Response to Consultation for Mobile Termination Rates in Norway

Submitted to:

Post- og teletilsynet

Norwegian Post and Telecommunications Authority

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CONFIDENTIALITY OF INFORMATION

The analysis presented in this document is based on network cost models for Tele2 from the Norwegian Post and Telecommunications Authority (NPT). These models contain substantial confidential and proprietary information from Tele2. In addition, supplemental confidential information from Tele2 and Network Norway has been used to illustrate and reinforce several points. As such, all information and data contained within this document is strictly confidential and meant for the sole use of NPT. No part of this document should be shared with any other party outside of NPT without the written permission of each of Tele2, Network Norway and CSMG.

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1. EXECUTIVE SUMMARY

This CSMG report has been prepared for Tele2 and Network Norway in response to a consultation by the Norwegian Post and Telecommunications Authority (NPT) on its cost model for mobile termination rates (MTRs).

The current regulation cycle lasts until December 2010. For the new cycle starting in January 2011, the NPT has commissioned a revised version of its cost model to account for several new factors, including: changes in market demand; price trends; new forecast assumptions; the emergence of 3G technology; the inclusion of a third national mobile network; and, revised EC recommendations. The model was built by the Analysys Mason Group and is referred to as the AMG model in this document.

In the revised model, the network costs of the incumbent mobile operators – Telenor and NetCom – are modelled using actual data supplied by these operators. In contrast, the costs of the new entrant network – Mobile Norway – are estimated using a hypothetical ("Third Operator") network. The output of the three cost models are used to determine the MTR that should apply in the forthcoming regulation period.

In its consultation document, the NPT proposes to also progressively reduce the asymmetry in MTRs between the incumbent operators and the new entrants, proposing a symmetric regime from July 2012 onwards. The speed at which the NPT proposes to remove the asymmetry is more rapid than that previously agreed by the Norwegian Telecoms Ministry. NPT justifies its proposal using the hypothetical network cost model.

Having analysed the AMG model and the assumptions supporting it, we believe that there are a number of issues with the estimation of the Third Operator investment costs. These issues also significantly impact the Third Operator MTR and should be addressed by the NPT. The issues are outlined below.

1.1 Unrealistic Third Operator Radio Network Estimation

The network projection for NPT's hypothetical Third Operator deviates significantly from Mobile Norway's network plans. The AMG model estimates far fewer cell sites are required to achieve the coverage objectives.

NPT estimates the Third Operator could cover 77% of Norway's population with only 1,209 cell sites at a cost of 1.44B NOK compared to the […][U.off.] in the Mobile Norway network plans submitted to the Telecoms Ministry.

The Mobile Norway network plan was derived through a detailed engineering design process that included a physical search for sites available on the ground for the coverage network build. This compares to a more theoretical network deployment in the AMG model based on network planning tools in conjunction with overall network data from other operators.

We have identified the following factors as possible reasons why the Third Operator network build in the AMG model may underestimate cell site requirements as compared to Mobile Norway network plans:

1. The radio network performance requirements specific to a Third Operator network are not accounted for in the AMG model;

2. 3G traffic concentration for the Third Operator in the AMG model is assumed to be the same as that for 2G traffic;

3. The AMG model seems to implicitly assume that the most densely populated regions in each market exists on a single contiguous piece of land.

Increasing the number of Third Operator cell sites in the AMG model to match the number in the Mobile Norway network plans ([…][U.off] cell sites) increases 2009 cumulative network capital costs from 1.44B NOK to 2.18B NOK. The latter figure is close to the Mobile Norway network plan cost estimate of […][U.off.] NOK. We strongly recommend further scrutiny of the underlying causes for the difference between cell site requirements for the Third Operator in the AMG model versus the Mobile Norway network plans especially since the AMG model is being used to determine both the MTR asymmetry and future MTR values.

1.2   Questionable Input Assumptions

Some input assumptions in the model are questionable and yield an incorrect output for the MTR calculated for the Third Operator network. Specifically, we believe the following three assumptions should be adjusted:

1. Third Operator GSM Market Share

2. Third Operator Voice Usage Per Subscriber

3. Data Usage Per Subscriber

The revised assumptions and the rationale for changes are detailed in the Assumption Validation section of this document.

Based on corrected assumption adjustments, the MTR for the Third Operator in 2013 would increase by 11.5% and network investment costs would increase by 24.5% as shown in the table below.

	Assumption to be adjusted	% Change in Investment Cost	% Change in 2013 Blended LRAIC MTR
Demand Assumptions	Third Operator GSM market share	19.1%	6.4%
	Third Operator voice usage per subscriber (incoming from other networks)	4.5%	1.2%
	Data usage per subscriber	*No effect*	3.4%
	Synergy	0.9%	0.4%

Total Change	24.5%	11.5%

Note: Synergy represents the effect of simultaneously changing multiple assumptions

These resulting changes to the Third Operator investment costs and MTR are distinct from those arising from the alignment on number of cell sites detailed in section 1.1

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1.3   <u>Understatement of Migration Costs</u>

In its consultation document, the NPT proposes that the investment costs which Tele2 and Network Norway shall recover through the MTR asymmetry be limited to only those costs which pertain to the migration from MVNO to MNO ("Option 2" in the NPT document).

