Digicel

Comments on ECTEL’s proposed Principles, methodologies and guidelines for the determination of new interconnection

**5 September 2016**

We thank you for inviting Digicel to provide its comments on ECTEL's proposed Principles, methodologies and guidelines for the determination of new interconnection rates. Digicel is of course available, and would be happy, to discuss our submission further.

The comments as provided herein are not exhaustive and Digicel's decision not to respond to any particular issue(s) raised in the consultation document or any particular issue(s) raised by any party relating to the subject matter generally does not necessarily represent agreement, in whole or in part nor does any position taken by Digicel in this document represent a waiver or concession of any sort of Digicel's rights in any way. Digicel expressly reserves all its rights in this matter generally.

Please do not hesitate to refer any questions or remarks that may arise as a result of these comments by Digicel to: -

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# Comments on ECTEL's proposed LRIC methodology

## 1.1 Overall comments to the recommended approach

The Eastern Caribbean Telecommunication Authority (ECTEL) consultation document sets out its approach, as recommended by Axon Partners, to the production of a cost model to determine the appropriate rates for mobile termination, and a cost model to determine the appropriate rates for fixed termination. Broadly, ECTEL has proposed the following principles for the production of the two models:

- ECTEL is proposing a bottom-up LRIC model for both fixed and mobile
- Common and joint costs are to be applied as a mark-up to network costs calculated on an LRIC basis
- The fixed and mobile core networks are to be dimensioned on a "scorched node" basis; the mobile access network is to be dimensioned on a "yearly scorched earth" basis
- Capital expenditure (capex) is to be depreciated using the "tilted annuity" methodology
- The network is to be dimensioned on a "single year" basis, with capacity being calculated to meet demand in any given year, without taking account of previously installed capacity.

Digicel's view is that, whilst the overall principles recommended by Axon Partners are in line with standard practice, the recommended implementation of these principles is flawed to the point that the resultant model will not be fit for purpose.

## 1.2 Comments related to specific design principles

We have comments to eleven specific implementation decisions which compromise the suitability and accuracy of the outputs of the model. These are:

- The use of a single-year approach to network dimensioning
- The use of a "scorched-earth" approach to dimension the mobile access network
- The calculation of the size of the radio access network required for coverage
- The treatment of geotypes in the mobile model
- The treatment of geotypes in the fixed model

- The approach to the tilted annuity calculation given the single year approach to network dimensioning
- The treatment of common and joint costs
- The treatment of mobile services
- The treatment of spectrum allocation
- The treatment of fixed services and inconsistency between the approach to modelling fixed and mobile networks
- The use of cost inputs and model calibration.

We discuss each in turn below.

### 1.2.1 Point 1: the use of a single-year approach to network dimensioning

In section 2.1.5 of the consultation document, ECTEL sets out the recommended approach to network dimensioning. It proposes to use a "single year" approach, where the required size of the network is calculated in each year to meet the demand in that year, without reference to the size of the network in previous years.

In Digicel's view, this approach is inappropriate and does not reflect the way efficient investment decisions are made in telecommunications networks. Decisions about efficient investments in these networks are made on a five- to eight- year cycle, matching the lifetimes of the relevant assets. Costs must therefore be recovered over this cycle. In a single-year approach, efficient assets that were built in one year could disappear completely the following year, especially in an environment where traffic is migrating from one technology to another, or where population patterns are shifting. The logical conclusion of the single year approach is therefore that the full cost of such an asset must be recovered in a single year.

In addition, assets built in previous years remain efficient over time. Customers do not replace their handsets every year as they typically cannot afford to. As such, many of them retain 2G handsets in the years after 3G has been deployed, or 3G handsets in the years after 4G has been deployed. Because of this, an efficient network deployment will retain assets of multiple technologies, built over several years, over time.

