



هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

Development, implementation and use of bottom-up fixed and mobile network cost models in the Kingdom of Bahrain

A report summarising and addressing the responses on the consultation document issued by the Telecommunications Regulatory Authority

19 October 2011

Ref: MCD/10/11/143

Purpose: To summarize and addresses the responses received by the Authority to its consultation on the proposed approach for the development, implementation and use of bottom-up fixed and mobile network cost models in the Kingdom of Bahrain.

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List of acronyms

Batelco	Bahrain Telecommunications Company B.S.C
BIPT	Institut Belge des Services Postaux et de Télécommunications (Belgian telecommunications regulator)
BU	Bottom-Up
CAPEX	Capital Expenditure
CAT	Customer Access Tail
ComReg	Commission for Communications Regulation (Irish telecommunications regulator)
DSL	Digital Subscriber Line
EPMU	Equi-proportionate mark-up
ERG	European Regulators Group
FAC / FDC	Fully Allocated Cost / Fully Distributed Cost
FTTB	Fibre to the building
FTTH	Fibre to the Home
FTTx	Fibre to the x (Generic name for fibre access network architecture)
GPON	Gigabit Passive Optical Network
GSM	Global System for Mobile (2G)
HLR	Home Location Register
LLCO	Local Leased Circuit for OLO
LLU	Local Loop Unbundling
LRAIC / LRIC	Long Run Average Incremental Cost / Long Run Incremental Cost
LRIC+	LRIC plus mark-up for non-network common cost
LTE	Long Term Evolution
MDF	Main Distribution Frame
MHz	MegaHertz
MPLS	Multiprotocol Label Switching
MTR	Mobile Termination Rate
MVNO	Mobile Virtual Network Operator
NBN	National Broadband Network
NGA	Next Generation Access
NGN	Next Generation Network
NRA	National Regulatory Authority
Ofcom	Office of Communications (UK telecommunications regulator)
OLO	Other Licensed Operator
OPEX	Operating Expenditure
P2P	Point-to-point
PSTN	Public Switched Telephone Network
PTS	Post and Telestyrelsen (Swedish telecommunications regulator)
SDH	Synchronous Digital Hierarchy
SLU	Sub Loop Unbundling
SMP	Significant Market Power
UMTS	Universal Mobile Telecommunications System (3G)
WACC	Weighted Average Cost of Capital

1 Introduction

1. On 19 May 2011, the Telecommunications Regulatory Authority of Bahrain ('the Authority') published a draft Position Paper for consultation titled "Development, implementation and use of bottom-up fixed and mobile network cost models in the Kingdom of Bahrain" under the reference MCD05/11/064 (the 'consultation document'). In the consultation document, the Authority presented for comment its initial views on a number of key issues relating to the development, implementation, and use of bottom-up cost models. The consultation document posed a number of questions relating to various elements of the proposed approach for the development, implementation, and use of bottom-up cost models.
2. In response to the consultation document, the Authority received submissions from the following four operators:
 - a. Batelco Telecommunications Company B.S.C. ('Batelco');
 - b. Lightspeed Communications W.L.L. ('Lightspeed');
 - c. MTC-Vodafone Bahrain B.S.C. ('Zain'); and
 - d. STC-Bahrain ('Viva').
3. The current report summarizes the submissions received by operators and provides the Authority's views and conclusions on the arguments and issues raised in those submissions. The remainder of this document is structured as follows:
 - a. for each of the 26 questions raised in the consultation document, the operators' responses are summarised and the Authority's consideration and position in respect of those responses is set out; and
 - b. an additional section summarizes all the other comments raised by the respondents, along with the Authority's views and position in respect of those comments.

2 Main changes made to the Authority's draft Position Paper as a result of the consultation

4. Based on the comments received on the consultation document, the Authority has modified the Position Paper as follows:
 - a. **Long Term Evolution ('LTE')**: in case the LTE technology is commercially launched and deployed to a significant extent between 2011 and 2015, the Authority will consider updating the model to include this technology in the modelled radio access network.
 - b. **Core network to be modelled**: Batelco has indicated that there is a separate SDH network for the provision of certain leased line services and this has been reflected in the Position Paper.
 - c. **GPON fibre deployment**: a P2P deployment will be modelled. For informational purposes, the Authority will undertake an 'ad hoc' assessment of the cost of a GPON deployment (expressed as a factor of P2P cost based on an international benchmark).
 - d. **Licence costs of the generic operator**: the Authority has modified the Position Paper to include two options for licence costs in the 'generic operator' model: average licence costs and latest entrants' licence costs. In any case, the models will be flexible enough

to test several levels of licence costs and therefore to enable sensitivity analysis for this parameter.

- e. **Yearly approach:** the Authority remains of the view that the “yearly approach” should be used for the purpose of optimising the dimensioning of the network. However, the model will be flexible enough to perform sensitivity analyses on different traffic inputs. As such, it will be possible to assess the impact of decreasing traffic on costs.
- f. **Treatment of OPEX with the adjusted tilted annuity methodology:** the Authority has specified in the final Position Paper that it may account for projected opex trends in the adjusted tilted annuity formula, if relevant.
- g. **List of services:** following responses to the consultation document, the Authority has updated the list of services provided in Table 4 of the draft Position Paper to reflect operators’ comments as appropriate.
- h. **Structure of BU models:** the Authority added in the final Position Paper that overhead costs are allocated at the “OPEX calculation” step.
- i. **Project timeline:** in light of operators’ responses, the Authority has reviewed the timelines of the project and now anticipates that:
 - i. Step 1 (data collection) will occur in Q4 2011,
 - ii. Step 2 (model implementation) will occur in Q4 2011,
 - iii. Step 3 (model validation) will occur in Q1 2012 and possibly Q2 2012.

3 Responses to the consultation document and the Authority’s views

5. In this section, the Authority summarizes, for each of the 26 questions listed in the consultation document¹, the comments received by the 4 respondents. The Authority also shares its view on each of these comments.

Question 1:

Do respondents agree with the Authority’s preliminary view to implement both pure LRIC and LRIC+ approaches for services handled by the fixed core and the mobile networks? Please elaborate.

Table 1. Summary of responses from stakeholders and the Authority’s position on Question 1

Respondent	Comments received	The Authority’s view & position
Batelco	Batelco supports the Authority’s view that both pure LRIC and LRIC + should be modelled for services handled by the fixed core and the mobile networks.	No comment.
	Batelco underlines that in several cases, the use of tariffs resulting from pure LRIC can have negative consequences on competition: it can lead to distortions of market signals since retail services need to recover the costs not supported by services priced on a pure LRIC basis; low termination rates can lead to higher retail prices; low termination rates can give rise to “hot potato routing”; and low termination rates combined with high origination retail prices can lead to arbitrage opportunities for third parties.	The Authority agrees with Batelco’s view that the pure LRIC cannot be used in every situation (see paragraph 78 of the consultation document in which it is explained that for services which account for a considerable proportion of traffic, pure LRIC is not appropriate as it could lead to cost recovery issues). At this stage, both approaches will be modelled (for some services) for informational purposes. The actual choice of pure LRIC or LRIC+ or a combination of both will be defined in the context of specific decisions (e.g. when MTRs are reviewed).

¹ The Authority also takes into account additional comments from operators at the end of this document.

	Batelco supports the Authority's view that the TELRIC approach should be implemented for the access network.	No comment
Lightspeed	Lightspeed supports the Authority's view that both pure LRIC and LRIC+ should be modelled for services handled by the fixed core and the mobile networks.	No comment.
VIVA	VIVA supports the Authority's view. In particular, VIVA explains that using the pure LRIC approach for setting mobile call termination charges reduces significantly any present or future concerns about on-net/off-net price discrimination.	No comment.
	VIVA is of the view that the pure LRIC approach should at least be implemented for mobile and fixed call termination services. Viva considers that it would be informative to undertake a pure LRIC calculation for all other cost-based regulated services including services which account for a considerable proportion of traffic (e.g. leased lines, broadband access).	As explained in the consultation document, the use of the pure LRIC approach is problematic for services which account for a large proportion of traffic, since pure LRIC-based prices for these services would not allow operators to recover their costs. In addition, a pure LRIC approach would lead to the model being much more complex. The Authority therefore disagrees with VIVA's comment and maintains its view expressed in the consultation document. The Authority's view is consistent with international practice.
Zain	Zain considers that LRIC+ is the only approach that should be implemented in the model as pure LRIC would lead to cost under recovery issues.	Using the pure LRIC approach for a given service does not necessarily lead to cost recovery issues as joint and common costs can be recovered by other services. However, all approaches are modelled for informational purposes at this stage. The Authority would like to emphasise that no decision has been made regarding the use of the pure LRIC approach for the setting of regulated charges.
	Zain is concerned that the Authority intends to apply the pure LRIC approach to fixed core and mobile networks but not to fixed access network services. Zain explains that the argument used by the Authority	The Authority disagrees with Zain's view and believes Zain has misunderstood the Authority's statements and in particular paragraph 259 ² . Indeed, paragraph 259 of the consultation document does not

² Paragraph 259 of the consultation document states: "In summary, bottom-up models are very useful to send 'build or buy' signals and to ensure that there are incentives to build efficient alternative infrastructure. This is why bottom-up cost models are often used to set regulated tariffs in the context of fixed core networks and mobile networks for

to limit the application of the pure LRIC approach to fixed access network on the basis that the access network is not easily replicable is also valid for mobile networks services. As a result, Zain advocates that only the LRIC+ methodology should be considered.

discuss the choice between pure LRIC and LRIC+ but rather the choice between bottom-up and top-down models. In the consultation document, the Authority has stated that in some cases the use of a top-down model could be more relevant than a bottom-up model for the setting of prices. Even if the Authority were to consider that more weight should be given to top-down model results when reviewing and setting the regulated charges of fixed access wholesale services (which is not yet determined), the Authority still intends to develop a bottom-up model for fixed access networks.

Also, in so far as all the costs of the access network are specific to the access network (i.e. there is no or marginal sharing of cost between the core and access), the choice between pure LRIC and LRIC+ is a false choice as the pure LRIC and the LRIC+ approach would give similar outcomes.

Source: The Authority from the operators' submissions

Conclusion

6. The Authority remains of the view that both the pure LRIC and LRIC+ approaches should be implemented for services handled by the fixed core and the mobile networks.

which alternative infrastructures exist. However, there may be some cases where the emergence of infrastructure-based competition is not possible because the network is not economically replicable (for example, it could be the case for ducts) and where sending appropriate 'build or buy' signals is not required because alternative operators are unlikely to deploy alternative infrastructure. In such cases, the main regulatory objective could be to ensure that the company owning the bottleneck network does not realise excessive profits and does not over-recover cost. In this context top-down models may be more aligned with the regulatory objective. This would result in the efficient use of the existing infrastructure."

Question 2:

Do respondents agree with the Authority’s preliminary view to implement both the required capacity and the Shapley-Shubik allocation methods for joint and common network costs in the bottom-up models? Please elaborate.

Table 2. Summary of responses from stakeholders and the Authority’s position on Question 2

Respondent	Comments received	The Authority’s view & position
Batelco	Batelco explains that the required capacity approach is more “tried and tested” and is the common practice in bottom-up models while the Shapley-Shubik increases the complexity and expected time to prepare such models. Batelco however notes that these two methods can provide very different results, which means that having these two methods provides a degree of flexibility.	The Authority considers that the Shapley-Shubik approach will not significantly increase the complexity of the models. The Shapley-Shubik approach will only require running several times the existing models.
Lightspeed	Lightspeed supports the Authority’s view.	No comment.
VIVA	VIVA’s view is that only the capacity-based allocation should be implemented in the bottom-up models because the implementation of the Shapley-Shubik approach would lead to unnecessary complications and to a reduction of the transparency of the models.	The Shapley-Shubik approach will not significantly increase the complexity of the models. The Shapley-Shubik approach will only require running several times the existing models. The implementation of the Shapley-Shubik approach will not reduce the transparency of the models since it will be visible to operators.
	VIVA indicates that the Authority’s reference to the required capacity allocation method is not clear. VIVA explains that it understands it as a method for the allocation of common network costs according to capacity-based traffic routing factors. VIVA expects the routing factors used in the bottom-up models to be consulted upon with the sector.	The Authority confirms VIVA’s understanding on the required capacity allocation method. Routing factors will be discussed with operators during the data collection and the model validation stages.
Zain	Zain supports the Authority’s view. Zain indicates that the Shapley-Shubik approach should be incorporated in the models as an option and that this approach should be discussed with operators prior to incorporation.	The Shapley-Shubik approach will be an option in the model. It will be incorporated in the model and operators will be able to review the models and comment on them.

Zain adds that Shapley-Shubik should only be used when it provides better results than the required capacity method.

Source: The Authority from the operators' submissions

Conclusion

7. The Authority remains of the view that both the required capacity and the Shapley-Shubik allocation methods should be implemented in the bottom-up models for joint and common network costs.

Question 3:

Do respondents agree with the Authority's preliminary view to allocate un-attributable costs (non-network common costs) on the basis of the EPMU approach? Please elaborate.

