

FORM TO PARTICIPATE IN THE PUBLIC CONSULTATION

How to fill out and participate:

- I. Opinions, comments and proposals shall be submitted to the following electronic mail: mee@ift.org.mx. Maximum file size is 25 MB.
- II. Enter your full name (name and last name), company name or the legal representative's full name (name and last name). In this last case, select the type of document to accredit such representation and submit as attachment a legible electronic copy to the same electronic mail address.
- III. Read carefully the **PRIVACY POLICY** to become aware of the care and safeguard of your personal data, as well as of the publicity to be given to the comments, opinions and contributions you submit as part of this consultation process.
- IV. Enter your comments according to the structure indicated in Section II.
- V. In case you have general comments or any additional contribution, fill out the last box.
- VI. In case you are interested, you may attach any documents you deem convenient to your electronic mail message.
- VII. This public consultation will be held from December 3, 2018 to January 29, 2019 (i.e. 30 business days). Upon its conclusion, the submitted comments and attached documents will be available at: <http://www.ift.org.mx/industria/consultas-publicas>
- VIII. The following contacts are available to direct any questions, comments or concern about this consultation process to the Institute: Gerardo Martínez Cruz, Assistant Director of Spectrum Engineering, electronic mail: gerardo.martinezc@ift.org.mx or Roberto Carlos Castro Jaramillo, Director of Engineering and Technology, electronic mail: roberto.castro@ift.org.mx, with phone number (55) 50154000 ext. 4577 and 4740, respectively.

I. Respondent's Information	
Name or company name:	Radiomovil Dipsa, S.A. de C.V. (TELCEL)
Legal representative's name, if applicable:	Daniel Bernal Salazar
Document to accredit representation: In the case of a legal representative, attach a digital copy of the document to accredit such representation to the email message.	Escritura Pública 40818, de fecha 28 de Agosto de 2009, ante el Notario 18 del D.F.
PRIVACY POLICY	
<p>In compliance with articles 3, section II, 16, 17, 18, 21, 25, 26, 27 and 28 of the General Law on the Protection of Personal Data Held by Private Parties (hereinafter, the “LGPDPPO”) and numbers 9, section II, 11, section II, 15 and 26 to 45 of the General Guidelines for the Protection of Personal Data Held by Private Parties (hereinafter, the “Guidelines”), the Integrated Privacy Policy is made available to the users:</p> <ol style="list-style-type: none"> i. Controller's name: Federal Telecommunications Institute (hereinafter, the “IFT”). ii. Controller's address: Av. Insurgentes Sur, No. 1143, Col. Noche Buena, Benito Juárez, zip code 03720, Mexico City, Mexico. iii. Personal data to be handled and its purpose: All comments, opinions and contributions submitted during every public consultation will be fully disclosed in the electronic portal of the Institute in an associated manner with the data subject and, in this sense, they will be considered invariably public in terms of number Eighth of the Public Consultation and Regulatory Impact Analysis Guidelines. This, because the nature of public consultations is to promote social participation and to transparent the new regulations making process, as well as any other matter that the Governing Board of the IFT may consider generating a space for the exchange of information, opinions and viewpoints on any matter of interest that this independent constitutional agency submits to public scrutiny. In case that information different from name and opinion is detected in the documents submitted, and it includes confidential personal data, it will be protected. Relating to the name and opinion of the respondent in this exercise, it is understood that consent is granted to disclose such information in at least the Institute's portal, in terms of articles 20 and 21, second and third paragraphs, of the LGPDPPSO and numbers 12 and 15 of the Guidelines. iv. Information relating personal data transfers requiring consent: Personal data collected for public consultation purposes will not be subject to transfers requiring the data subject's consent. v. Legal basis granting authority to perform the treatment: the IFT, convinced of the usefulness and importance of transparency and civil participation in the new regulations making process, as well as any other matter of interest, performs public consultations based on articles 15 sections XL and XLI, 51 of the Federal Telecommunications and Broadcasting Law, last amendment published in the Federal Official Gazette on June 15, 2018, 12, section XXII, second and third paragraphs, and 138 of the Federal Economic Competition Law, last amendment published in the Federal Official Gazette on January 27, 2017, as well as Guideline Eighth of the 	

Public Consultation and Regulatory Impact Analysis Guidelines of the Federal Telecommunications Institute, published in the Federal Official Gazette on November 8, 2017.

vi. **Mechanisms and means available to the data subject to manifest his denial to the treatment of his personal data for purposes and transfers requiring the data subject’s consent:** In accordance with section IV of this Privacy Policy, personal data collected for public consultation purposes will not be subject to transfers requiring the data subject’s consent. However, the following contacts are made available: Gerardo Martínez Cruz, Assistant Director of Spectrum Engineering and Roberto C. Castro Jaramillo, Director of Engineering and Technology, electronic mail: gerardo.martinezcz@ift.org.mx and roberto.castro@ift.org.mx, and phone number (55) 50154000 ext. 4577 and 4740, with whom the personal data subject may communicate for any comment or question on this matter.

vii. **The available mechanisms, means and procedures to exercise access, rectification, cancellation or opposition rights on his personal data treatment (hereinafter, the “ARCO rights”):** Requests to exercise ARCO rights shall be submitted before the Transparency Unit of the IFT, by free form document, formats, electronic means or any other means established by the National Institute of Transparency, Access to Information and Personal Data Protection (hereinafter the “INAI”). The procedure will be governed by articles 48 to 56 of the LGPDPPSO as well as numbers 73 to 107 of the Guidelines, in accordance with:

a) The requisites that shall be included in the request to exercise ARCO rights:

- Data subject’s name and address, or any other means for service;
- Documents to accredit the identity of the data subject or, when applicable, the capacity and identity of his representative;
- If possible, the area concerned with personal data treatment and before which the request is submitted;
- A clear and precise description of the personal data on which the exercise of any of the ARCO rights is intended;
- Description of the ARCO right to be exercised or whatever the data subject is requesting, and
- Any other element or document that may be useful to locate the personal data.

b) The means by which the data subject may submit requests to exercise ARCO rights.

