

1. Introduction

1.1. Overall context

In 2021, EGTI approved the report of the EGTI Sub-group on Over-the-top (OTT) indicators,¹ including the following definition of OTT:

OTT = A service

- provided and delivered over the public Internet without control of the network layer, and
- access to which is independent of a specific Internet access service.

The ITU Expert Group on Telecommunication / ICT Indicators (EGTI) and the ITU Expert Group on Household Indicators (EGH) also agreed on 14 September 2021 that further work on the matter of OTT measurement should be conducted with joint involvement of experts representing both groups. This led to the creation of a joint sub-group (JSG), participation in which was open to all interested EGTI and EGH members.

Following adoption of its 2022 report,² EGTI and EGH decided to reconduct extend the mandate of the OTT sub-group. As per the terms of reference, the objective of the group was

to produce a short document which will operationalize the definition adopted by EGTI, according to which OTT is a “service, provided and delivered over the public Internet without control of the network layer, and access to which is independent of a specific Internet access service”. The document will, among others, describe a proposed measurement approach taking into consideration technical aspects of OTT communications and framework conditions for data collection on OTT services. It will also take into account the related work of other international organizations, and evaluate the feasibility of data collection, with the aim to eventually define indicator(s) and, if possible, conduct data collection trials. The joint sub-group should propose indicators that could be collected from either household surveys or administrative data sources. Insofar as possible, it will examine existing data collection instruments, discuss their relation to relevant ITU indicators and create a repository. This includes particular attention to the question of data sourcing and minimum requirements for data collection to be internationally comparable. The end view of its proposal(s) is to facilitate the future collection of this new set of indicators.

Mr Oliver Füg (Telefónica) and Mr Winston Oyadomari (Cetic.br) continued as JSG Chair and Vice-chair, respectively. The joint sub-group consisted of experts from ARCT of Burundi, StatCan from Canada, the Commission of Communications Regulation of Colombia, CAICT and CNNIC of China, AGCOM of Italy, the Statistical Institute of Jamaica, the Communications Authority of Kenya, TRA of Oman, the Ministry of Transport and Communications of Peru, ANACOM of Portugal, the Communications Regulatory Authority

¹ [Report of the EGTI Subgroup on OTT Indicators \(2021\)](#).

² [Report of the EGTI & EGH Joint Sub-group on OTT Indicators \(2022\)](#).

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of Qatar, CST of Saudi Arabia, TATT of Trinidad and Tobago, AGESIC and Universidad de Montevideo of Uruguay, ZICTA of Zambia, as well as independent subject matter experts.

1.2. Work plan

To structure the JSG work, the Chair and the Vice-chair proposed an agenda to the sub-group that would allow measurement to be discussed from the perspective of each expert group, while enabling participation from both. An equal number of sessions was foreseen for each perspective.

Deliberations took place between January and June 2023. Due to rescheduling and reporting constraints, five sessions were dedicated to demand and three sessions to supply questions.

This report reflects the JSG's work carried out from these perspectives. The Chair and the Vice-chair have drafted the chapters representing the work linked to their respective expert group; both have read and endorsed the overall report before submitting the present version to experts' attention, which reflects comments received from JSG members.

2. Summary of the sub-group's work

2.1. Deliberations from a demand side perspective

2.2.1. Background on previous demand side work

The sub-group has in the past identified that the indicator HH9 (proportion of individuals using the Internet, by type of activity) stands out as a relevant measure already existent.³ It contains items, such as making VoIP calls, watching videos and social networks, which relate directly to the subject.

The sub-group concluded that the primary data gap to be addressed concerns the impact of traffic generated by OTT on network infrastructure. While the indicator HH9 measures the proportion of people engaging in activities related to OTT, in its present form, it is impractical to determine unequivocally if it indeed constitutes OTT use. Importantly, it also counts people rather than data traffic.

The sub-group discussed advantages and limitations of household surveys as a source of information, as well as how household surveys could add to the indicators defined by the Manual and provide more information on the use of OTTs by individuals.

Household surveys allow data disaggregation by variables of interest, such as age, gender, income level, etc. This is especially relevant for policy-making purposes, as it reveals disparities and informs policy action. Another relevant aspect is the existence of knowledge and experience accumulated in collecting ICT indicators in household surveys in line with the ITU Manual.

³ Report of the EGTI & EGH Joint Sub-group on OTT Indicators (2022), at 4.

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Three key limiting aspects have been singled out. The first one is related to the lack of funding since surveys are the most expensive of all data sources. In some Member States, they might not always be available or might not be conducted with regular periodicity. The second aspect is questionnaire length, which is already a challenge for data producers as the demands of information are getting broader in scope and deeper in detailing aspects of ICT adoption by individuals. The third is related to the capability of respondents to understand the questions and recall the information (intelligibility and recall). This is particularly relevant regarding OTT and the defined data gap of OTT traffic, since individuals will neither automatically recognize OTTs and their distinct categories, nor be able to estimate the amount of data consumed by type of activity or platform.

