



**Independent Communications Authority of South Africa**  
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***Responses to stakeholder requests for  
clarification on bottom-up and top-down shell  
models for the determination of mobile and  
fixed-line wholesale voice call termination  
rates***

***June 2023***

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## 1. Purpose

- 1.1. The purpose of this document is to provide clarity in response to licensee's submissions on the:
  - 1.1.1. gazetted Notice of Commencement of the Cost Modelling Phase with Respect to the Review of the Pro-Competitive Conditions Imposed on Relevant Licensees in Terms of the Call Termination Regulations, 2014 (as Amended) (GG 48660), of Friday 26 May 2023; and
  - 1.1.2. the questionnaires, top-down and bottom-up cost models proposed by the Authority to determine suitable mobile and fixed-line termination rates provided to licensees; and
  - 1.1.3. the timelines provided in the Stakeholder Plan as published on ICASA's website.
- 1.2. In its clarification to stakeholder concerns, the Authority is cognisant of the impact some of its responses may have on the timelines as published in the stakeholder plan.
- 1.3. As such, the ***Deadline for inputs on cost models 10 July***, has been replaced with a ***Deadline for commentary on the methodologies on top-down/bottom-up cost models 10 July 2023*** on the Stakeholder Plan.
- 1.4. Stakeholders are requested to submit their comments on the Authority's proposed cost modelling approach and underlying methodologies **by close of business 10 July 2023**.
- 1.5. A revised Stakeholder Plan will be shared with stakeholders in due course.

## 2. Operators concerns regarding the process

Issue no.	Issue/comment	ICASA Response
1.	Some operators commented that “a mere 3 days of consultation is manifestly inadequate” on the cost standard to be applied. MTN explains that it will comment on the modelling approach while it responds to the questionnaires.	Stakeholders may comment on the cost standard to be applied in their submissions.  Stakeholders have until 10 July 2023 to comment on the cost standard that will be used in their submissions.
2.	An operator also comments that it appears that ICASA has taken a decision on the cost standard already.	The cost standard has not yet been decided on by the Authority. Submissions about the cost standard that will be received before or on 10 July 2023 will be taken into consideration by the Authority.
3.	Cell C, MTN, Telkom and Vodacom all commented that the timelines are too short. This is particularly so given the electricity crisis in the country, and the many other priorities that the businesses face.	The Authority has decided that that the modelling approach will be consulted on first, and this will be followed by revised information requests.
4.	MTN 2.6: Please can the Authority explain why such an extensive data set is being required from the industry when the previous modelling approach and request was deemed appropriate to deliver the regulatory objective? When and why has ICASA decided that the past approach and	As explained below, the economic depreciation approach is more information intensive. Nonetheless, the Authority has not yet taken a final decision on the modelling approach, including on economic depreciation versus tilted annuity.

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	data requirement is now insufficient, and that such an extensive data request is now warranted?	Stakeholders are encouraged to make submissions on the modelling approach, and the Authority will take these submissions into account when taking a decision.
<b>5.</b>	MTN 2.7: It is not clear how the data being requested flows into the model shells. Please could the Authority clarify why such extensive data is being requested that does not feed directly into the shell models.	<p>The questionnaires call for information in addition to the shell models in two respects: (i) to sense-check the outcomes of the models (such as the number of sites by geotype, etc), and (ii) in order to inform the 'plus' component of LRIC-plus. Nonetheless, the information requested in the questionnaires has been significantly reduced in response to stakeholder comments.</p> <p>Stakeholders are encouraged to comment on the modelling approaches, including in respect of LRIC versus LRIC+, and what data and information might best inform these approaches to estimate call termination rates.</p>
<b>6.</b>	MTN 2.8: During the one-to-one meeting held on 2 June 2023, ICASA, through its consultant (Acacia) submitted that some of the data requested may not in fact be required (for example, wholesale revenues by customer, or	The data currently being requested will be used to inform the Authority's model generation process. The greater the amount of information available to the Authority, the more informed this modelling process will be. As explained during the meeting MTN

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	<p>detailed site information). Acacia proposed a new data request would be issued highlighting the items that are critical, nice to have, or not necessary. Please could the Authority indicate when this updated request will be made available, and its impact on the proposed timeline? In addition, please could the Authority clarify why data is currently being requested that is nice to have, or not necessary?</p>	<p>mentions, the additional data was requested to (i) sense-check the models, and (ii) to information the 'plus' component of LRIC plus.</p> <p>At the same time, the Authority has considered stakeholder comments, and the questionnaires have been significantly curtailed in response to these comments.</p> <p>Stakeholders are encouraged to comment on the modelling approaches, including in respect of LRIC versus LRIC-plus, and what data and information might best inform these approaches to estimate call termination rates, and stakeholders are encouraged to provide such data.</p> <p>The updated information requests will be made available together with responses to clarification questions.</p>
<b>7.</b>	<p>MTN 2.9: During the one-to-one meeting, Acacia indicated that the operators are not in fact expected to produce the exact data request, over the full-time horizon, or templates provided, and the operators should be afforded flexibility on how</p>	<p>As explained above, the Authority's approach is to inform the termination rate models as far as possible with licensee data and information. If the reason that MTN cannot comply is that data and information requested are not available, then this information need</p>

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	<p>the requested data is fulfilled, implying the data requested should be in fact provided on a best effort basis.</p> <p>MTN 2.10: Apart from our understanding in the above paragraph, MTN understands that the request for information is published in terms of Section 67(4B) of the ECA, which provides that, subject to Section 4D of the Independent Communications Authority of South Africa Act No 13 of 2000, as amended ("ICASA Act"), licensees are required to provide to the Authority any information specified by the Authority to enable it to carry out its duties in terms of Section 67 of the ECA. In the context of this "best effort" and "flexible" mindset, please could the Authority clarify MTN's obligation, and how the Authority will treat MTN's response if it cannot comply with the full scope, granularity and time horizon requested? The Authority is requested to be specific which information, which, if not provided, will be taken adversely by the Authority.</p>	<p>not be provided. If information is not provided on any aspect, the Authority will use information from other licensees or international best practice, and so the Authority will not take any information not provided 'adversely'.</p>

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<b>8.</b>	Telkom General 3: Telkom will not be able to provide the forward-looking information (up to 2048). Given the volatility of the market Telkom will only be able to provide estimated projections/forward looking information for a period of 3 years.	As mentioned above, the timeline has been significantly reduced. Stakeholders are encouraged to provide as much information as they can. The 20-year period requested is especially reasonable given that business plans for this time period were submitted during the course of the recent spectrum auction. Nonetheless, stakeholders are invited to comment on a reasonable period for the models.
<b>9.</b>	MTN 2.11: Given the extensive amount of time used to align methodologies and populate past models, it is not clear why the Authority decided to start the modelling process from scratch using new models, methodologies, and data requests when simple updates of existing models and requests would have been a much more efficient and less onerous process. Please could the Authority clarify why it decided the 2018 models and data requests should be jettisoned, rather than simply be updated?	The Authority has not decided that the 2018 models and data requests should be 'jettisoned'. As explained below, the Authority is considering adopting a pure-LRIC approach to termination rates, and economic depreciation, which are departures from the previous methodologies.  Nonetheless, it may be possible to use information previously submitted to inform the new modelling approach. Licensees are encouraged to submit such information to the Authority, and to comment on the alternative modelling approaches overall.



<b>Issue no.</b>	<b>Issue/comment</b>	<b>ICASA Response</b>
<b>10.</b>	<p>MTN 2.12: Please can the Authority clarify when it intends to respond to the questions of clarification raised by the stakeholders. The Stakeholder Plan provides no indication for this deadline. This appears to be unfair given that MTN is required to respond to the data request by 10 July 2023, and yet may not receive timely feedback on its questions to meet that deadline.</p>	<p>The Authority’s response to questions of clarification are incorporated in this document. The Authority has decided that that the modelling approach will be consulted on first, and this will be followed by revised information requests.</p>
<b>11.</b>	<p>MTN 2.13: During the 2017 MTR review process, MTN was afforded close to four months to comply with a much simpler data request (typically, single year request, over a much-reduced set of dimensions and granularity, see above). The ICASA consultants (Aetha) stated during the initial workshop that “Collating the required data typically takes several months, so we suggest that parties begin this process as soon as possible” (our emphasis)<sup>1</sup>.</p> <p>MTN 2.14: In this context, could ICASA explain why it believes the exceptionally onerous data request being sought now should and can be performed in about a month?</p>	<p>Stakeholders will be afforded sufficient time to provide data to inform the models. Note that the information needed to complete the pure-LRIC model can be estimated using publicly available data and international best practice, and so the information that stakeholders need provide is relatively limited. Nonetheless, stakeholders are encouraged to comment on the modelling approach, and if the Authority decides on a different modelling approach, more data may be needed and more time to collect data this may be required. Stakeholders are encouraged to comment on timelines when commenting on the overall modelling approach.</p>

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<b>12.</b>	MTN 2.15: Please could the Authority explain why the process presented in the Stakeholder document is so front-loaded (c. 1 month for data gathering vs 5 months between Draft and final Regulations).	The Authority has left some time available in the stakeholder plan to accommodate unforeseen delays while ensuring that final regulations are passed before March 2024. Stakeholders are encouraged to comment on timelines.
<b>13.</b>	MTN 2.16: Significant methodological choices (including important departures from previous Authority decisions around cost standards, depreciation method, the treatment of spectrum and the definition of the Hypothetical Efficient Operator) have been put forward in the shell models and Modelling Guide. These methodological changes have been hard coded in the models shared with the industry. Could the Authority please clarify how these decisions have been made? If decisions have been made, MTN is entitled to receive all the documents that the Authority took into consideration including all internal meetings that would shed light on the decisions that have been made by the Authority. If the Authority has not in fact settled its mind on these issues, what process will be used to settle	<p>The Authority has not yet taken a decision on the methodological questions that MTN raises here.</p> <p>Stakeholders are encouraged to comment on the methodology to be applied by the Authority when arriving at its decision as to whether to set termination rates at LRIC or LRIC+, and whether to apply economic depreciation or the tilted annuity approach, discussed in the next section.</p> <p>Stakeholders are also encouraged to comment on the models, model guide, and questionnaires more broadly.</p>

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	these critical methodological issues, and when will these critical decisions in fact be made? The very nature of the hard coding process leads MTN to believe that decisions have already been made on the cost standard. The Authority is invited to address the industry on this statement.	
<b>14.</b>	MTN 2.17: Given these methodological issues directly impact the data required for modelling, could the Authority explain how the data request and timeline would be adapted if, following such a consultation process which currently is lacking, the cost standard, modelling approach, and finally the data request is modified?	Stakeholders are encouraged to comment on the timelines needed to complete the process of setting MTRs, together with their comments on the models, model guide, and questionnaires.
<b>15.</b>	MTN 2.18: If the process and models do not allow for such an accommodation, has the Authority fettered its discretion by issuing a data request, modelling guide and shell model where these methodologies are hard coded before such decisions have in fact been made?	<p>The Authority has not fettered its discretion by issuing a data request, and modelling guide, and two shell models were provided: a top-down and a bottom-up model, permitting a range of approaches to setting termination rates for the Authority to consider.</p> <p>As explained above, stakeholders are encouraged to comment on the modelling approaches, including applying pure LRIC and LRIC+, and economic</p>

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		depreciation and tilted annuity. Stakeholders may also comment more broadly on the models themselves, and the questionnaires.
16.	MTN 2.19: MTN notes the Modelling Guide states that the chosen cost standard for this exercise is pure LRIC. This modelling approach is embedded in the BU shell model. When has the decision to implement pure LRIC been made, and based on what factors and whose input?	The Authority has not yet decided whether to implement pure-LRIC or not, and the models and data requested permit the Authority to choose between LRIC and LRIC plus, as set out in the Authority's findings document issued in 2022. As explained above, stakeholders are invited to comment on the methodological approach to be adopted in this process.
17.	MTN 2.20: Will the data request, modeling guide and model shells be re-issued if the Authority finally settled on a different cost standard?	Yes.

