis threshold international rule
- Current and emerging Intellectual Property Rights (IPR) ➔ domain name system, ccTLD
- Internet Governance Issues (open data, privacy, digital identity, data localization, sovereign rights, etc.)
- Cybersecurity and cyberspace (legal and regulatory framework)
- Economic Model (2-sided market, long tail, monetization, network science, technology policy)
Global Internet Back Bone
Internet Interconnection

- Peering and Transit (Routing)
- Latency and Speed
- Packet Switching vs. Circuit Switching
- Bandwidth (Broadband, Narrowband)
- Domain Name Servers (DNS)
- Internet Exchange Point
- API
- Net Neutrality
- Internet Chokepoint
The Technology Behind the Internet

TCP/IP Network Architecture

- **Application Layer**: client-server model
- **Transport Layer**: operating-system/computer-architecture independent
- **Network Layer**: LAN/MAN/WAN applicable
- **Link Layer**: physical-medium independent
13 servers enabling the Public Internet
Mesh Network – Avoids Single Failure Point

This is how the Internet interconnects and scales via distributed network!
Transit and Peering

- Transit -
  “Transit” has an upstream and a downstream, then the traffic from/to the latter and its customers are carried by the former to/from the rest of the Internet with payment from the downstream.

- Peering -
  Traffic between two parties and their customers are exchanged by using “peering.” Useless traffic to the upstream decreases by exchanging traffic with peering, and their transit cost can be reduced.

Source: Yoshiki Ishida, Japan Internet exchange

This is how the Internet traverses!
Internet Exchange Point (IXP) – Promotes Local Traffic, Saves Cost and Keeps Traffic Local (avoids tromboning network effects)

Source: Yoshiki Ishida, Japan Internet exchange
Merits of using IX

- Exchanging Traffic at IX Points
  - High Bandwidth
  - Low Latency
  - Cost Efficiency
  - Direct Relationship

- Peering with Internet Infrastructure such as root servers

• Recommendation as critical Internet Development infrastructure by WCIT/ITU 2013, OECD policy and Internet Society (IETF)
• APIX (APAC region)
Successful Internet exchanges have become an integral part of the global Internet.

DE-CIX in Germany is the biggest IXP in terms of traffic volume – including significant amounts from Eastern Europe.

NetNod in Sweden has significantly improved the efficiency and performance of Internet services in Sweden, where it acts as a major point of domestic traffic exchange.

LINX in London and AMS-IX in Amsterdam were founded in the early days of the Internet, and established themselves as major international hubs for traffic exchange.

In Singapore and Malaysia, governments have sought to encourage the establishment of IXPs, in recognition of the benefits they can bring.
The heart of the Internet functionality and technology!

Source: USC Packet Switching Course
Packet Switching in a Data Network

Many paths may be used for a single communication as individual packets are routed to a destination.

Prior to transmission, each communication is broken into packets which are addressed and numbered.

During peak periods, communication may be delayed, but not denied.

Internet

No fixed path is established. Packets are routed according to the best path available at the time.

At the destination, packets may be reassembled into order according to their sequence number.
Model of Packet Switching Network

Source: USC Packet Switching Course
IX Status
Asia-Pacific Region

- **APIX**“Asia-Pacific Internet Exchange”
  - An association of Internet Exchange Providers in Asia—Pacific region.
  - just like Euro-IX in Europe
- **Objectives**
  - To share information about technical, operational, and business issues and solutions regarding Internet Exchange.
- **APIX** was established in 2010 under the support of **APNIC**
- **APNIC**’s support for **APIX**
  - Engineering assistance for organizations needed.
  - **APNIC** is in a good position to encourage on facilitate to share knowledge and experience among IX points in the region.
- **Members**: 16 IXPs from 12 economies
  - BDIX (BD)
  - HKIX (HK)
  - BBIX, DIX-IE, JPIX, JPNAP (JP)
  - KINX (KR)
  - IIX (ID)
  - NIXI (IN)
  - MyIX (MY)
  - NP-IX (NP)
  - NZIX (NZ)
  - SGIX, SOX (SG)
  - VNIX (VN)
  - Equinix (US, HK, JP, AU)
- **Contact**
  - sc(at)apix.asia
Global Data Traffic (Internet)

Source: Dyn expert
Global Interconnection is dependent on the following key measures:

1) Latency (mbps)
2) Bandwidth (mbps)
3) Hops
4) Geographic distance
ASEAN experienced healthy growth in penetration, especially in wireless, but regional averages mask huge diversity among countries.


Source: ISOC Study Lifting the Barriers to Internet Development in ASEAN.
** The Philippines fares well in affordability but not in speed!

