Critique of the IFT's MTR model for 2017 regulation

A report for AT&T

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1 Introduction

This report has been commissioned by AT&T to examine the IFT's Long Run Incremental Cost (LRIC) models which are to be used when setting mobile termination rates (MTRs) for 2017. While it is understood that the IFT has committed to revising the model and regulations during 2017, when setting regulated prices for 2018, the model used for this consultation has had no major modification from the model used in previous years. As a result, changes to MTRs have occurred in the first instance through changes to input variables.

Given this, the focus of this report is identifying changes in input variables and assumptions from previous models, with a secondary objective to examine the model and methodology.

This report should not be considered to be comprehensive examination of every assumption in the MTR model. Analysis has been limited by time and data availability, including a lack of information regarding which variables in the IFT's model will change for 2017, and no access to a revised model. Some aspects of this analysis may change if further data is provided. Plum has additional concerns with the regulatory process, such as the use of pure-LRIC and the definition of a hypothetical efficient operator, which are outside the scope of this report.

1.1 Structure of this report

The remainder of this report is structured as follows.

- Section 2 looks at modelling assumptions and input parameters. This section first looks at where changes have been made to these variables from the models used in previous years, and examines how this has been justified by the IFT. Where applicable, international benchmarks are considered to verify if these are reasonable assumptions. The section then looks at variables where change would have been expected but is not observed.
- Section 3 examines the modelling methodology. Again, the section first looks at changes that have been made to the methodology, as described in the IFT's consultation documents, and analyses whether they represent a reasonable change. The report moves on to consideration of ways in which the methodology would have expected to evolve since previous years, given developments in the market.
- Section 4 concludes.

1.2 Notes on consultation materials

This report has been written based on the IFT's publication of a consultation document on its website at http://www.ift.org.mx/industria/consultas-publicas/consulta-publica-del-anteproyecto-de-condiciones-tecnicas-minimas-para-la-interconexion-entre. This sets out a number of adjustments for the existing model to be made when setting the MTR for 2017. These adjustments are limited to inputs and assumptions, which is therefore the focus of this paper. However, it is clear that several aspects of the calculation methodology are no longer accurate for the Mexican market, and it is important that the IFT understand that these may lead to a significant bias on the calculated MTR. It is therefore recommended that the IFT is cautious in its use of the results.

The models linked to from the IFT website are the 2015 models (used for setting MTRs for 2015 and 2106), and therefore do not include the proposed changes to enable calculation of 2017 rates. In order to carry out the analysis in this paper, therefore, manual adjustments have had to be made to the existing models. There are some areas of the models where adjusting inputs causes an error – for example, increasing the total data traffic to current forecasts causes the network dimensioning calculation for MSC network elements to fail. It is recommended that the IFT produces a revised model for further consultation ahead of finalising regulation.

Finally, the IFT has not provided a clear justification for a number of the potential changes in parameters. This makes it difficult to understand the justification for changes, and to understand where variables have been set using the average of available information from Mexican operators, or from international benchmarking. Again, this should be rectified ahead of making a decision on termination rates.

2 Inputs and assumptions

Although a number of changes have been made to key parameters for the MTR models, the structure of the models remains the same as those used in 2015 to set 2015 and 2016 MTRs. This means that the models proposed for 2017 also inherit the same treatment of networks. In particular, the networks reflected only include technologies available in Mexico between 2009 and 2013 such as 2G and 3G. The omission of LTE will result in a misleading MTR if adjustments are not made to allow for the transition of mobile data to the LTE network following its launch.

IFT have provided a list of assumptions as follows for the 2015 and 2017 mobile MTR models. The rest of this section discusses the key modelling parameters.

Table 2-1: Comparison of assumption parameters

Variable	Previous cost models	New cost model
Methodology	Pure-LRIC	Pure-LRIC
Network	2G in 850 MHZ band	2G in 850MHz band
	2G and 3G in 1900 MHz band	2G and 3G in 1900 MHz band
Market share	16%	16%
Spectrum holdings	10MHz in 850 MHz band	10MHz in 850 MHz band
	43MHz in 1900 MHz band	43MHz in 1900 MHz band
Time series	50 years	50 years
Inflation	3.4%	3.19%
WACC	9.74%	10.17%

2.1 WACC

As shown in Table 2-1, a WACC of 10.17% is proposed for the mobile model. This has been calculated using the following parameters.