### 1.2.2 Point 2: the use of a "scorched-earth" approach to dimension the mobile access network

ECTEL sets out the recommended approach to dimensioning the mobile network in section 2.2.3 of the consultation document. Here, ECTEL claims that the model will be able to dimension a scorched-earth network by estimating the number of radio sites per technology and geotype in order to meet the coverage needs, by considering the cell radii of coverage for different geotypes and the area to be covered in each geotype. ECTEL also proposes (in section 2.1.5) to do a yearly optimisation. The combination of these two principles creates a modelled mobile network which is simply unachievable in reality. Mobile networks are not deployed and redeployed on an annual basis to optimally meet the estimate of traffic in each year. Network deployments reflect a series of efficient decisions taken over the deployment planning horizon of network equipment (e.g. around 3–5 years) and the siting of equipment to provide service, not just an average cell radius estimated in an off-line link-budget calculation. Mobile site equipment is not moveable by a few hundred meters on a yearly basis, simply because new buildings or land plots have become available or unavailable for siting mobile access network equipment in a more optimal fashion to meet 2G, 3G, and 4G technology coverage requirements. Deploying a tall mast in the centre of a village or town is not suitable in touristic areas where the natural visual amenity should be preserved for valued overseas visitors.

Digicel is of the opinion that in practice there would be a requirement to check the output of the yearly modelling of coverage, to determine the extent to which the model implies that sites are being moved around, or being abandoned, on a yearly basis in favour of other ‘optimised’ sites (which may not exist in the locality).

The scorched-earth approach is recognised in section 2.2.3 as significantly more complex to implement. Doing a scorched-earth radio plan to determine the coverage required for the ECTEL markets is not straightforward, particularly given the different and challenging geography of each country. Based on these considerations it is Digicel’s view that the proposed scorched earth approach is flawed and will yield unreliable model outputs and be unworkable in practice.

In the alternative Digicel believes that it is more appropriate that a modified scorched-node approach is adopted, which would refer primarily to the operators’ actual deployments. The operators’ deployments have necessarily reflected the need to meet the coverage characteristics of ECTEL’s five member countries and the availability of buildings and land to site suitable antennas, some of which need to be sympathetic with the environment. Only then should node modifications be applied with suitable justification in an independent assessment.

### 1.2.3 Point 3: the calculation of the size of the radio access network required for coverage

It is Digicel's view that the geography of ECTEL's five member countries (Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines) does not fit well with a model that appears to have been designed with other geographies in mind. These countries are small, mountainous, heavily forested islands. Main towns and cities are coastal, and there are smaller towns and villages inland. These are typically in heavily forested valleys. The main towns and cities themselves are typically densely built up, with narrow streets. Digicel has summarized the features of these geographies in more detail in Annex A.

This has implications for the design of the mobile access network. In order to meet coverage targets and obligations, coverage must be built to a significant proportion of inland settlements, as well as the main coastal towns. In addition, in order to meet the expectations of customers, coverage must be built along the road network that links these inland settlements where sporadic settlements and villages exist or are being built, as well as around headlands on the coast.

The geography described above is hostile to radio propagation, resulting in numerous coverage holes. This increases the number of sites required to meet coverage targets and obligations above that which would be estimated by a simple 'cell radius and coverage area' approach. In many places, coverage is not area-based, but linear, since the coverage sector out to sea does not cover the resident population. The coverage aspect of mobile networks in these countries is therefore of critical importance to their deployment.

In Digicel's view this mismatch between the terrain for which the model was designed and the actual geography of the ECTEL states is likely render the model output unreliable.

### 1.2.4 Point 4: the treatment of geotypes in the mobile model

In section 2.2.3 of the consultation document, ECTEL presents the recommended approach regarding geotypes in the mobile network. It sets out the following eight geotypes to be modelled:

- Dense urban
- Urban
- Dense suburban
- Suburban

- Mountainous rural
- Non-mountainous rural
- Mountainous rural spread
- Non-mountainous rural spread.

In Digicel's view, the use of eight geotypes is counter to international best practice and especially inappropriate given the unique geography of the member countries. Four geotypes (dense urban, urban, suburban, and rural areas) is more typical. Five geotypes could be appropriate to take account of the differences between mountainous and non-mountainous areas. The use of eight is likely to create modelling discontinuities. Given the small size of the member countries, the proposed approach is likely to create geotypes that contain very few base stations. This is likely to make the model less accurate. Some geotypes (e.g. roads) may also best be represented by linear modelling segments of each country.