### 3. Operators concerns regarding the modelling approach

Issue no.	Issue/comment	ICASA Response
18.	Vodacom submitted an expert report submitted by Frontier Economics in 2022 that setting termination rates below LRIC+ would reduce the net termination revenue received by the mobile sector, and that mobile consumers who are net receivers of calls, low-income subscribers, would be less profitable. According to a November 2021 report by the GSMA, 32% of the South African population do not use mobile services. A move to pure-LRIC would also result in less profitability for mobile operators, if the waterbed effect is incomplete, and so they would have less incentive to invest in their networks, particularly in rural areas.	The Authority will consider all submissions on the proposed modelling approach and provide reasons on the selected method.
19.	Vodacom B1: What are the specific roles of the TD and BULRIC models when setting cost-based pricing?	The two models provide data points for the Authority to consider, including for LRIC vs LRIC+, and the TD model also allows the checking of BU inputs against operator data.

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<b>20</b>	Vodacom B2: Which BU LRIC model will the Authority use in case it decides to retain the LRIC+ cost standard?	Stakeholders are encouraged to comment on their proposed approach to LRIC+, including whether a simple mark-up will be applied to the LRIC model, or whether an LRAIC model would be more appropriate, and if so stakeholders may comment on the relevant increment that would be applicable. The Authority will consider all submissions in the modelling approach.
<b>21.</b>	Vodacom B3: Why must stakeholders review, comment on and provide input to Pure LRIC, BU LRIC models and Guides if the Authority intends still to consult and decide on the applicable cost standard	The Authority has decided that that the modelling approach will be consulted on first, and this will be followed by revised information requests
<b>22.</b>	MTN 2.1: At the outset, MTN believes that the scope of the data request is the most detailed and onerous request ever witnessed through the relevant CTR Regulation review process. MTN makes this claim as it notes that the BU data request spans 35 years (10 years of historical data, and a 25 year forecast) across all network dimensions (RAN sites infrastructure, Backhaul, Core, Transmission), costs (for Core, RAN, Additional costs, joint and common costs, WACC,	The scope of the time period for information requested has been significantly reduced to 20 years, in line with radio frequency spectrum auction business plans. The questionnaires have also been reduced in scope, removing revenues for example, and removing many of the details requested.

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	<p>wholesale costs, roaming costs), retail volumes (broken down by services, bearers, geotype, traffic type), ditto retail revenues, wholesale revenue and volume information by customer, traffic by bearer and devices. Additional data is being sought for each of MTN's data sites (including addresses, long / lats, site IDs, customers hosted on site, wholesale revenues from such sites, by licensee, tower height, etc.).</p>	
<p><b>23.</b></p>	<p>MTN 2.21: The previous round of price-setting (2014, 2018) was based on the LRAIC+ cost standard. Could the Authority explain why this cost standard was deemed adequate in 2014 and 2018, but not in 2023? In particular, the Authority, through its Consultant (Aetha) previously stated that this approach was preferred because: "The calculation will be far more transparent. The calculation will be far more stable/consistent over time and forecast scenarios. The model will not have to look a long way into the future. It will not be necessary to use the highly complex economic depreciation</p>	<p>As explained above, the Authority has not decided on a cost standard, and licensees are encouraged to submit their comments on this.</p>

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	method" <sup>2</sup> . Accordingly, please could the Authority clarify why it believes pure LRIC is now a superior approach, and how the previously identified shortcomings have been overcome?	
24.	<p>MTN 2.22: Similarly, during the previous MTR price setting round, ICASA stated that "<i>[The] characteristics of the customary 'Pure' LRIC calculation make it extremely difficult to understand and follow, and hence to have confidence in the results. The results can also be sensitive to assumptions about demand, technology and costs a long way into the future.</i>"</p> <p>As such, please could the Authority explain how these issues have been overcome, or why it believes these are no longer relevant?</p>	As explained above, the Authority has not decided on a cost standard, and licensees are encouraged to submit their comments on this.
25.	<p>MTN 2.23: The Modelling Guide suggests pure LRIC is a superior methodology to meet the regulatory objective based on four broad criteria: (i) economic efficiency, (ii) distributional effects, (iii) competitive effects, and (iv) commercial and regulatory consequences. On i) the Authority suggests pure LRIC is "likely to lead to the</p>	<p>As explained above, the Authority has not decided on a model, and invites licensees to comment on this. Stakeholders are invited to provide their own estimates of the distributional and competitive effects of the modelling approach they suggest compared to pure LRIC, should their views differ from what is presented in the modelling guide.</p>



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	<p>efficient of resources in South Africa". It also states that it "should not distort investment incentives". It then concludes that "pure LRIC is therefore supportive of economic efficiency" (our emphasis added). Please could the Authority explain how it arrived at a conclusive position based on these tentative statements. Could the Authority also clarify where the industry was consulted on this cost modelling standard? On ii) and iii) could the Authority please clarify and quantify the distributional and competitive effects available of moving to pure LRIC when mobile tariffs in SA are already priced on an all-net basis. On iv) could the Authority please clarify if an impact analysis were performed to arrive at the conclusion that "there will be only a limited commercial impact, if any, from implementing pure LRIC". Accordingly, please could the Authority share any such impact analysis as well as the information or consultation used by the Authority to arrive at such a conclusion which is a</p>	<p>Stakeholders are also invited to assess the impact implementing the modelling approach they suggest compared to pure LRIC, should their views differ from what is presented in the modelling guide.</p> <p>More broadly, stakeholders are invited to provide their views on all relevant aspects of the methodology, models, questionnaires, and model guide, and are invited to submit any relevant information relating to the pure LRIC methodology proposed in comparison to the methodology favoured by the stakeholder.</p>

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	decision which could only be reached after a consultation process.	

#### 4 Operators concerns regarding tilted annuity vs economic depreciation

Issue no.	Issue/comment	ICASA Response
26.	<p>Vodacom D12b: Section 3.1.2 of the Guide provides “follow the approach to economic depreciation that results in outcomes that it would observe in a competitive market, applying modern equivalent asset values, and considering the lifetime of a business rather than a narrow timeframe” and it considers “a business period of 2013 – 2048, which balances the need to have realistic values of assets, costs and volumes, with the need to have a long enough life of business. Applying this approach, each asset is purchased in the year in which it is needed, applying a cost for the asset based on a specific price trend for it. All</p>	<p>The time frame for data requested has been narrowed using the approach described in the general comments and is reasonable given that licensees had to provide data over a similar time period when submitting business plans for the recent spectrum auction process.</p>

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	<p>of the capital expenditure is added in each year, together with operating expenditure (adjusted on a specific price trend) and discounted to the beginning of the period using the WACC".</p> <p>In essence, the Guide requires the following parameters to be forecasted 25 years into the future: Asset and opex price trends; Inflation; WACC; Modern equivalent assets; Traffic; Efficient operator (and network). The BULRIC model requires stakeholders' inputs on these parameters via red fill cells.</p> <p>25 years into the future is a very long time and, on its own, render the forecast of all the above parameters susceptible to a substantial risk of material error.</p>	

<b>Issue no.</b>	<b>Issue/comment</b>	<b>ICASA Response</b>
27.	<p>Vodacom D12c: When adding the undeniable fact of a fast-changing telecommunication sector, the risk of material error is even greater. It is for this very reason that the Authority reviews the call termination market every 3 years. By way of example, the Authority acknowledged in its Findings that OTT voice calling service was growing in popularity and some barriers to entry were diminishing and some of its functionalities were comparable to traditional voice services. Other topical issues include the shutdown of 2G/3G networks, the upcoming spectrum auction, more advanced radio technologies, etc.</p>	<p>As explained in the general comments, the modelling process can accommodate various scenarios to develop confidence intervals for the Authority. Licensees are encouraged to submit their views on such scenarios. Furthermore, as noted above, the prices are typically reviewed after a 3-year period and adjustments to the forecasts will occur.</p>

Issue no.	Issue/comment	ICASA Response
28.	<p>Vodacom D12d: When adding to the above those risk factors that are both unique and recent to South Africa, the risk of material error is even greater. Examples of such risk factors include severe electricity supply constraints, decline in macro-economic conditions, material increase in the cost to do business, threats of international sanctions, material devaluation of the rand, etc. South Africa's situation is so dire that Government attempted to declare a national state of disaster, the DTIC issued Block Exemptions Regulations to allow collaboration between industry players, the Authority is considering forbearance measures, etc. It is no longer "business as usual" in South-Africa and Vodacom is currently grappling with short to medium outlooks on all aspects of its business, let alone 25 years into the future. These factors will have a material impact on each of the above parameters that the Guide and BULRIC model require stakeholders to estimate. Such requirement is simply not rational in the circumstances.</p>	<p>Again, the timelines have been reduced significantly, and various scenarios can be adopted in the modelling process, and stakeholders are encouraged to provide their comments on this. Stakeholders recently provided long term business plans for the spectrum auction process, which means the data are readily available.</p>

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29.	Vodacom D12e: Given all the above uncertainties, Vodacom is of the view that forecasting 25 years into the future risks distorting materially the values for assets, costs, and volumes, thereby casting serious doubt on the ability to “balancing of the need to have realistic values of assets, costs and volumes, with the need to have a long enough life of business”. The S.A specific risk factors, on its own, risk material distortion, even over the short to medium term.	Again, the period has been reduced, and stakeholders are encouraged to provide scenarios for modelling purposes.
30.	As a contrasting illustration, during the 2017 MTR review process, the BU request covered a single year / actual only (except for population coverage and demand, seeking data points around the prior year, the current year, and a 3-year forecast).	<p>The previous process followed a tilted annuity approach, whereas the current process envisages an economic depreciation approach, which requires data over a longer a period of time.</p> <p>In the event that information is not available, stakeholders may (i) provide information used for their business cases submitted during the course of the 2022 high-demand spectrum auction, or (ii) provide data for the economic depreciation approach for only one year, 2022, and then trends for prior years (2018) and forecast years (to 2037).</p>

Issue no.	Issue/comment	ICASA Response
31.	<p>MTN 2.24: MTN understands the use of economic depreciation in the BU shell model drives the 35 years' time horizon / data request, and the extremely onerous nature of the obligation placed upon its business. During the 2018 determination, the Authority, via its consultant stated that: "Calculating economic depreciation therefore requires coverage, demand, network deployment and unit costs to be forecast a long way into the future – typically at least 20 years – and also for the full history of the business up to the present time to be included in the model. The calculation of economic depreciation is therefore highly complex, difficult to understand and validate, and the results can be sensitive to uncertain forecasts of demand and network deployment a long way into the future". In contrast, the Authority stated that A tilted annuity approach to depreciation is a lot simpler to implement and a lot easier to understand than economic depreciation". As such, please could the Authority explain why it has changed its mind on these issues, how and when</p>	<p>The Authority has not yet determined the final methodology to be applied for the modelling process, including the use of economic depreciation.</p> <p>Stakeholders are invited to comment on the modelling approach proposed in the modelling guide, and further explained above.</p>

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	the decisions were reached and how the difficulties identified with economic depreciation have been overcome since the 2018 determination?	
32.	Telkom General 2: Telkom will not be able to provide the historical (from 2013) information within the proposed timeframe. Sourcing the historical information, if available, could take up to 3 months.	As explained above, the time period has been narrowed significantly, and this should enable stakeholders to provide information timeously.
33.	Vodacom D13: Please clarify and explain how, given the context above, the Authority's proposed business period of 2013 – 2048 balances the need to have realistic values of assets, costs, and volumes, with the need to have a long enough life of business? In particular, the approach proposed by the Authority seems to disregard the current economic challenges and the challenges that these pose for an economic depreciation approach. The current economic climate creates several shocks on operators in relation to operating and capital expenditures, many of which will hopefully be of a transitory nature. However, the economic depreciation approach will result in many of these	As explained above, the time period has narrowed, and stakeholders are encouraged to provide scenarios for the various shocks to operating and capital expenditures. The modelling approach can accommodate whether such shocks are transitory in nature or not, following the approach described above in the general comments. This will assist the Authority to develop a confidence interval for termination costs. All efficiently incurred costs will be considered in this and future models.