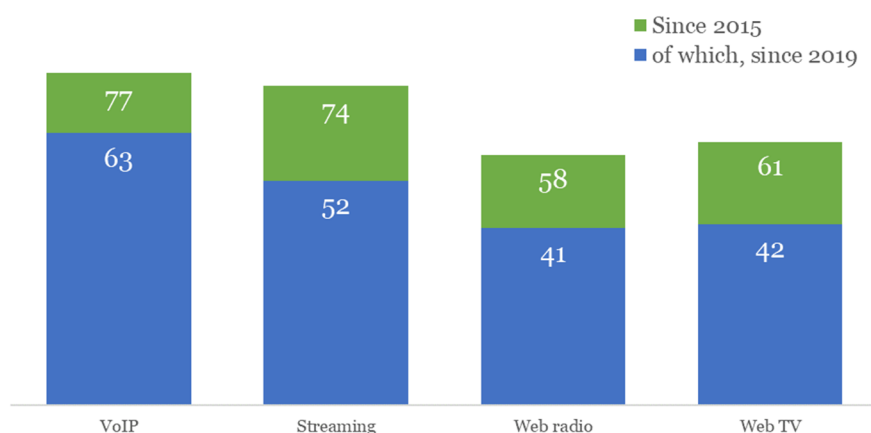
2.2.2. Analysing Currently Available OTT-Related Indicators

Harmonized OTT-related data are already collected by countries (primarily through national statistics offices) and compiled by the ITU in its annual ICT Household Long Questionnaire. These data are based on ITU recommendations through indicator HH9 (individuals using the Internet, by type of activity). However, these indicators were not created with a specific purpose of collecting data on OTTs.

When analysing indicator HH9 – Proportion of individuals using the Internet, by type of activity (Annex 1), it can be noted that it covers a very wide range of activities and services online, not restricted to the subject of OTT. Some of these items are also being considered under the Skills indicator, complementing the specific indicator dedicated to that (HH15).

Figure 1 displays the number of member states reporting categories under HH9 commonly associated with the OTT subject. This suggests a decrease in the number of member states reporting those categories over time.⁴

Figure 1. Number of countries providing data for HH9 OTT-related indicators (February 2023)



Source: ITU

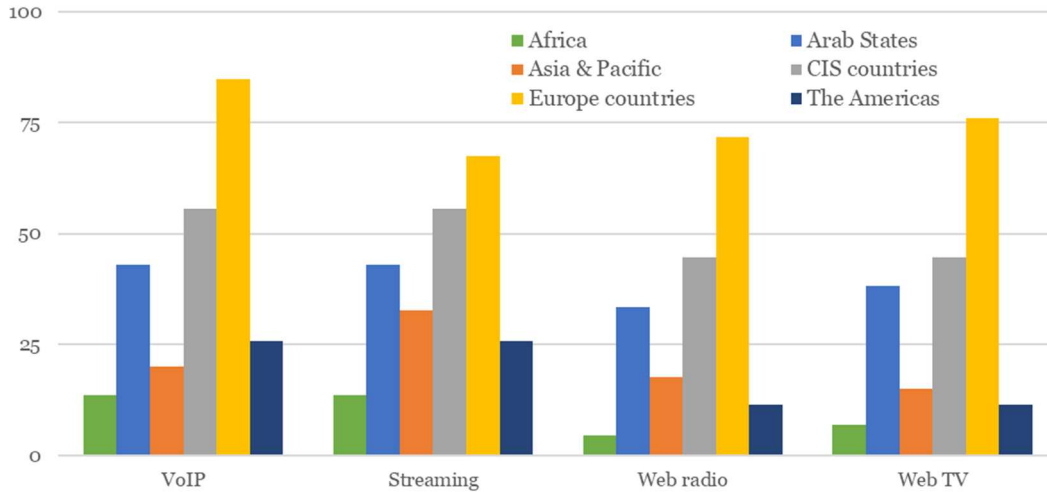
Making calls over the Internet and streaming are the most collected of those 4 analysed. At a regional level, data availability for these indicators is like most other indicators.

⁴ For further analysis, see Figure 3 and accompanying text.

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Europe, CIS, and Arab States most frequently collecting these data, while Africa, Asia & Pacific and the Americas collect them less frequently. This is described in Figure 2.

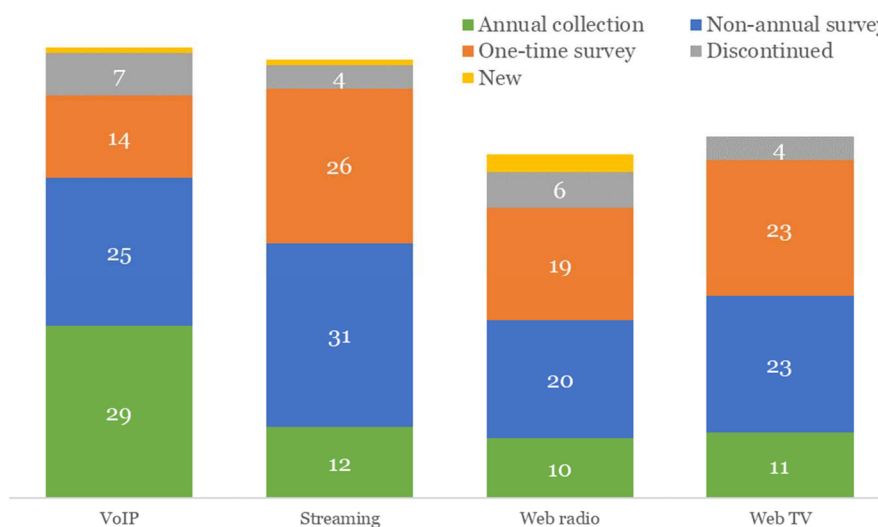
Figure 2. Share of countries reporting data on HH9 OTT-related indicators since 2015 (% , by region)



