MINISTERE DE L'ECONOMIE NUMERIQUE ET DE LA POSTE

ARTCI

ITU Regional Workshop on ICT Statistics for Africa

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The ICT Development Index (IDI): supply side indicators

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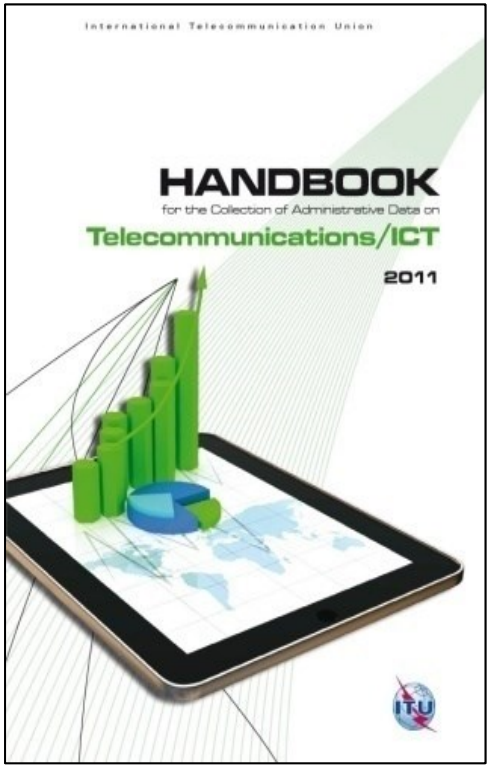
WTI HANDBOOK

ITU Handbook

- Covers **81 indicators** on telecommunication/ICT services
- Covers data collected from **administrative sources** (e.g. telecom operators)
- Discussed in the ITU Expert Group on Telecom/ICT Indicators (**EGTI**)
- Available at:

http://www.itu.int/pub/D-IND-ITC_IND_HBK-2011



ITU Handbook (cont.)

Groupings:

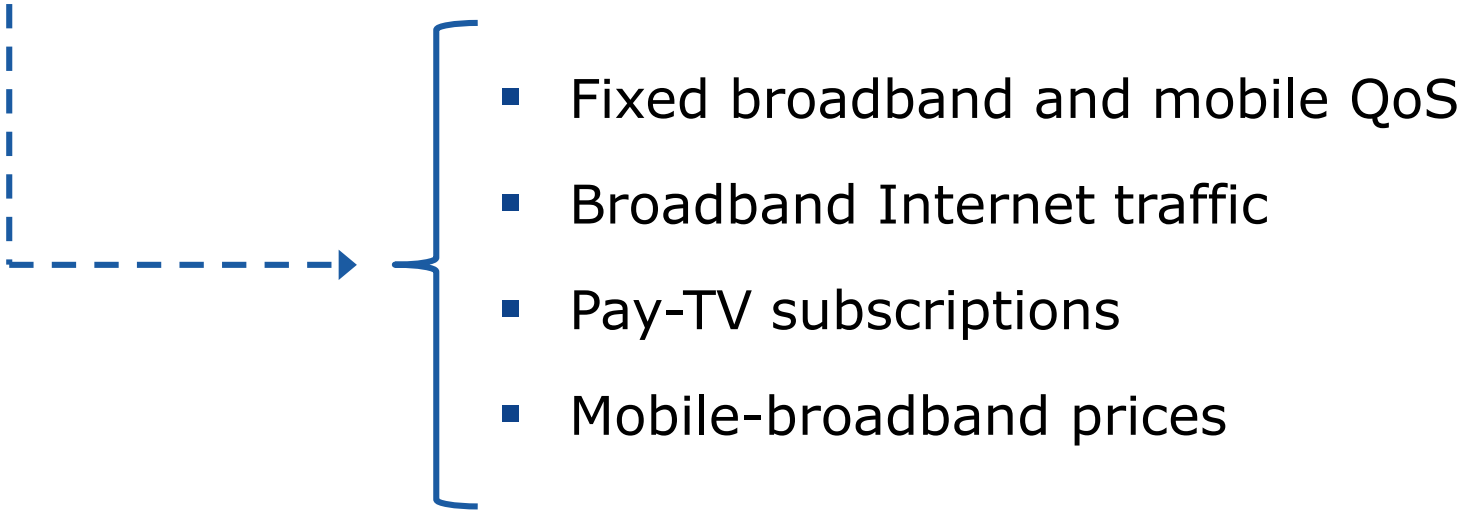
- Fixed-telephone networks
- Mobile-cellular networks
- Internet
- Traffic
- Tariffs
- Quality of service
- Persons employed
- Revenue
- Investment
- Public access
- Broadcasting and other indicators

- Definition
- Clarifications and scope
- Method of collection
- Relationship with other indicators
- Methodological issues
- Examples

ITU Handbook – additions

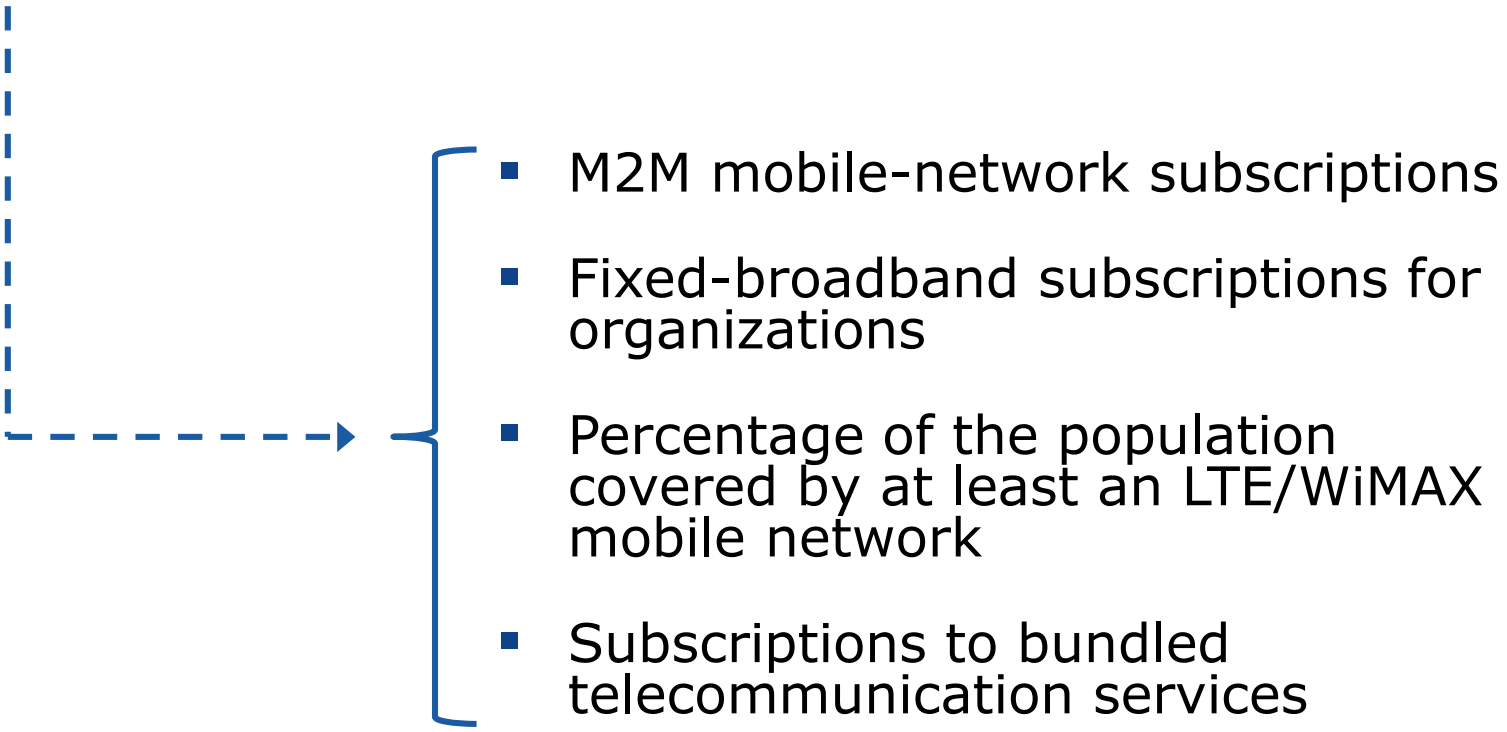
- Revision of revenue and investment indicators