Table 2-2: WACC proposals

	Fixed	Mobile
Risk-free rate	5.05%	5.05%
Beta	0.92	1.09
Market premium	5.81%	5.81%
Cost of equity	**14.83%**	**16.27%**
Cost of debt	**6.36%**	**6.36%**
Leverage	26.75%	26.16%

	Fixed	Mobile
Tax rate	30.00%	30.00%
Nominal pretax WACC	**12.56%**	**13.68%**
Inflation rate	3.19%	3.19%
Real pretax WACC	**9.08%**	**10.17%**

Source: IFT

Although this appears to be a reasonable calculation, there has been insufficient information made available to enable an analysis of how each of the elements has been calculated. It is unclear if adjustments have been made to industry risk to account for the potential 700 MHz wholesale network, the asymmetric competition in the country, or the recent consolidation. It is, however, possible to compare elements of the WACC calculation to previous values and international benchmarks, and some analysis is included below.

Note that the inflation rate is also used elsewhere in the model, and is discussed in more detail in Section 2.3.

Risk-free rate and market risk premium

The risk-free rate used by the IFT appears very low. In its previous model, the IFT used a risk-free rate of 6.08%[1], and there is little evidence to suggest that the risk-free rate should have decreased in that period – indeed, Mexican government bond yields have stayed roughly constant over the past two years, even increasing slightly[2], and the Treasury has been steadily increasing interest rates over the course of 2016[3] which is likely to be reflected in the interest rates for future bonds.

This higher risk-free rate from Mexican institutions reflects a significant country risk premium which has been fairly constant for the past year[4]. It is clear that the IFT's proposal for 5.05% as an appropriate rate for the Mexican market is considerably lower than should be expected.

Further, the Stern School of Business at NYU, often used as a standard source for WACC by regulators worldwide, indicates that the overall equity risk premium should be significantly higher than that proposed by the IFT[5]. The calculation proposed by Professor Aswath Damodaran is as follows.

[1] See http://www.ift.org.mx/sites/default/files/contenidogeneral/politica-regulatoria/wacc-2015.pdf

[2] See http://www.tradingeconomics.com/mexico/government-bond-yield

[3] See http://www.tradingeconomics.com/mexico/interest-rate

[4] See http://www.market-risk-premia.com/mx.html

[5] See http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

Table 2-3: Stern NYU equity risk premium calculation

		Calculation note	Value
1	Rating for Mexico		A3
2	Rating-based default spread		1.33%
3	Multiplier for equity market volatility		1.39
4	Country risk premium	2 × 3	1.85%
5	Risk premium for a mature equity market		6.25%
6	**Total equity risk premium**	4 + 5	**8.10%**

This calculation implies that the IFT's risk premium is too low, which, when combined with a low risk-free rate has the impact of greatly underestimating the total cost of equity in the Mexican market.

Beta

The equity Beta proposed by the IFT for 2017 is again much lower than the value used in 2015, which was 1.52. Again, no information has been given as to why there is such a reduction, and as such it is not possible to state whether this is appropriate.

However, it must be recognised that mobile network operation in Mexico is a significantly risky business given the dominance of Telcel in the market, the uncertainty over the status of the 700 MHz wholesale network, and the current shifts in market structure. This would be expected to increase the Beta considerably.

Impacts on WACC

The findings above, that market risk premium, risk-free rate, and Beta should all be higher than those used by the IFT in their calculation, indicate that the true level of WACC should be significantly above the 10.17% proposed.

2.2 Exchange rate

There has been a significant change in the USD exchange rate of the Mexican Peso. The Mexican Central Bank, Banco de Mexico, expects in August 2016 that the exchange rate will be between MXN17.95 and MXN18.20 to USD1[6]. This is well above the MXN15 to USD1 used in the 2015-2016 model. Given that the bulk of network equipment will be imported, it is important that a rate that is reflective of the market's condition is used in the calculation of MTR.

[6] See http://www.banxico.org.mx/informacion-para-la-prensa/comunicados/resultados-de-encuestas/expectativas-de-los-especialistas/%7B7B9D1E39-154B-8207-7097-27EBDD87C353%7D.pdf

2.3 Inflation rate

The proposed rate of 3.19% in 2017 appears to be in line with historical observation from Banco de Mexico[7]. However, the bank also expects that the general inflation could rise to between 3.39% and 3.41% by mid-2017[8], which may suggest grounds for a less conservative estimate of inflation then proposed.