Source: ITU

Trends show a variety of approaches in collecting these data. Most countries who have provided data have done so through an annual survey or a non-annual regular survey. However, many countries have only provided data one time since 2015, presumably through a non-regular survey that was conducted without sustainable funding for subsequent years. Some, but not many countries appear to have discontinued their surveys on this indicator (not having provided data after 2018) while a few have also provided data for the first time from 2019 onwards. The breakdown of these situations is displayed in Figure 3.

Figure 3. Number of countries reporting HH9 OTT-related indicators since 2015 by regularity of data collection (February 2023)



Source: ITU

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Note: New = at least 2 years of data since 2019 after no data from 2015-2018. Annual collection = data every year since 2019 and at least one year prior. One-time survey = one year of data since 2015. Discontinued = at least two years of data 2015-2018 and no data since 2019. Non-annual survey = data in at least one year but not all years since 2019 and at least two years since 2015.

In summary, there is a substantial amount of Member States collecting and reporting HH9 categories somehow related to OTT traffic, though the level of reporting is uneven between regions and some of this effort might have been discontinued in recent years. It is relevant to acknowledge that Member States face difficulties and limitations in producing the indicators currently recommended in the Manual, even before the known impact of the COVID-19 pandemic on the capacity of national statistics offices (NSOs) around the world to collect data from households.

Nonetheless, the sub-group reinforces its recommendations from the past year of encouraging countries willing to produce information about OTT from the demand side to collect at least the items from HH9 mentioned above, as an initial stage on the understanding of the consumer behaviour. It must also be noted that some categories of HH9 are gaining more attention due to the topic of digital skills, which reflects an overall need to improve the comprehension of internet users' behaviour from several data users and for several different reasons.

In order to deepen this understanding, it is necessary to define some standardized options for the Member States interested in collecting additional information on the subject, that allow for international comparison, coordination, and cooperation.

2.2. Deliberations from a supply side perspective

2.2.1. Introduction

On the supply side, the sub-group's work this year aimed to further investigate technical foundations and options of traffic measurement, to examine available commercial solutions and to study cases of real-life data collection, including innovative approaches that could potentially help to address the data gap identified. The corresponding activities and findings are reported on in sections 2.2.2., 2.2.3. and 2.2.4. below.⁵

The relevance of OTT traffic has continued to grow in the post-endemic environment also during this reporting cycle.⁶ This trend, the expert groups' endorsement and continued efforts by the Chair and the Secretariat notwithstanding, participation in these activities did not significantly increase beyond the levels of past years. This has a bearing on the conclusions and recommendations that can be derived from this year's work, as stated in section 3.2. below.

⁵ A Content Delivery Network (CDN) is a system of distributed servers that are strategically placed in multiple locations around the world to deliver content to users based on their geographic location. The goal of a CDN is to provide faster delivery of content to users by reducing the physical distance between the user and the server delivering the content.

⁶ Section 2.2.3 below provides estimates on global volumetric traffic growth by a leading commercial traffic analytics provider.

2.2.2. Overview of possible supply side measurement approaches

Following last year's work on traffic identification in local networks, the sub-group under this heading sought awareness of wider network topology and its impact on measurement possibilities as well as technical issues to be addressed.

A research scientist in engineering provided an overview of basic network topology, charging data records (CDRs) and associated traffic data. The presentation pointed to challenges in traffic measurement regarding:

- The difficulty of identifying traffic reliably based solely on IP and Domain Name System (DNS) information, a problem reinforced by increasing importance of encryption;
- Cost and complexity of differentiated live traffic analysis.

Further discussion of traffic identification focussed on the use of deep packet inspection (DPI).⁷ While this technique can be used for traffic identification by probing inside communications contents, the exchange concluded to limitations in live usage and potential problems regarding non-discriminatory treatment of Internet packets ('net neutrality'). Furthermore, DPI could infringe national laws on the protection of privacy, unless overriding public interest objectives allowed dispensing therewith.

The group further heard about the possible use of charging data records (CDRs) for the analysis of traffic flows. In principle, per connection information could be analysed with regard to domain requests in order to derive traffic for a specific target domain. This manner of proceeding faces difficulties in that it requires recording of individual usage patterns and retaining information on usage behaviours over the entire billing period. Furthermore, retaining this data will often be irrelevant for billing purposes where subscribers use unlimited or high volume data plans that are unlikely to be exceeded. More generally, for data plans with data usage caps, network operators will have no interest in identifying individual access requests for billing purposes as the only relevant information is the aggregate volume of data consumed in relation to the applicable cap. In addition to concerns over user privacy, the proportionality of a CDR-based approach to traffic analysis therefore appears problematic. Finally, it is also not clear how this could address the problems associated with traffic encryption.

Thirdly, the possibility of network operators utilizing hardware-based probes at network level was mentioned, but could not be discussed due to time constraints.

