INSTITUT LUXEMBOURGEOIS
DE REGULATION

Projet de l'élaboration d'un modèle de coûts mobile

Réponse aux contributions soumises à la demande d'avis
menée du 21 novembre 2013 au 21 janvier 2014

Version publique

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Preliminary Observations

The current document sets out the ILR's response to the comments provided by stakeholders in response to the call for inputs on the Reference Document "Bottom-Up Mobile Network and Cost Model for the Determination of the Cost of Terminating Calls in Mobile Networks". The stakeholders were invited to submit their comments until 21st January 2014.

As a follow-up to the call for inputs, the ILR decided not to address further changes in the Reference Document. Therefore, the ILR's response has to be considered as additional information to the Reference Document.

Stakeholders comment	ILR response
Comments in relation with market analyses	The objective of this consulation concerned only the setting up of a cost model for mobile termination rates. Therefore, all comments regarding market analyses have not been taken into account.
General Comments – Overview • More transparency should be provided.	• Given the large amount of detail taken into account in the model, the documentation provided in the call for inputs focussed on the most relevant parts for stakeholders to comment on. • The ILR considers that the published reference document contains sufficient transparency for stakeholders to be able to assess the methodology and the main assumptions of the model. The model itself as well as the results were not covered by this call for inputs. As noted in the stakeholders meeting on 10th December 2013, stakeholders will be granted access to the model in the premises of ILR as part of a separate consultation on the price setting for call termination rates.
General comments – Mobile network cost model by one stakeholder • The results of the model to be developed by ILR should provide similar results as the model developed by one of the stakeholders. If there are significant differences in the model results, ILR should investigate the differences together with the stakeholder.	• There are a number of reasons why the results of ILR's BU LRIC model and of the stakeholder's model would not be expected to fully reconcile with each other. Furthermore, the ILR's BU-LRIC model considers an efficient network operator in Luxembourg rather than a stakeholder's current network.

General comments – Data • The ILR's consultant did not ask operators specific data regarding their networks, their design rules, their equipment, their topology and their costs	• ILR requested stackholders to provide information on their networks. Unfortunately this data request had only limited feedback. • However, additional and detailed information will be requested from operators as input data for the model.
General comments – Source of the asset cost data • To avoid underestimating the cost incurred by Luxembourg operators through the use of international benchmarks or the database of ILR's consultant, cost data from the operators should be requested and used in the model.	• Before the model is going to be applied as well as used to calculate the cost of termination, operators will be requested to submit detailed information, e.g. in relation to the cost of facilities and equipment.
Background, requirements and specifications – Overview • The approach based on C++ leads to a high degree of complexity which is: ▪ Different from other practices, ▪ Not transparent, and ▪ Not user friendly.	• ILR selects the methodology for its own bottom-up model to determining the cost of termination. The published reference document sufficiently describes the model in a transparent way. • The use of C++ allows a faster calculation processing and therefore provides a certain efficiency. An approach based, for example, solely on MS Excel that would implement comparable optimisation algorithms would lead to an increased software processing time and therefore decrease the efficiency of the model. Nevertheless the model remains user friendly, since all parameters can be entered through an Excel interface and the results can be verified on an Excel based output.

Background, requirements and specifications – LTE • The model should include LTE technology, since it is already being deployed and fees are being paid for it.	• Since LTE is currently and in the near future used exclusively for data, the related costs would also exclusively have to be assigned to data services. This also applies to the spectrum fees. • In this context, it is necessary to remember the philosophy of pure LRIC as stated in the Commission recommendation from 7th May 2009[1]. Only the incremental cost actually caused by providing termination has to be considered as the cost of that service. If, as stated above, LTE is not used for the provision of voice and therefore termination of calls, none of its cost should be borne by or allocated to termination.
• By relieving the 2G and 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 argument is misleading since releasing 2G and 3G base stations of data traffic leaves those same base stations with more capacity to carry voice traffic so that the provision of termination can often be provided with capacity not used anymore by data services. So costs should be less traffic sensitive.