Table 3. Summary of responses from stakeholders and the Authority's position on Question 3

Respondent	Comments received	The Authority's view & position
Batelco	Batelco explains that there are theoretical merits in adopting Ramsey-Boiteux pricing for allocating un-attributable costs because it is the economically optimal approach. Batelco suggests that benchmarks could be used when input data are not easily available and therefore asks the Authority to reconsider the use of Ramsey-Boiteux pricing.	<p>While Ramsey-Boiteux is the theoretically optimal approach from an economic welfare stand-point, it has not been fully implemented in practice in the telecommunications sector for a number of reasons, because of informational and computational challenges as well as the risk of errors it carries. This has been recognised by many regulatory authorities and economists:</p> <ul style="list-style-type: none">- Ofcom stated in March 2011: <i>"Consistent with the view reached in other proceedings, full application of Ramsey pricing is computationally very difficult and highly prone to regulatory error"</i> and added <i>"mobile markets (including MCT) are not easily amenable to Ramsey pricing analysis"</i>.³- <i>"Academic economists and policymakers both often argue that regulators do not have the information to set Ramsey prices"</i>⁴- <i>"While regulators could try and approximately implement such global Ramsey pricing formulas, there have been no known attempts to do so"</i>⁵.- <i>"This requires a substantial amount of information, particularly as the impact of one service's price on the demand for other</i>

³ Ofcom, Wholesale mobile voice call termination Statement, March 2011

⁴ Laffont J-J., Tirole J. (2000).

⁵ Vogelsang I. (2006).

services has to be taken into account. It is also very important that market rather than company elasticities of demand are used to set prices, because otherwise all the shared and common fixed costs end up being recovered from services where there is little or no competition.”⁶

These quotations are only some examples of the consensus around the impracticality of Ramsey-Boiteux pricing, especially in the context of the telecommunications sector in which a large amount of different products is sold. In a context of the development of bundle offers and of the very frequent launching of new offers, it would be extremely difficult to find studies enabling the calculation of price-elasticities in the specific case of Bahrain that could be used for Ramsey-Boiteux pricing. Implementing Ramsey-Boiteux pricing would generate a high risk of regulatory error.

Further, the amount of un-attributable costs should not represent a large amount of total costs, which implies that this issue is less relevant in the present context.

Lightspeed	Lightspeed supports the Authority’s view. Lightspeed indicates that when the pure LRIC approach is preferred for a given service, no un-attributable costs must be allocated to this service.	No comment.
	Lightspeed adds that the EPMU percentage should be kept between 5 to 12% in order to minimize the consumption-distorting effect of raising prices too much above marginal costs. Lightspeed indicates that the EPMU percentage was 6% in Jordan for interconnection.	The Authority will endeavour to allocate to the different services as many types of costs as possible, and to minimise the amount of cost to be allocated using the EPMU approach. The Authority notes that the rule set out in the Accounting Separation Regulation dated 2 August 2004, whereby the un-attributable costs that are allocated by the EPMU method shall represent less than 10% of overall costs, has been adhered to by Batelco in its prior submissions of separated regulatory accounts.
VIVA	VIVA agrees with the Authority’s proposed approach. VIVA would expect the relevance and magnitude of each and any	

⁶ Office of the Director of Telecommunications Regulation (“ODTR”) (Comreg predecessor), Decision D8/01.

	potential overhead cost to be discussed in detail during the later phases of this bottom-up LRIC modelling process.	Comment noted.
Zain	Zain supports the Authority's view.	No comment.

Source: The Authority from the operators' submissions

Conclusion

8. The Authority remains of the view that the EPMU approach should be used for allocating un-attributable costs. The Authority will review carefully the relevance and magnitude of un-attributable costs to make sure they remain a relatively small share of total costs.

Question 4:

Do respondents agree with the choice of the scorched node approach for bottom-up cost models? Please elaborate.

Table 4. Summary of responses from stakeholders and the Authority’s position on Question 4

Respondent	Comments received	The Authority’s view & position
Batelco	Batelco supports the Authority’s view.	No comment.
	Batelco anticipates that the risk of detecting obvious inefficiencies with a scorched node approach is relatively low thanks to a) the geographic size of Bahrain which encourages economies of density and minimizes the risk of inefficient deployment and b) the regulations related to mast sharing which encourage operators to optimise base station usage and sharing.	The Authority considers that it would still be important to look at potential inefficiencies when implementing the scorched node approach.
Lightspeed	Lightspeed supports the Authority’s view and proposes that potential inefficiencies should be addressed (which could lead to a simplification in the switching hierarchy).	As explained in the consultation document, in the event that obvious inefficiencies are observed, adjustments could be made in accordance with best practices.
VIVA	VIVA supports the Authority’s view and expects all efficiency adjustments to be described in detail in the documentation accompanying the draft model.	The Authority will describe any potential efficiency adjustment in the documentation accompanying the draft model.
	VIVA indicates that the models will need to take into account expected tightening of site deployment restrictions and associated difficulties in obtaining planning permissions for new sites.	The Authority will take into account these aspects as long as they are sufficiently described to be implemented in the model. These difficulties will increase the cost of finding a site and this cost increase will need to be assessed and taken into account in the model. However, this will impact additional sites but not existing sites. Therefore, it may not have an impact on costs in the short to medium term but only in the long term.
	VIVA believes that the modified scorched node approach might need to be applied for example to simplify the switching hierarchy. VIVA agrees with the ERG’s statement that “ <i>when a modified scorched node</i>	As explained in the consultation document, efficiency adjustments could be made in accordance with best practices, in the event that obvious inefficiencies are observed. This could apply to the switching hierarchy

approach is not applicable because elimination of inefficiencies is not practical, it could be more appropriate to use a scorched earth approach”.

following discussions with relevant operators.

The Authority does not intend to implement a scorched earth approach because it would require taking into account administrative or demographic constraints for site locations that are very difficult to model. Such an approach is very rarely implemented.

Zain

Zain supports the Authority’s view.

No comment.

Source: The Authority from the operators’ submissions

Conclusion

9. The Authority remains of the view that the scorched node approach should be used for both the fixed and mobile models because it is based on a more achievable and realistic level of efficiency. In the event that obvious inefficiencies are observed, adjustments could be made in accordance with best practices.

Question 5:

Do respondents agree with the proposed approach for mobile network cost modelling, and in particular the generic operator? Please elaborate.

Table 5. Summary of responses from stakeholders and the Authority's position on Question 5

Respondent	Comments received	The Authority's view & position
Batelco	Batelco supports the Authority's view that both an 'operator specific' and a 'generic operator' model should be implemented for mobile networks.	No comment.
	Batelco adds that it supports symmetrical termination rates in Bahrain: <i>"it would be unfortunate for this proposed costing design to result in fragmentation of termination rates and the distortions which are then created."</i> ⁷	The implementation of a specific model per operator is made for informational purposes. The specific use that will be made of the models' output is outside the scope of this consultation. However, the Authority's position on symmetry has been clearly set out in its Position Paper on Mobile Terminations Rates dated 1 February 2010.
	Batelco is of the view that using VIVA as a reference to build the generic operator model is a common sense pragmatic approach and supports the 33% market share assumption proposed by the Authority. However, Batelco considers that in case of inefficient roll-out evidence, VIVA should not remain the reference for the generic operator model.	The Authority agrees with Batelco. If evident inefficiencies were to be highlighted, the Authority would have to conduct efficiency adjustments. As explained in the consultation document, <i>"In the event that obvious inefficiencies are observed, adjustments could be made in accordance with best practices"</i> (paragraph 108).
	Batelco takes the view that alternative networks should also be modelled. These include: a) The new proposed national broadband network; b) Other alternative fixed networks being developed; c) Menatelecom's wimax network.	Considering these infrastructures, the Authority would like to emphasise that: a) The Authority will develop a nationwide FTTH network model to understand the cost of such a future network and the distribution of these costs over the territory as explained in paragraph 136 of the consultation document. In other words, the Authority is not

⁷ See Batelco's response, page 9, paragraph 35 (a)

calculating the cost of one operator in particular.

- b) Other alternative fixed networks are too small to be modelled at this stage. Depending on the evolution of these infrastructures, they could be considered in a further version of the model. It also remains that at present only Batelco's fixed network is regulated.
- c) Wimax networks are out of the scope of this project because they are not regulated at present. The Authority has informed the industry that it intends to conduct market reviews. As a result of such reviews, the Authority will consider any regulatory obligations that are appropriate including any that could apply to wimax networks.

Lightspeed

Lightspeed shares the Authority's view that in the bottom-up model, assets should be re-evaluated at their MEA (Modern Equivalent Asset).

In the data request, operators will be asked for the latest available market prices for assets.

Lightspeed considers that rather than using data provided by operators (current asset values, OPEX, local engineering rules), the model should be based on data provided by suppliers (asset values) and international benchmarked values (OPEX). Data from operators should only be used as a cross-check.

Data provided by operators is the most reliable source of information. From a general point of view, using operators' own information ensures that operators will not under-recover the cost of the efficient provision of services in Bahrain.

Also in the specific case of Bahrain, because assets' market prices can differ from one country to another (operators may not have the same negotiation power in a small country even if they are parts of large groups), it is preferable to consider operators' data in the first instance.

OPEX can also vary significantly from one country to another due to different levels of wages, building rents, etc. As a consequence, the Authority is of the view that benchmarked data cannot be considered as the best option to estimate OPEX.

If available and where relevant, benchmarked data and data provided by suppliers will be used as a cross-check in order to assess if the data provided by operators is reasonable.

Lightspeed is of the view that if no significant cost differences between operators are highlighted, symmetrical pricing should be set using the generic operator model.

This comment is out of the scope of the consultation document and may be discussed later by the Authority when the results of the model are available and when the Authority reviews termination charges.

Please refer to the Authority's Position Paper issued on 1 February 2010 regarding the regulation of mobile termination rates.

Lightspeed states that the generic operator should be modelled with a backhaul based on microwaves.

The Authority is of the view that the most efficient type of backhaul has to be used. In practice, the cost of microwave backhaul will be compared to the costs of other available technologies for the network of the generic operator modelled (see paragraph 120 of the consultation document).

VIVA

VIVA supports the Authority's view that both the operator-specific and generic operator models should be implemented for mobile networks and agrees with the Authority's definition of the generic operator.

No comment.

VIVA requests explanation from the Authority on how the Authority would ensure that no confidential information regarding VIVA's network topology would be provided to other operators, in case VIVA's network topology is used for the generic operator.

The Authority is of the view that although VIVA's network topology will be used as a starting point for the 'generic operator' modelling, several adjustments will be required, as:

- Spectrum allocation is an average assignment (different from VIVA's assignment)
- Consumption patterns will be those of the market (different from VIVA's customer base).

All other inputs such as unit prices will probably be average values from the 3 operators.

As a consequence, the network modelled for the 'generic operator' will be the one of a hypothetical operator, providing appropriate protection of VIVA's confidential information.

VIVA underlines that in rolling out its network, it has faced more difficulties than Batelco and Zain with regard to site acquisition. VIVA is of the view that since it is being used as a reference for the 'generic operator' model, this could lead to an overstatement of Batelco's and Zain's costs.

If there is evidence of significant differences of cost between operators, this will be reflected in the specific operator models and therefore considered by the Authority in future decisions as appropriate.

Zain

Zain supports the Authority's view that both the operator-specific model and the generic model should be implemented for mobile networks.

No comment.

Zain is of the view that the generic operator should reflect all mobile network topologies rather than follow VIVA's network topology.

The Authority is of the view that the generic operator model should reflect the current conditions of the market and that these are better reflected by the conditions faced by the latest entrant. However, as explained in the consultation document (see paragraph 120), "*the generic topology will be subject to possible adjustments to reflect the generic operator's spectrum assignment (refer to Table 3), potential differences in the number of base stations, and potential differences in mobile traffic load*". The Authority therefore believes that Zain's position is not fundamentally different from the Authority's position. However, by using VIVA's topology as a starting point and then adjusting, the Authority will be able to reflect current conditions by also taking into account other operators' constraints.

Source: The Authority from the operators' submissions

Conclusion

10. The Authority remains of the view that both the operators' specific models and the generic model should be implemented for mobile networks.

Question 6:

Do respondents agree with the Authority's preliminary position regarding the type of technologies (2G + 3G) to be modelled? Please elaborate.

Table 6. Summary of responses from stakeholders and the Authority's position on Question 6

Respondent	Comments received	The Authority's view & position
Batelco	Batelco supports the Authority's view. Batelco is of the view that 2G technology needs indeed to be modelled because: there are no plans to withdraw GSM technology; GSM licences will still be in force for a number of years to come; and GSM technology is part of Batelco's actual cost base, even if Batelco anticipates future developments.	Comment noted.
	Batelco adds that in the modelling exercise a 50:50 split of traffic between 2G and 3G should be assumed.	The Authority will consider the split of traffic between 2G and 3G during the data collection process, which will include in particular meetings and discussions with operators' technical staff. The model will allow sensitivity analysis on the traffic mix (percentage of voice over 2G and over 3G, percentage of data over 2G and over 3G).
Lightspeed	Lightspeed supports the Authority's view.	No comment.
VIVA	VIVA indicates that, at a minimum, a combination of 2G and 3G technology should be modelled.	No comment.
	However, VIVA adds that LTE should be included in the modelling exercise because commercial launch of LTE should occur between 2011 and 2015, which is the period of time contemplated by the Authority.	The Authority agrees that over the period covered by the models (i.e. 2011 to 2015), LTE technology will probably be deployed in Bahrain. However, the Authority believes that it will not be possible in the following months to appropriately model the cost of LTE because neither unit costs nor engineering rules related to LTE are sufficiently known. However, LTE could be included in the model once LTE has been deployed by operators to a significant extent. As a consequence, the model will need to be updated at that time and the Authority will make every effort to build the models so that LTE can easily be included in the

future.