- New indicators from administrative sources 2011-2013



ITU Handbook – additions (ii)

- New indicators from administrative data sources added in 2015:



ITU Handbook – additions (iii)

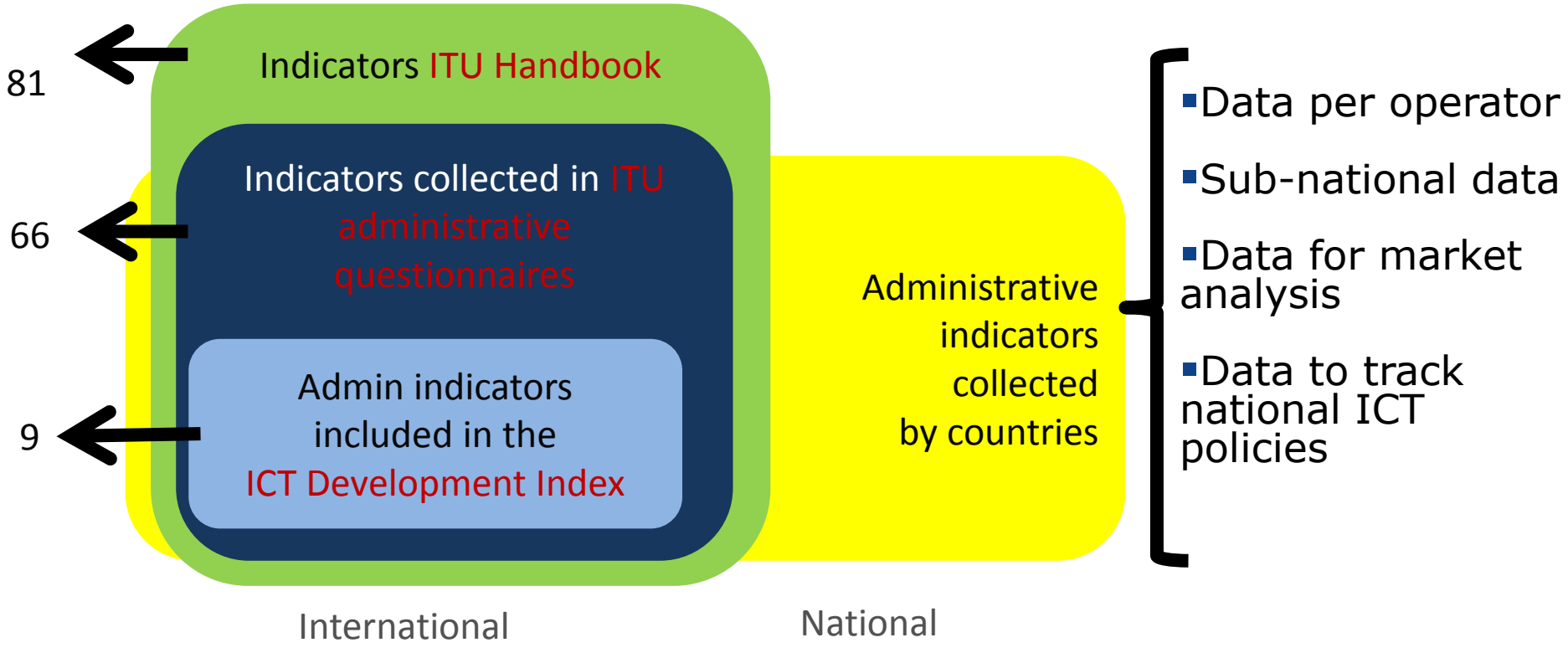
- New indicators from 2016:
  - Active subscriptions to LTE/WiMAX mobile-broadband networks
  - Change in mobile-bb sub-categories
- New indicators from 2017:
  - Fixed wired network coverage
  - Extension fixed-broadband speed tiers
  - Modification price baskets

ITU Handbook – additions (iv)

- Methodological note on the indicator "Fixed-broadband Internet traffic"

New March 2018

Context: indicators from administrative sources

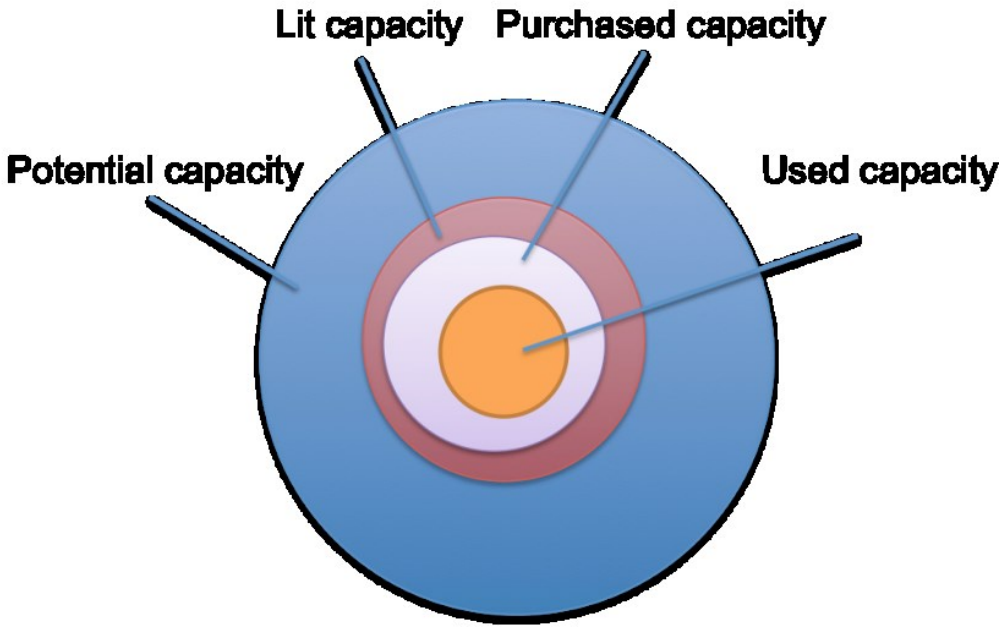


IDI SUPPLY SIDE INDICATORS - DEFINITIONS

IDI indicator 1.3

- **International Internet bandwidth (bit/s) per Internet user**
- Access sub-index
- Source: WTI

International bandwidth



ITU collects data on two indicators:

