



## **Résultat de la demande d'avis relative au projet de l'élaboration d'un modèle de coûts mobile**

Le présent document clôture le processus de demande d'avis relative au projet de l'élaboration d'un modèle de coûts mobile et reprend textuellement les contributions des acteurs du marché luxembourgeois transmises durant la période prévue à cet effet.

L'Institut a reçu des contributions de la part de :

1. Entreprise des postes et télécommunications ;
2. Join Experience S.A ;
3. Orange Communications Luxembourg S.A ;
4. Tango S.A.

Le fait d'inclure ces commentaires dans ce document ne signifie nullement que l'Institut approuve ou désapprouve les opinions exprimées. L'Institut n'a pris en compte que les commentaires qui se rapportaient à l'étude en question. Les passages confidentiels et les parties ne se rapportant pas au sujet spécifique qui étaient inclus dans les contributions n'ont pas été publiés.

Luxembourg, le 19 mars 2014



Par courrier et par  
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**N. réf. : T/1255/R11**

Luxembourg, le 21 janvier 2014

**Objet :** Réponse à votre demande d'avis relatif au projet de l'élaboration d'un modèle de coûts mobile

Monsieur le Directeur,

Faisant suite à la publication par votre Institut, en date du 21 novembre 2013, de la demande d'avis relatif au projet d'élaboration d'un modèle de coûts mobile, je vous prie de bien vouloir trouver ci-joint la prise de position de l'EPT quant au document intitulé « *Development of a Bottom-Up Mobile Network and Cost Model for the Determination of the Cost of Terminating Calls in Mobile Networks* ».

Je vous prie d'agréer, Monsieur le Directeur, l'expression de ma profonde considération.

Jos GLOD  
Directeur Général adjoint

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## EPT comments on ILR reference document for setting the MTR

*Development of a Bottom-Up Mobile  
Network and Cost model for the  
Determination of the Cost of Terminating  
Calls in Mobile Networks review*

**EPT**

Ref: 2014-04-DB-EPT – WIK response

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## 1 Management summary

The *Institut Luxembourgeois de Régulation* (ILR) has started the development of a bottom-up long run incremental cost (BU-LRIC) model to assist in assessing the Mobile Termination Rate (MTR).

As part of the implementation process, the ILR has organised a consultation process in order to collect the industry's views on the model which is highly appreciated by EPT.

In the context of this consultation, the ILR has not yet offered access to the draft model and has provided 1 reference document. The review of this document raises a number of important questions.

In summary, EPT's comments and proposals are:

- We would appreciate if the modelling best practices could be considered when developing the mobile network cost model:
  - Transparency of the model and access to the draft model by Luxembourg operators is important and necessary;
  - The model shall reflect as much as possible operators' local network and operators' local costs;
  - The model shall include cross-checks with reality. This is unfortunately absent from ILR's approach as described in their document while it is fundamental, as part of ILR's statutory objective, to make sure operators can recover their efficiently incurred costs;
- LTE shall be included in the model to carry data. The 1800 MHz band should be dedicated to the LTE and GSM usage;
- The model granularity is such that the model can only be insensitive to traffic. The model shall use instead geotypes;
- The model is a theoretical model based on theoretical inputs such as a migration model or a propagation model. These models shall be compared with real world figures provided by operators in Luxembourg;
- Capacity and utilization rates of controllers shall be updated; Utilization rates of core assets shall be updated;
- The transmission network (aggregation and backhaul) topology shall be based on operators' transmission network topology;
- Unit costs shall be based only on Luxembourg operators' unit costs;
- Opex shall take into consideration only Luxembourg operators' opex;
- Interconnection specific costs should be included in the pure LRIC calculation. They should represent a significant share of the total given the size and particularities of Luxembourg.

EPT findings and factual elements show that the approach followed by the ILR will probably not allow any efficient Luxembourg operator to recover its costs. Therefore,

we would appreciate if ILR could therefore review its model to reflect an efficient operator in Luxembourg. We would also appreciate if more explanations and documentation could be provided so that operators can verify the modelling approach being used. EPT would highly appreciate if explanatory sessions and parameter definition and evaluation sessions could be foreseen in the near future, as well as contact points in order to validate the key important data together with the Luxembourg mobile operators.

## 2 Review of ILR MTR reference document

The document “development of a bottom-up mobile network and cost model for the determination of the cost of terminating calls in mobile networks”<sup>1</sup> on the ILR’s BU LRIC cost model raises a number of important questions.

This document has been organized in the same way as ILR’s document: the titles of the different sections of this document are the titles of sections of the ILR’s document:

- Background, requirements and specification (see §4);
- Network design and dimensioning (see §5);
- Determination of the cost of termination (see §6);
- Appendix (see §7).

These are detailed hereafter.

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<sup>1</sup> ILR\_MTR\_ReferenceDocument\_20131121.pdf

### 3 General Comments

#### 3.1 Overview

When setting regulated rates, an important part of the Regulatory Authority's work consistent in being transparent and make sure that the prices derived from the cost models are reasonable and will enable the operators to recover their costs and are reasonable.

The mobile network cost model is not sufficiently documented. Misunderstandings have been identified. The model has not been provided to the Luxembourg operators and the modelling approach, worldwide unique by its degree of complexity and by the fact that it is theoretical, and does not take into consideration the methodologies of the model benchmarked by the ILR in its market analysis.

To ensure that the operators are able to recover their costs, the model shall be "as close as possible to reality" as described in the model documentation on page 4. In order to do so, the mobile network modelled shall be close to a real mobile network of a real operator instead of a purely theoretical network with no direct comparison with reality. The design rules, the parameters, the network topology, the network assets shall be those of real world operators. The main goal of a network cost model is to compute the network total cost of an efficient operator and its variation when the traffic is changing. It is visible from both the model documentation and the data request published that only few attempts to conduct basic comparisons with reality have been made at this point in time: comparison of traffic at peak hour between the model and reality, comparison of unit costs, comparison of geographic dispersion of traffic, comparison of number of sites, etc.

Many data are not included in the document published by the ILR to ensure that the prices that will be derived from ILR model will allow EPT or other mobile operators in Luxembourg to recover their costs. We would appreciate if ILR and its consultants could provide more information on cross-checks, extensive intermediate results, final results and sensitivity analysis regarding all the parameters of the model whether it is the value of a parameter or any modelling approach selected by ILR's consultants.

We would also appreciate if the mobile network cost model could be available to the Luxembourg operators so that the operators can run their own cross-checks and be offered to comment any aspect of the model.

The model and the document should be reviewed and complemented with all the comments listed in this document.