Zain

Zain supports the Authority's view.

No comment.

Source: The Authority from the operators' submissions

Conclusion

11. The Authority remains of the view that 2G+3G technologies should be modelled. However, in case the LTE technology is commercially launched and deployed to a significant extent between 2011 and 2015, the Authority will consider updating the model to reflect this technology.

Question 7:

Do respondents agree with the Authority's preliminary position regarding the spectrum to be considered when modelling the costs of mobile networks? Please elaborate.

Table 7. Summary of responses from stakeholders and the Authority's position on Question 7

Respondent	Comments received	The Authority's view & position
Batelco	Batelco supports the Authority's view that taking the average spectrum assignment for the generic operator is a reasonable approach. Batelco also explains that it could be possible in the 'generic operator' model to align the spectrum assignment to VIVA's spectrum assignment, which would be in line with the Authority's position on the use of VIVA's topology.	The Authority would like to emphasise that it intends to use VIVA's network topology as a starting point for the 'generic operator' model. However, this starting point will be subject to possible adjustments to reflect the generic operator's spectrum assignment, potential differences in the number of base stations, and potential differences in mobile traffic load.
	Batelco adds that spectrum should be considered as a variable cost as it can be migrated or traded (depending on the Authority's spectrum policy).	Although Article 44 (b) the Telecommunications Law does not prevent operators to migrate or trade spectrum on the condition that written consent is obtained from the Authority, such cases are extremely rare to non-existent. As a result, the Authority maintains its position to consider spectrum licence cost as a fixed cost.
	Batelco requires confirmation that the size of the radio network (number of sites) can be variable during the life of the model.	The Authority confirms that the size of the radio network (number of sites) can be variable over the life of the model depending on the demand evolution. Operators will be asked during the data collection process to present their radio network roll-out forecast for the coming years.
Lightspeed	Lightspeed supports the Authority's view.	No comment.
VIVA	VIVA underlines that the 3 mobile operators' amount and mix of spectrum in the 900MHz, 1800MHz and 2100MHz bands varies significantly and that this has implications for deployment costs.	Comment noted.
	VIVA shares the Authority's view that cost differences will be	No comment.

ascertained with each mobile operator's specific model.

VIVA considers that should cost differences occur due to spectrum allocation being identified, using the average allocation for the generic operator might be inappropriate. VIVA considers that the sensitivity of the spectrum allocation on the generic operator costs should at least be tested.

The Authority agrees with VIVA that if significant cost differences were to be observed due to different spectrum allocation, this will have to be taken into account as appropriate.

In addition, when implementing the generic operator model, the Authority will verify that the chosen network topology (based on VIVA's network topology) is coherent with the spectrum allocated. Should this not be the case, adjustments will be made.

VIVA considers that the Bottom-Up model needs to take into account relevant future frequencies for the development of LTE.

The Authority agrees that over the period covered by the models (i.e. by 2015), LTE technology is likely to be deployed in Bahrain. However, the Authority believes that it will not be possible in the following months to appropriately model LTE spectrum as long as the attribution process and timeline are not known.

However, LTE could be included in the model once LTE has been deployed by operators to a significant extent. As a consequence, the model will need to be updated at that time

Zain

Zain agrees with the generic operator being modelled with the average spectrum allocated to three mobile operators for GSM900, GSM 1800 and 3G.

No comment.

Zain states that *"corrective factors have to be taken in cases where there is a big gap between the current number of sites in the operators' models and the calculated number of sites in the generic model"*⁸.

The Authority will pay special attention to the case of the generic operator. It will be necessary to check that the topology (derived from VIVA's topology) and the spectrum allocated (average allocation) are coherent. If not, adjustments will be required.

Source: The Authority from the operators' submissions

⁸ See Zain's response to question 7 pages 8 and 9.

Conclusion

12. The Authority remains of the view that the spectrum allocated to each operator should be considered for specific models and that the average allocated spectrum should be used when modelling the network of a generic operator. The network's topology of the generic operator will follow Viva's network topology to which adjustments may be made to reflect the average allocated spectrum.

Question 8:

Do respondents agree with the Authority's preliminary position regarding the treatment of licence costs and frequency usage fees? Please elaborate.

Table 8. Summary of responses from stakeholders and the Authority's position on Question 8

Respondent	Comments received	The Authority's view & position
Batelco	<p>Batelco requires clarifications on what it calls 'licence fees' and in particular whether these type of fees would include:</p> <ul style="list-style-type: none">- Amount paid up front for the third mobile operator licence (some BD80 million); and/or- Annual amount of service licence fees (treated as a common cost for the whole business); and/or- Annual amount of frequency licence fees (treated as a network cost recovered in the same way as other radio network assets).	<p>'Licence fees' include the following 4 categories:</p> <ul style="list-style-type: none">- Licence fee: one-off payment to acquire the right to operate and commercialise telecommunications services in the Kingdom of Bahrain;- Annual licence fee: annual payment expressed as a percentage of gross revenues (currently set at 0.8%);- Frequency licence fee: one-off payment to acquire the right to use certain frequency bands; and- Annual frequency licence fee: annual payment proportional to the quantity of spectrum used.
	<p>Batelco states that some MVNOs may need to have a licence. Batelco's comment implies that, in this context, the Authority's statement that licence fees are network costs and not retail costs (paragraph 128 of the consultation document) would not be correct.</p>	<p>This issue is not applicable at present.</p> <p>In any case, in the event that MVNOs were to pay licence fees, it would not be of the same order of magnitude as network operators as it would not include any frequency-related licence fees and would not modify the Authority's view that licence fees should be considered as network costs.</p> <p>However, if MVNOs were to pay licence fees, then a sensitivity analysis could be carried out to assess the impact of allocating licence fees paid by MVNOs to retail costs also.</p>
	<p>Batelco is of the view that licence costs for service and frequencies of an operator with a 33% market share and an average spectrum</p>	<p>The Authority agrees with Batelco's view (see paragraph 128 of the consultation document). The Authority believes that the use of an average spectrum assignment on the one hand and the use of the latest</p>

assignment should be considered.

entrant licence costs on the other hand, as proposed in the consultation document, could be seen as a contradiction. Therefore, the inclusion of average spectrum costs in the models may be needed. However, the use of the latest entrant's licence costs can also be justified from an economic point of view: the latest entrant's licence cost has been determined as the outcome of an auction process and it can be considered that this outcome reflects the true value of mobile licences in Bahrain. In this context, the Authority proposes to include the two values in the 'generic operator' model (latest entrant's licence costs and average licence costs). The bottom-up models will be flexible enough to test several levels of license costs and to undertake sensitivity analysis for license costs.

Lightspeed

Lightspeed shares the Authority's view that licence fees and frequency licence fees should be included in the cost model.

No comment.

Lightspeed states that *"LSC does not agree with the Authority to consider the license fee costs as network costs rather than retail costs because license is needed for the whole operator services so LSC is with considering the license fee as a common cost. While the frequency usage fee is considered as a network cost because it relates to the operation of a network."*⁹

The Authority believes that Lightspeed has misunderstood the Authority's position, as the Authority plans to consider non spectrum-related license fees as a common cost whereas spectrum-related license fees will be considered as a network cost (see GSMA statement quoted by the Authority in paragraph 128 of the draft Position Paper).

VIVA

VIVA considers that according to international best practices, spectrum fees are not necessarily included in cost models. VIVA is of the view that spectrum fees should be excluded. To justify its position, VIVA takes the UK and France as examples: two countries where a pure LRIC approach is implemented to assess the costs of termination rates. In these countries, licence fees (network/common costs) are not considered.

The Authority believes that such licence fees are not included in France and the UK because a pure LRIC approach is used. In a LRIC+ approach, licence fees should be included. The Authority is therefore of the view that VIVA's comment is consistent with the Authority's intention to apply a pure LRIC approach. However, in the case of the LRIC+, the Authority remains of the view that licence fees should be included. This is consistent with international practice.

VIVA considers that with the difference between the operators' licence

The Authority is of the view that these cost differences will be captured

⁹ See Lightspeed's response to question 8, page 8

fees, choosing VIVA's fees for the generic operator would lead to the over-estimation of Batelco's and Zain's costs.	thanks to each operator-specific model. This is indeed the role of the operator-specific models.
VIVA considers that the 'generic operator' model should be able to illustrate these differences.	The bottom-up models will be flexible enough to test several levels of licence costs and to complete a sensitivity analysis for licence costs.
In case the Authority considers a single spectrum cost for the 'generic operator', VIVA is of the view that licence costs should be excluded or derived from an international benchmark.	The Authority is of the view that the data used to model the 'generic operator' should be derived from Bahrain operators as the purpose of the model is to assist in pricing decisions in Bahrain. Sensitivity analysis on the impact of licence costs will be easy to test in the model.

Zain	Zain agrees with the proposal to take into account licence costs.	No comment.
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Source: The Authority from the operators' submissions

Conclusion

13. The Authority remains of the view that licence fees (including frequency licence fees) should be taken into account in the model. However, the Authority has modified the Position Paper to reflect the fact that it intends to include two options for licence costs in the 'generic operator' model: average licence costs or latest entrants' licence costs. In any case, the bottom-up models will be flexible enough to test several levels of licence costs and to conduct a sensitivity analysis for this input.
14. In the final Position Paper, the Authority has added that if MVNOs were to pay licence fees, then a sensitivity analysis could be carried out to assess the impact of allocating licence fees paid by MVNOs to retail costs.

Question 9:

Do respondents agree with the Authority’s preliminary view regarding the type of technologies to be considered when modelling the costs of the fixed core network? Please elaborate.

Table 9. Summary of responses from stakeholders and the Authority’s position on Question 9

Respondent	Comments received	The Authority’s view & position
Batelco	Batelco supports the Authority’s view that a NGN core network should be modelled, and in particular that Batelco’s network will be used as a reference.	No comment.
	Batelco reports that figure 2 on page 35 of the consultation document does not illustrate the full extent of Batelco’s fixed core network. Batelco said: “There is a separate SDH network in the fixed core which is used by Batelco to provide CATs and LLCOs”.	The illustration provided in the consultation document reflects Batelco’s NGN network at a high level and not the legacy (SDH network). However, the Position Paper has been modified to reflect the fact that there is a separate SDH network for the provision of certain services (i.e. CAT and LLCOs). However, when implementing a bottom-up model, the modeller needs to have a precise understanding of the traffic routing in the network. The Authority agrees that if CATs and LLCOs are provided on a separate SDH network, this has to be reflected in the bottom-up cost model. As a consequence, an up-to-date overview of Batelco’s core fixed network topology will be requested during the data collection process.
	Batelco considers that the model with the Media Gateway is more appropriate in the short term as the NGN network would need to be interconnected with OLO’s TDM equipment.	The Authority agrees with Batelco’s comment but believes that calculating the NGN cost without a Media Gateway would be more forward-looking and only requires a small amount of work. The Authority remains therefore of the view that the NGN network should be modelled both with and without the Media Gateway.
Lightspeed	Lightspeed supports the Authority’s view that a NGN core network should be modelled.	No comment.

VIVA	VIVA supports the Authority's view that the fixed core NGN networks both with and without the Media Gateway should be modelled. VIVA also considers that the model should take into account any network evolution plan forecasted by Batelco.	No comment.
	VIVA requires clarifications on the 'standalone scenario'.	The 'standalone scenario' described in paragraph136 of the consultation document refers to the scenario in the fixed access network cost model which assumes that the FTTH access network is not sharing any asset with the copper access network. The Authority wishes indeed to have a view of the costs of deploying a FTTH access network in case this is deployed in the same infrastructure as the copper access network (using same trenches for example, this is the 'overlay' scenario) and in case this is deployed separately from the copper access network (which requires digging new trenches, this is the 'standalone' scenario).
Zain	Zain supports the Authority's view that a NGN core network should be modelled.	No comment.

Source: The Authority from the operators' submissions

Conclusion

- The Authority remains of the view that the fixed core network should be based on Batelco's existing NGN core network. Two types of NGN will be modelled: with and without a Media Gateway. The Authority has modified the Position Paper to reflect the fact that there is a separate SDH network which is currently used for the provision of certain leased line services.

Question 10:

What is the respondents' view on the type of fibre architecture and technology that should be modelled for the NGA? Please elaborate and formulate a substantiated alternative proposal if necessary.

