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ASSESSING 700 MHZ MIGRATION COSTS INCURRED BY 2RN

A report for ComReg

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19 December 2017

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EXECUTIVE SUMMARY

The Commission for Communications Regulation ("ComReg") has engaged Frontier Economics ("Frontier") to analyse the costs that 2rn has incurred to date, and expects to incur in future, as a result of the migration of its digital terrestrial television ("DTT") network from the 700 MHz band. This follows an earlier report that Frontier authored which set out forecast recommended compensation for RTÉ and described the methodology for assessing appropriate compensation (the "2016 Frontier Report")[1].

The purpose of this report is to assess the costs that have been and will be incurred by 2rn in order to ensure that the correct compensation is paid to RTÉ in each of payment phases 1 and 2, as set out in the recommendations of the 2016 Frontier Report.

Our report examines a report that 2rn (on behalf of RTÉ) has provided to ComReg which describes the costs that it has incurred to date and that it expects incur in future as a result of the migration from the 700 MHz band (the "2rn Report").

Our review of the costs and subsequent recommendations is then based on the following three assessments:

- First, we consider whether 2rn's changes to its DTT network reflect the required changes described in the 2016 Frontier Report. Where the approach taken by 2rn has diverged from the approach as described in the 2016 Frontier Report we consider whether the alternative approach is reasonable (and if not we consider what might be considered a reasonable alternative).
- Second, we consider whether the costs incurred by 2rn in making the changes necessary to migrate its DTT network from the 700 MHz band (such as acquiring and/or installing all equipment necessary) are reasonable.
- Third, we assess whether 2rn's method for recording its costs in the tariff model reflects the method described in the 2016 Frontier Report.

Based on these reviews we conclude on the appropriate compensation to be paid to RTÉ.

Results

The 2rn Report forecasts the costs that 2rn has already incurred and the costs which it expects to incur in migrating its DTT network from the 700 MHz band.

It identifies the total allocation of costs between:

- committed costs (i.e. costs that are already committed);
- identified costs (i.e. costs which are not yet committed, but it knows with certainty that it will incur (and for which it has often already identified a supplier)); and,

[1] In December 2016, ComReg published a report by Frontier, its consultant, titled the "700 MHz Repurposing Cost Compensation Report 16/114a" ("the 2016 Frontier Report").

- the remaining balance of forecast costs (i.e. costs which 2rn considers that it will reasonably incur, though which it has not yet fully identified). 2rn's report shows all these costs under "Balance". However 2rn could clearly identify and quantify over 30% of these costs. The remaining unquantified balance is expected to be reasonably incur too, but quantification of these items is not possible exactly at this stage (e.g. because they are strongly depend on circumstances, weather, ad hoc issues that arise at local sites as the project develops etc.).

Figure 1 Total forecast spend by category €

	Total forecast spend
Committed	[✂]
Identified	[✂]
Balance quantified*	[✂]
Balance unquantified*	[✂]
Total	7,731,182

Source: Frontier analysis

** 2rn's Report shows these in one line, although there is a difference in the nature of quantified and unquantified items. For further details on the breakdown of quantified and unquantified balance, please refer to Figure 8.*

For obvious reasons, there is more clarity and certainty over committed costs (and to a lesser degree identified costs) than the remaining balance of costs that have yet to be incurred. Therefore conclusions in relation to committed spend are made with more certainty than those in relation to the "balance unquantified". Nonetheless, we recognise that there is a degree of uncertainty in a project of this size, which will be reflected in the final phase 3 payment and there is scope for the Department of Communications, Climate Action and Environment ("DCCAE") to clawback overpayments, should outturn costs be lower than currently anticipated.

Frontier has made three adjustments to the forecast costs in order to estimate the total Allowable Costs for the purposes of estimating compensation:

- In relation to transmitters and transposers (costpools CXMTR01 and CXMTR02[2]), we have reduced the allowable costs to reflect the fact that 2rn will earn incremental revenues from the assets from the tariff model, at the point where the existing assets would have been fully depreciated. This is in accordance with the methodology set out in the 2016 Frontier Report.
- In relation to fibre links (costpool CXMDI01), we have reduced the allowable compensation to reflect the minimum required configuration required for 700 MHz migration (i.e. to remove incremental costs required to "future-proof" the fibre link).
- In relation to site rigging & engineering (costpool CXMPM03), we have adjusted costs to reflect the remaining value to 2rn of the vehicle assets at the end of the migration process.

[2] The costpools relate to the internal 2rn labels for different categories of costs. These are described in Figure 5.

Figure 2 Comparison of costs and compensation by cost pool (€ excluding NRV, contingency and senior management time)

Description	Total Costs (2016 Frontier Report)	Total forecast costs Forecast (2rn Report)	Allowable costs for compensation
Transmitters Supply & Install	[✂]	[✂]	[✂]
Transposers	[✂]	[✂]	[✂]
Combiner Supply & retuning	[✂]	[✂]	[✂]
Antennas, Surveys & Structural Strengthening	[✂]	[✂]	[✂]
Antennas Mods & Retunes	[✂]	[✂]	[✂]
New Site development - Wicklow	[✂]	[✂]	[✂]
New Site development - Drogheda	[✂]	[✂]	[✂]
Fibre links	[✂]	[✂]	[✂]
SFN Config	[✂]	[✂]	[✂]
RBR & Off-Air feeds	[✂]	[✂]	[✂]
Consultant Project Management	[✂]	[✂]	[✂]
Project Engineers	[✂]	[✂]	[✂]
Site rigging & engineering	[✂]	[✂]	[✂]
Freq planning, EHS	[✂]	[✂]	[✂]
	7,674,600	7,731,182	6,669,318

Source: Frontier analysis

Total Allowable Costs for the purposes of calculating compensation is therefore €6,669,318.

Non Recoverable VAT ("NRV") is applied to all costs with the exception of senior management time and salaries of internal 2rn staff (Figure 3).

The total compensation for phases 1 and 2 should be no more than the costs that 2rn will incur over that period. This reflects total forecast costs, including NRV and including the costs of senior management time, but excluding the remaining contingency. This amounts to €7,975,880.

Figure 3 NRV costs

	€
Compensation estimate excluding NRV	[✂]
NRV	[✂]
Senior management time NRV (is not applied)	[✂]
Total allowable costs	7,975,880

Source: Frontier

Managing a complex project such as the 700 MHz migration will inevitably require attention and input from 2rn's senior management. This is resource that would otherwise be allocated to 2rn's other regulated and non-regulated activities. In this sense 2rn faces an "opportunity cost" as a result of its senior staff being required to support the 700 MHz migration project.

2rn estimates that the cost of senior management time is now higher (than was estimated in the 2016 Frontier Report) as 2rn is internally managing many of the changes to its network, whereas the 2016 Frontier Report assumed a greater degree of outsourcing.

As noted in section A.9, 2rn provided information on the specific ongoing activities of six of its senior management team and the level of resource that will be required to support the 700 MHz migration project. The roles and functions of the six 2rn Senior Managers that will be required to provide input during the project are reasonable given the complex nature of the 700 MHz migration project. 2rn's allocation of time (of approximately ½ - 1½ days per week per manager depending on the role) are reasonable given their ongoing activities. The costs of senior management time are consistent with the full costs (including on-costs) of the roles that are reviewed by ComReg in its tariff model. Therefore we conclude that this level of senior management time involvement recognises the incremental internal resource costs associated with managing 2rn's 700 MHz migration plan and is deemed to be reasonable and proportionate.

2rn has already been paid compensation of €5,160,000 to reflect the estimated costs that it incurred in phase 1 of the project. As noted in Figure 4, the remaining forecast costs up to the end of phases 1 and 2 (after deduction of the compensation paid in phase 1) amounts to €2,815,880. This figure exceeds the allocated phase 2 compensation in the 2016 Frontier Report by €235,880. As noted in the 2016 Frontier Report, the maximum payable compensation for phases 1 and 2 should not exceed the estimate as set out in the 2016 Frontier Report, unless otherwise determined by the DCCAE.

However the risk of over compensation is low given that a final balancing payment will be withheld by the DCCAE until the end of the project, subject to a determination of the Allowable Costs by Frontier in line with the 2016 Frontier Report. The payment to RTÉ at phase 3 is to act as a balancing payment such that the total compensation paid will only equal the total Allowable Costs incurred, as determined and recommended by Frontier. If Frontier determines at phase 3 that the Allowable Costs incurred in phases 1, 2 and 3 are less than the compensation in phases 1 and 2 (i.e. if there has been an overpayment of compensation), then Frontier will recommend to ComReg that RTÉ should repay the difference to DCCAE, such that the total compensation paid to RTÉ will equal the Allowable Costs.

Given that there is limited scope for overpayment, Frontier recommends that it is reasonable for the compensation to reflect the forecast costs that 2rn will incur (including senior management time, but excluding contingency) even though this exceeds the forecast compensation estimate in the 2016 Frontier Report.

Figure 4 Allowable compensation phase 2

	(€)
Total forecast allowable costs phases 1&2	7,975,880
Less compensation phase 1	-5,160,000
Remaining forecast allowable costs phases 1&2	2,815,880
2016 Frontier Report proposed phase 2 payment	2,580,000

Source: Frontier

Therefore, subject to the determination of the DCCAE, as part of the phase 2 compensation, Frontier recommends that RTÉ should be compensated for the forecasted allowable costs of €2,815,880.

