



5th World Telecommunication/ICT Indicators Meeting (Geneva, 2006)

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Singapore

STATE OF TELECOMMUNICATION / INFOCOMM STATISTICS COLLECTION & DISSEMINATION IN SINGAPORE

1. INTRODUCTION

The infocomm sector¹ is an important part of Singapore's economy. In 2005, the sector generated S\$37.89 billion² (or about USD22.7 billion) in revenue, contributing 6.5%³ to Singapore's Gross Domestic Product (GDP). Infocomm manpower in Singapore grew 3.1% from 2004 to reach 111,400 in 2005⁴, or 4.9% of the total employed labour force⁵.

The Infocomm Development Authority of Singapore (IDA) is the national regulator for the telecommunication industry in Singapore and has fully liberalised the industry since April 2000. The IDA is also the promoter and developer of the infocomm sector. In this respect, IDA has put in place various schemes and plans to further the growth and development of the infocomm sector in Singapore, including a national framework to develop globally competitive infocomm manpower and an infocomm-savvy general workforce.

The IDA also works closely with industry and other government agencies to help transform other economic sectors in Singapore by leveraging on infocomm to improve their overall operational efficiencies as well as explore new business opportunities.

In June 2006, the IDA launched its latest ten-year infocomm masterplan, Intelligent Nation 2015 (iN2015)⁶ which was developed in close consultation with the private, public and people sectors. iN2015 acknowledges and takes into account the strategic role of infocomm as a critical enabler to transform various economic sectors, through the development of a next-generation infocomm infrastructure, the growth of the infocomm sector and the enhancement of infocomm competency of the general workforce and

¹ The infocomm (information and communications) sector in Singapore includes the following primary categories of activities:

- Wholesale of infocomm products such as telecommunication equipment; computer equipment, hardware and software; office equipment etc;
- Retail sale of infocomm products;
- Telecommunication services;
- Computer and IT services; and
- Content services.

Activities pertaining to infocomm manufacturing activities are not included.

² Source: IDA Annual Survey on Infocomm Sector for 2005. Revenue of the infocomm sector is defined as Export sales and End-User sales in Singapore i.e. revenue excludes OEM/Other Resellers' sales.

³ Source: Singapore Department of Statistics

⁴ Source: IDA Annual Survey on Infocomm Manpower for 2005.

⁵ Singapore's 2005 employed labour force was obtained from the Singapore Ministry of Trade & Industry publication, "Economic Survey of Singapore 2005."

⁶ More details on the iN2015 masterplan, including soft copies of the full masterplan report are available on the website: www.iN2015.sg

capabilities of the infocomm manpower. The four strategic thrusts under iN2015 are to:

- Spearhead the transformation of key economic sectors, government and society through more sophisticated and innovative use of infocomm;
- Establish an ultra-high speed, pervasive, intelligent and trusted infocomm infrastructure;
- Develop a globally competitive infocomm industry; and
- Develop an infocomm-savvy workforce and globally competitive infocomm manpower.

2. TELECOMMUNICATION / INFOCOMM STATISTICS AND INDICATORS

The IDA has been collecting various infocomm statistics and indicators for the purposes of:

- i. Planning, policy formulation and review;
- ii. Monitoring and tracking progress in meeting set goals and targets; and
- iii. Benchmarking the state of Singapore's infocomm development to assess gaps and identify areas for improvement.

Regular reviews are also conducted to evaluate the relevance of such infocomm statistics and indicators to ensure that they are updated and can reflect the trends and developments in the ever-changing infocomm landscape. The reviews also seek to ensure that the statistics and indicators collected are aligned to international standards and best practices in order to ensure that they are comparable for international benchmarking purposes.

Annex A presents the state of telecommunication industry and infocomm landscape in Singapore.

Annex B sets out the latest statistics and indicators subject to availability of data (as at the end of fiscal year 2005) for some of the ITU indicators.

2.1 Collection and Dissemination

IDA obtains the relevant statistics of the infocomm sector through a combination of surveys and administrative means. These mechanisms are reviewed on a regular basis to ensure that the means of collection continue to be effective in providing the necessary information on a timely basis.

2.1.1) Surveys

Surveys are one of IDA's primary means of obtaining information in order to assess the general health and performance of the infocomm sector in Singapore. The IDA conducts a number of surveys to gauge the level of infocomm adoption and usage by businesses and in households and by individuals. Other surveys collect information on the infocomm sector and manpower. The key findings from these surveys are made publicly available on the IDA website www.ida.gov.sg.

The Annual e-Government Customer Perception Survey is jointly conducted by the IDA and the Singapore Ministry of Finance. This survey assesses the

general public's level of receptivity towards e-government initiatives. The main findings of this survey are also available on the IDA website.

The IDA also conducts other surveys on a semi-regular or ad-hoc basis for specific purposes. For example, the IDA Consumer Awareness and Satisfaction Survey is conducted every two years and aims to measure consumers' usage, awareness of, and satisfaction with selected telecommunication services in Singapore.

2.1.2) Administrative Means

Besides the various surveys, the IDA collects a basket of telecommunication statistics and indicators to monitor the development of the telecommunication industry. Telecommunication service providers licensed by the IDA are required to provide information on their services and operations, mostly on a monthly basis. Aggregated figures (such as total fixed line subscriptions, total mobile subscriptions, mobile penetration, total broadband subscriptions) are available on the IDA website.

2.2) Challenges Faced and Approaches Adopted to Address These

In the collection of relevant telecommunication / infocomm statistics, IDA faces the primary challenge of managing respondent fatigue and survey burden.

To address this challenge, IDA has adopted several measures so as to obtain quality and timely submissions and returns:

- Regular review of the scope and coverage of surveys and administrative data forms. Where appropriate, the survey questionnaires and data forms have been simplified, streamlined and consolidated so as to provide better focus for respondents;
- The timing for the various surveys has been revised wherever possible so as to have a more even phasing of the conduct of the surveys throughout the year;
- Work closely with industry associations and groups to improve the overall procedures and processes and incorporate their suggestions for improvements where appropriate; and
- Judicious use of IDA's regulatory powers to ensure that the licensed telecommunication service providers submit the information requested.

3. SUMMARY

Telecommunication / infocomm statistics and indicators serve as necessary inputs for planning, policy review and formulation. It is therefore important to have a rigorous process in place that ensures the collection of relevant statistics and indicators, and their dissemination, on a timely basis. It is also important to regularly review these statistics and indicators and the collection mechanisms to ensure their relevance and effectiveness in tracking and monitoring of developments and emerging activities in the infocomm landscape.

Annex A

State of Singapore Telecommunication Industry / Infocomm Landscape

Table 1: Overview

Category	Indicators	Status
A) Infocomm Sector⁷		
1) Infocomm Revenue ⁸ , 2005 (S\$b)	- Total Revenue - Domestic Revenue - Export Revenues	37.89 15.83 (43%) 22.06 (58%)
	- Note: - Total revenue increased for the 5th consecutive year. - The 8.9% total revenue growth from 2004 to 2005 represented the highest percentage increase since 2001.	
2) Infocomm Value-Added, 2005	Infocomm Value-Added Contribution to GDP	6.5%
	- Note: - Between 2000 and 2005, the Compound Annual Growth Rate (CAGR) of the infocomm sector value-added (7.8%) was almost double the CAGR of Singapore's GDP (4.0%).	
3) Infocomm Manpower, 2005	- Total infocomm manpower - Total infocomm job vacancies % with tertiary⁹ qualifications - Infocomm Manpower in Infocomm Organisations - Infocomm Manpower in End-User Organisations	111,400 (4.9% of total employed workforce) 5,700 83% 55,600 55,800
	- Note: - Infocomm manpower grew for the 4th consecutive year. Total infocomm job vacancies more than doubled from 2004 to 2005.	
4) Research & Development (R&D)	As part of Singapore's S\$13.5b national Science & Technology 2010 Plan, the National Research Foundation intends to pump in S\$5b into R&D over the five years from 2006, with S\$2b earmarked for two areas, including Interactive and Digital Media.	
B) Business Environment		
5) International accolades	- WEF Global IT Report, 2005-2006 - World Bank Group, Ease of Doing Business 2006 Top 30 Economies - IMD World Competitiveness Yearbook, 2006 - EIU e-Readiness Rankings, 2006 - Accenture Annual e-Government Rankings	2 nd 2 nd in Corporate Governance 3 rd 2 nd in Asia Top 3 for 5 years running (2000-2005)

⁷ Please refer to the definition of the infocomm sector stated in footnote 1.

⁸ Revenue of the infocomm sector is defined as Export sales and End-User sales in Singapore i.e. revenue excludes OEM/Other Resellers' sales. Domestic revenue is defined by End-User sales in Singapore and export revenue is defined by Export sales.

⁹ Tertiary educated persons include diploma and degree holders.

6) Connectivity	• International Internet Connectivity, 2005 • Total Submarine Cable Capacity, 2005 • Public Wireless Hotspots, 2006	30.62 Gbps 27.98 Tbps 970 (about 1.4 per sq. km.)
	• Note: - o Singapore has the 3rd highest submarine cable capacity in the world.¹⁰	
7) Telecommunication	Singapore has fully liberalised its telecommunication market since April 2000. With full liberalisation, there are no foreign equity limits for players entering the market. There is also no limit to the number of licences issued except where there are resource constraints such as spectrum frequency. Service providers are free to decide on the types of networks, systems, services and technologies to deploy. <u>Regulatory Framework</u> A regulatory framework is in place to ensure a level playing field and effective and sustainable competition in the telecommunication sector, including: • A sector-specific competition management framework (Telecommunication Competition Code) which sets out the regulatory principles and approach in managing competition in the market. The framework covers major aspects such as (i) dominant licensee classification and obligations; (ii) fair competition rules; (iii) interconnection and infrastructure sharing framework, including obligation for the dominant licensee to offer a Reference Interconnection Offer (RIO); (iv) competition enforcement framework; (v) end-user/consumer protection rules; and (vi) merger and acquisition rules in the telecommunication market. • A commitment to open, consultative and transparent decision-making processes. There is a regular process of industry and public consultation before any major regulatory policies or decisions are taken. Regulatory decisions taken are made publicly available and published on the IDA website. <u>Benefits from Full Telecommunication Liberalisation</u> • 39 facilities-based licensees and 801 service-based licensees as of Sep 2006, with a mix of various infrastructure, technologies and services launched in the market. • Wide range of service offerings at competitive pricing. • Telecommunication services was the 2nd highest contributor to total infocomm sector revenue, accounting for 19% of the S\$37.89 billion revenue in 2005.¹¹ • More than 4300 jobs created in the telecommunication industry since 2000.	
C) Infocomm Adoption		
8) Telecommunication & Internet	• Fixed Lines Household Penetration, Jul 2006 • Mobile Phone Penetration, Jul 2006	98.1% 98.4%

¹⁰ Source: TeleGeography Research, © PriMetrica, Inc. 2006

¹¹ Source: IDA Annual Survey on Infocomm Sector 2005.

¹² For businesses with 10 or more employees.

	- Broadband Coverage, 2005 - Home Broadband Penetration, Jul 2006 - Home Internet Access, 2005 - Home Computer Access, 2005 - Business Broadband¹², 2005	99% 57.4% 66% 74% 77%
	- Note: - As at Jul 2006, there were 534,600 3G subscribers (or 12.5% of total mobile subscriber base).	

Table 2: Some Cluster-based Information

Cluster	Status
Education (Primary schools, Secondary schools and Junior Colleges)	
1) Availability of computers (All schools)	100%
2) Broadband Penetration (All schools)	100%
3) Ratio of teachers to computers or laptops (All schools)	1:1
4) a) Ratio of students to computers (Primary school) b) Ratio of students to computers (Secondary school and JC)	6.5 students : 1 computer 4 students : 1 computer
Healthcare (Public Hospitals, Polyclinics and Private Hospitals)	
1) Adoption of Hospital Information System (All hospitals and polyclinics)	100%
Note: National Health Information Infrastructure: - Medinet, a central health information backbone linking all hospitals and polyclinics in Singapore. Medinet also hosts key national health applications. - Since Apr 2005, the National Healthcare Group and Singapore Health Services have implemented a system, Electronic Medical Records (EMR) Exchange, to enable exchange medical records between all public sector hospitals and institutions, which account for 80% of Singapore's hospital providers. - A central claims processing system (MediClaim) to process medical claims from patients' Medisave and Medisave approved insurance plans. - A central information store on allergies and medical alerts of all Singapore residents is available. - The Health Promotion Board has implemented the Integrated Dental Electronic Assessment for Students (IDEAS) system to support the school health and dental services. IDEAS is the first dental clinical system in Asia that enabled real time sharing of student records island-wide via WAN and 3G technology from 230 clinics and mobile clinics on buses. Award-winning Innovations: - The National University Hospital developed a doctor-centred, patient-based Computerised Patient Support System (CPSS) to enable an integrated view of patient data from multiple source systems such as X-rays, laboratory results, surgical operating notes, discharge summaries, clinical results and reports. CPSS won the Asian Hospital Management Awards 2003, IT category, in Asia Pacific. - The Interactive Patient Guide (IPG) developed by Changi General Hospital (CGH), allows a patient to obtain information on treatments, surgical procedures and aftercare of 25 common medical conditions through videos and printable text online in the comfort of his home. CGH's IPG won the Most Outstanding Project in the IT category of the 2004 Asian Hospital Management Awards.	

