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Presentation for Industry Group 2 (IG2)

# 2012 update of OPTA's fixed and mobile BULRIC models

18 October 2012 • Ian Streule, Matthew Starling, Alex Reichl

# Confidentiality notice

## Introduction

Finalisation of the conceptual paper

Updates to the original BULRIC model

- Market module
- Fixed network design
- Mobile network design
- Interconnect calculations
- Service costing calculations

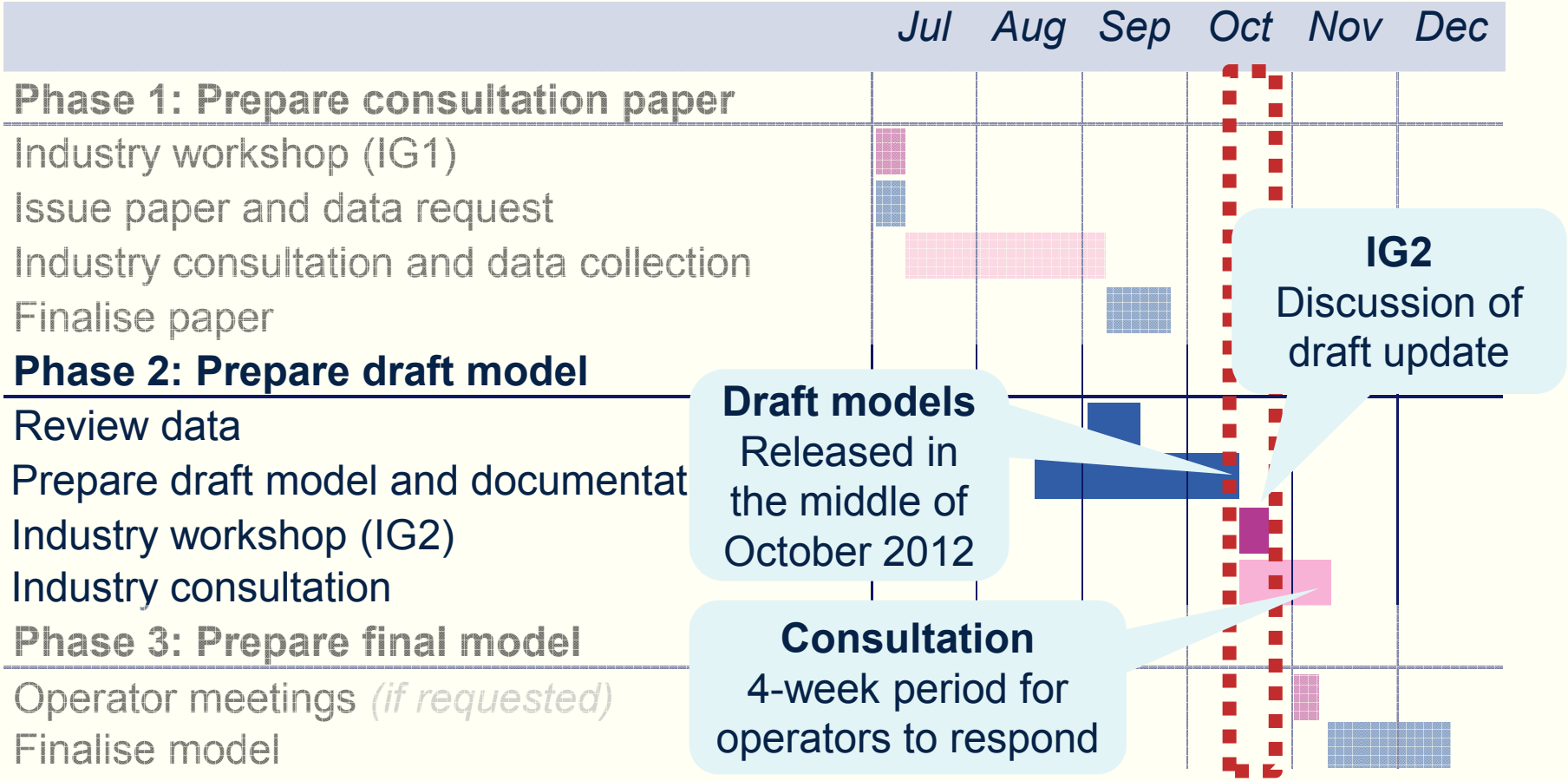
Next steps

Supplementary material

# Introduction

- Analysys Mason Limited ('Analysys Mason') has been commissioned to assist the Onafhankelijke Post en Telecommunicatie Autoriteit ('OPTA') in updating the existing bottom-up long-run incremental cost (BULRIC) models for fixed and mobile networks in the Netherlands
- The original BULRIC models were released in April 2010, with a subsequent modification to the VoIP cost per subscriber in 2011
  - we will refer to the 2011 version of these models as the "v3" models
- The draft updated versions of these BULRIC models will help inform future OPTA decisions on the pricing of regulated fixed and mobile services after the current regulation ends in 2013, until 2016
  - we will refer to these as the "v4" models

# Update on project status: Currently preparing the draft model for Phase 2




**KEY**

- Model development
- Operator consultation period
- Industry meetings/workshops
- Holiday periods



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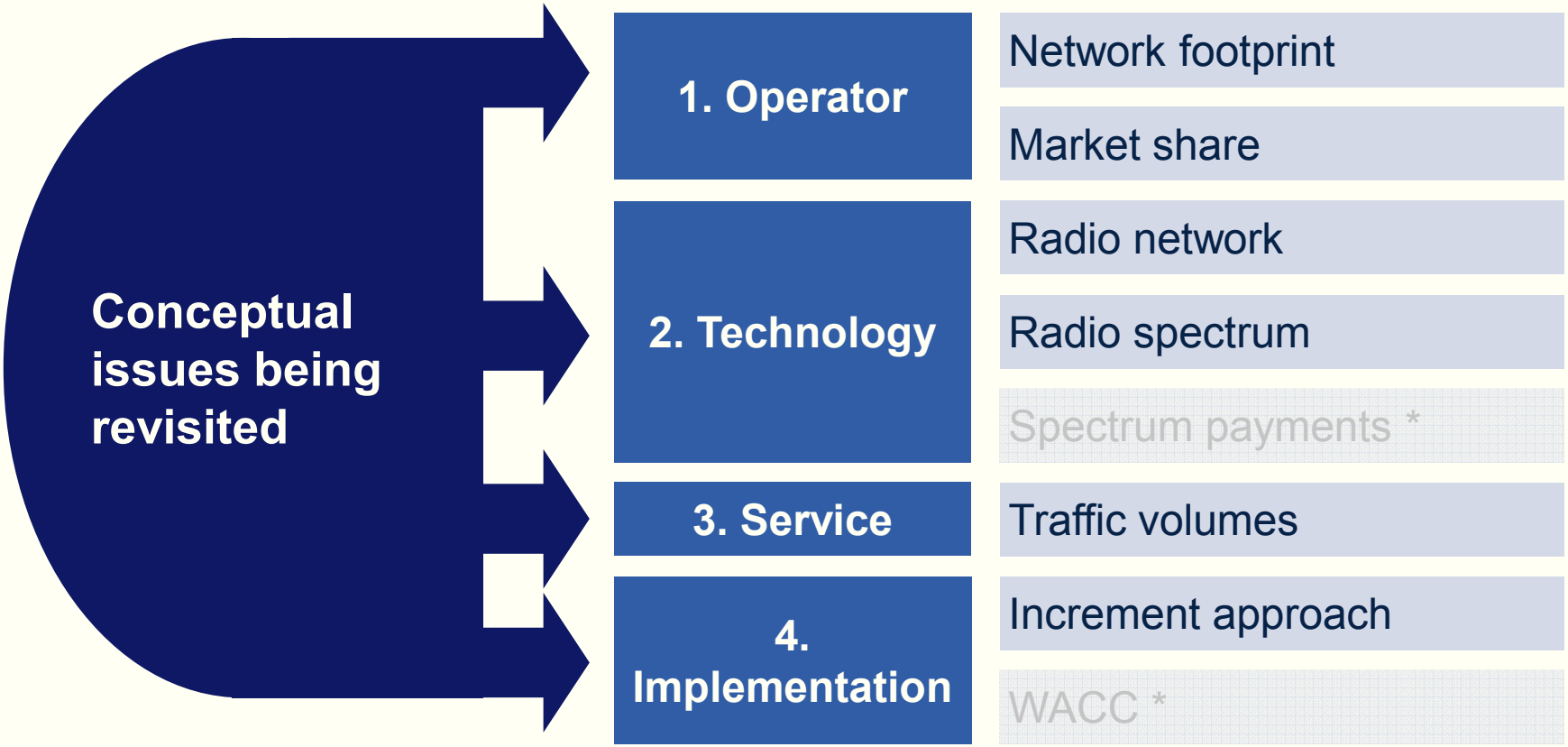
# Certain issues are being revisited in the upgrade; operator comments were received




The concept paper has been augmented with operator feedback and Analysys Mason's responses: this will be released as part of the consultation

** These aspects of the model have not been revisited in this update*

# Operator issues [1/2]

| Concept | Comment | Response |
|---|---|---|
| 2 – Network footprint | By using actual operator coverage, rather than the that of a ‘single call’ network, an incorrect demarcation will be drawn between coverage/capacity | The demarcation between assets deployed for minimum coverage and capacity purposes is not directly relevant to the Plus BULRIC approach, since voice termination is considered as the last service in the stack |

# The "one-call" coverage network is not directly relevant to the Pure BULRIC calculation…

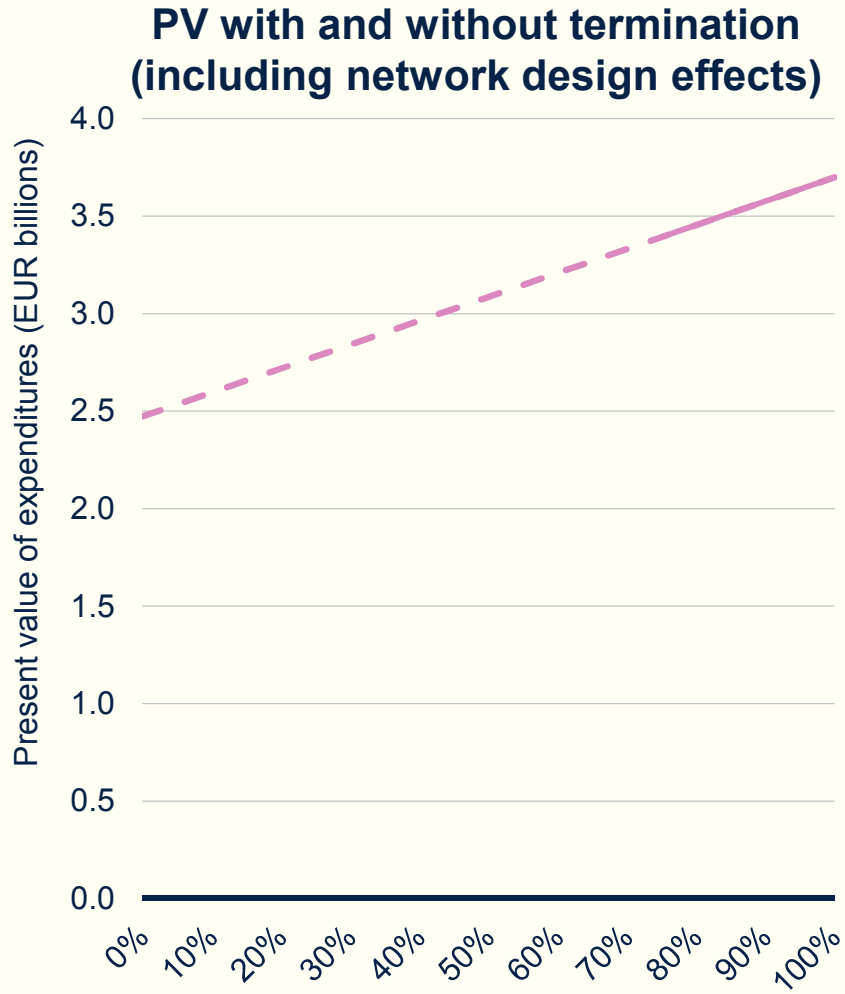
## Comparison of the current calculation of pure LRIC and using the "one-call coverage network"

| Approach implied by a respondent | Approach implemented by Analysys Mason | |
|---|---|---|
| Additional 3G network costs to support voice termination | 3G network costs to support all services including voice termination | Additional 3G network costs to support voice termination |
| Additional 3G network costs to support all services except voice termination | | Additional 3G network costs to support all services except voice termination |
| 3G network costs to support one indoor voice call | | |

*Source: Analysys Mason*

# Our network design adjustments steepen the curve of the pure LRIC calculation

- We also observe that there are network design adjustments in the absence of termination:
  - Minimum of 1 TRX per macro sector, rather than 2
  - Cell breathing leading to a larger UMTS cell radius
  - Fewer minimum channel elements per NodeB
  - Less 1800MHz spectrum
  - Fewer GSM special sites
- These capture additional costs being avoided in the absence of termination traffic




*Source: v4 model*



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# Operator issues [2/2]

| Concept | Comment | Response |
|---|---|---|
| 3 – Market share | There is a discrepancy between the auction design catering for a new entrant, while the concept indicates that N=3 | • A new operator could be a data-only operator (i.e. not in the mobile voice market)<br>• A new entrant could use network sharing with an existing operator<br>• It is not yet clear that a new entrant will persist, and would take some years to establish itself<br>• N=3 appears reasonable for the forthcoming regulation to 2016 |
| 3 – Market share | The argument to assume only the costs of 3 mobile networks in the Dutch market appears flawed | • The auction caters for a new entrant in the *mobile* market<br>• However, this does not mean that there will be a fourth operator in the *mobile voice* market |

