Development of cost models and pricing framework for wholesale and retail telecommunications services in Malawi

A public consultation document

7 April 2017
# Table of Contents

1 Executive Summary ........................................................................................................ 4
  1.1 Scope of the project ................................................................................................. 4
  1.2 Stakeholder consultations ..................................................................................... 4
  1.3 Structure of this report .......................................................................................... 5
  1.4 Consultation questions .......................................................................................... 5

2 Project Background ......................................................................................................... 7
  2.1 The legal context in Malawi ................................................................................... 7
    2.1.1 The Communications Act .................................................................................. 7
    2.1.2 Legal powers of MACRA – interconnection and pricing .................................. 9
    2.1.3 MACRA’s market analysis ................................................................................. 10
  2.2 Using cost models to set interconnection charges .................................................. 10
    2.2.1 Cost orientation ................................................................................................ 10
    2.2.2 Types of Cost Models ...................................................................................... 13
    2.2.3 Costing Methodologies .................................................................................... 14
  2.3 Tariff Approvals ...................................................................................................... 17
    2.3.1 International retail price benchmark ................................................................. 17
    2.3.2 Comparison between on-net and off-net mobile call charges ......................... 18
  2.4 Consultation questions ............................................................................................ 19

3 Proposed Approach to Cost Modelling .......................................................................... 20
  3.1 Scope of the cost models ......................................................................................... 20
  3.2 Cost standards .......................................................................................................... 21
  3.3 Network topology .................................................................................................... 23
  3.4 Data requests ........................................................................................................... 24
  3.5 Mobile network cost model ..................................................................................... 24
    3.5.1 Network Technologies ....................................................................................... 24
    3.5.2 Mobile network services .................................................................................. 25
    3.5.3 Mobile scenarios ............................................................................................... 25
  3.6 National backbone transmission network cost model ............................................. 26
    3.6.1 Network Technologies ....................................................................................... 26
    3.6.2 National backbone network services ............................................................... 27
    3.6.3 National backbone network scenarios .............................................................. 27
  3.7 International transmission network cost model ...................................................... 28
    3.7.1 Network Technologies ....................................................................................... 28
    3.7.2 International transmission network services .................................................... 28
    3.7.3 International transmission network scenarios .................................................. 28
  3.8 Consultation questions ............................................................................................ 29

4 Annualisation of Capital Costs ...................................................................................... 31

© Incyte Consulting 2017
4.1 Approach to capital costs................................................................. 31
4.2 Calculation of the WACC............................................................... 32
  4.2.1 Background.................................................................................. 32
  4.2.2 Theory used: WACC and CAPM.................................................. 32
  4.2.3 Formulas ..................................................................................... 33
  4.2.4 Cost of Debt.................................................................................. 33
  4.2.5 Real or Nominal rates and Inflation.............................................. 34
  4.2.6 Risk Free Rate.............................................................................. 34
  4.2.7 Cost of Debt Risk Premium........................................................ 35
  4.2.8 Gearing ....................................................................................... 36
  4.2.9 Cost of Equity.............................................................................. 37
  4.2.10 Equity risk premium................................................................. 38
  4.2.11 Equity Country Risk premium.................................................... 40
  4.2.12 Beta Values............................................................................... 42
  4.2.13 Tax............................................................................................. 43
  4.2.14 WACC estimates..................................................................... 44
4.3 Overview of Questions ................................................................. 44
1 EXECUTIVE SUMMARY

Incyte Consulting Ltd (Incyte) has been selected following a competitive tendering process to assist the Malawi Communications Regulatory Authority (MACRA) with the development of cost models and a pricing framework for ICT services. The project operates under the Procurement Reference Number: MACRA/IPC/EAD-CMPF/2016/11.

1.1 Scope of the project

The Objectives set out in the Terms of Reference state that the consultant is to develop cost models for wholesale and retail telecommunications services in order to enhance competition among operators in Malawi. The specific objectives are to:

- Recommend the appropriate pricing methodologies that can be applicable to the Malawi market after analysing the existing telecommunications services
- Develop an optimal Cost of Capital Methodology Framework for the telecommunications industry in Malawi
- Develop costing principles that will be applied to set the tariffs and other charges including price caps, tariff guidelines and other price controls for different classes and categories of services and products
- Develop a cost model and pricing framework for MACRA for the various regulated services
- Review the recommendations from relevant consultancy studies in relation to pricing and costing and take appropriate action
- Train and transfer skills to MACRA staff on the cost modelling and pricing frameworks.

The project commenced on 22 February 2017 and is due to be completed within 6-9 months.

1.2 Stakeholder consultations

Engagement with industry is a key part of this assignment. It will help to ensure that the cost models are fully representative of local supply conditions, and that the decisions MACRA subsequently makes using the cost models are in line with international best practice. The consultations are also an important means by which MACRA can create a transparent regulatory environment.

Two stakeholder consultations are planned as part of this project:

- This first consultation, which commenced with a stakeholder workshop held in Blantyre Tuesday 4 April 2017, seeks views on the proposed cost modelling methodology, its consistency with international best practice and its practical implementation in Malawi. As part of this consultation, network operators and other stakeholders are requested to:
• Comment on the proposed approach to cost modelling;
• Comment on the proposed WACC and, where appropriate, to suggest justified changes to the calculation;
• Supply market, network and cost data that will be required for the construction of the cost models, using a template provided by Incyte.

- The second consultation will follow a stakeholder presentation by the consultants of the draft final report (proposed for late July 2017), including a description of the cost models and proposals on how those models will be used by MACRA in tariff regulation. Comments received from the industry will be taken into account before the final report is submitted to MACRA.

1.3 Structure of this report

This consultation document is structured as follows:

- Chapter 2 establishes the context in which MACRA is working. This includes the legal environment in Malawi and, specifically, the laws and regulations that govern MACRA’s approach to costing. It also includes the international context, and especially regional and international best practice in tariff regulation.
- Chapter 3 identifies and specifies the various cost models that will be constructed as part of this project, identifying the:
  ▪ cost standards to be used;
  ▪ models to be constructed;
  ▪ services to be included;
  ▪ conceptual methodologies to be followed;
  ▪ data to be collected; and
  ▪ operator scenarios to be assessed.
- Chapter 4 describes the proposed approach to converting capital investments into annualised cost, including our assessment of the weighted average cost of capital (WACC).

1.4 Consultation questions

Throughout the report questions are raised for the consideration of stakeholders. Whilst any feedback in any format is to be welcomed, respondents’ attention is drawn to the specific questions at the end of each chapter. All interested parties are encouraged to answer these questions as fully as possible, providing supporting evidence for each response. Operator-specific data and circumstances will of course be taken into account but will not necessarily determine the approach taken to the modelling exercise.

Responses to this consultation, including responses to the data requests that have been issued to the network licensees, must reach Incyte and MACRA by Friday 19 May 2017. Please set out your answers in the same order as the questions and by reference to the question numbers.
All responses must be in writing and should be emailed to all of the following email addresses:

- lkambale@macra.org.mw
- anyirenda@macra.org.mw
- ke@incyteconsulting.com

Incyte will receive, assess, and consider all submissions and clarifications on its preliminary findings before making any recommendations to MACRA on its next steps.

Please mark any confidential information with an appropriate legend. Only the financial information of operators will generally be considered to be confidential.
2  PROJECT BACKGROUND

2.1  The legal context in Malawi

2.1.1  The Communications Act

The new Malawi Communications Act was published on 4 November 2016 (“the 2016 Act” or “the Act”). The 2016 Act is likely to be brought into force in May 2017 and it will repeal the Communications Act of 1998 (“the 1998 Act”).

Under section 4 of the 1998 Act, the Authority shall:

- (a) protect the interests of consumers, purchasers and other users of communication services in respect of the prices charged for the quality and variety of services provided and terminal equipment supplied;
- (b) promote open access to information by means of communication services;
- (c) promote efficiency and competition among persons engaged in provision of communication services or supply of communication equipment;...

Two of the objectives of the 2016 Act set out in section 2 which are most relevant to this project are:

- “(b) to remove unnecessary barriers to entry, and attract investment in the communications sector”; and
- “(f) to facilitate the provision of affordable communication services”.

These objectives must be borne in mind when the Malawi Communications Regulatory Authority, or MACRA, carries out any of its functions and exercises any of its powers. Of relevance to our project are, among others, section 6(2):

- “(c) protect the interests of consumers, purchasers and other users of communication services”;
- “(e) promote efficiency and competition among entities engaged in the provision of communication services or in the supply of communication equipment”; and
- “(o) carry out projects to promote the development of the communications sector...”

In general, MACRA is tasked with the regulation and monitoring of communications services and under section 6, “shall...ensure that, as far as it is practicable, reliable and affordable communications services are provided throughout Malawi and are sufficient to meet the demand for such services in accordance with the principles of transparency, certainty, market orientation, efficiency, and consumer satisfaction”. These goals and objectives are entirely in keeping with international best practice in regulation.
Part IV of the 2016 Act deals with economic regulation and specifically authorises MACRA to “promote, develop and enforce fair competition and equality of treatment among operators in any business or service relating to the communications service sector”.

MACRA is also required to “co-ordinate” the exercise of its powers with the Competition and Fair Trading Commission.

Section 57(3) of the 2016 Act deems a licensee to hold a “dominant position in a relevant market” if the licensee:

(a) “holds a large market share;
(b) has control of essential facilities;
(c) is involved in a vertical relationship that could harm competition in the market applicable to the particular category of licence as determined by the Authority; or
(d) any other factors as determined by the Authority [apply].”

In addition to this definition, section 57(4) provides that MACRA shall deem a licensee to hold a dominant position “in a given relevant communications service market for a given calendar year where, in its opinion, the licensee may, acting alone, be able to profitably and materially restrain or reduce competition within the relevant communications service market and during the calendar year concerned.” Joint dominant positions are also provided for in section 57(5).