Manufacturing, Logistics & Retail	
% of trade permits applied and issued online	100%
Number of forms required for trade permit application	1 single electronic form to all controlling agencies
Amount of time to get approval for trade permits	Within 10 minutes
% of paperless clearance for containerised cargo	100%
Online air cargo bookings	More than 2 million electronic bookings are carried out each year for air cargo
Gate clearance process ¹³ to provide container delivery location to drivers	Maximum of 25 seconds
Note: - A significant proportion of transactions between manufacturers and their suppliers and partners takes place over B2B networks. Most of these networks are based on RosettaNet standards. For example, Chartered Semiconductor, one of the world's top semiconductor foundries, embarked on a supply chain transparency initiative 2 years ago. This enabled its global customers and partners to have B2B connectivity with Chartered, thereby accessing real-time information on work-in-process, product orders, product shipping and testing status. Such connectivity has enabled Chartered and its partners to reap benefits, such as productivity gains of up to 40% in streamlining labour operations. - The Port of Singapore is the busiest port in the world, handling more than 23 million TEUs every year, PSA Corp (the operator of the largest port in Singapore) makes extensive use of technology to ensure highly efficient operations. One example is the use of intelligent software to unload containers from one vessel and load them to another vessel in the most optimal and shortest time. PSA's Computer Integrated Terminal Operations System (CITOS) ensures that though some 60 vessels of different sizes call on the port on any given day, expecting to be berthed immediately despite the fact that usually 90% of them arrive out of schedule, their expectations are met. - For the air cargo community, the Cargo Community Network (CCN) provides online connectivity to more than 20 major cargo airlines and 1,000 freight forwarders in Asia Pacific for online bookings, customs declarations, issuance of airway bill, track and trace, and electronic payment & invoicing. Through CCN's integrated portal, some 2 million electronic bookings are carried out yearly, with over S\$1.2 billion of invoicing amount transacted yearly.	
e-Government	
1) % of respondents who had transacted electronically with the government ¹⁴	86%
2) % of respondents who are satisfied with overall quality of e-Service	85%
3) Availability of online services	1,600 services available online (>98% of all public services)
4) Adoption rate of key e-Services	73% of population filed income tax returns electronically in 2006

¹³ Information from PORTNET and planning instructions from CITOS are closely integrated with PSA's Flow-Through-Gate System. This innovation clears container trucks at PSA gates in world record time of 25 seconds in one paperless process. It uses automated Container Number Recognition System and auto-notification of hauliers to optimise the movement of containers and their clearance.

¹⁴ Amongst those with a need to transact.

Note:

- Online Business Licensing System (OBLS):
 - o Allows businesses to apply, update, renew or terminate any combination from a suite of 82 online business licences issued by 18 government agencies, in one online transaction.
 - o Saves businesses from having to make separate trips to different counters, completing many online forms at various agencies' websites or providing duplicate information to multiple parties.
 - o Licence process review also led to a 10% reduction in the licences issued.
 - o Since its launch in Jan 2004, more than 55,000 transactions have been made.
 - o Examples of benefits to businesses include¹⁵:
 - To incorporate a new company, cost has been reduced from S\$1,200 (~US\$736) and up, to a flat fee of S\$300 (~US\$184). Processing time has been reduced from 5 days to 2 hours.
 - To obtain a public entertainment licence, processing time has been reduced from 8 weeks to 2 weeks. Also, the number of counter visits has been decreased from visits to 7 government agencies to none.
 - o Awarded the United Nations Public Services Award in the category of "Application of Information and Communication Technology (ICT) in Government: e-Government" in May 2005.
- Integrated Work Permit Online Services (WPOL):
 - o Developed by the Ministry of Manpower, the WPOL is a one-stop portal for employers to perform Work Permit transactions (application, issuance, renewal and cancellation) online for their foreign workers.
 - o Examples of benefits include:
 - Reduction of processing time for applications for work permits from as long as 14 working days to the next working day.
 - o Awarded the United Nations Public Service Award in the category of "Improving Transparency, Accountability and Responsiveness in the Public Service) in Jun 2006.

Community

1) Availability of computers in public libraries	100%
2) Average no. of computers in each library	30 per library
3) Internet penetration (All libraries)	100%
4) Broadband penetration (All libraries)	100%
5) Internet connection speed (All libraries)	6Mbps

Note:

- CitizenConnect:
 - o Aims to help citizens or resident who do not have access to, or need help with using computer or Internet, to transact online with the Government in their neighbourhoods.
 - o Offers two conveniences: free access to the Internet; and staff present to help citizens and residents access the Singapore Government Online portal and perform online transactions with government agencies.
 - o As of May 2006, 5 CitizenConnect Centres have been set up at community clubs, with plans to expand to a network of 25 Centres island-wide by mid-2007.

¹⁵ More details can be found from the OBLS Factsheet jointly issued by Singapore's Ministry of Trade and Industry and IDA, released 4 Mar 2005.

Annex B

Key indicators of the telecommunication/ICT sector

	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
Fixed Telephone network			
1	112	Main (fixed) telephone lines in operation	1'844'400
2	117	Total capacity of local public switching exchanges	-
3	1142	Percent of main lines connected to digital exchanges	100.0%
4	116	Percent of main lines which are residential	58.9%
5	1162	Percent of main lines in urban areas	100%
6	1163	Number of localities with telephone service	-
7	1112	Public payphones	10'900 ¹⁷
Mobile network			
8	271	Mobile cellular telephone subscribers (post-paid + prepaid)	4'384'600
8.1	271p	Mobile cellular subscribers: prepaid	1'609'700
9	2712	Digital mobile cellular subscribers	4'384'600
9.1	271h	Total number of subscribers to mobile networks	2'180'500
9.1.1	271L	Number of subscribers to low and medium speed mobile networks	1'862'900
9.1.2	271G	Number of subscribers to IMT-2000 (3G) high-speed mobile networks	317'600
10	271land	Percent coverage of mobile cellular network (land area)	99.9%
11	271pop	Percent coverage of mobile cellular network (population)	99.9%
Text/data network			
12	311	Telex subscriber lines	-
13	412	Private leased circuits	-
14	413	Total subscribers to public data networks	-
15	4213	Internet subscribers	2'255'100
15.1	4213d	Dial-up Internet subscribers	1'589'500
15.2	4213tb	Broadband Internet subscribers	665'600
15.2.1	4213cab	Cable modem Internet subscribers	302'600
15.2.2	4213dsl	DSL Internet subscribers	355'700
15.2.3	4213ob	Other broadband Internet subscribers	7'400 ¹⁸
16	4212	Estimated Internet users	1'749'930 ¹⁹
16.1	4212f	Percent female Internet users	51.5%
16.2	4212f%f	Female Internet users as percent of female population	59.2%

¹⁶ Code used by the International Telecommunication Union (ITU) to identify the indicator. This code appears in ITU questionnaires.

¹⁷ Excludes coinafones operated by private premise owners.

¹⁸ Includes leased line Internet subscribers.

¹⁹ The figure reflects the total resident Internet users aged 15 years and above. Source: IDA Annual Survey on Infocomm Usage in Households and by Individuals for 2005

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	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
17	424	PWLAN locations	Approximately 970
18	28	ISDN subscribers	25'200 lines ²⁰
18.1	281	Basic rate ISDN subscribers	18'100 lines
18.2	282	Primary rate ISDN subscribers	7'100 lines
18.3	28c	ISDN voice channel equivalents	-
19	4214	International Internet bandwidth	30'620 Mbps ²¹
19.1	4214og	Outgoing	-
19.2	4214ic	Incoming	-
Quality of service			
20	123	Waiting list for main lines	-
21	143	Faults per 100 main lines per year	0.3% ²²
22	141	Percent of telephone faults cleared by next working day	98.0% ²³
Traffic			
23	1311m	Local telephone traffic (minutes)	13'060 million
23.1	1313wm	Fixed to mobile traffic (minutes)	-
23.2	1311im	Internet Dial-up traffic (minutes)	-
24	1312m	National trunk telephone traffic (minutes)	N.A.
25	132mb	International incoming and outgoing telephone traffic (minutes)	4'539 million
25.1	132m	International outgoing telephone traffic (minutes)	2'994 million
25.2	132mi	International incoming telephone traffic (minutes)	1'545 million
26		Public data traffic (non-Internet)	-
27	133wm	Outgoing mobile minutes	-
27.1.1	1331wm	Outgoing/originating mobile minutes to same mobile network	-
27.1.2	1332wm	Outgoing/originating mobile minutes to other mobile networks	-
27.1.3	1333wm	Outgoing/originating mobile minutes to international	-
27.1.4	1334wm	Roaming minutes out (own subscribers)	-
27.1.5	1332wmf	Outgoing mobile minutes to fixed networks	-
27.2.1	1335wm	Incoming international minutes to mobile network	-
27.2.2	1336wm	Roaming minutes in (foreign subscribers)	-
27.3	133sms	SMS sent	9'051 million
27.4	133mms	MMS sent	-
28		International outgoing telegrams	-

²⁰ The figure reflects the number of ISDN lines, and not subscribers; likewise for indicators 18.1 and 18.2.

²¹ As at Dec 2005.

²² Weighted average of fixed line operators for the month of Mar 2006.

²³ Weighted average of fixed line operators for the month of Mar 2006.

	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
Tariffs			
Because most countries now have some form of competition in at least one market segment, there may not be a standard tariff. In addition, tariffs within services may not be uniform (e.g., telephone subscription charges may vary across the nation). The following guidelines may be useful. It is preferable to use the tariffs of the operator with the largest market share (measured by subscribers or minutes). It is preferable to use the tariffs that the majority of consumers pay (e.g., if most of the customers are in urban areas, use urban tariffs). It is preferable to include taxes and provide a note specifying whether taxes are included and what the rate is. It is preferable to use the same operator each year to enhance chronological comparability. It is preferable to report tariffs in national currency. If this is not the case, it should be specified in a note.			
31.1			
31.1.1	151	Installation fee for residential telephone service	S\$42.00 to S\$52.50 ²⁴
31.1.2	152	Monthly subscription for residential telephone service	S\$8.75 to S\$10.29 ²⁵
31.1.3	153	Price of a 3-minute fixed telephone local call (peak rate)	S\$0.00 to S\$0.0444 ²⁶
31.1.4	153o	Price of a 3-minute fixed telephone local call (off-peak rate)	S\$0.00 to S\$0.0222 ²⁷
31.2			
31.2.1	151b	Installation fee for business telephone service	S\$52.50 ²⁸
31.2.2	152b	Monthly subscription for business telephone service	S\$13.13 ²⁹
32		National telephone call prices	-
33		International telephone call prices	U.S. – S\$0.33 for 3 min ³⁰ Malaysia – S\$0.27 for 3 min Canada – S\$0.39 for 3 min Australia – S\$0.39 for 3 min U.K – S\$0.42 for 3 min Hong Kong – S\$0.48 for 3 min China – S\$0.57 for 3 min
34.1.1	151c	Mobile cellular connection charge	S\$8.00 to S\$18.00 ³¹
34.1.2	152c	Mobile cellular monthly subscription	S\$0.00 ³²
34.1.3	153c	Mobile cellular - price of 3 minute local call (peak)	S\$0.52 to S\$0.66 ³³
34.1.4	153co	Mobile cellular - price of 3 minute local call (off-peak)	S\$0.52 to S\$0.66 ³⁴
34.1.5	153sms	Mobile cellular – price of SMS	S\$0.05 ³⁵

²⁴ Source: Operator websites. This is an indicative range and is valid as of 26 Sep 2006.

Taxes are included.

²⁵ Please see footnote 24.

²⁶ Please see footnote 24. Local calls are charged on a caller-pay basis.

²⁷ Please see footnote 24. Local calls are charged on a caller-pay basis.

²⁸ Source: Operator website. Figure is valid as of 26 Sep 2006. Taxes are included.

²⁹ Please see footnote 29.

³⁰ Rates for each country were obtained by taking the average of rates by selected operators, taken as at Aug 2006.

³¹ This is an indicative range of connection charges for prepaid services (as recommended by ITU) and is valid as of 26 Sep 2006. Taxes are included.

³² Reflects prepaid tariffs (as recommended by ITU for inter-country comparability).

³³ Reflects prepaid tariffs (as recommended by ITU for inter-country comparability). Taxes are included.

³⁴ Please see footnote 33.

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	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
34.2	153m	Mobile termination rate	N.A. ³⁶
Other data tariffs			
35		Leased line charges	-
36		Data communication charges	-
37		Internet tariffs Connection, monthly rental and usage charges for Internet access service. The tariff chosen for a particular country would be the package that is the cheapest, that is widely available (or, in the case of regional service providers, is available in the capital city) and is available to the general public without restriction (e.g., excluding in-company or limited time offers, and excluding offers that are bundled with some other service). If additional charges are payable for telephone usage for dial-up use, this and the amount should be specified in a note. A note should indicate whether the subscription includes free hours and/or is flat-rate.	
37.1	4213c	Internet connection charge	S\$41.95 ³⁷
37.2	4213s	Internet monthly subscription	S\$121.80 ³⁸
37.3	4213p	Internet - price of per minute (peak) connection	N.A. (Unlimited broadband)
	4213po	Internet - price of per minute (off-peak) connection	N.A. (Unlimited broadband)
37.4	4213_t2 0	Internet access tariff (20 hours per month)	N.A. (Unlimited broadband)
STAFF			
38	51	Total full-time telecommunication staff	-
38.1	51f	Female telecommunication staff	-
38.2	51w	Mobile communications staff	-
REVENUE			
39	75	Total revenue from all telecomm-unication services	S\$7.2 billion ³⁹
40	71	Revenue from telephone service	-
40.1	711	Income from telephone connection charges	-
40.2	712	Income from telephone subscription charges	-
40.3	7131	Income from local calls	-
40.4	7132	Income from national long distance calls	-
40.5	7133	Income from international calls	-
41	731	Revenue from data transmission	-
42	732	Revenue from leased circuits	-

³⁵ Applies to prepaid mobile subscription accounts and includes taxes. For postpaid mobile subscriptions, the sending of SMS is usually bundled with a basic mobile package and is therefore considered free.

³⁶ Mobile operators in Singapore operate on a Mobile-Party-Pays system so no such termination rate is applicable.

³⁷ Taxes are included.

³⁸ Flat rate for an unlimited broadband subscription with download speeds of up to 30 Mbps. This rate is the cheapest in terms of cost per 100 kbits/s, and is available to the general public without restriction. Taxes are included.

³⁹ Source: IDA Annual Survey on Infocomm Sector 2005. Telecommunication Services comprises the following business activities: Fixed line services; Mobile and radio paging services; Satellite uplink and downlink services; Internet service providers; Third party telecommunication/value-added network services; Data communication services not elsewhere classified; Television and/or radio broadcasting (including cable, satellite & terrestrial TV); Telecommunication services not elsewhere classified; Web hosting services; and Cyber 'cafes'.