We believe that the NPT may not have fully accounted for all costs incurred in such a migration. Specifically we see three areas in which investment costs appear to have been overlooked:

1. Investment in new systems beyond those listed in the consultation document;

2. System integration costs to adapt legacy MVNO systems to meet the extended requirements of operating as an MNO;

3. Unavoidable operational expenditure incurred in building the Mobile Norway network.

2. INTRODUCTION

CSMG was recently engaged by Tele2 and Network Norway to provide support in the NPT consultation on its cost model for mobile termination rates. We have worked closely with our client to understand the current MTR situation, provide an in-depth analysis, and produce this document and recommendations.

We have extensive telecom experience and qualifications in several areas that are of particular relevance to this engagement:

1. We have developed numerous mobile operator business case models with a granular focus on both demand drivers and network costs.
2. We have developed several detailed MTR LRIC models in a variety of different regulatory markets across the world.
3. We have worked with telecom regulators in the US, Europe, and Asia on a range of critical topics and decisions.

As a result of our past wireless and regulatory experience, we believe CSMG is well positioned to provide an in-depth analysis and assessment of the present MTR regulatory decision and methodology.

3. BACKGROUND, CONTEXT AND SCOPE

3.1 Norwegian MTR Determination

Mobile termination rates in Norway are currently based on a Long Run Average Incremental Cost (LRAIC) model commissioned by the NPT and built by the Analysys Mason Group (AMG).

For the current regulation cycle lasting until December 2010, AMG developed a common industry cost model to determine long-run unit costs using a LRAIC +++ methodology. The model is populated with operator-specific data to determine the cost of termination on each network. The NPT then applies the MTR level of higher cost operator as the common MTR applied for incumbent operators.

For the new regulation cycle starting January 2011, the NPT commissioned a revision (v6) of the AMG model in 2009 to account for several new factors:

1. Changes in market demand, forecast assumptions, price trends etc.

2. The emergence of 3G technology

3. The addition of a third national mobile network

4. New EC recommendations on MTR

MTR Glide Paths for Incumbents, Tele2 and Network Norway - 2010 to 2013
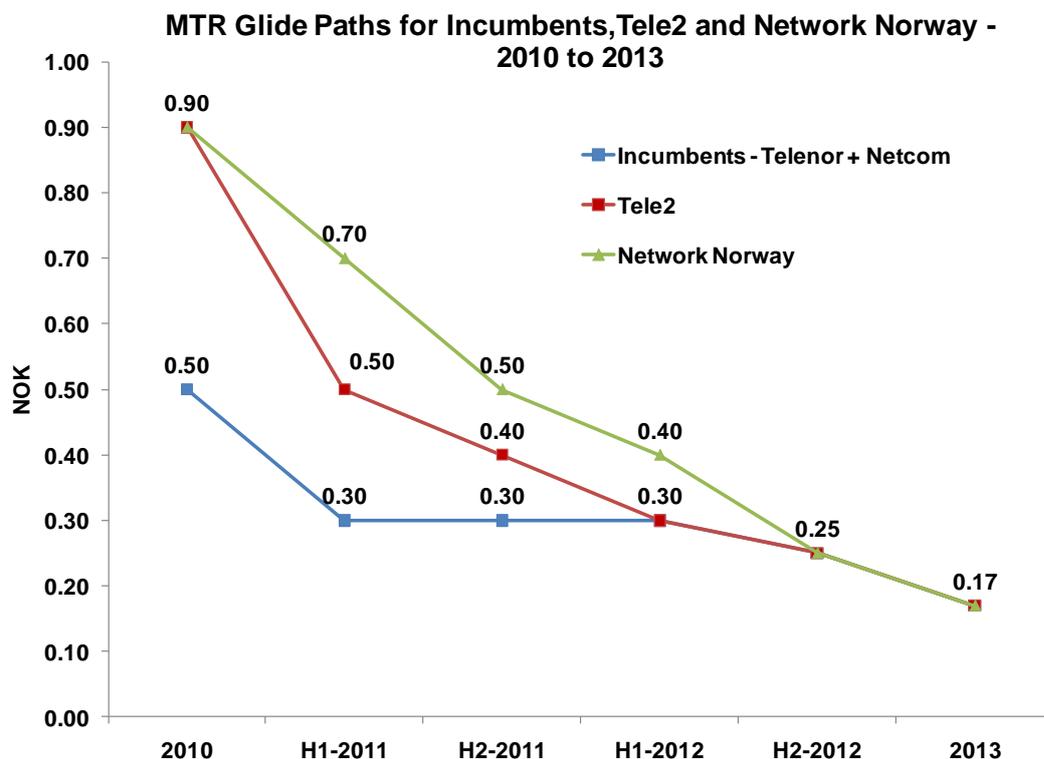
For the next regulation cycle, the NPT proposes to continue using the LRAIC+++ methodology from January 2011 to June 2012 and then moving to a lower cost LRAIC methodology after June 2012. The above chart shows the NPT's proposed glide paths under this regime for the incumbents, Tele2 and Network Norway.