# Technology issues [1/2]

| Concept | Comment | Response |
|---|---|---|
| 4 – Roll-out and market share profile | NGN should be excluded from at least the mobile model until its deployment, use and cost base is supported by known actual costs and significant mobile traffic volumes | The Commission Recommendation states that "the core part could be assumed to be NGN-based."<br><br>These core architectures are now widespread and established in mobile operations throughout Western Europe |
| 7/8 – Radio spectrum | The modelled operator represents a "market average profile" operator holding and should thus hold exactly 1/3 of the spectrum available | The operator will now be assumed to have 1/N of available 900MHz, 1800MHz and 2100MHz spectrum, to the nearest whole channel i.e.<br>• 2x11.6MHz of 900MHz<br>• 2x23.2MHz of 1800MHz<br>• 2x20.0MHz of 2100MHz |

# Technology issues [2/2]

| Concept | Comment | Response |
|---|---|---|
| 9 – Spectrum payments | It is impossible to use the auction to derive an accurate estimate of the spectrum price per band as required for the cost model | These comments will be considered in the context of the auction results, and at that point the approach to revising these values (if at all) will be determined |
| 10 – Mobile switching network | As in concept 4 | As in concept 4 |
| 15 – Network nodes | An efficient operator would have at least adopted the reduction in network nodes KPN announced in its all-IP programme (but eventually did not execute) | Even if implemented, all-IP would still have thousands of aggregation points at the street cabinet level, which would be relevant to the core network and to which scorched-node modification would still apply |

# Services issues [1/2]

| Concept | Comment | Response |
|---|---|---|
| 16 – 20 – Service sets | Including elements in the model which are still to be realized in practice is highly speculative and should therefore be omitted | We do not envisage any reason for changing or extending the established service set in the model as part of this update |
| 21 – Traffic volumes | Future growth in mobile data is likely to be slower than previously forecast e.g. due to WiFi offloading | The mobile data forecast is one that has been revisited in the upgrade, and the effect considered by the respondent will be considered |
| 22 – Points of interconnect | Having only 4 PoIs in the fixed network leads to inefficient costs | The modelling approach does not preclude operators having more PoIs in practice. From the view of efficient network costing, we shall maintain the assumption of four PoIs |

# Services issues [2/2]

| Concept | Comment | Response |
|---|---|---|
| 23 – Interconnect and co-location | Under cost orientation, modelling interconnection costs separately to voice is valid provided all relevant costs for mobile termination and interconnection can be recovered | If termination is priced using Pure BULRIC, then some costs of termination are “unrecovered” compared to Plus BULRAIC. These could be recovered by other traffic-related services, but interconnection services are not traffic-related |
| 24 – Wholesale or retail costs | The assumption that the level of general business overheads is invariant to the wholesale termination increment is incorrect | Business overheads are intended to cover the only the activities that are common to network/retail functions in the long-run. Other components are captured in opex mark-ups to network assets, some of which vary with termination traffic. Interconnect costs are captured separately. |

# Implementation issues [1/2]

| Concept | Comment | Response |
|---|---|---|
| 27 – Depreciation method | The model needs to ensure that incremental assets are treated as incremental from the point of purchase rather than the point at which they become capacity constrained | An asset should not be considered incremental from the point of purchase, even if it becomes capacity constrained later.<br>We capture assets being upgraded later in their life in the absence of termination, and the resulting lower time value (PV) of the investment |
| 28 – Modelling timeframe | The 50-year approach carries a serious risk of over-estimating the period in which mobile operators can recover the cost of their investments | The original BULRIC models assume a technology-specific lifetime of 15 years i.e. all technology-specific expenditures are recovered from that technology's volumes in this 15-year period |

# Implementation issues [2/2]

| Concept | Comment | Response |
|---|---|---|
| 29 – 36 – WACC | The equity risk premium of 6.1% is too high.<br>It would be sensible to defer consideration of the WACC parameters until the consultation period planned for October 2012” | These observations will be accounted for by Analysys Mason and OPTA if the WACC is revisited |
| 37 – Mark-up mechanism | EPMU has a strong bias towards services with a relatively high proportion of incremental costs | Alternative mechanisms such as Ramsey pricing have been discussed heavily in the past and rejected.<br>Also, the routeing factor calculations allocate proportionately more cost to traffic services that consume more resources on average |

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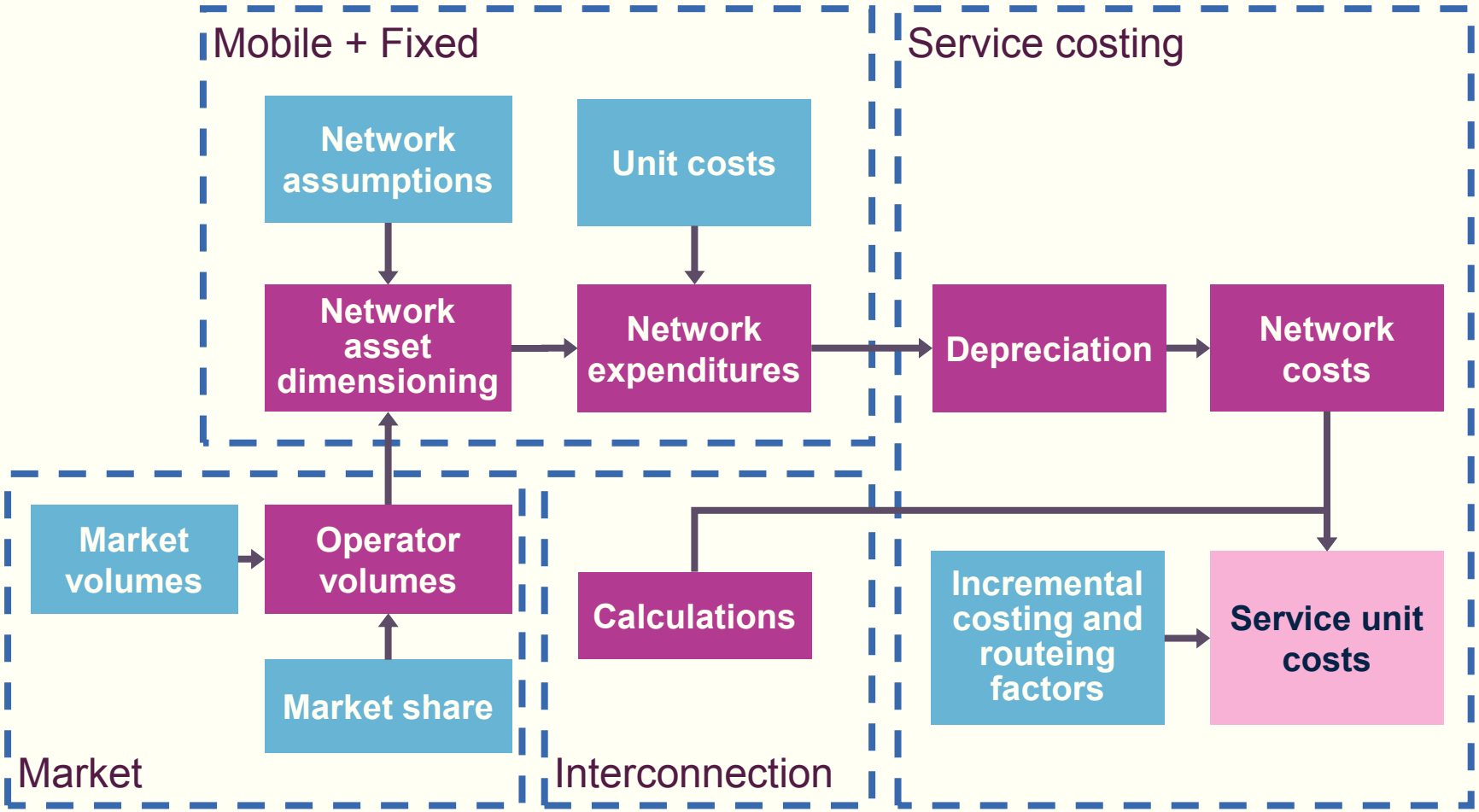
Supplementary material

# The BULRIC models have five modules, which have been revisited in the update




*Source: Analysys Mason*



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# The Market module has been updated using various sources

- Total market demand is based on available figures* from a number of sources:
  - Analysys Mason Research (AMR)
  - Other publically available datasets
  - OPTA data
  - operator published information e.g. KPN factsheets
  - data requested from the operators (primarily for cross-checking purposes only)
- These input/data revisions to the market model have led to updated demand forecasts for both the fixed and mobile models

**Sources: Analysys Mason Research, Operators' annual reports, OPTA data*

# A large number of inputs* were updated with data from various sources

| Source | Datasets | Updated |
|---|---|---|
| CBS | Population | 2008 – 2012 |
| AMR: Netherlands fixed telecoms forecasts | Households; Business sites | 2009 – 2016 |
| EC: E-communications survey | Mobile-only households | 2009 – 2010 |
| KPN factsheets | Mobile-only households | 2009 – 2011 |
| AMR: Telecoms market matrix | Fixed/mobile lines; Fixed voice | 2009 – 2011 |
| AMR: Netherlands fixed telecoms historic data | Fixed lines; Mobile subscribers | 2008 – 2011 |
| AMR: W.E. telecoms forecasts | Fixed lines | 2009 – 2016 |
| OPTA, including Market monitor | Connections; mobile traffic | 2009 – 2011 |
| AMR: W.E. voice market forecasts | Fixed voice; Mobile voice | 2009 – 2016 |

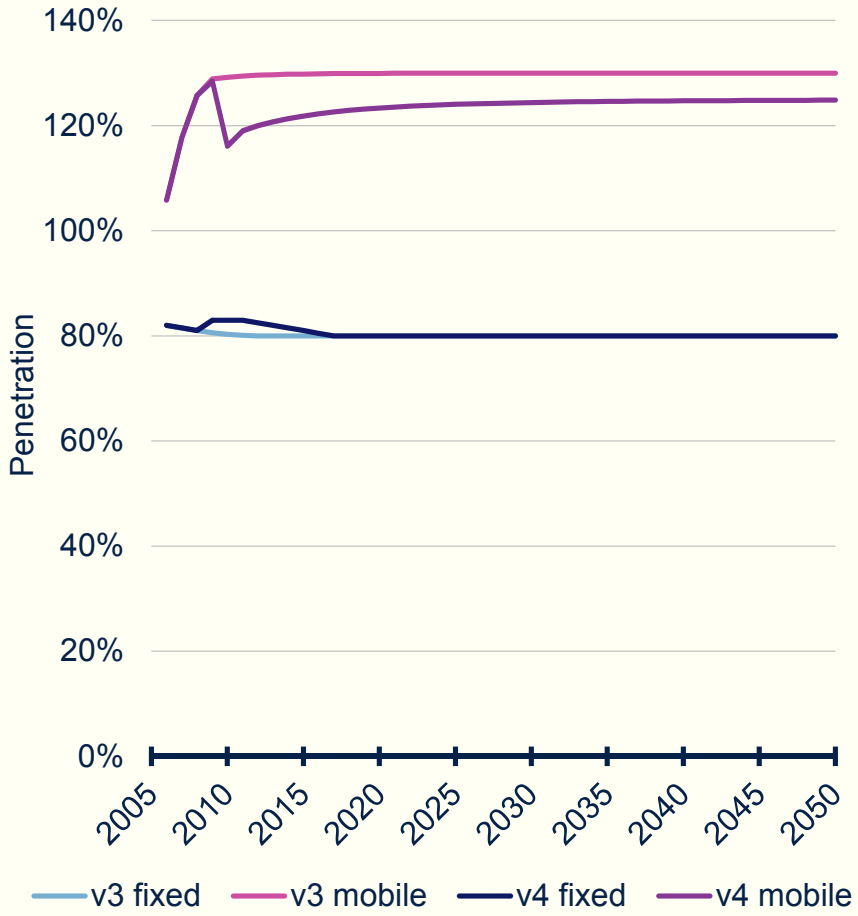
** A small number of data points related to Mobile TV and mobile broadband-only homes were not revisited as the sources are no longer available*

# Some adjustments have been required where data is now reported in an alternative manner

| Datapoint | Original dataset | Current dataset | Nature of adjustment |
|---|---|---|---|
| Prepaid mobile subscribers | There has been a 2 million drop in retail prepaid subscribers reported by OPTA's Market Monitor in 2009-2010 due to operators revising their subscriber databases | | We have reduced the saturation point of the forecast mobile penetration |
| Mobile subscribers by technology | Specified by 2G / 2.5G / 3G / 3.5G | Only the 2G / 3G split is available | Proportion of 2.5G subscribers extrapolated using change in blend in 2007-08; 3.5G treated similarly |
| Mobile broadband subscriptions | Included handset access | Now excludes handset access | The forecast from the v3 model has been retained, since it appears to remain reasonable |

# In the long-term, fixed penetration is unchanged, but mobile penetration is reduced

## Fixed and mobile market penetration

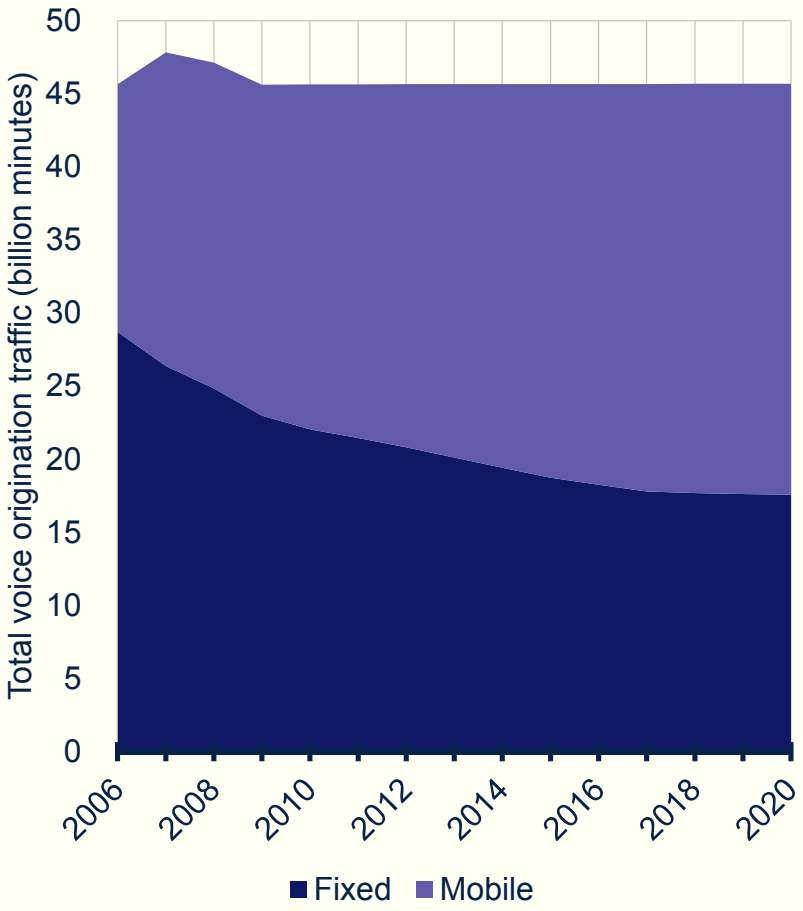



- Fixed-to-mobile substitution appears to be stabilising
- The forecast decrease in fixed penetration has been slowed, with steady state now reached in 2017
  - this steady-state remains at 80%
  - our long-run assumption of mobile-only households remains at 20%
- We have reduced mobile penetration to 116% in 2010 to adjust for definition of prepaid subscribers
  - the long-run steady state is now assumed to be 125% rather than the 130% steady-state in v3