Table 10. Summary of responses from stakeholders and the Authority's position on Question 10

Respondent	Comments received	The Authority's view & position
Batelco	Batelco supports a model based on the GPON architecture as it is the architecture rolled out by Batelco. Concerning the extent to which fibre is rolled out, Batelco considers that FTTH is a likely configuration for single dwellings whereas FTTB will be the usual configuration for multiple dwellings.	<p>The Authority remains of the view that a P2P architecture is preferable. It can support any type of current and future access network and is therefore more future-proof, it is better for consumer choice (unbundling is possible) and over the long run is likely to be less costly due to the simplicity of the maintenance. As explained in paragraph 138 of the consultation document, <i>"The Authority's preliminary view is that a fibre deployment based on a point-to-point ('P2P') architecture is preferable; as such a deployment provides a dedicated fibre pair to each end-user without the need to employ splitters and share capacity in the access network. As a result, a P2P deployment is more 'future-proofed' and better able to accommodate future growth in bandwidth demand. P2P also provides more flexibility in terms of competitive access, including access at the layer 1 level as it is easier to 'unbundle' "</i>. As a consequence, the Authority will implement a model based on P2P. However, the Authority agrees that having estimates of both GPON and P2P costs is interesting (for informational purposes at this stage).</p> <p>The Authority will therefore implement an ad hoc assessment of GPON costs (based on a discount on the P2P cost, for example based on international benchmarks).</p>
	Batelco underlines that with the current regulatory framework, LLU obligations are only related to the copper local loop.	<p>The Authority would like to highlight that the consultation document only states that the P2P option provides better unbundling opportunities: <i>"P2P also provides more flexibility in terms of competitive access, including access at the layer 1 level as it is easier to 'unbundle' "</i>. At this stage, no obligation for fibre unbundling has been discussed.</p>

Lightspeed	Lightspeed supports the Authority's view that the cost of a copper network along with the cost of a P2P FTTH architecture should be modelled.	No comment.
	Lightspeed wants fibre access to end users to be provided at the lowest possible charge, which can be calculated by following 'stand-alone network' and 'overlay of the current copper network scenario'.	The choice of the appropriate access remedies to be implemented is out of the scope of this consultation.
VIVA	VIVA states that GPON technology is more likely to be rolled-out in Bahrain. As a consequence, VIVA considers that the model should consider a deployment based on a combination of GPON and P2P.	See the Authority's comment above in response to a similar comment by Batelco.
	VIVA considers that FTTx deployments as envisioned for the future National Broadband network should be taken into account.	The Authority will develop a nationwide FTTH network model to understand the cost of such future network and the distribution of these costs over the territory as explained in paragraph 136 of the consultation document. The Authority is therefore not calculating the cost of any operator in particular.
Zain	No comment.	No comment.

Source: The Authority from the operators' submissions

Conclusion

16. The Authority remains of the view that a P2P deployment is more future-proofed and better for consumer choice than a GPON deployment. As a consequence, a P2P deployment will be modelled. For informational purposes, the Authority will perform an 'ad hoc' assessment of the cost of a GPON deployment (as a proportion of the P2P cost, based on international benchmark). This has been reflected in the consultation document

Question 11:

Do respondents agree with the Authority’s preliminary view on a proposed “yearly approach” to network dimensioning optimisation? Please elaborate.

Table 11. Summary of responses from stakeholders and the Authority’s position on Question 11

Respondent	Comments received	The Authority’s view & position
Batelco	<p>Batelco remains neutral on this particular issue at this point.</p> <p>Batelco explains that the “historical” approach takes into account unavoidable inefficiencies that are generated by the fact that it is difficult to predict the future with perfect accuracy.</p>	<p>No comment.</p> <p>The Authority agrees with Batelco but believes that such unavoidable inefficiencies should remain very limited in the context of growing demand (see comment below).</p>
	<p>Batelco understands that differences between the “yearly” approach and the “historical” approach are narrowed when a market is growing but questions this observation in the context of decreasing number of leased lines and falling growth for fixed line services.</p>	<p>Even if some types of traffic are decreasing, the Authority remains of the view that the “yearly” approach is preferable as it reflects better the costs of a new entrant investing today in Bahrain and gives therefore better ‘build or buy’ signals.</p> <p>The Authority believes that the context of decreasing number of leased lines and falling growth for fixed line services does not imply that the “historical” approach is preferable:</p> <ul style="list-style-type: none"> - The decrease in the number of fixed lines mainly impacts the unit costs of the access network. However, an access network is mainly dimensioned on the basis of the number of buildings existing in the country, and to a much lesser extent on the number of active lines. As a consequence, the decrease in the number of fixed lines should not impact the cost of the access network in the “yearly” approach, compared to the “historical” approach. - The Authority would expect that the fall in the number of leased line circuits would be compensated by the overall increase of traffic in the fixed core network (thanks to broadband for

example). As a consequence, the choice of the “yearly” approach compared to the historical approach should not impact the measure of costs. However, the Authority believes that for assets that are specific to legacy leased line circuits, the modelled number of assets in the yearly approach may be lower than the modelled number of assets in reality (the same would not apply in the “historical approach”). This is due to the fact that the actual number of these installations is today higher than the number of installations that would be required to fulfil current demand. However, taking into account these costs would not give appropriate ‘build or buy’ signals as they would not be incurred by a new operator entering the market today in Bahrain.

Finally, the Authority would like to point out that the model will be flexible enough to dimension the network and calculate unit cost using different inputs for the traffic. For example, it will be possible to have a different traffic input for the dimensioning of the network (for example, using a traffic in the past that was higher than today) and for the calculation of unit cost (for which the current traffic must be used). This will enable the Authority to carry out sensitivity analyses. However, this will be achievable only if operators provide sufficient historical data on traffic.

Lightspeed	Lightspeed supports the Authority’s view and explains that using the yearly approach will lead to flexibility and is better adapted to sensitivity analysis because it does not depend on the availability and accuracy of historical data.	The Authority agrees with Lightspeed’s comment that the yearly approach is better adapted and does not depend on the availability and accuracy of historical data.
VIVA	VIVA supports the Authority’s view.	No comment.
Zain	Zain recommends using the “historical” approach because it will provide a better understanding of cost evolution and generate accurate forecasts compared to the yearly approach. Zain agrees with the use of the “yearly approach” only in cases where there is difficulty in gathering full historical time-series data.	<p>The Authority agrees with Zain’s view that the “historical” approach will provide a better understanding of cost evolution. However, the Authority believes that this is mainly true looking backward. By looking forward, the “yearly” approach will provide a better understanding of how costs will evolve, which is an important focus given the legal framework in Bahrain which refers to ‘forward-looking cost’.</p> <p>The Authority remains of the view that it will be extremely difficult to</p>

gather full historical time-series data.

The Authority is of the view that the “yearly” approach will ease the data collection process which involves resources from operators. As a consequence, in light of the few theoretical advantages of the “historical” approach, the Authority remains of the view that the “yearly” approach should be preferred.

Source: The Authority from the operators' submissions

Conclusion

17. The Authority remains of the view that the “yearly approach” should be used to optimise the dimensioning of the networks. The Authority believes that in the context of growing traffic and demand, the “yearly” approach has more merits than the “historical” approach since it is more practical to implement and requires less resources and efforts from operators in the data collection phase. Also, it provides better ‘build or buy’ signals since it better reflects the situation faced by a new operator entering the market today. In any case, the model would be flexible enough to have a different traffic input for the dimensioning of the network (for example, using a traffic in the past that was higher than today) and for the calculation of unit cost (for which the current traffic must be used). This will enable the Authority to carry out sensitivity analysis. However, this will be achievable only if operators provide sufficient historical data on traffic.

Question 12:

Do respondents agree with the list of services to be considered in the bottom-up cost models? If there is any service requiring significant capacity that is not listed above, please specify.

Table 12. Summary of responses from stakeholders and the Authority's position on Question 12

Respondent	Comments received	The Authority's view & position
Batelco	<p>Batelco makes several comments on the possible exclusion of the following products:</p> <p>a/ Wholesale DSL. Batelco notes the Authority's proposal to withdraw this from the reference offer during the period of the model if LLU is fit for purpose and questions whether this product should be included as a separate item since it is a resale retail product.</p> <p>b/ Local leased circuits and LAN Connect. Batelco indicates that on a forward-looking basis, the IP-VPN product is the principal line of business compared to the other two;</p> <p>c/ PSTN TS and PSTN GMSC: Batelco indicates that label descriptions should be updated to take account of network changes in 2010;</p> <p>d/ PSTN transit: Batelco reiterates it wishes to withdraw this service as there has been no take up since it was offered in 2006;</p> <p>e/ PSTN call to voicemail and mobile call to voicemail: Batelco questions the materiality of these scenarios.</p>	<p>The Authority is of the view that Batelco has misunderstood question 12. When building the bottom-up models, the Authority will need to make sure that all services generating traffic on the fixed and mobile networks are taken into account. Indeed, if a service generates traffic on the networks then it needs to be considered for dimensioning purposes as it affects cost and economies of scale. However, the inclusion of a service in the model does not necessarily imply that it is a regulated service. The Authority has therefore listed services that generate traffic on mobile and fixed networks in Table 4 of the consultation document. In particular, wholesale DSL, Local leased circuits and LAN Connect, PSTN transit, PSTN calls to voicemail and mobile calls to voicemail need to be listed because they generate traffic on the network today and therefore have to be taken into account when dimensioning the network.</p> <p>With respect to Batelco's point c, as service labels change, these will also be updated in the bottom-up models.</p>
	<p>Regarding the inclusion of "FTTH broadband access service" and "dark fibre" in the model, Batelco underlines that it does not support the inclusion of these remedies in future reference offers.</p>	<p>To avoid any doubts, the Authority would like to specify that a service being modelled does not necessarily mean that the Authority plans to impose remedies on it.</p> <p>The legal and regulatory framework in place sets out a clear process for</p>

the introduction and removal of regulatory remedies which the Authority adheres to.

Batelco asks the Authority to reconsider the inclusion of international inbound calls to mobile services in the mobile networks model.

The “international inbound calls to Batelco mobile telephones” service uses Batelco’s mobile network and therefore contributes to the economies of scale of Batelco’s mobile network (this is the same argument raised above). This traffic must therefore be included in the models. Please note that international network costs will not be modelled as they are outside the scope of this project.

Lightspeed

On the fixed network services, Lightspeed proposes the following amendments:

- a/ ADSL broadband access should be distinguished between shared and naked DSL
- b/ Bitstream should be distinguished between DSLAM, Regional and IP
- c/ UMPL (LLU) should be distinguished between full unbundling and line share
- d/ Collocation space should be distinguished between ‘MDF’ and ‘Shelter in the yard’
- e/ Sub duct rental should be added
- f/ Accessing customer services & Inquiry services should be added.
- g/ Ancillary services such as Air conditioning, Electricity, Fire fighting, etc. should be added.
- h/ Local and national leased circuits for OLO (CAT&LLCO) should include Backhaul.

The Authority would like to clarify that there is no naked DSL product, no DSLAM-bitstream product, no regional bitstream product, no line sharing product and no sub duct rental product today in Bahrain. If these services were to be provided by the operator whose network is modelled, then they would be included in the model.

With respect to Lightspeed’s comment on ancillary services, the Authority would like to clarify that the focus of the bottom-up models is on telecommunications services and not on ancillary services.

The Authority has modified the list of services to reflect Lightspeed’s comments on points d) and h).

On the mobile network services, Lightspeed considers that the “conveyance of inquiry and customer services from mobile” service should be added.

The Authority agrees with Lightspeed’s comments and has modified the Position Paper accordingly.

Lightspeed also makes several comments on the most suitable units for the different services:

- a/ Leased line costs should be measured as multiple of E1
- b/ Mobile broadband should be measured by “G byte download”.

The Authority broadly agrees with Lightspeed’s comments but believes that this will be discussed in more detail at the model development and implementation stages. While the Authority agrees that some leased lines should be measured as multiple of E1, the Authority believes that this is not always the case (e.g. for IPVPN).

VIVA

VIVA shares the Authority’s view that all services that are necessary in order to capture economies of scope should be included.

No comment.

VIVA states that services should be considered with the appropriate level of granularity in order to capture significantly different uses of the network.

Comment noted.

VIVA is of the view that the following services should be implemented:

- a/ dark or wavelength fibre access services
- b/ linear and on-demand video and TV services (unicast services), and
- c/ other typical NGN services in case market introduction of these is likely to occur within the forecasting period of the bottom-up LRIC model forecast (e.g. multicast).

The Authority agrees with VIVA and has modified the final Position Paper accordingly.

VIVA is of the view that the granularity of mobile services should be extended to:

- a service labelled “subscriber” to appropriately allocate a portion of network asset costs which are driven either wholly or partially by subscribers (e.g. HLR, network management system);
- GPRS data;
- EDGE data;
- Release 99/UMTS data;
- HSDPA data; and

While the Authority generally agrees with VIVA that all these services should be included in the model, it does not consider that it would be appropriate to model them at this level of granularity.

The Authority would like to point out that such a breakdown for data would give rise to too much complexity in the model. Modelling best practices (see the France and UK mobile models mentioned by VIVA for example) are essentially to split 2G and 3G data. Also, such a breakdown as proposed by VIVA would necessitate a substantial amount of information to be provided by operators and would bring limited benefits in light of the added complexity.