**We would appreciate if more transparency could be provided and access to the draft model could be ensured. Many data and results are unfortunately not published. Based on the document, it appears that the model will probably not enable efficient operators in Luxembourg to recover their costs.**



### 3.2 Modelling approach

The ILR and its consultants have benchmarked 7 mobile network cost models in the market 7 analysis<sup>2</sup>:

**Figure 1 – Mobile network cost model included in the benchmark**

Countries
Denmark
Spain
France
Netherlands
Portugal
Sweden
United-Kingdom

*Source: TERA Consultants*

Although the EPT is contesting<sup>3</sup> the use of any benchmark in order to replace its costs<sup>4</sup>, design rules and constraints by data from other operators from other countries, a benchmark can be used to define and validate modelling best practice.

Having used the 7 models quoted above, the ILR approves therefore tacitly the modelling approach of these models. It would be appreciated if ILR's consultants would therefore follow very similar modelling methodologies. Any difference shall be justified and documented for the purpose of enhanced transparency. It is observed that the modelling approach is in reality very different from the 7 countries used by ILR to set intermediate MTR.

### 3.3 EPT mobile network cost model

It has to be noted that the EPT has developed with TERA Consultants in 2013 a bottom-up model assessing the cost of the mobile network and the mobile termination rate. This model has been developed using the best practices recommended by the European Commission and the BEREC. The approach followed is very similar to other cost models developed by TERA Consultants in other European countries and approved by all the industry players (the operators, the national regulatory authority and the European Commission). Furthermore this approach is quite similar to the approach followed by all the models benchmarked by the ILR in its market 7 analysis:

<sup>2</sup> "Analyse du marché de la terminaison d'appel vocal sur réseaux mobiles individuels (Marché 7/2007)" document

<sup>3</sup>

<sup>4</sup> See Letter EPT with reference T/1239/R01 in the context of the response to the public consultation on Market 7

**Figure 2 – Modelling approach comparison**

Countries	Modeling approach
Denmark	Very similar
Spain	Very similar
France	Very similar
Netherlands	Very similar
Portugal	Very similar
Sweden	Very similar
United-Kingdom	Very similar

Source: TERA Consultants

This model has been presented to the ILR in 2013.

As the model developed by EPT uses real data, when developing its own bottom-up model, most of the inputs the ILR will use shall be very similar.

As a consequence, the two models should have very similar results when run with similar market share and input data. If model results are significantly different from EPT costing model, it would be appreciated if ILR could investigate the difference together with the stakeholders.

### 3.4 Data

ILR's consultants state that *"the objective of the model is to be as close as possible to reality"* on page 4 of the documentation.

It is unfortunate that ILR's consultant did not ask operators specific data regarding their networks, their design rules, their equipment, their topology and their costs.

Given the data requested and given the documentation provided, it appears that ILR's consultants have developed an entire theoretical mobile network model.

We would appreciate if ILR's consultants could send a data request to the operators similar to the one that has been sent for the fixed network cost model. The mobile network cost model shall be based on the analysis of the answers to such a data request. Only this process would allow developing a model *"as close as possible to reality"* and therefore allow the operators to recover their costs when setting the mobile termination rate.

### 3.5 Source of the assets cost data

In section 4.2 of ILR's document, it is stated that the unit costs are based on ILR, operators, international benchmarks and ILR's consultants database.

First, it has to be noted that at this point in time, no unit cost whatsoever has been asked to EPT. According to our experience, this is the first time that such a process is followed: in all models developed or audited by TERA Consultants, unit costs data have been requested by the consultants. TERA Consultants is not aware of any country even outside Europe where unit costs have not been requested. This tends to indicate once more that no attempt to calculate costs that can be achieved in

Luxembourg by any of the mobile operators has been made. It is therefore not possible that the unit costs used by ILR's consultants rely on EPT data.

Second, international cost data do not reflect the costs incurred by the most efficient mobile operators in Luxembourg. International cost data underestimate the costs incurred by EPT and other Luxembourg mobile operators as:

- Due to its size, EPT faces significant disadvantages compared to operators from larger countries such as France, Germany, England or Spain:
  - The bargaining power of EPT is considerably lower than other operators in Europe resulting in higher unit capex, higher maintenance unit costs and higher supplier support costs;
  - Economies of scale are considerably lower in Luxembourg than in other European countries resulting in higher capex and opex;
- Wages are proportionally higher in Luxembourg than in any other countries in Europe resulting in:
  - Higher opex;
  - Higher installation costs.

The use of benchmarks results therefore in EPT not recovering its efficiently incurred costs (over optimisation) which is a breach in the cost orientation principle.

Furthermore, it should be noted that unfortunately, no benchmark information has been provided at all in this document, not allowing the EPT to cross-check and validate the values used (e.g. checking that the countries used are comparable with Luxembourg or that the scope of the assets cost benchmarked is the same as the scope of the assets cost in Luxembourg).

We would appreciate if ILR's consultants could thus ask operators their data and use these data and document any change made on these data.

## 4 Background, requirements and specifications

### 4.1 Overview

The model developed by the ILR and its consultants is based on C++ for the network planning tool and is based on Microsoft Excel for the cost module.

This approach leads to a high degree of complexity which is:

- Different from other practices;
- Not transparent; and
- Not user friendly

The ILR in its market analysis (Market 7/2007) uses a benchmark to set a temporary mobile termination rate. Although the EPT is contesting the use of any benchmark in order to replace its costs, design rules and constraints by data from other operators from other countries, a benchmark can be used to define and validate modelling best practices:

**Figure 3 – Mobile network modelling tools**

Countries	Modeling tools
Denmark	Excel
Spain	Excel
France	Excel
Netherlands	Excel
Portugal	Excel
Sweden	Excel
United-Kingdom	Excel

*Source: TERA Consultants*

The 7 models quoted in this benchmark use only Microsoft Excel. Each of these models has been accepted in its own country, has been validated by the European Commission and allows modelling properly the operators' mobile network with a mobile termination that reflects their costs. The use of C++ is therefore different and against existing practices.

This unique degree of complexity is not transparent. It could partially be mitigated by providing the model along with the final and intermediate results together with relevant analysis such as sensitivity analysis as it has been done for the fixed network cost model<sup>5</sup>. The model has not been provided at this point in time and the documentation fails to provide any insight on the modelling and on the results.

<sup>5</sup> "Input data and intermediate calculations" document

The complexity used involves providing extensive documentation on the model description, on the model implementation, on the data used and on the results. The documentation fails to provide these informations.