3.2   Third Operator Network Investment

In 2008 the Norwegian Telecoms Ministry encouraged the construction of a new third national network to promote competition in a market dominated by the two incumbents - Telenor and NetCom. Through a joint venture known as Mobile Norway, two of the largest MVNOs in the market developed plans to jointly build a network that would cover at least 75% of the population.

To support Mobile Norway in establishing itself in the market, the Norwegian Telecoms Ministry agreed that the two parties – Tele2 and Network Norway – would temporarily receive higher MTRs than the incumbents. The asymmetric MTRs were calculated such that, over time, the incremental termination revenue would be equivalent to the investment cost of the network. This would enable Tele2 and Network Norway to each recover 50% of the network investment costs.

The investment cost accepted by the Ministry was specified by Mobile Norway's network plans, which forecasted […][U.off] NOK expenditure to reach the 75% population coverage target. The door was also left open for continued asymmetry on a sliding scale in 2011 and 2012 if network investment costs were not recovered by Tele2 and Network Norway by the end of the current regulation cycle in December 2010

The degree and duration of asymmetry for the MTRs applied to Tele2 and Network Norway is therefore directly linked to the estimated investment costs required for the new Mobile Norway network.

In its consultation on the cost model for MTRs, the NPT has reassessed the asymmetric MTRs previously agreed for Tele2 and Network Norway. The NPT proposes that the asymmetric MTRs be based on the costs of the hypothetical Third Operator as defined by the AMG cost model. One would expect the Third Operator network should be a close approximation of the Mobile Norway network.

3.3   Cost Model Assessment.

In our assessment of the NPT proposals, CSMG has examined the AMG network cost model, studied the associated documentation from the NPT and has also held discussions with the NPT and AMG. The primary purpose of the investigation has been to assess the input assumptions and methodology used to determine the mobile termination rates and investment costs of the Third Operator network.

It is important to note that CSMG did not have access to the Telenor and NetCom demand data for reasons of confidentiality. Consequently we were unable to fully audit the final model for the highest operator MTR result. Based on our discussion with the NPT, it is our understanding that in the AMG model provided to Tele2, the Third Operator network and all costs are dimensioned using Tele2 subscribers/usage whereas in the actual model used by NPT both Tele2 and Network Norway subscribers/usage are used.

3.4   Scope of Assessment

Our approach for evaluating the proposed MTR change and Third Operator network investment cost centred on two areas:

1. <u>Third Operator Network Build Costs</u>**:** We assess the accuracy of the AMG model in estimating capital costs for the Third Operator network build as compared to the Mobile Norway network plan estimates submitted to the Telecoms Ministry

2. <u>Model Assumptions</u>**:** We have identified and examined key demand and cost assumptions across the AMG model and provided a rigorous validation of important drivers that we believe to be questionable or inaccurate.

We have used our extensive telecom experience, knowledge base, and research to present a robust and detailed evaluation of the above areas in this document.

4. THIRD OPERATOR NETWORK BUILD COSTS

In developing the business case for the Mobile Norway venture, Tele2 and Network Norway undertook a detailed analysis of the business requirements and developed a network design that would fulfil these business needs. The design process involved in-depth radio access network simulation. After evaluating the number of sites required for coverage of a given market with a standard model, physical site searches were conducted to identify the availability of site locations in each market. The information was then used in a network planning tool to calculate the total number of sites that would be required to cover Norwegian markets. The result of this analysis was a network design covering 75% of the population comprising […][U.off] cell sites at a cost of […][U.off] NOK. These network plans along with the designs, maps and associated costs were submitted to and approved by the Telecoms Ministry.

In its consultation document, the NPT has published the results of its independent estimate of the costs for building a national network. The hypothetical Third Operator in the AMG model covers 77% of Norway's population by 2009 with only 1,209 sites at a substantially lower capital cost of 1.44B NOK. We have chosen to highlight the difference in the number of cell sites required between the Mobile Norway and AMG model estimates since cell site acquisition and civil work costs constitute nearly half of total network capital costs in the AMG model.