1. Lit/equipped capacity	2. Used capacity

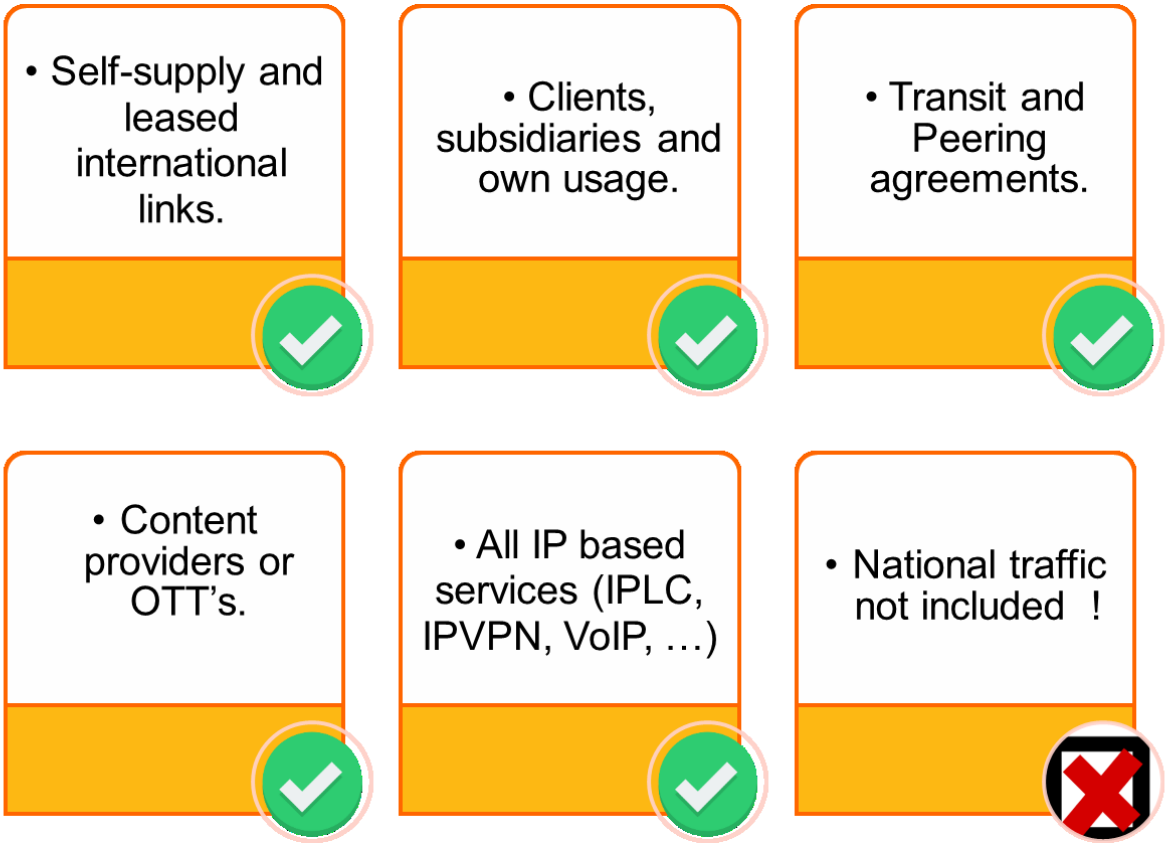
i4214u: Used international bandwidth (traffic), in Mbit/s

Average usage of all international links including fiber-optic cables, radio links and traffic processed by satellite ground stations and teleports to orbital satellites (expressed in Mbit/s).

All international links used by all types of operators, namely **fixed, mobile and satellite** operators should be taken into account. The average should be calculated over the 12-month period of the reference year.

For each individual international link, if the traffic is asymmetric, i.e. incoming traffic is not equal to outgoing traffic, then the higher value out of the two should be provided. The combined average usage of all international links can be reported as the sum of the average usage of each individual link.

What is counted as usage?



Source: ANACOM Portugal & EGTI sub-group on international Internet Bandwidth

Methods of data collection

Method 1

- Collect data from facilities-based carriers that provide wholesale international connectivity.

Method 2

- Collect data from all operators that lease or self-supply international bandwidth, namely fixed, mobile and satellite operators.
- Strive to collect data from OTT's and content-providers who use direct international connections

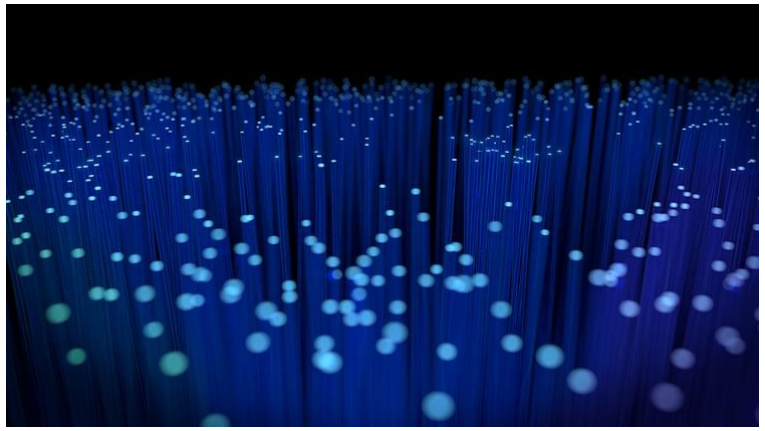
BEWARE OF DOUBLE COUNTING

Double counting can occur if data are collected from both service providers and facilities-based carriers.

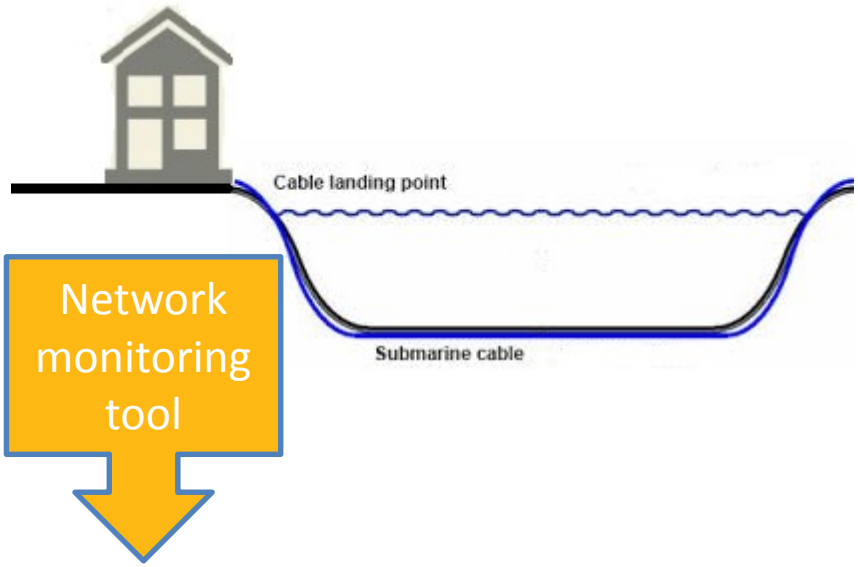
Source: ANACOM Portugal & EGTI sub-group on international Internet Bandwidth

Lit/equipped international bandwidth, in Mbit/s

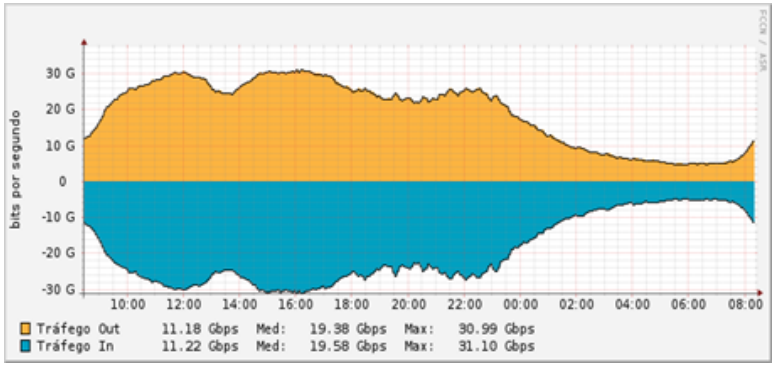
Total **lit/equipped** international **bandwidth capacity** refers to the total lit/equipped capacity of international links, namely fiber-optic cables, international radio links and satellite uplinks to orbital satellites in the end of the reference year (expressed in Mbit/s).