In addition, having a service labelled “subscriber” is not relevant since it does not correspond to a real wholesale or retail service. Network asset

	- HSUPA data	costs which are driven either wholly or partially by customers (HLR, network management) should be allocated to existing wholesale or retail services, otherwise there is a risk of costs not being recovered by operators.
	VIVA states that it is not useful to model Voice, SMS or MMS origination services because they are similar to corresponding termination services.	The Authority agrees with VIVA that origination and termination services are technically close. If routing factors are sufficiently close, both services could be merged in the model. However, it is important not to exclude the corresponding traffic and this is why it needs to be included in the table.
Zain	Zain agrees with the list of services proposed by the Authority.	No comment.
	Zain considers that the 'Mobile broadband' service needs to be more detailed (Internet access, PUSH-EMAIL, video, etc.)	The Authority agrees with Zain and has modified the final Position Paper accordingly.
	Zain considers that "international inbound calls to Batelco mobile telephones" should not be included as long as the Authority's final decision on this service is pending.	See the Authority's comment above on a similar point raised by Batelco.

Source: The Authority from the operators' submissions

Conclusion

18. The Authority has updated the list of services accordingly.

Question 13:

Do respondents agree with the Authority's preliminary view on the treatment of OPEX in the bottom-up cost models? Please elaborate.

Table 13. Summary of responses from stakeholders and the Authority's position on Question 13

Respondent	Comments received	The Authority's view & position
Batelco	Batelco indicates that its default position is to support the continued use of the top down approach in order to ensure cost recovery.	<p>The Authority remains of the view that the approach in the Position Paper is appropriate; in particular adjustments to the top-down OPEX or a bottom-up calculation may be warranted.</p> <p>The Authority also reminds Batelco that the Telecommunications Law stipulates that "<i>tariffs shall be fair, reasonable and non-discriminatory and (...) based on forward-looking incremental costs</i>" which implies that only costs which are efficiently incurred should be recovered.</p>
	Batelco explains that it is difficult to assess the relevance of each method presented by the Authority as it will depend on the impact of those choices in particular cases.	The Authority agrees with Batelco's view but considers that, as explained in the consultation document, OPEX should be calculated using the operators' actual costs (top-down) with adjustments or with a bottom-up calculation depending on the feasibility of both approaches.
Lightspeed	Lightspeed supports conducting a bottom-up approach either with percentages provided by suppliers or expressed as a percentage of investment or through benchmarking. Lightspeed urges the Authority to use the OPEX mark-ups used by Jordan TRC in its hybrid TSLRIC+ model (between 5 to 8% of the current asset value).	<p>While the Authority considers Lightspeed's proposed approach to be correct in theory, information and assumptions necessary to perform such a bottom-up approach are not necessarily available in practice. This is why using top-down information (with adjustment) is also necessary.</p> <p>The Authority disagrees with Lightspeed's view that a benchmarked value should be used as a primary source of information. Indeed, OPEX cost drivers (for example wages) can be very different from one country to another and therefore the Authority remains of the view that benchmark information will be used as a primary source of information only if operators' data is unavailable. However, as explained in the consultation document "<i>even where operator data is available, benchmarked data will be used as a cross-check of the resulting OPEX estimates</i>" (see</p>

paragraph157).

Lightspeed indicates that using top-down OPEX is in contradiction with the bottom-up approach because it includes the SMP operator's inefficiencies.

As explained in the consultation document, the Authority will make necessary adjustments to top-down information.

Lightspeed states that "*calculating operating costs based on the operators' actual costs (top-down) with efficiency adjustments and the removal of irrelevant costs [...] will not lead to an efficient operator cost because the early retirement cost is not a regular process and the high number of network faults is an indicator for inefficient cost due to fault repetition*"¹⁰.

The Authority believes that Lightspeed has misunderstood the Authority's statement since the top-down approach with efficiency adjustments consists of removing inefficient or irrelevant costs such as early retirement costs or inefficient costs generated by a high number of faults.

VIVA VIVA agrees with the Authority's adjusted top-down approach and adds that this will need to be further benchmarked.

No comment.

Zain Zain supports the Authority's view. Zain suggests that operating costs are calculated as a percentage of the asset value but by using percentages derived from the operator's accounting systems. Zain adds that this approach would be more accurate and more realistic than those taken from benchmarks or equipment suppliers as these can vary substantially to the point of not being at all suitable or representative.

Using percentages derived from the operator's accounting systems could in some cases be suitable but could also tend to overestimate or underestimate operating costs. For example, if asset prices are decreasing over time by 5%, the approach proposed by Zain would result in operating costs always decreasing over time by 5% in the bottom-up models. However, some operating costs may be mostly staff-related and

¹⁰ See Lightspeed's response to Question 13, page 11, paragraph 2

staff wages rarely decrease in reality although productivity would. In such a case, this approach would not be appropriate as it would underestimate operating costs (assuming that productivity gains are limited). A more pragmatic approach is to consider operating costs from the accounting system, and to undertake appropriate efficiency adjustments. This is precisely one of the options proposed by the Authority.

Source: The Authority from the operators' submissions

Conclusion

19. The Authority remains of the view that operating costs should be calculated using the operators' actual costs (top-down) with adjustments and/or with a bottom-up calculation depending on the feasibility (e.g. information available) of both approaches. The Authority remains of the view that the direct use of OPEX based on top-down information is not consistent with the principle of the bottom-up approach as inefficiencies and irrelevant cost may be included. When operator data is unavailable, a benchmark will be conducted. Even when operator data is available, benchmarked data may be used as a cross-check of the resulting OPEX estimates.

Question 14:

Do respondents agree with the Authority's preliminary view to implement tilted annuities or adjusted tilted annuities in the bottom-up cost models? Please elaborate.

Table 14. Summary of responses from stakeholders and the Authority's position on Question 14

Respondent	Comments received	The Authority's view & position
Batelco	<p>Batelco believes that tilted annuities should be preferred considering the complexity presented by the multi-year economic depreciation approach.</p> <p>Batelco explains that in order to factor in the trend in changes in output volumes, regulators changed the tilt of the tilted annuity which led to heavy back load of recovery and low costs in the current period. This, according to Batelco, approximates the effect of economic depreciation but only for early years. Batelco therefore recommends modifying the tilt in later periods to allow realistic cost recovery levels for Batelco.</p>	<p>Comment noted.</p> <p>The Authority understands that Batelco is proposing to adjust the tilt of the tilted annuity over time to cater for the trend in changes in output volumes and in later periods to allow realistic cost recovery levels. The Authority believes that such an approach is in practice very close to the Authority's proposed adjusted tilted annuity. However, the Authority believes that the proposed adjusted tilted annuity gives more certainty and provides a smoother evolution of unit costs while also ensuring cost recovery.</p>
Lightspeed	<p>Lightspeed supports the Authority's view.</p>	<p>No comment.</p>
VIVA	<p>VIVA believes that proxies for economic depreciation such as the adjusted tilted annuity approach do not give sufficiently accurate results, especially when demand is growing. VIVA adds that economic depreciation is widely used in bottom-up LRIC models and gives the example of the Danish regulatory authority which has outlined the merits of economic depreciation because it takes into account¹¹:</p> <ul style="list-style-type: none">- projected trends in operating expenditures associated with	<p>The Authority believes that VIVA has misinterpreted the Authority's statement. In fact, the Authority believes that VIVA's proposal to implement economic depreciation is consistent with what the Authority has called "adjusted titled annuity". Adjusted tilted annuity is a reasonable proxy for economic depreciation. Indeed, contrary to what VIVA states, the goal of the adjusted tilted annuity compared to the tilted annuity is to take into account growth in demand. In paragraph 175 of the consultation document, the Authority explains: "<i>By accounting for changes in the level</i></p>

¹¹ http://www.itst.dk/tele-og-internetregulering/smp-regulering/engrospriser/filarkiv-engrospriser/lraic/lraic-processer/lraic-pa-fiber-og-kabel-tv/horing-over-udkast-til-lraic-model-og-prisafgorelse-for-fiber-kabel-tv-og-multicast/ED_Documentation.pdf

the asset (MEA OPEX trends)

- projected trends in replacing the asset with its MEA (MEA investment trends)
- the economic output that can be generated by the network asset over time.

of outputs produced, adjusted tilted annuities reflect changes in the market value of the asset, which corresponds to the definition of economic depreciation. With such an adjusted tilted annuity, the annuity per unit of output remains stable and follows the evolution of asset prices. This approach requires forecasts on the level of outputs produced.”

The Authority also believes that the Danish regulatory authority has proposed an approach that is consistent with the adjusted tilted annuity in the way it accounts for volume changes. The adjusted tilted annuity takes into account:

- projected trends in replacing the asset with its MEA (MEA investment trends)
- the economic output that can be generated by the network asset over time.

The only point listed by the Danish regulatory authority not covered by the Authority's adjusted tilted annuity is the “*projected trends in operating expenditures associated with the asset (MEA OPEX trends)*”. The Authority agrees that this could also be included in the adjusted tilted annuity to provide more precise economic signals. For example, if the adjusted tilted annuity does take into account projected trends in OPEX, then in the first years of a product life, the level of operating costs per output sold may be high and could decrease when outputs increase thanks to economies of scale. This could give rise to discontinuities in the level of unit cost calculated. In such a case, it would therefore be necessary to include projected trends in OPEX in the adjusted tilted annuity. However, the Authority considers that it is highly unlikely to be relevant because OPEX are typically more variable compared to CAPEX and therefore less sensitive to economies of scale (for example, in the earlier years of FTTH, OPEX will be low because there will be a low number of customers while CAPEX will be high).

Overall, the Authority is of the view that VIVA's position is broadly similar to the Authority's position. However, the Position Paper now specifies that the Authority may, if relevant, account for projected OPEX trends in the adjusted tilted annuity formula.

Zain

Zain supports the Authority's view.

No comment.

Source: The Authority from the operators' submissions

Conclusion

20. The Authority remains of the view that tilted annuities or adjusted tilted annuities (in case of significant volume growth) should be implemented in the bottom-up cost models. The Authority has also specified in the Position Paper that, if deemed appropriate, it may account for projected OPEX trends in the adjusted tilted annuity formula.

Question 15:

Do respondents agree with the Authority's view that economic asset lives should be used in bottom-up models? Please elaborate.

Table 15. Summary of responses from stakeholders and the Authority's position on Question 15

Respondent	Comments received	The Authority's view & position
Batelco	<p>Batelco indicates that it cautiously supports the use of economic asset lives as they send out more appropriate economic signals and are akin to the adjusted asset lives already instructed or ordered by the Authority in respect of fixed access network elements.</p> <p>Batelco reserves its position on this point as the full impact of such a choice is not yet known for fixed core and mobile networks.</p> <p>Batelco also refers to Batelco's arguments presented in 2009 against the lengthening of asset lives for the fixed access network.</p>	Comment noted.
Lightspeed	Lightspeed supports the Authority's view.	No comment.
VIVA	VIVA supports the Authority's view and expects the Authority to involve operators in the validation of lifetimes and to benchmark economic lives with international best practices.	The Authority will review economic lives with international best practices and operators will have the opportunity to provide comments.
Zain	Zain supports the Authority's view.	No comment.

Source: The Authority from the operators' submissions

Conclusion

21. The Authority remains of the view that economic asset lives should be used in bottom-up models.

Question 16:

Do respondents agree with the Authority's preliminary view to exclude the working capital which is not related to the network activities or the provision of services?

Table 16. Summary of responses from stakeholders and the Authority's position on Question 16

Respondent	Comments received	The Authority's view & position
Batelco	Batelco does not support the Authority's view and explains that the company could not exist without overhead functions and that related costs should be taken into account in the model.	The Authority believes that Batelco has misunderstood the Authority's statement since corporate overheads will be implemented in the model and will be allocated to services (except in the pure LRIC approach by definition).
	In page 16 of its response, Batelco states that " <i>some non-network working capital relates to items such as utilities and insurance, buildings and vehicles, IT developments, and other stock materials are very much related to the network operations and are necessary parts of cost for providing our communications services. To exclude them is to make arbitrary dividing lines over what is required to deliver a service in practice and what is functionally related to network operations.</i> "	To avoid any doubt, the Authority would like to specify that all these costs (utilities, insurance, buildings and vehicles, IT developments) will be taken into account as overheads in the model. The question here is whether or not the financial costs (cost of capital) related to these items should be considered. The Authority believes that for the setting of wholesale regulated charges, the cost of capital associated with the working capital of these overhead costs is not material and should not be included. However, as explained at paragraph 198 of the consultation document, the Authority will consider any representation made by Batelco or any other operator which may demonstrate that the level of working capital (and associated capital cost) is material and efficient and should therefore be included.
Lightspeed	Lightspeed shares the Authority's view that non-network related working capital should be excluded.	No Comment.
VIVA	VIVA shares the Authority's view that non-network related working capital should be excluded.	No Comment.
Zain	Zain states that it " <i>disagrees with the the Authority in totally taking out or excluding the working capital</i> ". Zain considers that " <i>the Authority</i>	The Authority believes that Zain has misunderstood the Authority's statement since the Authority plans to include a 'network CAPEX working

needs to include the working capital while using a tilted annuity formula to consider the “time to build” incurred by any network roll-out¹².

capital' factor in its depreciation formula. The types of working capital which the Authority plans to exclude are the non-network related working capital and the network OPEX-related working capital.