2.4 Utilisation of assets

The utilisation of assets in the model – that is, the load which assets can carry before they are deemed requiring expansion – are summarised in Table 2-4.

Table 2-4: Utilisation of assets

Asset	Utilisation
Transmitters	85%
Node B	85%
BSC equipment	40% – 60%
MSC equipment	40% – 60%
RNC equipment	70% – 75%
HLR	60%
Core network	40% – 80%
Backbone links	100%

These utilisation rates are high when compared to international benchmarks, including Ofcom's MCT model[9]. The utilisation factor used for the access and transmission network in other countries is around 70%, and most core network elements run with a utilisation of around 40%, in order to ensure network resilience. There appears to be no justification for setting utilisation to be higher in Mexico than other countries.

2.5 Traffic capacity of 3G carriers

In the IFT's 2012 model, the traffic capacity per 3G carrier per sector was set at 21 Erlangs. In the 2015 model, and likely the 2017 model, this was increased to 29 Erlangs.

Investigation indicates that this parameter is a calculated value based on service-quality provisioning in the form of call-blocking rate and the allowance made for soft-handover. Changing the blocking rate

[7] http://www.banxico.org.mx/publicaciones-y-discursos/publicaciones/informes-periodicos/trimestral-inflacion/%7BFAADDD12-F661-69A0-383B-87ED2D07E25D%7D.pdf

[8] http://www.banxico.org.mx/informacion-para-la-prensa/comunicados/resultados-de-encuestas/expectativas-de-los-especialistas/%7B7B9D1E39-154B-8207-7097-27EBDD87C353%7D.pdf

[9] http://www.ofcom.org.uk/static/models/2015%20MCT%20model.zip

from 0.1% to 2% and simultaneously decreasing the total allowance for soft-handover and softer-handover from 40% to 30% increase the capacity from 21 Erlangs to 29 Erlangs. This is a significant change in the quality of service.

The assumptions on quality previously used to calculate a capacity of 21 Erlangs appear to be consistent with the assumptions in Ofcom's MCT model. In particular, Ofcom applies a factor of 70% to the total maximum capacity in order to account for soft-handover, which is roughly the same as a provisioning of 40% in the IFT's MTR model[10]. In addition, Ofcom uses a blocking rate of 0.1% for the overall network but a rate of 2% for the air interface.

The IFT appear therefore to be assuming a much worse quality of service in their MTR model in order to increase the theoretical capacity of 3G carriers. This will have a significant impact on the MTR, and goes against international best practice.

[10] The available capacity in the IFT's model is calculated by dividing the maximum capacity by 1 + the soft-handover percentage; if calculated 1 ÷ (1+40%) is approximately 70%.

3 Changes to modelling methodology

This section examines the methodology followed in the LRIC model, and how this has changed – or can be argued should have changed – from previous years. The section looks at a number of issues separately, although it is likely that if incorporated in the model correctly there would be some overlap to their impacts.

It is understood from the IFT's consultation documents that the LRIC model used for 2017 is largely an update of the model used in 2015, with only small changes for input assumptions as discussed in Section 2. There are therefore no significant changes to the model, and the description of methodology included in the consultation documents confirms this. Further, it is understood that a more significant update to modelling methodology is to be investigated during 2017 for use when setting MTRs for 2018 and beyond.

Nevertheless, analysis of the 2017 model has shown a number of areas in which the methodology does not reflect best practice or the idiosyncrasies of the Mexican market. The remainder of this section details more fundamental issues which may have a material impact on the way the model has been built.

The analysis contained here focusses only on specific issues in the methodology and how it has been implemented. Plum has additional concerns regarding the general methodology followed, including arguments over pure-LRIC and LRIC-plus use, the definition of an efficient operator and adjustments that could be used to adjust for this in the model, and the time period modelled; these are outside the scope of this paper.

3.1 Concerns over robustness of model

Before looking at potential improvements to the model, it is important to note that the current model – or at least the model used by the IFT in 2015-2016– appears to produce some very unintuitive results. In some cases this appears to be because network dimensioning is running at the extremes of what was allowed for when the model was built; in other cases there are concerns over the way that elements of the model are constructed.

Another concern relates to the calculation of economic depreciation. This is designed to load more depreciation onto periods where an asset is more productive – so, for example, if an asset were to produce 5 units for five years, and 25 units in the last year, the depreciation profile should be 10% for the first five years and 50% in the last year.