[1] Reference to EC Recommendation: Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, (2009/396/EC); available online http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:124:0067:0074:EN:PDF

Background – Model granularity • The threshold effects lead to the overestimation of the number of base stations required to meet the coverage constraints.	• In Figures 4 and 5 one of the stakeholder's comments claim to see the effect of subdividing zones into up to 3 sub-zones and that this leads to an overestimation of the number of base stations. This claim misrepresents the deployment of base stations both in reality and as carried out by ILR's model. Most zones will be subdivided into only 2 sub-zones; only one zone will have 3 sub-zones. Each of the sub-zones identified by the model has generally a larger area than the largest area covered by the type of base station required for that sub-zone. So there are always several base stations in a particular sub-zone. • In order illustrate the above statement: There will be about 30 zones which are subdivided into about 45 sub-zones. From this follows that many zones are not subdivided at all and are either only densely, medium densely or sparsely populated. When there is a subdivision, then in most cases there are two zones. The average size of a sub-zone is larger than 50 km^2. In each sub-zone there are in general several base stations. This means that the "threshold" problem referred to does not arise.
Background – Model granularity (continued) • ILR should define geo-types based on population density analysis.	• The model considers geo-types based on population density and topographical classification.

Background – Migration model • The mobile network should be dimensioned based on the busy hour of each base station and not on the network busy hour • Traffic volumes resulting from this model should be cross-checked with operators' traffic. • Shopping malls and big schools should be identified	• The model does not base its cell deployment on the network busy hour but on the busy hour of each sub zone. • Dimensioning the network based on the actual number of users in each sub-zone and the demand these users generate, enables the definition of the type and quantity of the necessary equipment according to the efficient provision criterion. • Operators will be requested to submit additional information concerning traffic data. This information will be used to derive the average traffic per user for voice, SMS and data services. • The model has been updated according to the input from stakeholders.

Background – Characteristics of different services • The figures in table 2-6 and in table 2-7 of the Reference Document do not reflect the figures provided by the operators. Real figures provided by the Luxembourg mobile operators should be used. • The information about commuters from neighbouring countries in Table 2.1 of the Reference Document is not complete. • The information in table 2.4 is based on data published in 2003.	• The figures in tables 2.6 and 2.7 of the Reference Document are used for illustrative purposes only. • The demand of commuters from abroad that do not have a SIM card from a Luxembourg operator will be reflected in the model as the demand of international roamers. The default assumption in the model is that international roamers coming into and leaving Luxembourg cancel each other. If it is the case that on balance there are more incoming roamers, the demand of these will be added to that of local users. The operators will be invited to provide the corresponding data. • The service categories defined in the reference document in table 2.4 are in relation to the definitions of the UMTS Forum Report 33 of 2003. These definitions are still used by the UMTS Forum in Report 44 of 2011 "Mobile Traffic Forecast 2010-2020 report".
Background – Frequency availability and use • 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).	• The model uses both frequency bands to deploy GSM, single-band or dual-band mode. In case of a large demand for traffic, the model deploys a two layer network, applying spectrum from both frequency bands, if this minimizes cost. The corresponding sub-zones are normally urban and other high density sub-zones.

Network design and dimensioning – RAN equipment • The use of macro cells would significantly increase the number of base stations needed to reach coverage requirement.	• Irrespective of the terminology used, the essential feature of a base station that determines its radius is the height of the carrying infrastructure. In case of what we call a macro cell, this carrying structure will be a tower of approximately 30 m. In case of a pico cell, it will be a smaller structure on a building with an equivalent height. For micro cells it will be something equivalent again of the same height. So the requirement of assuring cell radii make use of the full coverage potential is always fulfilled. Pico cells that are coverage driven may also be relatively large.
Network design and dimensioning – Cell deployment for 2G • Operators' data should be used to set real world utilisation rates.	• The comment implies that the model installs base stations with fixed utilisation rates. This in turn implies that any change in volume, due to termination, would require the addition of extra base station equipment since the utilisation rates of already installed equipment could not be changed. This would be a very arbitrary specification of base stations, since there are certainly base stations in low demand areas with low utilisation rates that should be allowed to fill up with increasing demand before new base stations are installed. • In the model, in case of coverage driven cells, utilisation rates are the result of the interplay of density of demand and size of the cells according to propagation properties.

Network design and dimensioning – Cell deployment for 3G • Operators' data should be used to set real world cell radii and utilisation rates.	• Using real world cell radii and utilization rates would replicate an exact copy of the operator's existing network. It cannot be assumed that this would reflect an efficient network. • Regarding 3G it can be said that the maximum load of a 3G cell is normally considered between 50% and 75% of the total capacity of a 3G cell. This percentage can be set by a parameter in the model.
Network design and dimensioning – Signalling • Out of the 8 channels in a TRX, one is used for BCCH, one for SDCCH and one for GPRS. • An element which needs further information is to explain "32" time slot as this means 4 TRX which cannot be deployed in reference to the described preconditions.	• This approach appears to be inefficient. Reserving one slot for signalling and another one for handover, as done in the model for the reference network, is more than sufficient to provide the required capacity. There is no need to reserve a third channel for the signalling purposes of GPRS. • In the fixed network part of the tool, the E1 configuration is used to connect the 2G network equipment (base stations to the controller). In this case the typical configuration of one E1 trunk is 32 channels or slots of 64 kbps, which turns into a total bandwidth of 2 Mbps. One of those 32 channels of 64 kbps is reserved for signalling purposes.