Same as established in paragraph eighth of article 52 of the LGPDPPSO, which indicates the following:

Requests to exercise ARCO rights shall be submitted before the Transparency Unit of the controller deemed competent by the data subject, by free form document, formats, electronic means or any other means established by the INAI for such purposes.

c) Forms, systems and other simplified means that the Institute may have established for the data subject to exercise his ARCO rights.

The forms developed by the INAI to exercise ARCO rights are available at its Internet portal (www.inai.org.mx), in the “Protección de Datos Personales”/“¿Cómo ejercer el derecho a la protección de datos personales?”/“Formatos”/“Sector Público” section.

d) The means enabled to respond request to exercise ARCO rights.

In accordance with number 90 of the Guidelines, the response adopted by the controller may be notified to the data subject in its Transparency Unit or in the offices established for that purpose, prior accreditation of his identity and, when applicable, the identity and capacity of his representative, in person or through the National Transparency Platform or registered mail. Notice through a representative will not be valid when using these last means.

e) The mode or means to reproduce personal data.

In accordance with number 92 of the Guidelines, the mode or means of personal data reproduction will be through direct consultation, in his location, or by simple copies, certified copies, magnetic, optical, sound, visual or holographic media, or any other technology determined by the data subject.

f) The terms established in the procedure, which may not contravene articles 51, 52, 53 and 54 of the LGPDPPSO, are:

The controller shall establish simple procedures to allow the exercise of ARCO rights, with response times no exceeding twenty days from the day following reception of the request.

The term referred above may be extended one time only, for up to ten days, under justified circumstances, provided that the data subject is notified within the response term.

In case the exercise of ARCO rights is valid, the controller shall make it effective within a term that may not exceed fifteen days from the day following notice of response to the data subject.

In case the request for data protection does not comply with any of the requisites referred in paragraph fourth of article 52 of the LGPDPPSO, and the controller does not have sufficient elements to correct it, the data subject will be warned within five days following the submission of the request to exercise ARCO rights, for one single time, to correct the omissions within a term of ten days from the day following the notice.

Upon conclusion of said term without any response, the request to exercise ARCO rights will be deemed as not submitted.

The warning will have the effect of interrupting the term for the INAI to respond the request of exercise of ARCO rights.

In case the controller is not competent to process the request for exercise of ARCO rights, it shall notify the data subject on such situation within three days following submission of the request, and in case it may be determined, direct him to the competent controller.

In case provisions applicable to certain personal data treatment establish a specific procedure or process to request the exercise of ARCO rights, the controller shall notify the data subject on its existence within a term of five days following submission of the request to exercise ARCO rights, so that the latter may decide whether to exercise his rights through the specific procedure or by the process that the controller may have instituted to care for requests to exercise ARCO rights in accordance with articles 48 to 56 of the LGPDPPSO.

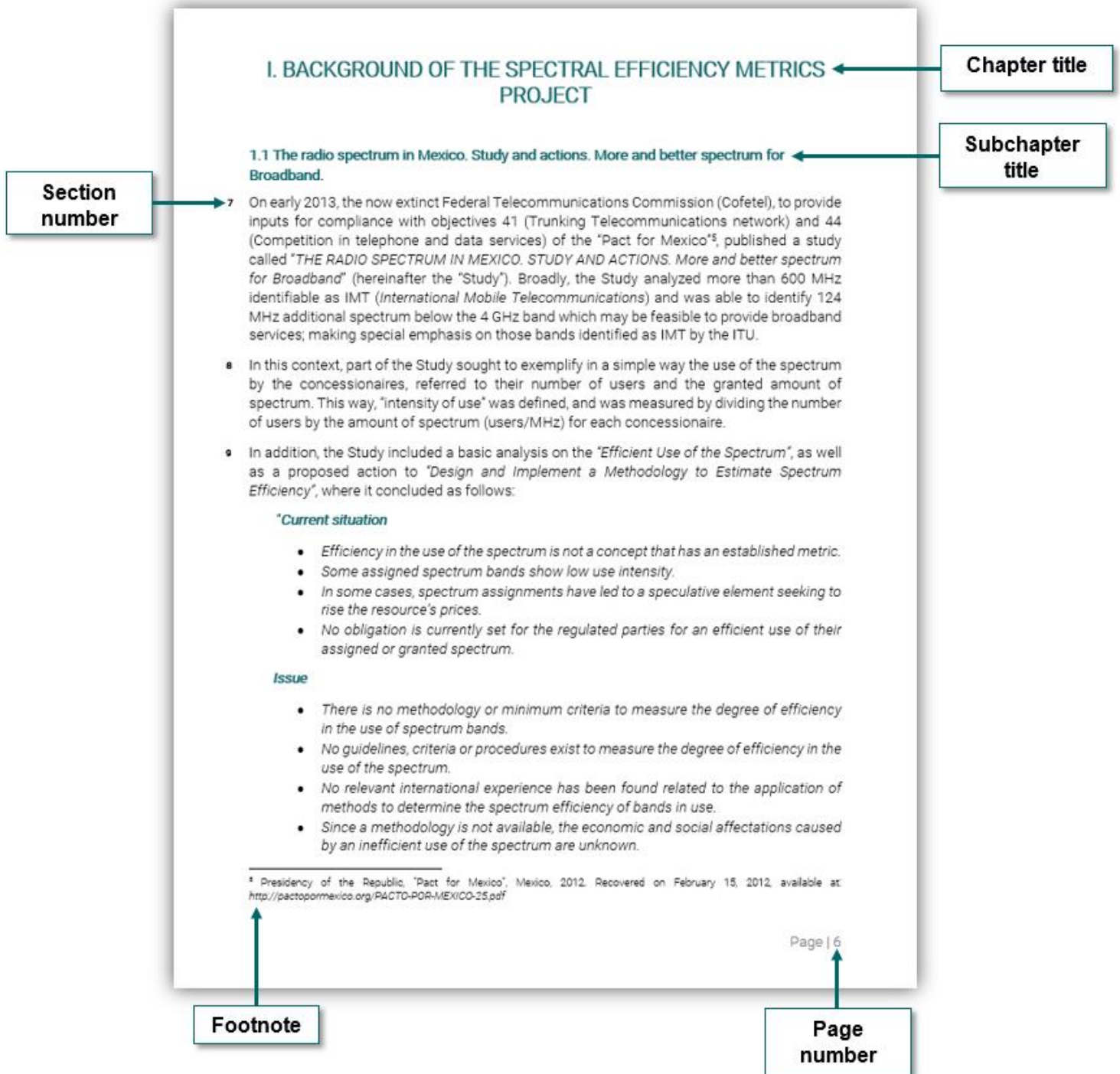
In the particular case, no specific process exists to request the exercise of ARCO rights relating to personal data collected for the consultation process at hand. (Case description, when applicable).