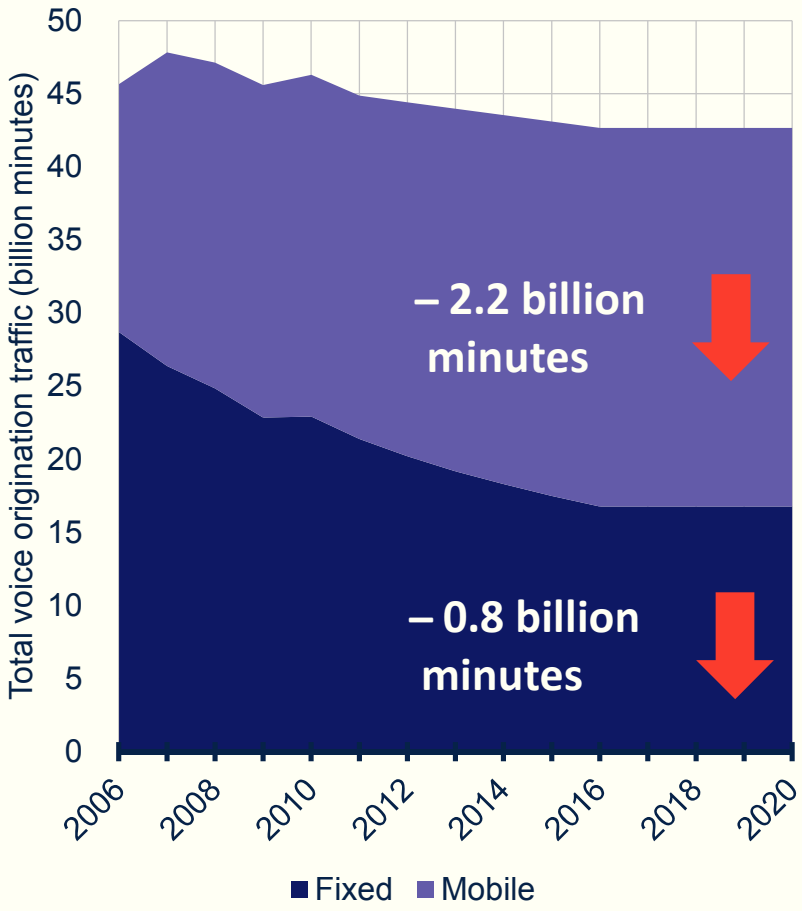
*Source: v3 / v4 BULRIC models*

# We have reduced the forecast of total origination between 2012 and 2016…

## Origination traffic (v3 model)




## Origination traffic (v4 model)




*Source: v3 / v4 BULRIC models*



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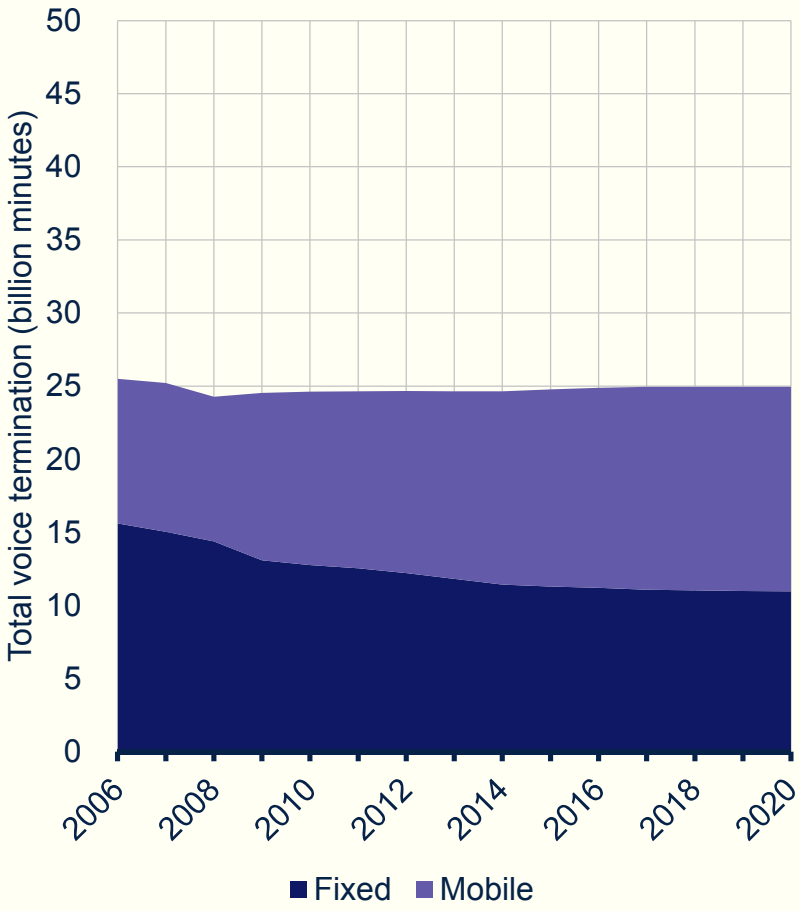
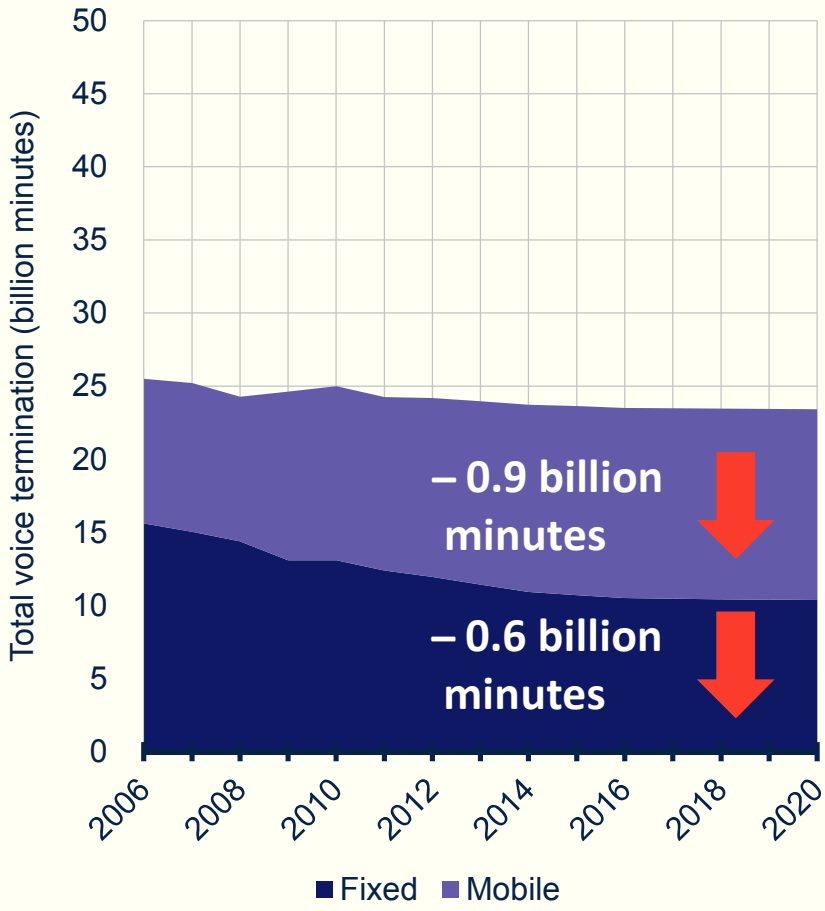
# … with mobile networks also carrying slightly less termination in the long term

## Terminated voice (v3 model)




## Terminated voice (v4 model)




*Source: v3 / v4 BULRIC models*



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# Almost all mobile voice traffic services now have lower volumes in the long-run…

| *Mobile service* | *Steady-state traffic (million minutes)* | |
|---|---|---|
| | *v3 model* | *Change in v4 model* |
| Outgoing to international | 826 | – 70 |
| Outgoing to other national fixed | 6 040 | – 509 |
| Outgoing to other national mobile | 8 797 | – 742 |
| On-net | 11 876 | – 1 001 |
| Incoming to international | 761 | + 94 |
| Incoming to other national fixed | 4 490 | – 328 |
| Incoming to other national mobile | 8 797 | – 742 |

These changes are a result of modifying the subscriber/connection forecasts, as well as the traffic usage information

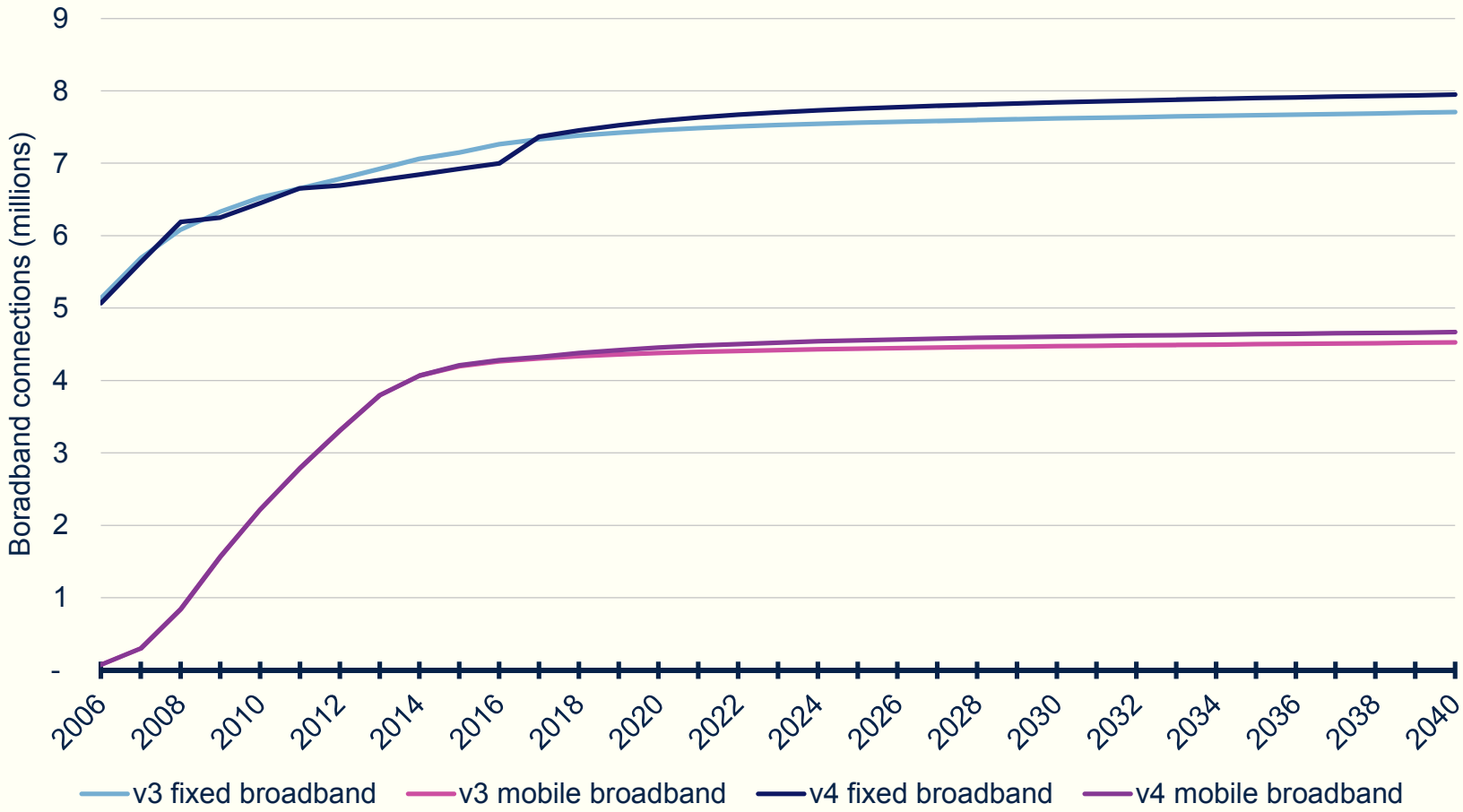
*Source: v3 / v4 BULRIC models*

# …as does fixed voice traffic

| *Fixed service* | *Steady-state traffic (million minutes)* | |
|---|---|---|
| | *v3 model* | *Change in v4 model* |
| Local on-net | 3 391 | – 95 |
| Regional on-net | 1 356 | – 38 |
| National on-net | 2 788 | – 78 |
| Outgoing to international | 1 071 | – 33 |
| Outgoing to mobile | 4 490 | – 328 |
| Outgoing to other fixed operators | 4 306 | – 120 |
| Outgoing to non-geographic | 52 | – 2 |
| Regional incoming | 8 179 | – 427 |
| National incoming | 2 726 | –142 |