### 1.2.5 Point 5: the treatment of geotypes in the fixed model

In section 2.3.3 of the consultation document, ECTEL presents the recommended approach to geographic modelling for the fixed network, setting out six geotypes as follows:

- Dense urban
- Urban
- Dense suburban
- Suburban
- Dense rural
- Rural.

In Digicel's view, the use of six geotypes for the fixed network model is inappropriate. Given the small size and populations of member countries, the architecture of existing fixed networks is likely to be very simple. There are likely to be very few network nodes, with a limited hierarchy. Individual network nodes will probably serve multiple areas in such an architecture. As such, a single geotype is likely to be more representative of realistic network deployment. This is especially the case given that the access network is beyond the scope of the fixed model.

### 1.2.6 Point 6: approach to the tilted annuity calculation given the yearly approach to network dimensioning

In section 2.1.3 of the consultation document, ECTEL sets out the recommended approach to the annualisation of capex. It proposes to use the "tilted annuity" method, whereby capex in a given year is annualised, taking account of both cost of capital, and the fact that the prices of network elements changes over time.

In section 2.1.5, ECTEL sets out the recommended approach to network dimensioning. It proposes to use a “single year” approach, where the required size of the network is calculated in each year to meet the demand in that year, without reference to the size of the network in previous years.

It is Digicel’s view that, when used in combination, these approaches could cause the model to behave in unpredictable or unrealistic ways. This is especially the case if traffic migrates from one technology (e.g. 3G) to another (e.g. 4G). In this case, the model will dimension a smaller and smaller 3G network. However, in the proposed modelling approach, the previous year’s capex, as annualised by the tilted annuity, will be recovered on assets that no longer exist.

### 1.2.7 Point 7: the treatment of common and joint costs

In section 2.14 of the consultation document, ECTEL sets out the recommended cost standard, including the treatment of common and joint costs. It proposes to use a method it refers to as the “efficient capacity approach”. In Digicel’s view, it is unclear what is meant by this. Earlier in section 2.14, ECTEL defines the “effective capacity approach” as the allocation of common and joint costs based on capacity used in the busy hour. It does not define the “efficient capacity approach”. This ambiguity over the methodology to be adopted can only undermine confidence as to the reliability of the model output. In order to properly assess this aspect of Axon’s proposed approach it would be necessary for it to be set out in more detail and stakeholders given an opportunity to review and comment on it.

In addition, it is Digicel’s view that the “effective capacity approach”, assuming this is what is intended, is not the most appropriate nor best practice. This is because it relies on a number of assumptions that are variable, unspecified to date, and can create uncertainty in the results. For example, the result depends heavily on how the busy hour is defined, and whether a different busy hour is assumed for voice, data, and other services (as is typically the case in a real network). It also depends on the proportion of total traffic that is carried by the network in the busy hour. This can vary between services, and also between operator as it is heavily influenced by target customer segments and price plans.

The most commonly used, and in Digicel's view most appropriate, approach is LRAIC+, where the increment used is the average traffic over the period, allocated to services according to annual traffic volumes.

### 1.2.8 Point 8: the treatment of mobile services

In section 2.2.2 of the consultation document, ECTEL sets out the recommended approach to mobile services and increments. It proposes to use two services: voice services, and data and other services.

In Digicel's view, whilst there is a logic to using these two services, given that SMS and MMS are declining in importance relative to data, it creates a lack of clarity in relation to how SMS termination rates might be set. In particular, it is unclear how SMS and MMS services will be dealt with in the incremental cost structure of the model. SMS data, for example, uses a completely different channel structure to GPRS, EDGE or UMTS data, so it is not clear how SMS will be considered alongside other data services. It is also unclear how the cost of SMS- and MMS-specific network elements such as the SMSC will be allocated.

As above, Digicel suggests a LRAIC+ approach using annual traffic volumes.

### 1.2.9 Point 9: the treatment of spectrum allocation

In section 2.2.1 of the consultation document, where ECTEL sets out the recommended definition of the reference mobile operator, it also describes the recommended approach to spectrum allocation. ECTEL assumes a reference operator as one with a 33% market share. It then uses this market share to allocate radio spectrum to the reference operator. As such, the operator is assumed to have 33% of the spectrum available in each band.