1 INTRODUCTION AND CONTEXT

The Commission for Communications Regulation ("ComReg") has engaged Frontier Economics ("Frontier") to analyse the costs that 2rn has incurred, and expects to incur, as a result of the migration of its broadcasting transmission services from the 700 MHz spectrum.

Our work is in two parts:

- Part one (this phase) will examine the costs incurred (or expected to be incurred) as at Autumn 2017.
- Part two will then take place in 2020, before the final compensation payment is due.

1.1 Context to this report

In December 2016 ComReg published a report by Frontier, its consultant, titled the "700 MHz Repurposing Cost Compensation Report 16/114" ("the 2016 Frontier Report"). The 2016 Frontier Report contained an assessment of the efficiently incurred capital and operational costs which 2rn, and ultimately RTÉ, would likely incur in migrating the DTT network from the 700 MHz band. The 2016 Frontier Report also formed the basis for estimating the compensation payable to RTÉ to cover such migration. The report estimated that RTÉ should be compensated up to €8.6m to cover allowable incremental costs as a result of the 700 MHz migration. The 2016 Frontier Report recommended that such compensation be paid in three *phases*, as follows:

- Phase 1 early 2017: 60% (€5.16m) to cover tendering and installation of equipment (to be installed in summer 2017)
- Phase 2 late 2017: 30% (€2.58m) to cover tendering and installation of equipment (to be installed in summer 2018);
- Phase 3 2020: 10% (€0.86m) to cover the final reconciliation between forecast and actual costs.

The purpose of this report is to assess the costs incurred by 2rn (and forecast costs) in order to ensure that the correct compensation is paid to RTÉ in each of payment phases 1 and 2, as set out in the recommendations of Frontier 2016 Report (a non-confidential version of which was published as ComReg document 16/114a).

2rn (on behalf of RTÉ) has provided a report to ComReg which describes the costs that it has incurred to date, and that it expects incur as a result of the migration from the 700 MHz band (the "2rn Report").

1.2 Terms of reference

ComReg's terms of reference stated that Frontier Economics will compare the costs in the 2rn Report against the cost categories in the 2016 Frontier Report (confidential version) in order to determine the "Allowable Costs" – i.e., the

payable compensation for phases 1 and 2. This cost comparison exercise will include three broad areas of analysis based on the following questions:

- whether 2rn's changes to its DTT network reflect the required changes described in the 2016 Frontier Report and, if not, whether the actual changes are reasonable and, if they are not reasonable, the changes that would be or would have been reasonable;
- whether the costs incurred by 2rn in acquiring and/or installing all equipment necessary to the 700 MHz DTT migration are reasonable in a way that is consistent with the 2016 Frontier Report; and
- whether 2rn's methodology for recording its costs in the tariff model reflects the methodology described in the 2016 Frontier Report. This will include ensuring that RTÉ does not over-recover costs - for example, by recovering costs from the compensation mechanism *and* from allowed regulated revenues.

It is important to note, however, that Frontier is not required to in any way audit 2rn's tariff model or regulatory accounts and this report does not constitute such an audit.

Rather, our analysis has considered whether the total allowable cost incurred by RTÉ up to and including Phase 2 was *less* than the total compensation paid to RTÉ at Phase 1. If our analysis determines that this is the case, then difference between the two figures may be netted off the recommended compensation payment for at Phase 2.

However, if this analysis determines that the total allowable cost incurred by RTÉ up to and including Phase 2 is *more* than the total compensation paid to RTÉ at Phase 1, a larger compensation payment to RTÉ will not be considered at Phase 2. This means that the payment to RTÉ at Phase 2 will not exceed the 30% allocated to this phase unless such a payment is recommended by Frontier Economics and in turn authorised by the DCCAE. This report considers whether the compensation payment should reflect any allowance for costs incurred which were allowable contingency costs.

1.3 Structure of the remainder of this report

The remainder of this report is set out as follows.

- Section 2 describes the approach we have taken in this review.
- Section 3 concludes and contains Frontier's recommendations.
- ANNEX A contains Frontier's detailed analysis of 2rn's cost data.

2 OUR APPROACH TO ASSESSING 2RN COSTS

In this section we summarise the analysis we have undertaken to assess the costs incurred by 2rn as a result of the migration of its DTT network from the 700 MHz band.

We set out below:

- the approach we have taken to assess the costs incurred by 2rn; and,
- describe the data provided by 2rn on the costs it has incurred.
- ANNEX A contains the detailed analysis of costs.

2.1 Approach

In assessing the costs of 2rn we reviewed the 2rn Report which sets out the costs that it has incurred to date, and expects to incur in future, as a result of the migration of its DTT network from the 700 MHz band. In addition, Frontier has examined a number of supplementary memos and information provided by 2rn which provide supporting information.

Following an initial assessment, Frontier, together with members of staff of ComReg, met with representatives of 2rn on 12 October 2017. At this meeting, the 2rn representatives provided further explanation and information relating to these cost figures. Frontier also posed a number of specific questions to which 2rn responded.

Consistent with the terms of reference, our review of the costs (which is set out in detail in ANNEX A) and subsequent recommendations (which is set out in section 3) are based on the three assessments described in section 1.2.

Based on this review we conclude on the appropriate compensation in a way that is consistent with the methodology set out in the 2016 Frontier Report.

2.2 The 2rn Report

The 2rn Report sets out the costs already incurred by 2rn, and the future costs expected to be incurred by 2rn, as a result of migration its DTT network from the 700 MHz band.

The 2rn Report is structured to group costs into cost categories that broadly reflected the cost categories that were described in the 2016 Frontier Report. These are listed in Figure 5.

Figure 5 Cost pools

Cost pool	Description
CXMTR01	High powered transmitters / main sites
CXMTR02	Transposers / relay
CXMTR03	Combiners / re-tuning
CXMAN01	Antenna replacements & surveys
CXMAN02	Antenna modifications
CXMSD01	New site development, Wicklow
CXMSD02	New site development, Drogheda
CXMDI01	Fibre links
CXMDI02	SFN configurations (head end)
CXMDI03	RBR backup / off air feeds
CXMPM01	Consultants
CXMPM02	Head office PM (2rn internal cost)
CXMPM03	Site rigging and engineering (2rn internal cost)
CXMPM04	Consultancy (environmental, health & safety, frequency planning)

Source: 2rn

In each cost pool, the 2rn Report identifies three categories of costs:

- **Committed costs**. These relate to costs that 2rn has already incurred, or has already committed to.
- **Identified forecast costs**. These relate to costs that are not yet committed to, but have been identified by 2rn as being required.
- **"Balance".** This is the remaining costs that 2rn forecast it will incur, but that it has not identified exactly what the costs are.

In addition, three categories of "overhead costs" are listed in the 2rn Report:

- **NRV**: This relates to non-recoverable VAT that 2rn incurs as a result of its activities. This is this applied to all costs with the exception of internal 2rn senior staff time.
- **Senior staff time**: This relates to the cost of the time of senior staff of 2rn which is allocated to the 700 MHz migration project, and which absent that project could have been spent on other activities (including both regulated and non-regulated activities). We note that NRV is not applied to senior staff time, as salaries are not subject to VAT.
- **Contingency**. This provides a contingency against costs being higher than would otherwise be expected. The costs related to contingency reflect the typical increase in costs which might be observed in a similar project of this scale, and at the time of the 2016 Frontier Report were based on a fixed percentage (15%) of forecast CAPEX and OPEX costs. However, given that the level of uncertainty in the project is now less it has reduced the estimate of contingency to 9%[3].

[3] In practice it has reduced the estimate of required contingency by its estimate of the cost of senior staff time.

3 CONCLUSIONS AND RECOMMENDATIONS

We set out below our conclusions and recommendations. We consider in turn:

- The summary of costs incurred by 2rn
- The allowable costs for compensation purposes
- The associated NRV and contingency
- The total proposed compensation to RTÉ for phase 2

3.1 Summary of costs incurred and to be incurred by 2rn

Based on the data provided by 2rn, we expect it to incur, over the period to June 2020, the costs (excluding NRV) as set out below in Figure 6.

Figure 6 Projected cashflow as a result of the 700 MHz migration (excluding NRV, contingency and senior management time) (€)

Cost Pool	Description	Costs (Ex NRV)							Total (over time)
		Paid to Date	Oct-17 to Mar-18	Apr-18 to Sep-18	Oct-18 to Mar-19	Apr-19 to Sep-19	Oct-19 to Mar-20	Apr-20 to Jun-20	
CXMTR01	Transmitters Supply & Install	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMTR02	Transposers	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMTR03	Combiner Supply & retuning	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMAN01	Antennas, Surveys & Structural Strengthening	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMAN02	Antennas Mods & Retunes	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMSD01	New Site development - Wicklow	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMSD02	New Site development - Drogheda	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMDI01	Fibre links	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMDI02	SFN Config	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMDI03	RBR & Off-Air feeds	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMPM01	Consultant Project Management	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMPM02	Project Engineers	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMPM03	Site rigging & engineering	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
CXMPM04	Freq planning, EHS	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total (over cost pools)		581,406	2,875,047	2,105,389	1,229,865	698,424	157,367	83,683	7,731,182

Source: Frontier analysis

As of September 2018, 2rn estimates that it will have spent €5,561,842 of the compensation already received. 2rn is currently in the process of entering into multiple contracts for the supply of equipment and services over the coming six months so that it can successfully migrate from the 700MHz band. Many of these contracts will have phased payments such as, deposits on signing contracts, part payments on receipt of equipment, part-payments on the successful commissioning of equipment and final payments post migration. It is considered prudent that 2rn be allocated sufficient financial resources to meet the full payment terms of these contracts (on signing).