Section 57(1) requires MACRA to publish for the following year, a list of all:

(i) retail and wholesale communications service markets that, in the Authority’s opinion, require ex ante regulatory control; and
(ii) licensees deemed as holding a dominant position for each identified communications service market.

Section 58 of the 2016 Act is important insofar as it deals with remedies or pro-competitive conditions that may be applied where dominance is established. It should be noted that dominance in and of itself is not always problematic, but it is the likelihood of abuse given the market circumstances, that is a key factor in determining remedies. Section 58 requires MACRA to impose obligations on dominant licensees to:

(a) “publicly make available information regarding interconnection, access and infrastructure-sharing;
(b) submit to the Authority its technical and price offers with respect to interconnection, access and infrastructure-sharing by such date as the Authority may determine;
(c) modify any offers submitted under paragraph (b) in order to make the offers compliant with this Act;
(d) have a separate account for interconnection, access and infrastructure-sharing costs and fees, and any other business activities sufficiently detailed to allow the
Authority [to] identify all elements of revenue and costs, together with the basis for their calculation;
(e) for the purpose of enabling the provision of communications services to the public in relation to the communications service market concerned, offer access to a licensee requesting [for] the access; and
(f) comply with any other obligation as determined by the Authority from time to time."

Regulatory authorities including MACRA typically have the power to exercise discretion in imposing remedies or to forbear from exercising their powers when it appears sensible to do so. In this project we anticipate imposing price controls on certain operators, which would fall within the category set out in subsection (f).

2.1.2 Legal powers of MACRA – interconnection and pricing

Interconnection
Part V of the 2016 Act deals with interconnection. It follows relatively standard provisions for this important activity. Section 61 is relevant to this project as it empowers MACRA to “make rules prescribing interconnection terminal rates to be applied by all licensees when negotiating interconnection agreements”. Section 63(4) also empowers MACRA to issue “minimum guidelines” for the negotiation of interconnection agreements.

Section 66 is perhaps the most relevant provision in this Part, which ties into the provisions of section 58 discussed above. It provides that MACRA may fix the maximum for interconnection rates. In order to make this determination, MACRA must (shall), under subsection (2), take into account:

(a) “Accessibility and affordability of electronic communication services; and
(b) Fair treatment and competition among licensees”.

Tariff regulation
This Part can be read with the provisions of Part VIII, entitled Regulation of Tariffs, and particularly section 78. Whilst licensees may in general set their own tariffs, MACRA may set caps on prices for one or more communication services for a period of years. The Act does not specify whether tariffs in this Part are retail or wholesale and therefore we consider that the Act applies to both.

Section 78(1) provides that MACRA “may reframe tariffs in order to promote fair competition and the granting of new licences...” while section 78(4) provides that MACRA “shall reframe tariffs in order to make the tariffs cost efficient and to remove cross-subsidisation between distinctive communication services”. Thus, regulatory action to make tariffs cost-efficient should be focused on dominant service providers. In normal circumstances, unless a service provider is in a dominant market position, it should be free to set tariffs on commercial principles.
Under section 79, MACRA may on its own motion or on receipt of a complaint, investigate tariffs set by a licensee in order to ensure compliance with the 2016 Act.

### 2.1.3 MACRA’s market analysis

The last market analysis exercise was undertaken in 2014, with the consultant’s final report being issued on 26 January 2015. The market analysis identified five key distinct telecommunications markets in Malawi, identified those service providers that are dominant in these markets, and proposed a number of pro-competitive remedies including some concerning tariffs. These findings are summarised in Figure 2.1 below.

**Figure 2.1: Key findings of MACRA’s market analysis**

<table>
<thead>
<tr>
<th>Market</th>
<th>Dominant suppliers</th>
<th>Commentary</th>
<th>Proposed tariff remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed voice</td>
<td>MTL</td>
<td>Very small and insignificant market</td>
<td>None identified</td>
</tr>
<tr>
<td>Mobile voice</td>
<td>TNM and Airtel</td>
<td>Retail prices appear low on a regional comparison</td>
<td>Reduce mobile voice termination rates to $0.02 on a clear glide path.</td>
</tr>
<tr>
<td>Retail broadband – urban and suburban</td>
<td>None</td>
<td>Prices low by regional standards, but so also is quality of service.</td>
<td>No retail remedy required (but could be affected by wholesale remedy in Market 5)</td>
</tr>
<tr>
<td>Retail broadband – rural</td>
<td>TNM and Airtel (market limited to 3G mobile)</td>
<td>USF could be used to target investment and expansion of the market</td>
<td>No pricing related remedy</td>
</tr>
<tr>
<td>Wholesale transmission capacity</td>
<td>MTL and ESCOM</td>
<td>Entry of SimbaNet could help reduce prices</td>
<td>Open Access with published reference price offers</td>
</tr>
</tbody>
</table>

### 2.2 Using cost models to set interconnection charges

#### 2.2.1 Cost orientation

The principle of cost orientation and the related concepts of transparency and non-discrimination are well established in international regulation of telecommunication services.

---

At its core, cost orientation is designed to ensure that operators with significant market power or dominance are prevented from exploiting that dominance by raising prices above the efficient level for the development of competition and ultimately, to protect the interests of end-users. Cost orientation aims to mimic the outcomes of competitive markets where excessive profits are competed away by existing competition or (the threat of) new entry. Since social welfare will be maximized under conditions of effective competition, price controls should make sure that regulated wholesale prices are close to (hypothetical) competitive prices.

While cost orientation aims to ensure the prevention of exploitative pricing, it also aims to ensure that the regulated firms are rewarded for legitimately incurred costs, including a reasonable rate of return on investments, thus providing incentives for investments in new infrastructure. Setting cost-oriented tariffs is therefore a balancing act between sometimes conflicting goals of stimulating competition versus ensuring that investments in infrastructure take place. However, the regulation of telecommunications markets and services where needed is not controversial and should lead to more competition, more investments and enhanced social welfare.

The principle of cost-orientation is also well established in the region. For example, a 2013 HIPSSA report titled “Regulatory accounting and cost modelling in Sub-Saharan Africa” by the International Telecommunications Union (ITU) shows that, in Sub-Saharan Africa, the following types of intervention were identified:

**Figure 2.2: Types of regulatory intervention in sub-Saharan Africa**

<table>
<thead>
<tr>
<th>Type of intervention</th>
<th>Number of countries where applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost orientation</td>
<td>5</td>
</tr>
<tr>
<td>Price cap</td>
<td>1</td>
</tr>
<tr>
<td>Sender Keeps All</td>
<td>1</td>
</tr>
<tr>
<td>Benchmarking</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 2.2 shows that, regionally, regulatory intervention takes the form of cost orientation (i.e. cost models), price caps, sender keeps all (also known as ‘bill and keep’) and benchmarking. We briefly address each of these types of intervention in turn:

---

2 The study covers 9 countries: Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe.
- **Cost-orientation**: in the context of the study this relates to the development of cost models to estimate the costs associated with the provision of regulated telecommunications services.

- **Price cap**: under a price cap prices are reduced over time until they are projected to align with costs, including a suitable rate of return, of providing services. Price caps are therefore a form of cost orientation but operators are given an adjustment period to adapt their business models to the changing price levels.

- **Sender Keeps All**: this is a billing protocol historically applied to IP traffic (i.e. “peering”) but this approach is increasingly being considered as an interconnection billing approach for voice services. In effect it means that interconnection charges are set to zero.

- **Benchmarking**: i.e. setting tariffs on the basis of an analysis of rates for similar services in countries considered comparable to the country for which rates are sought.

Each of these types of intervention has advantages and drawbacks, which the following table summarises.

**Figure 2.3: Advantages and disadvantages of different types of intervention**

<table>
<thead>
<tr>
<th>Type of intervention</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost orientation (i.e. cost models)</td>
<td>Captures costs and specific local circumstances</td>
<td>Complexity</td>
</tr>
<tr>
<td></td>
<td>Predictability of approach</td>
<td>Cost of model development</td>
</tr>
<tr>
<td></td>
<td>Mimics outcome of competitive markets</td>
<td></td>
</tr>
<tr>
<td>Price cap</td>
<td>Provides incentives for improved efficiency</td>
<td>Costs are not necessarily cost-oriented during price cap period</td>
</tr>
<tr>
<td></td>
<td>Predictability of rates over time</td>
<td></td>
</tr>
<tr>
<td>Sender Keeps All</td>
<td>Low administrative costs</td>
<td>Not cost-oriented</td>
</tr>
<tr>
<td></td>
<td>Simplicity</td>
<td></td>
</tr>
<tr>
<td>Benchmarking</td>
<td>Low costs of implementation</td>
<td>May not capture specific local circumstances</td>
</tr>
</tbody>
</table>

We believe that a Sender Keeps All approach is not currently a reasonable option in Malawi because current prices are relatively high, and a complete removal of interconnection charging may have a significant impact on the business models of existing operators.
MACRA is keen to ensure that any prices set are reflective of the unique operating circumstances in Malawi. Hence cost orientation is the preferred approach, consistent with the objectives outlined in the 2016 Act. However, benchmarks may be used to ensure proposed cost-oriented rates are not significantly outside regional best practice, and price caps may be considered in those cases where immediate adjustment of prices towards costs would be seen as too disruptive to the industry.

2.2.2 Types of Cost Models
There are two main types of cost models:

- “top-down” or accounting models based on the costs recorded in the accounts of the regulated operators, and;
- “bottom-up” or engineering models designed to make an estimate of efficiently incurred costs on the basis of engineering relationships between costs and outputs (i.e. services).

Combining the results of bottom-up and top-down models gives rise to a third option, the so-called “hybrid” model.

OFCOM in the UK summarised the use of these types of models as follows.