Whilst this approach makes sense on a superficial level, it may not match the actual spectrum blocks available for allocation in each country. Also, for certain technologies, spectrum must be banded into specific blocks (e.g. 2×5MHz bands for 3G). The proposed approach may therefore allocate unrealistic spectrum blocks, or fragments of spectrum blocks, to the reference operator. A more robust and reliable approach to selecting the spectrum used by the reference operator is needed.

### 1.2.10 Point 10: the treatment of fixed services and inconsistency between the approach to modelling fixed and mobile networks

In section 2.3.2 of the consultation document, ECTEL sets out the recommended approach to fixed services and increments, proposing a single increment that includes all traffic. This differs significantly from the approach recommended by Axon Partners to the OUR in Jamaica as part of its recent fixed LRIC consultation where multiple services were included. Neither Axon Partners nor ECTEL has justified the use of a different approach in this case.

In addition, the treatment of fixed services is a difference in principle from the modelling of mobile networks. This will result in a difference in the treatment of common costs between fixed and mobile networks which may be difficult to explain and justify, given the similarities between the core networks of each technology.

Given the relative network capacity impacts of voice and non-voice services (leased lines and broadband) in the fixed network the use of a single increment will yield unreliable model outputs.

### 1.2.11 Point 11: the use of cost inputs and model calibration

ECTEL does not explicitly discuss the recommended approach to the use of cost data received through the data request, and the calibration of its models. However, there are a number of considerations that are important in the context of creating a model to determine termination rates in five separate countries.

When collecting and applying cost data, ECTEL must recognise the differences between the countries, and the differences between the operators submitting data. For example, as recognised by ECTEL in section 2.2.1 of the consultation document, three member countries have only two mobile operators, whereas two countries (Grenada, and Saint Kitts and Nevis) have three. The collection and use of data from mobile operators will need to reflect this, in order to accurately model the differences in network costs in each country. In addition, one of the mobile operators is owned by the incumbent, Flow, and is therefore integrated with the fixed network. This operator will have a different cost base, and is likely to share costs between fixed and mobile services. For example, the cost of a mobile site that is used by the fixed network for microwave backhaul should not be allocated to fixed traffic, as it will have already been covered by the mobile network costing. This difference should also be recognised and treated in an appropriately justified manner.

As ECTEL is aware Digicel is offering fixed services in a number of the ECTEL states. The treatment of cost inputs from multiple sources in respect of the fixed modelling requires to be elaborated on and reviewed by stakeholders before that can be any confidence that the model will produce appropriate outputs in respect of the fixed termination rate.

The same concern applies to the calibration of the cost models. Each member country has a slightly different geography and demand, and has different operators present. It is unlikely to be accurate to take a generalised average view of costs for all member countries. A correctly constructed model should be able to reflect the differences between the member countries.

# Annex A Geographic considerations

## A.1 Topography of the Eastern Caribbean countries

All five countries regulated by the Eastern Caribbean Telecommunication Authority (ECTEL) have similar topographies.

They all are small islands (land area is below 750 $km^2$) with mountains due to their volcanic origins, as shown in Figure 1 below.

*Figure 1: Topography indicators for Eastern Caribbean countries [Source: CIA World Factbook, 2016]*

| Countries under ECTEL jurisdiction | Land area ($km^2$) | Maximum altitude (m) | Topography[1] |
|---|---|---|---|
| Dominica | 751 | 1447 | Rugged mountains of volcanic origin |
| Grenada | 344 | 840 | Volcanic in origin with central mountains |
| Saint Kitts and Nevis | 261 | 1156 | Volcanic with mountainous interiors |
| Saint Lucia | 606 | 950 | Volcanic and mountainous with broad, fertile valleys |
| Saint Vincent and the Grenadines | 389 | 1234 | Volcanic, mountainous |

A large proportion of the population is located along the coast or in steep-sided valleys inland. The interior of each country is mainly mountainous, as shown in Figure 2 to Figure 6 below.

1 Uses the "Field listing: terrain" category of the CIA World Factbook. Available at: https://www.cia.gov/library/publications/the-world-factbook/fields/2125.html.