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	<p>costs being shifted (by applying the economic depreciation approach) into future periods when such costs may no longer actually be incurred. There is then no guarantee that a future determination of termination costs will consider that such costs were part of the efficiently incurred costs, so risking the ability of operators to recover these costs.</p>	
34.	<p>Vodacom D14: Vodacom observes that the Authority seeks to refer to an extensive body of precedent for the use of economic depreciation. Vodacom is of the view that the use of economic depreciation is by no means standard and only implemented in highly stable economic environments (EU, UK, Ireland). In many other jurisdictions, including EU member states, a tilted annuity approach is frequently used. The benefit of such an approach is that the risks referred to above are reduced and the determination of annual costs are more closely aligned to how operators recover their costs, e.g. where annual costs is driven by linear depreciation and unit costs</p>	<p>As explained above and as set out in Vodacom’s comment here, the tilted annuity approach front-loads costs and results in higher tariffs in initial periods, which harms consumers and competition in general. Nonetheless, stakeholders are encouraged to provide their submissions on whether or not to apply economic depreciation or a tilted annuity approach, and the Authority will take these submissions into account.</p>

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	are falling in line with volume growth. Would the Authority consider a tilted annuity approach?	
35.	MTN 2.25: In the Modelling Guide, the Authority suggests the use of economic depreciation is best practice, as per GSMA recommendation. In fact, the GSMA report takes a much more nuanced position than depicted in the Modelling Guide: "In our opinion, there is no single method of capital cost recovery that can be considered best practice in all circumstance. In principle, a proper articulation of economic depreciation considering, inter alia, output levels over time, capital input price in(de)flation, operating cost expenditure over time is to be preferred. However, the associated informational difficulties may argue for the application of a simpler proxy (our emphasis).	This is noted and will be considered when deciding on what methodology to apply. The text in the guide has been revised accordingly. As explained above, stakeholders are invited to comment on approaches to recovering costs of capital.

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36.	<p>MTN 2.26: Please could the Authority clarify when and how the decision to change the existing determination's depreciation methodology was made? If that decision has not been made, and tilted annuity is finally maintained as the proposed approach, there would be no need for a 35-year data request. How would this then be accommodated in the request and associated timeline? And why is the industry being required to produce such an extensive data request ahead of a formal decision on the depreciation method to be used?</p>	<p>The Authority has not decided to change the cost of capital recovery methodology, and stakeholders are invited to comment on this. The 35-year timeline has been reduced to 20 years to accommodate stakeholder comments on this question, and in line with the lifetime of the business cases for spectrum licences, for example, as explained above.</p>
37.	<p>Telkom General 4: (i) Telkom needs to understand the reasons why the economic depreciation, rather than the tilted annuity method used in the previous study, will be used given that the tilted annuity method is well understood and acceptable to the operators. (ii) Telkom would like to know if Authority is amenable to using the tilted method, considering the challenge that operators face in providing historical / forward looking information?</p>	<p>The Authority has not yet decided to make the change to economic depreciation, and stakeholders are invited to comment on this proposed change. The reasons for the proposed change to economic depreciation are explained above, and include that this benefits consumers and competition, since a lower termination rate is achieved in earlier years, reflecting outcomes in a competitive market.</p> <p>The Authority encourages stakeholders to comment on all aspects of the methodology, including in relation to</p>

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		the challenges they face in providing historical/forward looking information.
38.	MTN 2.27: In general, please could the Authority explain how, and when it plans to formally consult the industry on the cost standards and methodologies to be used to derive cost- oriented termination rates in South Africa - and if these choices have already been made, how and why the Authority reached different conclusions from its previous determinations.	The industry is currently invited to comment on the cost standards and methodologies to derive termination rates in South Africa. The Authority has not yet made choices on these issues.
39.	MTN 2.28: MTN understands this round is about clarification questions on the questionnaires issued by the Authority. During the one-to-one, Acacia asked the operators to comment on certain aspects of the modelling, methodologies, and make suggestions on how some of the identified modelling issues may be addressed. MTN submits this is not the purpose of the current “clarification questions” round and reserves the right to make submissions on substantive issues of methodology, cost standards, modelling	Stakeholders were invited to comment on all aspects of current modelling process, including during the course of the current clarification questions process, and in due course when making submissions on 10 July 2023.  The Authority is thus presently carrying out a consultation process on all issues, including on methodology, cost standards, modelling assumptions, modelling algorithms and the like, and stakeholders are invited to comment on these issues when making submissions on 10 July 2023.

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	assumptions, modelling algorithms at a later stage. MTN seeks additional clarity on when and how the Authority plans to perform formal consultation on these issues. If the Authority is not planning on doing a consultation process on these issues, the Authority is requested to inform when and how and by whom the decisions not to consult were reached.	

## 5 Operators concerns regarding BU Model

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40.	Vodacom (economic efficiency and cost recovery): In relation to the modelling limitations, Acacia must be aware that the rollout of an actual network is more nuanced than its current model suggests. In particular, the rollout in rural and economically disadvantaged areas can rely more extensively on termination revenues, such that without such revenues the rollout might not take place (see further discussions in this regard below). However,	Stakeholders are encouraged to submit details of additional features that need to be included in the model, and these additional aspects can be considered in one of two ways: (i) if operators provide their data on such additional features for dimensioning purposes (i.e. to build the relevant number of units), and on the costs per unit in respect of capital expenditure and operating expenditures, then this can be explicitly modelled, or

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	<p>given that the model only considers the rollout of network sites on the basis of (i) operators' current network dimensions and implied cell radii alone; and (ii) highly aggregate traffic assumptions (i.e. at the level of only three geotypes (rural, suburban and urban) the model cannot reflect the economic rationale for the actual network rollout. In so doing, it fails to identify costs that are incremental to termination, which, as outlined below, risks making the economic case for serving low usage customers unviable, to the detriment of those consumers. This affects the rationality of adopting the model.</p>	<p>(ii) if operators do not provide the relevant data, then the comment on the model can be taken into account qualitatively, in order to provide the Authority with a confidence interval for the costs of call termination.</p>
<p><b>41.</b></p>	<p>Vodacom (economic efficiency and cost recovery): This would also address the issue described earlier whereby costs that were previously considered variable with traffic, including termination traffic (such as transmission / backhaul and parts of the radio access network) are no longer considered variable / directly attributable to termination because the modelled increment is not large enough to trigger the lumpy upgrades that are often encountered in telecommunication networks.</p>	<p>Stakeholders are encouraged to comment on all aspects of the model, including Pure LRIC and LRIC plus, as explained above. Stakeholders are therefore invited to comment on the relevant increment, and network elements that vary with the relevant increment.</p>

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	<p>For example, in response to increases in traffic, Vodacom would upgrade its backhaul links from E1 (2Mbps) leased lines to Ethernet (10Mbps) or own fibre links operating at 1 or 10 Gbps. This means the associated costs of such transmission links are sensitive to traffic. However, due to the size of the termination increment such costs are assumed, in the model, no longer to be variable with traffic. Vodacom contends that this means that setting MTRs based only on Pure LRIC will mean that they are not cost based: rather, they are likely to omit a very significant element of costs. This renders adopting them irrational and contrary to their ostensible purpose.</p>	
42.	<p>Vodacom B6: Which licensees will currently qualify as "New licensees" in terms of the Notice?</p>	<p>Stakeholders are encouraged to comment on this in their submissions.</p>
43.	<p>Cell C 5.4 Q02: [Various, including the "2 Dimensioning" worksheet] The model developed by the European Commission ("Eurorate model") appears to be the source of many inputs that are not shaded red e.g. on the "2 Dimensioning" worksheet. Why are the previous</p>	<p>Stakeholders are encouraged to comment on any parameters and make suggestions on these for the current model building process, including commenting on previous parameters used from 2018.</p>

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	models developed by ICASA not being used as a source, since this model was refined through extensive consultation back in 2018? Cell C believes the 2018 models provide a much more robust and South-Africa specific set of parameters.	
44.	Vodacom C7: Given the Authority's determination that MTRs move to symmetry within a transitional period of twelve months, what is the justification for modelling Large, Small and FWA scenarios? How does this reconcile with symmetrical MTRs?	This is to provide flexibility to the Authority in the event that the courts decide in favour of Telkom in the review of the Authority's decision on asymmetry.
45.	Vodacom C8: What is the Authority's definition for Large and Small and what is required from stakeholders in the red fill cells below?	Stakeholders are encouraged to comment on the definition of large and small, and the various scenarios suggested, including on market share, coverage, and cost premium.
46.	MTN 3.12: Please could the Authority explain the definition and parameter choices in the sheet entitled "scenarios" - and how such scenarios will be used for MTR price setting within the exiting regulatory framework / findings.	These scenarios are intended to permit flexibility in the model to accommodate a range of modelling possibilities that stakeholders are invited to comment on. For instance, in the event that the courts find in favour of Telkom where asymmetry is concerned, the model is designed to permit different sizes of operators and termination rate outcomes.



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		Stakeholders are encouraged to comment on these scenarios and suggest relevant parameters.
47.	MTN 3.13: Please could the Authority provide definitions for the elements requested, for example, are antenna costs apportioned across all mobile technologies in the transceiver (bottom up) cost analysis?	Various definitions can be accommodated in the model, and stakeholders are invited to comment on this. For instance, antenna costs are currently modelled as a shared resource in individual site types and are not technology-specific. At the same time, if stakeholders consider antenna in a modern efficient network to be technology specific, they can be modelled in the transceiver, controller and backhaul tab, and stakeholders are invited to comment on this.
48.	MTN 3.14: Please can the Authority define Generic operator, Large Mobile, Small mobile and Fixed-wireless access in the context of the 2022 Findings Document on the Review of the 2014 Pro-competitive Remedies imposed on Licensees in terms of the Call Termination Regulations, 2014.	The operators are currently defined in the scenarios tab, in terms of assumptions on spectrum, coverage and market share. These operator types have been built into the model to provide flexibility in the context of ongoing litigation. As noted above, stakeholders are invited to comment on these definitions, including on the current assumptions in the cost model.