**Figure 2.4: Benefits and drawbacks of different types of models**

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top-down</strong></td>
<td>• Begin with historical accounting cost levels and forecast on the basis of observed output / cost relationships</td>
<td>• Helps ensure that relevant historical costs are not omitted</td>
</tr>
<tr>
<td></td>
<td>• Identify granular components of cost and define cost-causal relationships to link the quantity of each of these with output, based on practical and theoretical evidence</td>
<td>• Most straightforward</td>
</tr>
<tr>
<td><strong>Bottom-up</strong></td>
<td>• Gives improved understanding of cost drivers</td>
<td>• May overlook some efficiently incurred costs</td>
</tr>
<tr>
<td><strong>“Hybrid”</strong></td>
<td>• Combines all of the advantages above</td>
<td>• Does not lock in cost inefficiencies</td>
</tr>
</tbody>
</table>

Source: OFCOM

It is essential to the development of the industry in Malawi that tariffs are reflective of efficiently incurred costs (as opposed to actual incurred costs) to provide the right signals for market entry and competition and to protect the interests of end-users. The development of bottom-up costing functionality is therefore central to the approach,
although actual cost data will be used where appropriate to inform decisions on model inputs.

This approach is in line with recommendations from the European Commission. For example:

"Operators which are compensated for actual costs incurred for termination have few incentives to increase efficiency. The implementation of a bottom-up model is consistent with the concept of developing a network for an efficient operator whereby an economic/engineering model of an efficient network is constructed using current costs. It reflects the equipment quantity needed rather than that actually provided and it ignores legacy costs." \(^3\)

The proposed approach to use bottom-up models is also in line with a regional trend on the development of cost models\(^4\) with only Zimbabwe using top down models while the rest either use bottom-up or hybrid models.

### 2.2.3 Costing Methodologies

There are many costing methodologies in use internationally but the two most common approaches are (variations on) fully allocated costs (FAC) and long-run-incremental costs (LRIC).

- **Fully allocated costs or FAC\(^5\)** is a costing methodology where (typically) historical costs incurred by an operator are allocated to services in full (i.e. costs are fully allocated or distributed). This includes the allocation of costs to services that do not vary with the production of those services (i.e. fixed costs like common and joint costs). FAC as a concept is historically most often associated with top-down models and tends to (but does not have to) be based on historic costs without efficiency adjustments.

- **Long-run-incremental-costs or LRIC** is a costing methodology where all costs, including capital costs, are measured over a period of time (the long run) where they become variable. Only costs that vary (incremental costs) with the production of a good or service are allocated to that service (i.e. costs are allocated to the increment to which they relate). The EC defines the relevant incremental costs (in this example for call termination) as:

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\(^3\) Commission Recommendation of 7 May 2009 on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU (2009/396/EC)

\(^4\) See HIPSSA report titled "Regulatory accounting and cost modelling in Sub-Saharan Africa" by the International Telecommunication Union (ITU), 2013.

\(^5\) Sometimes also referred to as fully distributed costs or FDC.
"The difference between the total long-run costs of an operator providing its full range of services and the total long-run costs of an operator not providing a wholesale call termination service to third parties."

And the Southern Africa Development Community (SADC) uses the following definitions:

"Incremental cost refers to the change in total costs from implementing a particular business decision, such as adding capacity to meet additional demand."

In graphical form, the two methodologies can be depicted as follows:

**Figure 2.5: LRIC versus FAC**

The graph shows a hypothetical example of an operator providing two services – service A and service B, where costs are assumed to relate to volumes as depicted, with scale economies on top of a fixed cost that does not vary with volumes (the fixed common and joint costs). In order to establish the LRIC of service A, service volumes associated with that service are removed and the difference in total costs is measured across the cost volume relationship (CVR). In FAC however, all costs are allocated to services A and B and the relationship between total costs and services is assumed to be linear, resulting in more costs being allocated to service A under FAC than under LRIC.

Incyte considers that the costing methodology used by MACRA for regulating tariffs should comply with the following main principles:

---

6 See "Policy guidelines on interconnection for SADC countries & model telecommunication regulations on interconnection", SADC, November 2000.
1. **Approximating marginal costs** – economic theory suggests that economic welfare is maximised where prices reflect underlying marginal costs i.e. it is at this point of the supply curve that productive and allocative efficiencies are maximised;

2. **Stimulating the development of competition** – prices should be set to provide the appropriate signals for market entry and market exit to support the development of sustainable competition; and

3. **Stimulating efficiency** – prices should be reflective of efficient operations.

Incyte considers that LRIC is the more suited methodology to comply with these principles. LRIC is a forward-looking costing methodology using costs associated with the most modern technologies available and LRIC therefore most closely resembles the cost structure of a new entrant into the market. It is this cost structure that existing operators would need to be able to compete with in a fully efficient and competitive market. LRIC also tends to be reflective of efficiently incurred operations and the concept of incremental costs (with all costs including capital costs assumed to be variable in the long term) most closely resembles the concept of marginal costs in industry characterised by high investments. This approach is supported by the European Commission, see for example:

> "In a LRIC model, all costs become variable, and since it is assumed that all assets are replaced in the long run, setting charges based on LRIC allows efficient recovery of costs which are caused by the provision of a defined increment. An incremental cost approach which allocates only efficiently incurred costs that would not be sustained if the service included in the increment was no longer produced (i.e. avoidable costs) promotes efficient production and consumption and minimizes potential competitive distortions."  

We propose to model a range of long run incremental cost (LRIC) results, including:

- **TS-LRIC** (Total Service LRIC) which provides the average incremental cost for each traffic minute or Megabyte, by setting the relevant increment to include all traffic from all services in the operator’s service portfolio.

- **TS-LRIC+** which takes the TS-LRIC results as the starting point and includes a proportionate mark-up for joint and common costs.

- **Pure LRIC** which identifies the avoidable costs if a specific service were excluded from the service portfolio.

By modelling a combination of LRIC approaches, MACRA will have flexibility to choose the approach that most closely matches the tariffing needs of a particular market segment.

---

2.3 Tariff Approvals

As well as using the cost models to fix maximum interconnection rates, MACRA expects to use them in assessing tariffs that are filed by licensees for regulatory approval (see Part VIII of the Act on regulation of tariffs).

Although it is unusual for regulators to establish cost-oriented retail prices directly from cost models, it is normal practice to use of cost models to check that proposed tariffs are reasonable. For example, price controls for retail services are in currently in place in Zambia, Botswana and Zimbabwe.

There are two areas in particular where MACRA might want to use cost models to assist in retail tariff approvals:

- Ensuring that dominant suppliers do not set excessive retail prices. Although it is tempting to decide on when prices are excessive based on measures of affordability or price benchmarks, ultimately prices are only excessive if they are above efficiently-incurred costs.
- Ensuring that the relationship between on-net and off-net mobile prices does not distort the market in an anti-competitive manner. Dominant mobile service providers have a great incentive to lower on-net prices relative to off-net so as to dissuade existing customers to leave their network and attract new customers onto their network. If on-net prices are below cost (predatory) or/and off-net prices are above cost (excessive) then the dominant provider may be seen as engaging in ant-competitive practices that are contrary to the long term interests of consumers.

2.3.1 International retail price benchmark

The simplest way to check whether retail prices are excessive is to compare prices in Malawi with those of similar services in other similar countries. A simple retail price benchmark is presented in Figure 2.6 below. It indicates that most prices in Malawi are higher than in neighbouring countries, although fixed line monthly subscriptions and mobile data charges are lower than the benchmark.

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*Note, however, that this is only because of an exceptional price in Zimbabwe.*
Figure 2.6: Price benchmark of telecommunications services

<table>
<thead>
<tr>
<th></th>
<th>Malawi</th>
<th>Mozambique</th>
<th>Tanzania</th>
<th>Zambia</th>
<th>Zimbabwe</th>
<th>Benchmark*</th>
<th>Difference**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed line / voice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly fixed line subscription</td>
<td>3,6</td>
<td>5,6</td>
<td>3,2</td>
<td>n/a</td>
<td>5,0</td>
<td>4,6</td>
<td>-22%</td>
</tr>
<tr>
<td>3-minute peak-rate call</td>
<td>0,38</td>
<td>0,17</td>
<td>0,27</td>
<td>0,08</td>
<td>0,13</td>
<td>0,16</td>
<td>132%</td>
</tr>
<tr>
<td><strong>Mobile</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-minute peak on-net mobile call</td>
<td>0,15</td>
<td>0,10</td>
<td>0,18</td>
<td>0,13</td>
<td>0,15</td>
<td>0,14</td>
<td>7%</td>
</tr>
<tr>
<td>1-minute peak off-net mobile call</td>
<td>0,19</td>
<td>0,11</td>
<td>0,22</td>
<td>0,15</td>
<td>0,16</td>
<td>0,16</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Fixed Broadband access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price per Mbps</td>
<td>39,5</td>
<td>32,5</td>
<td>45,2</td>
<td>14,5</td>
<td>15,0</td>
<td>26,8</td>
<td>47%</td>
</tr>
<tr>
<td><strong>Mobile Broadband access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price of 1 Gb</td>
<td>6,7</td>
<td>2,3</td>
<td>2,4</td>
<td>12,1</td>
<td>30,0</td>
<td>11,7</td>
<td>-43%</td>
</tr>
</tbody>
</table>

Source: ITU Statistical Yearbook, all prices in USD at average 2015 exchange rates and Research ICT Africa for 1 Gb price.

* Benchmark is simple average of Malawi’s four neighbors
** Malawi prices relative to benchmark prices

International benchmarks can be contentious. The specific circumstances of the benchmark countries may be different to those of Malawi (for example, Malawi has a lower GDP per capita than any of its neighbours – see Figure 2.7) and the comparisons can only be made with advertised tariffs whereas the as effective rates paid by subscribers (after accounting for promotional offers) may be considerably different. Consequently it is important not to place too much emphasis on the outcomes of these benchmarks. However, they do give an indication of prevailing price levels, and they help to identify those services for which a cost model may be required to determine the reasonableness of prevailing prices.