Examples of network monitoring tools



Bandwidth usage in Gbps



Source: Gigapix

- MRTG-Multi Router Traffic Grapher
- PRTG
- Cacti (www.cacti.net)
- OpenNMS (www.opennms.com)

Source: ANACOM Portugal & EGTI sub-group on international Internet Bandwidth

IDI indicator 1.4

- **Percentage of the population covered by mobile networks**
  - **any mobile network**
  - **at least 3G**
  - **at least LTE/WiMAX**
- Access sub-index
- Source: WTI

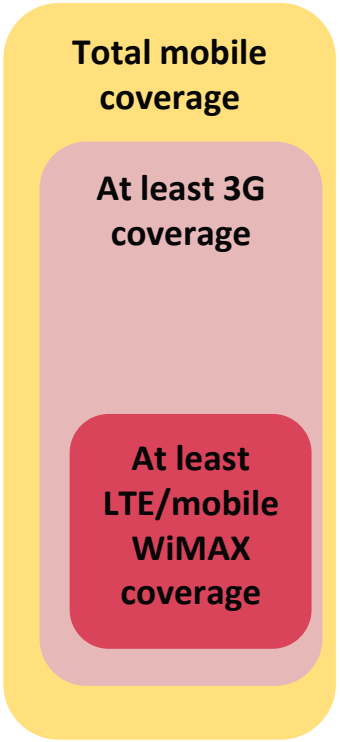
Mobile coverage indicators

irrespective of whether or not they are subscribers,
% of inhabitants that live within range of:

1. Any mobile-cellular signal

2. At least a 3G mobile network
   (excl. EDGE, GPRS, CDMA 1xRTT)

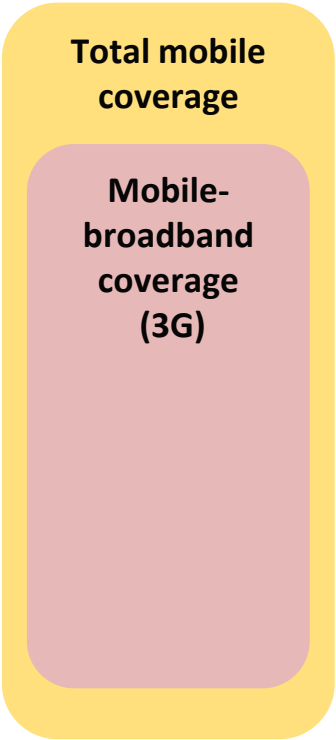
3. At least an LTE/WiMAX mobile network
   (excl. HSPA, UMTS, EV-DO)



% of the population covered by at least an 3G network

Percentage of the population covered **by at least a 3G mobile network** refers to the percentage of inhabitants that are within range of at least a 3G mobile-cellular signal, **irrespective of whether or not they are subscribers**.

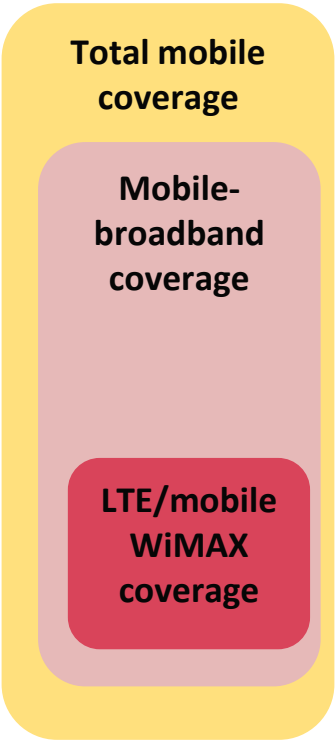
This is calculated by dividing the number of inhabitants that are covered by at least a 3G mobile-cellular signal by the total population and multiplying by 100. It excludes people covered only by GPRS, EDGE or CDMA 1xRTT.



% of the population covered by at least an LTE/WiMAX mobile network

Percentage of inhabitants that live within range of LTE/LTE-Advanced, mobile WiMAX/WirelessMAN or other more advanced mobile-cellular networks, irrespective of whether or not they are subscribers.

It excludes people covered only by HSPA, UMTS, EV-DO and previous 3G technologies, and also excludes fixed WiMAX coverage.



Mobile coverage – *methodology*

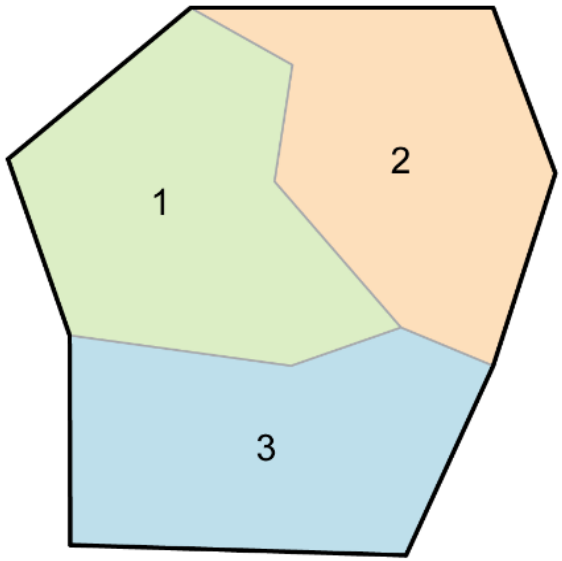
Possible ways of collecting the data:

1. Each operator reports total country coverage
   ⇒ Max value of all reported

2. Each operator reports total per admin unit
   ⇒ Max value of all reported per admin unit
   ⇒ Aggregation according to population/admin unit

Mobile coverage – *methodology*

Example: *aggregation*



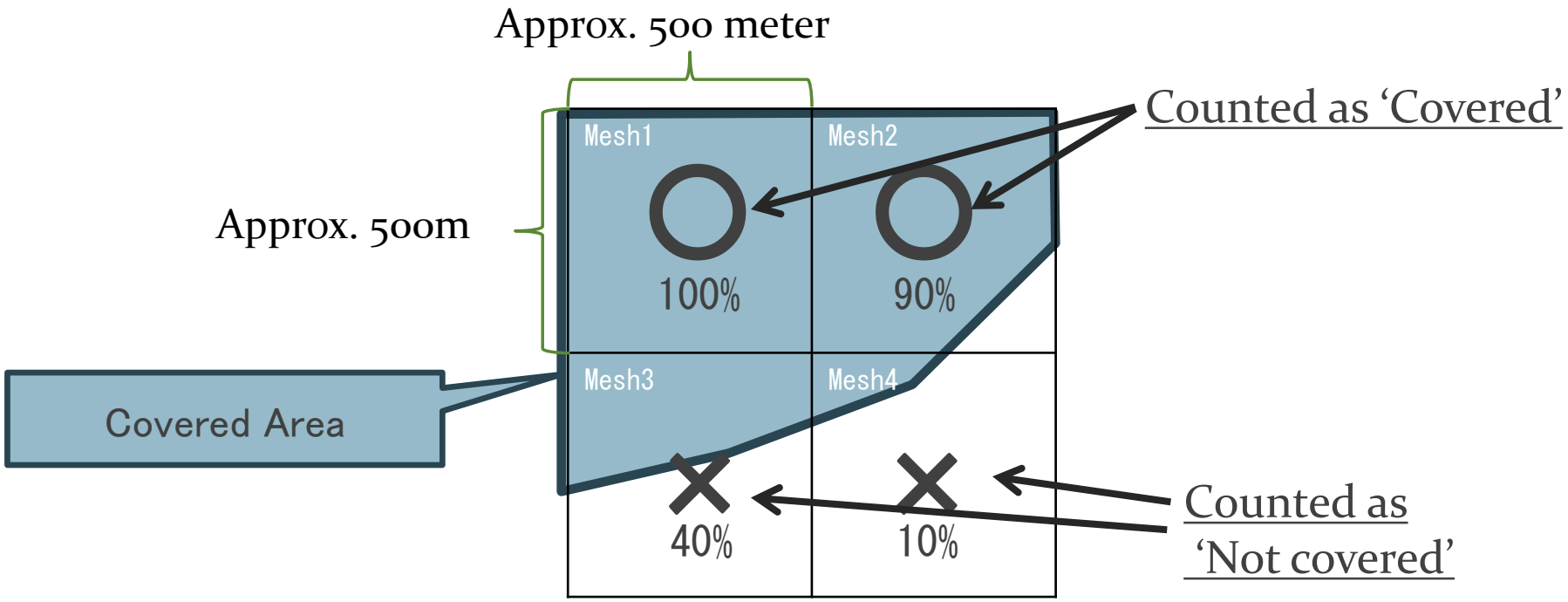
	Op 1	Op 2	Op 3
Region 2 (25% pop)	50%	60%	**70%**