**The use of C++ in order to develop a mobile network cost model is not user friendly, different from existing practices, and not transparent.**

## 4.2 LTE

The model does not include the LTE technology. The exclusion of LTE by the ILR's consultants has been justified by:

*"LTE is not included as it is not yet used to carry voice services".*

The exclusion of LTE of the mobile network modelling is in our eyes not acceptable as:

- EPT is already using the LTE technology and is paying spectrum fee to the ILR since 2013 for its use;
- Today EPT uses LTE in the 1800 MHz band which was previously used by the 2G. The LTE is indeed not used today to carry voice services but to carry data services. The voice services are planned to be carried over 2G mainly and 3G technologies for the upcoming years. By relieving the 2G and the 3G networks of an important share of the data traffic, the roll-out of 2G and 3G base stations becomes more sensitive to voice traffic.

**The model should include the LTE technology.**

## 4.3 Model granularity

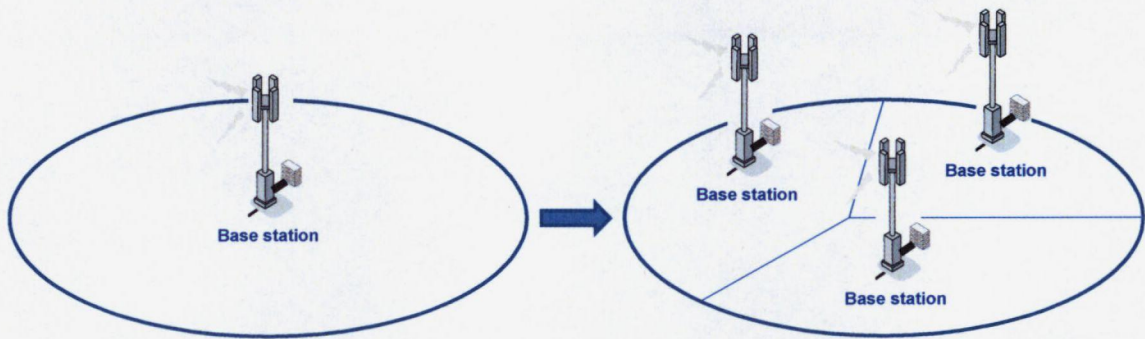
The ILR's consultants have created a complex algorithm in order to create "zones" with a homogeneous population density based on the local government areas and on distance between the areas. These zones, although "each of which is relatively homogenous", is then further "divided into sub-areas with high, medium or low density".

This approach, developed by ILR's consultants, leads to many issues, the main one being the threshold effects created.

The threshold effects lead to the overestimation of the number of base stations required to meet the coverage constraints which in turn lead to make the mobile network less sensitive to traffic variations and therefore lower MTR. The following example is providing more details on these threshold effects consequences:

As illustrated in the next figure, when an area which could be covered by only one base station (in order to meet the coverage required) is split into smaller sub-areas with their own coverage requirements, the number of base stations rolled-out for coverage purpose increases.

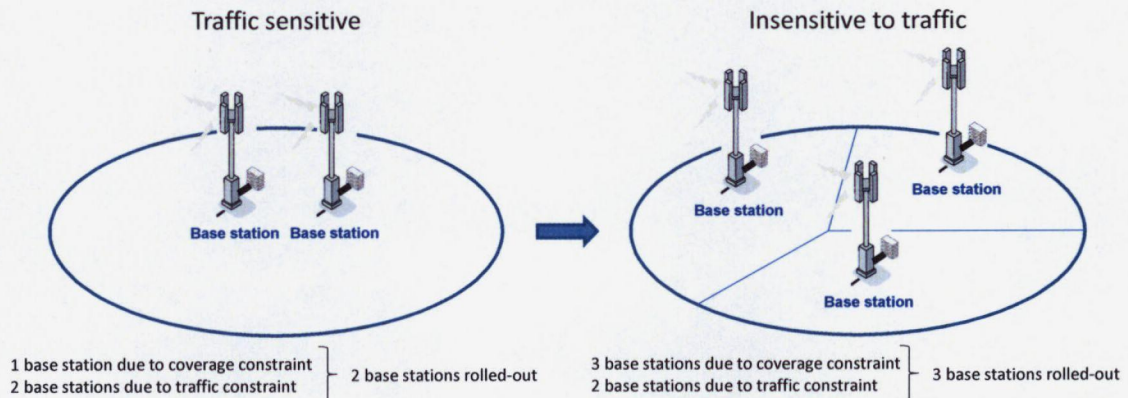
**Figure 4 – Threshold effect: base stations rolled-out for coverage**



Source: TERA Consultants

As illustrated in the next figure, if in the area not subdivided, the number of base stations required to meet both coverage and traffic constraints is two, then the number of base stations is insensitive to traffic when the area has been split in sub-areas.

**Figure 5 – Threshold effect: base stations rolled-out for coverage**



Source: TERA Consultants

The smaller a country is, the bigger the threshold effects are.

The approach chosen by the ILR, i.e. modelling a network almost insensitive to traffic, underestimates the mobile termination rates under the pure LRIC approach, not allowing any mobile operator to recover its efficient incurred costs.

It is furthermore not clear why, if each zone is “relatively homogenous”, it is needed to further split a zone in sub-areas. This subdivision leads to more granularity and therefore to more threshold effects. It would be appreciated to add more information on the introduction of homogenous zones together with a graphical illustration. Other issues result from these “zones” and “sub-areas” creation especially the definition of the coverage requirement and the computation of the demand (the traffic) in each of these areas:

- The coverage requirement is unfortunately not documented or illustrated;
- The computation of the demand in each area is carried out with a complex and theoretical model of migration within the country. Issues regarding this model are discussed in the next section (see §4.4).

To overcome these difficulties and to reduce as much as possible the threshold effects, the use of “zones” and “sub-areas” is replaced by geotypes in all publicly available models and especially in the seven models selected by the ILR in its market analysis.

**Figure 6 – Geotypes**

Countries	Modelling tools
Denmark	4 geotypes (dense urban, urban, suburban and rural)
Spain	Unknown
France	5 geotypes (dense urban, urban, suburban and rural, rural mountains)
Netherlands	3 geotypes (urban, suburban, rural) + indoor
Portugal	4 geotypes (dense urban, urban, suburban and rural)
Sweden	3 geotypes (urban, suburban and rural)
United-Kingdom	7 geotypes (urban, 2 for suburban, 4 for rural) + highways and railways

*Source: TERA Consultants*

The average number of geotypes is 4.

We would appreciate if ILR’s consultants could therefore define geotypes based on a population density analysis instead of its approach which is both too complex and too theoretical. This would allow simplifying the model, making it more transparent, more robust, more realistic and less subject to threshold effects.