Figure 2.7: GDP per capita at purchasing power parity (PPP)

<table>
<thead>
<tr>
<th>Gross domestic product (2015, USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malawi</td>
</tr>
<tr>
<td>1183,6</td>
</tr>
</tbody>
</table>

2.3.2 Comparison between on-net and off-net mobile call charges

When MACRA conducted its market analysis of mobile communications (see section 2.1.3) it found that:

- The Malawi mobile market essentially remains a duopoly in which TNM and Airtel split the market more or less equally.
- Competition between the two main operators is mainly based in price promotional discounts;
- Mobile penetration remains very low in comparison to the African average despite the fact that prices are similar to (and, once price promotions are taken into account, maybe even lower than) other countries.

Available at: [http://www.researchictafrica.net/pricing/ramp_1gb.php](http://www.researchictafrica.net/pricing/ramp_1gb.php)
- Affordability is a main constraint on market development.
- On-net traffic is above 90% of all voice minutes, which is higher than in most other national markets.
- It appears that, in order to benefit from the lowest rates possible including promotional discounts, dynamic tariffs and rewards, Malawian consumers make use of two SIMs or two handsets.

This market structure and consumer behaviour is consistent with the likely outcomes from a tariff-mediated network externality in the retail mobile market. Such a situation arises when there is marked differential between on-net and off-net pricing, resulting in users making extra efforts in order to avoid high off-net call charges. International case studies have shown that reducing the price differential between on-net and off-net calls (e.g. by lowering mobile termination rates) results in significantly improved consumer welfare both in the short and long term.

2.4 Consultation questions

**Question 1.** Please comment on the suggestion that cost-oriented price regulation should be limited to two scenarios: a) setting maximum wholesale termination rates; and b) regulating tariffs of dominant service providers.

**Question 2.** Do you agree with the proposed approach to cost orientation, i.e. through the development of cost models? If not, please explain your concerns and recommend your preferred approach, with reasons.

**Question 3.** Do you agree with the proposal to develop bottom-up cost models to set cost-oriented rates? If not, please explain your concerns.

**Question 4.** Do you agree with the proposal to include a number of long-run-incremental-cost (LRIC) approaches in the model, in particular to address potential issues of excessive pricing and predatory pricing? If not, please explain your concerns.

**Question 5.** Do you have any other comments on this section of the consultation document?
3  PROPOSED APPROACH TO COST MODELLING

3.1  Scope of the cost models

In Chapter 2 we established the legal basis and market requirement for the development of bottom-up long run incremental cost (BU-LRIC) models focused on the wholesale services of mobile call termination and wholesale transmission capacity. However, cost models may also assist MACRA when called upon to approve retail tariffs of dominant service providers, the models providing a guide to the underlying service costs and, ultimately, to identifying anti-competitive prices.

The following table explains how each of the services for which MACRA may wish to regulate prices will be addressed through the development of three cost models.

**Figure 3.1: Services to be covered and cost models to be constructed**

<table>
<thead>
<tr>
<th>Service</th>
<th>What is included</th>
<th>Cost model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased lines</td>
<td>Wholesale services provided (e.g. to broadcasters) on national backbone transmission infrastructure (microwave or fibre)</td>
<td>National backbone transmission network cost model</td>
</tr>
<tr>
<td>Termination rates</td>
<td>Wholesale call termination on mobile networks</td>
<td>Mobile network cost model</td>
</tr>
<tr>
<td>Fibre services</td>
<td>Wholesale leased services provided on fibre transmission infrastructure</td>
<td>National backbone transmission network cost model</td>
</tr>
<tr>
<td>Passive infrastructure</td>
<td>Wholesale access to towers and/or co-location of equipment</td>
<td>No specific cost model</td>
</tr>
<tr>
<td>Broadband services</td>
<td>Wholesale and retail broadband access provided over mobile networks</td>
<td>Mobile network cost model</td>
</tr>
<tr>
<td>International services</td>
<td>Outbound and inbound international call services, including roaming, provided over mobile networks</td>
<td>Mobile network cost model</td>
</tr>
<tr>
<td>Access services</td>
<td>Wholesale and retail services (voice and data) provided over mobile networks</td>
<td>Mobile network cost model</td>
</tr>
<tr>
<td>International bandwidth</td>
<td>Access to international internet connectivity</td>
<td>International transmission network cost model</td>
</tr>
</tbody>
</table>
The following assumptions have been made:

- Given the small penetration of the fixed-line network in Malawi and given that few calls originate or terminate on the fixed network, it is unnecessary to construct a fixed network cost model. As in other African markets, the fixed retail market based on the existing Malawi Telecommunications Limited (MTL) copper legacy network, is very small (penetration less than 0.2% or 20,000 lines) and declining as it is substituted by mobile subscriptions for voice and/or data services. It appears reasonable to assume that for fixed network services (e.g. fixed call termination or fixed retail calls) the same charges will apply as for the equivalent service carried over a mobile network. Moreover, in line with technology advancements, MACRA has started implementing a new Converged Licensing Framework (CLF) which allows mobile operators to offer fixed services and vice versa. Future investments to provide broadband services to households or small businesses most likely will be based on wireless solutions.

- For all retail services the cost models will also identify an equivalent wholesale service, even if such a service is not currently available on the market. This will ensure that the cost models can be used for service providers (e.g. Internet Service Providers (ISPs) and Mobile Virtual Network Operators (MVNOs) that rely on network services provided by other operators.

- The cost models for international call services will only include those network and service components provided in Malawi.

- Costs of access to passive infrastructure vary from asset to asset, so need to be worked out on a case-by-case basis. However, a methodology and an assessment of average costs for each asset type may help MACRA to assess the validity of price proposals that operators may submit for approval.

- The international transmission network cost model will include the cost of the international gateway in Malawi, backhaul to the submarine cable landing station, and access to capacity on that cable. However, it should be noted that MACRA does not directly have jurisdiction to set prices for those components outside of Malawi, and the operators in Malawi may be able to provide limited information about the cost of these components (other than what they may be charged for the use of them).

### 3.2 Cost standards

In building each BU-LRIC model we will use a number of modelling principles:

- The models will assume long run incremental cost i.e. the measure of the increase (or decrease) in costs causally associated with the supply (or removal) of the service at the full volume of demand. We assume a “long run” view of
costs and thus the model takes all costs as variable. In other words: the “long run” is defined as the time horizon within which the operator can make capital investment or divestment to increase or decrease the capacity of its existing productive assets.

- Each model will involve the construction of a modern and efficient network designed to handle the current or forecast customer service demand.
- Relevant costs will be measured by the current costs of assets (or adjusted historic costs). Replacement costs are determined by the Modern Equivalent Asset (MEA) approach.
- Annualised costs will be calculated as the sum of annualised capital costs and operational expenditure. The annualised capital costs will be computed using a tilted annuity approach, consistent with the use of a BU model in which the network is recalibrated every year to meet that year’s level of demand.
- The tilted annuity will be based on a weighted average cost of capital (WACC) that will be separately computed, using the capital asset pricing model (CAPM) methodology to set the return on equity, for each stand-alone model. Most of the assumptions within the WACC will be the same for each of the cost models (e.g. risk free rate, country risk premium) but those assumptions that are specific to the operator (e.g. debt risk premium, equity beta) may vary between the models.
- All the models will provide forecasts of costs for the period 2017 to 2020. Where historical data is available we will also present cost estimates for 2015 and 2016.
- All the cost models will derive cost estimates for the actual operators in Malawi, but they will derive estimates for a hypothetical modern efficient operator (MEO) that:
  - is of a scale that is achievable for all market participants and sufficient to obtain most of the available economies of scale;
  - uses the most efficient technology obtained at the lowest reasonable price;
  - has international benchmark levels of operational efficiency.

The cost models will serve two primary purposes:

- Setting maximum interconnection rates. Following international best practice such rates will be based on Total Service Long Run Incremental Costs plus a mark-up for common and joint costs (TS-LRIC+). However, in the European Union an even lower cost standard known as “Pure LRIC” (also known as average avoidable costs, AAC) has been used to set the lowest possible cost-oriented termination rates.
- Providing an objective benchmark against which MACRA can decide whether to approve service tariffs. There will be two things for MACRA to check on:
  - Is the tariff excessive? Excessive prices will be above the TS-LRIC+ rate allowing also a mark-up for retail costs.
Is the tariff predatory? Predatory prices will be below the Pure LRIC rate.

### 3.3 Network topology

The models will not be exact replicas of the actual networks deployed in Malawi today, nor will they provide a prediction of what the network of any particular operator could look like in the future. Instead each will be a model of a hypothetical network that would be built using modern technology to provide the existing or future service volumes.

The topology of the network to be designed is in general defined by the locations of the nodes. There are three main options available for the network topology in cost models:

- **Scorched node**: this option uses the location of existing network nodes as the starting point. The operator can use the best technology to configure the network at and in between the nodes to meet forecasted traffic demand as an efficient operator would do. For example, this could mean the replacement of legacy network equipment with new equipment. This option is relatively simple to model but internalizes potential inefficiencies of the operator’s network design.

- **Modified scorched node**: this is a variation of the scorched node approach. With this option, the location of network nodes may be modified in cases where inefficiency is identified. For example this can be achieved by simplifying the switching hierarchy, e.g. reducing the number of switching nodes, or replacing a set of smaller switches with a larger one. The complexity level of this option is similar to the previous one, but allows for the elimination of inefficiency. Therefore the scorched-node approach can be reasonably modified in order to model a more efficient network topology than the one that is currently in place.

- **Scorched earth**: this approach estimates the locations of the network nodes of an “optimized” network without enforcing any of the constraints of the existing network. This option allows the calculation of a theoretical efficient network, not relying on any of the existing networks. This approach models what a market entrant would build from scratch, based on the known location of customers and forecasts of traffic demand. However, this option is generally significantly more complex to implement. This approach would be the one to give the lowest estimate of costs, because all inefficiencies are in theory absent and the most efficient technologies are employed.