- g) The data subject's right to submit a writ of review before the INAI in case of disagreement with the response.

Such right is established in articles 103 and 116 of the LGPDPPSO, which indicate that the data subject, in his own behalf or through his representative, may file a writ of review before the INAI or the Transparency Unit of the controller who has heard of the request to exercise ARCO rights within a term of fifteen days from the day following the date of notice of the response.

- viii. **Address of the Transparency Unit of the Federal Telecommunications Institute:** Av. Insurgentes Sur, No. 1143, Col. Noche Buena, Delegación Benito Juárez, zip code 03720, Mexico City, Mexico. Ground Floor, phone 50154000, ext 4267.
- ix. **The means by which the controller will communicate data subjects on changes to the privacy policy are:** All changes to the Privacy Policy will be notified to the data subjects in the public consultation section of the IFT's Website.

II. Guide to identify the section number in the study “Spectrum Efficiency Measurement. Definitions and considerations to be observed for its application in Mexico



The diagram illustrates a page from a study with several key elements highlighted by callouts:

- Chapter title:** I. BACKGROUND OF THE SPECTRAL EFFICIENCY METRICS PROJECT
- Subchapter title:** 1.1 The radio spectrum in Mexico. Study and actions. More and better spectrum for Broadband.
- Section number:** 7
- Footnote:** ² Presidency of the Republic, “Pact for Mexico”, Mexico, 2012. Recovered on February 15, 2012, available at <http://pactopormexico.org/PACTO-POR-MEXICO-25.pdf>
- Page number:** Page | 6

The main text of the page includes the following content:

On early 2013, the now extinct Federal Telecommunications Commission (Cofetel), to provide inputs for compliance with objectives 41 (Trunking Telecommunications network) and 44 (Competition in telephone and data services) of the “Pact for Mexico”², published a study called “THE RADIO SPECTRUM IN MEXICO. STUDY AND ACTIONS. More and better spectrum for Broadband” (hereinafter the “Study”). Broadly, the Study analyzed more than 600 MHz identifiable as IMT (International Mobile Telecommunications) and was able to identify 124 MHz additional spectrum below the 4 GHz band which may be feasible to provide broadband services; making special emphasis on those bands identified as IMT by the ITU.

- In this context, part of the Study sought to exemplify in a simple way the use of the spectrum by the concessionaires, referred to their number of users and the granted amount of spectrum. This way, “intensity of use” was defined, and was measured by dividing the number of users by the amount of spectrum (users/MHz) for each concessionaire.
- In addition, the Study included a basic analysis on the “Efficient Use of the Spectrum”, as well as a proposed action to “Design and Implement a Methodology to Estimate Spectrum Efficiency”, where it concluded as follows:
 - Current situation**
 - Efficiency in the use of the spectrum is not a concept that has an established metric.
 - Some assigned spectrum bands show low use intensity.
 - In some cases, spectrum assignments have led to a speculative element seeking to rise the resource’s prices.
 - No obligation is currently set for the regulated parties for an efficient use of their assigned or granted spectrum.
 - Issue**
 - There is no methodology or minimum criteria to measure the degree of efficiency in the use of spectrum bands.
 - No guidelines, criteria or procedures exist to measure the degree of efficiency in the use of the spectrum.
 - No relevant international experience has been found related to the application of methods to determine the spectrum efficiency of bands in use.
 - Since a methodology is not available, the economic and social affectations caused by an inefficient use of the spectrum are unknown.

III. Public Consultation for Integration Questionnaire

Note 1: The study “Spectrum Efficiency Measurement. Definitions and considerations to be observed for its application in Mexico” is a reference document (of imperative reading) to support the understanding of the questions listed below. The study itself is not subject to public consultation.

Note 2: Answering all the questions included in the following table is recommended, along with arguments and elements as you may deem necessary to support the opinion, including supporting documents that you may want to attach.