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<b>49.</b>	MTN 3.15: Please can the Authority explain how "cost premium" in the scenario tab will be derived, and to what elements / operators these may be applied to?	Stakeholders are encouraged to provide submissions on whether smaller operators have higher costs, and if so by how much, for the small operator scenario currently included in the model. Stakeholders are also encouraged to comment on what elements such a cost premium ought to be applied.
<b>50.</b>	Vodacom C9: Acacia requested that stakeholders complete the red fill cells throughout the BULRIC model. Should Vodacom complete the red fill cells based on its perspective or from the perspective of a generic or Large or Small mobile operator?	Stakeholders are encouraged to provide information on their own networks and supplement this information as much possible if the stakeholder considers there are factors to consider on small versus large operators, including on the scenarios set out in the model.
<b>51.</b>	MTN 3.1: MTN notes the Authority is proposing to model an operator with 174MHz of spectrum. MTN notes such a holding was unavailable until the conclusion of the recent spectrum auction. Yet the model's starting year is 2013. Up until the recent auction, MTN (and much of the industry's holdings) were limited to 76MHz. Please can the Authority clarify how this will be reflected in its modeling?	The model's starting year has been changed to 2018, in response to licensee comments. As explained in the current model guide, the modelling approach is to assess costs of a modern efficient network, based on existing network topologies. This means that 174MHz is a reasonable assumption for modelling purposes. The model is nonetheless flexible and can accommodate a range of different spectrum assumptions, and stakeholders are invited to comment on this.

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<b>52.</b>	MTN 3.2: Please can the Authority clarify whether 5G spectrum will be included in the holdings of the Hypothetical Efficient Operator?	The modelling approach does not currently model 5G networks, since the difference between the total costs of running a network including incoming voice and the total costs excluding incoming voice will not vary significantly whether 5G costs are included or not. The modelling effort required to do this is therefore unlikely to have any benefits. Stakeholders are nonetheless invited to comment on this issue.
<b>53.</b>	MTN 3.3: How does the Authority plan to address the issue of 800MHz availability due to delayed digital migration?	The model considers an efficient operator modelled on a forward-looking basis, and since the analogue switch off date is likely to be in the near future, the model incorporates 800MHz spectrum. Nonetheless, the model can accommodate various assumptions about spectrum holdings, and stakeholders are invited to comment on this issue.
<b>54.</b>	MTN 3.4: Please can the Authority clarify how it plans to model the refarming of 2G/3G spectrum to 4G, subsequently to 5G, and future technologies into 2048?	The model currently anticipates changes in volumes by technology, though not spectrum refarming. This can nonetheless be modelled if necessary, and stakeholders are invited to comment on this issue.
<b>55.</b>	Vodacom C10: We understand that volumes will be checked for reasonability against actual data provided by stakeholders. Please confirm.	Yes, this is the purpose of requesting volume information in the questionnaire.

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<b>56.</b>	Vodacom D11: Section 3.1.1 in Acacia Guide provides "We develop a WACC for telecommunications networks in South Africa in order to apply a reasonable return to the regulatory asset base". Where in the BULRIC model does Acacia apply a reasonable return to the regulatory asset base?	This is now rephrased in the updated guide document, to "in order to provide a return on assets including when applying the economic depreciation methodology in the BU model, and when applying a return on assets in the top-down model".
<b>57.</b>	MTN 3.9: Please can the Authority explain the relevance of the 2008 Spanish and Italian WACC and 2019 Estonian and Czech risk premium for this exercise.	These are illustrative examples of various WACC estimates applied over the years. Stakeholders are encouraged to provide their estimates of WACC as requested in the models and questionnaires.
<b>58.</b>	MTN 3.10: Please can the Authority clarify whether it plans to use a 2,3 and 4G only-operator WACC, and how such WACC will be derived. Can the Authority also explain why it considers there were no risks involved in deploying 2, 3, or 4G technologies at the time these were launched. Please could the Authority also assess the risks and prospects of a business that is not going to invest in any new technology (starting with 5G) for the next 25 years.	Licensees are encouraged to submit their views on how WACC ought to be estimated, and whether a forward-looking WACC would vary significantly for an operator building new technologies over the next 15 years. The modelling process can accept different WACC scenarios, and stakeholders are encouraged to comment on such scenarios if necessary.

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<b>59.</b>	Vodacom D12a: Section 3.1.1 in Acacia Guide provides "we apply a levelised cost of incoming voice minutes, including a time trend for inflation". In row 507 of "2 Dimensioning" tab, termination volumes are multiplied by the Inflation index in "5a Cost – capital". Please explain why this is done.	This is so as to apply the economic depreciation approach, explained in the next sentence and in the references provided in the guide.
<b>60.</b>	Vodacom E15: Section 3 of the Guide provides that the BULRIC model models the costs of an efficient network. Please clarify what an efficient network entails for each of Passive facilities, 2G radios, 3G radios, 4G radios backhaul transmission, switching and core transmission over the period until 2048?	As explained above, the time frame has been considerably reduced. Stakeholders are encouraged to provide their comments on what efficiently incurred costs are for these network elements.
<b>61.</b>	Vodacom E16: Please explain why 3G and 4G are included in the coverage network. This is relevant given that Acacia seems to consider different definitions of coverage and traffic network. In its model it seems to rely on the dimensions of operators' current networks, as requested in the form of average cell radii of current sites providing both, coverage and traffic, as the basis of modelling both, coverage and traffic networks. In the guide it says "we first build a coverage network to a	The main idea with the 2G, 3G and 4G coverage networks, as explained during the meeting, is that these coverage networks need to be built whether voice call termination is offered or not. Switching off call termination does not avoid any costs in the coverage network. This is applicable for all three technologies: 2G, 3G and 4G. This is now explained more in the updated guide document, as follows:

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	<p>specified population coverage, and this coverage network provides for a basic layer of network capacity using coverage spectrum. We then use traffic demand to assess the total capacity requirements, and first apportion traffic demand to coverage sites." This seems to suggest that the coverage network that Acacia considers does not provide any given amount of traffic. Acacia seemed to confirm this during the one-on-one meeting when saying that the coverage network it considers is one that provides one minute / minimal amount of traffic across the modelled network. However, this would imply a fundamentally different network structure which is driven by radio propagation properties of different frequency bands allowing a site in principle to cover a significantly larger area and doing so with a single technology providing a minimum amount of voice / data traffic (e.g. 2G) rather than several technologies (2G, 3G, 4G) simultaneously. This appears to be irrational.</p>	<p>We consider a coverage site following the approach set out by the European Commission in 2009, as follows:<sup>1</sup></p> <p><i>"Coverage can be best described as the capability or option to make a single call from any point in the network at a point in time, and capacity represents the additional network costs which are necessary to carry increasing levels of traffic. The need to provide such coverage to subscribers will cause non-traffic-related costs to be incurred which should not be attributed to the wholesale call termination increment."</i></p> <p>We consider that coverage networks are required for 2G, 3G and 4G services, which will cause non-traffic-related costs to be incurred, and which are not attributed to the wholesale call termination increment.</p> <p>The coverage network in the model does indeed provide a given amount of traffic for each technology. This is calculated in cells F38-55 in the tab '4a Network demand – RAN'. Stakeholders are encouraged to provide cell radii for the hypothetical generic operator, as well as for their own network as a sense-check.</p>

<sup>1</sup> See: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0396>

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61.	Vodacom E17: Section 3.3.2 of the Guide provides "We can then construct a coverage network reaching, for example, 99% of the population in South Africa using low frequency spectrum, e.g. the 900MHz band for 2G and 3G and the 800MHz band for 4G". What is the traffic assumption for this coverage network? Is it assuming 1 voice call anywhere in the coverage network as Acacia confirmed in the meeting on 2 June 2023?	The traffic assumptions for the coverage network are in cells F38-55 in the tab '4a Network demand – RAN'. The cell radii provided for the coverage network should accommodate these traffic assumptions. The 1 voice call assumption mentioned during the meeting was intended to be illustrative to allow for a discussion of the principles without going into the details of the model. Stakeholders are encouraged to comment on the actual details of the model.
62.	MTN 3.5: Please could the Authority clarify how coverage is defined in its model. What QoS, spectrum type and spectrum quantity will be used for the coverage layer in each technology?	See response above in relation to Vodacom E16 and E17. See also the updated guide document in relation to coverage, which explains that we consider a coverage site following the approach set out by the European Commission in 2009, as follows: <sup>2</sup>  <i>"Coverage can be best described as the capability or option to make a single call from any point in the network at a point in time, and capacity represents the additional network costs which are necessary to carry increasing levels of traffic. The need to provide such coverage to subscribers will cause non-traffic-related costs to be incurred which should not be attributed to the wholesale call termination increment."</i>

<sup>2</sup> See: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0396>

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		<p>We consider that coverage networks are required for 2G, 3G and 4G services, which will cause non-traffic-related costs to be incurred, and which are not attributed to the wholesale call termination increment.</p> <p>Stakeholders are invited to comment on this issue.</p>
63.	<p>MTN 3.11: Please could the Authority explain the relevance of national roaming when modeling an operator with 99% coverage.</p>	<p>The Authority understands that roaming may need to be assessed in the modelling process in two ways where the costs of call termination volumes may be affected: (i) certain licensees in South Africa roam on other licensees' networks not only for coverage purposes but also for capacity purposes, (ii) other licensees roam purely for coverage purposes. The costs of these roaming arrangements may vary with and without call termination traffic, and licensees are invited to comment on (i) whether this is the case, and (ii) what impact this might have on termination costs. The Authority can then take a decision on whether and how roaming costs are relevant to the setting of termination rates in South Africa.</p>



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64.	<p>Vodacom E18: Section 3.3 of the Guide provides "we first build a coverage network to a specified population coverage, and this coverage network provides for a basic layer of network capacity". Please define precisely and explain what "basic layer of network capacity" means for Passive facilities, 2G radios, 3G radios, 4G radios, backhaul transmission, switching and core transmission, respectively.</p>	<p>This is computed in the cells F38-55 in the tab '4a Network demand – RAN'. Stakeholders are encouraged to consider these computations and comment on them.</p>
65.	<p>MTN 3.6: Please could the Authority clarify the engineering rules that will be used to determine the type and quantum of spectrum necessary to achieve adequate coverage vs capacity from 2013-2048.</p>	<p>The model does not currently anticipate acquiring additional spectrum over the lifetime of the business. This can best be thought of as all future spectrum being acquired for 5G purposes, not explicitly modelled for our purposes here for the reasons explained above.</p>
66.	<p>MTN 3.7: Please could the Authority explain what drives the 2013 start date for the Hypothetical Operator. MTN started operation in 1994.</p>	<p>As explained above, the time period for the modelling process has been changed, to start in 2018, to accommodate the incorporation of a reasonable information base going back five years and forward fifteen years. This balances the need to limit the information burden on licensees and reduce the forecast risk associated with the modelling</p>

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		<p>exercise, while using costs that reasonably reflect modern efficient 2G, 3G and 4G networks. Stakeholders are nonetheless encouraged to comment on the modelling period.</p>
<p><b>67.</b></p>	<p>Vodacom E19: Section 3.3.2 of the Guide provides "dimensions the network based on cell radii and a standard model of cell coverage" and in column D on "3 Geography" tab the model references the "Eurorate" model for its cell radius assumptions. Whilst Acacia's model uses the "Eurorate" model for its cell radius assumptions, it applies a different approach and formula for calculating coverage area resulting in material differences in coverage area. More specifically, the Acacia model assumes a cell radius that spans furthest corners of a hexagon whilst the "Eurorate" model assumes that the site radius is always 3/2 of the length of one side of the hexagon. Please explain this selective use of the Eurorate model and clarify why the Authority opted for a different formula when calculating coverage area.</p>	<p>The formula applied considers that the cell covers the entire hexagon, and applying the cell radii, which do not all use the same assumptions as the Eurorate model, results in a reasonable number of coverage sites currently in the model. Stakeholders are encouraged to comment on cell radii and cell overlap assumptions used in the model.</p>

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68.	Cell C 5.4 Q01: [3 Geography!B40:B57] These cells (cell radius inputs) are not shared red, but we assume that they should be?	This has been corrected, and the cells are now shaded red.
69.	Vodacom E20: 4a Network demand – RAN" tab, row 179: The formula contained in this cell includes "*sectors_per_site*gsm900_volume/khz_gsm/freq_reuse_2g", i.e. 4,17 transceivers per coverage site or 1,39 transceivers per sector per coverage site. Please clarify and explain this assumption of 1,39 transceivers per sector for coverage sites.	This computation multiplies the number of sites with active equipment by the number of sectors per site and the amount of spectrum available (divided by the reuse factor to account for the fact that not all spectrum assigned will be available at each site) and dividing this available spectrum capacity by the khz per transceiver, to arrive at the number of transceivers. Since the number of transceivers is an outcome of various inputs, including available spectrum, which can be changed to accommodate flexibility, the number of transceivers is linked to this availability, and this number is best considered as an average number of transceivers per sector. The model can accommodate a variety of assumptions about the number of transceivers and their capacity, and stakeholders are encouraged to comment on their proposed approach and also apply the data necessary for this.