*Source: v3 / v4 BULRIC models*

# The evolution in broadband penetration remains more or less unchanged




*Source: v3 / v4 BULRIC models*



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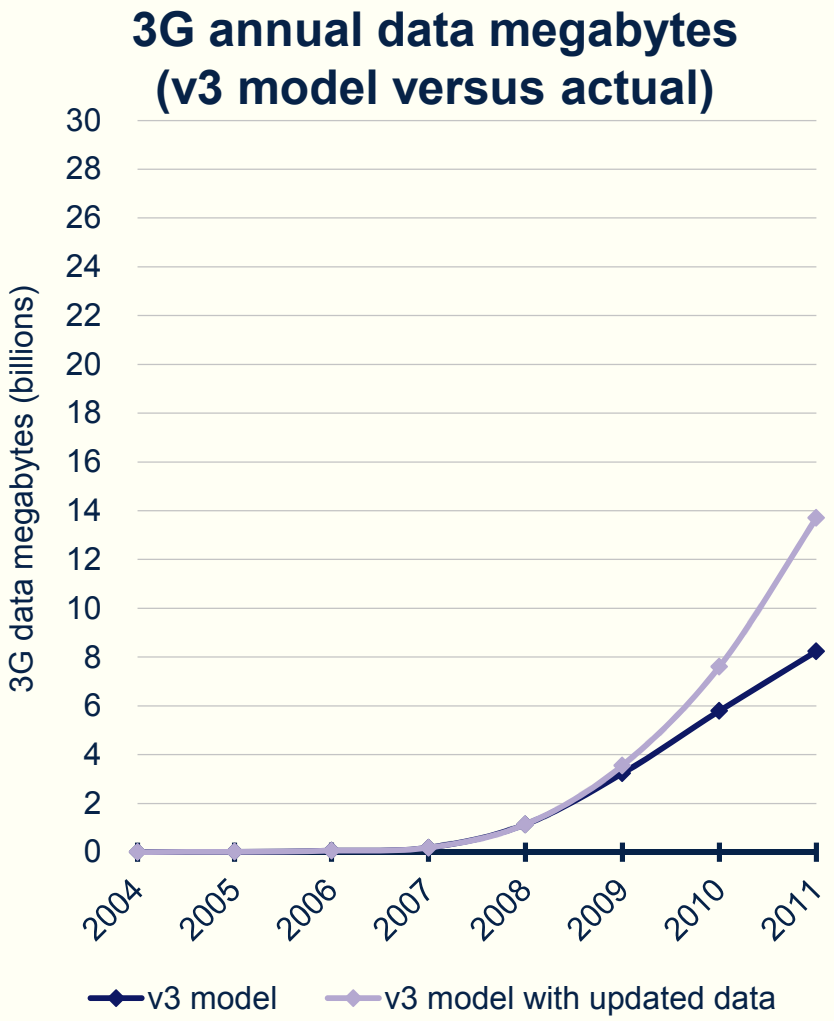
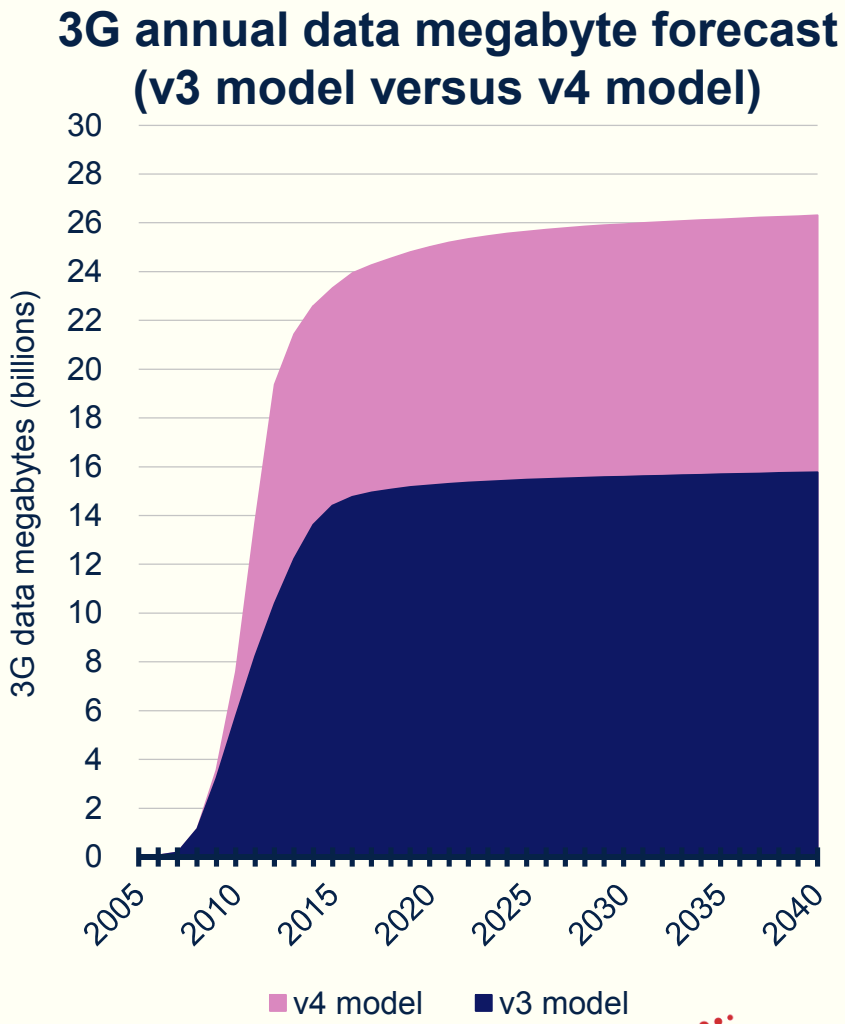
# 3G data usage has risen faster than modelled, which we have reflected in the forecast




*Source: v3 / v4 BULRIC models*



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# Data updates have also had an impact on other connection outputs

| *Connections* | *Steady-state connections (millions)* | |
|---|---|---|
| | *v3 model* | *Change in v4 model* |
| Households with fixed connections | 6.100 | +0.230 |
| Mobile-only households | 1.525 | +0.058 |
| Supplementary mobile broadband connections | 3.957 | +0.107 |
| Substitutive mobile broadband connections | 0.629 | +0.024 |
| Business data connectivity lines | 0.151 | +0.000 |
| VoD households | 3.021 | +0.114 |
| Households with fixed connections | 6.100 | +0.230 |

*Source: v3 / v4 BULRIC models*

# We have not revised SMS volumes, but have adjusted the business data connectivity

| *Service* | *Steady-state traffic* | |
|---|---|---|
| | *v3 model* | *Change in v4 model* |
| Retail business data (million Mbit/s) | 5.7 | +1.7 |
| Telco business data (million Mbit/s) | 3.8 | +1.1 |
| VMS retrievals (million minutes) | 1 296 | – 99 |
| VMS deposit s (million minutes) | 1 555 | – 119 |
| On-net SMS (million messages) | 6 229 | +0 |
| Outgoing off-net SMS (million messages) | 4 614 | +0 |

Operator data indicates that the Mbit/s per circuit has increased by 20% year-on-year since 2008, rather than the 10% year-on-year increase in the v3 model: this has been reflected in the Market module

*Source: v3 / v4 BULRIC models*

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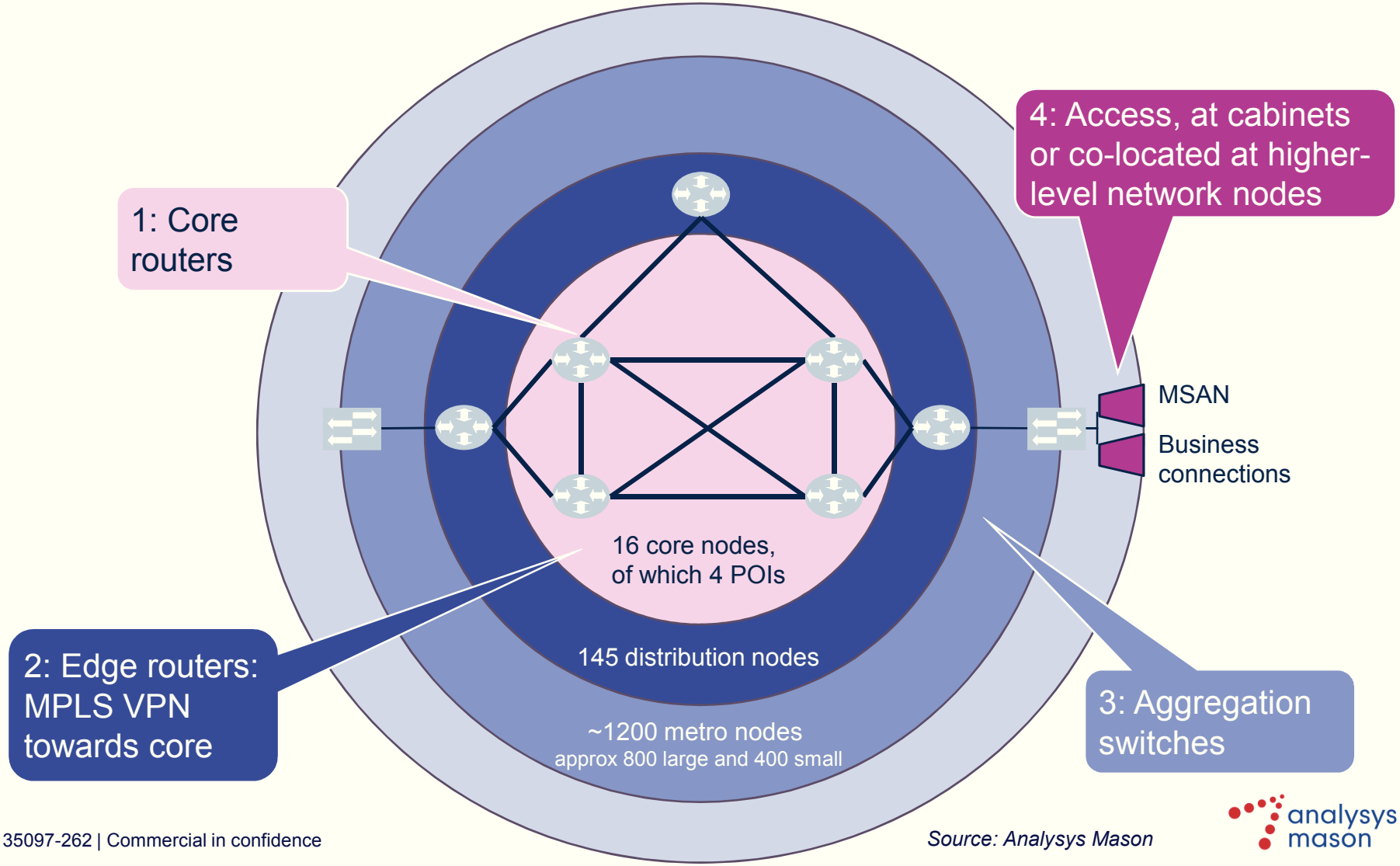
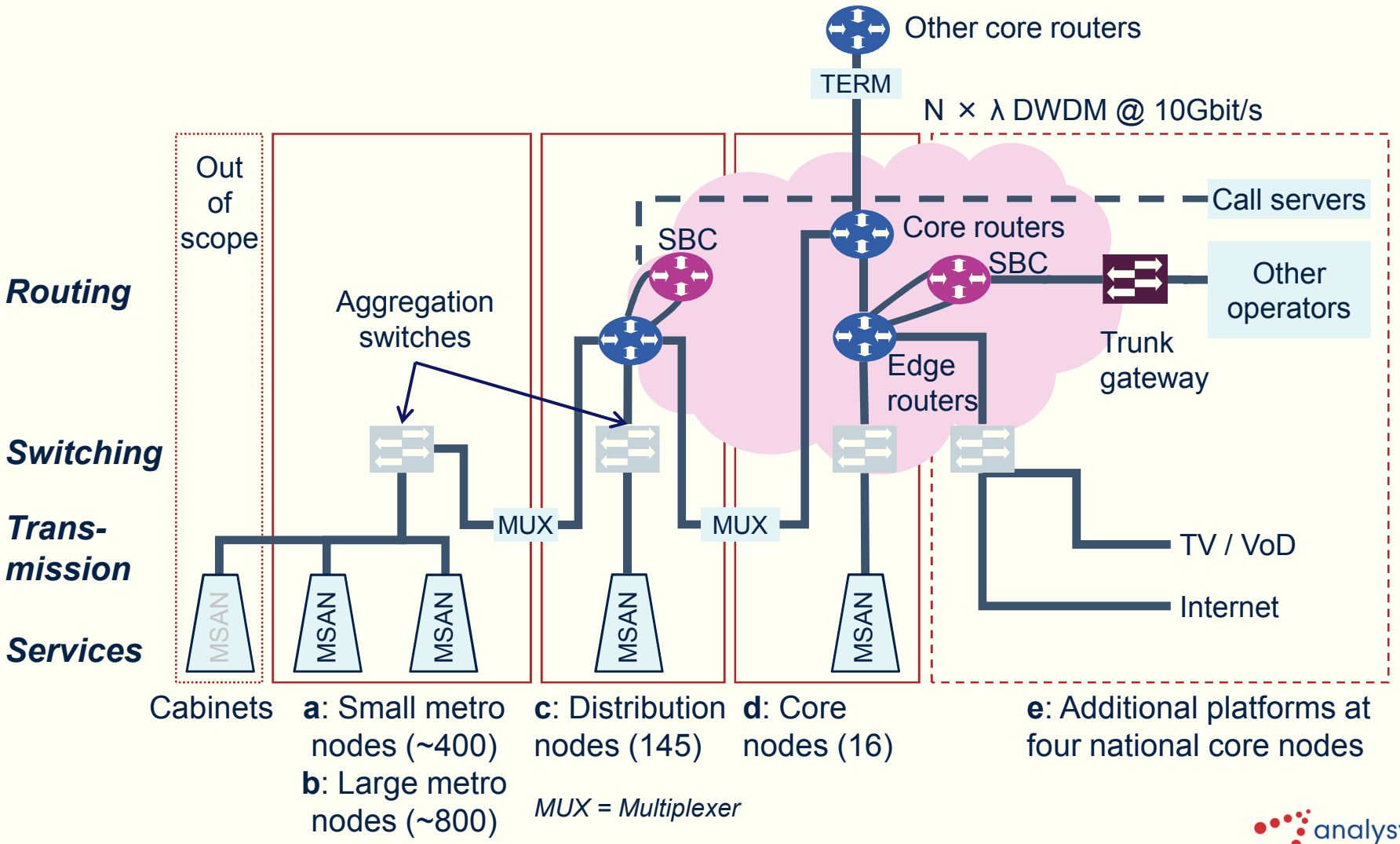
# Overview of logical fixed network