Network design and dimensioning – Aggregation network • The number of controllers (BSC and RNC) and therefore the number of controller locations should be part of the model and not a parameter as stated by ILR consultants. • The number of BSC and RNC should be based on operators' design rules. • 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.	• Considering the numbers of controller locations and controllers as part of the model, i.e. as an endogenous result of the model, would make the model more "theoretical" than needed, something that one of the stakeholders has deplored in its comments. • For the specification of the aggregation network, the model takes into account operators' parameters by providing the number of controller locations and their geographical distribution. • The values in table 3-1 refer to transmission systems between cell hubs and controller locations, while the values mentioned in section 3.2.2.2.1 refer to transmission systems between cell sites and cell hubs. One would expect the former to be of higher capacity than the latter. In any case, the bandwidths used can be adapted to the actual operators' systems.

Network design and dimensioning – Backhaul network • The location of core nodes is not the same as the location of controller nodes. • Regarding the different types of BSC, it should be noted that one of the operators 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 dimensioning of the BSC should furthermore include a realistic utilisation rate based on operators' data. The proposed value of 80% is overestimating the utilisation rate applied by stakeholders. The ILR should update it with operators' data.	• Core node locations are generally installed in high density areas; often together with a fixed network operator in the buildings of the local switch. A hypotectical efficient operator would also install in this place BSC and RNC equipment. • The capacity values and utilisation rates of the BSC and RNC are input parameters and can be based on information provided by the operators. As mentioned earlier operators will be requested to submit additional relevant information, such as the capacity of controller facilities.
Network design and dimensioning – Core network • The capacity of the core network assets shall be documented. The utilisation ratio shall be based on operators' data.	• The capacity values of the core network facilities are an input parameter and can be based on information provided by the operators. As mentioned earlier, operators will be requested to submit additional relevant information.
Cost determination – Requirements for determining cost in the model • It is requested that cost data provided by operators should be used.	• Mobile network costs are mainly driven by the capital expenditures (CAPEX) on network facilities. Operators are going to be requested to provide their data on these investment costs. International benchmarks will be used for validation purposes and if no such information is forthcoming from the operators.

Cost determination – Annualised CAPEX • The formula used to compute the annuities should be provided. • The annuities should allow to recover the cost of working capital.	• The annuity formula is provided on page 70 of the Reference Document. The specification of the formula will depend on the values of the WACC, the economic lifetime of the facilities, the expected changes in the prices of network facilities as well as on the expected growth rate of services. The WACC will be determined by ILR. Regarding the other three parameters, operators will be requested to provide their information. International benchmarks will be used for validation purposes and if no such information is provided by the operators. • The cost of financing facilities, due to the fact that it takes time to install them, should be included in the initial cost of installing those facilities, i.e. should be included in the amount to be recovered by the annuities. When providing data on these costs, stakeholders will be requested to differentiate between cost categories.
Cost determination – OPEX • The mark-ups for OPEX should be based on Luxembourg operators' data instead of ILR's consultants own data.	• Operators will be requested to provide their data on OPEX. International benchmarks will be used for validation purposes and if no such information is provided by the operators.

Cost determination – Special aspects of cost estimation • The model should include a factor based on real world data on rental cost to reflect the scarcity of sites. • The overhead costs directly associated with the mobile termination include the cost of interconnection staff. • Also the cost of the E1 links used for interconnection should be included.	• Operators will be requested to provide information on the cost of sites to be used as input into the model. • Operators will be requested to provide relevant information on this cost. • The cost of E1 links used for interconnection between different networks is used for outgoing traffic as well as for incoming traffic (termination). The model considers this cost as fixed that does not vary with termination. This fixed cost can be entered into the model; the relevant information will be requested from the operators.
Appendix • For each of these parameters, a sensitivity analysis should be carried out.	• Before application of the model for determining the cost of termination, there will be sensitivity analyses by varying the values of essential parameters.