In a case study of an OTT communications service in Uruguay, it was explained that to ensure the gratuity of that service, the provider committed to notifying network operators of the server addresses from which the service was being provided. This allowed service identification by source of origination. While the group recognised that granting gratuity of consumption to specific services might conflict with domestic net

⁷ Deep packet inspection (DPI) is a type of data processing that inspects in detail the data being sent over a [computer network](https://en.wikipedia.org/wiki/Deep_packet_inspection), and may take actions such as alerting, blocking, re-routing, or logging it accordingly. Cf. https://en.wikipedia.org/wiki/Deep_packet_inspection.

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neutrality provisions, it was acknowledged that proactive source identification by OTT providers offered a particularly probate means for identifying service-specific traffic volumes.

Another possible source of traffic data was identified by the sub-group in the form of content delivery network (CDN) operators. There was a shared appreciation that the amount of traffic served in response to requests to those operators had generally been growing, as notably popular retail offers, both in the entertainment and professional domains, increasingly relied on such intermediate storage infrastructures.⁸ Additionally, several examples were provided of CDN operators ranking Internet access quality at country level in the context of delivering their services.⁹ However, there were doubts about the methodologies used, the availability of data and the possibility of obtaining them.

The sub-group did not hear expert testimony on the possibilities for source-centric data collection.¹⁰

The presentation also suggested a list of four indicators.¹¹ Two of these were unrelated to data traffic volume; the remaining two were articulated around the concept of peak traffic.¹² Discussion in the sub-group reached no consensus as to how peak traffic relates to total traffic measurement.

Overall, the discussions provided a high-level overview of possible data collection approaches from a supply-side perspective. It became clear that there are two principal points of entry for collecting information about traffic related to particular OTT services: network operators or service providers and their intermediaries. The level of examination does not at this stage support any final determination of a singularly most appropriate approach. While there may be jurisdictional issues in obtaining data from service providers and their intermediaries, the practicability and legality of an approach targeting network operators could not be established.

2.2.3. Commercial data traffic analytics solutions

To shed further light on practical data collection solutions, the sub-group heard a presentation by traffic analytics company Sandvine. Sandvine estimates overall global traffic volume to have increased by approximately 23% in 2022. In terms of global traffic shares, video traffic was estimated to account for 65% of all Internet traffic, equalling a 24% year-on-year increase. Out of more than 2,500 applications analysed, those attributable to six OTT service providers were seen to make up close to 50% of overall traffic.¹³

⁸ For estimates on traffic growth trends, see section 2.2.3 immediately below.

⁹ E.g., Netflix ISP Speed Index, <https://ispspeedindex.netflix.net>.

¹⁰ Sections 2.2.4.1. and 2.2.4.2. below provide illustrations of the practical feasibility of such an approach.

¹¹ Cf. Annex 3.

¹² In total and by service, respectively.

¹³ Sandvine, *Global Internet Phenomena Report 2023* (Sandvine, 2023), at 10.

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The presentation underlined the challenges posed by encryption, as more than half of all Internet traffic today is encrypted using various technologies. Importantly, it highlighted that DPI was insufficient under those circumstances. Key to understanding the need for traffic measurement was resource usage by OTT service providers who have an incentive to capture capacity to the disadvantage of competing services and to maximize quality of their own offerings. This includes the running of features that may not be strictly required for the rendition of a specific service. Such practices require network operators to assess the impact on quality of experience of other services that suffers as a result. This assessment cannot be performed on the basis of volumetric analysis alone.

The traffic analytical solution presented is based on data that are collected directly in the operator network and provided under contractual agreement to Sandvine. Personal identifiers are removed before traffic analytics are performed. The challenge of encryption is addressed by combining artificial intelligence with traffic behaviour analysis to identify the traffic type.¹⁴ Participating operators can evaluate their network's performance in comparison to their world region; direct inter-operator comparisons are not possible, nor are analyses at national level.

While the presentation usefully highlighted the availability of commercial solutions that enable service-specific analysis with the aim of monitoring and managing quality of experience, the sub-group noted that its deployment cannot be readily prescribed under existing conditions. The need to preserve operator's commercial freedom and business confidentiality means that sourcing of these data additionally faces important challenges. Furthermore, the use of different solutions by different operators, or the lack of use of any specific solution, raises obvious issues of data homogeneity. A potential solution to these issues could be the creation of a traffic identification tool by NSOs and/or NRAs for use by operators.

2.2.4. Case studies of Member State OTT data collection

2.2.4.1. OTT communications data collection under extant statutory framework

The Austrian regulatory authority for telecommunications and broadcasting presented to the sub-group its domestic legal framework as well as its methodological approach to OTT data collection. Having been empowered to collect statistics under the national Telecommunications Act, the authority issued its Communications Survey Ordinance in 2022. The Ordinance includes within its scope so-called number-independent interpersonal communications services (NIICS), which overlap with the notion of OTT communications.

Surveys among OTT service providers are carried out on a quarterly basis on the basis of a sampling approach. Sample selection has been informed by a consumer survey that was performed prior to the initiation of supply-side data collection. The survey covered

¹⁴ This approach may encounter limitations where targeted obfuscation techniques are used; however, the share of traffic to which this applies tends to be small as a percentage of overall traffic.