*Source: Analysys Mason*

# Overview of physical fixed network






*Source: Analysys Mason*

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# OPTA undertook some adjustments to the VoIP platform costs in the previous period

- The final Analysys Mason model from 2010 produced, after a final consultation correction, an overall voice cost per minute
  - EUR0.57 cents per minute (nominal, national)
- OPTA then reviewed the VoIP platform component and recalculated the Plus BULRAIC per minute
- OPTA's adjustments centred on the VoIP platform costs (HW and SW) based on new information submitted by the operators
- We have reviewed the additional information submitted by the operators as part of this consultation, also taking into account OPTA's previous calculations

# The calculation of the VoIP software opex per subscriber was reduced in a revision last year

- The final model provided to OPTA in 2010 output a Plus BULRAIC of EUR0.57 cents
  - this assumed a VoIP software opex per subscriber of EUR12
- In 2011, based on additional operator data, OPTA revised the VoIP software opex per subscriber in the model to be EUR5
  - the Plus BULRAIC fell to EUR0.37 cents
- The VoIP software opex is modelled per subscriber, but 100% of its Plus BULRAIC per minute is included in the Pure BULRIC
- This gave a Pure BULRIC of:
  - EUR0.36 cents in the 2010 AM model
  - EUR0.16 cents in the 2011 OPTA model

| Voice platform network elements | Split of Plus BULRAIC | |
|---|---|---|
| | AM (2010) | OPTA (2011) |
| Access facing SBC and cards | 0.07 | 0.24 |
| Call server HW | 0.02 | |
| Call application software per sub | 0.34 | |
| IN | 0.02 | 0.02 |
| VMS | 0.04 | 0.04 |
| Wholesale billing | 0.01 | 0.01 |
| Core transport | 0.06 | 0.06 |
| **TOTAL (rounded)** | **0.57** | **0.37** |

*Source: Analysys Mason final model, April 2010; OPTA market analysis FTA-MTA-3b*

# We have revisited the underlying voice network elements in more detail

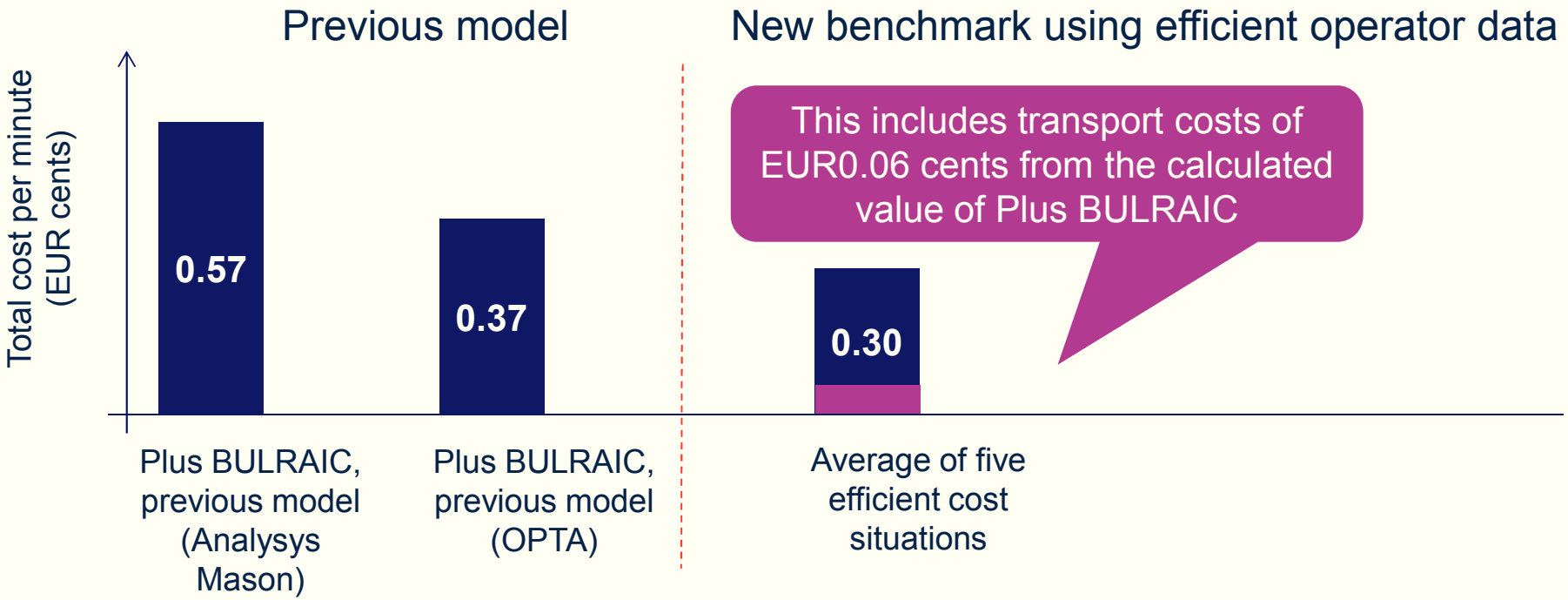
- Firstly, where possible we have ignored any specific costs or network elements associated with interconnection gateways – these costs are covered in the cost model by the 'establishing interconnection costs'
- Secondly, we assume the transport layer contribution is set based on our model outputs (i.e. we do not consider any transport costs from the operator data)
- Thirdly, we have reviewed the full list of voice platform elements in the model and within operator data, listed opposite

| Voice platform network elements |
|---|
| Access facing SBC and cards |
| Call server HW |
| Call application software per sub |
| Intelligent network (IN) |
| Voicemail system (VMS) |
| Wholesale billing |

Based on the new operator data provided, we have calculated an updated benchmark of efficient unit cost per minute for the VoIP service

*Source: Analysys Mason final model, April 2010; OPTA market analysis 3b*

# Our benchmark for the total cost of voice per minute is shown below




- These costs include:
  - Access SBC+cards
  - Call server software
  - Call server hardware
  - Wholesale billing system
  - Intelligent network
  - Voicemail system
  - Core network costs (transport layer, physical layer, etc.)

*Source: Operator data*

*Plus BULRAIC*



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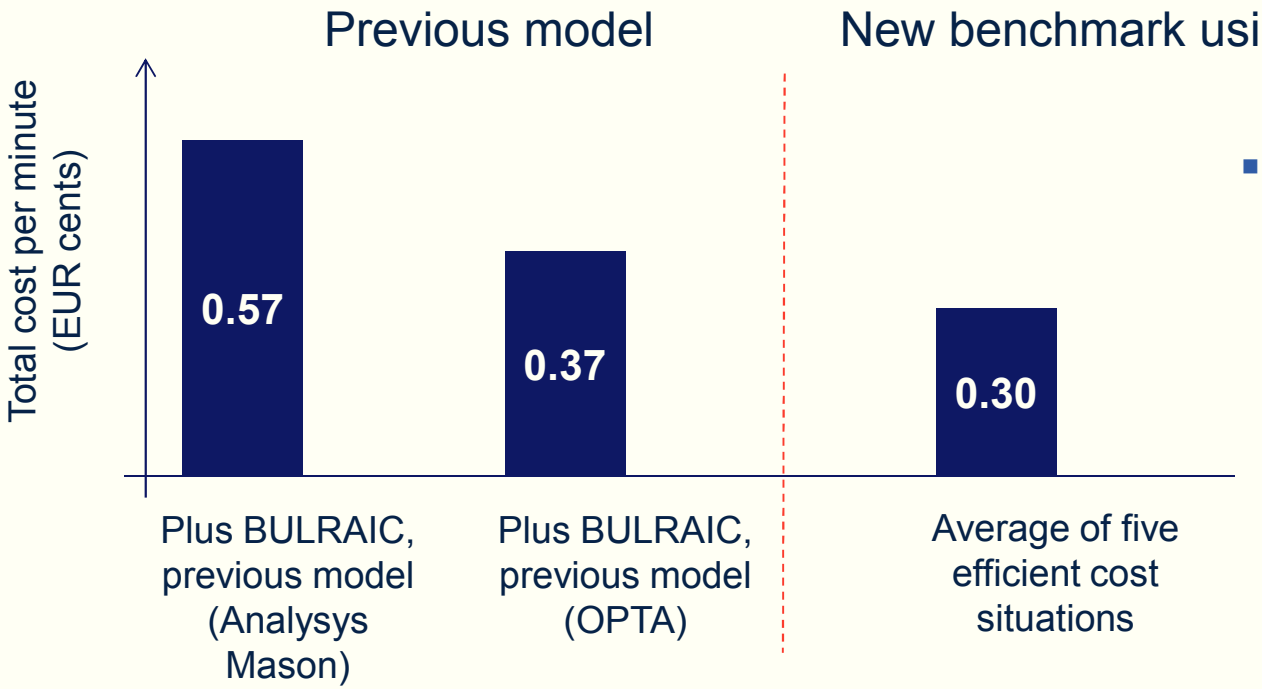
# We capture this benchmark by applying a scaling factor to particular asset costs




- To capture this average cost per minute in the model, we apply a 75% scaling factor to the costs of the following assets in the Fixed module:
  - Access SBC+cards
  - Call server software
  - Call server hardware
  - Intelligent network
  - Voicemail system

*Source: Operator data*

*Plus BULRAIC*



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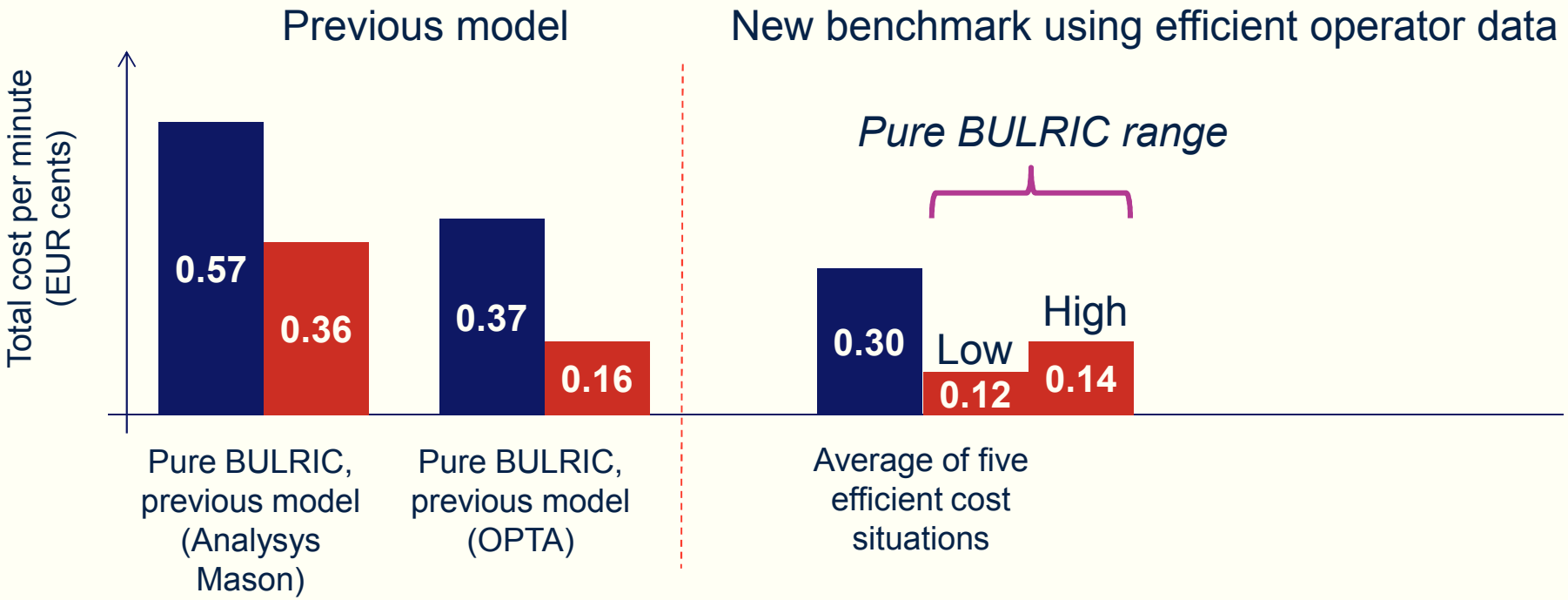
# Our benchmark range* for the Pure BULRIC of voice per minute is shown below




- The range* of pure BULRIC depends on the degree to which underlying costs are believed to vary with traffic (even if modelled as fixed/subscriber driven costs)
- The high case includes additional costs from:
  - Call server
  - Intelligent network platform