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	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
43	741	Revenue from mobile communications	-
43.1	741d	Mobile data revenues	-
43.1.1	741m	Text and multimedia messaging revenues	-
44	74	Other revenues	-
45		Value-added from telecommunication sector	-
46	81	Total annual investment in telecom	-
46.1	83	Fixed telephone service investment	-
46.2	841m	Mobile communication investment	-
46.3	841f	Foreign investment	-
47	PIAC1	Percentage of localities with PIACs	99%
48	PIAC2	Percentage of the population with access to a PIAC	99%
49	PIAC3	Number of localities with PIAC	-
50	PIAC4	Target population for DCC services	-
51	PIAC5	Total number of PIACs	76 ⁴⁰
51.1	PIAC6	Total number of DCCs	-
51.2	PIAC7	Total number of other PIACs	-
52	PIAC8	Total number of computers in DCCs	-
53	PIAC9	Actual DCC usage percentage	-
OTHER INDICATORS			
54	955	Number of radio sets	549'300 ⁴¹
55	965	Number of TV sets	895'900 ⁴²
56	965m	Total number of multi-channel TV subscribers	476'400
56.1	965c	Number of terrestrial multi-channel TV subscribers	476'400 ⁴³
56.2	965s	Direct to Home satellite antennas	0
57	965cp	Homes passed by multi-channel TV	-
58	422	Number of Personal Computers	-

Note:

Singapore total population (2005): 4'351'400

Singapore resident population (2005): 3'553'500

Total number of resident households (2005): 1'049'000

Source: Singapore Department of Statistics

⁴⁰ 39 public libraries and 37 community clubs offering public computer and Internet access.

⁴¹ Refers to total number of vehicle radio licences. Source: Media Development Authority of Singapore.

⁴² Refers to total number of residential TV licences. A TV licence is required if an individual operates or has, on any premise owned or occupied by him/her, TV sets or any equipment that is capable of receiving broadcasting services. Source: Media Development Authority of Singapore.

⁴³ Refers to total number of residential cable TV subscribers. Source: Media Development Authority of Singapore.



INTERNATIONAL TELECOMMUNICATION UNION

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STATE OF TELECOMMUNICATION / INFOCOMM STATISTICS COLLECTION & DISSEMINATION IN SINGAPORE

1. INTRODUCTION

The infocomm sector¹ is an important part of Singapore's economy. In 2005, the sector generated S\$37.89 billion² (or about USD22.7 billion) in revenue, contributing 6.5%³ to Singapore's Gross Domestic Product (GDP). Infocomm manpower in Singapore grew 3.1% from 2004 to reach 111,400 in 2005⁴, or 4.9% of the total employed labour force⁵.

The Infocomm Development Authority of Singapore (IDA) is the national regulator for the telecommunication industry in Singapore and has fully liberalised the industry since April 2000. The IDA is also the promoter and developer of the infocomm sector. In this respect, IDA has put in place various schemes and plans to further the growth and development of the infocomm sector in Singapore, including a national framework to develop globally competitive infocomm manpower and an infocomm-savvy general workforce.

The IDA also works closely with industry and other government agencies to help transform other economic sectors in Singapore by leveraging on infocomm to improve their overall operational efficiencies as well as explore new business opportunities.

In June 2006, the IDA launched its latest ten-year infocomm masterplan, Intelligent Nation 2015 (iN2015)⁶ which was developed in close consultation with the private, public and people sectors. iN2015 acknowledges and takes into account the strategic role of infocomm as a critical enabler to transform various economic sectors, through the development of a next-generation infocomm infrastructure, the growth of the infocomm sector and the enhancement of infocomm competency of the general workforce and

¹ The infocomm (information and communications) sector in Singapore includes the following primary categories of activities:

- Wholesale of infocomm products such as telecommunication equipment; computer equipment, hardware and software; office equipment etc;
- Retail sale of infocomm products;
- Telecommunication services;
- Computer and IT services; and
- Content services.

Activities pertaining to infocomm manufacturing activities are not included.

² Source: IDA Annual Survey on Infocomm Sector for 2005. Revenue of the infocomm sector is defined as Export sales and End-User sales in Singapore i.e. revenue excludes OEM/Other Resellers' sales.

³ Source: Singapore Department of Statistics

⁴ Source: IDA Annual Survey on Infocomm Manpower for 2005.

⁵ Singapore's 2005 employed labour force was obtained from the Singapore Ministry of Trade & Industry publication, "Economic Survey of Singapore 2005."

⁶ More details on the iN2015 masterplan, including soft copies of the full masterplan report are available on the website: www.iN2015.sg

capabilities of the infocomm manpower. The four strategic thrusts under iN2015 are to:

- Spearhead the transformation of key economic sectors, government and society through more sophisticated and innovative use of infocomm;
- Establish an ultra-high speed, pervasive, intelligent and trusted infocomm infrastructure;
- Develop a globally competitive infocomm industry; and
- Develop an infocomm-savvy workforce and globally competitive infocomm manpower.

2. TELECOMMUNICATION / INFOCOMM STATISTICS AND INDICATORS

The IDA has been collecting various infocomm statistics and indicators for the purposes of:

- i. Planning, policy formulation and review;
- ii. Monitoring and tracking progress in meeting set goals and targets; and
- iii. Benchmarking the state of Singapore's infocomm development to assess gaps and identify areas for improvement.

Regular reviews are also conducted to evaluate the relevance of such infocomm statistics and indicators to ensure that they are updated and can reflect the trends and developments in the ever-changing infocomm landscape. The reviews also seek to ensure that the statistics and indicators collected are aligned to international standards and best practices in order to ensure that they are comparable for international benchmarking purposes.

Annex A presents the state of telecommunication industry and infocomm landscape in Singapore.

Annex B sets out the latest statistics and indicators subject to availability of data (as at the end of fiscal year 2005) for some of the ITU indicators.

2.1 Collection and Dissemination

IDA obtains the relevant statistics of the infocomm sector through a combination of surveys and administrative means. These mechanisms are reviewed on a regular basis to ensure that the means of collection continue to be effective in providing the necessary information on a timely basis.

2.1.1) Surveys

Surveys are one of IDA's primary means of obtaining information in order to assess the general health and performance of the infocomm sector in Singapore. The IDA conducts a number of surveys to gauge the level of infocomm adoption and usage by businesses and in households and by individuals. Other surveys collect information on the infocomm sector and manpower. The key findings from these surveys are made publicly available on the IDA website www.ida.gov.sg.

The Annual e-Government Customer Perception Survey is jointly conducted by the IDA and the Singapore Ministry of Finance. This survey assesses the

general public's level of receptivity towards e-government initiatives. The main findings of this survey are also available on the IDA website.

The IDA also conducts other surveys on a semi-regular or ad-hoc basis for specific purposes. For example, the IDA Consumer Awareness and Satisfaction Survey is conducted every two years and aims to measure consumers' usage, awareness of, and satisfaction with selected telecommunication services in Singapore.

2.1.2) Administrative Means

Besides the various surveys, the IDA collects a basket of telecommunication statistics and indicators to monitor the development of the telecommunication industry. Telecommunication service providers licensed by the IDA are required to provide information on their services and operations, mostly on a monthly basis. Aggregated figures (such as total fixed line subscriptions, total mobile subscriptions, mobile penetration, total broadband subscriptions) are available on the IDA website.

2.2) Challenges Faced and Approaches Adopted to Address These

In the collection of relevant telecommunication / infocomm statistics, IDA faces the primary challenge of managing respondent fatigue and survey burden.

To address this challenge, IDA has adopted several measures so as to obtain quality and timely submissions and returns:

- Regular review of the scope and coverage of surveys and administrative data forms. Where appropriate, the survey questionnaires and data forms have been simplified, streamlined and consolidated so as to provide better focus for respondents;
- The timing for the various surveys has been revised wherever possible so as to have a more even phasing of the conduct of the surveys throughout the year;
- Work closely with industry associations and groups to improve the overall procedures and processes and incorporate their suggestions for improvements where appropriate; and
- Judicious use of IDA's regulatory powers to ensure that the licensed telecommunication service providers submit the information requested.

3. SUMMARY

Telecommunication / infocomm statistics and indicators serve as necessary inputs for planning, policy review and formulation. It is therefore important to have a rigorous process in place that ensures the collection of relevant statistics and indicators, and their dissemination, on a timely basis. It is also important to regularly review these statistics and indicators and the collection mechanisms to ensure their relevance and effectiveness in tracking and monitoring of developments and emerging activities in the infocomm landscape.

Annex A

State of Singapore Telecommunication Industry / Infocomm Landscape

Table 1: Overview

Category	Indicators	Status
A) Infocomm Sector⁷		
1) Infocomm Revenue ⁸ , 2005 (S\$b)	- Total Revenue - Domestic Revenue - Export Revenues	37.89 15.83 (43%) 22.06 (58%)
	- Note: - Total revenue increased for the 5th consecutive year. - The 8.9% total revenue growth from 2004 to 2005 represented the highest percentage increase since 2001.	
2) Infocomm Value-Added, 2005	Infocomm Value-Added Contribution to GDP	6.5%
	- Note: - Between 2000 and 2005, the Compound Annual Growth Rate (CAGR) of the infocomm sector value-added (7.8%) was almost double the CAGR of Singapore's GDP (4.0%).	
3) Infocomm Manpower, 2005	- Total infocomm manpower - Total infocomm job vacancies % with tertiary⁹ qualifications - Infocomm Manpower in Infocomm Organisations - Infocomm Manpower in End-User Organisations	111,400 (4.9% of total employed workforce) 5,700 83% 55,600 55,800
	- Note: - Infocomm manpower grew for the 4th consecutive year. Total infocomm job vacancies more than doubled from 2004 to 2005.	
4) Research & Development (R&D)	As part of Singapore's S\$13.5b national Science & Technology 2010 Plan, the National Research Foundation intends to pump in S\$5b into R&D over the five years from 2006, with S\$2b earmarked for two areas, including Interactive and Digital Media.	
B) Business Environment		
5) International accolades	- WEF Global IT Report, 2005-2006 - World Bank Group, Ease of Doing Business 2006 Top 30 Economies - IMD World Competitiveness Yearbook, 2006 - EIU e-Readiness Rankings, 2006 - Accenture Annual e-Government Rankings	2 nd 2 nd in Corporate Governance 3 rd 2 nd in Asia Top 3 for 5 years running (2000-2005)

⁷ Please refer to the definition of the infocomm sector stated in footnote 1.

⁸ Revenue of the infocomm sector is defined as Export sales and End-User sales in Singapore i.e. revenue excludes OEM/Other Resellers' sales. Domestic revenue is defined by End-User sales in Singapore and export revenue is defined by Export sales.

⁹ Tertiary educated persons include diploma and degree holders.

6) Connectivity	• International Internet Connectivity, 2005 • Total Submarine Cable Capacity, 2005 • Public Wireless Hotspots, 2006	30.62 Gbps 27.98 Tbps 970 (about 1.4 per sq. km.)
	• Note: - o Singapore has the 3rd highest submarine cable capacity in the world.¹⁰	
7) Telecommunication	Singapore has fully liberalised its telecommunication market since April 2000. With full liberalisation, there are no foreign equity limits for players entering the market. There is also no limit to the number of licences issued except where there are resource constraints such as spectrum frequency. Service providers are free to decide on the types of networks, systems, services and technologies to deploy. <u>Regulatory Framework</u> A regulatory framework is in place to ensure a level playing field and effective and sustainable competition in the telecommunication sector, including: • A sector-specific competition management framework (Telecommunication Competition Code) which sets out the regulatory principles and approach in managing competition in the market. The framework covers major aspects such as (i) dominant licensee classification and obligations; (ii) fair competition rules; (iii) interconnection and infrastructure sharing framework, including obligation for the dominant licensee to offer a Reference Interconnection Offer (RIO); (iv) competition enforcement framework; (v) end-user/consumer protection rules; and (vi) merger and acquisition rules in the telecommunication market. • A commitment to open, consultative and transparent decision-making processes. There is a regular process of industry and public consultation before any major regulatory policies or decisions are taken. Regulatory decisions taken are made publicly available and published on the IDA website. <u>Benefits from Full Telecommunication Liberalisation</u> • 39 facilities-based licensees and 801 service-based licensees as of Sep 2006, with a mix of various infrastructure, technologies and services launched in the market. • Wide range of service offerings at competitive pricing. • Telecommunication services was the 2nd highest contributor to total infocomm sector revenue, accounting for 19% of the S\$37.89 billion revenue in 2005.¹¹ • More than 4300 jobs created in the telecommunication industry since 2000.	
C) Infocomm Adoption		
8) Telecommunication & Internet	• Fixed Lines Household Penetration, Jul 2006 • Mobile Phone Penetration, Jul 2006	98.1% 98.4%

¹⁰ Source: TeleGeography Research, © PriMetrica, Inc. 2006

¹¹ Source: IDA Annual Survey on Infocomm Sector 2005.

¹² For businesses with 10 or more employees.

	• Broadband Coverage, 2005 • Home Broadband Penetration, Jul 2006 • Home Internet Access, 2005 • Home Computer Access, 2005 • Business Broadband¹², 2005	99% 57.4% 66% 74% 77%
	• Note: - o As at Jul 2006, there were 534,600 3G subscribers (or 12.5% of total mobile subscriber base).	

Table 2: Some Cluster-based Information

Cluster	Status
Education (Primary schools, Secondary schools and Junior Colleges)	
1) Availability of computers (All schools)	100%
2) Broadband Penetration (All schools)	100%
3) Ratio of teachers to computers or laptops (All schools)	1:1
4) a) Ratio of students to computers (Primary school) b) Ratio of students to computers (Secondary school and JC)	6.5 students : 1 computer 4 students : 1 computer
Healthcare (Public Hospitals, Polyclinics and Private Hospitals)	
1) Adoption of Hospital Information System (All hospitals and polyclinics)	100%
Note: National Health Information Infrastructure: • Medinet, a central health information backbone linking all hospitals and polyclinics in Singapore. Medinet also hosts key national health applications. • Since Apr 2005, the National Healthcare Group and Singapore Health Services have implemented a system, Electronic Medical Records (EMR) Exchange, to enable exchange medical records between all public sector hospitals and institutions, which account for 80% of Singapore's hospital providers. • A central claims processing system (MediClaim) to process medical claims from patients' Medisave and Medisave approved insurance plans. • A central information store on allergies and medical alerts of all Singapore residents is available. • The Health Promotion Board has implemented the Integrated Dental Electronic Assessment for Students (IDEAS) system to support the school health and dental services. IDEAS is the first dental clinical system in Asia that enabled real time sharing of student records island-wide via WAN and 3G technology from 230 clinics and mobile clinics on buses. Award-winning Innovations: • The National University Hospital developed a doctor-centred, patient-based Computerised Patient Support System (CPSS) to enable an integrated view of patient data from multiple source systems such as X-rays, laboratory results, surgical operating notes, discharge summaries, clinical results and reports. CPSS won the Asian Hospital Management Awards 2003, IT category, in Asia Pacific. • The Interactive Patient Guide (IPG) developed by Changi General Hospital (CGH), allows a patient to obtain information on treatments, surgical procedures and aftercare of 25 common medical conditions through videos and printable text online in the comfort of his home. CGH's IPG won the Most Outstanding Project in the IT category of the 2004 Asian Hospital Management Awards.	