Question no.	No. of section in the Study	Question	Comment, opinion or contribution
1	5	How to measure spectrum efficiency?	<p>TELCEL appreciates the opportunity to present its responses to these Public Consultation questions with reference to the study “Spectrum Efficiency Measurement. Definitions and considerations to be observed for its application in Mexico” – in the remainder of this response document referred to as “the study”.</p> <p>Regarding this first question on how to measure spectrum efficiency, “the study” already gives a wide range of different approaches towards measuring spectrum efficiency, none of which captures all aspects, parameters and implications in a holistic manner.</p> <p>In this context, it is important to make a clear distinction between spectral efficiency, which is a purely technical term defined as the amount of bits per second that can be transmitted per Hertz and the more relevant spectrum efficiency, which refers to an efficient use of spectrum and needs to take into consideration a wide range of economic, social and regulatory parameters.</p> <p>“The study” recognizes (e.g. in section 20) that there is no single precise definition for “spectrum efficiency” even by the ITU (or other institutions). Most spectrum efficiency metrics presented in Chapter 2 of “the study” have a strong physical and technical focus and “the study” recognizes regulatory conditions and economic or social implications mainly as supplementary factors.</p> <p>Regarding the technical aspects, “the study” fails to address the Shannon theorem, which defines the theoretical upper capacity limit of a communications channel, neither does it address the advances of 5G mobile technology. TELCEL is a strong supporter of the technological neutrality principle, also mentioned throughout the study. However, the study makes some references to specific technologies, such as the use of 2G, 3G or 4G and therefore should also include the latest technology generation. The theoretical limit in terms of spectral efficiency has already been approximated with OFDM and 64/256 QAM modulation used in 4G systems. 5G is able to expand this capacity limit by the use of multiple parallel channels through massive MIMO technology (MIMO: Multiple Input Multiple Output). A discussion of these aspects by Roberto</p>

Question no.	No. of section in the Study	Question	Comment, opinion or contribution
			<p>Saracco, an IEEE expert, can e.g. be found at the IEEE Website¹. Similarly, the latest technology standard for digital TV broadcast (DVB-T2) with its use of higher order QAM modulation is getting close to the Shannon limit².</p> <p>Now that technology has reached theoretical limits of the amount of information that can be transmitted through a given bandwidth, the measurement of technical parameters should become less relevant and real focus should be given to the efficient use of spectrum in economic, social or regulatory aspects.</p> <p>A pure focus on technical definitions would force operators to constantly upgrade their networks to the latest available standard of technology, irrespective of cost. For mobile operators for example, this would imply an immediate upgrade to 5G technology of all networks with maximum MIMO configuration on a country-wide basis. While “efficient” in technical terms of data throughput per given spectrum band, this would come at an unjustifiable high cost and would destroy a lot of economic value, both on producer side as well as on consumer side. On producer side, operators would lose return on investment on previous installations, which have not yet reached the end of their useful economic life, which in turn would lead to higher consumer prices. As a further consequence on consumer side, a large number of subscribers would be left without any service, if they cannot afford the latest generation of mobile handsets (in this case supporting the latest 5G technology). With new technology generations initial devices come at premium prices, which only few consumers can afford.</p> <p>As such, an “efficient” operator takes complex decisions, which type of technology is most adequate to serve which geographic area and which types of customers segments. This is why most operators around the world today still operate a mix of 2G, 3G and 4G networks.</p> <p>The optimum or most efficient use of resources (of which spectrum is one important element, but investment capital is another important one) can be assured by competitive processes:</p> <ol style="list-style-type: none"> (1) Allocation of spectrum through a competitive auction process, (2) High spectrum fees – in Mexico, the amount paid for the right of use represents 80% over yearly basis payments and only 20% represents the upfront.³ (3) A competitive market of various operators, which will secure that consumers get the best available technology at most affordable prices.

¹ Roberto Saracco is currently the Chair of the Symbiotic Autonomous Systems Initiative of IEEE-FDC. His blog entry regarding 5G can be found here: <http://sites.ieee.org/futuredirections/2017/05/17/taking-a-fresh-look-at-5g-technology-enablers/>

² A detailed discussion can be found in ITU Report ITU-R BT.2254-3

³ <https://telconomia.com/analisis-resultados-de-la-licitacion-2-5-ghz-en-mexico>

Question no.	No. of section in the Study	Question	Comment, opinion or contribution
			<p>These processes will guarantee, that the operator who values spectrum the most will obtain it in an auction process and therefore has the highest economic interest to bring it to the most efficient use in a competitive market. The high annual spectrum fees in Mexico also assure, that operators will only buy the amount of spectrum absolutely necessary to provide the services to their customers and operators will make use of such spectrum as fast as possible.</p> <p>As a result, the operator will increase producer value through an appropriate Return-on-Investment and consumers will get the lowest price possible for their services.</p> <p>This process of competitive market forces takes into account a tremendous amount of all relevant factors, which cannot be reduced to a simplistic efficiency formula – or even a small set of formulae.</p> <p>As such, TELCEL strongly supports the conclusions of the SPTF (research report by the FCC), quoted in section 58 of “the study”, that “it is not possible, nor appropriate, to select a single, objective metric that could be used to compare efficiencies across different radio services ...”</p> <p>Therefore, TELCEL does not share the introduction of additional Spectrum Efficiency Metrics as a regulatory measure for the time being.</p> <p>TELCEL believes, that existing regulatory tools and attribution processes combined with current licence conditions are sufficient to promote the efficient access to and use of spectrum. As such, the IFT is already compliant with legal provisions to assure the efficient use of spectrum in Mexico.</p> <p>These tools and processes (already mentioned above) include the allocation of spectrum through competitive auctions combined with high annual spectrum fees. Licence conditions include e to assure an effective rollout and provision of services.</p>
2	5	Which parameters shall be considered in the metrics?	<p>Chapter 2 of “the study” presents and discusses a wide range of different (though mostly technical) definitions of spectrum efficiency including a wide range of different parameters, including data volumes, bit rates, data bandwidth, channel numbers, voice traffic (measured in Erlang), coverage area, the time dimension, spectrum bandwidth, etc.</p> <p>“The study” only briefly quotes parameters related to economic efficiency, which will require an in-depth analysis of all cost elements (such as cost of spectrum, equipment, labor, cost of capital, etc.) plus a detailed value analysis of producer or consumer surplus generated by the economic activities of spectrum users. Since producer and consumer surplus are the result of competitive market processes, there is no simplistic formula or set of parameters, which could capture these market dynamics, let alone, lead to a justification for regulatory intervention.</p>