*Source: Operator data*

*Plus BULRAIC* | *Pure BULRIC*



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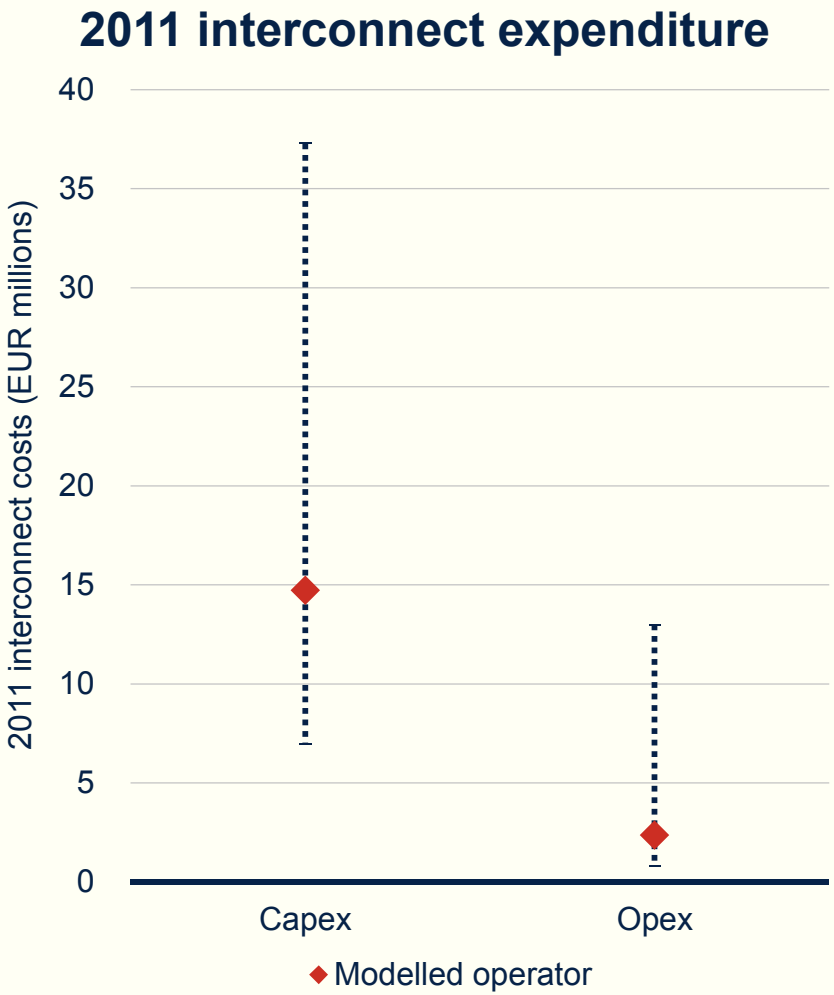
# Operator data has also been used to sense-check the modelled network costs




- Several operators provided top-down costs related to their interconnect capex and opex
- We have compared these values to those from the BULRIC model

*Source: v3 / v4 BULRIC models, operator data*

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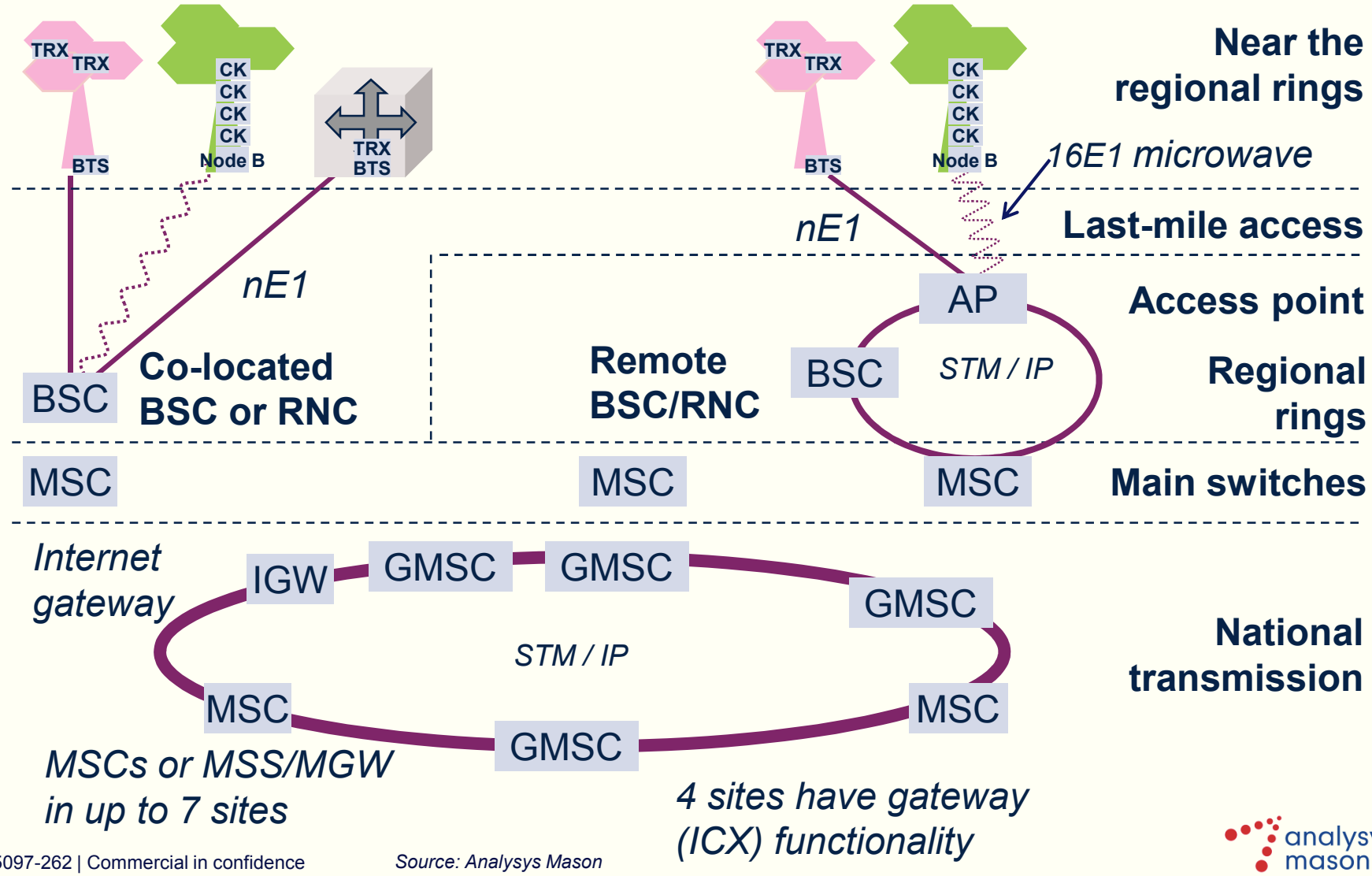
# Overview of mobile network






Source: Analysys Mason

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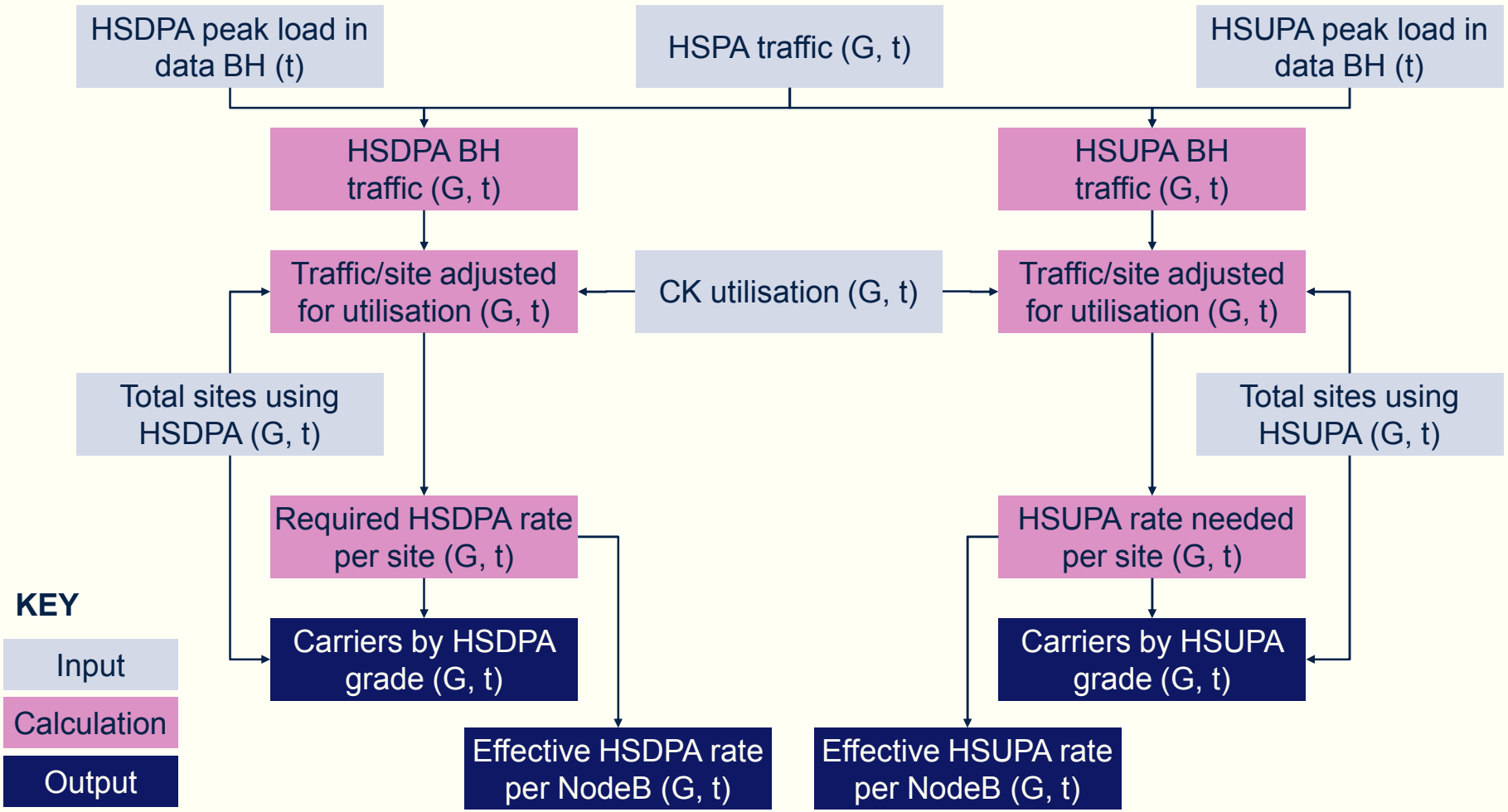
# The HSPA network overlay calculation has been refined to respond to data traffic

- The v3 model could deploy HSPA overlays:
  - with options for 1.8, 3.6 and 7.2Mbit/s HSDPA, plus HSUPA
  - by deploying a specific speed in a geotype from a given “activation year”
  - with a check included to ensure enough equipment was deployed to carry the assumed data traffic load
- Following our refinements, the v4 model:
  - can deploy five HSDPA options (as well as 14.4 and 21.1Mbit/s)
  - can also deploy five HSUPA options
  - deploys a higher speed when the average HSPA traffic per site in a geotype is high enough to require it
    - this calculation assumes that the effective speed available from a NodeB is 40% of its peak rate

# Analogous calculations are made for the HSDPA and HSUPA upgrade calculations




*Source: Analysys Mason; G = geotype, t = time, BH = busy-hour*

# We have revisited voice/data busy-hour inputs use data from mobile operators…

## Updating of the voice/data busy-hour inputs

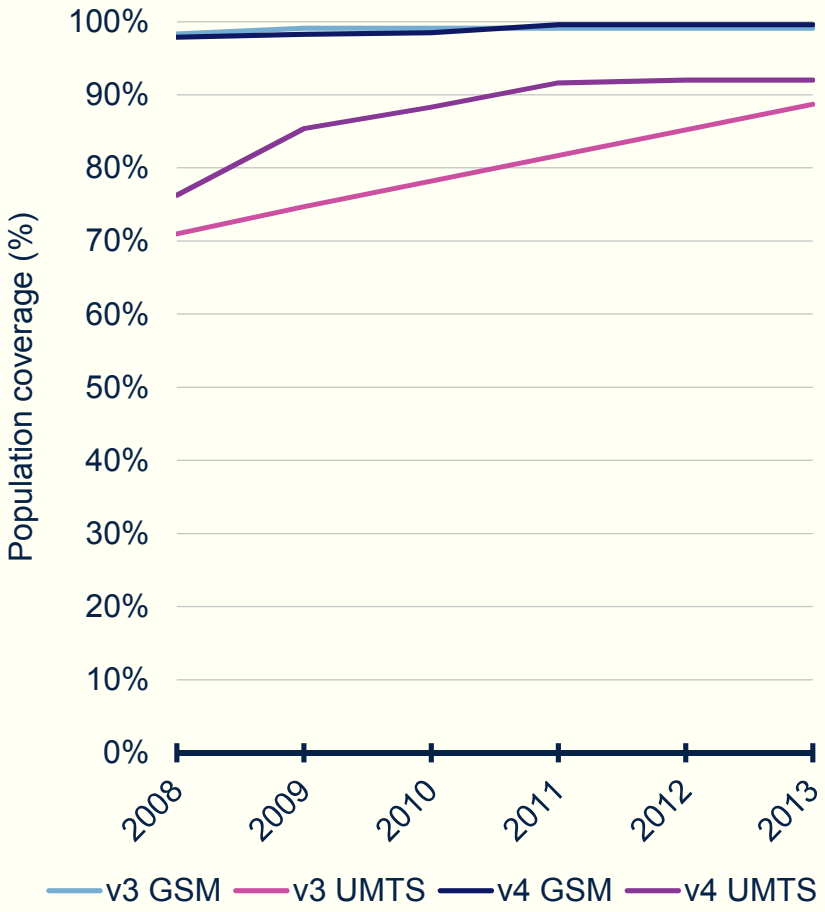
| Inputs (% of all traffic) | v3 model | Data used in v4 revision | v4 model |
|---|---|---|---|
| Voice busy hour | 8.42% | Average of 2012 operator data for each hour | 8.27% |
| Weekday voice | 77.46% | Average of operator data | 83.47% |
| Data busy hour | 5.62% | Average of 2012 operator data for each hour for high-speed data | 5.85% |
| Weekday data | 72.82% | Average of operator data | 72.97% |

*Source: Mobile operator data*

# …and also reconsidered the coverage of both the GSM and UMTS networks

- The model assumes GSM indoor population coverage using 900MHz
  - the v3 model assumed 99.1% in the long term
  - the average coverage by operators is now just under 99.6%, so we now assume 99.6% coverage long-term
- In the v3 model, UMTS population coverage increased to 85% in 2012
  - operator data indicates average coverage is currently just under 92%
  - the v4 model now assumes 92% coverage in the long-term
- Spectrum allocations have also been revised as set out in the concept paper

**Comparison of population coverage**




*Source: Mobile operator data*



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# We have updated the assumed capital equipment cost trends