Manufacturing, Logistics & Retail	
% of trade permits applied and issued online	100%
Number of forms required for trade permit application	1 single electronic form to all controlling agencies
Amount of time to get approval for trade permits	Within 10 minutes
% of paperless clearance for containerised cargo	100%
Online air cargo bookings	More than 2 million electronic bookings are carried out each year for air cargo
Gate clearance process ¹³ to provide container delivery location to drivers	Maximum of 25 seconds
Note: - A significant proportion of transactions between manufacturers and their suppliers and partners takes place over B2B networks. Most of these networks are based on RosettaNet standards. For example, Chartered Semiconductor, one of the world's top semiconductor foundries, embarked on a supply chain transparency initiative 2 years ago. This enabled its global customers and partners to have B2B connectivity with Chartered, thereby accessing real-time information on work-in-process, product orders, product shipping and testing status. Such connectivity has enabled Chartered and its partners to reap benefits, such as productivity gains of up to 40% in streamlining labour operations. - The Port of Singapore is the busiest port in the world, handling more than 23 million TEUs every year, PSA Corp (the operator of the largest port in Singapore) makes extensive use of technology to ensure highly efficient operations. One example is the use of intelligent software to unload containers from one vessel and load them to another vessel in the most optimal and shortest time. PSA's Computer Integrated Terminal Operations System (CITOS) ensures that though some 60 vessels of different sizes call on the port on any given day, expecting to be berthed immediately despite the fact that usually 90% of them arrive out of schedule, their expectations are met. - For the air cargo community, the Cargo Community Network (CCN) provides online connectivity to more than 20 major cargo airlines and 1,000 freight forwarders in Asia Pacific for online bookings, customs declarations, issuance of airway bill, track and trace, and electronic payment & invoicing. Through CCN's integrated portal, some 2 million electronic bookings are carried out yearly, with over S\$1.2 billion of invoicing amount transacted yearly.	
e-Government	
1) % of respondents who had transacted electronically with the government ¹⁴	86%
2) % of respondents who are satisfied with overall quality of e-Service	85%
3) Availability of online services	1,600 services available online (>98% of all public services)
4) Adoption rate of key e-Services	73% of population filed income tax returns electronically in 2006

¹³ Information from PORTNET and planning instructions from CITOS are closely integrated with PSA's Flow-Through-Gate System. This innovation clears container trucks at PSA gates in world record time of 25 seconds in one paperless process. It uses automated Container Number Recognition System and auto-notification of hauliers to optimise the movement of containers and their clearance.

¹⁴ Amongst those with a need to transact.

Note:

- Online Business Licensing System (OBLS):
 - o Allows businesses to apply, update, renew or terminate any combination from a suite of 82 online business licences issued by 18 government agencies, in one online transaction.
 - o Saves businesses from having to make separate trips to different counters, completing many online forms at various agencies' websites or providing duplicate information to multiple parties.
 - o Licence process review also led to a 10% reduction in the licences issued.
 - o Since its launch in Jan 2004, more than 55,000 transactions have been made.
 - o Examples of benefits to businesses include¹⁵:
 - To incorporate a new company, cost has been reduced from S\$1,200 (~US\$736) and up, to a flat fee of S\$300 (~US\$184). Processing time has been reduced from 5 days to 2 hours.
 - To obtain a public entertainment licence, processing time has been reduced from 8 weeks to 2 weeks. Also, the number of counter visits has been decreased from visits to 7 government agencies to none.
 - o Awarded the United Nations Public Services Award in the category of "Application of Information and Communication Technology (ICT) in Government: e-Government" in May 2005.
- Integrated Work Permit Online Services (WPOL):
 - o Developed by the Ministry of Manpower, the WPOL is a one-stop portal for employers to perform Work Permit transactions (application, issuance, renewal and cancellation) online for their foreign workers.
 - o Examples of benefits include:
 - Reduction of processing time for applications for work permits from as long as 14 working days to the next working day.
 - o Awarded the United Nations Public Service Award in the category of "Improving Transparency, Accountability and Responsiveness in the Public Service) in Jun 2006.

Community

1) Availability of computers in public libraries	100%
2) Average no. of computers in each library	30 per library
3) Internet penetration (All libraries)	100%
4) Broadband penetration (All libraries)	100%
5) Internet connection speed (All libraries)	6Mbps

Note:

- CitizenConnect:
 - o Aims to help citizens or resident who do not have access to, or need help with using computer or Internet, to transact online with the Government in their neighbourhoods.
 - o Offers two conveniences: free access to the Internet; and staff present to help citizens and residents access the Singapore Government Online portal and perform online transactions with government agencies.
 - o As of May 2006, 5 CitizenConnect Centres have been set up at community clubs, with plans to expand to a network of 25 Centres island-wide by mid-2007.

¹⁵ More details can be found from the OBLS Factsheet jointly issued by Singapore's Ministry of Trade and Industry and IDA, released 4 Mar 2005.

Annex B

Key indicators of the telecommunication/ICT sector

	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
Fixed Telephone network			
1	112	Main (fixed) telephone lines in operation	1'844'400
2	117	Total capacity of local public switching exchanges	-
3	1142	Percent of main lines connected to digital exchanges	100.0%
4	116	Percent of main lines which are residential	58.9%
5	1162	Percent of main lines in urban areas	100%
6	1163	Number of localities with telephone service	-
7	1112	Public payphones	10.9 ¹⁷
Mobile network			
8	271	Mobile cellular telephone subscribers (post-paid + prepaid)	4'384'600
8.1	271p	Mobile cellular subscribers: prepaid	1'609'700
9	2712	Digital mobile cellular subscribers	4'384'600
9.1	271h	Total number of subscribers to mobile networks	2'180'500
9.1.1	271L	Number of subscribers to low and medium speed mobile networks	1'862'900
9.1.2	271G	Number of subscribers to IMT-2000 (3G) high-speed mobile networks	317'600
10	271land	Percent coverage of mobile cellular network (land area)	99.9%
11	271pop	Percent coverage of mobile cellular network (population)	99.9%
Text/data network			
12	311	Telex subscriber lines	-
13	412	Private leased circuits	-
14	413	Total subscribers to public data networks	-
15	4213	Internet subscribers	2'255'100
15.1	4213d	Dial-up Internet subscribers	1'589'500
15.2	4213tb	Broadband Internet subscribers	665'600
15.2.1	4213cab	Cable modem Internet subscribers	302'600
15.2.2	4213dsl	DSL Internet subscribers	355'700
15.2.3	4213ob	Other broadband Internet subscribers	7'400 ¹⁸
16	4212	Estimated Internet users	1'749'930 ¹⁹
16.1	4212f	Percent female Internet users	51.5%
16.2	4212f%f	Female Internet users as percent of female population	59.2%

¹⁶ Code used by the International Telecommunication Union (ITU) to identify the indicator. This code appears in ITU questionnaires.

¹⁷ Excludes coinafones operated by private premise owners.

¹⁸ Includes leased line Internet subscribers.

¹⁹ The figure reflects the total resident Internet users aged 15 years and above. Source: IDA Annual Survey on Infocomm Usage in Households and by Individuals for 2005

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	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
17	424	PWLAN locations	Approximately 970
18	28	ISDN subscribers	25'200 lines ²⁰
18.1	281	Basic rate ISDN subscribers	18'100 lines
18.2	282	Primary rate ISDN subscribers	7'100 lines
18.3	28c	ISDN voice channel equivalents	-
19	4214	International Internet bandwidth	30'620 Mbps ²¹
19.1	4214og	Outgoing	-
19.2	4214ic	Incoming	-
Quality of service			
20	123	Waiting list for main lines	-
21	143	Faults per 100 main lines per year	98.0% ²²
22	141	Percent of telephone faults cleared by next working day	0.3% ²³
Traffic			
23	1311m	Local telephone traffic (minutes)	13'060 million
23.1	1313wm	Fixed to mobile traffic (minutes)	-
23.2	1311im	Internet Dial-up traffic (minutes)	-
24	1312m	National trunk telephone traffic (minutes)	N.A.
25	132mb	International incoming and outgoing telephone traffic (minutes)	4'539 million
25.1	132m	International outgoing telephone traffic (minutes)	2'994 million
25.2	132mi	International incoming telephone traffic (minutes)	1'545 million
26		Public data traffic (non-Internet)	-
27	133wm	Outgoing mobile minutes	-
27.1.1	1331wm	Outgoing/originating mobile minutes to same mobile network	-
27.1.2	1332wm	Outgoing/originating mobile minutes to other mobile networks	-
27.1.3	1333wm	Outgoing/originating mobile minutes to international	-
27.1.4	1334wm	Roaming minutes out (own subscribers)	-
27.1.5	1332wmf	Outgoing mobile minutes to fixed networks	-
27.2.1	1335wm	Incoming international minutes to mobile network	-
27.2.2	1336wm	Roaming minutes in (foreign subscribers)	-
27.3	133sms	SMS sent	9'051 million
27.4	133mms	MMS sent	-
28		International outgoing telegrams	-

²⁰ The figure reflects the number of ISDN lines, and not subscribers; likewise for indicators 18.1 and 18.2.

²¹ As at Dec 2005.

²² Weighted average of fixed line operators for the month of Mar 2006.

²³ Weighted average of fixed line operators for the month of Mar 2006.

	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
Tariffs			
Because most countries now have some form of competition in at least one market segment, there may not be a standard tariff. In addition, tariffs within services may not be uniform (e.g., telephone subscription charges may vary across the nation). The following guidelines may be useful. It is preferable to use the tariffs of the operator with the largest market share (measured by subscribers or minutes). It is preferable to use the tariffs that the majority of consumers pay (e.g., if most of the customers are in urban areas, use urban tariffs). It is preferable to include taxes and provide a note specifying whether taxes are included and what the rate is. It is preferable to use the same operator each year to enhance chronological comparability. It is preferable to report tariffs in national currency. If this is not the case, it should be specified in a note.			
31.1			
31.1.1	151	Installation fee for residential telephone service	S\$42.00 to S\$52.50 ²⁴
31.1.2	152	Monthly subscription for residential telephone service	S\$8.75 to S\$10.29 ²⁵
31.1.3	153	Price of a 3-minute fixed telephone local call (peak rate)	S\$0.00 to S\$0.0444 ²⁶
31.1.4	153o	Price of a 3-minute fixed telephone local call (off-peak rate)	S\$0.00 to S\$0.0222 ²⁷
31.2			
31.2.1	151b	Installation fee for business telephone service	S\$52.50 ²⁸
31.2.2	152b	Monthly subscription for business telephone service	S\$13.13 ²⁹
32		National telephone call prices	-
33		International telephone call prices	U.S. – S\$0.33 for 3 min ³⁰ Malaysia – S\$0.27 for 3 min Canada – S\$0.39 for 3 min Australia – S\$0.39 for 3 min U.K – S\$0.42 for 3 min Hong Kong – S\$0.48 for 3 min China – S\$0.57 for 3 min
34.1.1	151c	Mobile cellular connection charge	S\$8.00 to S\$18.00 ³¹
34.1.2	152c	Mobile cellular monthly subscription	S\$0.00 ³²
34.1.3	153c	Mobile cellular - price of 3 minute local call (peak)	S\$0.52 to S\$0.66 ³³
34.1.4	153co	Mobile cellular - price of 3 minute local call (off-peak)	S\$0.52 to S\$0.66 ³⁴
34.1.5	153sms	Mobile cellular – price of SMS	S\$0.05 ³⁵

²⁴ Source: Operator websites. This is an indicative range and is valid as of 26 Sep 2006.

Taxes are included.

²⁵ Please see footnote 24.

²⁶ Please see footnote 24. Local calls are charged on a caller-pay basis.

²⁷ Please see footnote 24. Local calls are charged on a caller-pay basis.

²⁸ Source: Operator website. Figure is valid as of 26 Sep 2006. Taxes are included.

²⁹ Please see footnote 29.

³⁰ Rates for each country were obtained by taking the average of rates by selected operators, taken as at Aug 2006.

³¹ This is an indicative range of connection charges for prepaid services (as recommended by ITU) and is valid as of 26 Sep 2006. Taxes are included.

³² Reflects prepaid tariffs (as recommended by ITU for inter-country comparability).

³³ Reflects prepaid tariffs (as recommended by ITU for inter-country comparability). Taxes are included.

³⁴ Please see footnote 33.

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	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
34.2	153m	Mobile termination rate	N.A. ³⁶
Other data tariffs			
35		Leased line charges	-
36		Data communication charges	-
37		Internet tariffs Connection, monthly rental and usage charges for Internet access service. The tariff chosen for a particular country would be the package that is the cheapest, that is widely available (or, in the case of regional service providers, is available in the capital city) and is available to the general public without restriction (e.g., excluding in-company or limited time offers, and excluding offers that are bundled with some other service). If additional charges are payable for telephone usage for dial-up use, this and the amount should be specified in a note. A note should indicate whether the subscription includes free hours and/or is flat-rate.	
37.1	4213c	Internet connection charge	S\$41.95 ³⁷
37.2	4213s	Internet monthly subscription	S\$121.80 ³⁸
37.3	4213p	Internet - price of per minute (peak) connection	N.A. (Unlimited broadband)
	4213po	Internet - price of per minute (off-peak) connection	N.A. (Unlimited broadband)
37.4	4213_t2 0	Internet access tariff (20 hours per month)	N.A. (Unlimited broadband)
STAFF			
38	51	Total full-time telecommunication staff	-
38.1	51f	Female telecommunication staff	-
38.2	51w	Mobile communications staff	-
REVENUE			
39	75	Total revenue from all telecomm-unication services	S\$7.2 billion ³⁹
40	71	Revenue from telephone service	-
40.1	711	Income from telephone connection charges	-
40.2	712	Income from telephone subscription charges	-
40.3	7131	Income from local calls	-
40.4	7132	Income from national long distance calls	-
40.5	7133	Income from international calls	-
41	731	Revenue from data transmission	-
42	732	Revenue from leased circuits	-

³⁵ Applies to prepaid mobile subscription accounts and includes taxes. For postpaid mobile subscriptions, the sending of SMS is usually bundled with a basic mobile package and is therefore considered free.