Total coverage: 80% * 25% + 70% * 25% + 80% * 50% = **77.5%**

Mobile coverage – *methodology*

3. Ask each operator to report coverage according to a given division of the land area

Example of Japan:



IDI indicator 1.5

- **Fixed-broadband subscriptions by speed** (as % of total broadband subscriptions):
  - **256 kbit/s to 2 Mbit/s**
  - **2 to 10 Mbit/s**
  - **Equal to or above 10 Mbit/s**
- Access sub-index
- Source: WTI

Definition of broadband

- For statistical purposes: *Minimum download speed of **256 kbit/s***

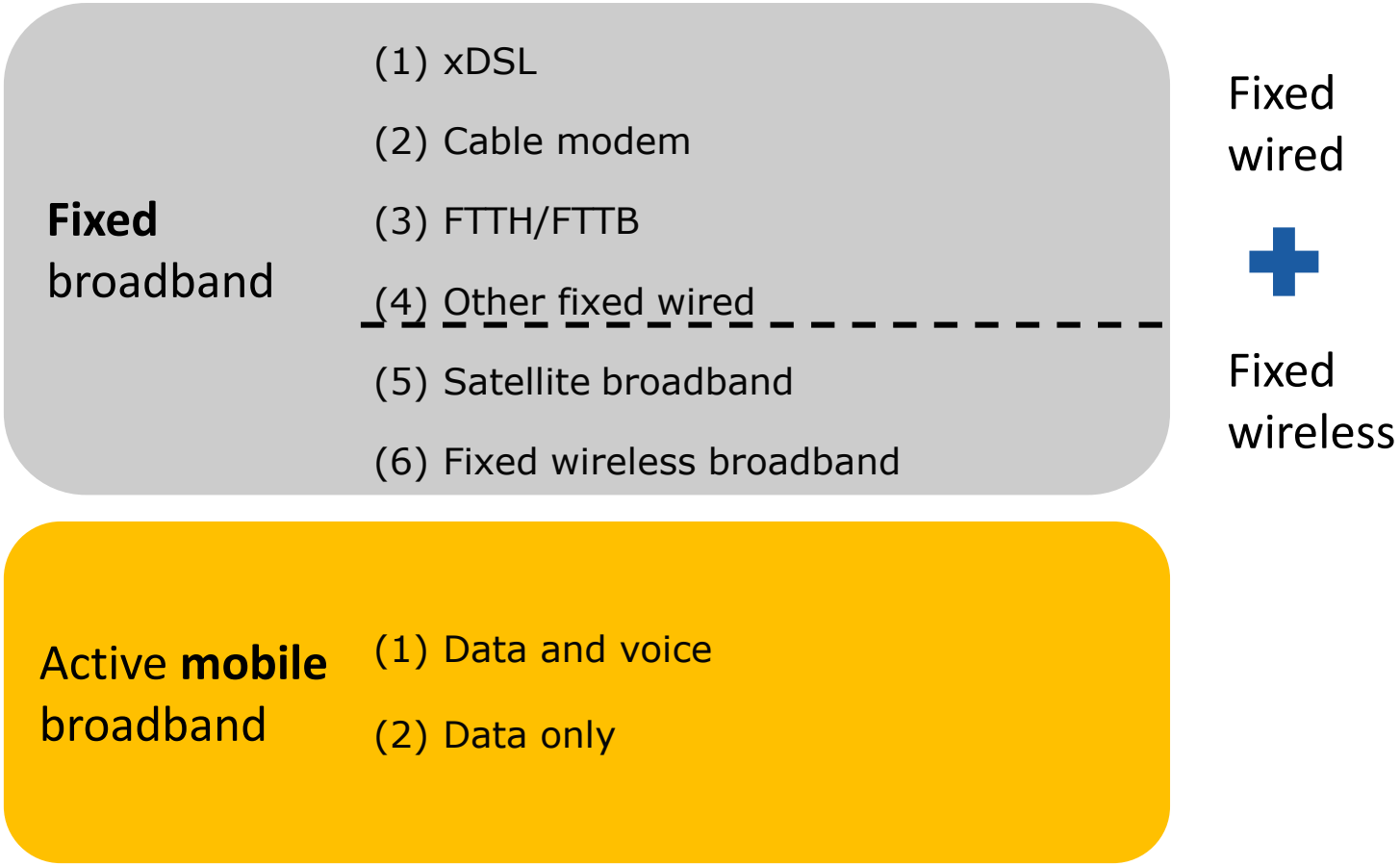
→ Importance of breakdown by speed

→ Breakdown by technology gives additional information on infrastructure

"transmission capacity that is faster than primary rate Integrated Services Digital Network (ISDN) at 1.5 or 2.0 Megabits per second (Mbits)"

– ITU-T Definition

Classification of broadband subscriptions



Fixed (wired)-broadband subscriptions

Fixed-broadband subscriptions refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, **256 kbit/s.** This includes **cable modem**, **DSL**, **fibre-to-the-home/building**, **other fixed (wired)-broadband subscriptions**, **satellite broadband** and **terrestrial fixed wireless broadband**.

This total is measured irrespective of the method of payment. It **excludes** subscriptions that have access to data communications (including the Internet) **via mobile-cellular networks**. It should **include fixed WiMAX** and any other **fixed wireless technologies**. It includes both residential subscriptions and subscriptions for organizations.