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70.	Vodacom E21: Given the above request to define basic layer of backhaul capacity for the coverage network, please clarify and explain how this basic layer of backhaul capacity is modelled in "4a Network demand – RAN"?	<p>There is no request to define a basic layer of backhaul capacity for the coverage network, but rather to define a layer of capacity provided by the coverage radio access network. This is now clarified in the updated guide. The call-termination related costs are identified by the difference between the total capacity needed including incoming voice in columns D-W, and the amount of capacity needed without incoming voice in columns Z-AS.</p> <p>Stakeholders are encouraged to comment on any additional costs avoided without termination traffic, including in relation to backhaul traffic.</p>
71.	Vodacom E22: "4b Network demand – core", rows 45:53 provide no explanation for the approach to calculate the number of core links to be deployed, their scaling, distance, capacity and topology. It is consequently not clear how core transmission will be dimensioned for a coverage network with a "basic layer of capacity". Please clarify and explain how the dimensioning of the core transmission network aligns with section 3 of the Guide?	<p>Again, the basic layer of capacity refers to the RAN, as explained above. It is unlikely that core transmission link capacity will vary with voice termination traffic, and so currently there is no avoided cost for these items. Stakeholders are encouraged to comment on how and whether their core link capacity would vary with call termination traffic, and this can be accommodated in the model.</p>

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72.	<p>Vodacom F23: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Rows 122:137: These rows contain traffic demand and rows 127, 128 and 131 are used to calculate termination volumes in row 507. If row 127 represents termination volumes (interconnect) from other MNOs, does this not mean that traffic demand is incomplete because it does not capture the origination leg of "Off-net mobile voice traffic - domestic (Minutes)"? Put differently, MNOs have both originating to and terminating volumes from off-net / interconnected MNOs.</p>	<p>That is correct, this has been revised in the updated model.</p>
73.	<p>Vodacom F24: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cell D62: The formula contained in this cell =21/128 and the result is mbps</p> <ul style="list-style-type: none"> <li>• Please explain in detail what the numerator of 21mbps represents</li> <li>• Please explain in detail what the numerator of 128 channels represents</li> </ul>	<p>This assumption is from the Eurorate model and is used to convert MB to minutes. The text has been corrected as suggested by Vodacom. Stakeholders are encouraged to provide alternative assumptions for each of these parameters.</p>

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	<ul style="list-style-type: none"> <li>• Is the description supposed to read "Channel rate at which the data is carried"</li> </ul>	
	<p>Vodacom F25: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cell D78: The formula contained in this cell =32,4/64 and the result is mbps</p> <ul style="list-style-type: none"> <li>• Please explain in detail what the numerator of 32,4mbps represents</li> <li>• Please explain in detail what the numerator of 64channels represents</li> <li>• Is the description supposed to read "Channel rate at which the data is carried"</li> </ul>	<p>This assumption is from the Eurorate model, and is used to convert MB to minutes. The text has been corrected as suggested by Vodacom. Stakeholders are encouraged to provide alternative assumptions for each of these parameters.</p>
74.	<p>Vodacom F26: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D112:D114: The formulas contained in these cells contain "=(1/(mins_hour*sec_minute))" and the result is "Minutes in busy hour to Megabits per second". Minutes in the busy hour are typically divided by 60 to derive erlang whereafter the</p>	<p>This has been corrected as Vodacom suggests. This is used from Cell A 372 to convert 2G voice traffic into Megabits per second for later comparison purposes. This is not used in the calculation of termination costs.</p>

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	channel rate is applied. Please confirm that it is correct to divide by 3600 (60*60) and explain why it is correct?	
75.	<p>Vodacom F27: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cell B240: The formula contained in this cell =1/365 and the result is traffic in 1 day, thereby assuming that annual traffic is distributed equally across each calendar years of a year. What is the justification for this assumption?</p>	<p>The model applies a busy hour percentage to annual traffic assuming the busiest hour of the busiest day of the year for dimensioning purposes. Stakeholders may nonetheless comment as to how to consider dimensioning for the busy hour, and the model can be adapted accordingly if needed.</p>
76.	<p>Vodacom F28: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Rows 388 and 393: The number of channels calculated in row 393 after applying Erlang B table is less than the erlang contained in row 388, which is counter intuitive (and contrary to the Eurorate model referenced by the model) since allowance for Blocking probability is supposed to increase materially the required number of radio channels. Please clarify in detail the calculation method and</p>	<p>The comment is incorrect for larger scale traffic carried (Typically above 1,700 Erlang where the number of channels required is typically less than the numerical Erlang figure of traffic that the link carries. The crossover typically occurs between 1,500 and 1,700 Erlang and links for a 2% blocking probability). The traffic and channel capacities have been linearised in stages as the traffic levels increase (up to a maximum of 300,000 Erlang). If Stakeholders feel that the Erlang B table can be further refined, they are welcome to propose alternative figures as</p>

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	<p>calculation itself and explain why/how the outcome of channels being less than erlang is reasonable.</p>	<p>well as the source of these figures. The table in the model is used with an equation which interpolates the table data to find a reasonable fit output for the number of voice channels required for a given traffic carrying capacity at a 2% blocking probability.</p>
77.	<p>Vodacom F29: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Rows 395 and 397: No allowance is made for Blocking probability for 3G and 4G, which is also counter intuitive (and contrary to the Eurorate model referenced by Acacia) since the need to make allowance for Blocking probability also applies to 3G and 4G. Please explain in detail why no provision is made for Blocking probability for 3G and 4G.</p>	<p>The impact of voice on utilisation of 3G and 4G networks is far lower compared to 2G, and so 3G and 4G traffic was dimensioned in megabits per second directly rather than Erlang. Stakeholders are nonetheless invited to comment on this approach, and the model can be adapted if necessary.</p>
78.	<p>Vodacom F30: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D314:AM315: The formulas contained in these cells contain "*mb_min_2g*downlink_2g_perc" where "mb_min_2g" is already reduced with</p>	<p>These cells have been corrected to remove the double counting of the downlink %.</p>



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	downlink%. Please confirm whether it is correct to duplicate the adjustment for downlink and explain why.	
79.	<p>Vodacom F31: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D316:AM327: The formulas contained in these cells for 2G traffic link to 4G traffic in rows 293:304, instead of 2G traffic in rows 258:269.</p> <p>Please confirm whether the formulas are correct and explain why.</p>	The cells have been corrected and are now linked to 2G traffic.
80.	<p>Vodacom F32: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D396:J396: The formulas contained in these cells link to years different from the column itself.</p> <p>Please confirm whether this is correct and explain why</p>	This has been corrected.
	Vodacom F33: ["2 Dimensioning" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]	The text has been changed to 'for sense-checking purposes. There is no roaming calculation involved in the model.

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	<p>Rows 438:440: These rows contain volumes for roaming calculation. Please clarify what is envisaged for "roaming calculation" in the BULRIC model.</p>	
81.	<p>Vodacom F34: [4a Network demand – RAN" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D70:BY81: The formula contained in these cells does not provide for over-provisioning of capacity for 3G and 4G. The explanation in row 59 seems to suggest that over-provision applies only to 2G. Please explain in detail why over-provisioning does not apply to 3G and 4G?</p>	<p>We consider that the 'over-provisioning' for 3G is captured in the 'soft-handover percentage' and adding additional over-provisioning would create too much network capacity. We did not consider it necessary to over-provision 4G. Nonetheless, stakeholders are encouraged to comment on additional over-provisioning parameters that can be considered for modelling purposes.</p>
82.	<p>Vodacom F35: [4a Network demand – RAN" tab in "Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls"]</p> <p>Cells D70:BY72 and D76:BY78: The voice values in these cells originate from "2 Dimensioning" tab where voice minutes were converted to Mbps using the standard voice channel rates of 13, 12,2 and 13kbps for 2G, 3G and 4G respectively. This voice mbps traffic "requirement" is then added to the</p>	<p>Currently, voice and data services are assumed to use <u>radio resources</u> in proportion to Mbps in the modelling approach for 3G and 4G services, and in proportion to Erlang for 2G services. Stakeholders are encouraged to comment on all dimensioning assumptions, including in respect of how radio resources are consumed differently by voice and data services for the different technologies.</p>

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	<p>data mbps traffic requirement, whereafter the total is compared with spectrum capacity for the purpose of assessing RAN capacity requirements. This approach assumes effectively that 1 voice mbps (using standard channel rates) and 1data mbps are equal in terms of resource consumption. Please explain in detail how this approach captures the difference by which radio resources are consumed, and the difference in efficiency, by voice services versus data services.</p>	
83.	<p>Vodacom F36: Further to the above, "2 Dimensioning" tab confirms in the cells listed below (<i>these refer to rows: 37, 42, 48, 50, 55, 59, 62, 65, 70, 72, 78 and 80</i>) that data is significantly more efficient than voice services with the channel rate for data being 2,2 (0,0286/(13/1000)), 13,5 (0,16/(12,2/1000)) and 39 (0,506/(13/1000)) times more efficient than voice. This is over and above erlang over provisioning that also applies to voice. Please clarify in detail how this difference in efficiency is reflected in "Network demand- traffic" for determining capacity requirements.</p>	<p>The two different channel bitrates for voice and data services have been used to convert voice and data volumes to a common measure: Erlang for 2G, and Mbps for 3G and 4G. As explained above, the common measure is assumed to use radio resources in the same proportion. If stakeholders have different views on this, they are encouraged to comment on this.</p>

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84.	<p>Vodacom F37: Cells C53:C56, C71:C73, C81:C83, C102:C104 and C109:112 on "5a Cost – capital" tab: Unit costs are calculated using "volumes_minutes_all_ran_pv" from "2 Dimensioning" tab, which is the sum of all traffic converted to minutes. Data traffic is converted to minutes using the MB to minute conversion factors of 4.268, 0.818 and 0.27 for 2G, 3G and 4G respectively. As explained above, these conversion factors imply data is 2,2, 13,5 and 39 more times more efficient than voice for 2G, 3G and 4G respectively. Please explain in detail why this approach of calculating unit costs differ so materially from the approach to determine capacity requirements.</p>	<p>Capacity requirements are determined using the dimensioning assumptions in the model, using a common measure of Erlang for 2G, and Mbps for 3G and 4G, as explained above. Capacity requirements are dimensioned for peak demand during the busy hour. The volumes of traffic through the network are substantially more than traffic during the busy hour, and a common unit of measure, volumes of minutes, are used for this computation. If stakeholders have different views on this, they are encouraged to comment on this.</p>
85.	<p>Vodacom F38: In contrast to the modelling of transceivers, "4a Network demand – RAN", rows 326:338 assume that backhaul is neither traffic nor distance sensitive, only site sensitive. Please explain the basis for this approach and the reasonability thereof</p>	<p>We consider modern networks to have very high-capacity links, transported over modern technologies being optical fibre and high-capacity microwave links. These high-capacity links are unlikely to vary with voice traffic. Nonetheless, if stakeholders consider that modern networks have backhaul links that vary with voice traffic, stakeholders are</p>