Figure 7 sets out the split of 2rn's costs between Committed, Identified and Balance – *as per 2rn's nomenclature*:

- "Committed" costs are those which 2rn has already incurred or which it knows with certainty that it will incur (as it has entered into a contract to procure equipment).
- "Identified" costs are those which 2rn has yet to incur but which it knows it will incur and for which it also has a good degree of certainty of the amount of those costs.
- "Balance" refers to future costs which 2rn reasonably expects to incur though which it has not yet fully identified.

Figure 7 Total forecast spend by category (€)

	Total forecast spend
Committed	[✂]
Identified	[✂]
Balance	[✂]
Total	7,731,182

Source: Frontier analysis

For transparency we have adopted 2rn's nomenclature above to describe the different types of costs that it reasonably expects to face (as described in Figure 7). However, we note that within the "balance" there are a number of costs which 2rn has been able to quantify with a reasonable degree of certainty (totalling €[✂]). Therefore the sum of costs which are yet to be fully quantified is €[✂] or approximately 12% of total costs.

Figure 8 Quantified costs within the balance (€000s)

Cost Pool	Description	Balance	Of which quantified	Remaining unquantified balance
CXMTR01	Transmitters Supply & Install	[✂]	[✂]	[✂]
CXMTR02	Transposers	[✂]		[✂]
CXMTR03	Combiner Supply & retuning			
CXMAN01	Antennas, Surveys & Structural Strengthening	[✂]		[✂]
CXMAN02	Antennas Mods & Retunes	[✂]		[✂]
CXMSD01	New Site development - Wicklow			
CXMSD02	New Site development - Drogheda			
CXMDI01	Fibre links			
CXMDI02	SFN Config			
CXMDI03	RBR & Off-Air feeds	[✂]		[✂]
CXMPM01	Consultant Project Management	[✂]		[✂]
CXMPM02	Project Engineers			
CXMPM03	Site rigging & engineering			
CXMPM04	Freq planning, EHS	[✂]	[✂]	[✂]
Total		1,149	353	796

Source: 2rn

3.2 Allowable costs (for compensation)

Frontier notes that some uncertainty remains in respect of 2rn's forecast of its future costs, including that there is a significant "balance" in many cost pools and this makes it difficult to assess whether 2rn's forecasts are reasonable. However, we recognise that there is inevitably a degree of uncertainty in a project of this size which will be reflected in the final phase 3 payment and that there is scope for clawback should outturn costs be lower than currently anticipated.

We have, however, made three adjustments to 2rn's forecast costs, in order to estimate the total allowable costs for which 2rn should be compensated (its "Allowable Costs") in a way that is consistent with the 2016 Frontier Report:

- In relation to transmitters and transposers (cost pools CXMTR01 and CXMTR02), we have reduced the allowable costs to reflect the fact that 2rn will earn incremental revenues from the assets from the tariff model, at the point where the existing assets would have been fully depreciated. This is in accordance with the methodology set out in the 2016 Frontier Report.
- In relation to Fibre Links (Cost pool CXMDI01), we have reduced the allowable compensation to reflect the minimum required configuration required for 700 MHz migration (i.e. to remove incremental costs required to "future-proof" the fibre link).
- In relation to Site rigging & engineering (cost pool CXMPM03), we have adjusted costs to reflect the remaining value to 2rn of the vehicle assets at the end of the migration process.

Figure 9 Comparison of costs and compensation by cost pool (excluding NRV, contingency and senior management time) (€)

Cost Pool	Total Costs (2016 Frontier Report)	Total forecast costs Forecast (2017 Report)	"Allowable costs"
CXMTR01	[✂]	[✂]	[✂]
CXMTR02	[✂]	[✂]	[✂]
CXMTR03	[✂]	[✂]	[✂]
CXMAN01	[✂]	[✂]	[✂]
CXMAN02	[✂]	[✂]	[✂]
CXMSD01	[✂]	[✂]	[✂]
CXMSD02	[✂]	[✂]	[✂]
CXMDI01	[✂]	[✂]	[✂]
CXMDI02	[✂]	[✂]	[✂]
CXMDI03	[✂]	[✂]	[✂]
CXMPM01	[✂]	[✂]	[✂]
CXMPM02	[✂]	[✂]	[✂]
CXMPM03	[✂]	[✂]	[✂]
CXMPM04	[✂]	[✂]	[✂]
Total	7,674,600	7,731,182	6,669,318

Source: Frontier analysis

*Notes: the three costpools where adjustments were made to forecast costs to estimate Allowable costs are highlighted in **bold italics***

3.3 NRV, contingency and senior management time

NRV of 13.34% is applied to all costs with the exception of senior management time and internal 2rn project engineering costs.

Figure 10 NRV costs

	(€)
Compensation estimate excluding NRV	[✂]
NRV	[✂]
Total costs including NRV	[✂]

Source: Frontier

Note: in the workings of the 2rn Report €[✂] of 2rn engineering staff costs (2rn engineering staff costs €[✂]) were identified within the NRV and the remaining €[✂] were identified within cost pool CXMPM03. However, this does not represent an over recovery of NRV and is simply a modelling artefact of the 2016 2rn Report.

The total compensation payable to RTÉ for phases 1 and 2 should be no more than the Allowable Costs that 2rn will incur in both phases. As set out in Figure 11, this amounts to €7,975,880. It includes total forecast costs (in each of the cost pools as set out in Figure 9), plus NRV and costs of senior management time, but excluding the remaining contingency costs.

The cost to 2rn of senior management time was based on 2rn's assessment of the time that senior management would spend on the 700 MHz migration project given its internal project plan[4]. 2rn estimates that the cost of senior management

[4] The cost of senior management time was implicitly included within each of the costs categories identified in the 2016 Frontier Report, however, it was not explicitly identified.

time is now higher (than was estimated in the 2016 Frontier Report) as 2rn is internally managing many of the changes to its network, whereas the 2016 Frontier Report assumed a greater degree of outsourcing.

Managing a complex project such as the 700 MHz migration will inevitably require attention and input from 2rn's senior management. This is resource that would otherwise be allocated to 2rn's other regulated and non-regulated activities. In this sense 2rn faces an "opportunity cost" as a result of senior staff being required to support the 700 MHz project.

As noted Annex A.9 2rn provided information on the specific ongoing activities of six of its senior management team and the level of resource that will be required to support the 700 MHz migration project. The roles and functions of the six 2rn Senior Managers that will be required to provide input during the project are reasonable given the complex nature of the 700 MHz migration project. 2rn's allocation of time (of approximately ½ - 1½ days per week per manager depending on the role) are reasonable given their ongoing activities. The costs of senior management time are consistent with the full costs (including on-costs) of the roles that are reviewed by ComReg in its tariff model.

Therefore we conclude that this level of senior management time involvement recognises the incremental internal resource costs associated with managing 2rn's 700 MHz migration plan and is deemed to be reasonable and proportionate.

Figure 11 Allowed compensation costs

	Allowable costs in phase 1 and 2 (€)
Total allowable identified costs	[✂]
Senior management time	[✂]
Total allowable costs phase 1 and 2	7,975,880

Source: Frontier

Contingency costs were assumed to be 15% of forecast OPEX and CAPEX costs (excluding senior management time). These contingency costs are set out below. Note, however, that these represent the current estimate of total project costs (to be compensated by the three compensation payments). The cost of senior management time is netted off the contingency allowed since 2rn consider that a lower level of contingency is now appropriate at this phase of the project (as there is now less uncertainty that costs will exceed forecasts than at the time of the 2016 Frontier Report).

Figure 12 Contingency excluding senior staff costs

Description	(€)
Total forecast project costs (up to end phase 2)	[✂]
Contingency at 15%	[✂]
Total forecast costs including contingency	[✂]

Source: Frontier

Contingency costs relate to a reasonable estimate of costs that may be incurred by the end of the project but which, at this early stage of the project are not foreseeable. For the avoidance of doubt, 2rn will only be recompensed for costs that it actually incurs as a result of the 700 MHz migration, and if the contingency

proves unnecessary then 2rn will not receive the amount labelled as contingency in its compensation payments.

3.4 Total allowed compensation for phases 1 and 2

We noted in the 2016 Frontier Report that the total compensation payable to RTÉ up to and including Phase 2 should not exceed the costs forecast in the 2016 Frontier Report unless determined by DCCAE. This means that the total compensation paid to RTÉ for Phase 2 would not exceed the 30% maximum allocated to Phase 2 compensation in the 2016 Frontier Report, unless we should recommend some higher payment (exceeding 30%) or the DCCAE should determine that some higher payment is appropriate.

2rn's forecast of its total costs for Phases 1 and 2 exceeds the forecast in the 2016 Frontier Report. Figure 13 shows that the remaining costs forecast by 2rn - up to Phases 1 and 2 and after deducting the compensation paid to RTÉ in Phase 1 - amount to €2,815,880. This figure is higher than the maximum Phase 2 compensation allocated in the 2016 Frontier Report (of €2,580,000).