Fixed (wired)-broadband subscriptions by speed tiers

Main features:

- advertised ≥ 256 kbit/s

- wired

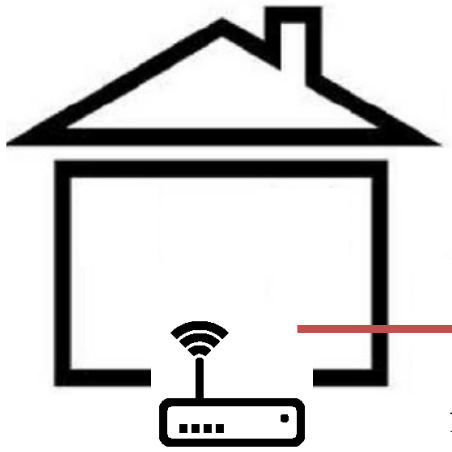
Breakdowns:

- by speed
  - **256 kbit/s – < 2 Mbit/s**
  - **2 – <10 Mbit/s**
  - **≥ 10 Mbit/s**
- by tech
  - DSL
  - cable
  - FTTH/B
  - Satellite/fixed wireless/other

Clarifications on WiFi networks

- The 2016 EGTI meeting clarified the following use cases of WiFi networks (3):

1) **WiFi used on top of other fixed-broadband subscriptions to distribute the signal at home**

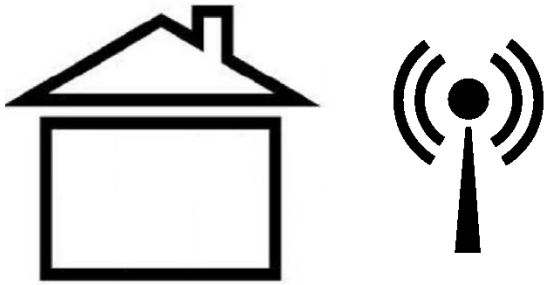


These connections are already counted as **"Fixed broadband subscriptions"** and should not be reported separately

fixed broadband connection
(ADSL, cable, fiber, etc.)

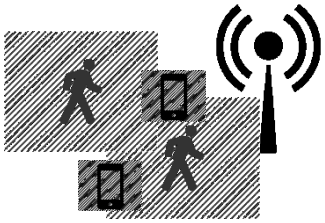
Clarifications on WiFi networks

2) **WiFi used as a last mile technology** and associated with a specific monthly fixed-broadband contract



these connections should be reported as "**Fixed wireless broadband subscriptions**"

3) **WiFi hotspots** (public, private, free, paid)



Individual country experiences, but in most cases out of the scope of regulators' data collections. Will **not** be **reflected in ITU supply-side indicators**

New speed tiers
collected from 2018 onwards on fixed broadband subscriptions (not in IDI) – included in Long Questionnaire

- in the 2017 EGTI meeting the need for enlarging the high-speed BB subscriptions was discussed and adopted new intervals for higher speeds

- the new speed tiers are **compatible** with previous (3) tier-classification

- in 2016 and based on data collected by ITU, **64%** of all fixed BB active connections had a (nominal, download) speed of 10 Mbps or higher

- Currently ITU collects three speed intervals

  (1) => 256 Kbps and < 2 Mbps,
  (2) => 2 Mbps and < 10 Mbps, and
  (3) => 10 Mbps

- Advances in fixed networks and speeds need to be measured by increasing the high speed intervals (> 10 Mbps) adding:

  (4) => 10 Mbps and < 30 Mbps
  (5) => 30 Mbps and < 100 Mbps
  (6) => 100 Mbps

New speed tiers for fixed BB subscriptions:

(1) => 256 Kbps and < 2 Mbps,
(2) => 2 Mbps and < 10 Mb
(3) => 10 Mbps and < 30 Mbps
(5) => 30 Mbps and < 100 Mbps
(6) => 100 Mbps

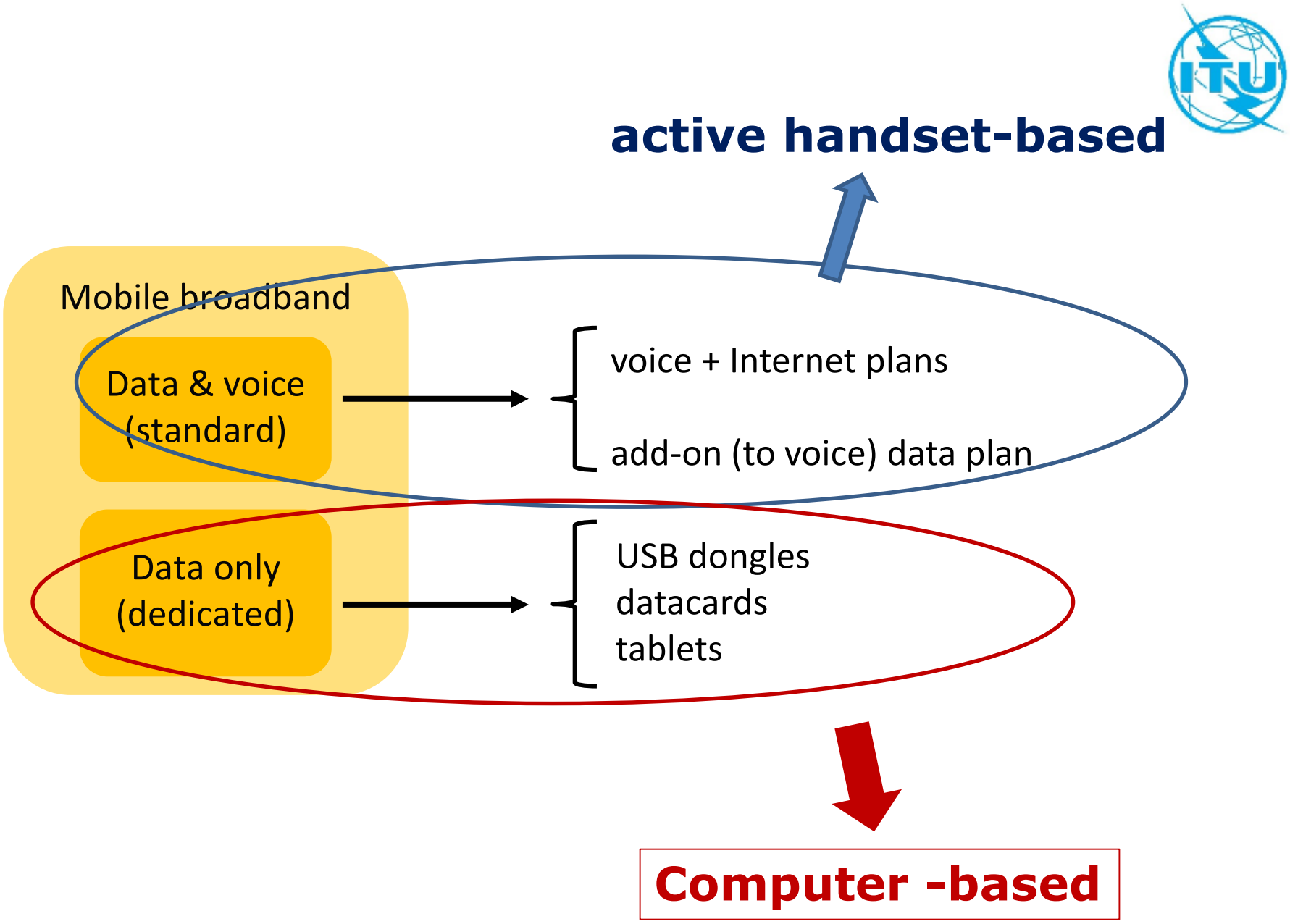
IDI indicator 2.2

- **Active mobile-broadband subscriptions per 100 inhabitants**
- Use sub-index
- Source: WTI

Active mobile broadband subscriptions

Active mobile-broadband subscriptions refers to the sum of **active handset-based** and **computer-based** (USB/dongles) mobile-broadband subscriptions to the public Internet.
It covers actual subscribers, not potential subscribers, even though the latter may have broadband-enabled handsets. Subscriptions must include a recurring subscription fee or pass a usage requirement – **users must have accessed the Internet in the last three months.**

It includes subscriptions to mobile-broadband networks that provide download speeds of at least 256 kbit/s (e.g. WCDMA, HSPA, CDMA2000 1x EV-DO, WiMAX IEEE 802.16e and LTE), and excludes subscriptions that only have access to GPRS, EDGE and CDMA 1xRTT.