In practice a network operator cannot easily or without substantial stranded investments change the nodal structure of its network once it has been established. Most BU-LRIC models therefore use a scorched node approach to network design, although as the European Commission has said:

"It can be appropriate to modify the scorched node approach in order to replicate a more efficient network topology than is currently in place. Such a modified scorched
node approach could imply taking the existing topology as the starting point, followed by the elimination of inefficiencies. This may involve changing the number or types of network elements that are located at the nodes to simplify and decrease the cost of the switching hierarchy. Other important issues in this respect are how to deal with spare capacity in the network and the existence of stranded costs. When the modified scorched node approach is not applicable because the elimination of inefficiencies is not practical, it could be more appropriate to use a scorched earth approach.”

We propose, as a minimum, to calibrate the cost models on the basis of the actual number of network nodes, and to use the actual geographical location of the nodes unless a change is justified on the grounds of inefficiency.

3.4 Data requests

For each of the cost models relevant service providers will be asked to provide data, so that the models accurately reflect the scale, scope and cost structure of actual operations in Malawi. Data requests have been issued separately from this public consultation document in the form of Excel tables to be completed by the relevant stakeholders.

The requested data is for the period 2014-2016 (historic, actual data) and 2017-2020 (forecasts), covering:

- Network coverage
- Subscriber numbers
- Traffic volumes by service
- Network design parameters
- Capital costs of equipment
- Site and building costs
- Depreciation periods
- Annual operating costs
- Common costs.

For consideration in the construction of the models, data should be submitted to MACRA before the closing date of the public consultation. Where relevant data has not been submitted, MACRA should reserve the right to use proxy data, derived from other submissions, from cost models used in other countries and from any other relevant source.

3.5 Mobile network cost model

3.5.1 Network Technologies

The BU-LRIC core network model uses a “scorched node” design, meaning that it assumes the actual nodal structure of the mobile networks in Malawi, but allows for modern equivalent assets to be used at each node and for the transmission links between them and in the radio access network. In particular, the number of primary network nodes will be
calibrated against the known number of local base stations in the networks of TNM and Airtel, using an evolving combination of 2G, 3G and 4G mobile network technology, and with a gradual migration towards fibre transmission infrastructure.

3.5.2 Mobile network services

The BU-LRIC model will be designed to calculate the costs per unit (in most cases minutes) of a variety of services. For most of the retail services there is also an equivalent wholesale service that may be provided to other licensees. Services included in the model are:

- On-net calls – retail calls that originate and terminate on the same mobile network.
- Outgoing calls to other mobile networks – retail calls that terminate on a different mobile network from that of the calling party.
- Outgoing calls to fixed networks – retail calls from a mobile customer to a fixed network customer.
- Outgoing international calls – retail calls from a mobile customer to a network subscriber in another country. An additional charge needs to be added to cost-model outputs for connectivity outside of Malawi.
- Incoming calls from other mobile networks – wholesale call termination for calls that originate on other mobile networks.
- Incoming calls from fixed networks – wholesale call termination for calls that originate on the fixed network.
- Incoming international calls – wholesale call termination for calls that originate outside of Malawi.
- Outbound roaming calls – retail calls made by mobile customers when roaming internationally.
- Inbound roaming calls – retail calls received by mobile customers when roaming internationally.
- SMS on-net – retail text messages that originate and terminate on the same mobile network.
- SMS outgoing calls to other networks – retail text messages that terminate on a different mobile network from that of the calling party.
- SMS incoming calls from other networks – wholesale termination of text messages that originate on another mobile network.
- Mobile data services. Retail access to the internet, applications and other data services from a mobile device.

3.5.3 Mobile scenarios

The model will be designed so that costs may be determined under a range of possible scenarios. Four such scenarios have been defined. They are as follows:
• **TNM**: this scenario is our calibration of the cost model to provide operator costs for a network with the coverage, subscriber base and traffic levels of TNM, so it may be assumed that this scenario gives an accurate representation of TNM’s efficiently incurred costs.

• **Airtel**: this scenario is our calibration of the cost model to provide operator costs for a network with the coverage, subscriber base and traffic levels of Airtel, so it may be assumed that this scenario gives an accurate representation of Airtel’s efficiently incurred costs.

• **Market entrant**: this scenario is our calibration of the cost model to provide operator costs for a hypothetical new market entrant, which is likely to have a low but increasing coverage, subscriber base and traffic levels compared with the established operators.

• **MEO**: this scenario uses estimates of coverage, subscriber base and traffic levels, consistent with a modern efficient operator. The default settings for this scenario are those of a MEO with a market share of 1/n (where n is the number of operators in the market) and a coverage equal to the maximum of any of the actual network operators.

The user will be able to adapt any of the above scenarios by changing individual parameters that make up that scenario.

### 3.6 National backbone transmission network cost model

#### 3.6.1 Network Technologies

The cost model will use a “scorched node” design, meaning that it assumes the actual nodal structure of the networks in Malawi, but allows for modern equivalent assets to be used at each node and for the transmission links between them. The number of nodes, geographical coverage and length of transmission paths assumed in the model will be based on the national broadband transmission network currently being rolled out by each operator.

Over recent years there has been a deep technological evolution that affects the way transmission networks are structured, the range of services that can be offered and the level of their unit costs. The main changes in technology include optical fibre replacing copper cables and the replacement of circuit-switched with packet-switched and multi-service NGN networks.

However, consideration should be given to the rate at which such technologies might reasonably be adopted and in which way should this be reflected in the fixed network cost models. It is unreasonable to assume that equipment with a significant remaining useful life will be scrapped every time a better technology is available. This is especially true of relatively recent investments, such as MTL’s SDH backbone network. In general operators are more likely to retire old assets gradually and phase in new technology over a period of time. This is also sound economic practice, unless there is substantial competitive disruption
in the market. We therefore propose to assume a gradual phase-in of an all-fibre, all-IP network within the national backbone transmission network cost model.

### 3.6.2 National backbone network services

The BU-LRIC model will calculate the costs per Mbps per annum of a variety of wholesale data services. MTL, ESCOM and SimbaNet all provide these services using their national broadband network that comprises both fibre cables and microwave links. Services included in the model are:

- Wholesale leased lines (provincial) – a dedicated wholesale transmission link between two points of interconnection in the same province.
- Wholesale leased lines (national) – a dedicated wholesale transmission link between two points of interconnection in different provinces.
- Wholesale leased capacity (provincial) – wholesale leased capacity between two points of interconnection in the same province.
- Wholesale leased capacity (national) – wholesale leased capacity between two points of interconnection in different provinces.

For each of these services separate costs will be provided for fibre-based services.

Equivalent retail service costs will also be shown, but it should be noted that the customer will in addition have to purchase an access service (e.g. 3G/4G mobile, WiFi or exceptionally a fixed broadband subscriber line) the cost of which is not included in the national broadband transmission network cost model.

### 3.6.3 National backbone network scenarios

The model will be designed so that costs may be determined under four possible scenarios, as follows:

- **MTL**: this scenario is our calibration of the cost model to provide operator costs for a network with the coverage and traffic levels of MTL, so it may be assumed that this scenario gives an accurate representation of MTL’s costs. Wherever possible we will use data provided by MTL in establishing this scenario.

- **ESCOM**: this scenario is our calibration of the cost model to provide operator costs for a network with the coverage and traffic levels of ESCOM, so it may be assumed that this scenario gives an accurate representation of ESCOM’s costs. Wherever possible we will use data provided by ESCOM in establishing this scenario.

- **SimbaNet**: this scenario is our calibration of the cost model to provide operator costs for a network with the coverage and traffic levels of SimbaNet, so it may be assumed that this scenario gives an accurate representation of SimbaNet’s costs. Wherever possible we will use data provided by SimbaNet in establishing this scenario.
• **MEO**: this scenario will estimate the costs of a modern efficient operator (MEO) having the same network coverage and traffic levels as MTL. International best practice is to model the MEO for core network cost models with a level of demand and coverage similar to that of the incumbent operator. This is the case even in countries where there are significant numbers of competing fixed operators, because it is unusual for more than one to have reached minimum efficient scale. Thus the MEO scenario is likely to be very similar to the MTL scenario, but we may adjust some of the modelling assumptions and parameters if we identify any inefficiency (compared with international best practice) in the data provided by MTL.

The user will be able to adapt each of the above scenarios by changing individual parameters that make up that scenario.

### 3.7 International transmission network cost model

Due to its landlocked situation, Malawi is connected to the international submarine fibre-optic cable network via neighbouring countries. MTL and ESCOM offer three gateways to the SEACOM and EASSy cables via Mozambique, Tanzania and Zambia/South Africa. In January 2016, Tanzanian operator SimbaNet finished construction of a third network, which established connection from Lilongwe to Tanzania and Zambia following the award of a contract to build fibre facilities and to establish a “virtual landing” in Malawi under the World Bank RCIP Project.

#### 3.7.1 Network Technologies

The BU-LRIC model uses a “scorched node” design, meaning that it assumes the actual nodal structure of the networks in Malawi, but allows for modern equivalent assets to be used at each node and for the transmission links between them. In the case of the international transmission network, the cost model will include four components:

- the international gateway in Malawi
- backhaul across neighbouring countries to the cable landing station
- co-location at the cable landing station (if appropriate)
- access to capacity on the submarine cable itself.

#### 3.7.2 International transmission network services

The BU-LRIC model will calculate the costs per Mbps per annum of wholesale access to international transmission capacity.

#### 3.7.3 International transmission network scenarios

The international transmission cost model will be designed so that costs may be determined under the following scenarios:
• **MTL**: this scenario is our calibration of the cost model to provide MTL’s costs for accessing the international connectivity. This scenario will present the weighted average of the costs of each of the international routes available to MTL and wherever possible we will use data provided by MTL in establishing this scenario.

• **ESCOM**: this scenario is our calibration of the cost model to provide ESCOM’s costs for accessing the international connectivity. This scenario will present the weighted average of the costs of each of the international routes available to ESCOM and wherever possible we will use data provided by ESCOM in establishing this scenario.