³⁶ Mobile operators in Singapore operate on a Mobile-Party-Pays system so no such termination rate is applicable.

³⁷ Taxes are included.

³⁸ Flat rate for an unlimited broadband subscription with download speeds of up to 30 Mbps. This rate is the cheapest in terms of cost per 100 kbits/s, and is available to the general public without restriction. Taxes are included.

³⁹ Source: IDA Annual Survey on Infocomm Sector 2005. Telecommunication Services comprises the following business activities: Fixed line services; Mobile and radio paging services; Satellite uplink and downlink services; Internet service providers; Third party telecommunication/value-added network services; Data communication services not elsewhere classified; Television and/or radio broadcasting (including cable, satellite & terrestrial TV); Telecommunication services not elsewhere classified; Web hosting services; and Cyber 'cafes'.

ITU World Telecommunication / ICT Indicators Meeting 2006
- Singapore Background Paper -

	ITU code ¹⁶	Indicator	2005 (as at Mar 2006 unless stated otherwise)
43	741	Revenue from mobile communications	-
43.1	741d	Mobile data revenues	-
43.1.1	741m	Text and multimedia messaging revenues	-
44	74	Other revenues	-
45		Value-added from telecommunication sector	-
46	81	Total annual investment in telecom	-
46.1	83	Fixed telephone service investment	-
46.2	841m	Mobile communication investment	-
46.3	841f	Foreign investment	-
47	PIAC1	Percentage of localities with PIACs	99%
48	PIAC2	Percentage of the population with access to a PIAC	99%
49	PIAC3	Number of localities with PIAC	-
50	PIAC4	Target population for DCC services	-
51	PIAC5	Total number of PIACs	76 ⁴⁰
51.1	PIAC6	Total number of DCCs	-
51.2	PIAC7	Total number of other PIACs	-
52	PIAC8	Total number of computers in DCCs	-
53	PIAC9	Actual DCC usage percentage	-
OTHER INDICATORS			
54	955	Number of radio sets	549'300 ⁴¹
55	965	Number of TV sets	895'900 ⁴²
56	965m	Total number of multi-channel TV	476'400
56.1	965c	Number of terrestrial multi-channel TV subscribers	476'400 ⁴³
56.2	965s	Direct to Home satellite antennas	0
57	965cp	Homes passed by multi-channel TV	-
58	422	Number of Personal Computers	-

Note:

Singapore total population (2005): 4'351'400

Singapore resident population (2005): 3'553'500

Total number of resident households (2005): 1'049'000

Source: Singapore Department of Statistics

⁴⁰ 39 public libraries and 37 community clubs offering public computer and Internet access.

⁴¹ Refers to total number of vehicle radio licences. Source: Media Development Authority of Singapore.

⁴² Refers to total number of residential TV licences. A TV licence is required if an individual operates or has, on any premise owned or occupied by him/her, TV sets or any equipment that is capable of receiving broadcasting services. Source: Media Development Authority of Singapore.

⁴³ Refers to total number of residential cable TV subscribers. Source: Media Development Authority of Singapore.



INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION
DEVELOPMENT BUREAU**

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SOURCE: ILO

TITLE: Occupations in Information and Communications Technology



International Labour Organization
Organisation internationale du Travail
Organización Internacional del Trabajo

Occupations in Information and Communications Technology

Updating the International Standard Classification of Occupations¹

**Paper for the fifth World Telecommunication/ICT
Indicators (WTI) meeting, Geneva, Switzerland
11 to 13 October 2006**

¹ This paper was prepared by David Hunter of the ILO Bureau of Statistics. The views expressed are his own and do not necessarily represent the views of the ILO.

Occupations in Information and Communications Technology

Updating the International Standard Classification of Occupations

Introduction

1 In recent years, issues of labour market supply and demand in occupations associated with information and communications technology (ICT) have been major concerns in government and in the private sector at both national and international levels. Policy debate about these issues, however, has not been well informed by good quality statistical information on the occupational structure of the ICT labour market. This has been due in part to the absence of an appropriate framework and agreed terminology for describing and quantifying ICT occupations. The update of the International Standard Classification of Occupations (ISCO) offers a timely opportunity to address this problem.

2 This paper provides some background information about ISCO and summarises some of the data problems and policy issues associated with the ICT labour market. It briefly outlines the progress that has been made so far and presents a draft framework for the classification of ICT occupations. This framework is intended as a stimulus to promote discussion rather than as a definitive solution. It concludes by identifying issues for discussion, particularly with respect to the classification of occupations in telecommunications.²

Background

3 The purposes of ISCO are:

- to provide a basis for the international comparison and exchange of statistical and administrative data about occupations;
- to provide a model for the development of national and regional classifications of occupations; and
- to provide a system that can be used directly or with minor adaptations in countries that have not developed their own national classifications.

4 Occupation classification systems are used in national contexts for the collection and dissemination of statistics from population censuses, household surveys, employer surveys and other sources. They are also used in a wide range of administrative and policy-related activities such as matching job seekers with job vacancies, educational planning, and the management of employment related international migration.

² This paper is provided for discussion at the Fifth World Telecommunication/ICT Indicators (WTI) meeting, to be held in Geneva from 11 to 13 October 2006. It is based closely on a paper circulated to members of the Working Party on Indicators for the Information Society in April 2006.

5 The current version of ISCO (ISCO-88) was developed during the mid to late eighties and was adopted by the Fourteenth International Conference of Labour Statisticians in 1987. The rapid changes that have taken place since that time in information and communications technologies, and the influence of these changes on the occupational structure of the labour market, were significant factors influencing the decision by the Seventeenth International Conference of Labour Statisticians in 2003 to ask the International Labour Office (ILO) to update ISCO-88. The update is to be completed by late 2007 to allow sufficient time for the new classification (ISCO-08) to be used in the round of national population censuses to be conducted from 2010 onwards

6 In an exploratory questionnaire on updating ISCO that was sent to all countries towards the end of 2004, a question was included on the need for the coverage of occupations in Information and Communications Technology (ICT) to be updated and expanded. Not surprisingly, the need to provide more relevant information about these occupations (including the need to address the increasing convergence between information and telecommunications technologies) was among the highest priority issues identified in the responses to the questionnaire.

Overview of the conceptual model to be used for ISCO-08

7 ISCO-08 will be an update rather than a major revision of ISCO-88. The concepts of skill level and skill specialisation will continue to be used to group occupations together.

8 Skill level is defined as a function of the complexity and range of tasks and duties to be performed in an occupation. Skill level will be measured operationally in ISCO-88 by considering one or more of:

- the nature of the work performed in an occupation in relation to the characteristic tasks and duties defined for each ISCO-88 skill level;
- the level of formal education defined in terms of the International Standard Classification of Education (ISCED-97) required for competent performance of the tasks and duties involved;
- the amount of informal on-the-job training and /or previous experience in a related occupation required for competent performance of these tasks and duties.

9 Skill specialisation is defined as a function of four factors:

- the field of knowledge required
- the tools and machinery used
- the materials worked on or with: and
- the kinds of goods and services produced.

10 The concept of skill level is applied mainly at the top (major group) level of the classification. This means that, in general, each major group in ISCO-08 will

contain occupations only at one of four skill levels. For example, ISCO Major Group 2, Professionals should only include occupations at the highest ISCO skill level, Skill Level 4. The four skill levels defined for ISCO-08 are described in Annexe 1 of the second questionnaire on updating ISCO-88 which can be found here: <http://www.ilo.org/public/english/bureau/stat/isco/isco88/quest.htm>.

11 Within each major group occupations are arranged into unit groups, minor groups and sub-major groups, primarily on the basis of aspects of skill specialisation. It is anticipated that there will be between four and five hundred unit groups at the most detailed level of ISCO-08 and that the ten major groups ISCO-88 will not be changed.

Policy and data problems with ICT occupations

12 The ICT labour market has been characterised over the last 20 years by a rapid rate of occupational change and rapid employment growth. The rapid growth in employment, in terms of total numbers employed and total numbers of job vacancies, is in part a reflection of the increasing dominance of ICT in the global economy. The rate of occupational change has been driven by the frequent emergence of new technologies requiring new skills and new ways of working.

13 A result of this rapid growth and rapid change has been the existence of serious skill shortages in ICT most of the time. The ICT labour market has also been characterised, however, by short episodes of over supply in some areas due to fluctuations in the business cycle.

14 There are two different aspects to the ICT skills needed by a modern work force. The first relates to the need for ICT skills by the users of ICT products and services. The second relates to those skills required for the production of goods and services in ICT.

15 The need for ICT skills among the general workforce varies significantly from one job to another and is also changing rapidly over time. Until recently, for example, nursing professionals had little requirement for general skills in the use of information technology, although they frequently needed skills in technology specific to the health field. Increasingly however, nurses are required to exchange patient and diagnostic information electronically within and between hospitals.

16 Since the rate of change in demand for these general ICT skills is so rapid, it is possible to address these issues in ISCO only in those exceptional cases where technological developments have led to new ways of organising work. The most notable example is in the emergence of customer contact centres (call centres) and of new occupations for those employed in these centres.

17 For the second dimension of the problem, relating to the skills required for the production of goods and services directly in ICT, ISCO has a major role in providing a framework for the consistent description of the ICT labour market. This is an area where ISCO-88 can be seen to be badly out of date. For example occupations such as Website Developer and Web Administrator are not separately identified in ISCO-88

and have been dealt with differently by users of the classification in different countries and contexts.

18 The absence of a common terminology or common understanding of occupational structures within the industry has made these problems worse. For example, the job titles and occupational descriptions used by one company in job advertisements might be quite different from those used by another company.

Occupations in ISCO which produce ICT goods and services

19 The dominant use of skill level in ISCO means that occupations unique to the production of goods and services in ICT can be found in several major groups. These include Managers, Professionals, and Technicians and associate professionals and Craft and related trades workers. The differentiation of ICT occupations according to skill level has proved to be problematical in a number of cases, especially where it is necessary to distinguish between occupations in ISCO Major group 2, Professionals (Skill level 4) and Major group 3, Technicians and associate professionals.

20 A listing of ISCO-88 groups that are explicitly intended for occupations related to ICT is provided below in Table 1.

TABLE 1
ICT specific groups in ISCO-88

12 CORPORATE MANAGERS

123 Other department managers

1236 Computing services department managers

21 PHYSICAL, MATHEMATICAL AND ENGINEERING SCIENCE PROFESSIONALS

213 Computing professionals

2131 Computer systems designers and analysts

2132 Computer programmers

2139 Computing professionals not elsewhere classified

31 PHYSICAL AND ENGINEERING SCIENCE ASSOCIATE PROFESSIONAL

312 Computer Associate Professionals

3121 Computer assistants

3122 Computer equipment operators

3123 Industrial robot controllers

21 A number of other groups in ISCO-88 also include occupations that are related to ICT. Most notably Minor Group 724, Electrical and Electronic Equipment Mechanics and Fitters contains unit groups for Electronics Fitters, Electronics

mechanics and servicers, Telegraph and telephone installers and servicers and for Electrical line installers, repairers and cable jointers. Managers of ICT service companies would be included in Unit Group 1319, General managers not elsewhere classified and ICT trainers in Unit Group 2359, Other teaching professionals not elsewhere classified.

22 Following analysis of the questions on ICT occupations in the questionnaire on updating ISCO sent to all countries in late 2004, a revised proposal was discussed by the UN Expert Group on International Economic and Social Classifications and by the ILO Technical Expert Group for Updating ISCO.

23 These groups of experts identified a number of issues that needed to be resolved before the approach to be taken could be finalised. Their concerns related in particular to skill level for applications and software programmers, to the need to address the convergence between information and communications technology, and to the distinction between hardware engineers and software engineers.

24 It was agreed that the ILO should prepare updated proposals on occupations in information and communication technology, based on the discussion held, and submit them to relevant stakeholders for consultation and advice. There was particular concern to ensure that occupations in telecommunications were adequately covered.

25 The groups listed in Table 2 are proposed as a starting point for discussion. Once there is agreement on the framework, the ILO will consult with industry on definitions of each group and on the detailed occupational titles to be listed with each group. In addition, options are being considered for the separate identification of ICT sales occupations.

Thematic grouping for ICT

26 In order to satisfy the demand for internationally comparable information on occupations from an industry perspective, a system of thematic groupings (or alternative views) will be developed to complement the main structure of ISCO-08. The ICT thematic grouping in ISCO-08 will allow all of the unit groups comprising occupations that directly provide ICT goods or services to be aggregated in a consistent and standard way. It is hoped that this approach will serve to address problems currently experienced by users of data who require nationally or internationally comparable information on the ICT work force.

27 Jobs that require the use of ICT as a tool only, even if this is at quite a high level, will be excluded from the ICT thematic grouping. Similarly, occupations that do not require specific skills in the production of ICT goods and services (for example, Accounting clerks, Secretaries, Industrial robot operators, Electronic equipment assemblers) will be excluded from the ICT alternative even when they relate to employment in enterprises that produce ICT goods and services.

28 The unit groups (4-digit categories) listed in Table 2 would provide the basis for the ICT thematic grouping.

TABLE 2
Proposed sub-major, minor and unit groups containing ICT occupations
in ISCO-08

13 Production and operations managers

....

133 Information and communications technology services managers

1330 Information and communications technology services managers

23 Teaching professionals

....

235 Other Teaching professionals

....

2356 Information technology trainers

25 Information and communications technology (ICT) professionals

251 Software and multimedia developers and analysts

2511 Systems analysts

2512 Software developers

2513 Web and multimedia developers

2519 Software and multimedia developers and analysts not elsewhere classified

252 Database specialists and systems administrators

2521 Database designers and administrators

2522 Systems administrators

253 ICT network and hardware professionals

2531 Computer network professionals

2532 Telecommunications engineering professionals

2529 ICT network and hardware professionals not elsewhere classified

35 Information and communications technicians

351 ICT operations and user support technicians

3511 ICT operations technicians

3512 ICT user support technicians

352 Web technicians

3520 Web technicians

353 Applications development and testing technicians

3531 Applications programmers

3532 Systems testing technicians

354 Communications Technicians

3541 Broadcasting and recording technicians

3542 Telecommunications engineering technicians

74 Electrotechnology trades workers

....