active handset-based
Mobile broadband
Data & voice (standard)
voice + Internet plans
add-on (to voice) data plan
Data only (dedicated)
USB dongles
datacards
tablets
Computer -based

Active mobile-broadband subscriptions

active handset-based

Data & voice (standard)

Data and voice mobile-broadband subscriptions (i271mb_active)

computer -based

Data- only (dedicated)

Data-only mobile-broadband subscriptions (i271md)

Active mobile-broadband subscriptions

Main features:

- advertised ≥ 256 kbit/s

→ GPRS and EDGE excluded

- **active**
  1. Monthly fee paid for Internet access

     OR

  2. Accessed the Internet in the previous three months
- **allows access to the open Internet**

Mobile broadband subcategories

i271mb_active - Data and voice mobile-broadband subscriptions (i271mw = i271mb_active+ i271md)

Data and voice mobile-broadband subscriptions refers to subscriptions to mobile-broadband services that allow access to the open Internet via HTTP and **in which data services are contracted together with voice services** (mobile voice and data plans) **or as an add-on package to a voice plan**. These are typically smartphone-based subscriptions with voice and data services used in the same terminal. Data and voice mobile-broadband subscriptions with specific recurring subscription fees for Internet access are included regardless of actual use. Prepaid and pay-per-use data and voice mobile-broadband subscriptions should only be counted if they have been used to access the ***Internet in the last three months***. M2M subscriptions should be excluded.

Mobile broadband subcategories

i271md - Data-only mobile-broadband subscriptions (i271mw = i271mb_active+ i271md)

Data-only mobile-broadband subscriptions refers to subscriptions to mobile broadband services that allow access to the open Internet via HTTP and that do not include voice services, i.e. subscriptions that **offer mobile broadband as a standalone service**, such as mobile-broadband subscriptions for datacards, USB modem/dongle and tablets. Data-only mobile-broadband subscriptions with recurring subscription fees are included regardless of actual use. Prepaid and pay-per-use data-only mobile-broadband subscriptions should only be counted if they have been used to access the Internet in the last three months. M2M subscriptions should be excluded. It excludes data subscriptions that are contracted together with mobile voice services.

Examples of activity criteria

	Type of plan	Voice	Data	How counted
1	Standalone voice	Standard voice subscription	Pay as you go	If Internet used in the last 3 months, **Standard**
2	3G modem	No	Monthly subscription	**Dedicated**
3	Bundled voice and data	X minutes included	Y MB included	If Internet used in the last 3 months, **Standard**
4	Bundled voice and data	X minutes included	Unlimited	If Internet used in the last 3 months, **Standard**
5	Standalone voice plan + data add-on	Standard voice subscription	Data paid separately (Y MB/month)	**Dedicated**

Examples of activity criteria

	Type of plan	Voice	Data	How counted
6	3G modem	No	Prepaid	If Internet used in the last 3 months, **Dedicated**
7	Voice plan + data credits	Standard voice subscription	Pay per use once credits are filled	If Internet used in the last 3 months, **Standard**

IDI indicator 2.3

- **Mobile-broadband Internet traffic per mobile-broadband subscription**
- Use sub-index
- Source: WTI

Mobile-broadband Internet traffic (within the country)

Mobile-broadband Internet traffic (within the country) refers to broadband traffic volumes originated within the country **from 3G networks or other more advanced mobile networks**, including 3G upgrades, evolutions or equivalent standards in terms of data transmission speeds.

Traffic should be collected and aggregated at the country level for all 3G or more advanced mobile networks within the country. **Download and upload traffic should be added** up and reported together. *Traffic should be measured at the end user access point*. Wholesale and walled-garden traffic should be excluded. The traffic should be reported in exabytes.

IDI indicator 2.4

- **Fixed-broadband Internet traffic per fixed-broadband subscription**
- Use sub-index
- Source: WTI

Fixed (wired)- broadband Internet traffic

Fixed (wired)- broadband Internet traffic (exabytes) refers to **traffic generated by fixed broadband subscribers measured at the end-user access point**. It should be measured *adding up download and upload traffic*.

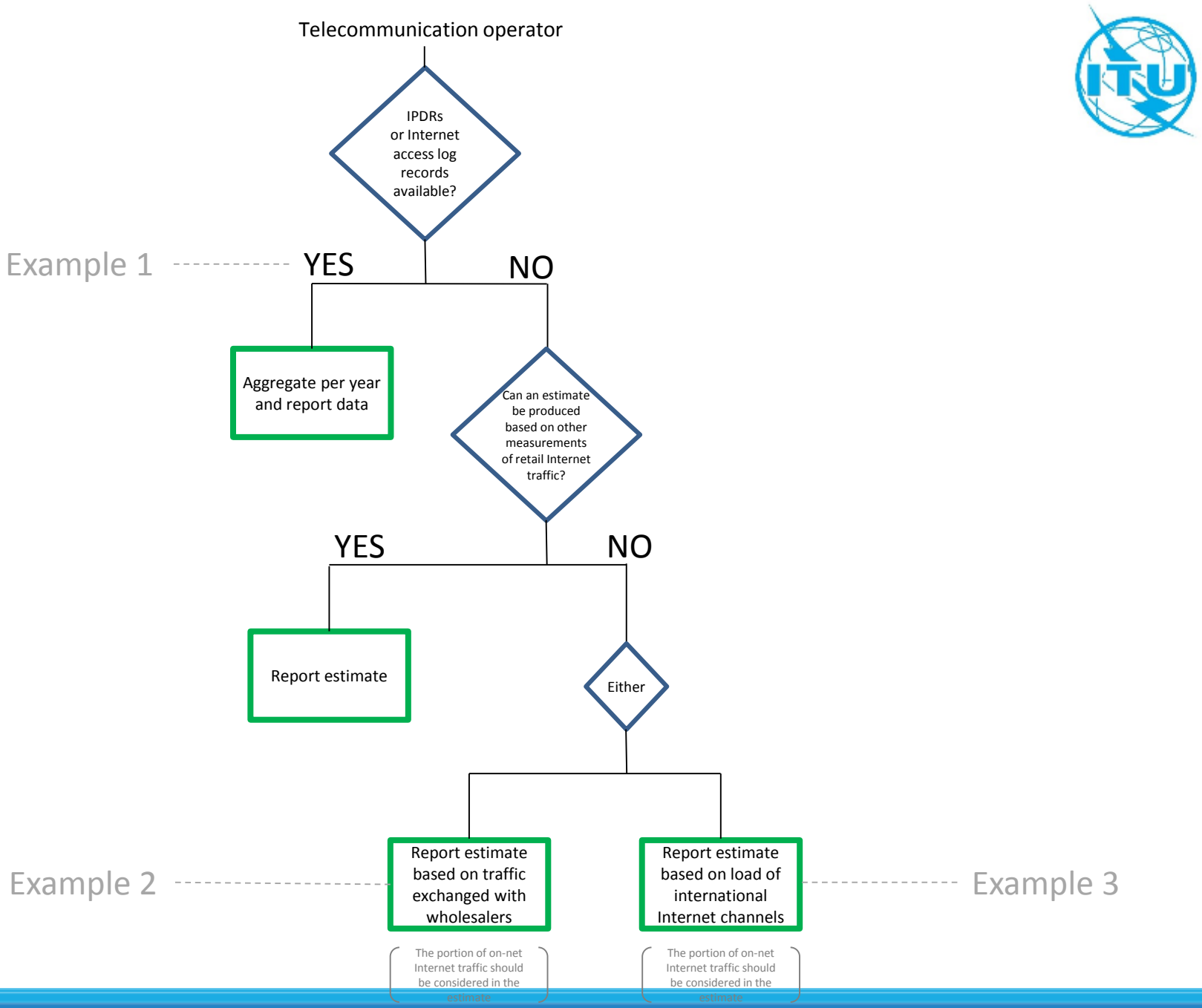
This should **exclude wholesale traffic, walled garden, IPTV and cable TV traffic.**