	AMG Model	Mobile Norway Network Plan
Population Coverage	77%	75%
Number of Sites	1,209	[…] [U.off.]
Investment	1.44 B NOK	[…] [U.off] NOK

Although it is clear that the model underestimates the radio access network size as compared to the Mobile Norway network plan, the precise reason for the discrepancy is unknown. We have identified a number of possible reasons why this may be so:

1. <u>Different performance objectives</u> – The hypothetical Third Operator network is designed for outdoor coverage. NPT uses a threshold of -94dBm (at 900MHz) to determine whether a given area would be covered by the hypothetical network.[1] However, in practice Mobile Norway require a more stringent coverage threshold due to their national roaming arrangements. Without good coverage, there is a high risk that calls would be carried by the roaming partner, even in areas which are nominally covered by Mobile Norway. A lack of good coverage would also cause mobile handsets to flip back and forth between home and roaming networks impairing customer experience. The design of a Third Operator network employing national roaming therefore necessitates a more stringent coverage

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[1] Source: NPT communication with CSMG

threshold. Specifically, as the majority of mobile traffic is generated indoors it is necessary to design the network to provide good indoor coverage. This typically requires an additional 12 to 18 dB in the link budget, which in turn requires a greater density of cell sites. Without good indoor coverage, the Third Operator would not have a viable business: it would suffer higher operational costs through greater use of national roaming and its customers would experience poor service quality. Addressing the customer experience issue without improving indoor coverage could only be achieved through shifting all traffic to the roaming partner's network in regions of poor coverage. This would further exacerbate the operational cost issue.

2. <u>3G traffic concentration</u> – The AMG model implicitly assumes that the 3G traffic distribution follows the same pattern as 2G traffic. There are no 3G capacity sites required in the AMG model and several 3G coverage sites are employed on available 2G coverage sites. 3G network traffic is likely to be much more concentrated in core urban areas especially during the initial years due to higher variability in factors such as 3G device functionality and data user experience compared to 2G technology. It is therefore expected that more 3G capacity sites would be required in densely populated urban markets.

3. <u>Disparate population pockets</u> – For population coverage in each of 20 fylker, the AMG model uses a detailed table listing the cumulative population over the amount of land that needs to be covered. The use of this table in the model implicitly assumes that the most densely populated areas exist on a contiguous land mass in each market. In reality the most densely populated land areas in a given market may be scattered in pockets over several different locations, thereby requiring more cell sites for coverage. It is not clear whether the AMG model accounts for this possibility.

To estimate the impact on the AMG model Third Operator investment cost for deploying the same number of cell sites as in the Mobile Norway network plans ([…][U.off]), we modulated one of the key assumptions determining the number of 3G coverage cell sites required – the 3G cell site radius. Decreasing the 3G cell site radius to 60.34% of the original value uniformly across all 20 fylker increases the number of cell sites deployed by the Third Operator in the AMG model from 1,209 to […][U.off.] at the end of 2009. We also removed the planning period requirement for all network elements so that only network elements actually deployed by 2009 were counted in the cost estimation. In this scenario, the cumulative network capital costs by 2009 for the Third Operator in the AMG model increase from the original value of 1.44B NOK to 2.18B NOK.

The above mentioned exercise is an approximation of the network costs that would be incurred in deploying […][U.off] sites. We acknowledge that there are several other ways in which the number of sites could be increased in the AMG model such as by increasing the number of capacity sites required or increasing the number of 2G coverage sites. However the above calculation strongly suggests that increasing the number of cell sites in the AMG model in line with Mobile Norway network plans is very likely to increase network costs to a level close to that estimated by Tele2 and Network Norway in the plan submitted to the Telecoms Ministry (i.e. […][U.off] NOK)

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5. ASSUMPTION VALIDATION

5.1 Overview

This section examines each contested assumption in detail and provides our rationale for adjusting them, as well as the resulting impact on the Third Operator network cost and resulting MTR. The overall net effect is an increase of 11.5% in Third Operator Blended LRAIC MTR for 2013 and an increase of 24.5% in Third Operator network investment costs.

	Assumption to be adjusted	% Change in Investment Cost	% Change in 2013 Blended LRAIC MTR
Demand Assumptions	Third Operator GSM market share	19.1%	6.4%
	Third Operator voice usage per subscriber (incoming from other networks)	4.5%	1.2%
	Data usage per subscriber	No effect	3.4%
	Synergy	0.9%	0.4%
	Total Change	**24.5%**	**11.5%**

Note: Synergy represents the effect of simultaneously changing multiple assumptions

These resulting changes to the Third Operator investment costs and MTR are distinct from those arising from the alignment on number of cell sites detailed in the "Third Operator Network Build Costs" section above.

5.2 GSM Market Share

Assumption Description and Model Location: GSM market share forecasts for each existing operator and MVNO in Norway are hard coded into the model on the "M6" market model sheet. In addition, a retail market share forecast for a hypothetical new entrant is included from AMG's previous market model, "M4". This "M4" forecast was created in 2006, before it was known who the third operator would be, and so assumes the new entrant starts with no subscribers and builds up its market share over time.