Source: ISOC Study Lifting the Barriers to Internet Development in ASEAN
Google Latency Statistics

Source: Dyn expert
Microsoft Latency Statistics
Source: Dyn expert
Global Data Traffic
Netflix Global Network

Source: Dyn expert
IBM Global Data Centers Network
Map of Information Technology Agreement (ITA) members

Generally, ITA members with FTA tariff rates avg. 0.6% vs. Non-ITA members of 3.3%
Map of Global Trade Tariff and Taxation on ICT

Figure 1: Map of countries by total taxes and tariffs for consumer ICT products and services

- Less than 1 percent
- Between 1 and 5 percent
- Between 5 and 15 percent
- Between 15 and 25 percent
- Greater than 25 percent
- Data not available
ICT Tax and Tariff by Regions

Source: Network economy and TISA
New Network Economics Effect

• More eyeballs (network) ➔ Competitive market (market access)
• More content (network) ➔ High local net worth
• Higher traffic ➔ Lower cost, better connectivity performance, promote inward investments
• Open data exchange ➔ GVC linked, leverage external growth effect, competitive market enabling new technology and services (i.e. blockchain, IoT, e-signature, paperless trade, regional single window, etc.)
• Secure network ➔ trustworthiness, resiliency
• Technology neutral policy ➔ neutral service policies grows innovative digital services and start up (open standard, open API, etc.)
• Cost efficiency ➔ lower operating cost, attract FDI and local entrepreneurs (HW, infrastructure, SW, network management policies, leverage global network effects, local content, infrastructure sharing, Climate Change, Energy Security)

Invest in neutral IXP, lower barrier to ICT devices and related technology, build local content and new businesses
(Mis)Understanding the Internet Workings
• SPAM ➔ Bulk of Junk Mail or Unwanted/Unsolicited Messages (Technical concept: Badly constructed and timed messages)
• Interconnection ➔ Connection based communication using Call Termination concept (like the telephone) (Technical concept: Connection less communication, no termination)
• Peering ➔ Equal exchange (Technical concept: exchanging traffic under open or close contracts)
• Privacy ➔ User protection (Technical concept: Anonymity and Cryptography)
• Net neutrality: No discrimination (speed) (Technical concept: application and package agnostic interconnection)
• Quality of Service: Guaranteed Service
  (Technical concept: Best effort, not guaranteed service)
• Data Protection: Data localization
  (Technical concept: Encrypted communication, Metadata)
• Free or Open Internet ➔ No one pays/No fees
  (Technical concept: Permissionless, Voluntary, Open Protocol/Standard or Open source code, Non-proprietary)
• Open Data ➔ Data Accessibility
  (Technical concept: Free flowing Bits and Bytes)
• Open Operating System (OS): No membership fee
  (Technical concept: Permissionless, Collaborative Development via sharing source code)
• Interoperability: harmonization or common standards/practices
  (Technical concept: Minimal impact or changes to current protocol at the core level)
• Technology neutral policy: No prejudice (equality basis)
  (Technical Concept: Accommodate future technology and its applications (beyond equality basis))
Lessons from Brazilian Government
Latency Impact After Google DNS Discontinued Operation in Sao Paulo

This not only affected Brazil but also the regional Internet latency and disrupted the country’s economic activities as well as the Latin American region!

Source: Dyn Blog
Why consider Legislation

• Define spam
• Specify what (legitimate) businesses must do to avoid their marketing messages being identified as spam
Australian Spam Legislation…

• Spam is defined as any email, SMS or instant message that:
  • Promotes a product or service to the recipient
  • Deceptively and dishonestly attempts to obtain a financial advantage

It is not necessary for messages to be sent in bulk or to contain offensive or illegal content, to be spam

• Rules are specified for sending commercial email, SMS or instant messages:
  • Recipient must have consented to the sending of the message
  • Message must accurately identify the sender, and indicate how the sender can be contacted
  • Message must indicate how the recipient can unsubscribe from receiving further messages
The Spam Law in the Netherlands specified

There is no definition of “spam” in the law.

It addresses unsolicited electronic communications
   Whether by fax, computer, device or phone

So, it is much broader than “spam”
The use of automatic calling systems without human intervention, faxes and electronic messages for transmitting unrequested communication to subscribers for commercial, idealistic or charitable purposes will only be permitted if the sender can demonstrate that the subscriber concerned has given prior consent for this, notwithstanding that laid down in paragraph 2.

1. The use of automatic calling systems without human intervention, faxes and electronic messages for transmitting unrequested communication to subscribers for commercial, idealistic or charitable purposes will only be permitted if the sender can demonstrate that the subscriber concerned has given prior consent for this, notwithstanding that laid down in paragraph 2.

2. Any party who has received electronic contact information for electronic messages as part of the sales of his product or service may use this information for transmitting communication for commercial, idealistic or charitable purposes in relation to his own similar products or services, provided that with the obtaining of the contact data the customer is explicitly given the opportunity to submit an objection in a straightforward manner and free of charge against the use of his electronic contact information and, if the customer has not taken up this opportunity, he is offered the opportunity with each communication transmitted to submit an objection against the further use of his electronic contact information under the same conditions. Article 41, paragraph 2, of the Personal Data Protection Act is applicable mutatis mutandis.
For inquiries, please write to duangthip@itd.or.th