*Figure 2: Terrain map of Dominica [Source: Analysys Mason, 2016]*

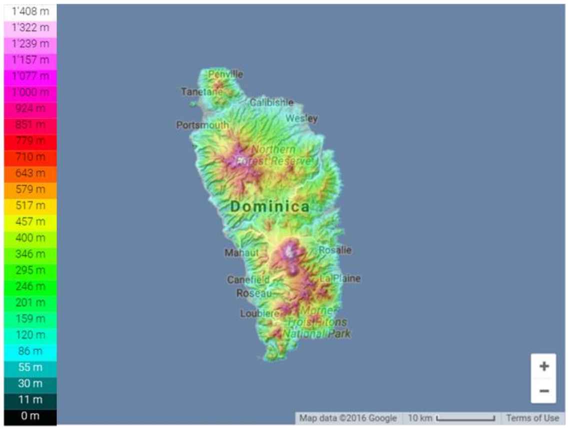



*Figure 3: Terrain map of Grenada [Source: Analysys Mason, 2016]*

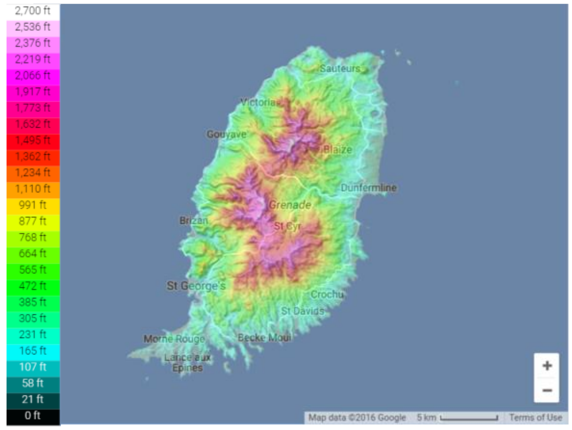



*Figure 4: Terrain map of Saint Kitts and Nevis [Source: Analysys Mason, 2016]*

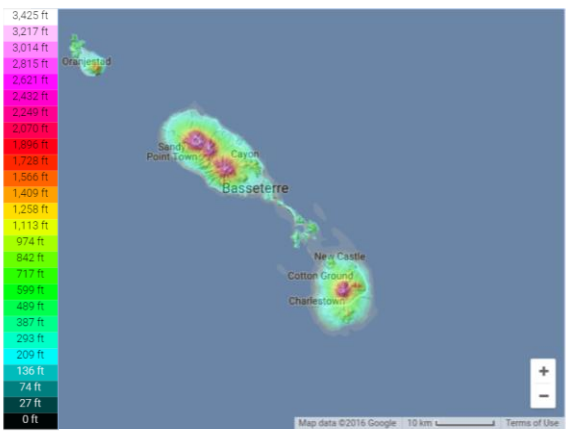



*Figure 5: Terrain map of St Lucia [Source: Analysys Mason, 2016]*

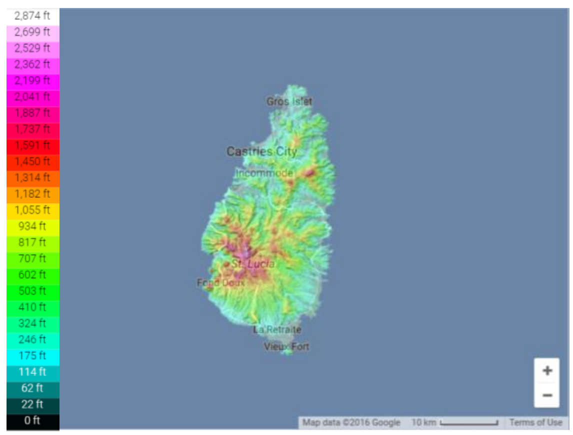
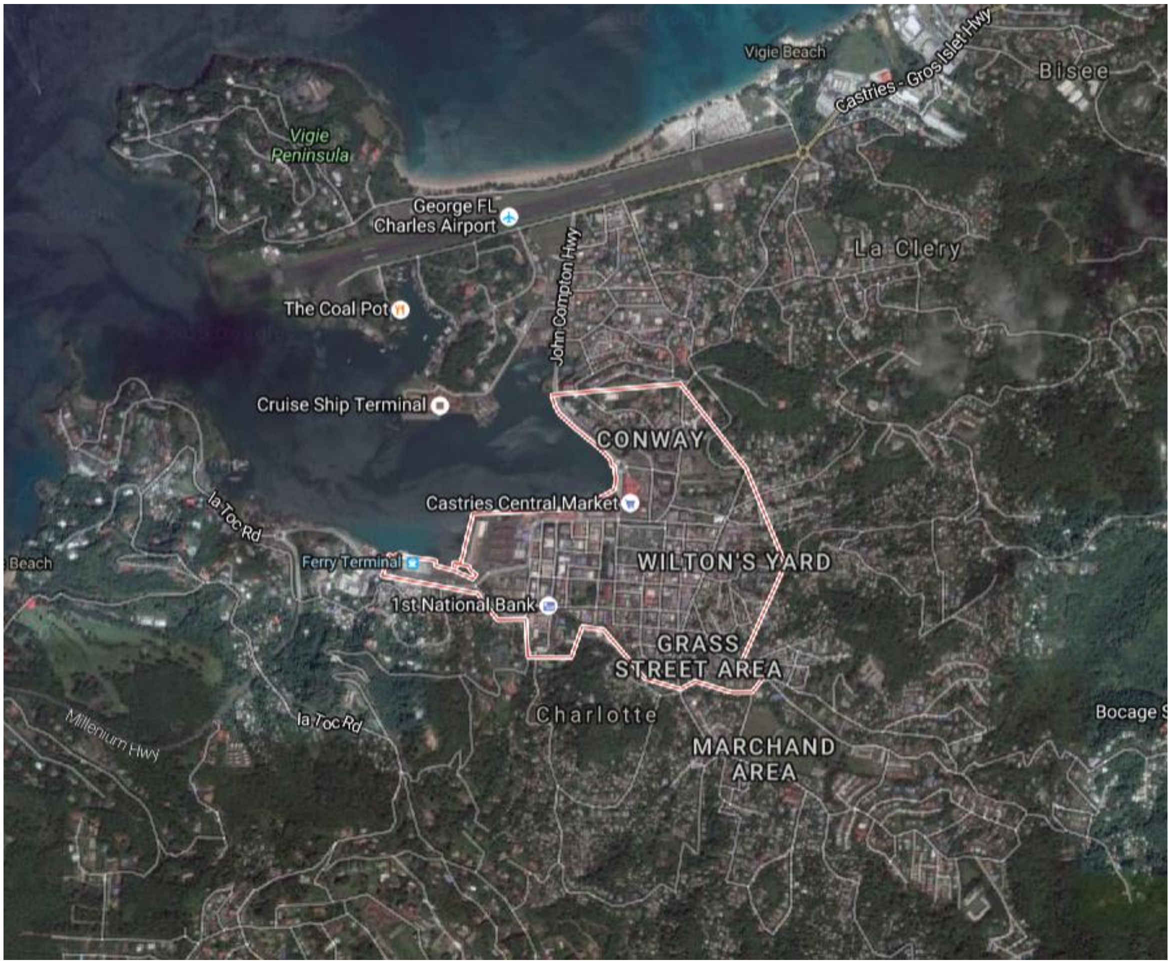


*Figure 6: Terrain map of Saint Vincent and the Grenadines [Source: Analysys Mason, 2016]*


In addition, the main towns in these islands, such as Castries in Saint Lucia or Saint Georges in Grenada, are generally composed of houses of various heights, built on the side of steep hills, as the terrain rises quickly towards the interior. Figure 7 below shows a satellite image of Castries. There is a dense central area, with residential roads rising into forested hills.

*Figure 7: Satellite image of Castries, Saint Lucia [Source: Google, 2016]*




## A.2 Topography: consequences on mobile access network investment

In order to improve the quality of their mobile network, operators can invest to increase either coverage or capacity per site.

Coverage quality is the main concern for operators in the Eastern Caribbean countries. Even if small islands are easier to cover than bigger territories, the presence of mountainous terrain makes these countries substantially more difficult to cover.

The fact that the majority of the population on these islands is distributed along the coasts and in interior valleys means that higher levels of investment will be required to reach a sufficient level of population coverage.

The geography of major towns (on hills with buildings of varying heights) also creates difficulties in providing sufficient coverage even in these dense areas.

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