**According to modelling best practices, we would appreciate if the ILR could define geotypes instead of “zones” and “sub-areas”.**

#### **4.4 Migration model**

The ILR points out correctly that, due to population migrations, the peak hour of different base stations does not occur at the same time. The mobile network should therefore be dimensioned based on the busy hour of each base station and not on the network busy hour.

However, as no figures have been provided to the industry, it is not possible to comment the migration model computed by ILR’s consultants. In order to model a mobile network “as close as possible to reality” as stated page 4 of the documentation, this migration model should be validated by real world figures, i.e. the traffic volume resulting from this model should be cross-checked with operators’ traffic. Given the data asked during the data request, it appears that no such cross-checks have been published at this point in time by the ILR. This approach is therefore not acceptable and it would be appreciated if the necessary cross-checks could be done.

The traffic included in all these models is the traffic of the operators that has been split between the different geotypes based on an analysis of the location of their base stations. And the busy hour traffic is the traffic at each base station busy hour and not the network busy hour.

Concerning the definition of users, we believe it is necessary to add shopping malls and big schools as category and temporary events (Schouberfourer, Rockhal).

**According to modelling best practices, it would be appreciated if ILR could calibrate the model busy hour traffic and its dispersion in Luxembourg on the basis of Luxembourg operators' data.**

#### 4.5 Characteristics of the different services

The figures in table 2-6 and in table 2-7 of the ILR document do not reflect the figures provided by the EPT or other mobile operators in Luxembourg. The model should use real figures or at least explain how these figures have processed and why they are potentially different than operators' data.

Concerning table 2.1, the listing in the consultation document is not complete to EPT understanding. It contains only commuter from abroad using SIM from Luxembourg Operator. As the number of commuters is high in relation to local commuters, the table shall be modified as follows:

Type of moving user	Description
Commuter from abroad (1)	People from neighboring countries who work in Luxembourg and use a SIM card from an operator in Luxembourg
Commuter from abroad (2)	People from neighboring countries who work in Luxembourg and use a SIM card from a foreign operator

Concerning table 2.4 in the consultation document the content is based on data published in 2003, EPT asks for updated figures in order to be in line with the real situation.

Concerning table 2.5, we believe the presented table in the consultation document is not representative due to the low level of granularity of the figures presented. Moreover, the methodology for definition and determination of threshold values for the Luxembourg situation needs to be explained.

**The ILR should use the real figures provided by the Luxembourg mobile operators when computing the traffic, including real figures for commuters.**



## **4.6 Frequency availability and use**

ILR documentation indicates that:

- The 900 MHz and 1800 MHz bands are used by 2G; and
- The 2100 MHz band is used by 3G.

It should be noted that the 900 MHz band is used by 2G for coverage purpose whereas the 1800 MHz band has been deployed for capacity purpose, i.e. this overlay should be entirely traffic sensitive. The 1800 MHz band is furthermore used only in certain areas of the country (only in urban areas).

As regards the technology mix, EPT believes it is important and necessary to include LTE deployment because it is universally used by a growing number of operators.

## 5 Network design and dimensioning

### 5.1 RAN equipment

ILR document indicates that:

- Macrocells are used for rural and suburban areas;
- Microcells for suburban and inner-city areas;
- Picocells for urban areas.

Macrocells are used for coverage purpose and Micro- and Picocells for capacity-

ILR model does unfortunately not reflect hierarchical cell concept.

This approach followed by ILR will probably not enable any operator to recover its efficient incurred costs as the number of base stations that would be needed to reach coverage requirement would be very high. The network modelled would therefore be insensitive to traffic in suburban and urban areas although these are precisely the areas where most of the sites are rolled-out for capacity purposes.

All the models benchmarked by the ILR in the market 7 analysis use only macrocells for the mobile network roll-out. Microcells or picocells are used only to cover specific areas such as malls, airports or hotels.

**Figure 7 – Type of base stations for the mobile network roll-out**

Countries	Base station
Denmark	Macrocells
Spain	Macrocells
France	Macrocells
Netherlands	Macrocells
Portugal	Macrocells
Sweden	Macrocells
United-Kingdom	Macrocells

*Source: TERA Consultants*

Finally, EPT believes it is important to take into consideration the concept of hierarchical cell structure because the symmetrical distribution of locations within an area is not reflecting the real environment.

### 5.2 Cell deployment for 2G

The ILR is defining two parameters aiming at decreasing the area covered by a cell:

- A percentage is applied in order to compensate an overlap between two cell areas;
- A parameter to increase the number of base stations in shadow areas.

These parameters combined with the roll-out of the network at the “sub-area of a zone” level aims at modelling a mobile network insensitive to traffic especially in urban areas where in reality many base stations are rolled-out for capacity purposes.

Instead of using theoretical parameters with theoretical values to model a theoretical mobile network, it would be appreciated if ILR consultants could use real world data provided by real operators running a real mobile network in Luxembourg. It is precisely due to the effects identified by the ILR and many others that mobile network cost models developed elsewhere always use operators' data as they are the most reliable data available. The ILR should therefore use data provided by operators especially regarding the cell radii in the different geographical areas (i.e. geotypes) of Luxembourg.

This approach is the approach followed by all national regulatory authorities which models have been benchmarked in the analysis of market 7 by the ILR:

- None of the model benchmarked by the ILR uses propagation models as they are too theoretical;
- All the models benchmarked by the ILR use cell radii as an input of the model. The value of the cell radii is always based on operators' data.

**Figure 8 – Cell radii**

Countries	Cell radii
Denmark	Operators' data
Spain	Operators' data
France	Operators' data
Netherlands	Operators' data
Portugal	Operators' data
Sweden	Operators' data
United-Kingdom	Operators' data

*Source: TERA Consultants*

Following the best practices would then allow the model "to be as close as possible to reality".

The 2G base station capacity is derived from the number of sectors and the number of TRX per sector. Utilization rates should be applied as base stations are not used at full capacity. The ILR should use operators' data in order to set real world utilization rate.

**The capacity of the 2G BTS should include a realistic utilization rate based on operators' data.**

### **5.3 Cell deployment for 3G**

It would be appreciated if ILR model could use real data in order to model a realistic mobile network which would allow the operators to recover their costs. EPT does not necessarily disagree with using as the starting point a theoretical approach but this approach must then be calibrated with real data relevant in the case of Luxembourg. This does not appear to be the case in the consultation document which is an important deviation from best practices.

In order to compute the area covered by each 3G base station, it would be appreciated if ILR could therefore use operators' cell radii in the different geotypes of Luxembourg. And, in order to compute the capacity of each 3G base station, take into consideration the operators' number of channel elements. As for the cell deployment for 2G, the capacity of base stations should include a realistic utilization rate based on operators' data.