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the NIICS categories of messengers, voice call services, video call services and e-mail. On this basis, the data collected on the supply-side achieve a market coverage of 90%, based on the number of monthly active users per category.

While the data collection does not cover traffic volumes by service category, it provides quantified information about the number of communications engaged in and, where relevant, their duration.¹⁵ The issue of multi-service communications¹⁶ is addressed individually for each service category. No differentiation is made between communications addressing a single and communications addressing multiple recipients. Data are to be published for public information in aggregate, anonymized format.¹⁷

The sub-group noted the impressive framework established in Austria in respect of the interaction between demand- and supply-side considerations, the level of market coverage achieved, the frequency of data collection and the public availability of findings. This case further illustrates the feasibility of creating appropriate statutory foundations, on whose basis a competent sectoral authority can enact a framework for data collection and pursue its implementation. The sub-group also took note of the important costs associated with consumer survey implementation that need to be considered in a forward-looking perspective.

2.2.4.2. Voluntary OTT audiovisual data disclosure

The group heard a presentation by Italy discussing how data from OTT providers could be obtained on the basis of an agreement between the provider of the service and the responsible sectoral regulator. This exchange is situated in a wider statutory setting concerned with audience certification for premium sports content. Thus, while the collection is not based on an OTT-specific regulatory framework, general rules are in place that require the monitoring of viewership figures for selected sports events of special significance.

When the rights to these events were assigned to an OTT provider, data collection had to extend beyond traditional broadcast media. This implied the need for a methodology that would accommodate all relevant media or platforms used for audiovisual content distribution. The methodology was adopted by a Joint Industry Committee. As the methodology serves to establish viewership figures across distribution platforms, it is not in its own right suitable to assessing traffic load from premium sports content in the networks. While complementary technical regulatory measures targeting network operators and content providers serve to maintain acceptable quality of viewing

¹⁵ For OTT communications, the data collected are the number of voice calls and voice call minutes, the number of video calls / video conferences and video calls / video conference minutes, the number of sent instant messages and the number of sent e-mails.

¹⁶ That is, communications sessions that, without interruption, switch between different modes of communication or perform these in parallel.

¹⁷ At the time of drafting, no publicly available release had yet been communicated.

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experience, this systemic approach is not concerned with traffic measurement in its own right, but rather with avoiding unacceptable quality losses or service breakdown.

The sub-group therefore concluded that the model was interesting for its successful establishment of an informal working relationship between the regulator and online service provider[s], but not immediately replicable for traffic data collection purposes. Furthermore, the focus on a subset of events in a specific content category would raise questions of generalizability to the category in its entirety and across categories, which remain beyond the scope of current regulatory practice and could not be further explored by the sub-group. The sub-group agreed that this case would be of particular interest for further monitoring and future learnings, especially if additional work were to be undertaken on OTT audiovisual.

3. Conclusions

3.1. Conclusions from a demand side perspective

Concluding the demand side activities of the JSG, it is possible to extract some recommendations for Member States to improve the data collection covering the topic of OTT services, particularly when it comes to better understanding to what extent their adoption has an impact on the internet infrastructure of a given country.

The first and more general recommendation regards the call for Member States to collect sub items related to OTT services under indicator HH9 from the Manual. It is worth noting that this indicator serves as a baseline for all other options explored in the cases analysed in the JSG this year. The fact that many Member States are not reporting this indicator is by itself an issue that should be considered and analysed under the auspices of the EGH, and does not fit under this group's mandate.¹⁸

The second recommendation aims to provide a qualifier for the use of OTT services captured by the items under HH9. Of all the alternatives analysed from the cases of the Member States, one stands out as viable option: frequency of use. As explained in the detailed section (Annex 2), this indicator has a good level of intelligibility and presents a reasonable hypothesis relative to the overall objective of measuring impact on infrastructure. It has already been collected in some of the Member States analysed and could serve as benchmark for the detailing of question phrasing, response categories, previous filter questions and position, and so on.

When it comes to the scope, two types of activities were commonly associated with this investigation: video and audio. Those items are categorized under the entertainment group of activities defined in HH9, even though its three items do not directly match video and audio (the streaming item covers both). Also, items in the communications

¹⁸ It is worth noting that this is not an isolated case, as the data availability on the demand side has shown to be a problem that impacted other forums as well, as discussed in the documents regarding the IDI revision.

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category have been of the interest to the sub-group, particularly those covering calls (voice and video).

Since the intensity of use might differ between different activities covered by the same item, a single question might be difficult for the respondent to properly answer. This means that each relevant activity will need a separate item. Finally, the scale for frequency can be the same as defined under indicator HH12 (proportion of individuals using the Internet, by frequency).

This suggests that the model question will need to be applied to a filter combining multiple categories of entry (e.g., having said yes to streaming or web tv) and will have to contain frequencies respective to each described activity. Below is an example of what the question for frequency would look like:

Model Question – Proportion of individuals performing online activities, by frequency.

Filter question: Respondents who said yes to corresponding HH9 Entertainment items.