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			<p>Chapter 3 of “the study” expands on the technical parameters by discussing economic, social, regulatory or quality aspects, none of which however, are defined in more detail, especially in terms of individual parameters to be taken into account.</p> <p>In particular, sections 77 to 80 of “the study” outline an integral metric, which is illustrated in a chart consisting of many bubbles, only three of which are roughly defined in these sections: the Technical-Regulatory Spectrum Efficiency Metrics (T-RSEM), the Economic Efficiency Metric (EEM) and the Quality Metric (QM).</p> <p>To illustrate the complexity of an all-encompassing efficiency measure as suggested by the study, TELCEL just wants to refer to section 79 which makes proposals regarding one specific aspect of the Quality Metric: “The study” suggests to use subjective aspects from the perception of the end user to evaluate different audio compression formats. Such micro-management of an operator’s business (prescribing specific audio compression format based on subjective end user evaluations) would be unacceptable and unnecessary: If in a competitive market one operator were to decide to implement high compression audio codecs leading to low service quality (which by-the-way would be highly efficient in technical terms, as many more voice calls could be carried over the same amount of spectrum), this would lead to quality-conscious end-users to switch to another operator offering better quality. On the other hand, certain user groups may be content with a lower service quality, if this comes at a reduced price.</p> <p>To further illustrate this point of efficiency of voice calls, a recent study by the Android Authority⁴ shows a wide discrepancy in the amount of data usage by the top 10 most popular voice calling applications: At the bottom of the list, Skype uses 2.7 times more data than the most “efficient” app. Since this is a competitive market, choice should be left to the end-user to decide on which applications or services to use, rather than having regulatory intervention restrict choice based on imposed efficiency metrics.</p> <p>A simplistic parameter-based regulatory decision process will never be able to fully capture all these dimensions of quality needs and perceptions of different user groups, and to condense the use of different compression techniques, price and affordability levels, etc. into one single metric.</p> <p>Similarly, the Technical-Regulatory Spectrum Efficiency Metrics (T-RSEM) and the Economic Efficiency Metric will easily require 10s if not 100s of parameters to be measured, collected and analyzed to fully capture all aspects of efficiency, such as geographic splits, end-user groups, end-user services, technology-generation, etc.</p> <p>As a consequence, IFT would have to define and measure efficiency parameters and metrics for:</p> <p>(a) a wide range of different technology generations,</p>

⁴ See here: <https://www.androidauthority.com/voice-call-data-comparison-598541/>

Question no.	No. of section in the Study	Question	Comment, opinion or contribution
			<ul style="list-style-type: none"> (b) each sub-version of each technology generation, (c) the use of each of these technologies in each geographic area, (d) mapping each technology / area combination to different income profiles and customer segments in these areas, (e) mapping device diffusion (mobile handset and other end-user devices) across geographic areas and customer profiles, (f) quantify the value generation both from user and producer perspective to evaluate, if spectrum is used efficiently, and (g) quantify the social effect and impact e.g. on specific disadvantaged user groups or institutional users with specific needs. <p>Most of questions 5 through 28 below are highlighting this immense complexity of many more parameters and criteria to be compiled into a single spectrum efficiency measure.</p> <p>The collection, processing and analyzing of such huge parameter sets will put a very high administrative burden, both on operators as well as on the IFT.</p> <p>Section 102 of “the study” states that ‘the Institute shall consider, to define the factors to be part of the metrics, that they shall not be highly complex and/or costly to obtain by the concessionaires.’ This consideration should be made a principle as it is in line with the Institutes mandate for regulatory efficiency and effectiveness.</p> <p>As stated in the response to question 1 above, TELCEL believes that it is not possible nor appropriate to come up with a comprehensive parameter set to adequately capture all dimensions of the efficiency metric.</p> <p>And TELCEL believes that the IFT is already compliant with legal provisions to assure the efficient use of spectrum in Mexico through the existing allocation processes and licence conditions.</p>
3	5	How should the result of the metrics be parametrized?	<p>None of the parameters presented throughout “the study” has been subjected to the principles proposed in section 74, which are “objectivity, precision, verification and temporariness” (see below the answer to question 29 for further considerations).</p> <p>Before entering into an analysis of parameters and principles, IFT could contemplate if there is indeed a regulatory problem that needs to be resolved and if the proposed integral metric is the appropriate solution.</p> <p>As part of its mandate, the IFT has to follow the principles of efficiency and effectiveness regarding its operations and regulatory market interventions. TELCEL has serious reservations when reviewing the recommendations of “the study”, that IFT is in the process of developing an immense set of additional regulatory interventions in the area of spectrum efficiencies without</p>