This approach would be more transparent and would rely on real world data that would allow operators to recover their costs.

**It would be appreciated if the ILR could use operators' data to dimension the 3G RAN. The base stations coverage area shall be based on operators' cell radii and the base stations capacity shall be based on channel elements and realistic utilization rate.**

## 5.4 Signalling

The ILR document states that *"one of the eight slots per TRX is reserved for signalling purposes, together with a second slot for handover purposes"*.

It should be noted that indeed a TRX has 8 channels. Nonetheless, out of these 8 channels, 1 is used for BCCH, one is used for SDCCH and one is used for GPRS, therefore only 5 calls can be made simultaneously.

The ILR documentation and model shall be updated.

The ILR document states also that *"one of the 32 slots of 64Kbps of such a group is reserved for signalling traffic"*.

An element which needs further information is to explain "32" time slot as this means 4 TRX which cannot be deployed in reference to described preconditions.

## 5.5 Aggregation network

The number of controllers (BSC and RNC) and therefore the number of controller locations should be a part of the model and not a parameter as stated by ILR consultants.

The number of BSC and RNC should be dimensioned based on operators' design rules. This would allow having a traffic sensitive network and therefore would allow appropriate cost recovery through MTR at pure LRIC.

The whole network topology should be based on real world operators' topology instead of a theoretical topology.

The table 3-1 of ILR document shows that the port bandwidth is either 100 Mbps or 1000 Mbps. These values should be 10 Mbps or 100 Mbps in line with chapter 3.2.2.2.1 of ILR report.

**The ILR shall model a network topology in line with operators' topology and the number of controllers and therefore the number of controller locations should be dimensioned based on design rules instead of using a parameter.**

## 5.6 Backhaul network

The location of core nodes is not the same as the location of controller nodes. The ILR should therefore update the model to reflect real world operator mobile network.

According to the ILR document, the dimensioning of the BSC is based on the number of BTS assigned to a BSC, the number of users and the number of active connections. The BTS should be dimensioned instead based on:

- The number of TRX assigned to the BTS; and
- The traffic in Erlangs.

Regarding the different types of BSC described by ILR's consultants, it should be noted that:

- EPT uses only one type of BSC, which is the BSC with the smallest capacity available as it is already enough to fulfil its needs given the size of Luxembourg;
- The number of BTS that can be assigned to a BSC is far too high and should be replaced by a maximum number of TRX.

As EPT is the main operator in Luxembourg and the smallest BSC is sufficient, other operators use most probably only the smallest BSC as well. The model should therefore include only one type of BSC, the smallest one.

The dimensioning of the BSC should furthermore include a realistic utilization rate<sup>6</sup> based on operators' data. The proposed value of 80% is overestimating the utilization rate applied by EPT. The ILR should update it with operators' data.

The model benchmarked by ILR in its market decision shows the following design rules:

- In average, 950 TRX are assigned per BSC;
- In average, the utilization rate is 66%.

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<sup>6</sup> The utilization rate is the maximum level at which the asset is used. This is used to provide some margin. This is not the observed utilization rate which should be lower.

**Figure 9 – Capacity in TRX of the BSC and utilization rates**

Countries	Maximum number of TRX	Maximum Utilization rate <sup>7</sup>
Denmark	700	58%
Spain	Unknown	Unknown
France	579	77%
Netherlands	Unknown	Unknown
Portugal	2000	50%
Sweden	Unknown	Unknown
United-Kingdom	512	80%

Source: TERA Consultants

With an average of 11 TRX per site in these countries, the average number of BTS assigned to a single BSC is therefore less than 90 compared to the 200 proposed by the ILR.

All the countries benchmarked by ILR have larger mobile network than any operator in Luxembourg and the operators of these countries use BSC with lower capacity than the capacity used by ILR in its model. The BSC capacity should therefore be updated. As operators in Luxembourg buy only the lowest capacity available, ILR model should therefore use the smallest equipment.

RNC utilization rate are the same as the BSC utilization rate. The RNC utilization rate should therefore be updated.

**It would be appreciated if the ILR could update the location of the core nodes as they are not collocated with controllers.**

**The capacity of the BSC shall be based on a maximum number of TRX and on a traffic capacity in Erlangs. The value of these parameters should be based on the minimum capacity available on the market.**

**The utilization rate of the BSC and the RNC shall be updated to reflect real world operators' utilization rate.**

**The capacity of the RNC defined in ILR model shall be documented.**

## 5.7 Core network

The documentation does not provide any information on the capacity of the core network assets. The ILR should therefore complete the documentation and provide to the industry all the figures.

The utilization ratio has been overestimated. It should be based on operators' data.

<sup>7</sup> This utilization rate is the maximum level at which the asset can be used and not the observed utilization rate which should be lower

**The capacity of the core network assets shall be documented. The utilization ratio shall be based on operators' data.**

## 6 Determination of the cost of termination

### 6.1 Requirements for determining cost in the model

The ILR model is using various sources for the unit costs including operators' data, international benchmark and ILR's consultants own database. EPT, as for the fixed network cost model, contests the use of any international data or not-transparent database as it leads to underestimate the costs incurred by any operators in Luxembourg, even the most efficient one.

ILR shall use data from Luxembourg operators.

It has to be noted that the document does not mention any price trend.

**It would be appreciated if the ILR could use data provided by operators in Luxembourg.**

### 6.2 Annualised CAPEX

The documentation does not provide the formula used to compute the annuities.

The ILR document indicates that the annuities should "*cover both depreciation and the interest of the capital provision*". However, it would be appreciated if the ILR could also include the cost of working capital in the annuities. There is indeed a delay between when a network asset is bought and then put in service. The delay is different depending on the network assets but is in average 12 months. Not including the cost of working capital will not allow EPT or Luxembourg mobile operators to recover its costs.

**The ILR shall provide the formula used to compute the annuities. The annuities shall allow recovering the cost of working capital.**

### 6.3 OPEX

Regarding the Opex, EPT agrees with the approach suggested by ILR, i.e. using a mark-up on capex. However, EPT contests the use of external data. It is even more contestable to use external data as the ILR document indicates that the Opex are "*not available to external observers*". ILR consultants rely on values from "*previous projects*" which are at the same time "*not available to external observers*". How, in the first place, have these values from "previous projects" been determined by ILR's consultants?

As already explained in section §3.5, the unit opex incurred by any operator in Luxembourg is higher than those incurred by any other European operators as:

- Due to its size, EPT faces significant disadvantages compared to operators from larger countries such as France, Germany, England or Spain:



- The bargaining power of EPT is considerably lower than other operators in Europe resulting in higher maintenance unit costs;
- Economies of scale are considerably lower in Luxembourg than in other European countries resulting in higher opex;
- Wages are higher in Luxembourg than in any other countries in Europe resulting in higher opex.