• **SimbaNet**: this scenario is our calibration of the cost model to provide SimbaNet’s costs for accessing the international connectivity. This scenario will present the weighted average of the costs of each of the international routes available to SimbaNet and wherever possible we will use data provided by SimbaNet in establishing this scenario.

• **MEO**: this scenario is our calibration of the cost model for a modern efficient operator. This scenario will present the weighted average of the costs of the three international operators, using modern equivalent assets and best practice operations.

The user will be able to adapt each of the above scenarios by changing individual parameters that make up that scenario.

### 3.8 Consultation questions

**Question 6.** Do you agree with the proposal not to establish separate costs for fixed voice services (retail calls and wholesale call termination) but instead to assume that the prices for these services will be determined by the equivalent mobile prices?

**Question 7.** Please comment on the proposal to create three cost models: a) Mobile network cost model; b) National backbone transmission network cost model; and c) International transmission network cost model. Do you agree on the proposed scope of these models? If not, please give reasons and suggested alternatives.

**Question 8.** Please supply any comments you may have about the proposed services to be included in each of the three cost models described in Q7.

**Question 9.** Do you agree with the choice of the BU-LRIC cost standard, and in particular the establishment of TS-LRIC+ and Pure LRIC as indicators, respectively, of excessive pricing and predatory pricing?

**Question 10.** Do you agree with the proposal to use the scorched node approach to network design topology (modified only if clearly justified on the grounds of inefficiency)? Please also comment on the proposal to phase in modern equivalent assets (such as 4G
mobile nodes, fibre transmission and IP routers) over a period of several years to reflect realistic network improvement programmes?

**Question 11.** Please comment on the proposed approach to defining the Modern Efficient Operator. In particular, do you agree with the proposals for setting the scale of the MEO: for the mobile market a market share of 1/n (where n is the number of operators in the market) and a coverage equal to the maximum of any of the actual network operators; for the national backbone network a market share and coverage equivalent to that of MTL?
4 ANNUALISATION OF CAPITAL COSTS

4.1 Approach to capital costs

A key component of the capital costs of a network operator is provided by the gradual reduction in the economic value of the acquired assets as they are used or get older, expressed in the form of asset depreciation.

In the financial accounts, depreciation is typically calculated for each asset as the gross book value of that asset divided by its lifetime (i.e. straight line depreciation). However, a major drawback of using this approach is that the speed of depreciation of the asset is not linked to the utilization or to changes in the replacement value of that asset and this, in turn, impacts negatively on the signals provided for market entry and the development of sustainable competition.

It is for this reason that some regulators (for example OFCOM in the UK) have in the past advocated the use of economic depreciation:

"Economic depreciation (ED) method matches the cost of equipment to the actual and forecast use over the long-term. Consequently, there is relatively little depreciation in years when utilization is low and relatively high depreciation in years of full, or almost full, equipment utilization."

And:

"A key benefit of Original ED is that is seeks to set the optimal path of cost recovery over time by mimicking the outcomes of a benchmark competitive market. In this hypothetical market, we assume that unit prices in a given year do not depend on the level of utilization at that point in time, but on the level of utilization achieved over the lifetime of the network." 10

The development of an economic depreciation module requires detailed projections of the utilization of assets over time and related projections in changes in the economic value (and even economic lifetimes) of the assets. The experience with OFCOM models that have attempted to capture these dynamics has been that they are very complicated to develop and implement and the outcomes of these modules tend to be highly sensitive to relatively subjective inputs (i.e. forecasts). It is for this reason that we propose an alternative approach which aims to mimic the outcomes of economic depreciation in a simplified form.

We propose that depreciation is based on a tilted annuity calculation, where the annual depreciation percentage is determined by the economic lifetime of the asset and the price change of the asset. For an asset with a declining replacement value the resulting depreciation pattern becomes more ‘front-loaded’ i.e. there is a higher depreciation rate at

10 See OFCOM Wholesale Local Access Market Review - Consultation on possible approaches to fibre cost modelling, Page 21.
the beginning of its economic life than at the end. This is a reasonable approximation of the declining economic value of the asset and therefore a defensible approach.

Next to depreciation, the models are to include a reasonable rate of return on assets deployed, i.e. a maximum profit margin to reward the investors in telecommunications assets for the deployment of capital.

It is proposed to calculate the annual capital charge (depreciation and the reasonable return on assets), as follows:

\[
(1-SV/((1+WACC)^AL))*(WACC-PT)/(1-((1+PT)/(1+WACC))^AL)
\]

Where:

- \( SV \) = Scrap value (assets are assumed to be depreciated taking account of a resale value)
- \( WACC \) = weighted average cost of capital
- \( AL \) = Asset Life
- \( PT \) = Price Trend

4.2 Calculation of the WACC

4.2.1 Background

In this report we provide a provisional estimate of the reasonable rate of return for communications services in Malawi, to be used in its service cost models. This is a major driver of the level of cost-oriented tariffs for communications services and therefore requires a robust, transparent approach based on international best practice. The section below sets out the proposed approach and the provisional WACC estimates.

Incyte proposes to use the most appropriate methodology, which is known as the Weighted Average Cost of Capital (WACC) and its related concept of the Capital Asset Pricing Model (CAPM). These methods are recommended by the European Commission and used by many European, African and other Telecoms Regulators.

4.2.2 Theory used: WACC and CAPM

The key principle underlying the calculation of the WACC is the fact that it always takes the perspective of potential, external investors in the company who have a choice whether to invest in debt or equity (shares). The decision involves evaluation of the company’s financial structure, the markets in which it operates, the tax regime the company has to operate under, dividend policy, management expertise, and its future prospects. Finally, the Capital Asset Pricing Model (CAPM) rests upon the presumption that markets are efficient and that

\[11\] In Southern Africa WACC and CAPM are used, for example, in Botswana, Mozambique, South Africa and Zimbabwe.
the investor needs to be compensated only for the risk element that cannot be diversified away through holding a portfolio of assets (shares).

4.2.3 Formulas

The WACC calculation incorporates the following elements:

\[ WACC = R_e \cdot \frac{E}{D+E} + R_d \cdot (1-t) \cdot \frac{D}{D+E} \]

Where:
- \( R_e \) = cost of equity
- \( R_d \) = cost of debt
- \( D \) = market value of debt
- \( E \) = market value of equity
- \( D/(D+E) \) = gearing factor
- \( t \) = marginal rate of tax

The CAPM calculation incorporates the following elements:

\[ R_e = R_f + b \cdot (R_m - R_f) \]

Where:
- \( R_e \) = cost of equity
- \( R_m \) = return on the market
- \( R_f \) = risk free rate
- \( b \) = beta factor
- \( R_m - R_f \) = equity premium

The definitions of the various components are set out and discussed in the following sections of this document.

4.2.4 Cost of Debt

The cost of debt consists of two parts: the risk free rate and the debt premium. Companies can raise debt finance from a variety of sources, from financial institutions, local or international markets or through loans from, for example, parent companies. The cost of debt can be calculated using three main approaches:

- Using accounting data and current loans, i.e. actual rates as per the books or accounts of the company;
- By estimating an efficient borrowing level to adjust any potential excessive over- or under borrowing level of debt and interest cost;
- By estimating a Risk Free Rate and a Debt Premium (reflecting the higher financial risk of the market or the company) – using published data for the parameters.
Incyte proposes to use the third method, which estimates the cost of a risk free rate and a debt premium as this most closely reflects a forward-looking approach. The debt premium is what the owners of the company demand above the risk free rate in order to be compensated for the risk of default.

The cost of debt within the WACC calculations relates to the cost the company has to sustain to obtain loan capital to finance its activities and its investments in a particular market. The factors that will impact upon the cost of debt include:

- Whether rates are to be calculated in real or nominal terms
- Level of risks (for default, which may be for government bonds and for the local market e.g. Malawi telecommunications markets)
- The currency of the loans
- Government bond, local or international interest rates
- Historic trends or latest rates
- The duration (period to maturity)
- Individual company’s loan interest rates and its credit rating
- Transaction costs (which may reflect liquidity issues)
- Taxation.

These factors are discussed in the following paragraphs with some comparisons and potential estimates for the cost of debt parameters, which can be included in the WACC.

### 4.2.5 Real or Nominal rates and Inflation

The WACC can be calculated in real or nominal terms. Real rates exclude inflation. Nominal rates include the effects of inflation. We propose to use nominal rates for the calculations and estimates made in WACC.

### 4.2.6 Risk Free Rate

Risk free rates are the starting point for calculating returns for cost models. Risk in finance is viewed in terms of the variance in actual returns around the expected returns. For the investment to be risk-free the actual returns should always be equal to the expected returns. For investment to be risk-free it has to exclude any default or re-investment risk. Normally, this applies to Government-issued, zero coupon bonds, typically for the longer term.

It is necessary to first focus on the country and the capital markets in Malawi. However, these markets are relatively illiquid, particularly in terms of the number of transactions carried out on the market. Malawi-issued government bonds and notes also tend to have a relatively short length of time to maturity.

The estimated rate to be used may be based on historical trends (if data is available) or a recent actual bond issue. The latter tends to reflect a forward-looking perspective but might
need to be averaged in some way. It is also important to try to match the bond maturity with the expected regulatory timeline, namely the next 5 years.

Ideally, the risk free rate should be measured in the same currency as the cash flows are measured. This implies that Malawian Kwacha should be used for the WACC related to retail tariffs (charged in Kwacha) and a conversion to $US should be applied for the WACC used for interconnection services (charged in $US).

The Malawi government has recently issued the following treasury bills\(^{12}\) denominated in Malawian Kwacha.

**Figure 4.1: Malawi Government Treasury Bills**

<table>
<thead>
<tr>
<th>Details of the results are as follows:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day</strong></td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>91</td>
</tr>
<tr>
<td>182</td>
</tr>
<tr>
<td>364</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

The proposal is to use the current yield of the longest (364-days) government treasury bill of 25.6% as the risk free rate in the WACC calculations that are Kwacha-denominated.