	In the past 3 months, how often have you...	At least once a day	At least once a week	Less than once a week	Don't perform the activity
A	Made telephone calls				
B	Made video calls				
C	Listened to web radio				
D	Listened to music on streaming				
E	Watched web television				
F	Watched videos on streaming				

The sub-group considers that improving availability on the indicator on Internet activities as well as the inclusion of the frequency dimension allows for important improvements in the standardization of data collection at the international level, while also providing more insight into the behaviour of Internet users regarding adoption of OTT services and applications, as well as its consequential impact on ICT infrastructure.

In view of the supply side case study set out in section 2.2.4.1., the sub-group would finally recommend that investigations of relevant demand side behaviour, at a minimum along the lines set out above, should generally inform efforts at supply side data collection.

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3.2. Conclusions from a supply side perspective

Over the past year, the sub-group significantly diversified and deepened its appreciation of supply side-related elements of OTT data collection.

This has yielded important additional insights in the domains of technical opportunities and constraints, availability and viability of solution models, and applied practices of data collection.

Under the first of these headings, the issue of encryption requires special recognition. While commercial solutions exist to overcome the challenges that encryption poses to traffic identification, dependence on such solutions would represent a significant obstacle to the collection of reliable and representative data. With more than half of Internet traffic being encrypted, this constitutes a major barrier. Furthermore, the ability for competent authorities to impose usage of these solutions and/or to require reporting of the data generated remains subject to limitations deriving from national legislation. Even if usage could be mandated, convergence on a single solution may not be achievable. In any case, methodological differences would have to be explored in order to ensure reporting consistency and comparability of data.

Secondly, the approaches to data collection differ as to source or destination centrality, as represented by OTT service providers and network operators, respectively. The activities carried out and the evidence heard by the sub-group do not at present allow to conclude to the superiority of either as a matter of principle. In view of the above-mentioned encryption challenge, the aggregation problem of a destination-centric approach, including its privacy-related aspects, and the technical control over service delivery that resides with OTT providers, there appear to be compelling reasons to further enquire into the feasibility and advantages of a source-centric approach. Indeed, the principal reason identified for non-implementation of such an approach remains a perceived lack of requisite statutory authority. The case studies of data collection examined¹⁹ have both shown that such limitations can be overcome via direct rule-making or via targeted normative framing of OTT activity in an industry-collaborative framework. Possibilities for extending these solutions deserve further enquiry across a wider range of jurisdictions.

As regards finally already existing data collection practices by competent authorities, the cases studied underscore the relevance and utility of informing supply side by demand side data collection; providing an appropriate minimum degree of normative embeddedness; foreseeing adequate resource endowments; and guaranteeing appropriate publicity for data collection findings. While the number of cases does not allow for any definitive conclusions in this regard, the examples studied suggest that sectoral authorities experienced in market oversight may be particularly well-placed to navigate the technical and administrative complexities associated with conceiving and implementing, directly or indirectly, data collection activities.

¹⁹ See section 2.2.4. above.

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Overall, the sub-group thus believes to have outlined a number of relevant dimensions that require suitable consideration to determine whether a given Member State can be reasonably expected to successfully engage in collecting traffic data on OTT service provisioning.

In view of the lack of homogeneity in framework conditions for data collection across countries,²⁰ the methodologically nascent stage of discussions and the challenges experienced with participation levels over the past three years, the sub-group at this point considers that a two-step process should be adopted. Under this format, Member States first promote greater recurrence and quality of demand side data collection, in parallel to capacity building, before deciding in a further step on practically feasible means for supply side data collection on that basis. The remarks above provide necessary orientation to that end, notably as regards source-centric data collection.

The recommendation of specific indicators for supply side data collection, and more specifically for addressing the OTT traffic data gap and its impact on telecommunications infrastructure, does not appear opportune until these more foundational issues can be resolved.²¹ In this respect, greater voluntary collaboration among expert group members and greater sharing of experiences promises to be a relevant enabling mechanism. The online repository created this year²² should be developed further in this spirit.

²⁰ In addition to the allocation of competences for data collection, this also comprises specific conditions along technical, legal and commercial dimensions; cf. Joint Sub-group report 2022, note 2 above, section 2.2.2, 5f.

²¹ On indicator development, cf. sections 2.2.2. and 2.2.4.1. above.

²² Presentations and supplementary materials from the sub-group's work are available in the EGTI Forum, at the following URL: https://www.itu.int/net4/ITU-D/ExpertGroup/topic.asp?TOPIC_ID=8449.

Annex 1 – Indicator HH9 – Proportion of individuals using the Internet, by type of activity

The indicator HH9 contains numerous items, some of which will be of interest to the study of OTT. Below is the complete list of activities by category as defined in the Manual.

Access to information

- Getting information about goods or services
- Seeking health- related information (on injury, disease, nutrition etc.)
- Getting information from general government organizations
- Using services related to travel or travel-related accommodation
- Downloading software or applications (includes patches and upgrades, either paid or free of charge)
- Reading or downloading newspapers, magazines or electronic books in a digital format

Communication, civic participation and collaboration

- Sending or receiving e-mail
- Making calls (telephoning over the Internet/VoIP using Skype, WhatsApp, Viber, iTalk, etc.; includes video calls via webcam)
- Participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, Instagram, Snapchat, etc.)
- Making an appointment with a health practitioner via the Internet (i.e. website, app, software)
- Interacting with general government organizations (downloading/requesting forms, completing/lodging forms online, making online payments and purchasing from government organizations etc.)
- Taking part in consultations or voting via the Internet to define civic or political issues (urban planning, signing a petition etc.)
- Accessing or posting opinions via any device on chat sites, blogs, newsgroups or online discussions (e.g. on civic or political issues, general interest topics) that may be created by any individual or organization