742 Electronics and telecommunications installers and repairers

7421 Electronics fitters

7422 Electronics mechanics and servicers

7423 Information and communications technology installers and servicers

Issues for consideration and discussion

29 The following points are proposed as a starting point for discussion:

- 1 **Is the overall approach outlined in Table 2 appropriate and useful?**
- 2 ISCO is not intended to provide the level of detail required by business for detailed job placement activities and personnel inventories. It aims, however, to provide an organising and integrating framework for these purposes and for the presentation of statistical data. **Is the level of detail provided for ICT occupations suitable for the intended purpose?**
- 3 Unit Group 3532, Systems testing technicians is based on an approach used in some countries. It includes occupations like user acceptance tester as well as those involved in testing telecommunications systems and equipment. **Is it useful or appropriate to create a unit group for systems testing technicians?**
- 4 Attempts have been made to reflect the growing convergence between information and telecommunications technologies by:
 - including unit groups that are specific to telecommunications (including broadcasting) in the same minor groups as other occupations in ICT; and
 - creating some unit groups that cover both information and telecommunications technologies where there appears to be real convergence in the skills required in the labour market (Unit group 7423, ICT installers and servicers is one such example).**Is the approach taken towards the convergence between IT and telecommunications occupations useful? Is there a need for more or less detail with respect to occupations that deal mainly with communications technology?**



INTERNATIONAL TELECOMMUNICATION UNION

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SOURCE: NECTEC, Thailand

TITLE: Collection and Dissemination of Internet Bandwidth Data: A case study of Thailand

Collection and Dissemination of Internet Bandwidth Data: A case study of Thailand

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Introduction

The Internet has been growing rapidly in the past decade in both network size and bandwidth usage. There are several ways to measure the growth of Internet. The International Telecommunication Union (ITU) defines the International Internet Bandwidth as an indicator which could be used to measure the growth of Internet usage. This paper presents a case study of Thailand in collection and dissemination of Internet bandwidth data. The following topics will be discussed.

Definition

The ITU's definition of International Internet Bandwidth is "Total capacity of international Internet bandwidth in Mega Bits Per Second (Mbps). If capacity is asymmetric (i.e., more incoming than outgoing), provide incoming capacity."

In our work, the International Internet Bandwidth is slightly revised as "total capacity of international Internet bandwidth in Mega Bits Per Second (Mbps) or higher (i.e., Giga Bits Per Second, Gbps). If capacity is asymmetric (i.e., incoming is not equal to outgoing), provide larger capacity." Basically, the total capacity of International Internet Bandwidth is the sum of Internet bandwidth from all ISPs, Telecom Operators, Research and Education Networks that connect to international providers.

Nowadays, the international Internet bandwidth in many countries is much larger than those in the past years. The total capacity of international Internet bandwidth in the order of Giga Bits Per Second (Gbps) can be easily achieved. Therefore, it might be appropriate to include the higher order unit like Giga Bits Per Second (Gbps) in the definition.

Background

The telecommunication industry in Thailand had been governed by two state enterprises: the Telephone Organization of Thailand (TOT) and the Communications Authority of Thailand (CAT) for a long time (since 1954). TOT (now TOT Corporation Public Company Limited) had controls over the domestic telephone industry while CAT (now CAT Telecom Public Company Limited) regulated the international telecommunications, including half-circuits to the Internet. Therefore, telecommunications services in Thailand have been mostly provided by two state-owned telecommunications operators. Anyhow, a number of companies have been awarded with a government concession in the last decade to provide telecommunications services.

Recently, the Telecommunications Business Act B.E. 2543 (2000) has entered into force with the objective to protect the public interests and to facilitate the free and fair competition environment for the Thai telecommunications industry. This Act defines the opening of the market with the new regulations for the industry and the ownership of the foreign investor to the telecommunications business. It also defines types of telecommunication services, network interconnection, tariff regulations, universal service obligations, etc. The Telecommunications Business Act is currently implemented by the National Telecommunications Commission (NTC).

Getting ISP License

CAT reserved the international Internet bandwidth leased for state academics and government until 1995 when NECTEC's legal entity, the National Science and Technology Development Agency (NSTDA), TOT and CAT set up Thailand's first commercial ISP, Internet Thailand Company. Nevertheless, CAT reserved the right for granting new ISP licenses and created a legal formula for establishing ISP. A new ISP must be a joint venture with CAT, which will get 35 percent of the total equity, and every ISP must buy leased circuits to the Internet through or from CAT. CAT also set up guideline pricing for ISPs, how much they can charge their customers.

The regulation has been changed after the National Telecommunications Commission (NTC) was established. At present, a potential company can apply for a commercial ISP license directly with NTC. After getting the license, the company will become a new ISP. There are currently 21 commercially licensed ISPs.

Connecting ISP to the Internet

ISP can connect to the Internet by purchasing International Internet Gateway (IIG) services or connecting to an international service provider using international private leased circuit (IPLC). For domestically exchange of data traffic, ISPs can connect to National Internet Exchange (NIX). Previously, both NIX and IIG were managed solely by CAT Telecom. The IPLC is also mostly provided by CAT Telecom. Recently, TOT Corporation has been granted license from the National Telecommunications Commission (NTC) to establish new NIX and IIG. TOT Corporation can also provide IPLC services.

International Bandwidth Data Collection and Dissemination

Basically, international bandwidth data come from telecom operators and ISPs. In our case, Internet Information Research (IIR) staff asks CAT Telecom and ISPs for updated data on a monthly basis. IIR staff then records the changes as well as updates the Internet connectivity map and information on IIR webpage [1]. The updated information and the Internet connectivity map will be posted on the webpage once a month. Starting from this month (October 2006), IIR staff will also ask TOT Corporation to provide international bandwidth data.

Data Collection Method

We set up the procedure for data collection as follows:

On the 25th of each month, IIR staff will make phone calls to get Internet bandwidth data mainly from telecom operators. Data may also come from ISPs and Research and Education Network (REN) operators sometimes. IIR staff will have a few days to verify the data, update the database, and modify the Internet connectivity map. On the 1st of the following month, new Internet connectivity map and updated information will be sent to telecom operators and ISPs as well as posted on the web.

Experience Sharing

Collecting Internet bandwidth data requires quite a bit of human efforts and collaborations from all parties involved especially telecom operators and ISPs. In our case, IIR staff receives good collaborations from both telecom operators and ISPs in providing Internet bandwidth data. The reasons might be because NECTEC is a government organization and neutral to both telecom operators and ISPs. NECTEC has made the Internet bandwidth data available since the beginning of Internet development in Thailand. Therefore, it is a reliable source of Internet statistics in Thailand for the public access. ISPs also require the Internet connectivity map for presenting their business to customers. This could impact customers' decision in selecting ISPs. Due to the importance of Internet bandwidth data, immediate update of the Internet bandwidth data and connectivity map are sometimes requested. We try to restrict the collection and dissemination of Internet bandwidth data once a month which is so far acceptable to all parties.

Conclusion

Collection and dissemination of Internet bandwidth data are very useful and essential for several reasons. The Internet bandwidth data can be used to indicate the growth of Internet for the country. Telecom operators can use the Internet bandwidth data for network and capacity planning. ISPs can also benefit from the Internet bandwidth data if they appropriately apply to their business use. Therefore, the work of collection and dissemination of Internet bandwidth data should be handled by neutral and reliable party. It is important to have good collaborations with all parties involved in order to be able to successfully collect Internet bandwidth data.

Reference

[1] Internet Information Research (IIR), <http://iir.ngi.nectec.or.th>



INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION
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TITLE: Change in Definition of Active Mobile Subscribers – The Experience of APEK



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Change in Definition of Active Mobile Users, the experience of APEK, Slovenija

APEK is a Post and Electronic Communications Agency of the Republic of Slovenia. As an NRA works on a market regulation for telecommunications and for that issue collects data from operators for market analysis needed.

APEK started with data gathering in 2004 for the past period (2002- 2004). In that first analysis the problem with operators perception of mobile users occurred, when they presented sold SIM cards in different manners. Most common manner was that the number of active mobile users, no matter prepaid or post paid, was the number of SIM cards ever sold. The number of active mobile subscribers was much above the reality.

The changing methodology procedure was developed through gathering descriptions of active mobile subscribers counting from operators presenting their methodology, opinion on how it should be, what became wider debate interested public.

APEK gave the proposition of new methodology and On June 2005 after public consideration the conclusion was the definition as follows:

- Mobile User is every resident or corporation, included in subscribers or SIM register of the operator, and is:
 - Subscriber of mobile network, which means every resident or corporation with the contract with an operator.
 - Pre-paid user of mobile network, that is every resident or corporation which uses pre paid SIM card from the operator.
- Active Mobile User is every user of mobile network (subscriber or pre-paid) with the possibility of use of services and is:
 - Active subscriber: each user - subscriber of mobile network, who paid the subscription fee at least once in the last 90 days or did use any service in mobile network
 - Active user – pre-paid: each user- prepaid of mobile network, which used at least one payable service in last 90 days with his SIM card.

We also meet several issues of limitations in the availability of data. The problem was that operators were unwilling of giving punctual and exact data. There are two possible arguments for that behavior, the first is that operators did not recognize the need for data gathering and the second they did not recognize the regulator as an authority.

For better screening of telecommunications market development APEK with general act for collecting, use and giving data established quarterly data collecting. Because of starting this year, many changes in questionnaires and definitions are needed and the problem is that each change requests public discussion and so the minimum time for that is at least one month and a half.

Next limitation in data availability is that we are collecting data also for other state bodies, like National Statistics office and also others, so we need to adjust definitions to their needs and the amount of data not to present unreasonable burden.

The most important issue in the change of definition was in the comparability of data between operators. There are some problems in the timeline observation, because there is a significant difference between first and the second half of 2005. On the other hand timeline comparability gives us possibility of logical control and validation of data. Since quarterly collecting, the data is more precise and also operators mostly already adjusted their system to ours.

Comparability by the contents has been done by adjustments regarding questionnaires from the European Commission bodies, by revising annual reports from other NRA's, on the basis of elementary reports and international benchmarking. Aimed to achieve proper balance between all, there are many issues to deal with.

At data collection we assure the confidentiality with Legal act for Telecommunications and also with above mentioned General Act for collection, use and giving data. That results in giving and publishing only aggregates and percents, but no absolute numbers, which operators' perceive as confidential.

From this experience, we learned some lessons; all of them can also be projected to other problems we meet in dealing with operators.

First of all, NRA must show the assurance to become trustful and respectful organization in which operators and investors can trust and depend on its output. To gain the respect, the authoritative way is not proper, because dealing with soft skills needs also a lot of conversation with people working with operators to make them understand the system of data collection.

Definitions are the result of above described comparisons and technical support, and after the time operators tailored definitions of NRA to their own needs, we need to rearrange large number of them. In this case, we keep the influence of incumbent as low as possible, holding neutral position also to alternative operators.

Regarding all it is very important to make operator understand, why we need data, why their punctuality and preciseness is important and give them proper feedback.

Prepared by:
Katja Mohar



INTERNATIONAL TELECOMMUNICATION UNION

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SOURCE: MEF, ITU

TITLE: Draft definitions: Key telecommunication/ICT indicators

Key indicators of the telecommunication/ICT sector

The fifth World Telecommunication/ICT indicators meeting (Geneva, October 2006) proposes the following key indicators and definitions. Please address any questions or comments to indicators@itu.int.

	ITU code ¹	Indicator	Definition
FIXED TELEPHONE NETWORK			
1	112	Main (fixed) telephone lines in operation	A main line is a telephone line connecting the subscriber's terminal equipment to the public switched network and which has a dedicated port in the telephone exchange equipment. This term is synonymous with the term <i>main station</i> or <i>Direct Exchange Line (DEL)</i> that are commonly used in telecommunication documents. It may not be the same as an access line or a subscriber. Some countries include the number of ISDN channels; if so, this should be specified in a note. Fixed wireless subscribers should also be included.
2	117	Total capacity of local public switching exchanges	The total capacity of public switching exchanges corresponds to the maximum number of main lines that can be connected. This number includes, therefore, main lines already connected and main lines available for future connection, including those used for the technical operation of the exchange (test numbers). The measure should be the actual capacity of the system rather than the theoretical potential when the system is upgraded or if compression technology is employed.
3	1142	Percent of main (fixed) lines connected to digital exchanges	This percentage is obtained by dividing the number of main lines connected to digital telephone exchanges by the total number of main lines. This indicator does not measure the percentage of exchanges which are digital, the percentage of inter-exchange lines which are digital or the percentage of digital network termination points. Respondents should indicate whether the main lines included in the definition represent only those in operation or the total capacity.
4	116	Percent of main (fixed) lines which are residential	This percentage is obtained by dividing the number of main lines serving households (i.e., lines which are not used for business, government or other professional purposes or as public telephone stations) by the total number of main lines. Respondents should indicate the definition of households that is being applied.
5	1162	Percent of main (fixed) lines in urban areas	This percentage is obtained by dividing the number of main lines in urban areas by the total number of main lines in the country. The definition of urban used by the country should be supplied.
6	1163	Number of localities with telephone service	Localities are cities, towns and villages in a country. This indicator reflects the number of localities that have telephone service. To enhance usefulness, the total number of localities should be provided as well as the population of localities covered by telephone service.
7	1112	Public payphones	Total number of all types of public telephones, including coin and card operated and public telephones in call offices. Publicly available phones installed in private places should also be included, as should mobile public telephones. All public telephones regardless of capability (e.g., local calls or national only) should be counted. If the national definition of "payphone" differs from that above (e.g., by excluding pay phones in private places) then respondents should indicate their own definition.

¹ Code used by the International Telecommunication Union (ITU) to identify the indicator. This code appears in ITU questionnaires.