### 4.2.7 Cost of Debt Risk Premium

A company has a number of sources of capital to finance their assets such as short or long-term debt as well as equity. The optimum capital structure, or proportions of debt to equity (referred to as gearing or leverage), is dealt with separately in the next section.

While gearing will affect the cost, we are concerned here with longer-term debt or bonds, which the company may issue in the local market or another country’s market. This cost in effect reflects a premium element above what is the risk free rate, i.e. recognising the higher financial risk.

The debt premium is easier to estimate due to our ability to use objectively verifiable data from companies’ records and published annual reports, locally and internationally. The debt premium can also be arrived at using market values if the company issued its own bonds, for example for the below companies.

---

\(^{12}\) [https://www.rbm.mw/FinancialMarkets/TreasuryBills/]
The only regional benchmark in the sample is for Telecom Namibia with a debt risk premium of 1.5%. In the absence of local data on long-term corporate debt yields, Incyte proposes to use this regional debt premium of 1.50% for the WACC calculations.

### 4.2.8 Gearing

Financial gearing (or leverage) represents the relation between the company’s debt and the value of equity. It is the share of the acquired assets that is financed by interest-bearing debt capital and is represented by the following formula:

\[ FG = \frac{D}{D+E} \]

Financial gearing is measured as \( D/(D+E) \) where both Debt (D) and Equity (E) ideally represent market values of an enterprise’s debt and capital, respectively.

Book values (as per the annual financial statements) can be used, but these typically lead to significant underestimates for equity in particular. Some regulators have calculated the WACC using the actual gearing levels while others have used estimates of an efficient gearing level. The approach of using the efficient gearing levels will usually reduce the cost of capital as debt is cheaper due to tax advantages over equity.

From other sources we have obtained the below overview of estimates for gearing ratios.
Figure 4.3: Historic Gearing Ratios

<table>
<thead>
<tr>
<th></th>
<th>Fixed Telephony</th>
<th>Mobile Telephony</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTA (2013)</td>
<td>30%</td>
<td>25%</td>
</tr>
<tr>
<td>TATT (2011)</td>
<td>10-40%</td>
<td>10-40%</td>
</tr>
<tr>
<td>OUR Jamaica (2010)</td>
<td>10-30%</td>
<td>10-20%</td>
</tr>
<tr>
<td>URCA (2009)</td>
<td>10-30%</td>
<td>10-30%</td>
</tr>
<tr>
<td>ERG (2009) (average EU Benchmark)</td>
<td></td>
<td>35%</td>
</tr>
<tr>
<td>ICTA (2008)</td>
<td>45%</td>
<td>35%</td>
</tr>
<tr>
<td>OFCOM (2009b)</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>PTS (2008)</td>
<td></td>
<td>25-35%</td>
</tr>
<tr>
<td>ComReg (2008)</td>
<td>30-50%</td>
<td></td>
</tr>
<tr>
<td>ECTEL (2008)</td>
<td>45-83%</td>
<td>13-54%</td>
</tr>
<tr>
<td>MCA (2008)</td>
<td>20-40%</td>
<td>10-30%</td>
</tr>
<tr>
<td>OUR Guernsey (2008)</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>OFCOM (2005a)</td>
<td></td>
<td>10-30%</td>
</tr>
<tr>
<td>OFCOM (2005b)</td>
<td>30-35%</td>
<td></td>
</tr>
<tr>
<td>NZ Commerce Commission (2005)</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>JCRA (2004)</td>
<td>10-30%</td>
<td>10-30%</td>
</tr>
<tr>
<td>UK Competition Commission (2003)</td>
<td></td>
<td>10%</td>
</tr>
</tbody>
</table>

Based on Figure 4.3, Incyte is of the view that gearing ratios generally vary around 30%\(^{13}\). However, the above gearing ratios apply in more developed telecommunications markets and we would prefer to use local or regional data to estimate an efficient level of gearing. In Namibia\(^{14}\) for example a gearing level of 60% was found for Telecom Namibia for 2013. This gearing level is substantially higher than the benchmark material presented. In the absence of local data on gearing, we have used this gearing level of 60% to set the WACC.

4.2.9 Cost of Equity

There are alternative ways and methods of calculating cost of equity. These could include the following:

- Dividend Growth Model
- Return on Capital Employed
- Economic Value Model
- APT (Arbitrage Pricing Theory)
- Capital Asset Pricing Model (CAPM)

---

\(^{13}\) The simple average of the sample is 28%.

\(^{14}\) See: “Supporting evidence-based policy and Regulation in Namibia”, ITU Conference Windhoek October 2014, by researchICTsolutions
Incyte believes that CAPM is the most appropriate method of calculating the cost of equity because this method relies on measurable input data from stock markets and because CAPM is the approach most commonly used by regulatory bodies around the world.

**Capital Asset Pricing Model**

CAPM provides the following formula for the calculation of the cost of equity:

\[ R_e = R_f + b \times (R_m - R_f) \]

The cost of equity is simply considered to be the sum of:

- The risk free rate \((R_f)\) that an institutional investor would pay plus;
- The difference between the market rate \((R_m)\) and risk free rate \((R_f)\) - i.e. the Equity Risk Premium or ERP;
- Multiplied by the beta coefficient \((b)\) that measures the correlation of the specific investment and market risk.

In addition, there is a Country Risk Premium and these factors are discussed below.

### 4.2.10 Equity risk premium

The equity risk premium reflects fundamental judgments an investor makes about how much risk he sees in an economy/market and what price he attaches to that risk. Although there are several risk and return models in finance that attempt to capture that risk measurement, they all define risk in terms of variance in actual returns from the expected returns. In other words, the risk is low when the actual return is close to the expected values. The models also assume that the equity risk has to be measured from the perspective of marginal investors in an asset that is well diversified (often referred to as the "portfolio effect").

In addition to the risk from the underlying real economy and “noise” in the recorded indices, equity investors also have to consider the additional risk created by lack of market liquidity. If investors have to accept high transaction costs to liquidate equity or a heavy discount on disposal, they will pay less for equities and demand a larger equity premium.

Malawian capital markets are less developed than those operating in more mature economies. Most of the market studies have been carried out in the USA and, in the absence of an extensive analysis available for the Malawi equity movements and prices, we propose that a benchmarking approach is used.

For benchmarking, in the most comprehensive study, Dimpson, Marsh and Staunton (2002 and 2008) estimated equity returns for 17 markets and obtained global risk premiums. In their update in 2011, they provide the risk premiums from 1900 to 2010 for 19 markets).
Figure 4.4: Historical Risk Premiums across Equity Markets (in %)

<table>
<thead>
<tr>
<th>Country</th>
<th>Stocks minus Short term Governments</th>
<th>Stocks minus Long term Governments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geometric Mean</td>
<td>Arithmetic Mean</td>
</tr>
<tr>
<td>Australia</td>
<td>6.7%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.9%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>4.2%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.8%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Finland</td>
<td>5.9%</td>
<td>9.5%</td>
</tr>
<tr>
<td>France</td>
<td>6.0%</td>
<td>8.7%</td>
</tr>
<tr>
<td>Germany</td>
<td>5.9%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Ireland</td>
<td>3.0%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Italy</td>
<td>5.8%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Japan</td>
<td>5.9%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4.2%</td>
<td>6.5%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>4.1%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Norway</td>
<td>3.0%</td>
<td>5.9%</td>
</tr>
<tr>
<td>South Africa</td>
<td>6.2%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Spain</td>
<td>3.2%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Sweden</td>
<td>4.3%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3.4%</td>
<td>5.1%</td>
</tr>
<tr>
<td>U.K.</td>
<td>4.3%</td>
<td>6.0%</td>
</tr>
<tr>
<td>U.S.</td>
<td>5.3%</td>
<td>7.2%</td>
</tr>
</tbody>
</table>


For regulatory benchmarking a source is the ERP rates, adopted by European regulators, which vary from 4% in Norway to 6.3% in Spain. An IRG report of 2007 shows the "country average" to be 5.04%.
Incite notes that a more current (February 2015) estimate for equity risk premiums is provided by Damoradan\textsuperscript{15} who estimates a basic rate of 5.75\%. A more regional source is provided by a recent report by PricewaterhouseCoopers\textsuperscript{16} which found that:

\begin{quote}
"The market risk premium ranges from 4\% to 10\% with the average used in South Africa ranging between 5.4\% and 6.8\%".
\end{quote}

Given the benchmarks and the comparisons above, we consider that the Equity Risk Premium should be 6\%.

### 4.2.11 Equity Country Risk premium

The equity risk premium in the previous section represents the excess return, over the riskless rate that equity investors can expect to earn in a representative economy. However, an investment in Malawi likely presents a higher risk to investors than an investment in a representative economy and the inclusion of a country-specific risk premium for Malawi is therefore appropriate.

\textsuperscript{15} http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

To provide a quantification of this premium, we propose using an analysis by Professor Aswath Damodaran of Stern Business School, New York University who:

- Used country credit ratings from Moody’s and the default spread of those ratings over a default-free government bond rate. This is a measure of the country risk premium on debt;
- Then calculated the equity country risk premium by multiplying the country risk premium on debt with an estimate of the relative equity market volatility for that market – the standard deviation of returns on the country’s equity markets divided by the standard deviation of returns on the country’s debt markets. This analysis is done for a large number of emerging countries.

The Damodaran\textsuperscript{17} calculations of equity country risk premiums are publicly available but do not include Malawi because Malawi does not have a credit rating issued by either S&P or Moody’s. It is therefore necessary to use the risk premium for a country considered to have a similar risk profile to Malawi as a proxy.

Fitch Ratings listed Malawi as ‘Highly Speculative’ in a recent assessment and gave Malawi a rating of B\textsuperscript{18}, slightly lower than Zambia, Uganda and Rwanda (these countries were all given a ‘B’ rating). Incyte proposes to use a country risk premium consistent with a B3 Moody’s Rating (the same as Zambia, the country with the lowest Moody’s rating of the three countries in the sample). Based on the table in Figure 4.6, we therefore propose to use a country risk premium of 9.25% for the WACC calculations in Malawi.