Source: The Authority from the operators' submissions

Conclusion

22. The Authority remains of the view that non-network-related working capital should be excluded from the BU-LRIC cost models.

¹² See Zain's reponse to question 16, page 12

Question 17:

Do respondents agree with the Authority’s preliminary view that, except for working capital generated by CAPEX which is taken into account through depreciation formulas, the cost of working capital related to network OPEX should be excluded from the cost model unless operators can provide evidence of a significant and efficient level of such working capital? Please elaborate.

Table 17. Summary of responses from stakeholders and the Authority’s position on Question 17

Respondent	Comments received	The Authority’s view & position
Batelco	Batelco considers that the level of network OPEX-related working capital is not immaterial and should not be excluded from the cost model.	The Authority agrees with Batelco that in case of efficient working capital costs being material, such costs should be taken into account. As a consequence, Batelco should provide evidence that network OPEX-related working capital costs are material and efficient during the data collection process of this project.
Lightspeed	Lightspeed is in favour of excluding working capital (Network / Non network, OPEX/CAPEX) because this is the international practice and because if it were included, this could lead to compensation being provided for operators’ inefficiencies.	<p>The costs incurred by the requirement for working capital (the financial costs associated with the working capital) cannot be avoided by operators and are not necessarily due to inefficiency (although for working capital, the level of efficiency should also be assessed).</p> <p>Concerning the CAPEX side, the Authority is of the view that NRAs’ depreciation formulas often imply that working capital has been taken into account. This includes for example:</p> <ul style="list-style-type: none"> • BIPT (BEL)¹³ / ComReg (IRL)¹⁴: 6 months between the time network is built and network is operational. • PTS (SWE)¹⁵: 12 months between the time network is built and network is operational.

¹³ Description du modèle des coûts top-down pour le calcul des tarifs d’interconnexion », IBPT, November 2006.

¹⁴ ComReg 10/10, Local Loop Unbundling (“LLU”) and Sub Loop Unbundling (“SLU”) Maximum Monthly Rental Charges.

¹⁵ PTS Document: Dnr 07-3652/23. Guidelines for the LRIC bottom-up and top-down models, published 12 September 2007.

The Authority's approach to include a 'network CAPEX working capital' factor in the depreciation formula is in line with international best practices.

Concerning the OPEX side, the Authority agrees with Lightspeed's view that the working capital should not be included.

Lightspeed adds that including working capital assessments derived from accounts would partially include top-down information in the bottom-up model, leading to less transparency.

With the Authority's proposed approach, the network CAPEX working capital is most likely to be the only type of working capital taken into account. As it is directly included in the depreciation formula, the approach is fully transparent for all operators.

VIVA	VIVA shares the Authority's view that network CAPEX working capital requirements should be reflected in the annuity formula.	No comment.
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	VIVA shares the Authority's view that network OPEX working capital requirements should be set to zero.	No comment.
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Zain	Zain generally agrees with the Authority's point of view.	No comment.
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Zain requires clarifications on how operators can provide evidence of a significant and efficient level of network OPEX working capital if the operator only has accounting system data to provide.

Such evidence could be provided thanks to a study on lags between the moment wages and suppliers are paid and the moment revenues are received by the operator. For example, Zain could give evidence on the average time between which employees and suppliers are paid and the time Zain receives the revenues corresponding to the activity of its employees for the period considered. This would give an idea of the level of working capital required to operate the network. This could then be reconciled with top-down accounts.

Source: The Authority from the operators' submissions

Conclusion

23. The Authority remains of the view that working capital costs related to network OPEX should be excluded from the BU-LRIC models unless operators provide evidence that such costs are material and efficient.

Question 18:

Do respondents agree with the Authority's preliminary view that it may be appropriate in some cases to use gradients for setting regulated prices based on bottom-up models? Please elaborate.

Table 18. Summary of responses from stakeholders and the Authority's position on Question 18

Respondent	Comments received	The Authority's view & position
Batelco	Batelco has no specific comment on this question.	No comment.
Lightspeed	Lightspeed indicates that " <i>if gradients are used (for example peak call prices or off-peak call prices) knowing that price differences do not necessarily reflect cost differences this will be in contradict with the interconnection charge definitions (Each OLO should only pay in accordance to its usage only) which might lead to under or over recovery of the dominant cost</i> ". ¹⁶	The use of gradients is not in contradiction with the fact that each OLO should pay in accordance with its usage because OLOs will still pay charges that depend on the number of minutes they use. The application of gradients only changes the level of interconnection charges but not the charging basis. Gradients will be set so that they lead to the exact recovery of costs.
	Lightspeed explains that it is " <i>against setting of calling prices with differences between peak and off peak calls [The Authority understands that Lightspeed is here referring to wholesale call charges] but instead the Authority can use capacity based pricing which will enable the OLO to set their retail price in peak different than its off-peak price</i> ". ¹⁷	The Authority would like to clarify that the Authority does not intend to oblige operators to introduce peak and off-peak pricing. The Authority does not intend here to modify current pricing structure for interconnection rates. The Authority only indicated that a gradient could be applied in the case of setting call prices.
	Lightspeed does not support the use of gradients for different level of quality of services because it can be difficult to identify the underlying	The Authority disagrees with Lightspeed's view. As explained in paragraph 211 of the consultation paper, gradients can be necessary for

¹⁶ See Lightspeed's response, page 13, paragraph 1)

¹⁷ See Lightspeed's response, page 13, paragraph 2)

cost differences.

different levels of quality of service when there are no cost differences.

To illustrate the Authority's view, the Authority proposes to take the example of an operator having a MPLS network and providing two types of leased lines. The two types of leased lines (L1 and L2) have the same speed and the same technology but have different levels of quality of service on the MPLS network. The difference in quality of service results in L1 type traffic having priority over L2 type traffic for leased lines, even if speed remains the same. In such cases, the two types of leased lines may have very similar costs. However, if no gradient is applied, then the two types of leased lines will have a similar price, implying that all customers will choose the higher quality L1 type of leased lines because this offers a better quality of service for the same price. In this case, the fact that L1 types of leased lines have priority is undermined because only L1 types of leased lines are sold. In such a case, a gradient is therefore necessary to increase the difference in prices between L1 and L2 types of leased lines.

Lightspeed agrees with the use of gradients for leased lines as long as total revenues recover total costs.

No comment.

VIVA

VIVA agrees with the Authority's view. VIVA adds that the bottom-up models the Authority intends to develop need to illustrate relevant cost implications of providing such services at different speeds or quality of service. VIVA explains that using gradients to an excessive extent could simplify cost implications and would not ensure cost orientation.

The Authority agrees with VIVA's comments, especially on the fact that gradients must not be used to an excessive extent. The Authority will endeavour to identify cost differences between leased lines of different speeds or leased lines with different quality of service. However, the Authority remains of the view that in some specific cases, it is necessary to apply gradients even if there are no significant cost differences (for example to ensure that very high-speed leased lines are not too expensive, or to ensure that two different levels of quality of service are differentiated from a pricing point of view).

Zain

Zain supports the Authority's view but indicates that operators have to be involved in the definition of gradients because they have the experience for this.

The Authority agrees with Zain and will base its calculations for leased lines or peak/off-peak pricing on operators' knowledge for the setting of gradients. For example, existing gradients could be used.

Source: The Authority from the operators' submissions

Conclusion

24. The Authority remains of the view that it may be appropriate in some cases to use gradients for the setting of regulated prices based on bottom-up models.

Question 19:

Do you agree with the Authority's preliminary view to model annual costs over a 4 to 5-year period, notably to give visibility to operators and to enable the setting of regulated charges for multi-year periods? Please elaborate.

Table 19. Summary of responses from stakeholders and the Authority's position on Question 19

Respondent	Comments received	The Authority's view & position
Batelco	Batelco has no objection to a multi-year model being developed. However, Batelco indicates that it does not support moving straight from the current annual RO assessment process to a multi-year assessment process (this is detailed in its response to question 25).	See the Authority's comment on question 25 below.
Lightspeed	Lightspeed agrees with the Authority's view.	No comment.
VIVA	VIVA agrees with the Authority's view but adds that the length of the period to be considered depends on the meaningfulness of the forecasts of demand and technologies considered in bottom-up models. As explained in VIVA's response to question 6, bottom-up models that the Authority intends to develop should include LTE.	Comment noted. See the Authority's view in Question 6. The Authority would like to clarify that amendments over the 4 to 5-year period may occur, especially when there are significant unanticipated changes in service usage as explained in paragraph 265 of the consultation document (<i>'While prices may be set for multiple years, it may be necessary to accommodate price adjustments in limited circumstances (especially due to exogenous factors such as a significant change in service usage).'</i>)
Zain	Zain agrees with the multi-year modelling approach and with the use of a glide path. However, Zain indicates that a 3 to 5-year glide path is more common and that a 3 year forecast period with a yearly review if needed would be more appropriate.	The Authority remains of the view that costs should be modelled over a 4 to 5-year period, notably to give visibility to operators and to enable the setting of regulated charges for multi-year periods. The Authority would like to clarify that amendments over the 4 to 5-year period may occur, especially when there are significant changes in service usage as explained in paragraph 265 of the consultation

document (*'While prices may be set for multiple years, it may be necessary to accommodate price adjustments in limited circumstances (especially due to exogenous factors such as a significant change in service usage).'*)

The Authority would also like to clarify that the 4 to 5-year period is the period covered by the models but not necessarily the period over which a glide path would be applied. The period over which any glide path may apply would be discussed separately.

Source: The Authority from the operators' submissions

Conclusion

25. The Authority remains of the view that it is necessary to model annual costs over a 4 to 5-year period, notably to give visibility to operators and to enable the setting of regulated charges over several years.

Question 20:

Do respondents have any comments and suggestions regarding the overall potential structure of bottom-up models that the Authority intends to develop?

Table 20. Summary of responses from stakeholders and the Authority's position on Question 20

Respondent	Comments received	The Authority's view & position
Batelco	Batelco has no specific comment. Batelco indicates that the model structure included in the Authority's consultation document is similar to common practice. Batelco reserves its legal rights to challenge details in the implementation, application and interpretation of the bottom-up cost model when the information on the model structure is available, even if the overall structure described at the outset is not contentious.	Comment noted.
Lightspeed	Lightspeed does not have comment on the overall potential structure of bottom-up models.	No comment.
	Lightspeed explains that the cost allocation step mentioned for the fixed access network is not clear.	The cost allocation step of the fixed access network enables the allocation of trench costs between fibre and copper or between access network cables or core network cables. No routing factor table is therefore necessary.
	Lightspeed indicates that " <i>The overhead cost is not clear</i> " ¹⁸ . Lightspeed recalls that the international best practice uses a mark-up of a maximum 12% to represent common overhead costs.	The Authority would like to clarify that overhead costs are allocated during the OPEX calculation step because overhead costs are mainly made of OPEX. Regarding the level of overhead costs, see the Authority's view in response to Question 3.
	Lightspeed indicates that Access service needs to be redefined because the current cost of this service is not accepted and services are defined in a way which is favourable to the dominant factors.	The Authority understands that Lightspeed refers to LLU services. Bottom-up models will enable the Authority to assess the level of costs of access services and may be used for setting such prices. The Authority

¹⁸ See page 14 of Lightspeed's response

would like to recall that LLU prices are currently based on Batelco's FAC regulatory accounts.

VIVA

VIVA shares the Authority's view that:

- the developed bottom-up LRIC models have to be fully auditable,
- the model should be implemented in Microsoft Excel (and if necessary for the fixed access model in Microsoft Access),
- spreadsheet types enable auditability of the models,
- it is necessary to develop 3 models (one for fixed access, one for fixed core, one for mobile).

No comment.

VIVA states that the 9-step approach outlined by the Authority in the consultation document is not sufficient to appreciate the actual model structures that the Authority intends to implement. According to VIVA, terminologies such as "street's segment level" are ambiguous and the granularity of, for example, the modelling of the demand and its resulting increment cannot be understood from the information provided.

The Authority understands that it is difficult for operators to appreciate the model structures on the basis of the consultation document but the goal of the consultation document is to establish key features and principles of the models. The Authority believes that the validation stage planned in the process will enable operators to have a view on the structure of the models.

Regarding the terminology "street's segment level", a segment of a street is that part of the street that is delimited by two intersections. The step corresponding to the deployment of cables at the street segment level involves the deployment of cables that are dedicated to the buildings located in the street segment, while other steps involve the deployment of cables that are shared with other streets (to go from the street to the street cabinet or the MDF).

VIVA expects to be provided with all 3 model types (fixed access, fixed core and mobile LRIC model) for review as early on in the process as feasible and proposes that these models be populated with reasonable dummy inputs to avoid any confidential inputs.

The Authority considers that all 3 model types should not be shared with the operators for a number of reasons:

- The inclusion of operators other than Batelco would significantly lengthen the process of development, implementation and validation of the fixed access and fixed core models.
 - It will also raise confidentiality issues since the models not only highlight cost and volume information - which could
-

indeed be replaced by dummy figures - but also network topology information. It is difficult to evaluate models with dummy input.

- The Authority does not consider that there would be enough value in releasing the fixed models to OLOs which do not operate a fixed access or fixed core network.
- The Authority observes that fixed models are typically not made available to other operators in other countries. In that regard the Authority's approach is consistent with international practice.