	ITU code ¹	Indicator	Definition
MOBILE NETWORK			
8	271	Mobile cellular telephone subscribers (post-paid + prepaid)	Refers to users of portable telephones subscribing to an automatic public mobile telephone service that provides access to the Public Switched Telephone Network (PSTN) using cellular technology. This can include analogue and digital cellular systems but should not include non-cellular systems. This should also include subscribers to IMT-2000 (3G) high-speed mobile networks (i271G). Subscribers to public mobile data services or radio paging services should not be included. If this service has a name, please indicate in a note as well as the year the service commenced operation.
8.1	271p	Mobile cellular subscribers: prepaid subscribers	Total number of mobile cellular subscribers using prepaid cards. These are subscribers that rather than paying a fixed monthly subscription fee, choose to purchase blocks of usage time. Only active prepaid subscribers that have used the system within a reasonable period of time should be included. This period (e.g., 3 months) should be indicated in a note.
9	2712	Digital mobile cellular subscribers	Total number of subscribers to digital cellular systems (e.g., GSM, D/AMPS (TDMA), CDMA). Should include both post-paid and pre-paid subscribers. 2712 = 271h + 271G
9.1	271L	Total number of subscribers to low and medium speed mobile networks	Sum of low and medium speed mobile subscribers (2G and 2.5G).
9.2	271G	Number of subscribers to IMT-2000 (3G) high-speed mobile networks	Number of subscribers to IMT-2000 (3G) high-speed mobile networks (e.g., CDMA2000 1X, WCDMA, CDMA2000 1xEV-DO, etc.) regardless of whether they are using multimedia services, though with capacity for data communications, via Internet. In this context, "high-speed mobile" implies a speed that is equal to, or greater than, 144 kbit/s in at least one direction. -Code Division Multiple Access (CDMA) 2000 1x is an IMT-2000 3G mobile network technology, based on CDMA, that delivers packet switched data transmission speeds of up to 144 kbps. -Wideband CDMA (W-CDMA) is an IMT-2000 3G mobile network technology, based on CDMA, that presently delivers packet switched data transmission speeds up to 384 kbps and up to 2 Mbps when fully implemented. Known as <i>Universal Mobile Telecommunications System (UMTS)</i> in Europe. -CDMA2000 1xEV-DO is an IMT-2000 3G mobile network technology, based on CDMA, that delivers packet switched data transmission speeds of up to 2.4 Mbps. -Enhanced Data rates for GSM Evolution (EDGE) is an intermediate technology that brings second-generation GSM closer to third-generation capacity for handling data speeds up to 384 kbits/s.
10	271land	Percent coverage of mobile cellular network (land area)	Mobile cellular coverage of the land area in percent. This is calculated by dividing the land area covered by a mobile cellular signal by the total land area.
11	271pop	Percent coverage of mobile cellular network (population)	Mobile cellular coverage of population in percent. This indicator measures the percentage of inhabitants that are within range of a mobile cellular signal whether or not they are subscribers. This is calculated by dividing the number of inhabitants within range of a mobile cellular signal by the total population. Note that this is not the same as the mobile subscription density or penetration.
TEXT/DATA NETWORK			
12	311	Telex subscriber lines	A telex subscriber line is a line connecting the subscriber's terminal equipment to the public telex network and which has a dedicated port in the telex exchange equipment.
13	4213	Total Internet subscribers	4213 = 4213tb + 4213d + 4213l The number of total Internet subscribers includes dial-up, public leased lines and broadband subscribers. Only active subscribers should be included.

	ITU code¹	Indicator	Definition
13.1	4213d	Dial-up Internet subscribers	Number of Dial-up Internet subscribers. Dial-up is a connection to the Internet via a modem and telephone line, which requires that the modem dial a phone number when Internet access is needed. Dial-up modem speeds are generally limited to speeds of 28 kbit/s to 56 kbit/s.
13.2	4213tb	Total broadband Internet subscribers	4213tb = 4213cab+4213dsl+4213ob Total broadband Internet subscribers refers to a subscriber who pays for high-speed access to the public Internet (a TCP/IP connection). High-speed access is defined as being equal to, or greater than 256 kbit/s, as the sum of the capacity in both directions. If countries use a different definition of broadband, this should be indicated in a note. The statistic is measured irrespective of the type of access, or the type of device used to access the Internet, or the method of payment.
13.2.1	4213cab	Cable modem Internet subscribers	Internet subscribers using modems attached to cable television networks. Speed should be equal to, or greater than 256 kbits, as the sum of the capacity in both directions.
13.2.2	4213dsl	DSL Internet subscribers	Internet subscribers using Digital Subscriber Line (DSL) technology. DSL is a technology for bringing high-bandwidth information to homes and small businesses over ordinary copper telephone lines. Speed should be equal to, or greater than 256 kbits, as the sum of the capacity in both directions.
13.2.3	4213ob	Other broadband Internet subscribers	Internet subscribers using other than DSL and cable modem. This includes technologies such as mobile cellular technologies, Satellite broadband Internet, Fibre-to-the-home Internet access, Ethernet LANs etc.
13.3	4213l	Leased line Internet subscribers	Number of leased line Internet subscribers.
14	4212	Estimated Internet users	The estimated number of Internet users. A growing number of countries are measuring this through regular surveys. Surveys usually indicate a percentage of the population for a certain age group (e.g., 15-74 years old). The total number of Internet users in this age group should be supplied and not the percentage of Internet users in this age group multiplied by the entire population. In situations where surveys are not available, an estimate can be derived based on the number of subscribers. The methodology used should be supplied, including reference to the frequency of use (e.g., in the last month).
14.1	4212f	Percent female Internet users	Share of females in the total number of Internet users. This is calculated by dividing the number of female Internet users by the total number of Internet users and multiplied by 100.
14.2	4212f%f	Female Internet users as percent of female population	Share of female Internet users in the total number of females. This is calculated by dividing the number of female Internet users by the total number of females and multiplied by 100.
15	424	PWLAN locations	The number of <i>Public Wireless Local Area Network</i> (PWLAN) locations (i.e., <i>hotspots</i>). PWLANs are based on the IEEE 802.1b standard, commonly referred to as WiFi.
16	28	ISDN subscribers	The number of subscribers to the Integrated Services Digital Network (ISDN). This can be separated by basic rate interface service (i.e., 2B+D, ITU-T Rec. I.420) and primary rate.
16.1	281	Basic rate ISDN subscribers	The number of subscribers to the basic rate interface service.
16.2	282	Primary rate ISDN subscribers	The number of subscribers to the primary rate interface service.
16.3	28c	ISDN voice channel equivalents	B-channel equivalents converts the number of ISDN subscriber lines into their equivalent voice channels, and is the sum of basic and primary rate equivalents. The number of basic rate subscribers is multiplied by two and the number of primary rate subscribers is multiplied by 23 or 30 depending on the standard implemented.
17	4214	International Internet bandwidth	Total capacity of international Internet bandwidth in Mega Bits Per Second (Mbps). If capacity is asymmetric (i.e., more incoming than outgoing), provide incoming capacity.
17.1	4214og	Outgoing	Total outgoing capacity of international Internet bandwidth in Mega Bits Per Second.
17.2	4214ic	Incoming	Total incoming capacity of international Internet bandwidth in Mega Bits Per Second.

	ITU code ¹	Indicator	Definition
QUALITY OF SERVICE			
18	123	Waiting list for main lines	Un-met applications for connection to the Public Switched Telephone Network (PSTN) due to a lack of technical facilities (equipment, lines, etc.). The waitlist should reflect the total number across all PSTN service providers in the country.
19	143	Faults per 100 main lines per year	The total number of reported faults to main telephone lines for the year. Faults, which are not the direct responsibility of the public telecommunications operator, should be excluded. This is calculated by dividing the total number of reported telephone faults <i>for the year</i> by the total number of main lines in operation and multiplied by 100. The number of faults per 100 main lines per year should reflect the total across all PSTN service providers in the country.
20	141	Percent of telephone faults cleared by next working day	Percentage of PSTN faults reported that have been corrected by the end of the next working day. (i.e., not including non-working days (e.g., weekends, holidays)). The percent of telephone faults cleared by next working day should reflect the total number across all PSTN service providers in the country.
TRAFFIC			
21	1311m	Local telephone traffic (minutes)	Local telephone traffic consists of effective (completed) fixed telephone line traffic exchanged within the local charging area in which the calling station is situated. This is the area within which one subscriber can call another on payment of the local charge (if applicable). This indicator should be reported in the number of minutes.
22	1312m	National trunk telephone traffic (minutes)	National trunk (toll) traffic consists of effective (completed) fixed national telephone traffic exchanged with a station outside the local charging area of the calling station. The indicator should be reported as the number of minutes of traffic.
22.1	1313wm	National fixed to mobile traffic (minutes)	Total outgoing minutes from the national fixed network to the mobile cellular network within the territory.
22.2	1311im	Internet Dial-up traffic (minutes)	The total volume in minutes of dial-up sessions over the public switched telephone network to access the Internet.
23	133wm	Outgoing mobile minutes	Total number of minutes made by mobile subscribers (including minutes to fixed and minutes to other mobile subscribers).
23.1	1331wm	Outgoing/originating mobile minutes to same mobile network	Number of minutes made by mobile subscribers to the same mobile network.
23.2	1332wmf	Outgoing mobile minutes to fixed networks	Number of outgoing minutes made by mobile subscribers to fixed networks.
23.3	1332wm	Outgoing/originating mobile minutes to other mobile networks	Number of minutes made by mobile subscribers to other mobile networks.
24	132mb	International incoming and outgoing fixed telephone traffic (minutes)	Sum of international incoming and outgoing fixed traffic (i132m+i132mi).
24.1	132m	International outgoing fixed telephone traffic (minutes)	This covers the effective (completed) fixed traffic originating in a given country to destinations outside that country. The indicator should be reported in number of minutes of traffic.
24.2	132mi	International incoming fixed telephone traffic (minutes)	Effective (completed) fixed traffic originating outside the country with a destination inside the country. The indicator should be reported in number of minutes of traffic.
25		Public data traffic (non-Internet)	Traffic from public data services such as X.25 and frame-relay (but excluding Internet) measured in megabytes per second (Mbytes).
26.1	1333wm	Outgoing/originating mobile minutes to international	Number of mobile minutes originating in a country to destinations outside that country.
26.2	1334wm	Roaming minutes (outside home network)	Total number of roaming minutes made by own mobile subscribers to make and receive calls when outside the country (outside home network), e.g., when traveling abroad.

	ITU code¹	Indicator	Definition
26.3	1336wm	Roaming minutes in visited network (foreign subscribers)	Total number of minutes made by visiting (foreign) subscribers when making and receiving calls in visited network.
26.4	1335wm	Incoming international minutes to mobile network	Number of incoming minutes (fixed and mobile) received by mobile networks from another country.
26.5	133sms	SMS sent	Total number of mobile Short Message Service (SMS) sent.
26.6	133mms	MMS sent	Total number of mobile Multimedia Messaging Service (MMS) sent.
26.7	133rm	Number of countries with which there is a roaming agreement.	Total number of countries, with which there is a roaming agreement. If there are several operators with a different number of roaming agreements, the operator with the highest number of roaming agreements should be selected.
27	132tb	International incoming and outgoing total telephone traffic (minutes)	Sum of international incoming and outgoing fixed and mobile traffic (i132m+i132mi).
27.1	132t	International outgoing total telephone traffic (minutes)	This covers the effective (completed) fixed and mobile traffic originating in a given country to destinations outside that country. The indicator should be reported in number of minutes of traffic.
27.2	132ti	International incoming total telephone traffic (minutes)	Effective (completed) fixed and mobile traffic originating outside the country with a destination inside the country. The indicator should be reported in number of minutes of traffic.
28	132vp	VoIP	<i>Definition not yet available. To be discussed: indicators to reflect rise in VoIP</i>

TARIFFS

Because most countries now have some form of competition in at least one market segment, there may not be a standard tariff. In addition, tariffs within services may not be uniform (e.g., telephone subscription charges may vary across the nation). The following guidelines may be useful. It is preferable to use the tariffs of the operator with the largest market share (measured by subscribers). It is preferable to use the tariffs that the majority of consumers pay (e.g., if most of the customers are in urban areas, use urban tariffs). It is preferable to include taxes and provide a note specifying whether taxes are included and what the rate is. It is preferable to use the same operator each year to enhance chronological comparability. It is preferable to report tariffs in national currency. If this is not the case, the currency has to be specified in a note.

			Fixed local telephone service tariffs –residential
29.1.1	151	Installation fee for residential telephone service	Installation (or connection) refers to the one-off charge involved in applying for residential basic telephone service. Where there are different charges for different exchange areas, the charge for the largest urban area should be used and specified in a note.
29.1.2	152	Monthly subscription for residential telephone service	Monthly subscription refers to the recurring fixed charge for subscribing to the PSTN. The charge should cover the rental of the line but not the rental of the terminal (e.g., telephone set) where the terminal equipment market is liberalized. Separate charges should be stated where appropriate, for first and subsequent lines. If the rental charge includes any allowance for free or reduced rate call units, this should be indicated. If there are different charges for different exchange areas, the largest urban area should be used and specified in a note.
29.1.3	153	Price of a 3-minute fixed telephone local call (peak rate)	Local call refers to the cost of a peak rate 3-minute call within the same exchange area using the subscriber's own terminal (i.e., not from a public telephone).
29.1.4	153o	Price of a 3-minute fixed telephone local call (off-peak rate)	Local call refers to the cost of an off-peak rate 3-minute call within the same exchange area using the subscriber's own terminal (i.e., not from a public telephone).
			Fixed local telephone service tariffs -business
29.2.1	151b	Installation fee for business telephone service	Installation (or connection) refers to the one-off charge involved in applying for business basic telephone service. Where there are different charges for different exchange areas, the charge for the largest urban area should be used and specified in a note.

	ITU code ¹	Indicator	Definition
29.2.2	152b	Monthly subscription for business telephone service	Monthly subscription refers to the recurring fixed charge for subscribing to the PSTN. The charge should cover the rental of the line but not the rental of the terminal (e.g., telephone set) where the terminal equipment market is liberalized. Separate charges should be stated where appropriate, for first and subsequent lines. If the rental charge includes any allowance for free or reduced rate call units, this should be indicated. If there are different charges for different exchange areas, the largest urban area should be used and specified in a note.
30	153tm	International telephone call prices	This is the cost of a fixed 3-minute directly dialed (i.e., without operator intervention) call originating within the country to another country. The rate should be supplied for peak rate time calls and off-peak (discount) rate calls (if applicable). The cost should be reported in national currency, with a statement on what taxes are applied. International tariffs to all countries should be provided.