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		encouraged to comment on this and provide data for this.
86.	Vodacom F39: "4b Network demand – core", rows 45:53 provide no explanation of the approach to calculate the number of core links to be deployed, their scaling, distance, capacity, and topology. Please clarify and explain in detail how the core transmission network will be dimensioned.	The number of core network sites is multiplied by the number of links per site (default is 3 diverse links per site). Because we use a single unit cost for optical fibre transmission, and core network links are a lot longer than backhaul links, we scale up the costs of optical fibre links using a parameter (default is 100). Notes have been added to the model on this. We consider that core links are very high capacity indeed and are highly unlikely to vary with voice traffic in a modern network. Nonetheless, stakeholders are encouraged to comment on how core links are likely to vary with voice traffic and provide relevant data for this.
87.	Cell C 5.4 Q07: [4b Network demand - core!B49] Please define what is meant by "Local vs long distance backhaul estimate"?	This is a parameter to factor in the fact that core network links between Johannesburg, Cape Town and Durban, for instance, are likely to be substantially longer in distance than backhaul links. Stakeholders are encouraged to provide their own

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		parameters and assumptions for backhaul vs long distance links.
88.	MTN 3.16: In respect of core network elements, please note that MTN capital costs are not available in the granular level of detail requested by the Authority and only an aggregated view of assets can be provided.	That is acceptable. Stakeholders are encouraged to provide what information they have on the costs of network elements, and comment on how these costs vary with and without call termination traffic.
89.	MTN 3.17: In respect of operating costs, please note that MTN Managed Services Agreements do not have price breakdowns per technology type, nor can MTN track maintenance by technology type in our financials. Please can the Authority advise how to manage this data request in that MTN will only be able to provide consolidated or allocate on a percentage basis (Weighted on Capex cost).	That is acceptable. Stakeholders are encouraged to provide what information they have on the costs of network elements, and comment on how these costs vary with and without call termination traffic.
90.	Vodacom G40: [4a Network demand – RAN” tab in “Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls”] Cells D152:BY154: The formulas contained in these cells link to coverage sites. Is it supposed to link to capacity sites?	This has been corrected.

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91.	<p>Vodacom G41: [4a Network demand – RAN” tab in “Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls” - Formulas]</p> <p>Cells J179:k184: The formulas contained in these cells link to different years. Is this correct?</p>	<p>This has been corrected. We have linked the cells to the appropriate years.</p>
92.	<p>Vodacom H42: [“SA geography - MP” tab in “Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls”]</p> <p>Please explain what data and method were used to populate column F, i.e. “Population 2020”.</p>	<p>We used map boundary data from the Demarcation Board<sup>3</sup>, and overlaid this with StatsSA Census 2011 data provided by DataFirst at the University of Cape Town.<sup>4</sup> The datasets were overlaid in R, and square kilometres and population densities calculated in R. This is now explained in the guide document.</p>
93.	<p>Vodacom H43: [“SA geography - MP” tab in “Bottom-up-long-run-incremental-cost-model-mobile-fixed-wireless-access.xls”]</p> <p>Please insert Main Place codes.</p>	<p>This has been added.</p>
94.	<p>Cell C 5.4 Q03 [“ITU” worksheet]</p> <p>Why are datapoints from a Kenyan cost model being used?</p>	<p>The shell model has been prepared using a range of placeholder assumptions that will be replaced with actual data from stakeholders in South Africa, including the data points referred to here.</p>

<sup>3</sup> See: <http://www.demarcation.org.za/index.php/downloads/boundary-data/boundary-data-main-files/local-munics/11453-local-munics>

<sup>4</sup> See: [https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/517/get\\_microdata](https://www.datafirst.uct.ac.za/dataportal/index.php/catalog/517/get_microdata)

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95.	MTN 3.8: Please could the Authority explain the relevance of the ITU Datahub and Kenya traffic statistics for this exercise <sup>4</sup> .	The shell model has been prepared using a range of placeholder assumptions that will be replaced with actual data from stakeholders in South Africa, including the data points referred to here.
96.	Cell C 5.4 Q04 4a Network demand - RAN[D107:D115] Are we correct that the modelled operator is assumed to have achieved full population coverage of each radio technology (2G, 3G and 4G) in 2013?	The time period for the modelling process has been changed to start at 2018. We do not assume that the generic operator has achieved full population coverage for each radio technology, but rather 99%. Stakeholders are encouraged to comment on operator profiles in the model, including in relation to coverage.
97.	Cell C 5.4 Q05: [2 Dimensioning[B241] Shouldn't the formula be 1/24 rather than 1/34?	This has been corrected.
98.	Cell C 5.4 Q06: [2 Dimensioning[B149] Please define what is meant by "Technology change decay"?	This is a placeholder factor used to estimate changes in technology mix over time. Stakeholders are encouraged to provide their own estimates of changes in technology mix over time, including the technology mixes of all of the different kinds of traffic.



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99.	<p>Cell C 5.4 Q08: [Various, including '2 Dimensioning'!D157:AN157]</p> <p>Excel formulae for a given step in the model sometimes vary over time. What is the reason for this? For example, in cells '2 Dimensioning'!D157:AN157, the formula is different for years 2013-2018, 2019-2020 and 2021 onwards.</p>	<p>Cells J157 (year 2019) and K57 (year 2020) differ from the rest of the cells in row 157 as these serve as "base" years, i.e. cells I157 (year 2018) and L157 (year 2021) rely on cells J157 and K57. The figures for J157 and K57 are from the red shaded cells.</p> <p>As mentioned above, stakeholders are encouraged to provide their own estimates on changes in technology mix over time.</p>
100.	<p>MTN 3.18: Please can the Authority clarify the methodology to be used in respect of reporting the annual increase in costs, as this is difficult to forecast given the high component of USD change in price is higher than the prevailing exchange rate.</p>	<p>Stakeholders are encouraged to comment on how costs are forecasted in the model. The model now incorporates exchange rate scenarios, to provide the Authority with a confidence interval with which to work. Stakeholders are encouraged to comment on these exchange rate scenarios.</p>

## 6 Operators concerns regarding TD Model and Questionnaire

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101.	Telkom General 5: Telkom does not see retail revenue and volumes as relevant for determining call termination costs and requests that the Authority remove its request for such information or clarify how this information is relevant to the study.	Retail revenues have been removed from the questionnaire. Volumes are very important for determining termination rates, and stakeholders are encouraged to submit this information.
102.	Cell C 5.3 Q01: Various worksheets: Cell C has significant traffic volumes carried as domestic roaming via commercial agreements. How should these volumes be captured in the current template, which is primarily concerned with own-network traffic (for each type of traffic, Cell C currently carries a mix of own-network and domestic roaming)?	Stakeholders are encouraged to provide as much detail as possible, including in respect of roaming volumes. If additional rows are needed in any of the current worksheets, please add these, and they will be considered. We may need to model roaming volumes with and without call termination volumes, and so stakeholders are encouraged to provide sufficient detail for us to be able to model this.

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103.	Vodacom I44: Most of the tabs require information from 2013 – 2048. It will not be possible for Vodacom to provide reasonable inputs for such an extensive time series. Furthermore, Vodacom's data retention policy is 5 years. During the meeting on 1 June the Authority confirmed that we should focus on the current year and price trends. Please confirm that this understanding is correct.	We have narrowed the timeframe to match the time period for the business plans submitted for the recent spectrum auction, i.e. for 20 years. This starts from 2018 and ends in 2037. This should fit within Vodacom's data retention policy.
104.	Cell C 5.1 Q08: Conversions & Definitions!B21:E23. The geotype definition refers to "grid cells". Please provide the grid cells we are expected to use.	The geotypes follow the World Bank definitions, the source for which can be found in the worksheet. There are no 'grid cells' referred to in this tab.
105.	Vodacom I45: "Specific Site Data" tab, please indicate the fields for which information is not required.	The specific site data tab has now been updated and only the critical information requested.
106.	Telkom Mobile: Telkom is of the opinion that some of the information requested is not relevant for determining mobile termination rates and requests that the Authority consider	The questionnaire has been substantially reduced considering stakeholder comments.

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	removing its request for the information highlighted below or provide explanations as to how the following information will be used in the study.	
107.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 1: Please clarify why it is necessary to provide site ID information	This is to provide a unique identifier for each site. One can be added to the spreadsheet later if Telkom prefers not to provide their own internal site IDs.
108.	Cell C 5.1 Q01: Specific Site Data!D8:E9: What is intended to be the difference between "Main place" and "Sub-place". Please provide an example to illustrate the difference	The sub-place column has been deleted as it is not necessary. The Main Places are as per Statssa Census 2011, as explained in more detail in the model guide document.

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109.	<p>Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 2:</p> <p>Please clarify how information on municipalities, main and sub places as per government maps will be used in this study and if such information is necessary.</p>	<p>The column requesting sub-place names has been removed. The main place need not be provided if the longitude and latitude is provided, as we can assign a main place to the site using the latter information. The information on municipality and main place can be used to sense-check the number of sites that the model calculates for each geotype in the model (cities, towns and semi-dense, rural), and therefore main place. Main places are categorised into geotypes according to population density in the BU model in the 'SA geography - MP' tab. Put differently, our model will compute several coverage sites for Alexandra Main Place, and we can use network information on how many sites of different kinds they have in Alexandra to compare the model to actual operator networks.</p>

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110.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 3: Please clarify why the physical address information is required if the GPS co-ordinates are supplied. Telkom does not see address information as being relevant. Column F	The physical address need not be provided if the longitude and latitude is provided.
111.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 4: Please clarify why antenna height information is relevant for this study. Column 1	Antenna height has been deleted.
112	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 5: Please clarify why and how the site type will be used in this study (lattice/building). Column J	The model permits a range of site types and builds those site types. Actual operator information requested in this part of the questionnaire can then be used to check that the number of sites per type that the model builds are comparable with actual operator networks.
113	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 6: Please clarify why information pertaining to the owner of a tower is relevant for the study. Column K	This question has been revised. We understand that a number of licensees have sold off their sites and now rent their sites, and so this information will provide insights as to whether the generic operator, for instance, should

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		follow a mainly opex model when we model costs, or a capex model.
114	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 7: Please clarify why the information on site access is relevant for this study. Column L	This column has been deleted.
115	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 8: Please clarify whether Telkom needs to provide such information. Given that Telkom Mobile rents all its sites such information is irrelevant. Column M/N	Column M has been deleted. Column N has been edited to reflect site rental information, which can be used to model an 'opex' variant for site costs.
116.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 9: Please clarify why it is necessary to provide tower owner information. Column O	This column has been deleted.
117.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 10: Please clarify why technology details for the site are necessary for this study? Column P	This will be used to compare the number of sites the model builds for each technology with operator networks in South Africa.