**Regarding the opex EPT agrees with the mark-up approach on capex. It would be appreciated if the ILR could base the opex on Luxembourg operators' data instead of ILR's consultants own data.**

## **6.4 Special aspects of cost estimation**

The rental cost of sites should change with the site location and with the number of sites rolled-out. Sites where a base station can be built are indeed a scarce resource as it is increasingly difficult to find new sites. This is particularly true in urban areas as people do not want a base to be built near their accommodation and even less on the top of their building. ILR model should therefore include a factor based on real world data on rental cost to reflect the scarcity of sites.

EPT agrees with the ILR that the cost dedicated to voice termination should be included in the mobile termination rate. It is all the more important that it represents a very high cost. The impact of these costs on mobile termination rate should be more important in Luxembourg than in other European countries because:

- The number of staff needed for interconnection is directly linked to the number of operators to be interconnected. Therefore, the same number of people is required in Luxembourg than in other European countries as the number of operators is about the same. However, wages are higher in Luxembourg. Therefore, the cost of staff working on interconnection will be higher in Luxembourg than elsewhere in Europe;
- The volume of mobile termination is small in Luxembourg due to the small size of the country;
- Having higher costs and lower volume of termination, the impact of interconnection staff costs on the mobile termination rate is expected to be very high in Luxembourg. It is expected that the unit cost in Luxembourg due to interconnection staff is among the highest in Europe.

In addition to the interconnection staff cost, the ILR should include the cost of the E1 used for providing mobile termination. EPT uses indeed 33 dedicated E1 links for mobile termination.

**The EPT agrees that overhead costs directly associated with the mobile termination shall be included in the pure LRIC calculation: these include the cost of interconnection staff and the cost of the E1 used for interconnection.**

## 7 Appendix

The ILR has provided nearly 50 pages of parameters. These parameters shall be updated with all the comments in this document.

Even if a comment has been provided, most of these parameters are not yet explained and it is not possible to understand with the current documentation how they have been used. The documentation should therefore be complemented in order for the mobile operators to understand these parameters (definition), understand how they are used in the model and understand how they impact the outputs of the model.

The parameters should be sorted and integrated in the documentation body: e.g. all cost units should be grouped together in a single table.

For each of these parameters, a sensitivity analysis should be carried out and provided to the industry in order to check that the model has been well built and reacts as expected.

**It would be appreciated if the ILR could update according to this document the value of many parameters.**

**All the parameters should be sorted and documented (definition) in order to allow the mobile operators to understand their use, their value and their impact. The source of each of these parameters should be provided.**

**For each of these parameters, a sensitivity analysis shall be carried out in order to provide the industry with cross-checks. This has been carried out in the fixed network cost model<sup>8</sup> and should be carried out in the mobile cost model too.**

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<sup>8</sup> "Input data and intermediate calculations" document

JOIN Experience S.A.  
11, rue de Bitbourg  
L-1273 Luxembourg

ILR – Institut Luxembourgeois de Régulation  
A l'attention de Monsieur Paul Schuh  
17, rue du Fossé  
L-2922 Luxembourg

Luxembourg, le 21 Janvier 2014

Cher Monsieur Schuh,

Concerne:

Commentaires de Join Experience S.A. suite à la demande d'avis relative au projet de l'élaboration d'un modèle de coûts mobile

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Nous avons pris note du projet de l'élaboration du modèle de coûts mentionné ci-dessus.

Veuillez noter que le texte complet repris dans notre lettre est confidentiel et ne peut être communiqué à des tiers qu'après autorisation écrite de Join Experience.

Join Experience est un opérateur qui est en pleine phase de lancement. Toutes nos ressources se concentrent sur la mise en œuvre de notre réseau ainsi que de nos activités commerciales. Nous regrettons d'être confrontés à un grand nombre de consultations et à un changement radical de la régulation dans un laps de temps très restreint. Nous déplorons aussi le fait que quasiment aucun élément mentionné dans nos courriers précédents n'ait été repris dans la publication du nouveau règlement sur les MTR's du 6 janvier 2014 (14/172/ILR).

En considération de ceci nous voudrions de manière générale demander de nouveau à l'ILR un délai de grâce en ce qui concerne l'application de toute nouvelle régulation défavorable vis-à-vis de Join Experience, en sa qualité de nouvel entrant sur le marché et ceci, conformément aux dispositions de la Recommandation n° 2009/396 CE du 7 mai 2009.

En ce qui concerne le modèle de coûts proposé Join Experience n'a malheureusement pas eu l'occasion, en raison des motifs mentionnés ci-dessus, d'étudier celui-ci en détails.

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Néanmoins nous voulons vous transmettre les éléments suivants :

L'hypothèse de base reprise dans ce modèle de coûts : « .....efficient operator.....that has a particular market share » (cfr § 2.1), ne peut en aucun cas être applicable à Join Experience. Vu le fait que nous n'avons pas (encore) démarré nos opérations cette hypothèse de base n'est pas valable et ne le sera pas dans le futur proche. Nous ne comprenons pas pourquoi l'ILR imposerait ce modèle de coûts alors que nous ne remplissons pas les conditions exigées pour l'application de ce modèle.

Le modèle de coûts proposé est un modèle théorique. Nous nous n'exprimons pas d'opinion sur la validité, fiabilité ou l'exactitude scientifique de ce modèle. Néanmoins comme opérateur full MVNO il faudra prendre en compte le fait très important que Join Experience ne déploie pas de réseau radio. Pour l'utilisation du réseau radio host nous devons payer une contribution par minute à notre opérateur host. Ceci représente un coût réel dont vous devez tenir nécessairement compte, y compris dans un modèle théorique.

Ceci engendre une situation inacceptable pour Join Experience, qui, dans le contexte actuel et futur, va perdre de l'argent sur chaque appels terminés vers ses abonnés.

Suite à notre dernière réunion, les éléments mentionnés à cette occasion et les éléments repris ci-dessous, nous réitérons notre demande au Régulateur de fixer les MTR de façon à ce que les MTR du nouveau entrant soient d'une façon suffisamment significative au-dessus de ceux des acteurs existants, et ceci pour une période d'au moins 3 à 4 ans, eu égard à notre qualité de nouvel entrant et de MVNO.

Nous vous demandons fermement de prendre les éléments repris dans cette lettre dans vos démarches futures en ce qui concerne les MTR's.