VIVA notes that, "while TRA outlines the issuing of four versions of the bottom-up LRIC model for the mobile network (Batelco, Zain, Viva and "generic" operator) , the previously mentioned scenario functionality of the fixed models is not further detailed in section 5 of TRA's Draft Position Paper".¹⁹

The Authority will issue a version of the fixed access and the fixed core network models to Batelco only.

Zain

Zain states that the potential structure of the models described in the Authority's consultation document complies with the common structure of bottom-up models.

No comment.

Zain adds that the example of the model control panel provided in the consultation document is confusing as it gives the impression that one single model will be built for mobile networks. Zain suggests the control panel should be reviewed to follow the outline (b, c, d and e) in paragraph 231 of the consultation document.

The control panel was only for illustrative purposes. The models which the Authority is developing will follow as much as possible the structure outlined in paragraph 231 of the consultation document.

Source: The Authority from the operators' submissions

Conclusion

¹⁹ See page 16 of VIVA's response

26. The Authority remains of the view that the overall potential structure of bottom-up models that the Authority will develop is appropriate. The Authority has specified in the final consultation document that overhead costs are allocated at the “OPEX calculation” step.

Question 21:

Do respondents agree with the anticipated timeline for the development and implementation of the bottom-up cost models? Please elaborate.

Table 21. Summary of responses from stakeholders and the Authority's position on Question 21

Respondent	Comments received	The Authority's view & position
Batelco	Batelco considers that the Authority's timelines to finish the project in 2011 are ambitious given summer holidays and the multiple projects that run in parallel. Batelco requests the Authority to provide more time for operators to review the models and more time for the Authority to implement changes to the model.	<p>Considering that the consultation period has been extended and that the review of the models is a major step, the Authority agrees with Batelco and now anticipates that:</p> <ul style="list-style-type: none"> - step 1 (data collection) will occur in Q4 2011; - step 2 (model implementation) will occur both in Q4 2011 and Q1 2012; and - step 3 (model validation) will occur in Q1 and possibly Q2 2012.
Lightspeed	Lightspeed supports the Authority's view and urges the Authority to complete the modelling process in Q4 2011 because current wholesale prices do not enable OLOs to invest and differentiate.	<p>The Authority does not consider it feasible to complete the modelling process by Q4 2011.</p> <p>See comment above on revised timeline.</p>
VIVA	<p>VIVA encourages the Authority to communicate a clear and detailed timetable to the relevant parties involved. In general, VIVA is in support of a speedy timeline to undertake this bottom-up LRIC modelling exercise.</p>	<p>The Authority agrees with VIVA and intends to keep stakeholders appropriately informed.</p>
	<p>VIVA indicates that the Authority's proposed timelines do not appear sufficient for the validation of the models. VIVA believes that 3 months would be necessary to review the models and that a staggered release of the consultations (e.g. by mobile, fixed core and fixed access models and by technology inputs and cost inputs) could be appropriate.</p>	<p>The Authority agrees with VIVA and proposes that the model validation stage starts in Q1 2012 (3 months). However, the Authority is of the view that a staggered release is not necessary because each type of model will involve different engineers or technicians for the review of those models (e.g. people familiar with or in charge of fixed access networks will review the fixed access network, etc.) and could be reviewed in</p>

parallel.

In addition, for the reasons outlined in the previous section, the Authority does not intend to release the fixed core and fixed access models to operators other than Batelco.

VIVA indicates that the Authority's proposed timelines do not appear sufficient for the data collection stage of the model due to Ramadan in August 2011 and due to the fact that the 4th quarter of the year involves financial and planning activities for operators.

The Authority notes VIVA's concern and will ensure that the data collection stage planned during Q4 2011 will be carried out in such a way as to minimize the amount of resources needed from the operators (workshops, clear and precise questionnaire, information collected during meeting, etc.)

Zain

Zain agrees with the proposed timeline of 6 months but recommends these phases to occur between Q4 2011 and Q1 2012.

See comment above on revised timelines.

Source: The Authority from the operators' submissions

Conclusion

27. In light of operators' responses, the Authority has reviewed the timelines of the project and now anticipates that:

- a. step 1 (data collection) will occur in Q4 2011;
- b. step 2 (model implementation) will occur in Q4 2011 and Q1 2012; and
- c. step 3 (model validation) will occur in Q1 and possibly Q2 2012.

28. The change in the project timelines has been reflected in the final Position Paper.

Question 22:

Do respondents agree with the key steps described in sections 6.1, 6.2, and 6.3 anticipated by the Authority for the development, implementation and validation of bottom-up cost models? Please elaborate.

Table 22. Summary of responses from stakeholders and the Authority's position on Question 22

Respondent	Comments received	The Authority's view & position
Batelco	Batelco has no specific comments on this question and explains that the Authority's steps appear in line with common practice.	No comment.
Lightspeed	Lightspeed agrees with the Authority's proposed key steps but has some comments.	No comment.
	Lightspeed proposes that the Authority should use benchmark data to populate the model when an operator does not provide the Authority with the data requested within the time limit set by the Authority.	This is consistent with the Authority's view. (Paragraph 238 in part 6.2 of the consultation document says that " <i>Information will be sought pursuant to Article 53 of the Telecommunications Law. The Authority will cross-check and/or complement the data based on benchmarks as appropriate.</i> ").
	Lightspeed makes the following comment on model granularity: " <i>LSC would like to draw the Authority's attention about the granularity of the network needed data required data which will help the Authority to remove the inefficiency of all specific operator models</i> "	This is consistent with the Authority's intention to require data as granular as possible.
	According to Lightspeed, the Authority should obtain the asset current value and the asset price trend from more than one supplier, as well as recourse to the cheapest price, in order to guarantee maximal efficiency from the intended operator.	The Authority will consider Lightspeed's approach if several values are available and if these values are comparable. If identical assets have different prices, then choosing the highest price would not enable the Authority to calculate the efficient level of costs, which is not in line with the Authority's objectives. The Authority therefore agrees with Lightspeed's view to the extent that several values will be available.
	Lightspeed explains that despite the scorched node approach, the	The Authority agrees with Lightspeed. It intends to optimise the quantity

	quantity of equipment in a given node should be re-dimensioned.	of equipment in each node in the bottom-up models.
	Lightspeed indicates: “ <i>The generic model usage, development, implementation and validation suppose to be more clarified by the Authority</i> ” ²⁰ .	The Authority has tried to clarify as many points as possible in the consultation document. Without the data being collected yet, and in advance of the model being developed, it is difficult to give more clarifications. The Authority notes that Lightspeed does not specify what needs to be further clarified.
	Lightspeed indicates that the Authority may need accounting information from operators (such as asset registers and account ledgers).	The Authority would like to point out that it intends to use accounting information from operators as shown, for example, in figure 17 – stage 3 “comparison with top-down information” of the consultation document.
VIVA	VIVA considers that the 3-step proposed approach is appropriate.	No comment.
	Regarding the data collection phase, VIVA adds that this phase needs to consider: <ul style="list-style-type: none"> - data requests with the necessary level of granularity, - the opportunity for the operators to discuss the Authority’s various data requests in all necessary detail. 	The Authority intends to issue data requests with a high level of granularity both for OPEX and CAPEX. As explained in paragraph 235 of the consultation document, the Authority will provide operators the opportunity to discuss the Authority’s various data requests in all necessary detail. At least two workshops have been identified (see paragraph 235, part 6.2): <ul style="list-style-type: none"> - a workshop with relevant operators to discuss the data requests, - a workshop with relevant operators to define relevant network topologies, structure and engineering rules.
	Regarding the model validation phase, VIVA indicates that this phase needs to include: <ul style="list-style-type: none"> - detailed presentations and discussions of the reconciliation process between the developed bottom-up models with the available data from the top-down models; - detailed presentation and discussion of the reconciliation 	The Authority would like to point out that in the validation phase, operators will be provided with documentation which will give details on the comparison between bottom-up and top-down models, and also on how the generic mobile operator model was built.

²⁰ See paragraph 5 page 15 of Lightspeed’s response

process between the outputs for the bottom-up mobile LRIC models for the “generic mobile operator” and the outputs of the 3 specific mobile operator models which are to be populated.

Zain	Zain Bahrain agrees with the key steps described in the consultation document but explains that there should be interactions with operators during the model implementation phase (figure 17, section 6.1).	The Authority does not intend to involve operators in the construction of the model because this step is a step which consists of populating and creating the logical structure and links of the Microsoft Excel or Microsoft Access spreadsheet where operators’ involvement would be meaningless and which cannot be completed during meetings. This is the responsibility of the modeller. However, the Authority recalls that it will provide models to operators, it will involve them in the validation process and it will take into account their comments as appropriate. This will give operators a transparent view of the models. The Authority believes that such an approach will be more efficient and less time-consuming.
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Source: The Authority from the operators’ submissions

Conclusion

29. The Authority remains of the view that key steps described in sections 6.1, 6.2, and 6.3 anticipated by the Authority in the consultation document for the development, implementation and validation of bottom-up cost models are appropriate.

Question 23:

Do respondents agree with the proposed strategy to involve relevant operators (Batelco, Zain and VIVA) in the development and validation of the models? Please elaborate.

Table 23. Summary of responses from stakeholders and the Authority's position on Question 23

Respondent	Comments received	The Authority's view & position
Batelco	Batelco agrees but adds that Menatelecom should be part of the process because Menatelecom's network should also be modelled.	The Authority does not intend to model the costs of Menatelecom's network at this stage. It is to be noted that Menatelecom's network is not currently regulated, although the Authority has informed the industry that it intends to conduct a number of market reviews. As a result of such reviews, the Authority will consider any regulatory obligations that are appropriate including any that could apply to wimax networks.
Lightspeed	Lightspeed agrees with the proposed strategy but indicates that the Authority should involve other operators in the model development, implementation and validation stages.	<p>The Authority does not intend to provide models to other operators at this point in time and does not intend to involve other operators in the model development, implementation and validation stages:</p> <ul style="list-style-type: none"> - for mobile networks, the Authority believes that the presence of 3 mobile operators in the process will ensure that the models and the results of the models are sufficiently robust, - for fixed networks, the Authority believes that other operators will not be able to provide sufficiently detailed information on Batelco's fixed network. The Authority has extensive experience in reviewing information from Batelco and believes that excluding other operators will not weaken the bottom-up models for the fixed networks. <p>The inclusion of other operators would significantly lengthen the process of development, implementation and validation of the model. The Authority would like to highlight that it will be assisted by consultants who have access to benchmark information and who have significant experience in such modelling exercises.</p>

Including other operators could also generate confidentiality issues since models not only highlight cost and volume information but also network topology information.

However, if other operators believe that they can provide detailed and relevant information for this exercise, then the Authority would consider such information.

VIVA VIVA welcomes that the Authority is planning to undertake this process in a “cooperative way and through a consultative process” and that the Authority envisages “many interactions” with the relevant parties concerned.

No comment.

VIVA is however looking for additional detail about the bottom-up modelling process:

- whether operators will be able to review, comment and provide inputs regarding the bottom-up LRIC model specification or other key documents,
- whether and how the Authority intends to respond to specific operator comments,
- how the Authority intends to demonstrate to operators that specific comments have been taken into account.

The Authority would like to clarify that:

- operators will be able to review, comment and provide inputs regarding model specification documents,
- the Authority will take into account operators’ comments if relevant,
- the Authority will set out in final documents that specific comments have been taken into account (if relevant).

As explained in VIVA’s response to question 20, VIVA would request that all operators can also review written versions of fixed access and core bottom-up LRIC models.

See comment above in response to a similar point raised by VIVA in response to Question 20.

Zain Zain fully agrees with the Authority’s proposed approach and appreciates that operators will not only be involved in the data collection process but also in the development and validation processes.

No comment. Same clarification as under question 22 applies here.

Source: The Authority from the operators’ submissions

Conclusion

30. The Authority remains of the view that the strategy to involve relevant operators (Batelco, Zain and VIVA) in the development and validation of the models is appropriate. At this stage, the Authority does not intend to share fixed core and fixed access network cost models with operators other than Batelco.

Question 24:

Do respondents have any comments regarding the above discussion (*i.e. the use of bottom-up model*)? Please elaborate.