In the V6 model, to account for the fact that there is now an actual third operator in the Norwegian market, the third operator's retail market share assumption has been revised. The input assumption is still based on the earlier "M4" forecast, however to account for the fact that the third operator launched with an existing retail subscriber base (that of Tele2 and Network Norway), the "M4" forecast is time-shifted such that the third operator begins with a base retail market share of 15% in 2009, equivalent to the "M4" forecast share in 2016.
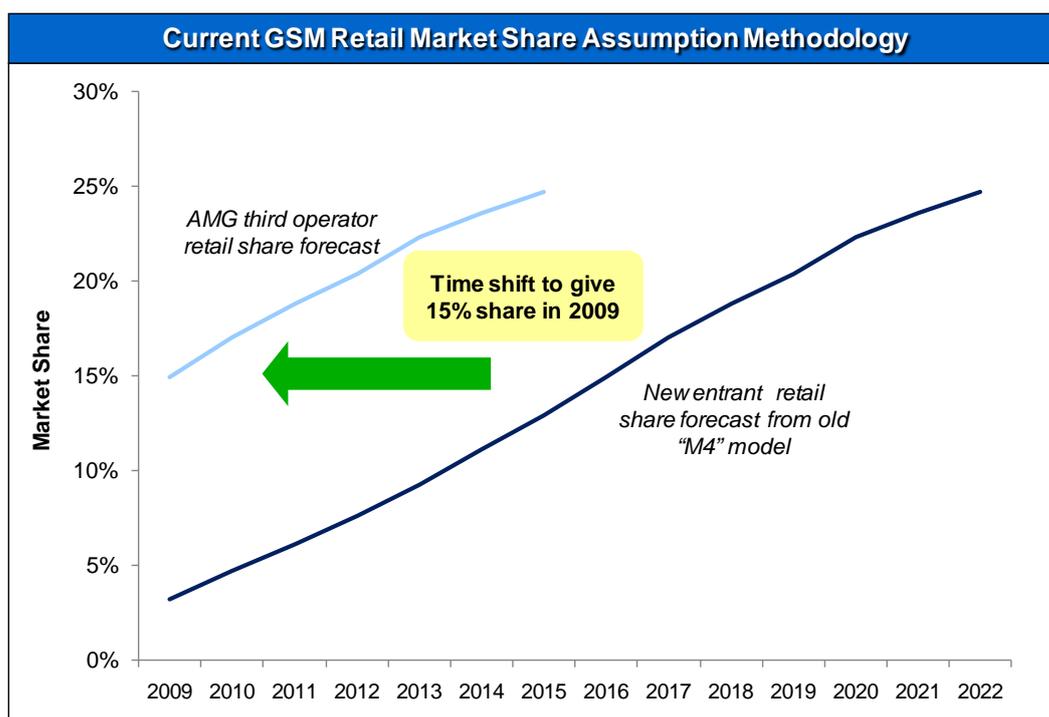
The base retail market share of the third operator is then adjusted due to Tele2 and Network Norway's national roaming agreements: until the third operator completes the build of its coverage network, a proportion of Tele2 and Network Norway's minutes will be carried on an incumbent's network. This multiplier is calculated using the third operator's 2G, 3G and total population coverage, and the proportion of users with a 2G handsets.

The effective third operator market share is obtained by multiplying the base market share by the national roaming multiplier. In 2009, the multiplier is 56%, giving an effective share of 8.3%.

Revised CSMG Forecast and Rationale: Our assessment of the market share assumption has uncovered two issues: one concerns the input assumptions that are being used and the other concerns the method by which the national roaming multiplier is calculated.

Considering the input assumptions first, the use of the hypothetical "M4" forecast significantly understates the actual number of retail customers for the third operator. The combined market share of Tele2 and Network Norway is 19% in 2009, compared to the 15% assumed in the model. The correct data is available in the model as operator-specific inputs, however these appear not to have been used in the calculation of the third operator market share.