Mobile cellular tariffs

Because most countries now have some form of competition in at least one market segment, there may not be a standard tariff. In addition, tariffs within services may not be uniform (e.g., telephone subscription charges may vary across the nation). The following guidelines may be useful: It is preferable to use the tariffs of the operator with the largest market share (measured by subscribers). It is preferable to use the tariffs that the majority of consumers pay (e.g., if most of the customers are prepaid subscribers, prepaid tariffs should be used). It is preferable to include taxes and provide a note specifying whether taxes are included and what the rate is. It is preferable to use the same operator each year to enhance chronological comparability. It is preferable to report tariffs in national currency. If this is not the case, it should be specified in a note. The note should further specify which operator and which tariff plan was used.

31.1.1	151c	Mobile cellular connection charge	The initial, one-time charge for a new subscription. Refundable deposits should not be counted. Although some operators waive the connection charge, this does not include the cost of the Subscriber Identify Module (SIM) card. The price of the SIM card should be included in the connection charge. A note should indicate whether taxes are included (preferred) or not.
31.1.2	152c	Mobile cellular monthly subscription	The monthly subscription charge for mobile cellular service. Due to the variety of plans available in many countries, it is preferable to use the tariff with the cheapest initiation/connection charge. If prepaid services are used (for those countries that have more prepaid than postpaid subscribers), the monthly subscription charge would be zero. If the plan includes free minutes, this should be put in a note. A note should indicate whether taxes are included (preferred) or not and what the rate is.
31.1.3	153c	Mobile cellular - price of 3 minute local call (peak)	The price of a <u>three</u> minute peak rate local call from a mobile cellular telephone. If operators charge different prices depending on who is being called (e.g., same mobile network, fixed network, another mobile network) these should be listed separately. In order to enhance inter-country comparability it is preferable to use pre-paid tariffs. A note should indicate whether taxes are included (preferred) or not.
31.1.4	153co	Mobile cellular - price of 3 minute local call (off-peak)	The price of a three minute off-peak rate local call from a mobile cellular telephone. If operators charge different prices depending on who is being called (e.g., same mobile network, fixed network, another mobile network) these should be listed separately. In order to enhance inter-country comparability it is preferable to use pre-paid tariffs. A note should indicate whether taxes are included (preferred) or not.
31.1.5	153sms	Mobile cellular – price of SMS	Price of sending a national Short Message Service (SMS) message from a mobile handset.
31.1.6	151pcard	Mobile cellular – cheapest recharge card value	Refers to the cheapest available prepaid recharge card.
31.2	153m	Average mobile termination charge	Operators inside a country add a mobile termination charge to all calls completed to wireless devices within their country. The charge amount varies by country and applies to all calls that are placed to wireless devices.

Other data tariffs

32	153l	Private leased line charge (2 Mbit/s)	Connection charge and monthly rental charge for 2 Mbit/s private leased line.
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	ITU code ¹	Indicator	Definition
Internet tariffs			
Connection, monthly rental and usage charges for Internet access service. It is preferable to use the tariffs of the ISP with the largest market share (measured by subscribers) The tariff chosen for a particular country would be the package with the cheapest/lowest minimum monthly charge, that is widely available (or, in the case of regional service providers, is available in the capital city) and is available to the general public without restriction (e.g., excluding in-company or limited time offers, and excluding offers that are bundled with some other service). If additional charges are payable for telephone usage for dial-up use, this and the amount, preferably by minute, should be specified in a note. A note should indicate whether the subscription includes free hours and/or is flat-rate.			
Dial-up Internet tariffs			
For a dial-up Internet connection, a telephone call charge may apply while connected. The telephone call charge refers to the amount payable to the telephone company for local telephone charges while connected to the ISP. This maybe similar to local call charges (indicators 153 and 153o) above, if not provide the cost applicable. Both peak and off-peak telephone call charge should be provided.			
33.1	4213c	Dial-up Internet connection charge	The initial, one-time charge for a new dial-up internet connection. Refundable deposits should not be counted. A note should indicate whether taxes are included (preferred) or not.
33.2	4213s	Dial-up Internet monthly subscription	The monthly subscription charge for dial-up internet service. A note should indicate whether taxes are included (preferred) or not. The note should also specify the amount of free monthly hours included if applicable.
33.3	4213p	Dial-up Internet - price of per minute (peak) connection	Cost of per minute (peak) connection once the free Internet hours included in the dial-up subscription is used up. A note should indicate whether taxes are included (preferred) or not.
33.4	4213po	Dial-up Internet - price of per minute (off-peak) connection	Cost of per minute (off-peak) connection once the free Internet hours included in the dial-up subscription is used up. A note should indicate whether taxes are included (preferred) or not.
33.5	4213_t20	Internet access tariff (20 hours per month)	This indicator refers to the lowest price for 20 hours of dial-up Internet usage per month. It includes the tariff components of monthly line rental, line usage charge and Internet access charge, plus any tax that may be levied (as this is a service used by both residential and business consumers). The tariff chosen for a particular country would be the package for 20 hours per month that is the cheapest, that is widely available (or, in the case of regional service providers, is available in the capital city) and is available to the general public without restriction (e.g., excluding in-company or limited time offers, and excluding offers that are bundled with some other service).
Broadband Internet tariffs			
34.1	4213bc	Broadband Internet connection charge	The initial, one-time charge for a new broadband internet connection. Refundable deposits should not be counted. A note should indicate whether taxes are included (preferred) or not.
34.2	4213bs	Broadband Internet monthly subscription	The monthly subscription charge for broadband internet service. A note should indicate whether taxes are included (preferred) or not.
STAFF			
35	51	Total full-time telecommunication staff	Total full-time staff employed by telecommunication network operators in the country for the provision of public telecommunication services, including mobile services. Part-time staff should be expressed in terms of full-time staff equivalents.
35.1	51f	Female telecommunication staff	The number of full time telecommunication staff that are female.
35.2	51fp	Female professional telecommunication staff	The number of full-time professional staff that are female. Professional staff are those included in ISCO-88 group XX (To check ISCO88)
36.1	51w	Mobile communications staff	Total number of staff employed by mobile cellular network operators. This refers to mobile operators building infrastructure and not staff employed by resellers.
36.2	51wf	Female mobile communications staff	Total number of female staff employed by mobile cellular network operators. This refers to mobile operators building infrastructure and not staff employed by resellers.
36.3	51wfp	Female professional mobile communications staff	Total number of professional female staff employed by mobile cellular network operators. This refers to mobile operators building infrastructure and not staff employed by resellers. Professional staff are those included in ISCO-88 group.

	ITU code ¹	Indicator	Definition
REVENUE			
37	75	Total revenue from all telecommunication services	This is the total (gross) telecommunication revenue earned from all (fixed, mobile and data) services within the country. This should exclude revenues from non-telecommunications services. Revenue (turnover) consists of telecommunication service earnings during the financial year under review. Revenue should not include monies received in respect of revenue earned during previous financial years, neither does it include monies received by way of loans from governments, or external investors, nor monies received from repayable subscribers' contributions or deposits. Revenues should be net of royalties.
37.1	71	Revenue from fixed telephone service	Revenue received from fixed telephone connection, subscription and calls.
37.1.1	711	Revenue from fixed telephone connection charges	Revenue received for connection (installation) of fixed telephone service. This may include charges for transfer or cessation of service.
37.1.2	712	Revenue from fixed telephone subscription charges	Revenues from recurring charges for subscription to the PSTN including equipment rentals where relevant.
37.1.3	713	Revenue from fixed telephone calls	The sum of income from local, national long distance and international calls. $713 = 7131 + 7132 + 7133$.
37.1.3.1	7131	Revenue from local calls	Revenue from fixed local calls based on applicable retail charges on users.
37.1.3.2	7132	Revenue from national long distance calls	Revenue from fixed national long distance calls based on applicable retail charges on users.
37.1.3.3	7133	Revenue from international calls	Revenue from fixed international calls based on applicable retail charges on users.
37.2	741	Revenue from mobile communications	Revenues from the provision of all types of mobile communications services such as cellular, private trunked radio and radio paging.
37.3	741d	Mobile data revenues	Revenues from mobile data services such as text messaging (SMS), high-speed network access, WAP use, etc.
37.4	741m	Text and multimedia messaging revenues	Revenues from text messaging (e.g., SMS) and from non-text messaging based mobile data services such as high-speed access charges and WAP use.
37.5	731	Revenue from data services	Revenues from data services such as data communications (e.g., packet switching) and Internet access but not telegram or telex.
37.6	7311	Revenue from Internet services	Revenue from internet service based on applicable retail charges on users.
37.7	732	Revenue from leased lines	Revenue from the provision of leased lines.
37.8	733	Revenue from fixed value-added telecommunication services	Represents the revenue generated by the telecommunication service sector for fixed value-added telecommunication services.
37.9	74	Other revenues	Any other revenues not accounted for elsewhere for the provision of public telecommunication services. Responders should indicate in a note what are the main sources of "other" telecommunications revenues.
INVESTMENT			
38	81	Total annual investment in telecom	Also referred to as annual <i>capital expenditure</i> , this is the gross annual investment in telecom (including fixed, mobile and other services) for acquiring property and network. The term investment means the expenditure associated with acquiring the ownership of property (including intellectual and non-tangible property such as computer software) and plant. These include expenditure on initial installations and on additions to existing installations where the usage is expected to be over an extended period of time. Note that this applies to telecom services which are available to the public, and excludes investment in telecom software or equipment for private use.
38.1	83	Fixed telephone service investment	Annual investment on equipment for fixed telephone service.

	ITU code ¹	Indicator	Definition
38.2	841m	Mobile communication investment	Annual investment on equipment for mobile communication networks.
38.3	841f	Foreign investment	Annual investment in telecom coming from foreign sources, also referred to as Foreign Direct Investment (FDI).
COMMUNITY ACCESS INDICATORS			
39	PIAC5	Total number of PIACs	Refers to the total number of Public Internet Access Centres (PIAC). A PIAC is a site, location, or centre of instruction at which Internet access is made available to the public, on a full-time or part-time basis. This may include telecentres, digital community centres, Internet cafés, libraries, education centres and other similar establishments, whenever they offer Internet access to the general public. All such centres should have at least one public computer for Internet access.
39.1	PIAC6	Total number of DCCs	Refers to the total number of a nation's Digital Community Centres (DCC). A DCC is a place where the public can access Internet services from terminal facilities placed at their disposal. A DCC is an undertaking based on a government framework for universal access. It should offer equitable, universal and affordable access. A DCC is a sub-category of a PIAC but there are some minimum requirements for a Public Internet Access Centre (PIAC) to be considered a DCC. Every DCC should have at least one computer and one printer and a minimum connection speed of 64 kbit/s per centre to the Internet Service Provider (ISP). DCC users should also be provided with support and maintenance and it should be opened a minimum of 20 hours per week.
39.2	PIAC7	Total number of other PIACs	Refers to the total number of other Public Internet Access Centres (not PIACs and not DCCs). Other PIACs include cybercafés. Education Centres may be classified as a DCC or a PIAC, depending on the conditions they satisfy (see indicator 51 and 51.1)
39.3	PIAC3	Number of localities with PIAC	Refers to all localities (a nation's villages, towns, and cities) that have at least one Public Internet Access Centre (PIAC). A PIAC is a site, location, or centre of instruction at which Internet access is made available to the public, on a full-time or part-time basis.
39.4	PIAC1	Percentage of localities with PIACs	A public Internet access centre (PIAC) is a site, location, centre of instruction at which Internet access is made available to the public, on a full-time or part-time basis. This may include telecentres, digital community centres, Internet cafés, libraries, education centres and other similar establishments, whenever they offer Internet access to the general public. All such centres should have at least one public computer for Internet access. Localities refer to a country's villages, towns and cities. The percentage of localities with public Internet access centres (PIACs) is computed by dividing the number of localities with at least one PIAC by the total number of the country's localities and multiplying by 100. The indicator should be broken down by range of inhabitants. This indicators will be used to measure the WSIS target "to connect villages with ICTs and establish community access points" by 2015.
39.5	PIAC2	Percentage of the population with access to a PIAC	Measures the number of inhabitants enjoying PIAC coverage as a proportion of the country's total population. When a locality (village, town, city) has at least one PIAC then the entire population living in this locality is considered to be served by that PIAC.
39.6	PIAC4	Target population for DCC services	Refers to the potential population (the potential population refers to anyone of age 6 years or more) minus the number of non-community Internet users (non-community Internet users are those citizens that have Internet access from a point different from a PIAC, for example at home).
39.7	PIAC8	Total number of computers in DCCs	Refers to the total number of computers available in all Digital Community Centres. A DCC is a place where the public can access Internet services from terminal facilities placed at their disposal. See Indicator 51.1 for the definition of a DCC.
39.8	PIAC9	Actual DCC usage percentage	To calculate the actual DCC usage percentage, countries should divide the actual number of DCC users by the DCC target population (see indicator 50 for definition) for DCC services and multiply by 100. A user is defined as a person who accesses the Internet at least once a month.

	ITU code¹	Indicator	Definition
OTHER INDICATORS			
40	955	Number of radio sets	The total number of radio sets. A radio set is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. A radio set may be a standalone device, or it may be integrated into another device, such as a Walkman, a car, or an alarm clock.
41	965	Number of TV sets	The total number of television sets. A television set is a device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. A television set may be a standalone device, or it may be integrated into another device, such as a computer or a mobile phone. It may be useful to distinguish between digital and analogue signal delivery and between TV sets receiving only a limited number of signals (usually over-the-air) and those that have multiple channels available (e.g., by satellite or cable).
42	965m	Total number of multi-channel TV subscribers	965m=965c+965s. This is the total number of multi-channel TV subscribers (both terrestrial and satellite).
42.1	965c	Number of terrestrial multi-channel TV subscribers	Number of terrestrial multi-channel TV such as cable TV, digital terrestrial TV, Microwave Multi-point Distribution systems (MMDS) and Satellite Master Antenna Television (SMATV) subscribers.
42.2	965s	Direct to Home satellite antenna subscribers	The number of subscribers to a home satellite antenna that can receive television broadcasting directly from satellites.
43	965cp	Homes passed by multi-channel TV	Number of households that have a multi-channel (both terrestrial and satellite) television connection whether they are subscribing or not.
44	422	Number of Personal Computers	The number of Personal Computers (PC) measures the number of computers installed in a country. The statistic includes PCs, laptops, notebooks etc, but excludes terminals connected to mainframe and mini-computers that are primarily intended for shared use, and devices such as smart-phones that have only some, but not all, of the functions of a PC (e.g., they may lack a full-sized keyboard, a large screen, an Internet connection, drives etc).