Table 24. Summary of responses from stakeholders and the Authority's position on Question 24

Respondent	Comments received	The Authority's view & position
Batelco	<p>Batelco requires more explanations from the Authority on the use of bottom-up cost models and especially on the following:</p> <ul style="list-style-type: none">- how bottom-up models will be precisely used;- whether bottom-up models will be given priority over other cost information;- whether Batelco can use bottom-up information in its submissions; and- how this approach maps onto services which use both the core and the access network.	<p>No further guidance in relation to the specific use of bottom-up cost models information can be provided at this stage as the relevance and appropriateness of specific cost information is case-specific.</p> <p>However, the Authority would like to reiterate that it intends to use bottom-up information along with other existing costing information and that "The availability of bottom-up models in addition to top-down models will result in more robust decision-making, consistent with the Authority's duties to promote competition and to protect the interest of end-users" (paragraph 260 of the consultation document).</p>
	<p>Batelco is of the view that this cost modelling project should not be pursued for the following reasons:</p> <p>a/ Consumers (retail market) and competitors (wholesale market) already benefit from competitive tariffs.</p> <p>b/ Operators are facing increasing costs of conducting business overall. Batelco states that the cost increases could be under-recovered with bottom-up models as these models generally remove joint and common costs.</p> <p>c/ Due to public services, universal service and general legislative requirements for Batelco, bottom-up modelling of costs would lead to the company not recovering its costs.</p> <p>d/ Several other sources of information could be used by the Authority to set "fair and reasonable prices" (top-downs, benchmarks, etc.).</p>	<p>The Authority disagrees with Batelco and remains of the view that it is important to develop bottom-up cost models as explained in the consultation document (see for example, section 2.3 titled "Purpose of developing bottom-up cost models" and section 7 titled "Use of Models"). It is also fully consistent with the legal framework (see paragraph 27 of the consultation document). Without repeating the argument presented in the Position Paper, the Authority notes the following in relation to Batelco's comments:</p> <p>a) BU-LRIC costs will send (in specific situations) well-adapted 'make or buy' signals that would support the development of competition, to the benefit of the end user. They will better reflect the provision of efficient services.</p> <p>b) BU-LRIC costs will be used in a way that enables operators to recover their costs: if a service is not allocated a share of joint and common costs</p>

e/ Substantial efforts have already been made to improve the top-down quality.	(pure LRIC approach), these costs will be recovered through other services.
f/ Batelco already has several priority regulatory projects ongoing.	c) Universal service and regulatory obligations (along with any related fund or aid) can be taken into account when setting regulated tariffs.
g/ Regulatory lag: Batelco considers that alternative networks should be taken into account (VIVA's planned fixed network, the new National Broadband Network, Menatelecom's national wimax network and Nuetel's fixed network exclusively in the Amwaj area).	d) The BU-LRIC model is an additional source of information which will enable the Authority to carry out its duties.
	e) Top-down and bottom-up models are complementary tools. However, recent experience has shown that top-down models are not fully transparent and deficient in important respects. Therefore a bottom-up model will better achieve the objective of transparency and providing an alternative source of information allowing cost drivers and forward-looking analysis to be performed. In contrast to top-down models which calculate accounting cost, bottom-up models better reflect economic costs.
	f) The Authority considers that the project has been designed with a reasonable timeline enabling operators to be as involved as required. The timeline has also been extended in light of operators' comments.
	g) The Authority is developing cost models of Batelco's fixed core network and Batelco's fixed access network because Batelco is dominant in the provision of services using these networks. VIVA's planned fixed network, the new National Broadband network, Menatelecom's national wimax network and Nuetel's fixed network exclusively in the Amwaj area do not currently raise concerns regarding dominance, and so the Authority does not intend to develop corresponding models for the time being.

Lightspeed

Lightspeed agrees with the Authority's view.	No comment.
Lightspeed would like the Authority to provide further explanations on how operator-specific and generic models will be used.	<p>Specific models will enable the Authority to illustrate cost differences between operators whereas the generic operator will enable the Authority to determine the costs of a 'hypothetical' operator in Bahrain.</p> <p>The way in which each model will be used cannot be precisely defined at this stage and will be decided later by the Authority.</p>

VIVA	<p>VIVA considers that BU-LRIC's internationally accepted purpose is to assess the costs of specific wholesale services.</p> <p>As a consequence, VIVA states that any other use should require very careful examination and consultation on a case-by-case basis.</p>	No comment.
Zain	<p>Zain indicates that the Authority's position on the use of a bottom-up or a top-down model for the access network is unknown and that the Authority has classified the access network as not being economically replicable.</p>	<p>To avoid any doubts, the Authority would like to point out that it has not classified the fixed access network in any category, as fixed access networks can be considered as bottlenecks in some countries but not in other countries (see examples in paragraph 258 of the consultation document). Even in the case of a top-down model being used, a bottom-up model can still be used to get a better understanding of the network, to allocate certain costs (joint and common network costs) or to model new technologies for which no accounting information is available (e.g. FTTH).</p>
	<p>Concerning the Authority's intention to use the bottom-up models to assist in setting retail prices, Zain is of the view that the scope of this assistance should be limited to regulated retail services or to cases of alleged price squeezes.</p>	<p>As explained in the consultation document, the Authority considers that bottom-up models can be useful not only in the context of regulated charges but in a wider set of circumstances (see section 7 of the Position Paper for instance).</p> <p>The calculation of the costs of retail services is of interest for the regulation and monitoring of the telecommunications market. In addition, the Authority would like to remind that Article 58 of the Telecommunications Law provides for tariffs charged by licensed operators to be "<i>fair and equitable, non-discriminatory and based on forward-looking costs</i>".</p>

Source: The Authority from the operators' submissions

Conclusion

31. The Authority does not have any further comment.

Question 25:

Do respondents agree that consideration should be given to setting access and interconnection prices over a medium-term time horizon such as 3 years? Please elaborate.

Table 25. Summary of responses from stakeholders and the Authority's position on Question 25

Respondent	Comments received	The Authority's view & position
Batelco	Batelco considers the current annual synchronised process offers a good level of flexibility to SMP operators (e.g. to meet the Authority's replicability requirements).	The Authority understands that the current framework gives Batelco a good level of flexibility but a mid-term time horizon would give more predictability to the market, predictability being a key success factor for competition. It will also minimise regulatory cost as regulatory intervention will be more focussed and there will not be a need to prepare an extensive annual RO submission.
	Batelco states that <i>"In the absence of timely market reviews and any reforms in the current system of retail tariff controls, locking in and "freezing" a three year wholesale tariff is expected to give even less freedom for Batelco's retail business to meet the competition and compete fairly."</i> ²¹	A medium-term time horizon (e.g. 3 years) does not mean having a "frozen" model. In case of material changes in the market conditions (e.g. a significant evolution in consumption patterns), a revision of the model and/or prices could be conducted before the end of the period. It could also be the case that the Authority sets maximum prices or caps.
Lightspeed	Lightspeed supports the Authority's position.	No comment.
VIVA	VIVA supports the Authority's position.	No comment.
Zain	Zain supports the visibility given to the market thanks to a medium-term time horizon. Zain shares the Authority's view that a review should be conducted in cases where the economic environment changes.	No comment.
	Zain considers that in the event that there is a significant gap between	The Authority agrees that the glide path period could depend on the gap

²¹ See paragraph 74 page 23 of Batelco's response

current and target prices, the glide-path should be extended to a five- year period. between current and target prices. The glide path will be defined on a case-by-case basis.

Source: The Authority from the operators' submissions

Conclusion

33. The Authority intends to use the bottom-up cost models to set regulated charges over several years.

Question 26:

Do respondents agree that in some cases, when there is a significant gap between service costs calculated today and before (due for example to the move from a top-down cost model to a bottom-up cost model), the use of a glide path might be appropriate to move from existing prices to the appropriate cost-based level? Please elaborate.

Table 26. Summary of responses from stakeholders and the Authority's position on Question 26

Respondent	Comments received	The Authority's view & position
Batelco	Batelco agrees with the Authority on the benefits of glide paths.	No comment.
	Batelco states that "fair and reasonable prices" do not necessarily mean "cost + WACC". Batelco underlines that this consultation represents a move to one extreme end of the "legal scale" (from retail to pure bottom-up LRIC).	The Authority's position on the legal framework is set out in section 2.1 of the consultation document. Batelco is also referred to various documents by the Authority in which its position on Article 57 has been clearly articulated (see e.g. Reference Offer Order dated 25 January 2011).
Lightspeed	Lightspeed considers that the Authority should make use of a glide path as a transitional mechanism towards the appropriate cost-based level only when the difference is considerable (more than 30%).	The Authority will implement a glide path when it considers it to be the most suitable solution. The implementation of a glide path and associated parameters (e.g. duration) will be decided on a case-by-case basis.
	Lightspeed considers that the glide path period should not be more than 3 years.	The Authority will implement a glide path when it considers it to be the most suitable solution. The implementation of a glide path and associated parameters (e.g. duration) will be decided on a case-by-case basis.
VIVA	VIVA supports the Authority's position.	No comment.
Zain	Zain considers that target prices should be based on LRIC+ costs rather than on pure LRIC costs in the specific context of Bahrain. Zain is of the view that a pure LRIC approach is best suited for fully mature markets.	In the context of this project, BU-LRIC models are built for informational purposes. The use of model outputs will be decided in the context of specific decisions.

Source: The Authority from the operators' submissions

Conclusion

34. When there is a significant gap between calculated service costs and current charges (due, for example, to the move from a top-down cost model to a bottom-up cost model), the Authority still considers that the use of a glide path might be appropriate to move from existing to appropriate cost-based charges.

Additional comments raised by operators:

Several operators have made general comments in addition to their answers to the specific questions contained in the consultation document.

Table 27. Summary of responses from stakeholders and the Authority's position on operators' general comments.

Respondent	Comments received	The Authority's view & position
Batelco	Batelco has not made any additional comment.	
Lightspeed	Lightspeed indicates that the service definition and service measurement unit are key success factors for wholesale products (possibility to differentiate its products, sufficient economic space for an OLO to compete at the retail level, etc.)	<p>The Authority shares Lightspeed's view that wholesale service descriptions and service measurement are keys for the development of competition.</p> <p>BU-LRIC cost models will be, for some wholesale products, an important tool to provide appropriate pricing signals to the market. In addition, BU-LRIC cost models give a good understanding of cost structures and can enable the use of service measurements that are in line with cost drivers (installation, access, traffic-related, etc.).</p>
	Lightspeed provides some comments about local switches and local concentrators which are at the boundary between access and core networks. It indicates that the costs of these types of equipment must be divided between access and core networks. Lightspeed adds that an international benchmark shows that between 30 to 50% of local switch costs relates to access.	<p>The Authority agrees with Lightspeed on the fact that local switch and local concentrator costs must be split between the core and the access networks. Costs that are related to access must be recovered by access prices (price per line and per month) while costs that are related to core must be recovered by usage and traffic prices (price per minute for example).</p> <p>However, the full local switch and local concentrators costs will be calculated within the fixed core network bottom-up cost models, even if a relevant share of these costs related to access will then be added to the costs calculated in the access network to derive access prices. In other words, some access prices will be derived using both access and core network bottom-up cost models.</p>
	Lightspeed stresses that OLOs in the industry need to be involved in	The Authority shares the view that operators' involvement is of the utmost importance for the success of this project. As detailed in section 6 of the

order to express their needs and their related remarks and comments.

draft Position Paper, the Authority has requested and will request interaction with the industry at several stages of this project.

Although the models will capture the networks of Batelco, VIVA and Zain, the Authority welcomes the views of other market players (through this public consultation for example) and any available data that could be of use for cost modelling.

Lightspeed believes that the asset's current value and the asset's cost trend should be obtained from more than one supplier and that the cheapest one should be adopted.

The Authority shares Lightspeed's view that asset values and price trends using all available sources should be considered.

In practice, the Authority will request (through the data collection process) that operators provide latest market prices and price trends. As a consequence, the Authority will be in a position to check the coherence of the inputs between operators. If required, data from suppliers could be used as a cross-check.

Lightspeed "*urges the Authority to remove the revenue share from the mobile network interconnection service cost because this cost should be recovered from retail services only*"²².

The Authority does not see the relevance of this comment in the context of the development, implementation and use of bottom-up fixed and mobile network cost models in the Kingdom of Bahrain.

VIVA

Viva has made additional comments in its response. However the comments were marked as confidential and thus cannot be publicised.

Zain

Zain considers that the pure LRIC approach is best suited for mature telecommunications markets. Zain considers that the use of the pure LRIC approach for the Bahrain case would be inappropriate (pure LRIC modelling should be used for analysis purposes only).

The Authority considers that Zain's comment is out of the scope of the Position Paper. Such discussion should be addressed when mobile termination rates are reviewed. The Authority adds that there are also some advantages in using a pure LRIC approach which have been highlighted by many regulators for termination rates, especially in Europe. In this context, modelling both pure LRIC and LRIC+ costs is relevant.

The Authority also considers that the mobile telecommunications market in Bahrain is mature.

Zain is concerned about the Authority's choice to build the generic

The Authority reaffirms that it will consider the data provided by all 3

²² See paragraph 5 page 3 of Lightspeed's response

operator network based on VIVA's network. Zain considers that the generic operator model should be based on the data provided by all 3 operators.

operators for the 'generic operator' model. The Authority will use VIVA's topology as a starting point because it considers that it better reflects current market conditions and an efficient network deployment, but will consider data provided by all 3 operators for traffic, asset prices, spectrum fees, etc. Also, as explained in the consultation document (see paragraph 120), *"the generic topology will be subject to possible adjustments to reflect the generic operator's spectrum assignment (refer to Table 3), potential differences in the number of base stations, and potential differences in mobile traffic load"*.

Zain is of the view that the Authority has to make a decision regarding the right level of cost of capital. Zain supports the use of the regulated cost of capital of 9.50% for all Bahraini operators including VIVA.

The Authority notes that Zain's comments on the cost of capital are out of the scope of the consultation document. The appropriate cost of capital is set and reviewed in separate regulatory proceedings.

Source: The Authority from the operators' submissions

Conclusion

35. The Authority does not have any further comment.