- Operators provided some data on capital equipment costs since 2009, which we have used to revise the capex cost trends
  - we have updated the trends for 2009 onwards
- In particular, the data provided indicates that:
  - sites have not been increasing in cost in real terms
  - 3G equipment has become cheaper
- We continue to assume zero opex cost trends in real terms

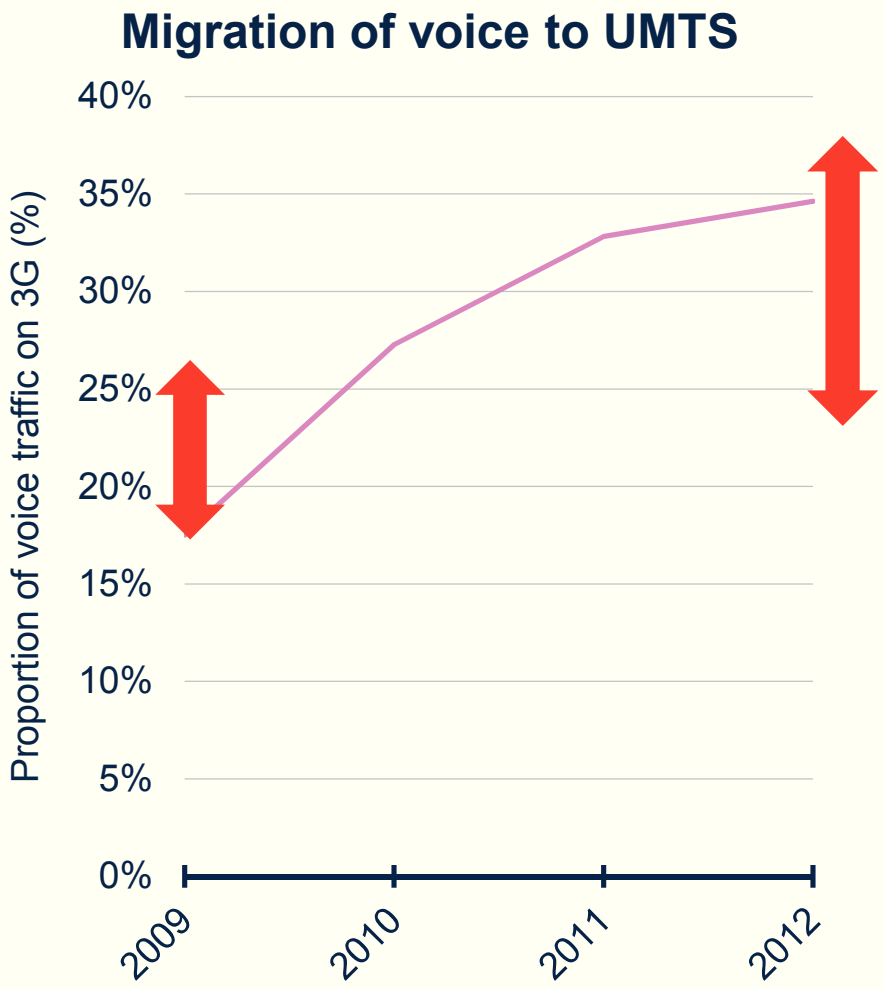
## Comparison of capex cost trends

| *Asset* | *v3 model* | *v4 model* |
|---|---|---|
| Sites | +2.0% | **+0.0%** |
| 2G BTS | -2.0% | **-4.2%** |
| NodeB | -2.0% | **-4.2%** |
| CK/carriers | -6.0% | -6.0% |
| Transmission | -8.0% | -8.0% |
| Switches | -5.0% | -5.0% |
| Switch software | +0.0% | +0.0% |
| Dark fibre | +0.0% | +0.0% |
| Data servers, BSC and RNC | -12.0% | -12.0% |
| TRX | -8.0% | **-2.0%** |

*Source: Mobile operator data*

# The migration profile has not been changed and appears consistent with operator data

- An increasing proportion of voice traffic is being carried over the UMTS networks
  - this was approximately 35% in the v3 model by year-end 2012
- The modelling principles specify long-term operation of the 2G and 3G networks
  - we continue to model the proportion of voice on 3G to remain at 35% in the long-run
  - this profile falls within the boundaries of those provided by operators




*Source: Mobile operator data; Mobile model*



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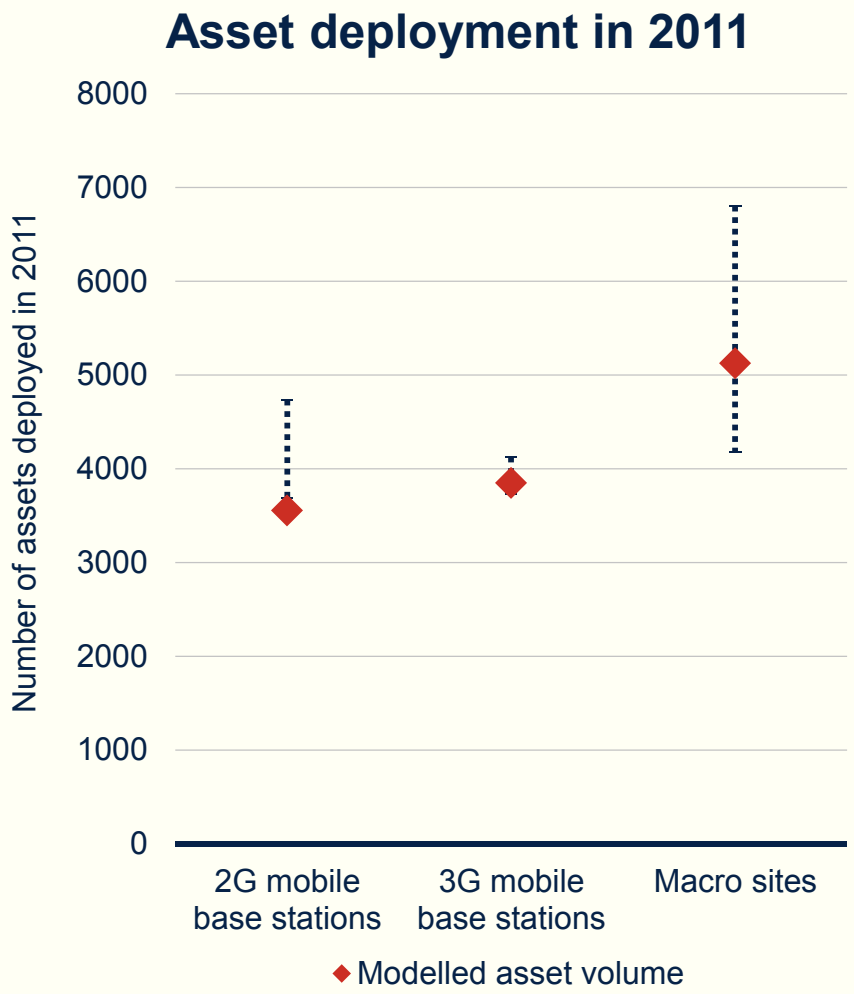
# We have compared the asset deployment in our model to data from the operators

- We have considered how the 2011 asset counts in our model compare to operator data provided for
  - 2G base stations
  - 3G base stations
  - macro sites
- The modelled asset volumes fall within or very close to the range indicated by operator data
- Modelled 2G BTS fall just below the range of actual asset volumes reported for 2011, but rise to within the range in the long-run




*Source: Mobile operator data; Mobile model*



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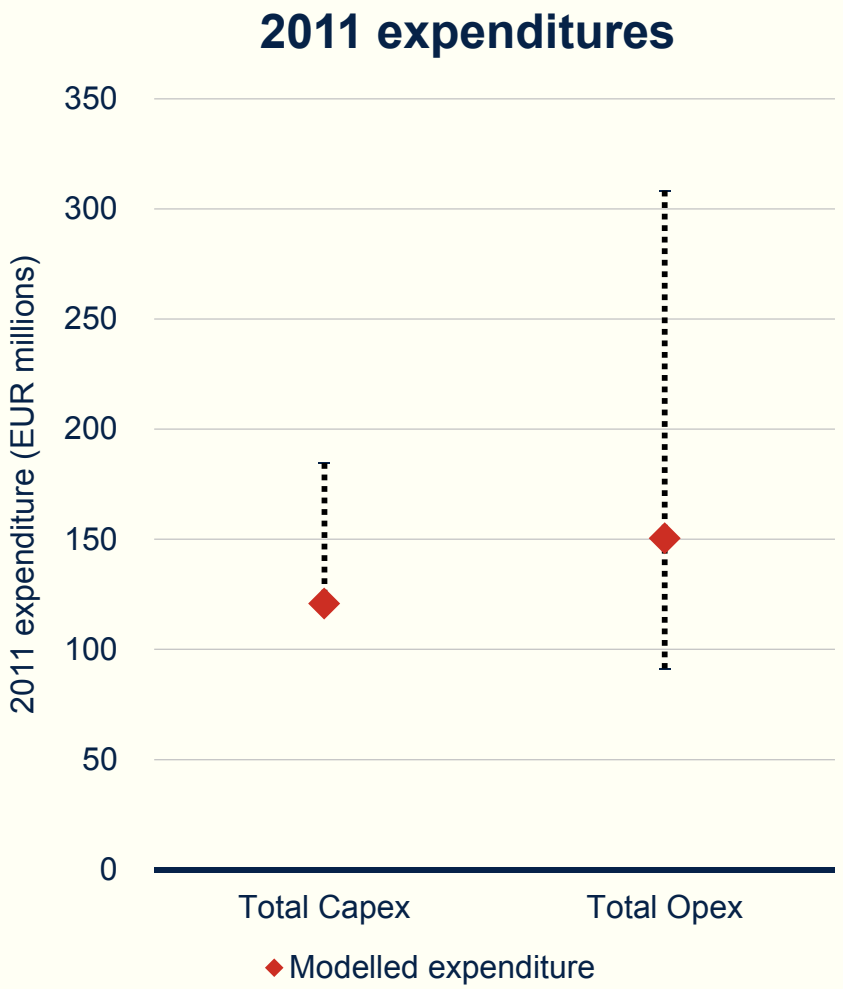
# We have also compared modelled expenditures against operator data

- Both the capex and opex of our modelled operator lie within the range of capex and opex as supplied by the mobile operators
  - our modelled business overhead opex remains unchanged
- We have revised the allocation of the 2100MHz spectrum payments so that only the first 2x5MHz is allocated to both voice and data
  - the remaining 2100MHz spectrum is allocated only to HSPA services




*Source: Mobile operator data; Mobile model*



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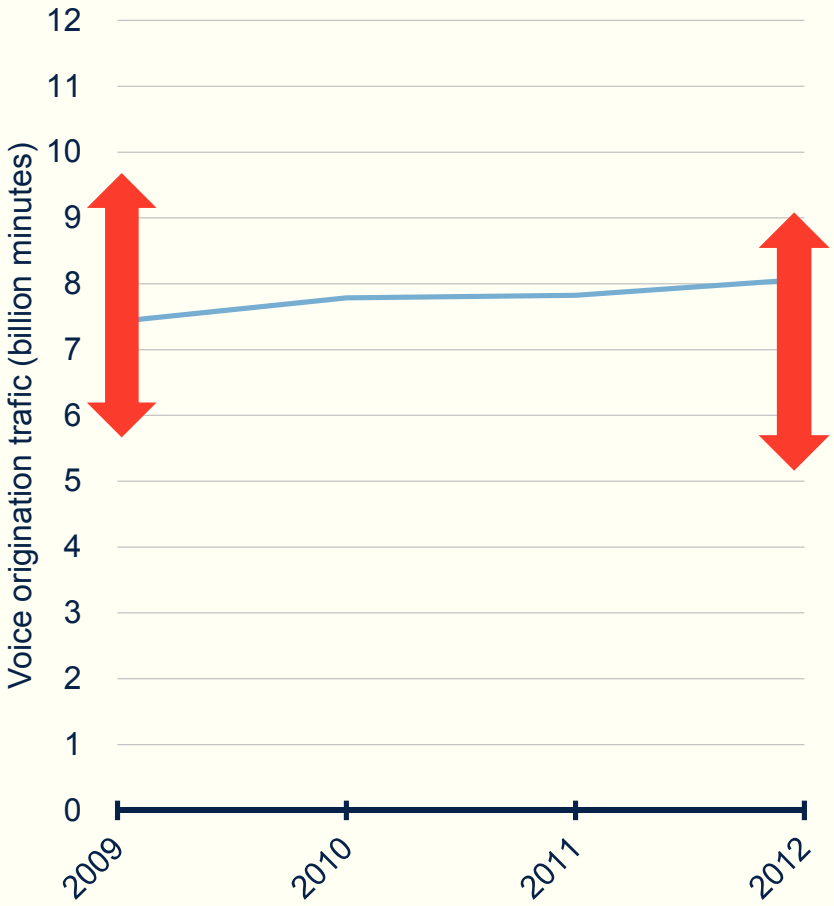
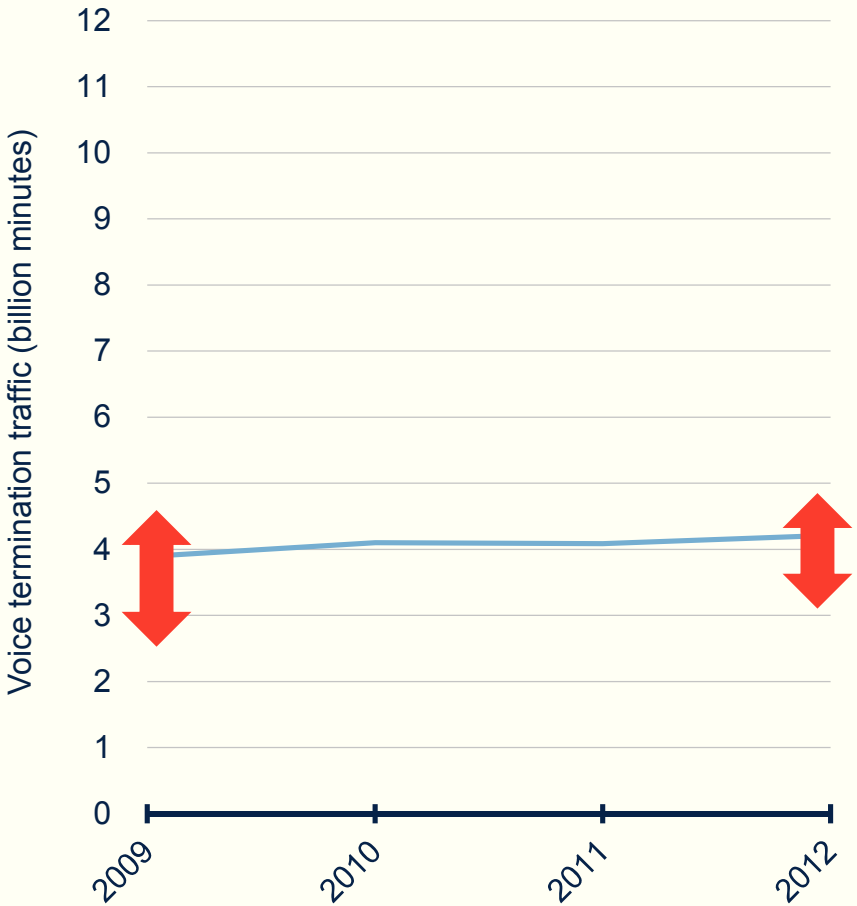
# The modelled voice traffic is also comparable to that of the actual operators…