# Réponse d'ORANGE à la consultation publique sur l'élaboration d'un modèle de coûts mobile (Marché 7/2007)

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ORANGE regrette que l'ILR fasse appel à un consultant spécialisé quant à l'élaboration du modèle de coûts LRIC pure sans préalablement analyser et exposer l'opportunité d'appliquer un modèle de coûts LRIC pure.

Le cadre réglementaire organisant un remède de contrôle des prix n'impose pas le choix d'un modèle de coûts spécifique mais requiert que le remède soit conforme au principe de proportionnalité et justifié au regard de l'objectif poursuivi. Puisque la réglementation de la terminaison mobile vise à contrôler l'imposition de charges de terminaison mobile excessives, des charges terminaison fondées sur les coûts LRAIC (Long Run Average Incremental Costs) sont tout autant à même de remédier aux prix excessifs. L'ILR doit donc, avant même d'élaborer un modèle de coûts LRIC pure, justifier le recours aux coûts LRIC pure plutôt que les coûts LRAIC.

Tant en Allemagne qu'aux Pays-Bas, les charges de terminaison ont d'ailleurs été fixées sur base d'un modèle de coûts LRAIC. Les tribunaux néerlandais ont condamné le recours au modèle LRIC pure à deux reprises. En 2011, le modèle LRIC pure a été écarté car non justifié par rapport à l'objectif de remédier aux prix excessifs de terminaison.<sup>1</sup> En août 2013, les tarifs fondés sur le LRIC pure prônés par la nécessité de ne pas porter atteinte au fonctionnement du marché intérieur, ont également été annulés par les tribunaux néerlandais.<sup>2</sup> En Allemagne, depuis l'adoption de la recommandation de la Commission européenne de 2009 jusqu'à aujourd'hui, en dépit des avis négatifs de la Commission européenne et du BEREC, le régulateur a appliqué des charges fondées sur un modèle de coûts LRAIC.<sup>3</sup>

Par ailleurs, si deux remèdes sont à même de remédier une défaillance de marché, le principe de proportionnalité impose de choisir le remède qui impose le moins d'inconvénients. Comme tant le modèle LRAIC que LRIC pure peuvent remédier aux charges excessives, l'ILR doit choisir le modèle de coûts qui comporte le moins d'inconvénients, à savoir le modèle LRAIC parce que contrairement au modèle LRIC pure, il permet la récupération des certains coûts conjoints et communs.

Nous rappelons encore que le modèle LRIC pure est inapproprié car il postule un marché où un certain niveau d'économies d'échelle peut être atteint, ce qui n'est pas le cas pour ORANGE Luxembourg du à sa très petite taille. Le LRIC pure basé sur le concept d'un opérateur hypothétique efficace aura en outre la conséquence perverse de permettre à POST, dominant sur tous les marchés de communications électroniques, d'appliquer des tarifs de terminaison

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<sup>1</sup> Cullen, Flash 9/2012 et 58/2012

<sup>2</sup> Cullen, Flash 28/08/2013

<sup>3</sup> Cullen, Flash 22/07/2013

plus proches de ses coûts réels et contraindre ORANGE de vendre son service à perte.<sup>4</sup> En conséquence, ORANGE sera poussée à récupérer ses coûts sur le marché de détail en augmentant ses prix aux consommateurs, objectif opposé à la réglementation et position intenable face aux offres compétitives d'EPT. Ce risque d'augmentation des prix de détail a été identifié par le régulateur allemand et a également justifié le choix des coûts LRAIC.<sup>5</sup>

Les charges fondées sur un modèle LRAIC, tenant compte des économies d'échelle réelles des opérateurs, doivent aussi refléter l'absence d'économies d'échelle au Luxembourg comparables à tout autre pays de l'Union européenne. Le régulateur ne doit pas craindre d'aboutir à des niveaux largement supérieurs à ceux des autres pays de l'Union européenne. Une comparaison des résultats du modèle LRAIC en Belgique et aux Pays-Bas est, à cet égard, très illustrative : la différence des résultats entre le modèle LRAIC et LRIC en Belgique est de l'ordre du quadruple (1 cent pour le LRIC pure et 4 à 5 cents pour le LRAIC). Au Pays-Bas, la différence est de l'ordre du double (1 cent pour le LRIC pure et 2 cents pour le LRAIC). Ceci illustre l'impact des économies d'échelles possible dans le marché géographique concerné : plus le marché est petit, plus la différence entre le LRIC pure et LRAIC est importante.

Finalement, le modèle LRAIC doit tenir compte de la réalité économique et donc des économies d'échelles des différents opérateurs du marché luxembourgeois. Il en ressort qu'une asymétrie entre POST et ORANGE d'un niveau bien plus important que celui existant actuellement (de 28% aujourd'hui nous devrions aboutir à une asymétrie de 50% entre POST et ORANGE) doit être prévue afin de tenir compte de l'absence d'économies d'échelle substantielles pour ORANGE.

Il apparaît dès lors que cette analyse d'opportunité entre les différents modèles de coûts est cruciale afin d'assurer la légalité des charges de terminaison au Luxembourg. Pour le surplus, quant au modèle de coûts LRIC pure analysé par le consultant WIK pour le Luxembourg, ORANGE ne dispose pas à ce stade d'information suffisante et ne peut dès lors pas soumettre des commentaires détaillés.

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<sup>4</sup> Le modèle de coûts LRIC fondé sur un opérateur efficace hypothétique avec des parts de marché de 33% sur le marché luxembourgeois, aboutira à ce que POST puisse appliquer des tarifs de terminaison proche de (ou même supérieur à) ses coûts (puisque avec 52% de parts de marché, il est capable de réaliser de plus grandes économies d'échelle que l'opérateur efficace hypothétique) et ORANGE, avec 16% de parts de marché, se verra obligé d'appliquer des tarifs de terminaison largement inférieurs à ses coûts

<sup>5</sup> Le régulateur s'est fondé sur le fait que les consommateurs retireraient plus d'avantages si les MTRs étaient fondés sur le LRAIC que le LRIC pure parce que les coûts LRIC pure ne permettent pas de recouvrer tous les coûts et que l'excédent non recouvré sera répercuté sur les prix de détail. Cullen, Big Five - April 2012, Germany



**Institut Luxembourgeois de  
Régulation**  
Attention de Monsieur le Directeur  
Paul SCHUH

17, rue du Fossé  
L-2922 Luxembourg

Bertrange, le 21 janvier 2014

Par courrier simple et par mail : [costmodel@ilr.lu](mailto:costmodel@ilr.lu)

**Objet: Demande d'avis relative au projet de l'élaboration d'un modèle de coûts pour la détermination des taux de terminaison d'appel mobile (MTRs) au Luxembourg**

Monsieur le Directeur,

Par la présente, nous répondons à la demande d'avis relative au projet d'élaboration d'un modèle de coûts pour la détermination des taux de terminaison d'appel mobile (MTRs) au Luxembourg.