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			<p>any cost-benefit analysis as to the potential burden imposed on operators and the expected regulatory outcome.</p> <p>As mentioned above in the answer to question 2, the collecting, processing and analyzing of such huge parameter sets will put an immense administrative burden, both on operators as well as on the IFT. A comprehensive efficiency assessment may require 10s if not 100s of parameters to fully capture all aspects of efficiency, split by geographic areas, end-user groups, end-user services, technology-generation, etc.</p>
4	82	How should the Institute cause compliance with the SEIM among capacity providing concessionaires?	<p>This question appears to imply that the IFT has already taken a decision to implement the SEIM. As explained in the responses to questions 1 through 3 above, TELCEL opposes the introduction of such an SEIM, based on the findings by the FCC, that it is not possible nor appropriate to define a single metric.</p> <p>As explained in the answers to question 1 through 3, an efficient use of spectrum has already been achieved through currently existing regulatory tools, spectrum allocation processes and licence conditions.</p> <p>Regarding the following questions, TELCEL will provide answers related to the issues addressed in the corresponding questions. However, answering these questions does not imply any consent by TELCEL with the approach proposed in “the study” or implied by the questions.</p>
5	84	What happens when different technologies with different spectrum efficiencies, not only by frequency bands but also by concessionaire, are present?	<p>This question begins to highlights a first set of the complexities and problems to be faced by the IFT to try and capture all aspects, parameters and dimensions relevant to spectrum efficiency.</p> <p>TELCEL is a strong supporter of the technological neutrality principle, as this allows operators to choose the most appropriate technology to optimally serve diverse customer segments and geographic regions.</p> <p>As discussed in the answers to questions 1 through 3 above, operators are driven by economic decisions based on market forces, technology developments, as well as regulatory conditions and legal obligations. As a result – in the example of mobile operators – a mix of different technologies is used in a highly efficient manner.</p> <p>It is common practice among most mobile operators around the world run 2G, 3G and 4G networks in parallel. In addition, each of these technology generations may come with different “sub-versions”, such as EDGE, HSPA/HSPA+, LTE/LTE-A, etc.</p> <p>Focusing purely on a technical metric, 2G or 3G are less efficient compared to 4G (which in turn will be less efficient compared to 5G). Why do operators still run 2G networks? Because this is the economically most efficient technology for certain areas and to serve certain customer segments, which e.g. can only afford low-cost feature phones that include a limited number of spectrum bands.</p>

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			As a consequence, IFT would have to define and measure efficiency parameters and metrics for: <ul style="list-style-type: none"> (a) each technology generation, (b) each sub-version of each technology generation, (c) the use of each of these technologies in each geographic area, (d) mapping each to different income profiles, customer segments, availability and cost of handsets and other end-user equipment, and (e) quantify the value generation both from user and producer perspective to evaluate, if spectrum is used efficiently.
6	84	A concessionaire uses, for example, two technologies to provide its service; should it have two different metrics?	This may be considered a rhetorical question, to which the apparent answer is “yes”. As discussed in the answer to question 5, operators may not just use two technologies, but a much wider range of technologies and technology generations with an even wider range of different features activated or not to serve the needs of a diverse client base.
7	86	Should the SEIM observe or not the under-utilization of the spectrum for this type of services?	<p>“Underutilization” is the wrong concept in this question: A more appropriate question would be, if there is a better alternative use or a more efficient use of the same amount of spectrum?</p> <p>Using the example of mobile operators for illustration, 2G or 3G technology may be “underutilizing” spectrum in a strictly technical sense, but this may be the only technology for which certain end-user can find affordable low-cost mobile phones.</p> <p>As such, a technical underutilization may well be the most efficient use of spectrum to serve a certain area and certain type of customers.</p>
8	86	Should public security and disaster relief concessionaires be evaluated?	<p>Using the principle of non-discrimination, all concessionaires should be evaluated by the same set of criteria.</p> <p>The more relevant question in the context of disaster relief or security services would be, what economic, social or other value parameters and attributes should be applied to this type of service and which additional metrics may need to be derived for appropriate efficiency assessment of these services.</p>
9	88	Would it be desirable that spectrum concession titles issued in the future establish a specific obligation on compliance with the minimum threshold of the spectrum efficiency metric?	<p>TELCEL explained in the answers to questions 1 through 3, that existing regulatory measures for spectrum allocation (through competitive auction process), the high annual spectrum fees and competitive market forces already secure the most efficient use of spectrum and as such are sufficient for IFT to comply with legal obligations.</p> <p>Current technologies – as explained in question 1 are already close to the maximum theoretical throughput limits. As such, any efficiency measures would need to focus on other aspects such as coverage area, rollout obligations, or quality of service criteria, which are already part of current regulatory obligations.</p>