Figure 13 Allowable compensation phase 2

	(€)
Total forecast allowable costs phases 1&2	7,975,880
Less compensation phase 1	-5,160,000
Remaining forecast allowable costs phases 1&2	2,815,880
2016 Frontier Report proposed phase 2 payment	2,580,000

Source: Frontier

However, as noted elsewhere in this report, a degree of uncertainty over the costs is inherent in a project of this size. We also note that the risk of over-compensation is also low, given that a final balancing payment will be withheld by the DCCAE until the end of the project and there will be scope for the DCCAE to clawback any overpayments (possibly following a recommendation by ComReg). Therefore we conclude that despite the degree of uncertainty, 2rn's forecast of its costs are reasonable for the purposes of assessing appropriate compensation, and make a recommendation on this basis.

In summary we recommend that it is reasonable for the compensation to reflect 2rn's forecast of the costs it will incur (including senior management time, but excluding contingency).

Therefore, subject to the determination of the DCCAE, as part of the phase 2 compensation, we recommend RTÉ should be compensated for the forecasted allowable costs (€2,815,880).

We note that that the recommended compensation of €2,815,880 for Phase 2 is €235,880 higher than the forecast of allowable costs for Phase 2 as set out in the 2016 Frontier Report (€2,580,000). This would in turn imply that the maximum Phase 3 compensation payment would be likely to be €235,880 less than the forecast amount as set out in the 2016 Frontier Report. This means that the final Phase 3 compensation payment should be around €624,120 (unless otherwise directed by the DCCAE).

Figure 14 Maximum phase 3 compensation payment

	€
Total proposed compensation phases 1&2	7,975,880
Max compensation forecast in the 2016 Frontier Report	8,600,000
Remaining forecast allowable costs phases 1&2	624,120

Source: Frontier

If, at Phase 3, it should transpire that the Allowable Costs incurred by 2rn in Phases 1, 2 and 3 are *less* than the compensation paid to RTÉ in Phases 1 and 2 (i.e. if there has been an overpayment of compensation) then Frontier will recommend to ComReg that RTÉ should repay the difference to the DCCAE such that the final total compensation paid to RTÉ, for Phases 1, 2 and 3, will equal the Allowable Costs.

ANNEX A DETAILED ANALYSIS OF COST POOLS

We set out below our analysis of the cost forecasts in the 2rn Report. For ease, we consider these in the categories set out in the 2rn Report. That is:

- Section A.1 considers High powered transmitters / main sites and Transposers / relay
- Section A.2 considers Combiners / re-tuning
- Section A.3 considers Antenna replacements & surveys and Antenna modifications
- Section A.4 considers New site development at Wicklow and Drogheda
- Section A.5 considers fibre links
- Section A.6 considers the SFN configurations (head end)
- Section A.7 considers RBR backup / off air feeds
- Section A.8 considers overheads including project management consultants, head office project management (2rn internal cost), site rigging and engineering (2rn internal cost) and consultancy (environmental, health & safety, frequency planning)
- Section A.9 considers the costs of senior management time.

In each section we describe the costs incurred, consider if the approach is consistent with the 2016 Frontier Report, whether 2rn's cost forecasts are reasonable, and the appropriate compensation.

A.1 High powered transmitters / main sites and transposers / relay

A.1.1 Description of costs incurred

CXMTR01

The cost pool CXMTR01 is for the supply and installation of transmitters.

Rhode & Schwarz is the supplier of the transmitters, with a contract of value €[✂]. The payment terms are: [✂]% upon delivery; [✂]% upon successful completion of all tests; and the final [✂]% after the retention period of one year. 2rn considers the cost of the transmitters to be is less than expected due to a positive outcome from its tendering process.

Figure 15 shows CXMTR01's costs split by when the payments are due and whether these payments are "Committed", "Identified" (but not committed) and "Balance" (not identified).

Figure 15 Time profile of CXMTR01 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	[✂]	[✂]	-	[✂]	-	-	[✂]
Identified	-	[✂]	[✂]	-	[✂]	-	-	[✂]
Balance	-	-	[✂]	[✂]	[✂]	-	-	[✂]
Total	-	1,433	598	252	322	-	-	2,605

Source: 2rn

The identified costs include cost of spares and a combiner for Kilduff.

Figure 16 identified costs

	€
Cost of spares	[✂]
Combiner for Kilduff	[✂]

Source: 2rn

The identified costs include €[✂] budgeted for spare transmitters (7.5% of contract value). Spares are needed to avoid a reduction in power, possible outages, and to achieve objectives in Service Level Agreements. 2rn noted that the general rate for spares should be around 10-15%. Indeed 2rn noted that Rhode & Schwarz recommended a higher percentage for spares, but as these spares will be warehoused in Dublin (and could be accessed easily and quickly) 2rn considered that 7.5% would be sufficient.

The "balance" (i.e., budgeted forecast spend which has not been already committed or identified) on this cost pool is €[✂]. This is budgeted for various smaller works (including but not limited to those set out below) though 2rn has not yet formally identified suppliers or costs. The larger items of the "balance" are set out in Figure 17.

Figure 17 Other costs

Description	Contractor	Estimate	Comment / Purpose
MIB Integration	Uncel	[✂]	To integrate new Tx GUIs into SCADA
Deliveries & Storage	Securispeed	[✂]	Storage of install materials and ancillaries throughout project
Electrical & Izar metering	R&S	[✂]	To address obligations to provide customer specific billing for power to customers in regulated Broadcasting Market A.
Removal of old equipment - electrician, plumber, labourer, equipment, civils	TBC	[✂]	Completed post simulcast - includes requirement to fix up Opes, decommission electrical & cooling, remove equipment & scrap equipment that is surplus to requirements
Training - 3 courses	R&S	[✂]	5 engineers per course at €4,950
Ice protection for Maghera	R&S	[✂]	No space in existing location for new heat exchanger so new protection required
Kilduff civils	L Bergin	[✂]	Plinth for new Heat exchanger location PO raised
Heat exchanger extras (vertical required for Kippure, Kilduff & Spur Hill)	R&S	[✂]	
Kilduff combiner & installation	R&S	[✂]	
Air vents for cooling system	TBC	[✂]	To allow priming of cooling systems
RF Power Monitoring system incl power meters	TBC	[✂]	For SLAs on new systems
DVMS for new systems	TBC	[✂]	For SLAs on new systems
Maghera & Spur Hill integration into existing 2+1 system	TBC	[✂]	Allows us to only buy 1No. Tx on each of these sites
Total		€337,575	

Source: 2rn

Therefore the remaining balance as at October 2017 was €[✂].

Figure 18 Extra items included within balance €

Balance	[✂]
Of which identified spending	[✂]
Remaining balance	[✂]

Source: 2rn

CXMTR02

The cost pool CXMTR02 is for transposers[5].

The main supplier is Thomson, with a contract already in place. Radionics, Huber & Suhner UK, and Lalor Steel are also listed as contractors within this cost pool. Other identified costs include installation materials and spare parts.

Figure 19 shows the costs in this cost pool, again split between "Committed", "Identified" and "Balance" costs.

Figure 19 Time profile of CXMTR02 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	[✂]	-	[✂]	-	-	[✂]
Identified	-	[✂]	[✂]	-	-	[✂]	[✂]	[✂]
Balance	-	-	[✂]	[✂]	-	-	-	[✂]
Total	251	423	193	94	83	10	10	1,063

Source: 2rn

Of the identified but not committed spend, €[✂] is budgeted for spares (based on an assumption of 7.5% of the total contract value).

The transposer / relay contract is for a "supply only" agreement as 2rn will do the installation work itself. The costs of installation are included in the cost pools related to internal 2rn costs (CXMPM02 head office project management and CXMPM03 site rigging and engineering).

The remaining balance covers materials and equipment related to the installation by 2rn. The cost of internal 2rn time for the installation is in the cost pools CXMPM02 and CXMPM03.

A.1.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

2rn's overall plan for replacing transmitters and installing new transposers is consistent with that set out in the 2016 Frontier Report.

A.1.3 Assessment of whether costs are reasonable

The costs of the equipment are consistent with the costs in the 2016 Frontier Report though some of the costs of transmitters are lower than forecasted that report. For example:

[5] Transposers are lower powered transmitters that rebroadcasts signals to receivers.

Figure 20 Comparison of transmitter costs

Description	Purchase Order Value	2016 Budget
Clermont Transmitter system	[✂]	[✂]
Kippure Transmitter System	[✂]	[✂]
Maghera Transmitter System	[✂]	[✂]
Spur Hill Transmitter System	[✂]	[✂]
Truskmore Transmitter System	[✂]	[✂]
Kilduff Transmitter System	[✂]	[✂]

Source: 2rn

2rn noted that there were a number of potential reasons why the costs were lower than had been forecast. These included that the acquisition of transmitters was for a sizeable order from a single supplier and the timing of the order was advantageous. However 2rn still anticipates some additional costs in getting the transmitters fully installed.