\textsuperscript{17} http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

\textsuperscript{18} http://mwnation.com/fitch-rates-malawi-as-highly-speculative/, also see: http://countryeconomy.com/ratings/malawi
Figure 4.6: Country Risk premiums - Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (in billions)</th>
<th>Moody’s rating</th>
<th>Country Risk Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>102.6</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>Botswana</td>
<td>14.4</td>
<td>A2</td>
<td>1.21%</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>10.7</td>
<td>B3</td>
<td>9.25%</td>
</tr>
<tr>
<td>Cameroon</td>
<td>28.4</td>
<td>B2</td>
<td>7.82%</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>1.9</td>
<td>B2</td>
<td>7.82%</td>
</tr>
<tr>
<td>Congo (Democratic Republic)</td>
<td>35.2</td>
<td>B3</td>
<td>9.25%</td>
</tr>
<tr>
<td>Congo (Republic of)</td>
<td>8.6</td>
<td>B3</td>
<td>9.25%</td>
</tr>
<tr>
<td>Côte d’Ivoire</td>
<td>31.8</td>
<td>Ba3</td>
<td>5.12%</td>
</tr>
<tr>
<td>Egypt</td>
<td>330.8</td>
<td>B3</td>
<td>9.25%</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>61.5</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>Gabon</td>
<td>14.3</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>Ghana</td>
<td>37.5</td>
<td>B3</td>
<td>9.25%</td>
</tr>
<tr>
<td>Kenya</td>
<td>63.3</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>Morocco</td>
<td>100.6</td>
<td>Ba1</td>
<td>3.55%</td>
</tr>
<tr>
<td>Mozambique</td>
<td>14.8</td>
<td>Caa3</td>
<td>14.21%</td>
</tr>
<tr>
<td>Namibia</td>
<td>11.5</td>
<td>Baa3</td>
<td>3.13%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>481.1</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>Rwanda</td>
<td>8.1</td>
<td>B2</td>
<td>7.82%</td>
</tr>
<tr>
<td>Senegal</td>
<td>13.6</td>
<td>B1</td>
<td>6.40%</td>
</tr>
<tr>
<td>South Africa</td>
<td>314.6</td>
<td>Baa2</td>
<td>2.71%</td>
</tr>
<tr>
<td>Tunisia</td>
<td>43</td>
<td>Ba3</td>
<td>5.12%</td>
</tr>
<tr>
<td>Uganda</td>
<td>27.6</td>
<td>B2</td>
<td>7.82%</td>
</tr>
<tr>
<td>Zambia</td>
<td>27.2</td>
<td>B3</td>
<td>9.25%</td>
</tr>
</tbody>
</table>

**4.2.12 Beta Values**

The equity beta reflects the equity risks associated with the company, rather than the market, and is a factor applied to the equity risk premium when estimating the cost of equity. In other words, the beta value shows whether an operator is more or less risky than the market as a whole. An equity beta of 1.5 means that a share moves 1.5% for every 1% movement in the market index. Conversely, a beta of 0.5 means that a share’s return is more stable than the market, resulting in lower risk and therefore lower cost of capital. An equity beta of 0.5 means that a share moves 0.5% for every 1% movement in the market index.

The beta factors are usually obtained from the financial markets and reflect the correlation between a company’s risk and overall market risk. It is, therefore, possible for an investment risk to be high, in terms of individual risk, but to be low in terms of market risk. Incyte has obtained the below historic equity Betas utilised in WACC calculations in other jurisdictions.
Figure 4.7: Equity Betas used by other regulators

<table>
<thead>
<tr>
<th></th>
<th>Fixed Telephony</th>
<th>Mobile Telephony</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTA (2013)</td>
<td>0.52</td>
<td>0.61</td>
</tr>
<tr>
<td>TATT (2011)</td>
<td>0.7 - 1.3</td>
<td>0.9 - 1.6</td>
</tr>
<tr>
<td>OUR Jamaica (2010)</td>
<td>0.63 - 0.91</td>
<td>0.8 - 1.14</td>
</tr>
<tr>
<td>URCA (2009)</td>
<td>0.6 - 1.1</td>
<td>0.8 - 1.4</td>
</tr>
<tr>
<td>ICTA (2008)</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>OFCOM (2009b)</td>
<td>0.8 - 0.9</td>
<td></td>
</tr>
<tr>
<td>PTS (2008)</td>
<td></td>
<td>1.49 - 1.67</td>
</tr>
<tr>
<td>ECTEL (2008)</td>
<td>1.0 - 1.4</td>
<td>0.9 - 1.8</td>
</tr>
<tr>
<td>MCA (2008)</td>
<td>0.9 - 1.4</td>
<td>1.1 - 1.3</td>
</tr>
<tr>
<td>OUR Guernsey (2008)</td>
<td>0.9 - 1.1</td>
<td></td>
</tr>
<tr>
<td>OFCOM (2005a)</td>
<td></td>
<td>1.0 - 1.9</td>
</tr>
<tr>
<td>OFCOM (2005b)</td>
<td>0.8 - 0.9</td>
<td></td>
</tr>
<tr>
<td>NZ Commerce Commission (2005)</td>
<td>0.7 - 1.1</td>
<td></td>
</tr>
<tr>
<td>JCRA (2004)</td>
<td>0.8 - 1.0</td>
<td>0.8 - 1.0</td>
</tr>
<tr>
<td>UK Competition Commission (2003)</td>
<td>1.0 - 1.6</td>
<td></td>
</tr>
</tbody>
</table>

The starting assumption for an equity Beta is that it is 1 (i.e. the same as the market average), unless there is strong evidence supporting deviation from this number. Regional evidence is suggesting there is support for a value of around 1, for example in Namibia, a value of 0.98 was used\(^{19}\).

Based on the above, we propose to use an equity Beta of 1.0 for all telecommunications services.

4.2.13 Tax

The WACC calculation so far is based on the quoted indices that include the effects of taxation. This is because debt finance attracts a tax allowance, usually at the companies’ marginal rate of tax, on the interest element. For the purposes of calculating WACC the regulator requires a pre-tax cost of capital so that it can then be grossed up using the country specific marginal rate of tax.

The cost of capital also includes an allowance for tax so that the total revenue entitlement is sufficient to leave a profit equivalent to the business’s post-tax cost of capital. The standard method adopted in the telecommunication sector is to set an allowed rate of return on a pre-tax basis and apply a tax adjustment equal to:

\[
X = \frac{1}{1-t} \text{ where } t \text{ represents the marginal rate of corporation tax.}
\]

\(^{19}\) See: “Supporting evidence-based policy and Regulation in Namibia”, ITU Conference Windhoek October 2014, by researchICTsolutions
In Malawi, the marginal rate of tax (t) is 30%. The use of the marginal rate rather than effective rate ensures that all companies are treated on par irrespective of their respective tax regimes.

### 4.2.14 WACC estimates

This approach results in the following provisional WACC calculations for telecommunications services in Malawi (please note that the WACC in Kwacha is converted into $US by taking the difference in inflation for Malawi and the USA for January 2017):

#### Figure 4.8: Provisional WACC estimates

<table>
<thead>
<tr>
<th></th>
<th>Malawi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk free rate</td>
<td>25.58%</td>
</tr>
<tr>
<td>Debt risk premium</td>
<td>1.50%</td>
</tr>
<tr>
<td><strong>Cost of Debt pre-tax</strong></td>
<td>27.06%</td>
</tr>
<tr>
<td><strong>Cost of Debt post-tax</strong></td>
<td>18.95%</td>
</tr>
<tr>
<td>Equity Risk Premium</td>
<td>6.0%</td>
</tr>
<tr>
<td>Country risk premium Malawi</td>
<td>9.25%</td>
</tr>
<tr>
<td>Equity Risk Premium Malawi</td>
<td>15.25%</td>
</tr>
<tr>
<td>Geared beta (equity beta)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Cost of Equity pre-tax</strong></td>
<td>56.32%</td>
</tr>
<tr>
<td><strong>Cost of Equity post-tax</strong></td>
<td>40.83%</td>
</tr>
<tr>
<td>Gearing</td>
<td>60.0%</td>
</tr>
<tr>
<td>Post-tax WACC</td>
<td>27.70%</td>
</tr>
<tr>
<td>Marginal rate of tax</td>
<td>30.0%</td>
</tr>
<tr>
<td>Pre-tax WACC (Kwacha)</td>
<td>39.58%</td>
</tr>
<tr>
<td>Pre-tax WACC ($US)</td>
<td>21.04%</td>
</tr>
</tbody>
</table>

### 4.3 Overview of Questions

**Question 12.** Do you agree to use a tilted annuity to estimate capital costs in the BU-LRIC model? If not please provide arguments and an alternative approach.

**Question 13.** Do you agree that the WACC as set out in this consultation is the correct way to calculate the cost of capital?

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Question 14. Do you agree that nominal rates should be used for the WACC calculations?

Question 15. Do you agree that the approach and parameters set out in this consultation for the cost of debt provide an appropriate basis for the proposed WACC calculations? If not please provide an alternative approach with justification.

Question 16. Do you agree that the approach and parameters for gearing provide an appropriate basis for estimating the WACC parameters?

Question 17. Do you agree that the approach and parameters for the cost of equity including the equity risk premium, country risk and beta values provide an appropriate basis for the WACC calculation? If not please provide an alternative approach with justification.

Question 18. Do you agree with the proposed treatment of tax in the WACC calculation?

Question 19. The WACC in Kwacha (for retail services) has been translated into $US (for interconnection services) using the inflation rate differential of January 2017 – do you agree?

Question 20. Are there any further principles, issues or factors, in addition to those set out in the above text, which you wish to propose? If so, kindly provide details with a justification.