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			Setting specific (technical) efficiency thresholds at the beginning of a new concession or licence will be meaningless : Such a threshold would have to take into account current technology standards and therefore be automatically fulfilled . On the other hand, imposing higher efficiency obligations for future rollout will be highly controversial, as there is no clear methodology as to predicting the capabilities and efficiency levels of future technology generations.
10	89	Would it be convenient to implement metrics for certain services where factors are based on the number of services offered by the concessionaire to the end user?	<p>A service portfolio is defined by competitive market forces of supply and demand and should not be determined by regulatory efficiency metrics.</p> <p>Since markets are highly dynamic, a regulatory agency may never be capable of adapting all metrics to each and every new service introduced or offered by each concessionaire.</p> <p>The answer to question 2 quotes a study on the data usage of different voice applications. Regulatory intervention on this level of granularity will be a nearly impossible task.</p>
11	91	How would this minimum number of services be determined?	Similar to the response to question 10, TELCEL believes that a regulatory agency should not get involved in the definition of service portfolios of commercial operators.
12	91	Would the established services be determined by frequency band or by geographic region?	ITU already establishes and harmonizes spectrum bands for different types of uses , such as broadcasting, mobile services or point-to-point applications. A comprehensive efficiency metric would therefore have to take into account all different kinds of established services, underlining the complexity already mentioned in previous answers.
13	91	Would it be fair for all concessionaires to count the number of services provided to the end user as part of the metric?	Simple counting of services would not be sufficient to come up with a comprehensive efficiency metric . For example, an SMS service is highly limited in terms of data rate transmission and as such highly inefficient, but this service has been very popular among many user groups. Should SMS then be counted as one service equivalent to broadband Internet access? Or should SMS services be completely abandoned due to the inherent inefficiencies? This is why, only operators themselves can take the most appropriate decisions based on customer needs and competitive market forces.
14	93	What kind of mechanism should the Institute implement to collect information from the concessionaires (through Guidelines, as an explicit obligation in concession titles, etc.)?	<p>As mentioned before, TELCEL does not see any additional benefits in the introduction of spectrum efficiency metrics as a regulatory intervention. As such TELCEL does not see a need for additional information collection.</p> <p>As part of its mandate, the IFT has to follow the principles of efficiency and effectiveness. TELCEL has serious reservations, that – as illustrated in the answers to other questions – the complexity of the problem to adequately and comprehensively measure spectrum efficiencies for all kinds of services, in all kinds of different geographic areas, for all kinds of different user groups with a wide range of different technologies will be impossible to achieve.</p>
15	93	How often and with what type of format would data collection be made?	As stated before, TELCEL does not share the envisaged framework and therefore sees no need for additional data collection.

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16	97	Who of the two concessionaires should observe the spectrum efficiency metric, the WMC, the MVNO or both?	By definition, an MVNO does not hold spectrum and could therefore not be directly responsible for spectrum efficiency metrics . However, since a comprehensive metric would also include economic, social and regulatory parameters, MVNOs may still be held accountable to fulfil these metrics. As a consequence, an additional set of metrics and parameters would need to be established for MVNOs taking into account that they do not hold spectrum assignments adding to even more complexity in the efficiency metric framework.
17	97	Should ad-hoc metrics exist for MVNOs?	See answer to question 16:
18	97	Should different metrics exist between WMCs and mobile telephone service concessionaires who are not WMC?	By definition WMCs hold spectrum assignments, while other service providers do not have spectrum. As such, different metrics would need to be applied.
19	97	Does a mobile telephone service concessionaire become spectrally more efficient when offering a wholesale service option, as compared with a MVNO?	There is no clear-cut answer to this question: If a host network has lots of spare capacity, selling this capacity through an MVNO may lead to higher efficiency. On the other hand, if an MVNO does not sell its assigned capacity at similar levels as the host network, overall efficiency may be less.
20	98	Would it be possible (or even feasible) that the weight of the metric be negotiated between the WMC and the MVNO, and established contractually (prior authorization by the Institute)?	This question 20 highlights another complexity dimension by suggesting a weighted metric between WMC and MVNOs. Even if it were possible to define such a weighted metric, this would constantly change, depending on evolving traffic profiles on the different networks.
21	100	Is it possible to establish a spectrum efficiency metric for concessionaires that implement these types of technologies in the future?	Opportunistic spectrum technologies are typically applied in licence-exempt spectrum bands (e.g. the use of WiFi technology in reserved 2.4 and 5.5GHz bands). Since these bands do not require dedicated spectrum licences, spectrum efficiency metrics will be difficult if not impossible to establish and to enforce.
22	100	How may the metrics be established for this type of concessionaires under the spectrum lease mode?	There should be not further metrics or obligations other than non-interference obligation.
23	100	Since this type of technologies may cover an ample range of spectrum, transmit and receive information through free spectrum, and even transmit over granted bands under a no-interference schema; would it be possible to establish a metric that counts over which frequency band the transmission is being made, and the period of transmission?	This question implies the need for yet another metric and potential additional regulatory intervention. Commercial operators will always strive to optimize the use of available resources. This will also hold in particular for services offered in licence-exempt or granted bands for other uses. Due to the shared nature of these bands and strict non-interference obligations, it will be impossible to establish a fixed metric to always meet a certain efficiency level.
24	100	Being technologies that use the spectrum in a dynamic and shared manner; would they be not appropriate for evaluation?	No. See answer to question 23.
25	101	Coverage was defined by ABS for some trunking radio service concessionaires, by road routes for others, by cities for others and	This question highlights the complexity due to concession areas or geographic dimensions. The answers provided to questions 1 through 3, which focused on mobile operators, are equally applicable to trunking services.