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118.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 11: Please indicate why the technology switch on date is necessary for this study? Column Q	This column has been deleted.
119.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 12: Why are the networks requested to provide throughput speeds per site on DL and UL. Subscribers have different packages which will offset these values. Column R	This column has been deleted.
120.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 13: Please clarify which volumes are required per site and how they will be used in this study. Column S	The volumes requested have now been clarified, to request voice, SMS and data volumes. This information is needed to allocate annual traffic to site geotypes and technologies. If it is not possible or too onerous for stakeholders to provide this information on a per site basis, this can be provided in the volume's tabs.
121.	Cell C 5.1 Q02: What is intended to be the volume measure required?	This is now explained more clearly in the questionnaire. We need usage volumes for voice, SMS and data, by technology. If this is not available or too onerous for



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		stakeholders to provide on a per site basis, this can be provided in the volume's tabs.
122.	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 14: Please clarify how this information will be used in this study since Telkom believes the information requested goes beyond the scope of this study. Column T.	This column has been deleted.
123.	Cell C 5.1 Q03: What does "Offering at site" mean?	This column has been deleted.
124	Telkom Mobile w.r.t. questionnaire sheet "Specific site data"- 15: Please clarify the description and how the information will be used in this study. Column U	This column has been deleted.
125.	Vodacom I46: "Specific Site Data" tab, please clarify what information is required in column U "Offering at the site", and how will it be used in the model?	This column has been removed.

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126.	<p>MTN 3.20: In terms of WACC, please note that MTN business plan is only forecast up to 2025, as such, MTN cannot provide reliable data beyond this point, nor is it feasible to forecast USD/EUR beyond this point. Please can the Authority clarify whether MTN can provide up to the date we have concluded in our approved business planning.</p>	<p>Stakeholders can provide such information up to date they have concluded in their approved business planning. Stakeholders are encouraged to supplement this with what information they have. For instance, assumptions were made for business plans for 20 years and submitted to the Authority during the recent high-demand spectrum auction process. These assumptions may be re-submitted by stakeholders, with suitable adjustments if necessary.</p>
127.	<p>Vodacom I47: "Average Site Data" tab, please clarify whether the requested Cell Coverage Radii is the Operators actual Cell Radii or a theoretical Cell Radii for Coverage sites? If it is a theoretical Cell Radii for Coverage sites, please clarify what the definition and criteria are for Coverage sites.</p>	<p>Stakeholders are encouraged to provide their own actual cell radii. If stakeholders consider their own networks to be unusual in some way, such that the data would not be relevant for the generic operator modelled in the BU model, then stakeholders are encouraged to supplement their submission with information for the generic operator. The definition of a coverage site is one that would be required regardless of whether there is call termination voice traffic.</p>

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		<p>We consider a coverage site following the approach set out by the European Commission in 2009, as follows:<sup>5</sup></p> <p><i>"Coverage can be best described as the capability or option to make a single call from any point in the network at a point in time, and capacity represents the additional network costs which are necessary to carry increasing levels of traffic. The need to provide such coverage to subscribers will cause non-traffic-related costs to be incurred which should not be attributed to the wholesale call termination increment."</i></p> <p>We consider that coverage networks are required for 2G, 3G and 4G services, which will cause non-traffic-related costs to be incurred, and which are not attributed to the wholesale call termination increment.</p>
128.	Telkom Mobile w.r.t. questionnaire sheet "Average site data" 1: Given that Telkom Mobile operates on a business case scenario for sites, the use of cell radii is confusing. Please provide more clarity on how this information will be used	Stakeholders are encouraged to provide as much detail as possible in respect of cell radii, and stakeholders may submit in this regard sample business case scenarios for sites to inform this. See also discussion above in response to Vodacom I47 on coverage sites. To the

<sup>5</sup> See: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0396>

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	in this study especially given that we have 2 roaming partners.	extent that stakeholders do not have such information, and roaming is more relevant, stakeholders are encouraged to comment on how their roaming costs vary with and without inbound calls so that this can be modelled if needed.
129.	Vodacom I48: "RAN Site Infrastructure" tab requires site information, split between coverage and capacity. Please clarify and explain in detail what definition and criteria should be applied to distinguish coverage sites from capacity sites in order to attempt such a split.	This distinction in the questionnaire has been removed.
130.	Vodacom I49: "RAN Site Infrastructure" tab. Please confirm that site counts be provided.	Confirmed.
131.	Cell C 5.1 Q04: RAN Site Infrastructure'!B2: What is the unit of measure required (km2 of coverage, people covered, number of sites)?	Please provide site counts for each of the site and technology types, splitting out radio frequency bands where relevant.

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132.	Telkom Mobile w.r.t. questionnaire sheet "RAN site infrastructure", coverage 1: Please clarify why type of site information is relevant for this study.	We have removed the distinction between coverage and capacity.
133.	Telkom Mobile w.r.t. questionnaire sheet "RAN site infrastructure", coverage 2: Please clarify how the mast type tree factors into this study.	The types of sites in the questionnaire are only indicative. At present, the model has only a few site types, though more can be accommodated, and so placeholders were created in the event that costs vary by the type of site. Stakeholders are invited to comment on the various site types that might be modelled.
134.	Telkom Mobile w.r.t. questionnaire sheet "RAN site infrastructure", coverage 3: Please clarify why only geotype information for rural and urban mast types is used in this study ?	All three geotypes are needed for the model, including cities, towns and semi-dense and rural. All three categories have not been added to the revised questionnaire.
135.	Telkom Mobile w.r.t. questionnaire sheet "RAN site infrastructure", capacity 4: Please clarify why the mast type information is relevant for this study.	As explained above, the model accommodates a range of site types, whose costs may vary, and so the questionnaire requests this information. Stakeholders are invited to comment on the various site types and modelling approach in this regard.

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136.	Telkom Mobile w.r.t. questionnaire sheet "RAN site infrastructure", capacity 5: Please clarify why the radio frequency information is required for this study.	The radio frequency information is required for comparison purposes, so that the number of sites using different kinds of radio frequency spectrum built by the model can be compared with actual site counts observed in operator networks.
137.	Vodacom I50: "Backhaul", "Core" and "Transmission" tabs. Please confirm that link / element counts be provided.	Confirmed.
138.	Telkom Mobile w.r.t. questionnaire sheet "Backhaul" 1: Please clarify why the connection type is being queried? The separation of sites based on coverage and capacity still needs to be considered as this speaks to the total network costs [voice call rates are determined at network level and not per area classification class].	The model accommodates various backhaul types that will be constructed according to a mix of backhaul types provided by licensees, that can be computed with information provided on this questionnaire tab. Stakeholders may also provide the mix of types needed directly in the red cells in the model instead. The distinction between coverage and capacity in this tab has been removed. While there will be one termination rate determined nationally, there are likely different costs associated with different geographies (areas) in the network, and so this is why geographic information is often sought in the questionnaires (though not in this

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		particular tab). Stakeholders are nonetheless invited to comment on this modelling approach.
139.	Vodacom I51: "Core Network Element" and "RAN Elements" tabs. Please confirm that these tabs require unit capex / opex.	Confirmed.
140.	Telkom Mobile w.r.t. questionnaire sheet "Core" 1: The description in this sheet includes information such as aggregation elements but these elements are not listed as specific line items in the sheet. Please clarify.	Stakeholders are invited to comment on any network elements, and to add rows as needed to the questionnaire for the network elements they suggest are relevant. This includes any additional core network aggregation elements that may need to be modelled. Stakeholders are encouraged to provide dimensioning assumptions for such network elements, as well as the data needed on number of units in their own network, as well as unit costs. Stakeholders may consider and comment on whether such network elements vary with and without incoming voice, so as to inform any decisions on whether to include those elements or not for pure LRIC (they may be needed regardless for LRIC plus).

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141.	Telkom Mobile w.r.t. questionnaire sheet "Core" 2: Should router infrastructure, where links are aggregated and links to other operators, be included?	Stakeholders are encouraged comment and provide data (including dimensioning assumptions, number of units, and unit cost) on any additional network elements, including router infrastructure. The dimensioning assumptions are important in this regard and stakeholders may consider and comment on whether such network elements vary with and without incoming voice, so as to inform any decisions on whether to include those elements or not for pure LRIC (they may be needed regardless for LRIC plus).
142.	Telkom Mobile w.r.t. questionnaire sheet "Core" 3: Should VoLTE information be included?	Stakeholders are encouraged comment and provide data (including dimensioning assumptions, number of units, and unit cost) on any additional network elements, including VoLTE infrastructure. The dimensioning assumptions are important in this regard and stakeholders may consider and comment on whether such network elements vary with and without incoming voice, so as to inform any decisions on whether to include those elements or not for pure LRIC (they may be needed regardless for LRIC plus).



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143.	Telkom Mobile w.r.t. questionnaire sheet "Core" 4: Should probing systems for monitoring and tracing voice calls not be included?	Stakeholders are encouraged comment and provide data (including dimensioning assumptions, number of units, and unit cost) on any additional network elements, including probing systems for monitoring and tracing voice calls. The dimensioning assumptions are important in this regard and stakeholders may consider and comment on whether such network elements vary with and without incoming voice, so as to inform any decisions on whether to include those elements or not for pure LRIC (they may be needed regardless for LRIC plus).
1454.	Telkom Mobile w.r.t. questionnaire sheet ""Transmission" 1: Please clarify if transmission information should be included for the aggregation part of the network.	This part of the questionnaire has been edited to reflect that the information being requested here is for core network transmission links. Transmission information for the aggregation part of the network may be provided here, as long as it is not duplicated in the backhaul component of the questionnaire.

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145.	Telkom Mobile w.r.t. questionnaire sheet "Transmission" 2: Please clarify if transmission information to other operators should be included	Transmission information to other operators can indeed be provided here. Stakeholders are encouraged comment and provide data (including dimensioning assumptions, number of units, and unit cost) on any additional network elements, including transmission information to other networks. The dimensioning assumptions are important in this regard and stakeholders may consider and comment on whether such network elements vary with and without incoming voice, so as to inform any decisions on whether to include those elements or not for pure LRIC (they may be needed regardless for LRIC plus).
146.	Telkom Mobile w.r.t. questionnaire sheet "RAN elements": It will be a challenge to provide the level of information requested. It will be difficult to breakdown by the classifications. When Telkom mobile built the sites, no site was classified by the build type. The compilation of data by segmentation of the site types is difficult. In most cases Telkom Mobile would not incur civil	Stakeholders are invited to comment on how site costs ought to be considered, including in respect of capex versus opex models. Thus, if there are no civil costs but site rentals and electricity are instead relevant, this information may be provided. If stakeholders do not have information on costs by type, then available cost information may be provided. A placeholder for vandalism and theft has been added to the

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	works costs but would incur power expenditure. Similarly, there is no classification for opex expenditure on vandalism or power upgrades. Please clarify what level of detail is necessary.	questionnaire under opex. Stakeholders need only provide the level of detail necessary to accommodate the different types of sites that suggest.
147.	Vodacom I52: "Additional Costs", "Joint and Common Costs", "Wholesale Cost" and "Roaming costs" tabs. Please clarify the exact nature of the costs that should be captured in this sheet and explain in detail how it will be used in the model?	<p>In respect of wholesale costs, stakeholders are encouraged to provide for instance the costs associated with interconnection (servers located at voice peering points for example, interconnection links, and the like) and then comment on how these vary with and without call termination volumes. The difference in the total costs of interconnection including call termination, and the total costs of interconnection without call termination volumes, will then be included in the cost model as additional costs associated with call termination.</p> <p>In respect of the additional costs, and joint and common costs, stakeholders are invited here to provide data that might be relevant to the computation of the 'plus' in LRIC plus. As mentioned above, stakeholders may</p>

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		comment on how best this might be computed, including in respect of a general mark-up or by applying LRAIC. In respect of roaming costs, stakeholders have previously commented that they incur roaming costs in addition to various other network costs. This is a placeholder for stakeholders to provide their roaming cost data. Stakeholders are invited to comment on how best to model roaming costs, with and without inbound call volumes.
148.	Cell C 5.1 Q05: Additional Costs'!B21: Please define what is intended by this activity	This cell, 'roaming business processes', is intended to account for any additional costs associated with business processes needed for roaming, such as network monitoring, IT systems needed for this, and the like. Stakeholders are encouraged to provide any details relating to roaming in a format that will enable to take the costs of roaming into account with and without inbound calls, and also in order to compute the 'plus' component of LRIC+, if necessary.