Electronic commerce, trade, and transactions

- Purchasing or ordering goods or services (purchase orders placed via the Internet whether or not payment was made online; excludes orders that were cancelled or not

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completed; includes purchasing of products such as music, travel and accommodation via the Internet)

- Selling goods or services (via eBay, Mercado libre, Facebook, Amazon, Alibaba, etc.)
- Internet banking (includes electronic transactions with a bank for payment, transfers, etc. such as M-Pesa, or for looking up account information; excludes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance)

Learning

- Doing an online course (in any subject)
- Consulting wikis (Wikipedia etc.), online encyclopedias or other websites for formal or informal learning purposes

Professional life

- Looking for a job or sending/submitting a job application (includes searching specific websites for a job; sending/submitting an application online)
- Participating in professional networks (professional networks are also seen in the broader context of social networking and have the same requirement of profile creation, contributing through messaging or chat, or uploading text or audio-visual content files; examples of professional or business networks are LinkedIn, Xing, Bark, Opportunity and Jobcase)

Entertainment, digital content consumption

- Listening to web radio (either paid or free of charge)
- Watching web television (either paid or free of charge)
- Streaming or downloading images, movies, videos or music; playing or downloading games (either paid or free of charge)

Digital content creation

- Uploading self/user-created content to a website to be shared (text, images, photos, videos, music, software, etc.)
- Using storage space on the Internet to save documents, pictures, music, video or other files (e.g. Google Drive, Dropbox, Windows Skydrive, iCloud, Amazon Cloud Drive)
- Using software run over the Internet for editing text documents, spreadsheets or presentations

Source: ITU Manual for Measuring ICT in Households, 2020.

Annex 2 – Analysis of Demand Side Case Studies presented in the Subgroup

Observations from available surveys specifically targeting OTT use

Country cases were presented to the JSG along the sessions of the year. Survey questions and/or results of surveys have been shared and analyzed. The summary of the cases is provided bellow.

- Brazil – in the context of the national ICT in Households Survey, a module of questions was designed to measure cultural activities conducted on the Internet. The indicators focus on three specific cultural activities: listening to music, watching movies, and watching series. For each of those activities, respondents were asked about frequency, payment, type of content and origin (national or international). Since 2017, this set of questions has been collected every two years using the items from the HH9 indicator as its filter questions. While the OTT topic was not present in the design and formulation of the module, it sheds some light on the habits of Internet users on the consumption of multimedia, which is a relevant driver in data usage. This case study underlined the potential for, and need to, examine existing data collection practices at Member State level to identify the potential contribution to addressing the data gap.
- Colombia (Comision de Regulacion de Comunicaciones) - [El rol de los servicios OTT en el sector de las comunicaciones en Colombia - 2022](#). As part of its 2022-2023 regulatory agenda, the CRC administered its fourth study on the role of OTT services through a survey of enterprises and households. The purpose of the study was to update the overview of the role OTT services play in the communications sector. While not focused specifically on the impact on infrastructure, the questions were designed to address the potential competition between OTT services and traditional telecom services. Indicators covered include services used for video calling, preferences between calling and SMS versus messaging apps, services of package delivery, audiovisual services, and others.
- Portugal (ANACOM) – [2022 Servicios Over-the-top \(OTT\)](#) report. Presentation of available information on OTTs in Portugal and the EU in 2022 as well as the main characteristics of the consumers of these services. The report focuses on broad OTT activities using indicators on existing household surveys – *instant messaging, video streaming on demand*, and other activities that might be considered OTT. These activities include email, online news, social networks, online music, etc.
- Saudi Arabia (CITC) – Digital content and platforms in the KSA – 2022. This was a market research project to better understand consumer usage of digital content and its platforms in the country. The project was conducted via a representative national survey with a focus on video, audio, and gaming platforms.

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- Trinidad and Tobago (Telecommunications Authority) – [National Digital Inclusion Survey 2021: Accelerating Digital Transformation](#). This survey included for the first time a module to collect information related to the proliferation, uptake, and perception of OTTs. The primary purpose of the module was to support the Authority’s data-driven approach to policy formulation and to further refine the Authority’s policy position on OTTs.
- Uruguay – While the presentation was not focused on specific indicators, the experience shared concerns regarding method of data collection and method of selection of the respondent. While it falls outside the scope of this sub-group, it is always relevant to mention that the indicators regarding ICT access and use are often difficult for persons with lower levels of education. There is also the difficulty on reporting the use aspects of other members of the households when the survey vehicle selects a household leader. This must be kept in mind when designing new indicators as well as in the process of adaptation of the Manual for the local survey.

These surveys captured data on varying types of OTTs. All countries asked questions regarding video platforms and most asked questions on audio platforms. In Colombia and Trinidad & Tobago there was a strong focus on voice and messaging OTT services, while Saudi Arabia also asked questions on online gaming.