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		by municipalities for others. In case a factor of the metric was the geographic coverage area, would it be possible to measure all of them in the same fashion?	The choice of the most efficient technology implementation should be left to the considerations and needs of commercial operators and their customers rather than regulatory intervention.
26	101	Is it feasible to obtain a metric applicable to the whole universe of concessionaires for each one of the telecommunications and/or broadcasting services?	No. Theoretically or academically, there might be a way to develop an all-encompassing framework for all different types of telecommunications services; however, TELCEL has serious doubts as to (a) coming up with such a framework, and (b) applying it effectively.
27	102	Should specific metrics be designed for concessionaires different from those with commercial use?	The answer depends on the type of non-commercial services. If these are comparable in nature to commercial service equivalents, the same metrics could be applicable. If not, yet another set of metrics would need to be developed for such non-commercial services.
28	104	How should the quantity and quality of channels arising from the use of multiprogramming and IBOC technology be evaluated on the concessionaires?	These decisions should be left to the corresponding concessionaires based on end user demands and availability of appropriate receiver equipment.
29	N/A	<p>The Institute is evaluating the development of metrics for a group of services deemed of higher relevance or impact for the provision of public telecommunications and broadcasting services. The services considered up to now are:</p> <ul style="list-style-type: none"> - Wireless access service (cell phone). - Point-to-point terrestrial fixed service. - Satellite pay TV services. - Mobile narrowband radiocommunication services. - Digital Terrestrial Television services. - AM and FM broadcasting services. <p>In this sense, the Institute seeks comments about additional or different services (besides the ones listed) that may be considered to develop and apply efficient use metrics, as well as the technical or regulatory justification on the feasibility and need for their implementation.</p>	<p>TELCEL recognizes the legal obligation of IFT to assure the efficient use of spectrum. However, as mentioned before, TELCEL does not see any need to introduce an integral spectrum efficiency metric suggested in “the study”.</p> <p>As highlighted in the answers to the majority of the above questions, there are too many parameters and variables to take into account and far too much complexity to come up with a meaningful metric to assess efficient use for all spectrum use cases. Measuring, collecting, reporting and evaluating all possible parameters and variables will place an unduly burden on both, operators and the IFT itself. In addition, IFT has a mandate to operate in an efficient and effective manner, thus implementing overly burdensome metrics may contradict with this mandate.</p> <p>Purely technical metrics are quickly losing relevance as current state-of-the-art technology is already close to theoretical capacity limits for any given transmission medium. Additional capacity can thus only be achieved by adding channels (i.e. more equipment) or by adding more spectrum (i.e. new allocations of unused or reassigned spectrum bands).</p> <p>As such, economic, social or regulatory considerations come to the forefront for assessing efficient use. However, the variables and parameters necessary for a concise analysis won't comply with the principles proposed in section 74 of the study:</p> <ul style="list-style-type: none"> • Objectivity: how can different services (mobile service, broadcasting service, emergency service, etc.) be objectively assessed for their social or economic value? • Precision: while quality of service has a technical dimension, end-user buying decisions are much more influenced by value perception rather than actual value metrics. Such value perception is hard to precisely quantify, but still has a major influence on overall operator economics. • Verification: A full audit process may be required to verify each and every parameter and variable provided in the efficiency metric evaluation, which will be very costly and may not be justifiable, considering alternative approaches.

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			<ul style="list-style-type: none"> • Temporariness: With continuous technological advancements, it will be near impossible for a regulatory agency to always stay ahead of these developments. In addition, decisions on implementing specific technologies should be left to operators and market forces, rather than regulatory intervention. <p>Regarding the latter point, regulatory interventions should – as far as possible – be technologically neutral (i.e. choices for specific technologies and investments are left to commercial operators). Still, “the study” makes various specific references to specific technologies, which should not be part of regulatory policy.</p> <p>As mentioned in responses to questions 1 through 3, TELCEL believes that current regulatory tools and licence conditions are sufficient to assure that IFT fulfils its mandate of efficient use of spectrum.</p> <p>These tools and conditions include:</p> <ul style="list-style-type: none"> - Competitive spectrum allocation process (through auction) to assure that operators who attribute highest value to spectrum put it to best economic use. - High annual spectrum fees (which make up 80% of all spectrum fees and which will lead to operators buying the minimum amount of spectrum and making maximum use of it). - Rollout and coverage obligations (time and space dimension, which also include rollout e.g. in economically weak regions) - Quality-of-Service obligations to guarantee minimum service levels <p>The FCC (as quoted in “the study”) abandoned the implementation of a comprehensive spectrum efficiency metric as being too complex and inappropriate. TELCEL believes that such an outcome is also appropriate for the case for Mexico.</p>

IV. General comments, opinions and contributions by the respondent

Note 3: This section may be used to freely offer comments, opinions and contributions related to the design and definition of Spectrum Efficiency Metrics. In case of making any contributions relating to the study “Spectrum Efficiency Measurement. Definitions and considerations to be observed for its application in Mexico”, indicate the corresponding section in the first column; otherwise, the indication “N/A” (Not Applicable).

Note 4: Add as many lines as necessary.

No. of section in the Study	Comment, opinion or contribution
Supplementary remarks to questions 1, 2 and 29.	<p>If the IFT indeed believes, that current regulatory tools and licence conditions are not sufficient to comply with the legal requirements of assuring spectrum efficiency, TELCEL may want to suggest the introduction of a simple and easy manner to implement metric, such as the ratio of active subscribers by allocated spectrum bandwidth as a measure of efficiency. This metric will demonstrate, how many subscribers are served by each operator through a specific amount of spectrum.</p> <p>The introduction of such a metric will be fairly easy and will impose a limited additional burden on both, operators and the IFT, while more complex goals and objectives are already achieved through existing tools and measures as mentioned in the above answers.</p> <p>For instance, if we consider an hypothetical operator with 50MHz allocated spectrum bandwidth and 10 million active subscribers, the ratio of active subscribers by allocated spectrum bandwidth for that operator would be 200,000; on the contrary, if we have at the same time an operator with 100MHz allocated spectrum bandwidth, but with only 5 million of active subscribers, the ratio of active subscribers by allocated spectrum bandwidth, would be 50,000; thus, in our example the first operator clearly is going to be more efficient than the second one.</p> <p>In that sense the introduction of this metric (ratio of active subscribers by allocated spectrum bandwidth) is an easier manner to measure spectrum efficiency without the administrative burden, both on operators as well as on the IFT.</p>