A comparison between the NPT market share assumptions and a revised forecast aligned to 2009 actual values is shown in the chart below.
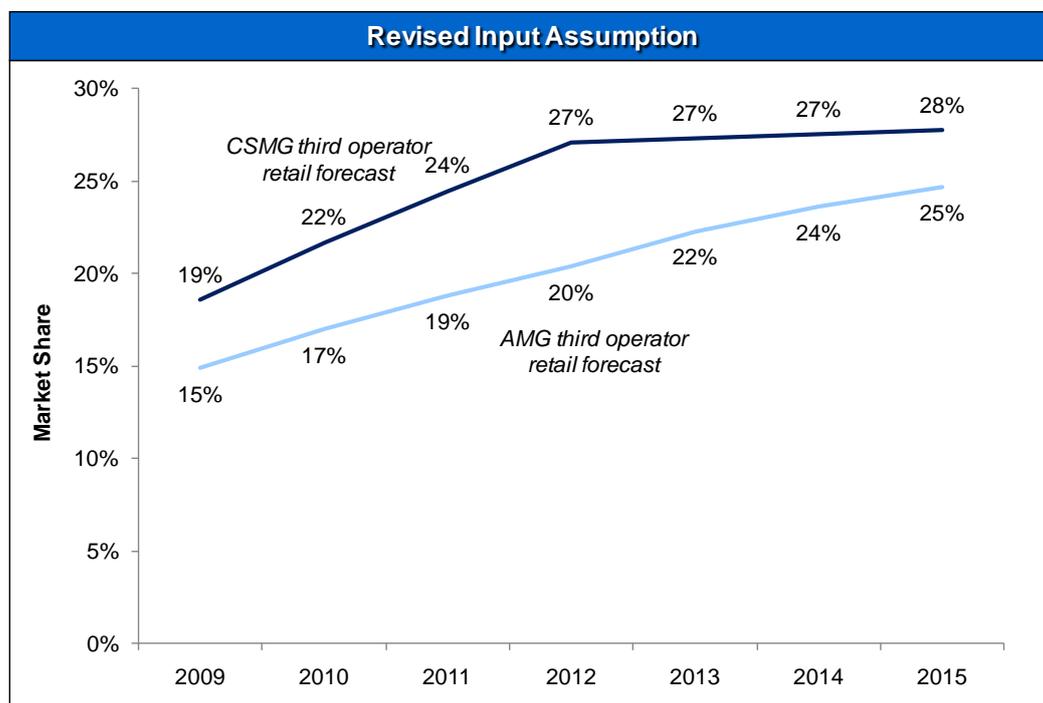
The second issue is the method by which the national roaming multiplier has been calculated. In the model this factor is based on the total population coverage of the third operator network. The model inaccurately estimates total coverage as the larger value between 2G and 3G network population coverage. In reality the total population coverage is greater than either of the individual 2G or 3G network coverage in the early years (estimated on the "A5" model sheet). Again, the correct figure can be found elsewhere in the model. For example, in 2009, the total population coverage by the Third Operator is 77% ("A5" model sheet) but is incorrectly stated to be 69% when calculating the multiplier for the market share estimation. This error leads to a further reduction in the estimated number of retail subscribers on the Third Operator's network.

Understating the number of subscribers that use the third operator network means that the model incorrectly calculates the amount of capacity required in the network, and hence gives a lower output for the investment required to build a third network. This effect is greater in the earlier years, where the discrepancy is wider.

While NPT has explained the benefits of modelling a hypothetical third operator rather than directly modelling Mobile Norway (e.g. for transparency), the assumptions used should at least be a close approximation to reality, and preferably use actual figures where they are available

Impact to Investment Cost and MTR: Correcting both the market share assumption and the multiplier for national roaming has a substantial effect on the investment cost and MTR outputs, increasing the investment cost by 19.1% and the 2013 Blended LRAIC+ MTR by 6.4%.

Impact of Adjusting Assumption	Investment cost	19.1%
	2013 MTR	6.4%

Note: 'MTR' refers to the Blended LRAIC MTR output of the AMG model. For simplicity, only the 2013 MTR effect is shown; the assumption also changes the MTR in other years.

5.3   Voice Usage

Assumption Description and Model Location: Voice usage assumptions for each operator are contained in the model in the "M6" sheet. On this sheet, the assumption "Incoming voice from other mobile networks per sub per month" for the third operator represents the average number of minutes terminated on the third operator's network per subscriber each month from other mobile networks.

The assumption is a set of hard coded values, starting at 60 minutes in 2008 and rising to 74 minutes by 2013.

Revised CSMG Forecast and Rationale: The assumption used appears very low when compared to Tele2 and Network Norway actual data. Tele2 and Network Norway both terminated over […][U.off] per subscriber per month in 2009 from other mobile networks.

Given that coverage and national roaming has already been factored in to the model by adjusting the number of subscribers, we see no reason why there should be such a large difference in incoming minutes between Tele2 and Network Norway on one hand and the Third Operator in the AMG model on the other.

A comparison between the NPT incoming minutes assumption for the Third Operator and a revised forecast of the weighted average incoming minutes using Tele2 and Network Norway actual data is presented in the chart below.

[

][U.off]

The consequence of understating the call volumes is that the third operator network described in the model does not build sufficient capacity to handle realistic incoming call volumes.

Impact to Investment Cost and MTR: Correcting this assumption increases the investment cost by 4.5%, and the termination rate output by 1.2%.

Impact of Adjusting Assumption	Investment cost	4.5%
	2013 MTR	1.2%

Note: 'MTR' refers to the Blended LRAIC MTR output of the AMG model. For simplicity, only the 2013 MTR effect is shown; the assumption also changes the MTR in other years.