Fixed and mobile data traffic – methodology (ii)

- Units:

10^{12}	EB	Exabyte
10^{9}	PB	Petabyte
10^{6}	TB	Terabyte
10^{3}	GB	Gigabyte
1	MB	Megabyte

- References:
  - Fixed: 0.05 – 30 EB
  - Mobile (domestic): 0.04 – 4 EB
  - Mobile (roaming): 10^{-6} – 10^{-2} EB


Telecommunication operator
IPDRs or Internet access log records available?
Example 1
YES
NO
Aggregate per year and report data
Can an estimate be produced based on other measurements of retail Internet traffic?
YES
NO
Report estimate
Either
Example 2
Report estimate based on traffic exchanged with wholesalers
Report estimate based on load of international Internet channels
Example 3
The portion of on-net Internet traffic should be considered in the estimate
The portion of on-net Internet traffic should be considered in the estimate

Fixed and mobile data traffic – examples

- Example 1: Internet log records

ID	TYPE_COMMERCIAL_PRIVATE	TYPE_TECHNOLOGY	TYPE_SPEED	TYPE_IP_ACCESS	LAU3_CODE	DATETIME	DURATION	DATA_VOLUME
50000001	1	1	1	1	636732	1460590789	21021	[illegible]
50000001	1	1	1	1	636732	1460624755	19544	[illegible]
50000001	1	1	1	2	636732	1460667621	52585	[illegible]
50000002	1	1	2	2	736283	1463600670	37146	[illegible]
50000002	1	1	2	2	736283	1463655957	6527	[illegible]
50000002	1	1	2	2	736283	1463670975	78445	[illegible]
50000003	1	1	3	1	226398	1463201560	30617	[illegible]
50000003	1	1	3	1	226398	1463256930	43324	[illegible]
50000003	1	1	3	2	226398	1463302871	60706	[illegible]
50000004	1	1	4	2	109399	1460986631	72621	[illegible]
50000004	1	1	4	1	109399	1461087020	62676	[illegible]
50000004	1	1	4	2	109399	1461150692	1057	[illegible]
50000005	1	2	1	2	860843	1463270886	76957	[illegible]
50000005	1	2	1	1	860843	1463380473	39007	[illegible]
50000005	1	2	1	1	860843	1463436321	29605	[illegible]
50000006	1	2	2	1	448844	1460148452	61626	[illegible]
50000006	1	2	2	1	448844	1460249825	8365	[illegible]
50000006	1	2	2	2	448844	1460271473	4632	[illegible]

Source: ITU Big Data for Measuring the Information Society: Country Report – United Arab Emirates.

Fixed and mobile data traffic – examples

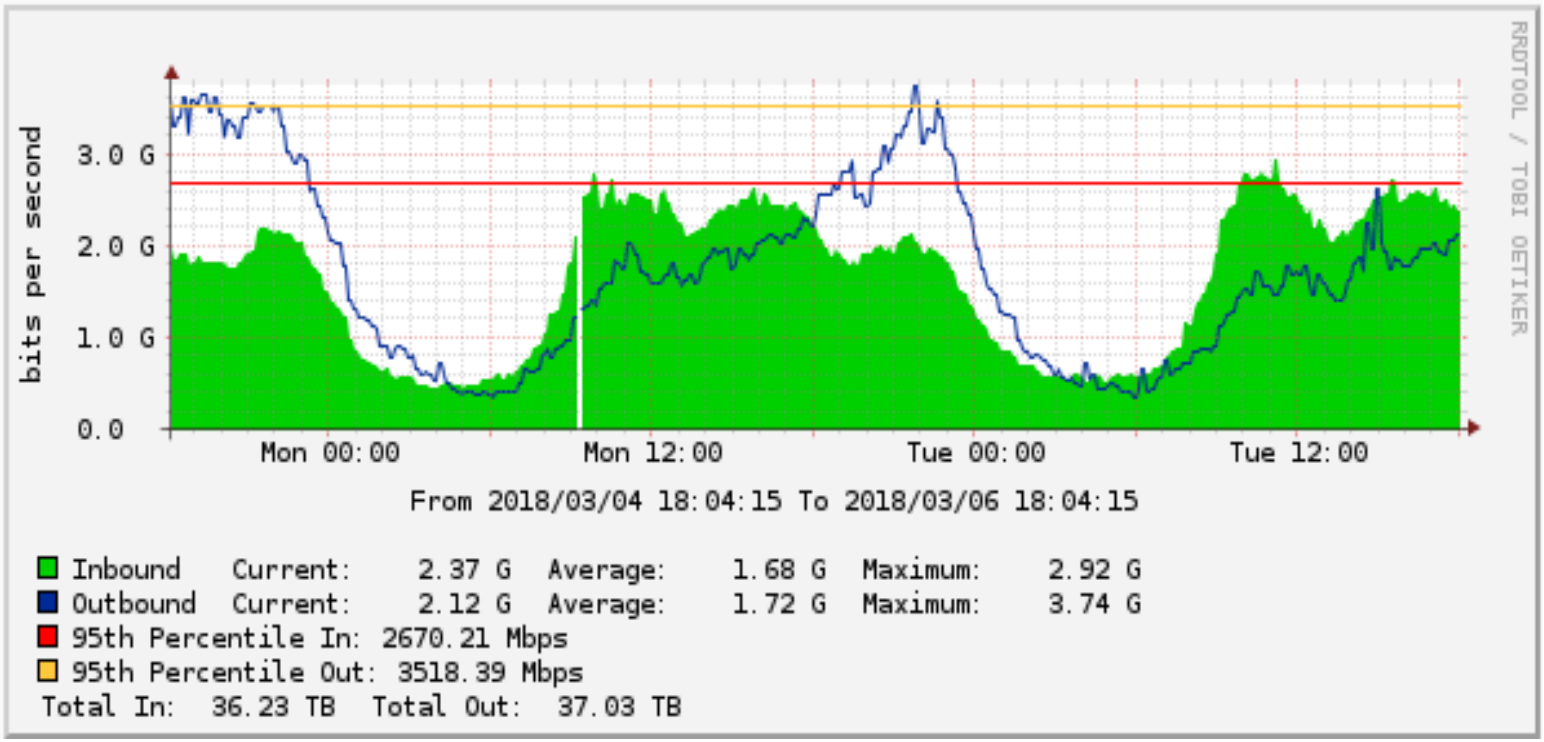
- Example 2: traffic data at IXPs

Nodeid	Ip Address	Operador	Downstrean/Upstream traffic	Date	Daily traffic volume	Value 8 20	Max day
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.01	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.01	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.02	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.02	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.03	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.03	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.04	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.04	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.05	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.05	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.06	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.06	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.07	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.07	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.08	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.08	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.09	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.09	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.10	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.10	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.11	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.11	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCOutOctets	17.10.12	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX
XXXX	XX.XX.X.XX	XXX	ifHCInOctets	17.10.12	XXXXXXXXX.XX	XXXXXXXXX.XX	XXXX.XX

Source: Autoridade Nacional de Comunicações (ANACOM), Portugal.

Fixed and mobile data traffic – examples

- Example 3: load international channels



Source: Autoridade Nacional de Comunicações (ANACOM), Portugal.

Thank you

For more information

https://www.itu.int/en/ITU-D/Statistics/

and

indicators@itu.int