Figure 21 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Transmitters (inc installation)	[✂]	[✂]
Transposers (inc installation)	[✂]	[✂]
Total	**4,294,600**	**3,668,234**

Source: 2rn, Frontier analysis

There is a considerable "balance" - i.e. forecast costs which are not specifically allocated to cost items. This amounts to €[✂] (CXMTR01) and €[✂] (CXMTR02). A degree of uncertainty over the costs is inherent in a project of this size. However the risk of over compensation is low given that a final balancing payment will be withheld by the DCCAE until the end of the project and there will be scope for DCCAE to clawback any overpayments (possibly following a recommendation by ComReg). We therefore conclude that despite a degree of uncertainty the forecast costs are reasonable for the purposes of assessing appropriate compensation.

A.1.4 Conclusion on allowable compensation

2rn has incurred costs in having to replace transmitter and transposer assets, earlier than it would have had it not migrated its DTT network from the 700 MHz band. However, 2rn would have replaced the assets in the medium term in any event (c. 2025). At the point where 2rn would have replaced its existing assets (c. 2025), 2rn will earn regulated revenues from the assets replaced as part of the 700 MHz migration. Therefore, in assessing the compensation payable to 2rn in a way that is consistent with the 2016 Frontier Report, our analysis nets off the present value of the regulated revenues that 2rn will earn from the newly installed assets (i.e. regulated revenues from the newly installed assets from the point at which they would have been replaced to the end of the asset life).

This would imply that compensation payable to RTE as a consequence of costs incurred by 2rn for transmitter and transposers should be as set out in Figure 22 below[6].

Figure 22 Allowable compensation (exc NRV) (€)

	Full cost	Compensation estimate
Transmitter and transposers	[✂]	[✂]

Source: Frontier

A.2 Combiners / re-tuning

A.2.1 Information in the 2rn Report

The cost pool CXMTR03 is for combiner supply and re-tuning.

2rn decided to re-tune existing combiners rather than purchasing new ones, which it believes will result in a cost saving. The contractor for the re-tuning is Spinner GMBH with a contract valued at €[✂] (ex NRV).

Figure 23 shows the costs in this cost pool.

Figure 23 Time profile of CXMTR03 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	-	-	-	-	-	[✂]
Identified	-	-	-	-	-	-	-	-
Balance	-	-	-	-	-	-	-	-
Total	[✂]	[✂]	-	-	-	-	-	[✂]

Source: 2rn

A.2.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

2rn's overall plan for replacing and retuning the combiners is consistent with that set out in the 2016 Frontier Report, though we note that 2rn has decided to re-tune existing combiners rather than purchase new combiners.

A.2.3 Assessment of whether costs are reasonable

The costs set out in the 2rn Report are less than those forecast in the 2016 Frontier Report (Figure 24).

[6] The methodology use d to estimate the allowable compensation is set out in ComReg 16/114a (700 MHz REPURPOSING COST COMPENSATION Non-confidential report for ComReg). https://www.comreg.ie/publication/frontier-report-700-mhz-repurposing-cost-compensation-non-confidential/

Figure 24 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Combiner disconnect	[✂]	-
Combiner re-tuning	[✂]	[✂]
Total	[✂]	[✂]

Source: Frontier Analysis

A.2.4 Conclusion on allowable compensation

Combiner costs are compensated in full, therefore the total compensation allowable to RTÉ is €[✂] as forecast by 2rn.

A.3 Antenna replacements & surveys and antenna modifications

A.3.1 Information in the 2rn Report

The cost pool CXMAN01 is for antennas, surveys & structural strengthening.

There are multiple suppliers for this cost pool, including 4site, Alan Dick, SIRA, RFS, TSN and Voss Eng, with contracts already in place. Identified costs include consumables such as cables, connectors, cranes and rigging.

The biggest single cost relates to the Kippure site.

The Kippure cost is more than forecast as there are few suppliers. The work to which this cost relates has a hard deadline of summer 2018 that cannot be missed. The work is also highly weather dependent and the risk is transferred to the supplier, but with a cost.

Despite the higher cost than was originally forecast, 2rn notes that it achieved potential savings in relation to this cost as the relevant contract was made jointly with antenna upgrades at Clermont Cairn which are not related with the 700 MHz migration (only costs for upgrading the Kippure site were included in the 2rn Report). Without this economy of scope, 2rn considers that the cost of the antenna could have been higher.

Figure 25 shows CXMAN01's costs.

Figure 25 Time profile of CXMAN01 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	[✂]	[✂]	[✂]	-	-	[✂]
Identified	-	[✂]	[✂]	[✂]	-	-	-	[✂]
Balance	[✂]	-	[✂]	[✂]	-	-	-	[✂]
Total	79	263	708	124	87	-	-	1,262

Source: 2rn

The balance of €[✂] will include the cost of consumables due to self-installations being done by 2rn including cranes, rigging, steelworks and storage which are not already identified by 2rn.

The cost pool CXMAN02 is for modifications of existing antenna and re-tuning.

The suppliers are set to be at three sites (supplied by RFS, Katherin and Elti), however contracts have not yet been signed. The identified costs include rigging and lifting materials.

Figure 26 Time Profile of CXMAN02 Costs (€ 000s, Ex NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	-	-	-	-	-	-	-
Identified	-	[✂]	[✂]	-	-	-	-	[✂]
Balance	-	-	[✂]	-	-	-	-	[✂]
Total	-	[✂]	[✂]	-	-	-	-	[✂]

Source: 2rn

The "balance" in cost pool CXMAN02 is the cost of consumables due to self-installations being done by 2rn. These relate to cost of cranes, rigging, steelworks and storage which are not already identified by 2rn.

A.3.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

2rn's approach of replacing the antenna at Kippure and upgrading other existing antennas is consistent with the approach set out in the 2016 Frontier Report.

A.3.3 Assessment of whether costs are reasonable

Some of the costs of antenna upgrades are higher than were anticipated in the 2016 Frontier Report. This is shown below in Figure 27.

Figure 27 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Antenna replacement,	[✂]	
Surveys (Structures and Cabins)	[✂]	
Structural Strengthening	[✂]	
Subtotal Antenna upgrade and survey	[✂]	[✂]
Antenna Modification & Retunes	[✂]	[✂]
Total	1,060,000	1,422,150

Source: 2rn

For example, the antenna replacement at Kippure was originally forecast to be €[✂] (excluding NRV) whereas TSN is supplying the upgrade for €[✂]. 2rn notes that the cost of antenna replacements was higher than budgeted due to:

- a small number of potential suppliers (4 in total);

- short timeframes for the work; and,
- high dependency on weather, the risk of which is borne by the supplier.

A.3.4 Conclusion on allowable compensation

We note that 2rn's total forecast costs of antenna works are significantly higher than those forecast in the 2016 Frontier Report. However, there was a degree of uncertainty in making the original forecasts and hence a reasonable contingency was allowed.

Furthermore, there is a significant "balance" of costs (of €[✂] across the two cost pools) which is currently as yet unidentified or uncommitted. An assessment of the actual costs incurred at a later date should ensure that these costs were reasonably incurred (and hence are allowable).

Subject to the above comments, antenna costs are compensated in full, therefore the total compensation allowable to RTÉ is €[✂].

A.4 New site development, Wicklow and Drogheda

A.4.1 Information in the 2rn Report

The cost pool CXMSD01 is for the development of a new site at Wicklow.

A [✂] lease for the new site has been signed with rent of €[✂]. "4site"[7] has advised 2rn on planning and sourcing suitable locations. Other identified costs include planning, design and site development.

Figure 28 shows CXMSD01's costs.

Figure 28 Time profile of CXMSD01 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	-	-	-	-	-	[✂]
Identified	-	[✂]	[✂]	-	[✂]	-	-	[✂]
Balance	-	-	-	-	-	-	-	-
Total	[✂]	[✂]	[✂]	-	[✂]	-	-	[✂]

Source: 2rn

The cost pool CXMSD02 is for the development of another new site at Drogheda.

The location of the new site is [✂].

A [✂] lease for the site has been signed [✂]. Similar to the Wicklow cost pool (CXMSD01), 4site has advised on planning and sourcing suitable locations, and other identified costs include planning, design and site development.

Figure 29 shows CXMSD02's costs.

[7] 4site is a specialist firm providing advice on site assessment, survey and acquisition.

Figure 29 Time profile of CXMSD02 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	-	-	-	-	-	[✂]
Identified	-	[✂]	[✂]	-	[✂]	-	-	[✂]
Balance	-	-	-	-	-	-	-	-
Total	[✂]	[✂]	[✂]	-	[✂]	-	-	[✂]

Source: 2rn

A.4.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

The approach to building new transmitters at two new sites is consistent with the approach taken in the 2016 Frontier Report.

Wicklow

[✂][8].

[✂].

[✂].

Figure 30 Assessment criteria for site selection

Criterion	Weighting
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
[✂]	[✂]
Total Scores	100%

Source: 2rn

Drogheda

Existing sites in Drogheda were not suitable for the following reasons:

[✂]

[✂]

[✂]

[✂]

[✂].

[8] [✂]

2rn considered [✂]alternative sites. 2rn's reasons for rejecting all [✂]are set out below.

These are set out in the figures below.

Figure 31 [✂]

[✂]

Source: 2rn

- [✂].

[✂]:

"[✂]."

- [✂]

[✂]:

"[✂]."

- [✂]

"[✂]."

Given that alternative sites were unavailable we conclude that the approach taken by 2rn was reasonable.

A.4.3 Assessment of whether costs are reasonable

We note that the costs of new sites are significantly higher than was anticipated in the 2016 Frontier Report. However, this is explained by the fact that when costs were initially estimated, 2rn had not fully tendered for new sites.