Table 3-1: Economic depreciation example

Year	1	2	3	4	5	6	**Total**
Productivity	5	5	5	5	5	25	**50**
Economic depreciation	10%	10%	10%	10%	10%	50%	**100%**

It is also valid to consider the value of outputs over time when calculating depreciation. If the retail price of output were to decrease over time, there is an argument that this indicates a reduction in the

value of productivity. This would mean that depreciation was more loaded to the beginning of the period.

Table 3-2: Economic depreciation example with prices

Year	1	2	3	4	5	6	**Total**
Productivity	5	5	5	5	5	25	**50**
Price	20	18	16	14	12	10	
Value	100	90	80	70	60	250	**650**
Economic depreciation	15%	14%	12%	11%	9%	38%	**100%**

It is important to note that this depreciation profile is not front-loaded due to net present value calculations, where the value of money is greater in the present compared to the future. Application of the discount rate occurs much later in the model, and must not be applied here otherwise there is a double counting error.

In the 2015 model, however the IFT's consultants have not applied the retail price of end-user services to look at the productivity of assets, but rather it appears they have applied asset price trends. There is no clear rationale for this, and it means that if there are increasing prices for any asset category, depreciation of that asset will be loaded towards the end of its useful life – or, indeed, the end of the model period, in 2056.

The model has been stress-tested by running a number of scenarios to see if outputs behave as expected. If asset prices are expected to rise over time, this should result in an increase in MTRs (since the total cost of the network – and the cost of any increment – over the period of the model rises, with no change to volumes). However, this leads to a fall in MTRs, seemingly due to the economic depreciation profile loading much more of the increased cost onto later years.

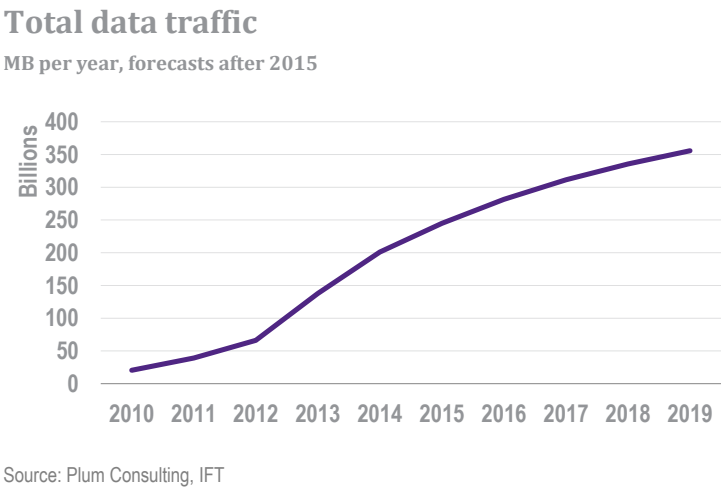
Similarly, when varying the model for data traffic, however, results are inconsistent – sometimes increases in data traffic lead to higher MTRs, sometimes the same increase leads to a lower MTR even when no other dimensioning input has changed and only financial inputs are altered.

It is vital that the model is revised ahead of any MTRs being set, so that its results can be trusted as robust. The IFT has not released a revised model for 2017, so it is unclear whether these corrections have already been made.

3.2 Inclusion of LTE

The model does not directly take account of any LTE rollout; instead the market model has been dimensioned to look only at data carried over the 2G and 3G networks and excluding LTE data. It is not clear how this has been done, and the consultation documents do not set out a methodology for continuing the forecasts into 2017. Figure 3-1 below illustrates the total 2G and 3G data traffic forecasts used in the 2015 model.