While directly asking about traffic would be unfeasible in the context of household surveys, these examples provided the JSG with relevant options to complement the information obtained from the categories under HH9. The measurement dimensions covered are analyzed below:

Use of OTT services – In all cases analyzed, there were questions about the services being used by the internet users. These questions often vary but could be standardized according to HH9 categories. One relevant aspect regards the use of brands and service names: while some countries offered brands as illustrative examples of items, others asked directly about platforms with the goal to measure them specifically.

It is relevant to notice that the ITU Manual for Measuring ICT in households does not recommend directly measuring the brands or platforms, as is often the case with official statistics. While some countries might be interested in understanding services by provider, the interest of the Manual is on the evolution of the overall behavior over time (ex: asking about watching videos, rather than asking one question about YouTube and another about Netflix).

The popularity of brands might vary severely over time, especially on a field such as technology with a very fast pace of innovation, which translates to constant changes in collection instruments and ruptures of comparability. It is also difficult think about international comparability when considering the need to include relevant local brands of services. Therefore, for international reporting purposes, it is expected that the estimates on number of users of such services are reported by category of services rather than brands.

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Content description – In Brazil, Colombia, and Saudi Arabia, questions were asked of the content viewed or listened to online – movies/TV shows, local/international, local language/other language. Brazil also included a question aiming to differentiate between business models. Other than type of content (movies and series, music and news, and so on), the questions on origin and language are not focused on the goal of understanding traffic behavior, so won't be considered in the final recommendation.

The type of content is one strategy applied to differentiate between types of audiovisual platforms. The video item from HH9, for example, do not differentiate between free user-based videos such as YouTube and paid subscriptions of movies and series such as Netflix, since the goal is to measure the number of internet users who have the habit of watching videos as a whole category. It could be argued that the impacts of such activities on infrastructure might differ depending on the type of platform and type of business model behind it, but the JSG did not find a proper assumption to base this type of measurement.

Therefore, while it is acknowledged that the type of content being consumed might be relevant to understanding the impact on data usage, it is not possible at this time to recommend one of the identified indicators for content description due to the lack of a strong hypothesis.

Level of usage – There were two main strategies adopted by member states on measuring the level of usage. These questions are most related to questions of traffic, even though there are limitations given by the nature of household surveys – specifically the capability of respondents to recall their true levels of usage.

In Brazil, Colombia and Trinidad and Tobago questions were asked about the frequency of use (times used per week). This is an easy-to-understand question with a good quality of responses. It serves as a qualifier on the intensity of the behavior, which relates to the subject of the impact on infrastructure.

Colombia, Saudi Arabia, and Trinidad and Tobago also asked questions about the time spent on OTT applications. In Colombia additional questions regarding the time spent on OTT applications compared to 3 months ago and compared with traditional services. This is a very common theme when discussing qualifiers of intensity to internet behavior, but there are some concerns regarding recall and precision. Recall means that the respondent might have difficulties trying to remember how much time they spent online on a given reference period, especially regarding activities that are performed frequently. Precision relates to the capacity of users to provide an accurate estimation of such habits.

While it is understood how the numeric value of number of hours might be more attractive to quantify the intensity of use, it is hard to ignore the methodological concerns of such measure. Therefore, the recommendation will prioritize the easier to understand question, which is the frequency.

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Use of paid services – Brazil, Colombia and Saudi Arabia each asked questions on whether services used were paid or free. Colombia also asked questions on subscription sharing. This is yet another strategy for measuring the intensity of use, under the assumption that those using paid or subscribed services will use them more frequently than those who do not.

The indicator is not absent of methodological issues, especially regarding the respondent. There are two possible issues, the first regarding capacity and the second about the interpretation of question. Also, the premise is questionable, since there is no strong evidence that the payment for a service will necessarily mean that the data consumption will be higher.

Regarding capacity, some users might not be aware of such payments and subscriptions, which could impact their ability to recognize if the services they use are paid or free of charge. It is also worth noting that, while in some cases the use of examples could solve this issue, it does not work for every platform and brand (ex: YouTube and Spotify offer both a free and paid version of their services).

When it comes to interpretation, some users might consider they are not paying themselves, but some other member of the household does for the whole family. This often happens for subscriptions of services that are shared by the whole household, such as video subscription services consumed on a TV. This needs to be properly clarified on the question wording, especially for surveys that select a random member of the household (this risk is likely lower for those that select the head of household).

Concluding, after looking at the methodological and theoretical limitations, this indicator will not be considered in the final recommendation.

Substitutability – Colombia and Trinidad and Tobago asked multiple questions on reasons why respondents use or don't use OTTs. Trinidad and Tobago also included questions over the perceived advantages of OTT services over traditional services, with the intention to investigate the substitutability between them.

These indicators relate to measuring the substitution of traditional services by OTTs, and do not directly relate to the impact of those services on infrastructure. The group identified that this type of data collection on the substitutability of traditional services for OTT services is subject of interest of many regulators, not restricted to those that already produced indicators on the subject.

Since it is outside the initial scope and mandate of the sub-group, this dimension was not included in the recommendations, but it is acknowledged that this could be an area of future investigation by expert groups.

Proposed indicators

Users

- Number of unique users (monthly/annual average).
- Number of concurrent users by application (monthly/annual average).

Traffic

- Traffic Peak (in GB, monthly/annual).
- Traffic Peak by application (in GB, monthly/annual).