Figure 32 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Transposer for new site	[✂]	
Combiner for new site	[✂]	
Site 1 Wicklow	[✂]	[✂]
Site 2 Drogheda	[✂]	[✂]
Total	[✂]	[✂]

Source: 2rn

A.4.4 Conclusion on allowable compensation

Subject to the above comments, new site costs are compensated in full, Therefore the total compensation allowable to RTÉ is €[✂].

A.5 Fibre links

A.5.1 Information in the 2rn Report

The cost pool CXMDI01 is for fibre links.

The 2016 Frontier Report explained that the more concentrated use by 2rn of spectrum in the bands below the 700 MHz band (following DTT migration) would increase the risk that a malfunctioning transmitter somewhere, say, on the west coast of Ireland could cause outages of the DTT network elsewhere in the State, because transmitters receive their feed in a single "ring" of transmitters.

In order to prevent one malfunctioning transmitter from potentially affecting the entire DTT network throughout State, or throughout some large part of the State, one of the main transmitter sites would receive the feed from a fibre link. This means that the site could then retransmit the signal to other transmitters on the north-west and south-west coasts. This would increase the resilience of the network and reduce risk of network outages as it would introduce a new point of transmission on the west coast (meaning that the signal will be transmitted in a "figure of eight" pattern rather than in a single ring).

2rn has since identified that the [✂] transmitter as the optimal site to run the fibre link to.

There is a pre-existing fibre link from [✂] that 2rn can use with no new cost, however 2rn must take a spur from the existing fibre network to the top of [✂] (which is close to [✂]). 2rn states that the site is [✂] km from the nearest point of presence and its estimated costs for the spur are €[✂] per km.

Figure 33 shows CXMDI01's costs.

Figure 33 Time profile of CXMDI01 costs (€ 000s, Ex NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	-	-	-	-	-	-	-
Identified	-	-	[✂]	[✂]	-	-	-	[✂]
Balance	-	-	-	-	-	-	-	-
Total	-	-	[✂]	[✂]	-	-	-	[✂]

Source: 2rn

A.5.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

2rn's fibre links approach is consistent with the 2016 Frontier Report, noting that 2rn has since firmed up the location of the fibre link which is intended to be direct to the [✂] site.

2RN notes the following:

> *"As explained the project is at a very early stage. While we have identified a route, this is a first proposal of a feasible route. We are aware of other existing fibre infrastructure in the area and we are continuing to engage with other fibre providers to identify the most cost effective, secure and achievable route. However, it is prudent to plan for the only option currently identified as feasible. The cost of installing the duct is a blended cost of the various types of surface which will be covered. Once a final route is identified we will survey and cost precisely.*
>
> *…*

While we are investigating possible alternatives, the current proposed route is as highlighted on the attached map. The section marked in yellow is over [✂] land over which 2RN currently has a right of way for access to the transmission site. This is circa [✂]Km and brings us to the public road. The cost to duct this is estimated at €[✂]k.

From this access point at the public road to the existing fibre infrastructure of this particular provider, marked in blue, is circa a further 8Km, we have allowed a further €[✂]k for this section.

[✂].”

A.5.3 Assessment of whether costs are reasonable

We consider 2rn’s forecast costs of the fibre links to be consistent with the 2016 Frontier Report.

Figure 34 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Fibre links	[✂]	[✂]

Source: 2rn

However, 2rn is in a relatively early stage of planning the fibre link.

It has assumed total costs of approximately **€**[✂] based on:

- €[✂] per km for [✂]km of duct (€[✂]);
- €[✂] for the remaining fibre trunk infrastructure ([✂]km @ €[✂]per km); and
- €[✂]-€[✂] for minor completion costs.

The above indicates that 2rn will incur an incremental costs of approximately €[✂] – €[✂] which it has not fully identified (though the costs were recorded as “identified” in the 2rn Report).

There are a number of factors that we have investigated with 2rn in order to determine whether its forecast costs are reasonable.

What is the necessary length of duct installation

Duct installation is a significant driver of the costs. We have therefore investigated whether there may be existing fibre links which are closer than 2rn has preliminarily planned. For example, in the figure below, the ESBT fibre network in high tension pylon is shown by the dashed orange line (run by the electricity network), and BT is the green line. However, direct access to these may also need to factor in the cost of way leaves across farm land. Furthermore, these fibre routes are backbone routes which might not be accessible everywhere.

Figure 35 [✂]

[✂]

Source: Frontier

Reportedly, there is also an available fibre optic access network that is relatively close to the transmitter site and which would an alternative choice to connect to (Figure 36 where green shaded areas represent existing fibre networks).

Figure 36 [✂]

[✂]

Source: Source: http://fibrerollout.ie/rollout-map/

2rn is currently seeking quotes for the fibre link. These will show which fibre route it will use and where the hand-off point to existing fibre infrastructure will be.

2rn has made a number of enquiries to eir in order to determine if an alternative fibre route might be available. [✂]has replied that the closest point to access a fibre link would be approximately [✂]km from the [✂]site as the crow flies (and approximately [✂]km in actuality).

Therefore, the route chosen by 2rn does not seem unreasonable at this stage though a full site survey and commercial quotation will be necessary before this can be confirmed.

What is the nature of the trenching that needs to be done?

The current cost estimates assume that the following trenching needs to be done for each km:

- [✂]m of soft “unmade”
- [✂]m of footpath
- [✂]m of carriageway trenching

2rn has not yet commissioned a full quote in order that we may assess the final costs. However, we note that if it were possible to do as much trenching as possible in softer unmade land, rather than in footpath or carriageway, then the cost of trenching could be reduced.

For example, if only [✂]m of the route was on footpath and [✂]m on carriageway (compared 2rn’s current assumption of [✂]m on footpath and [✂]m on carriage way in 2rn’s current estimate), then the total cost of trenching along the carriage way would fall from €[✂] to €[✂] (see Figure 37).

Figure 37 Cost of trenching under different assumptions

	cost per km	m/km	cost per km (€)	m/km	cost per km (€)
soft unmade	[✂]	[✂]	[✂]	[✂]	[✂]
footpath	[✂]	[✂]	[✂]	[✂]	[✂]
carriageway	[✂]	[✂]	[✂]	[✂]	[✂]
total cost per km			[✂]		[✂]
Total cost @ [✂]km along the carriage way			[✂]		[✂]

Source: 2rn

Once 2rn has instructed a full site survey then it will have greater certainty over costs.

What quality of duct is required?

2rn has a quote for costs of duct assuming [✂]km of [✂] mm duct with four sub-ducts selected. We note that this specification of duct is similar to a "Metropolitan Area Network" solution for very high capacity areas. However, other options such as a smaller diameter duct could be suitable.

In response to this concern, 2rn has pointed out that:

- Providing a lower capacity duct would be slightly cheaper, but would not "future proof" the investment.
- Furthermore, the incremental cost of providing a single core duct is small (given that the largest component of the cost of the fibre link is the trenching) and hence that it is commercially appropriate to "futureproof" the investment.

For example, 2rn estimates that the cost of ducting is €[✂]per km using a four bore duct (totalling approximately €[✂]). If a single bore ducting was used this would cost approximately €[✂] per km.

Figure 38 cost of duct (by number of sub ducts)

	€/km
Supply & Install pre roped sub duct 1/way	[✂]
Supply & Install pre roped sub duct 2/way	[✂]
Supply & Install pre roped sub duct 3/way	[✂]
Supply & Install pre roped sub duct 4/way	[✂]

Source: 2rn

Although we note 2rn's response, we conclude that because a single bore is sufficient to support the 700 MHz migration, compensation should be limited to the cost of the single bore (€[✂]per km). We therefore deduct €[✂] from the allowable compensation, based on the cost difference between single bore and four bore ducting, over [✂]km.

In future, 2rn may lease capacity on its fibre link to third parties (such as mobile operators who lease capacity at the [✂] site). While we note that currently 2rn has no plans to lease capacity on the fibre link, if it should do so in future then the resulting unregulated revenue may be considered by ComReg when considering appropriate tariffs.

A.5.4 Conclusion on allowable compensation

2rn has confirmed to ComReg that its preliminary investigations with [✂] have revealed that there is not a closer alternative fibre link which would be suitable. Therefore, we consider that the approach chosen by 2rn is reasonable (subject to the final costs and survey yet to be carried out).

However, we note that compensation should not cover the costs of providing a four bore sub-duct since this is not necessary to support the 700 MHz migration, (though, as 2rn points out, this is *commercially* reasonable in order to make the investment future proof, should 2rn use the asset for other purposes). Therefore, we exclude from the cost base for compensation the incremental cost of providing four bore sub-ducting.

This indicates that 2rn will incur an incremental cost of approximately €20,000 – €30,000 which it has not fully identified. This represents [✂]%-[✂]% of the estimated cost of the fibre link.

Subject to us noting the uncertainty of 2rn's forecast costs, because it has not yet fully tendered for the fibre link or completed a site survey, we note that fibre link costs as a result of the 700 MHz migration are compensated in full and therefore the estimated compensation to RTÉ should be €[✂]. There will be greater certainty over costs once 2rn has tendered for the fibre link and its chosen contractor implements a site survey.