Figure 3-1

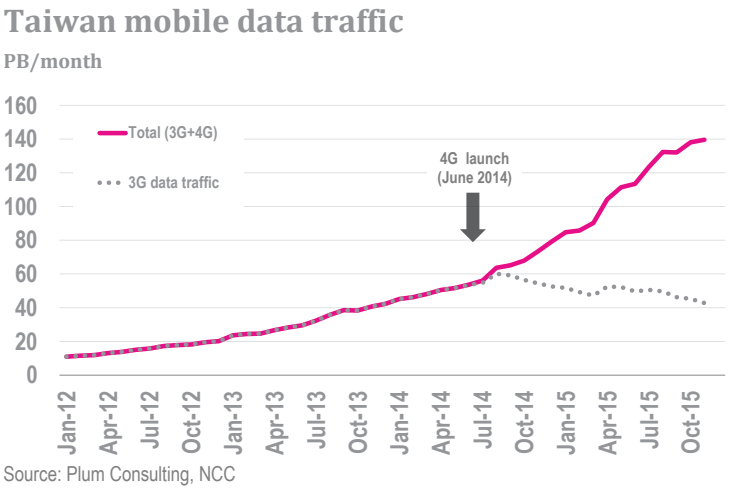


Source: Plum Consulting, IFT

In theory, it is correct to look only at 2G and 3G networks, since these are the networks used for voice traffic and there has been no announcement on the introduction of VoLTE. However, due to the significant interplay between technologies, data traffic quickly moving over to transmission over LTE, removing LTE from the model may lead to a significant error in data traffic forecasts.

Further, experience around the world has shown a far quicker movement to LTE data than previously expected. In Taiwan, for example, as soon as LTE launched in July 2014 there was a substantial increase in the growth rate of data use, but the total amount of 3G data began to fall immediately. This can be seen in Figure 3-2. A similar effect is expected to occur in Mexico.

Figure 3-2



Source: Plum Consulting, NCC

The model assumes that after 2023, the total 2G and 3G data per subscriber remains constant, implying that any additional traffic growth is carried over LTE. This assumption is unrealistic given the above analysis; the amount of data per subscriber on 2G and 3G would in this case be assumed to fall over time. However, statistics of the Mexican market must be incorporated.

There is a wider question on how interaction between LTE and legacy technologies is handled within the model. When looking at international benchmarks, there is a strong correlation between LTE uptake and smartphone use, and a similarly strong relation between smartphone use, data use per subscriber, and use of over-the-top applications, such as FaceTime, Skype, or WhatsApp. Although there appear at the moment to be no plans to introduce VoLTE to the Mexican market, it is possible that a more accelerated LTE rollout and uptake could lead to a faster reduction in voice minutes.

3.3 On-net and off-net call ratios

The current model defines the proportion of total calls which are off-net using the following formula:

$$Offnet\% = \frac{1 - marketshare}{(marketshare \times 49.058 \times e^{-4.015 \times marketshare}) + (1 - marketshare)}$$

It is understood that the coefficients included in this formula have been derived by looking at historic data relating market shares to on-net and off-net calls. However, this analysis has not been provided in the consultation documentation.

The results from the formula indicate that it may not be robust for use in the IFT's model. Table 3-3 shows how the percentage of calls that are on-net varies as market share increases.

Table 3-3: Relationship between market shares and on-net calls

Market share	1%	5%	10%	25%	50%	75%
Percentage of calls that are on-net	32.3%	67.9%	78.5%	85.7%	86.8%	87.9%

It is difficult to understand how this can be the case. An operator with 1% market share would expect the vast majority of calls from its network to terminate on other networks, but this analysis indicates that almost a third will be on-net. The results, if anything, are more extreme for operators with 10% or 20% market share.

4 Conclusion

This report has examined the IFT's proposals for regulated MTRs in 2017, and the underlying model to the extent possible (including both the inputs and the methodology). It has highlighted that there are a number of concerns about both the inputs proposed by the IFT, and some characteristics of the model it is using to calculate the MTR.

In terms of the input parameters, the IFT has proposed to use an inflation rate of 3.14% and WACC of 10.17%. It has not defined an exchange rate. This study has identified that the inflation rate, based on a historic trend, is likely to be higher in forthcoming periods and this should be taken into account when setting forward-looking regulation. Similarly, it appears that the proposed WACC should be higher when compared to international benchmarks and academic studies, although it is unclear in many areas how the IFT's calculation should be analysed.

When looking at the model itself, a number of concerns have been raised over the model's robustness and elements to its methodology. In particular, the way in which economic depreciation and on-net traffic proportions appear erroneous. In addition, the model looks to calculate costs over 50 years, but does not include reasonable estimates of technology change, or indeed current technology. There are therefore some methodological improvements which should be made to increase the accuracy of the model and to make it operate in a more realistic way.

Overall, there are a number of questions raised by the current consultation that cannot be answered without more information being made available; details such as how the model has been adjusted to allow it to work with current traffic levels, how the Beta and risk-free rate have been estimated for WACC calculation, and how data traffic inputs have been adjusted to take account of LTE technology.