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149.	Cell C 5.1 Q06: Additional Costs!B23: Please define what is intended by this activity	This cell, 'costs of accounting for roaming', is intended to account for any additional accounting costs associated with national roaming services, including any billing systems that might be needed and the like.
150.	Vodacom I53: "Additional Costs", "Joint and Common Costs", "Wholesale Cost" and "Roaming costs" tabs. Please confirm whether total annual costs are required.	Stakeholders may provide total annual costs.
151.	Telkom Mobile w.r.t. questionnaire sheet "Joint & Common Costs" 1: Telkom would like to understand this information will be used this study.	This tab in the questionnaire is intended to be used for the 'plus' component in LRIC plus, should the Authority opt to use this methodology. Stakeholders are invited to comment on any and all costs that may be relevant for this purpose, which are typically joint and common costs. Stakeholders may comment on what they consider to be joint and common costs, and these may travel beyond network divisional costs if the stakeholder considers this to be appropriate.

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160.	MTN 3.19: In respect of joint and common costs, please can the Authority clarify what is expected – is it the network Divisional costs only?	This tab in the questionnaire is intended to be used for the 'plus' component in LRIC plus, should the Authority opt to use this methodology. Stakeholders are invited to comment on any and all costs that may be relevant for this purpose, which are typically joint and common costs. Stakeholders may comment on what they consider to be joint and common costs, and these may travel beyond network divisional costs if the stakeholder considers this to be appropriate.
161.	Telkom Mobile w.r.t. questionnaire sheet "WACC" 1: Telkom would like to understand why it is necessary to provide cost of debt, cost of equity, debt/equity, and risk-free information separately if WACC information is provided.	The BU model requires the WACC to be forecast over time, and so the WACC will be dependent on interest rate forecasts, which can then be interrogated. Stakeholders are encouraged to provide as much detail as possible for the Authority to make decisions on this.
162.	Telkom Mobile w.r.t. questionnaire sheet "WACC" 2: Please clarify which exchange rate information needs to be provided.	Stakeholders are encouraged to provide their views on exchange rate scenarios, which can then be incorporated in the models.

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163.	MTN 3.21: In respect of wholesale costs, please note that MTN do not apply a wholesale retail cost allocation methodology in our accounting. As such all costs are aggregated under a Network division and are not easy to split between Wholesale and Retail. Please can the Authority advise how to manage this data request?	Stakeholders are encouraged to provide what information they have, including costs aggregated under a Network division. Stakeholders are further encouraged to comment on how such costs might vary with and without call termination traffic for modelling purposes.
164.	Vodacom I54: "Retail Revenue", "Wholesale", and "Devices" tabs. Please clarify what information is required here and explain in detail how it will be used in the model.	The retail revenue and wholesale tabs have been deleted. The devices tab data will be used to apportion voice, SMS and data traffic to technologies (2G, 3G and 4G), in the event that data in the specific site data and retail volumes tabs are not provided.
165.	MTN 3.22: In respect of retail volumes, please can the Authority clarify whether this is all traffic or just billable traffic (the schedule mentions "Sales")?	Stakeholders are encouraged to provide at a minimum billable traffic, and if they consider that all traffic ought to be taken into account, stakeholders are also encouraged to supplement this information with all traffic.

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166.	MTN 3.23: In respect of retail revenues, please note that MTN revenue recognition is not disaggregated by Technology type (i.e., 2G/3G/4G/5G). As such, MTN does not have voice revenues disaggregated between on-net and off-net. This is partly due to the introduction of IFRS15 which introduced a new methodology to the way in bundle revenues are allocated.	The retail revenues tab has been removed from the questionnaire to limit the information burden on licensees.
167.	Vodacom I55: "Devices" tab. Please confirm whether this is the number of 2G, 3G, and 4G enabled devices or the technology traffic that is used (regardless of the device classification).	Please use column D to capture the number of , 3G, and 4G enabled devices, and please supplement this information by the number of devices by technology traffic that is used if available and if stakeholders consider that this will have an impact on apportioning traffic volumes by technology in the model.
168.	Vodacom I55: "Devices" tab. Please confirm whether this is the number of 2G, 3G, and 4G enabled devices or the technology traffic that is used (regardless of the device classification).	Please use column D to capture the number of , 3G, and 4G enabled devices, and please supplement this information by the number of devices by technology traffic that is used if available and if stakeholders consider that this will have an impact on apportioning traffic volumes by technology in the model.



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169.	Cell C Q07: Devices'!B5: Most devices are not specific to one radio technology. How should this be captured in this question?	Stakeholders are encouraged to provide data on devices applying the highest available technology on a device connected to their network. Stakeholders are requested to supplement this information with the number of devices by technology traffic that is used by the device if available and if stakeholders consider that this will have an impact on apportioning traffic volumes by technology in the model.
170.	Telkom Mobile w.r.t. questionnaire sheet "Devices": Please explain why information per technology and device penetration factor is relevant.	This information may be used to apportion traffic (voice, data, SMS) volumes to different technologies (2G, 3G and 4G) in the model, depending on what data is provided in the sites tab and the volumes tab. Stakeholders are encouraged to comment on this approach, and to consider how best to apportion traffic to the different technologies (2G, 3G and 4G).
171.	MTN 3.24: In respect of P&L, please can the Authority clarify whether the request is for MTN to just include what is available in our standalone financial statements (E.g., If voice is not disaggregated, we just show total voice)? In	Stakeholders are encouraged to submit what data they have, and comment on how their total costs vary with and without call termination traffic. It is not necessary for this information to be signed off by external auditors. The comments that not all operating costs are

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	<p>addition, in respect of disaggregated data, please clarify whether the expectation is that MTN have this breakdown signed off by our external auditors? Please note that this would compromise the proposed timeline as Auditors would have to get risk acceptance and would need time to audit the information. Please further note that not all operating costs are allocated between Wholesale and Retail and MTN can only provide data up to margin level.</p>	<p>allocated between wholesale and retail, and that MTN can only provide data up to margin level, are noted.</p>

## 7 Bottom up and top-down fixed line models and questionnaires

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172.	Telkom Fixed With respect to ("w.r.t.) questionnaire sheet "Core" 1: Telkom would like to understand how the mobile elements mentioned in the description will be used in for determining fixed costs [please update the descriptions where relevant].	The references to mobile network elements in the description text at the top have been removed from the questionnaire. The remaining network elements have been used in previous fixed-line models but can nonetheless best be considered as placeholders. Stakeholders are encouraged to comment on the relevant network elements and add / remove elements in the current questionnaire and provide data accordingly.
173.	Telkom Fixed With respect to ("w.r.t.) questionnaire sheet "Core" 2: Telkom would like to know why no network element information is requested for aggregation.	Stakeholders are encouraged to add relevant network elements, including for aggregation, provided that these vary with and without inbound call traffic.
174.	Telkom Fixed w.r.t. questionnaire sheet "Transmission" 1: Telkom would like to know why no network element information is requested for transmission.	Stakeholders are encouraged to comment on network elements, adding rows to the questionnaire and models if necessary and provide data on these additional networks, provided that they vary with and without inbound call traffic. It is also important that stakeholders comment on costs where the elements are leased /

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		where there are monthly recurring charges (i.e. on an opex basis), and where they are bought (on a capex basis).
175.	Telkom Fixed w.r.t. questionnaire sheet "Additional cost" 1: Telkom does not see roaming information as being relevant for the provision of fixed termination services. Please clarify why the information has been requested?	References to roaming have been removed in the additional costs tab.
176.	Telkom Fixed w.r.t. questionnaire sheet "Joint & Common Costs" 1: Telkom would like to understand how this information will be used separately in this study.	This information will be used to inform the 'plus' component in LRIC+, which stakeholders are encouraged to comment on.
177.	Telkom Fixed w.r.t. questionnaire sheet "WACC" 1: Telkom would like to understand why it is necessary to provide information on cost of debt, cost of equity, debt/equity, and risk-free information separately if the WACC figures are provided.	The BU model requires the WACC to be forecast over time, and so the WACC will be dependent on interest rate forecasts, which can then be interrogated. Stakeholders are encouraged to provide as much detail as possible for the Authority to make decisions on this.

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178.	Telkom Fixed w.r.t. questionnaire sheet "WACC" 2: The exchange rate fluctuates continuously, and Telkom would like to know which exchange rate/s should be provided.	Stakeholders are encouraged to provide their views on exchange rate scenarios, which can then be incorporated in the models.
179.	Telkom Fixed w.r.t. questionnaire sheet "Devices" 1: Telkom does not see device information as relevant since devices do not form part of the network. Please clarify why it is necessary to provide information on devices for the study.	This tab has been deleted.

## Appendix: Economic depreciation and tilted annuity examples

In this appendix we compare economic depreciation and tilted annuity examples with a stylised three-period model with an asset costing R100 000 at the start of period 1, a nominal pre-tax WACC of 20%, and an inflation rate of 6%, and the following volume profile per period: 1 000, 2 000, and 3 000 minutes. We show how the two methodologies result in very different revenue and tariff profiles with revenues and tariffs much higher in the initial years using the tilted annuity approach, even though the revenue profiles arrive at the same present value, thus recovering the initial cost of the investment.

The result of the tilted annuity computation in this case is:

	<b>Total</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Replacement value of asset		106 000	112 360	119 102
Tilted annuity revenues <sup>6</sup>		45 052	47 755	50 620
Discounted revenues (present value)	<b>100 000</b>	37 543	33 163	29 294
Price per unit		<b>45.05</b>	<b>23.88</b>	<b>16.87</b>

Clearly, the price per unit changing dramatically over time does not reflect what we see in competitive markets for telecommunications services.

By way of contrast, the economic depreciation method is calculated by dividing the present value of the assets, of R100 000, by the present value of volumes increased by inflation over time, as below:

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<sup>6</sup> The formula for the tilted annuity calculation for a given replacement value of the asset in a given year is:  

$$= \text{replacement\_value} * (\text{wacc} - \text{inflation}) * (1 + \text{wacc})^{\text{depreciation\_period}} / ((1 + \text{inflation}) * ((1 + \text{wacc})^{\text{depreciation\_period}} - (1 + \text{inflation})^{\text{depreciation\_period}}))$$

	<b>Total / Summary</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Volumes - economic depreciation (indexed by inflation)		1060	2247	3573
Present value of volumes	4 512	883	1561	2068
Tariff-economic depreciation – indexed (PV of revenues / PV of volumes)	<b>22</b>	<b>23.49</b>	<b>24.90</b>	<b>26.40</b>
Revenues (actual tariff X actual volumes) - economic depreciation		23 495	49809	79196
Discounted revenues (present value)	<b>100 000</b>	19 579	34590	45831

The substantially higher initial tariffs and revenues for tilted annuity are also apparent when shown graphically, as on Figure 1 below. The significantly higher revenues and prices in the initial years arising from the tilted annuity model are not what we would expect in a competitive market. The balanced pricing over time, and lower revenues in earlier years, is more in line with what we would expect in a market with a number of competing firms.

**Figure 1: Comparing tariff and revenue profiles for tilted annuity vs economic depreciation**