Figure 39 Estimated compensation

	€
Estimated cost	[✂]
Excluded incremental cost of 4 bore sub-ducting (over cost of single bore)	[✂]
Compensation	[✂]

Source: Frontier

A.6 SFN configurations (head end),

A.6.1 Information in the 2rn Report

Cost pool CXMDI02 is for SFN configurations.

This identified cost is for an MIP inserter in order that two sites (Clermont Carn and Truskmore) on the north east and northwest coast can be synchronised so as to avoid interference.

Figure 40 shows CXMDI02's costs.

Figure 40 Time profile of CXMDI02 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	-	-	-	-	-	-	-
Identified	-	-	[✂]	-	-	-	-	[✂]
Balance	-	-	-	-	-	-	-	-
Total	-	-	[✂]	-	-	-	-	[✂]

Source: 2rn

A.6.2 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

The approach to SFN configurations is consistent with the 2016 Frontier Report. These relate to the use of a Single Frequency Network between two sites which imply incremental costs.

A.6.3 Assessment of whether costs are reasonable

The costs of SFN configurations are consistent with the costs anticipated in the 2016 Frontier Report.

Figure 41 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
SFN	[✂]	[✂]

Source: 2rn

A.6.4 Conclusion on allowable compensation

SFN costs are compensated in full. Therefore the total compensation allowable to RTÉ is €[✂].

A.7 RBR (rebroadcast relay) backup / off air feeds

The cost pool CXMDI03 is for RBR backup and off-air feeds.

These costs relate to receiving antennas on about 50 sites. There is an established contract with SIRA for high direction antennas and other identified costs include Rx filters and installation materials.

Figure 42 shows CXMDI03's costs.

Figure 42 Time profile of CXMDI03 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	[✂]	-	-	-	-	-	[✂]
Identified	-	[✂]	[✂]	-	-	-	-	[✂]
Balance	-	-	[✂]	[✂]	[✂]	-	-	[✂]
Total	-	[✂]	[✂]	[✂]	[✂]	-	-	[✂]

Source: 2rn

A.7.1 Assessment of whether the approach is consistent with the approach in the 2016 Frontier Report

The approach of building RBR backup / off air feeds is broadly consistent with the approach taken in the 2016 Frontier Report though there were some changes.

The 2016 Frontier Report noted that off-air feeds would include:

- RBR costs of €[✂].
- 5 microwave feeds at €[✂] each
- Off-air feeds for 26 sites at €[✂] each
- highly directional receive antennas at €[✂].

However, the 2rn Report envisages the replacement of off-air feeds at many more sites than had been foreseen in the 2016 Frontier Report, and at a higher cost per off-air feed. 2rn envisages changes will be made at 46 sites, rather than at 26 sites as in the 2016 Frontier Report.[9] However there are no overhead costs, RBR specific costs, or microwave fees as in the 2016 Frontier Report.

2rn explained the reasons for its change in approach:

[9] See: Memorandum for Off-Air Receive Antennas & Filters for 700MHz Clearance (Costpool CXMDI-03)

> *The [2016 estimate] was an early estimate, prior to detailed engineering design/site surveys – so not the baseline technical sheet subsequently issued as part of the progress report. The solution outlined at that point was based on best information then available. The technical details from sheet 12b then did not identify:*
>
> *a. Main stations sites requiring changes to receive filters/splitters for their back-up off-air sources*
>
> *b. Simulcasting relay sites attached parent sites whose frequencies are not changing – which require receive splitters to feed the new transmitters.*
>
> *So far no spend has been committed in relation to the additional microwave links. It is possible that not all of this spend will be necessary – but we will only know for sure once the new frequencies have been on-air in Ireland and UK during difficult propagation conditions. We continue to target a solution to the off-air/re-transmit issues within the original budget but the final configuration of the solution continues to develop.*
>
> *We require more [highly directional receive antennas] than we originally nominally estimated, but following tender they have a lower unit cost. Any increase in the cost of antennas is anticipated to be offset by reduction in the requirement for microwave links. The splitters/filters have not been ordered yet, but following tender it looks like their per site cost will be similar to the original estimate."*[10]

We conclude that 2rn's explanation for the proposed changes is reasonable. There is a degree of uncertainty in the costs of off-air feeds as it is not currently fully clear what, and at how many sites, will be necessary for upgrade (for example it is uncertain if microwave links will be necessary or if that can be avoided altogether). 2rn can only determine whether microwave links are required once there are exception propagation conditions between the UK and Ireland to see if those conditions result in interference or not.

A.7.2 Assessment of whether costs are reasonable

We note that change in design of the approach to RBR (rebroadcast relay) backup / off air feeds (described above) means the costs are lower than were anticipated in the 2016 Frontier Report.

Figure 43 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
RBR backup / off air feeds	[✂]	[✂]

Source: *2rn*

Note: *The 2016 Frontier report noted that the forecast cost of RBR back up of €[✂] and Off-air Feeds/Antennas/Filters/Re-Transmitters at a forecast cost of €[✂].*

There is a significant balance of €[✂] which amounts to more than 50% of the expected costs. This should be further considered at the final review.

[10] See: Response to Frontier Email queries Oct 2107 V2 (2)

A.7.3 Conclusion on allowable compensation

Costs related to RBR back up and off air feeds are compensated in full. Therefore, the total allowable compensation to RTÉ is €[✂].

A.8 Overheads: consultants, head office PM (2rn internal cost) site rigging and engineering (2rn internal cost) and environmental, health & safety, and frequency planning

A.8.1 Information in the 2rn Report

The cost pool CXMPM01 is for consultant project management.

2rn has an external project management contract with Nicholas O Dwyer with a value of €[✂]. This covers the preparation of quarterly reports and basic reviews. Other contracts are with Arthur Cox (to review contract terms and conditions) and with Irish Jobs (to place job advertisements). 2rn reserves €[✂] (approximately [✂] day per month per annum) in the balance to pay for possible additional engineering support if needed.

Figure 44 shows CXMPM01's costs.

Figure 44 Time profile of CXMPM01 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	[✂]	[✂]	-	-	-	[✂]
Identified	-	-	-	-	-	-	-	-
Balance	-	[✂]	[✂]	[✂]	-	-	-	[✂]
Total	[✂]	[✂]	[✂]	[✂]	-	-	-	[✂]

Source: 2rn

The cost pool CXMPM02 is for central project management.

These costs are 2rn internal costs. They include €[✂]committed for 2 man years of two staff members, namely a project manager and manager of logistics, ordering and coordination. Other committed costs include training, Personal Protective Equipment (PPE) and laptops.

Figure 45 shows CXMPM02's costs.

Figure 45 Time profile of CXMPM02 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Identified	-	-	-	-	-	-	-	-
Balance	-	-	-	-	-	-	-	-
Total	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: 2rn

The cost pool CXMPM03 is for site rigging and engineering.

These include internal 2rn staff costs and project engineering costs. These amount to €[✂] (NRV is not applied to internal staff costs) for three people (a senior rigger and a senior engineer, and an engineer) for two man years each.

Figure 46 Internal 2rn staff costs (€000s)

	Cost
Senior staff	[✂]
project engineer	[✂]
Total 2rn staff costs	[✂]

Source: 2rn memo on 700 MHz resourcing

Note: NRV is not applied to internal 2rn staff costs. However, in the workings of the 2rn Report €[✂] of 2rn engineering staff costs (engineering staff costs totalled €[✂]) were identified within the "NRV costs" and the remaining €[✂] were identified within cost pool CXMPM03, though, this does not represent an over recovery of NRV and is simply a modelling artefact.

Cost pool CXMPM03 includes a committed cost for vehicles, laptops, training and other staff related costs, and 14 months of 3rd party contractor (i.e. non-2rn) for project engineering (see Figure 47).

Figure 47 Other project management costs

	€
Project contract staff	[✂]
Vehicle	[✂]
Other consumable	[✂]
Total	[✂]

Source: 2rn

Note: [✂].

The costs of internal 2rn staff will be not be included in costs relating to the tariff model, ensuring that 2rn is not compensated twice for costs.

2rn recognises that the value of vehicles at the end of the project will be approximately €[✂] (around 20% of costs), and that these costs should be deducted from forecast costs. However, in the 2rn Report it has only deducted €[✂] to reflect the value of vehicles at resale (see Figure 51 for the further adjustment to reflect the residual value of vehicles).

Figure 48 Total forecast costs

	€
Staff costs recovered from PM03 (see note to Figure 46)	[✂]
Consumable (Figure 47)	[✂]
Total costs	[✂]
Implicit vehicle resale value	[✂]
Total forecast costs (based on cost pool data)	[✂]

Source: 2rn

Figure 49 shows CXMPM03's forecast costs.

Figure 49 Time profile of CXMPM03 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Identified	-	-	-	-	-	-	-	-
Balance	-	-	-	-	-	-	-	-
Total	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: 2rn

The cost pool CXMPM04 is for frequency planning and environmental, health and safety management.

There is a contract in place for ARUP to provide health and safety management consulting. Other identified costs include frequency planning and a drone.

2rn included a cost of "Information for local switchovers are expected to be circa €15k and are part of the CXPM04 costpool. They are not specified in detail as yet.

Figure 50 shows CXMPM04's costs.