5.4   Data Usage

Assumption Description and Model Location: The assumptions for data usage per high-speed subscription per month are located in the "D3_M6" model worksheet. This includes both downstream (HSDPA) and upstream (HSUPA) usage in megabytes. In addition, an assumption is made that the ratio of downstream to upstream traffic will be 4:1 throughout the model time period.

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Downstream usage is a series of values based on hard-coded assumptions in certain years. Upstream usage is then calculated based on the downstream values and the 4:1 ratio between downstream to upstream traffic.

For example, the model assumes 975MB downstream usage per high-speed subscriber per month in 2010. This is divided by 4 to obtain a value of 244MB of upstream usage per high-speed subscriber per month.

Data usage in the model grows rapidly until 2012, and then continues to grow steadily until 2033.

Revised CSMG Forecast and Rationale: The data forecast does not adequately take into account the effects of LTE network launches on the amount of data that will be carried by the HSPA network.

In the documentation accompanying the model, AMG explains that the effects of LTE have not been included in the model as the HSPA network is expected to continue carrying traffic after the introduction of LTE.[2] AMG cites GPRS as an example of a legacy data network, and provides a chart (reproduced below) showing that total GPRS traffic volumes have been roughly constant since the introduction of 3G data networks.
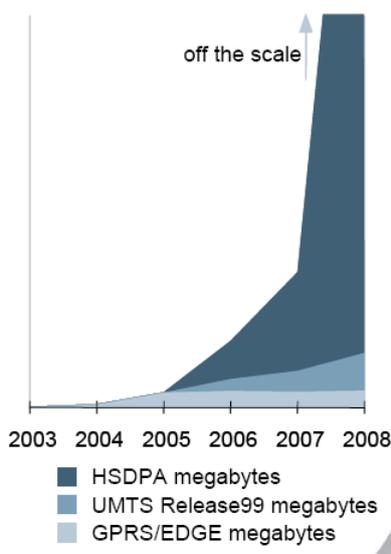
*Norwegian mobile data traffic by radio technology (source: AMG)*

We concur with AMG that the roll-out of LTE will not cause overall 3G data traffic volumes to decline in the short term. We expect that 3G/HSPA traffic will level off, much like GPRS, once a carrier deploys LTE as usage migrates to the new network.

To model the impact of HSPA traffic levels levelling off, we have adjusted the HSDPA usage per subscriber over time such that total usage (i.e. across all subscribers) remains constant after the deployment of LTE in 2011. The decrease in HSDPA usage per subscriber is to counter the effect of increasing HSDPA subscriptions in the AMG model after 2011.

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[2]"The updated cost model of mobile termination", I Streule and J Allen, (Updated LRIC model_industry slides_241109.pdf)

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HSUPA traffic is modified in the same way, maintaining the original assumption of a 4:1 downstream to upstream ratio.

A comparison between AMG's original assumptions and the revised forecast accounting for total HSPA volumes levelling off is presented in the chart below.
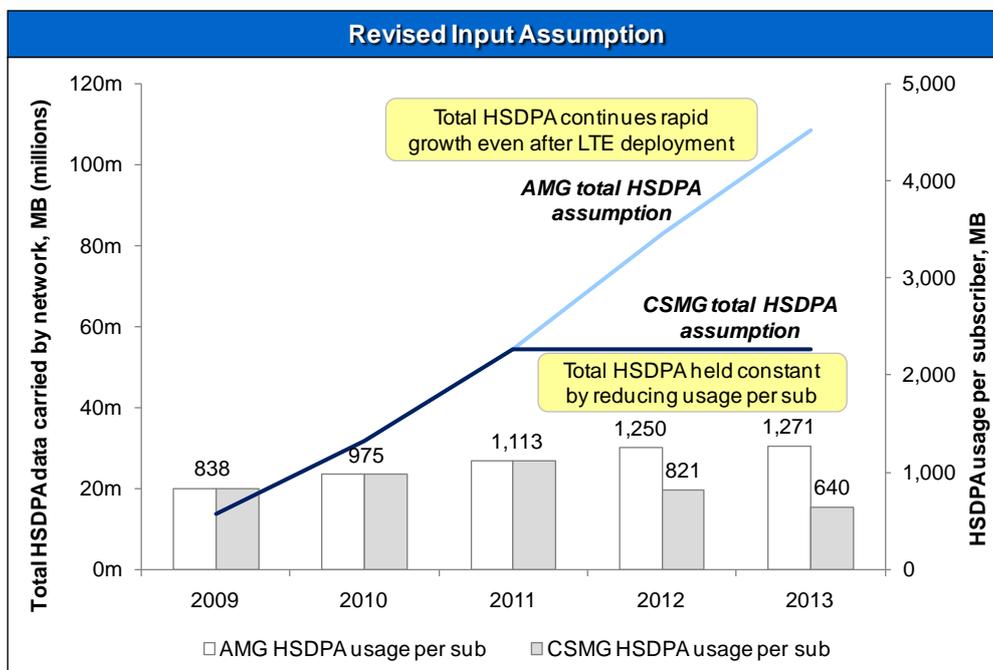
Impact to Investment Cost and MTR: Correcting this assumption has a small effect on MTR output, but does not change investment cost.