Tango remercie l'ILR pour cette consultation mais se limitera à quelques commentaires. Nous sommes ainsi d'avis qu'au stade des informations transmises à savoir une présentation du 10 décembre 2013 lors d'une réunion avec le consultant WIK et les opérateurs ainsi que le document WIK de novembre 2013 « Development of a Bottom-Up Mobile Network and Cost Model for the Determination of the Cost of Terminating Calls in Mobile Networks », nous ne sommes pas en mesure de nous prononcer. En effet, il nous paraît tout à fait impossible de pouvoir juger de la validité du modèle au vu des seules informations transmises. Cet exercice ne peut se faire qu'après analyse et qu'après la détermination des paramètres économiques représentatifs pour un opérateur hypothétique efficient sur le marché luxembourgeois, ce qui laisse d'être le cas en l'espèce. Le timing et le support transmis pour la présente consultation ne plaide pas en faveur de la transparence requise. De trop nombreux points restent encore, de notre point de vue, sujets à question.



*En premier lieu*, il nous semble primordial et impératif que les éléments ayant un impact majeur sur le résultat final soient testés, ce qui n'est pas le cas pour l'heure. Ainsi et à titre d'exemple :

- s'il est vrai que les consultants du Cabinet WIK ont repris le modèle utilisé en Allemagne et en Autriche, le seul avantage est ici pour nous de disposer d'une base et d'une certaine maturité du modèle sous-jacent. En revanche, cela n'assure absolument pas la prise en compte des adaptations notamment techniques à apporter au modèle choisi pour être en cohérence avec les spécificités du marché luxembourgeois ;
- il convient encore d'appréhender comment seront intégrés les paramètres économiques d'importance tels que les prix unitaires des équipements, l'évolution des parts de marché (en tenant compte par exemple du nouvel opérateur entrant), les volumes de trafic mobile, etc... et de les tester ;
- il est enfin essentiel de prévoir, dans le cheminement de l'introduction du modèle de coût final, une étude de sensibilité de ces paramètres afin de s'assurer de la cohérence du modèle dans son intégralité. Nous requérons formellement la mise en place d'une telle mesure.

*En second lieu*, nous souhaitons commenter spécifiquement l'utilisation des benchmarks européens à défaut des données réelles soumises par les opérateurs luxembourgeois. Ce n'est en effet qu'après avoir assuré le respect des étapes cruciales reprises ci-dessus que les résultats du modèle pourront le cas échéant être comparés, sinon recoupés avec les benchmarks européens et ce dans le seul but, d'éviter tout déséquilibre important au niveau des flux financiers internationaux, sinon pour produire des « résultats aussi fiables que possible » selon les prescriptions des recommandations de la commission du 7 mai 2009 sur le traitement réglementaire des tarifs de terminaison d'appels fixe et mobile dans l'UE. La procédure ne peut être inverse : les MTR luxembourgeois doivent être en premier lieu, calculés suivant les paramètres fournis par les opérateurs luxembourgeois pour tenir compte justement des spécificités locales. Sans quoi tout cet exercice n'aurait aucun sens, sinon cela reviendrait à mettre en place un modèle visant à seulement établir un benchmark des MTR européens, ce qui n'est pas ici le scope. De plus, cela induirait des écueils dramatiques. A titre d'exemple, au niveau des prix unitaires : le risque serait une sous-estimation des prix unitaires en utilisant ceux d'un opérateur international majeur avec un grand pouvoir de





négociation comme benchmark, ce qui ne peut être pas le cas pour un opérateur de la taille du Luxembourg. Au niveau des « busy hours traffic » : ceux-ci diffèrent pour chaque pays, voire même pour chaque région dans certains pays, suivant le degré de concentration de l'activité économique et selon le nombre d'heures de travail du pays de référence. Donc utiliser un benchmark étranger serait un réel non-sens. Nous sommes dès lors dans l'attente légitime de la détermination d'une valeur MTR finale reflétant les caractéristiques d'usage et de géographie *atypiques* du Luxembourg, ainsi que de la prise en compte des faibles possibilités d'économies d'échelle (comme c'est le cas au Portugal par exemple).

*Enfin*, nous nous posons la question de l'intégration ou non de la technologie 4G dans le modèle en cause, le cabinet Wik ayant pris le parti de l'exclure. Cette question avait été soulevée lors de la réunion du 10 décembre 2013. Nous tenons à rappeler les dispositions des recommandations de la commission du 7 mai 2009 à ce sujet : « *Le modèle de calcul des coûts doit reposer sur les choix technologiques efficaces qui sont disponibles dans les délais prévus par le modèle, dans la mesure où ils peuvent être identifiés. (...)* ». Bien que les textes ne parlent que d'une « combinaison 2G et 3G » pour le réseau mobile, il ne faut pas perdre de vue que cette recommandation date de 2009, à un moment où la 4G n'était pas encore disponible en Europe. Dès lors, une lecture correcte de cette recommandation nécessiterait une approche « forward-looking ». Or, en 2014, le LTE est bel et bien un choix technologique efficient à prendre en considération dans le déploiement du réseau mobile, et donc pourrait le cas échéant être intégré dans le modèle de coûts MTR. D'ici quelques années, la voix sur LTE (VoLTE) deviendra le moyen standard pour offrir un service vocal pour les utilisateurs d'un terminal mobile 4G. Il serait dès lors attendu que le cabinet WIK justifie de son choix alors que deux pays majeurs l'ont inclus, sans que la commission n'émette de critique à ce sujet.

Pour autant que de besoin et pour conclure, nous réitérons ici nos commentaires sur l'absence de justification du caractère limité des ressources dont dispose l'ILR et le besoin d'une période transitoire pour élaborer le modèle recommandé de calcul des coûts (suivant consultation de novembre sur le marché 7 et le règlement du 6 janvier 2014) alors que nous estimons que l'ILR n'a pas justifié du respect du point 12 de la Recommandation de la Commission 2009/396/CE du bien-fondé des « circonstances exceptionnelles » ne le rendant pas à même de finaliser à temps le modèle recommandé de calcul des coûts.



Veillez agréer, Monsieur le Directeur, Cher Monsieur SCHU, l'expression de nos salutations distinguées.



Didier ROUMA  
CEO

A handwritten signature in blue ink, consisting of several vertical strokes and a horizontal line, enclosed within a large, loopy oval shape.