Figure 50 Time profile of CXMPM04 costs (€ 000s, exc NRV)

Type	Paid	10/17-03/18	04/18-09/18	10/18-03/19	04/19-09/19	10/19-03/20	04/20-06/20	Total
Committed	-	[✂]	[✂]	[✂]	-	-	-	[✂]
Identified	-	[✂]	[✂]	-	-	-	-	[✂]
Balance	-	-	[✂]	[✂]	-	-	-	[✂]
Total	-	[✂]	[✂]	[✂]	-	-	-	[✂]

Source: 2rn

A.8.2 Assessment of whether 2rn's approach is consistent with the 2016 Frontier Report

2rn's approach to project overheads is broadly consistent with the 2016 Frontier Report.

Drone

2rn has chosen to use a drone to survey new antenna works. This is significantly cheaper than using a helicopter which has been the more typical means, to date, of assessing antenna patterns.

2rn notes that the asset life of the drone is unlikely to exceed the 700 MHz migration project and hence this asset will not have a residual value at the end of the project.

Vehicles

Cost pool CXMPM03 contains the costs of three vehicles which are necessary in order to facilitate the migration. These will be used to transport 2rn staff who will be working on the migration.

2rn notes that there will be a residual value associated with the vehicles at the end of the migration period the present value of which it has estimated at 20% of the purchase price.

2rn has implicitly already deducted €[✂] from its forecast costs, to partially reflect the residual value of the vehicles to 2rn at the end of the project. In order to fully reflect the value of the vehicles to 2rn at the end of the project, a further €[✂] should be deducted from forecast costs.

Figure 51 Adjustment to allowable costs to reflect residual value of vehicles

	€
Vehicle costs	[✂]
Value at resale (20% of cost)	[✂]
Implicit 2rn vehicle resale value deduction	[✂]
Remaining vehicle resale value to be deducted	[✂]

Source: Frontier

Therefore total allowable costs are the sum of forecast costs minus the adjustment for the residual value to 2rn in the vehicles.

Figure 52 Total allowable costs

Total 2rn forecast costs	[✂]
Residual value after 700 MHz project	[✂]
Allowable costs	[✂]

Source: Frontier

A.8.3 Assessment of whether costs are reasonable

Costs of site rigging and engineering include the costs of installation of combiners, and antennas. These costs are, overall, consistent with the 2016 report. The cost of engineering and rigging has increased as this work now incorporates the cost of 2rn installation (which was initially allocated to individual cost pools).

We note that 20% of the value of the vehicles will be deducted from the total to reflect the residual value of the vehicles at the end of the 700 MHz migration project.

Figure 53 Costs (exc NRV) (€)

	2016 Frontier Report	Current estimate
Information for local switchovers	[✂]	[✂]
Consultant Project Management	[✂]	[✂]
Site Rigging and Engineering	[✂]	[✂]
Project Engineers	[✂]	[✂]
Frequency Planning and Reception Investigation	[✂]	[✂]
Environmental, Health and Safety	[✂]	
Total	1,134,000	1,302,139

Source: 2rn

Compensation for overhead costs for acquiring and installing of new transmitters and transposers

We have considered whether some adjustment to overhead costs should be made to reflect the fact that a portion of the overhead costs relate to 2rn acquiring and installing new transmitters and transposers. 2rn would in any event have replaced the transmitters in the coming years (c.2025) and the allowable overhead cost should arguably be adjusted downwards to reflect this fact. This would make the approach taken on overheads consistent with the approach to compensating the costs of acquiring and installing transmitters and transposers.

In practice, however, 2rn has noted that by far the biggest contribution to the resource costs of overheads relates to the new sites and having to install new transmitters. The cost of acquiring and installing new transmitters and transposers is a relatively small portion of overall overhead costs, as most of this work will be done by third parties and not by 2rn internally. Put another way, 2rn considers that *overhead* costs would not vary significantly if the 700 MHz migration project excluded the acquisition and installation of new transmitters and transposers.

We conclude that overhead resources related to transmitter and transposer make a relatively small contribution to overall overhead resources. Furthermore there would be practical difficulties in allocating overhead costs specifically to the acquisition and installation of new transmitters and transposers. Therefore, we do not propose to make a specific adjustment to the costs to estimate the allowable compensation.

A.8.4 Conclusion on allowable compensation

Costs related to overhead costs are compensated in full. Therefore, the total allowable compensation to RTÉ is €323,000.

A.9 Senior management time

A.9.1 Cost of senior management time

2rn has estimated the cost of senior management time relating to the 700 MHz project. This cost was implicitly included within each of the costs identified in the 2016 Frontier Report but it was not *explicitly* identified.

2rn has provided its estimate of the time spent by its senior management on the 700 MHz project which, absent the migration would have instead been spent on other 2rn activities. 2rn forecasts the percentage of time that each manager will dedicate to the project and how this varies during the project.

A summary of the estimated time spent by senior management is set out below in Figure 54. 2rn estimate that the cost of senior management time is now higher (than was estimated in the 2016 Frontier Report) as 2rn is internally managing many of the changes to its network, whereas the 2016 Frontier Report assumed a greater degree of outsourcing. This level of senior management time involvement recognises the incremental internal resource costs associated with managing 2rn's 700 MHz migration plan and is deemed to be reasonable and proportionate. It is appropriate therefore that senior management time is a separate, identifiable cost category in respect of the 700 MHz project and is compensated for as part of the allowable costs.

Figure 54 Allocation of senior management time to the 700 MHz project

	2017		2018			2019	
	Jan to June	July to Dec	Jan to June	July to Sept	Oct to Dec	Jan to June	July to Dec
Technology (Tech.)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Finance and Administration (F & A)	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: 2rn.

Notes: the data provided by 2rn was more detailed and is summarised as a weighted average of the full costs for the senior staff affected for the purposes of protecting confidentiality

2rn's estimates of the senior management time related to the following staff.

- The Chief Executive Officer (CEO) will provide strategic oversight for the entire project. The CEO will be responsible for the project initiation, project team set up, agreement of scope of works, responsible for liaising with wider stakeholders (DCCAE or ComReg). The CEO's input is on average less than a day a week but will be concentrated during the initiation phase and final implementation phase.
- The Chief Technology Officer (CTO) will provide technical support to the project team throughout the project. This will include Factory Acceptance Testing and Site Acceptance Testing as equipment is manufactured and commissioned. In addition it will provide technical input during simulcast. It will also provide on-going support and contact with external suppliers. The CTO's

input is on average less than a day and a half a week but will be most intensive during the initiation and implementation phase,

- The Financial Controller (FC) will have an ongoing role during the project to establish cost and budgetary control processes and procedures. Work on the 700 MHz migration project will be most intense during the project initiation phase (financial control system design and testing, budget preparation, agreement internally of processes and liaison with external stakeholders (DCCAE or ComReg). In addition there will be an ongoing role in monitoring and controlling costs and cost allocation. The FC's input will be on average around a day per week but will be most intensive during the initiation and implementation phase,
- The Operations Manager will manage the supply and allocation of internal 2rn resources to support the installation and internal works to support the 700 MHz migration. The contribution of the Operations Manager is relatively light (less than a ½ day per week).
- The Infrastructure Manager will include the scheduling of 2rn staff to support the installation of the 700 MHz migration. This task will be complex given that it will require a dynamic response to weather conditions, to support works on high sites. It will ensure that the 700 MHz migration can be managed in a way that ensures that 2rn's on-going work can continue. The Infrastructure Manager's input will be less than a day a week and will be most intensive during the first half of the project to support the works on the antennas.
- Frequency Planning and senior 2rn Project Manager will provide the necessary 2rn input to support the frequency planning and management of internal 2rn senior resource. The 700 MHz project relies on the implementation of the new Frequency Plan and will therefore require ongoing support from the 2rn Frequency Planner throughout the project. The senior 2rn project manager will design and implement the internal 2rn project management processes (including project plan, monitoring and overseeing externally procured activities to support the 700 MHz migration). Frequency Planning and senior 2rn Project Manager's role will be on average around a day per week but will be most intensive during the initiation and implementation phase,

Based on the allocations set out in Figure 54 the cost of senior management time totals €417k.

Figure 55 Cost of senior management time €

	2017	2018	2019	Total
Total cost	[✂]	[✂]	[✂]	[✂]

Source: 2rn

A.9.2 Compensation allowable

Managing a complex project such as the 700 MHz migration will inevitably require attention and input from 2rn's senior management. This is resource that would otherwise be allocated to 2rn's other regulated and non-regulated

activities. In this sense 2rn faces an “opportunity cost” as a result of senior staff being required to support the 700 MHz project.

As noted above 2rn provided information on the specific ongoing activities of six of its senior management team and the level of resource that will be required to support the 700 MHz migration project. The roles and functions of the six 2rn Senior Managers that will be required to provide input during the project are reasonable given the complex nature of the 700 MHz migration project. 2rn’s allocation of time (of approximately ½ - 1½ days per week depending on the role) are reasonable given their ongoing activities.

The costs of senior management time are consistent with the full costs (including on-costs) of the roles that are reviewed by ComReg in its tariff model.

Consistent with the approach taken by ComReg in assessing the costs of senior management time (for example in relation to the tariff model) we assume that senior management time which is specifically related to the 700 MHz migration should be compensated in full (and not recovered via the tariff model). Therefore we assume that compensation to RTÉ is €[✂].

However, this cost is netted off the contingency allowed in the initial estimate since 2rn consider that a lower level of contingency is appropriate at this phase of the project (as there is now less uncertainty that costs will exceed forecasts than at the time of the 2016 Frontier Report).

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