Impact of Adjusting Assumption	Investment cost	*No effect*
	2013 MTR	3.4%

Note: 'MTR' refers to the Blended LRAIC MTR output of the AMG model. For simplicity, only the 2013 MTR effect is shown; the assumption also changes the MTR in other years.

6. MIGRATION COSTS FROM MVNO TO MNO

In its consultation document, the NPT proposes that the investment costs which Tele2 and Network Norway should recover through the MTR asymmetry be limited to only those costs which pertain to the migration from MVNO to MNO ("Option 2" in the NPT document).

We make no comment on whether this choice is reasonable. However, in the consideration of migration costs we believe that the NPT may not have fully accounted for all costs incurred. Specifically we see three areas in which investment costs appear to have been overlooked:

1. Investment in new systems beyond those listed in the consultation document

2. System integration costs to adapt legacy MVNO systems to meet the extended requirements of operating as an MNO

3. Unavoidable operational expenditure incurred in building the Mobile Norway network

We look at each of these issues in turn below.

6.1 New Systems

In its consultation document, the NPT has identified several network elements and systems which an MVNO would be expected to own. These systems are excluded from the NPT Option 2 investment cost estimate on the basis that they have been purchased prior to the transition to MNO.

The NPT list includes the retail billing platform of the MVNO, which is assumed to be repurposed for billing subscribers on the MNO network. We note however that no consideration is made for a billing mediation platform which would be required to interface between the new MNO network and the retail billing platform. This additional system is not required in the MVNO scenario and hence should qualify as a relevant investment cost under "Option 2".

6.2 System Integration Costs

Whilst we agree that it may be possible to repurpose some systems in a migration from MVNO to MNO we would not expect this to be without cost.

Specifically, system integration work will be required to adapt existing systems and integrate them with the new MNO systems. For example, support systems must now handle additional complexities of customer SIM cards and IMSI numbers, much of which would previously have been managed by the host network operator.

Again, these integration costs are a necessary cost in the transition from MVNO to MNO and hence we believe it is reasonable to consider them within the "Option 2" scenario.

6.3   <u>Operational Costs</u>

The third area in which costs appear to have been overlooked is in the operating costs of the network.

In the consultation document (para. 173) NPT states that it does not seem reasonable to take account of operating costs in the investment cost estimate, since this is essentially the cost that the companies would have had anyway as MVNOs.

Whilst we would agree that the selling, general and administrative costs could conceivably be comparable between an MVNO and an MNO, the rationale for excluding network operating costs is unclear.

Specifically, where commitments are required for leased facilities such as cell site accommodation and transmission circuits, it is difficult to understand why these should not be considered an investment cost.

7. CONCLUSION

After carefully evaluating the latest AMG model, it is clear that the number of cell sites estimated for the Third Operator network covering 77% of Norway's population by the end of 2009 is substantially lower than the number of cell sites planned in Mobile Norway's network plans for comparable coverage levels. The precise reason for this significant difference in the number of cell sites between the two estimates is not yet known but possible causes may be differences between radio performance objectives and implicit model assumptions on population and traffic distribution. Since the Mobile Norway network plan and associated cost estimates were developed in detail, and include field surveys, we strongly urge the NPT to further scrutinize this issue and revise the number of cell sites required for the Third Operator in the AMG model to make these consistent with Mobile Norway network plan. This additional scrutiny is especially needed in light of the fact that the current AMG model with its erroneous cell site estimates is being used to determine both asymmetry and future MTR for Mobile Norway

There are also several demand assumptions for the Third Operator in the AMG model such as market share and usage levels that are inaccurate. While we understand the reasons for modelling the Third Operator as a hypothetical carrier rather than directly modelling Mobile Norway, the assumptions used for the Third Operator in the model should use actual data where available. This is not the case with the model assumptions that we have highlighted earlier in this report and we urge the NPT to change these assumption values in the AMG model to match the actual values available for Tele2 and Network Norway.

The third area for which we recommend a reassessment are the migration costs that an MVNO would incur in migrating to an MNO. We believe three cost categories have been overlooked: billing mediation; system integration; and, network operational costs. All three categories appear reasonable for inclusion under the NPT-defined "Option 2" scenario.

In aggregate, these issues have a significant impact on both the investment cost of building a new network in Norway, and the MTR of such a network. Therefore, this warrants a re-calculation of both the investment cost that Tele2 and Network Norway should recover through MTR asymmetry, and the MTRs applied to operators in Norway.