## Comparison of voice origination




## Comparison of voice termination




*Source: Mobile operator data; Mobile model*



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# Based on new data points, we have refined several inputs in the Interconnect module

- Four operators provided an average cost per hour for the model, from which we have derived and used an average value of **EUR79.40** per hour (real 2009 EUR)
- Some of the hours by task inputs have also been revised based on operator data
- The equipment costs for the "Interconnect switch card (full STM1)" have also been revised based on operator data
- We are unsure if this represents a reasonable and efficient change in this part of the market and would welcome operator comments on these revisions

- If termination is priced using pure LRIC, then there are some costs that will not be recovered by termination
- These costs could be recovered through other services (such as the modelled interconnect services)
  - these interconnect services are not traffic-related and this may not reflect the principles of cost-causality particularly well
- However, OPTA may decide in their market analysis that adjacent markets nonetheless function better with a specific treatment of these "unrecovered" costs

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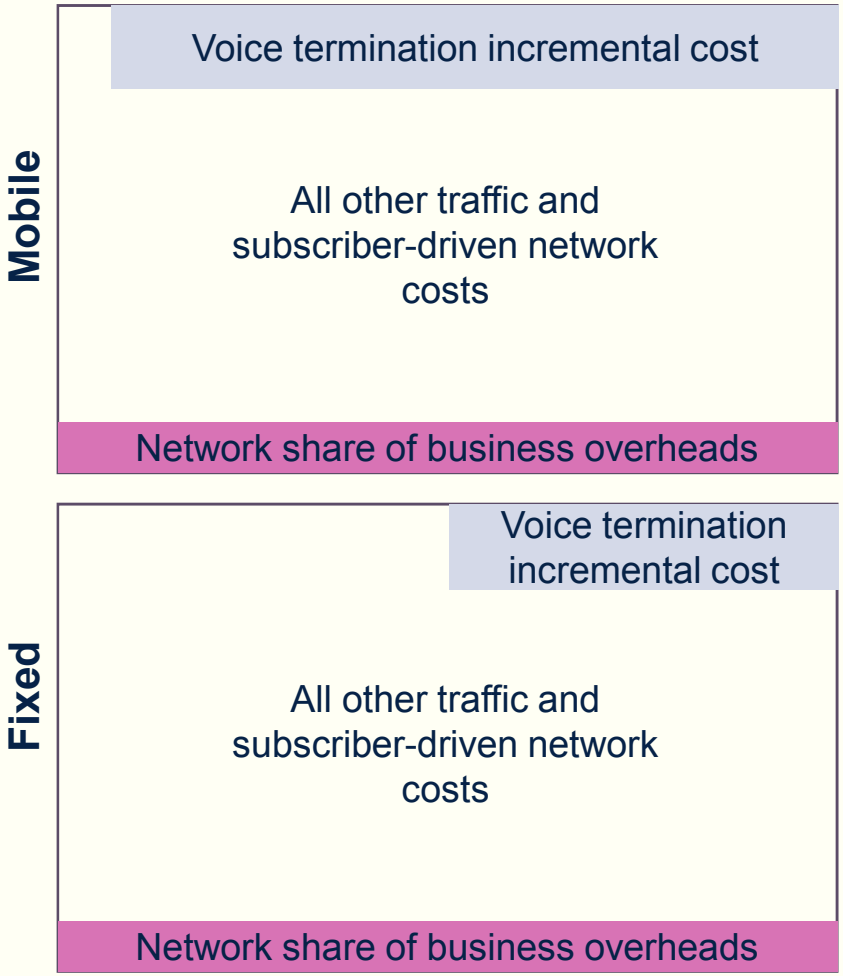
# Based on OPTA's requirements, we used three costing methods

- In the model, three costing approaches were implemented that differed in the definition of the increment and the treatment of common costs
- These were:
  1. **Pure BULRIC**
  2. **Plus BULRAIC**
  3. **Plus Subscriber BULRAIC**
- For the purposes of the update, only options 1 and 2 are relevant
- The v3 model also used a migration profile to assume that the next fixed and mobile technology generations (not modelled) are carrying traffic from 2014 onwards
  - 0.3% of traffic in 2014
  - 1.4% of traffic in 2015
  - 8.6% of traffic in 2016
- For the purposes of the v4 model, we have updated the migration profile so that all traffic is carried on the modelled networks in these years

# 1 The *Pure BULRIC* approach only includes incremental costs

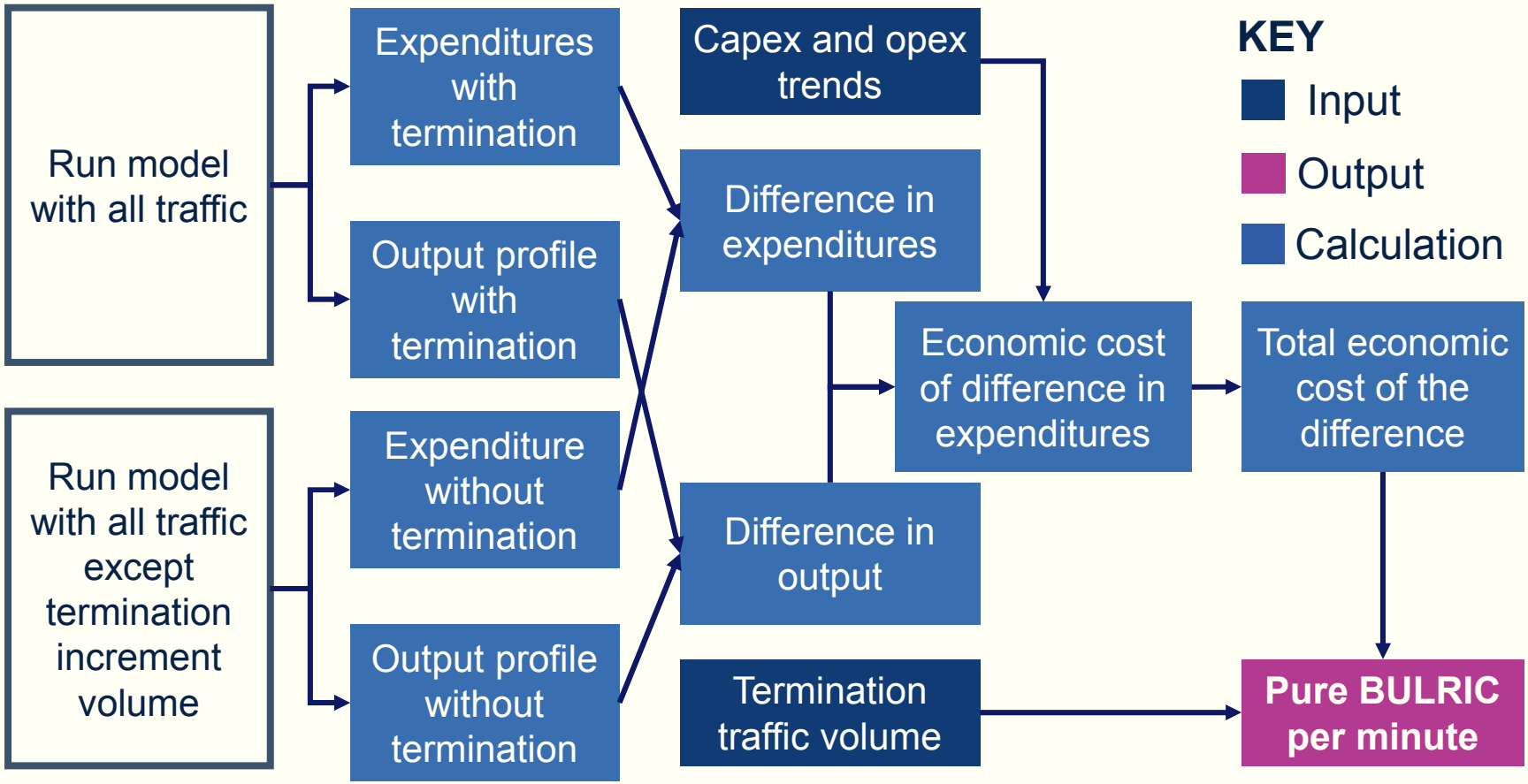



- The **Pure BULRIC** approach was based on the EC Recommendation; it specifies that
  - only the cost '*which is avoided when not offering voice termination'* was allocated to this service
  - wholesale termination was treated as the 'last' service in the network
  - non-traffic related costs, such as subscriber costs, were not allocated
  - network common costs and business overheads were not allocated to the end result
  - this therefore considers the costs of voice termination at the margin



*Source: Analysys Mason*

# 1 We calculate *Pure BULRIC* using the difference between two modelling states






*Source: Analysys Mason*

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# 1 We have reviewed the network designs of both models regarding traffic sensitivity

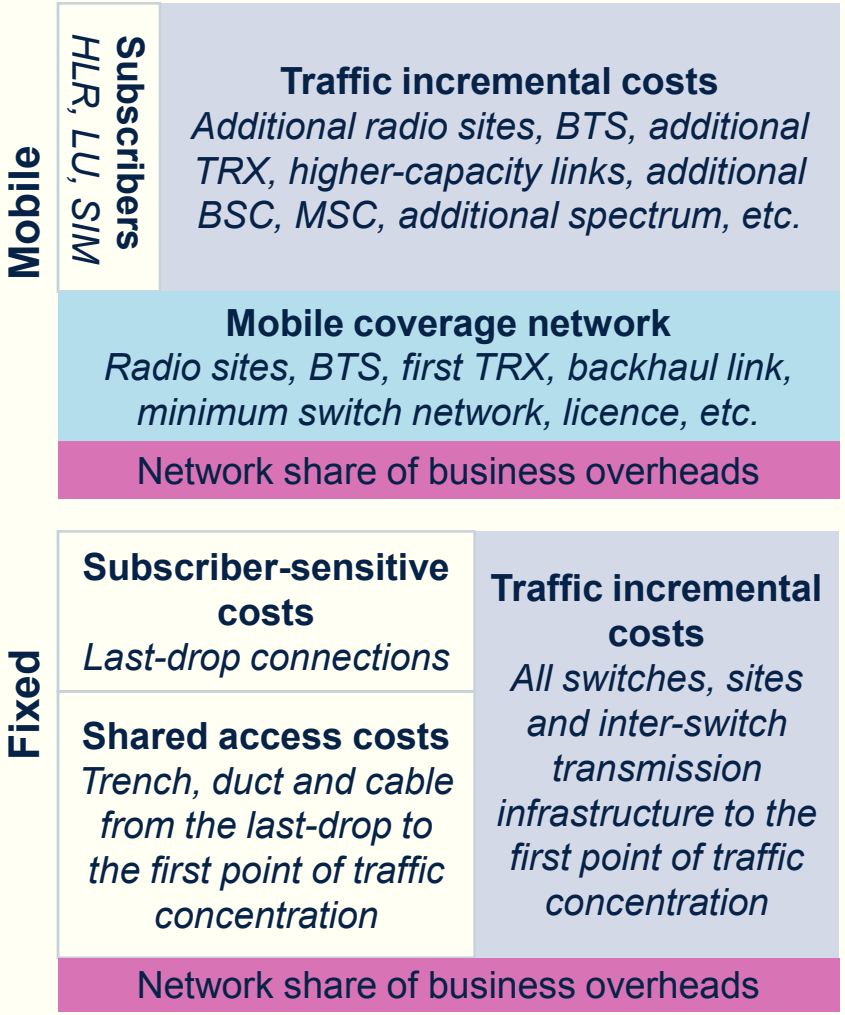
- The v3 model already made several network adjustments
  - e.g. the mobile model assumed 2 × 19MHz 1800MHz spectrum *with termination* and removed 2 × 7.5MHz *without termination*
- We continue to remove 2 × 7.5MHz in the case without termination in the v4 model
- The treatment of spectrum will be considered further if needed after the upcoming auction is completed

## Summary of traffic-sensitive assets

| Fixed model | Mobile model |
|---|---|
| CN_NN Edge router | Radio network sites and backhaul |
| CN_NN SBC cards | Regional backbone access points |
| Call server | BSC+PCU/RNC |
| Interconnect trunk gateways | MSC equipment |
| Wholesale billing system | Wholesale billing system |
| | 2G upfront licence fees |

*Source: Analysys Mason, v3 model*

# 2 *Plus BULRAIC* was consistent with previous regulatory costing




- The **Plus BULRAIC** approach focused on consistency with the previous approach in Europe for fixed and mobile termination costing
- Average incremental costs of traffic were defined in aggregate, then allocated to various traffic services using routeing factors
- Common costs were included (using an equi-proportionate cost-based mark-up)
  - we estimated that these were only significant in the mobile network
- A large traffic increment implied that costs common to multiple traffic services were included in the average incremental cost of traffic



*Source: Analysys Mason*

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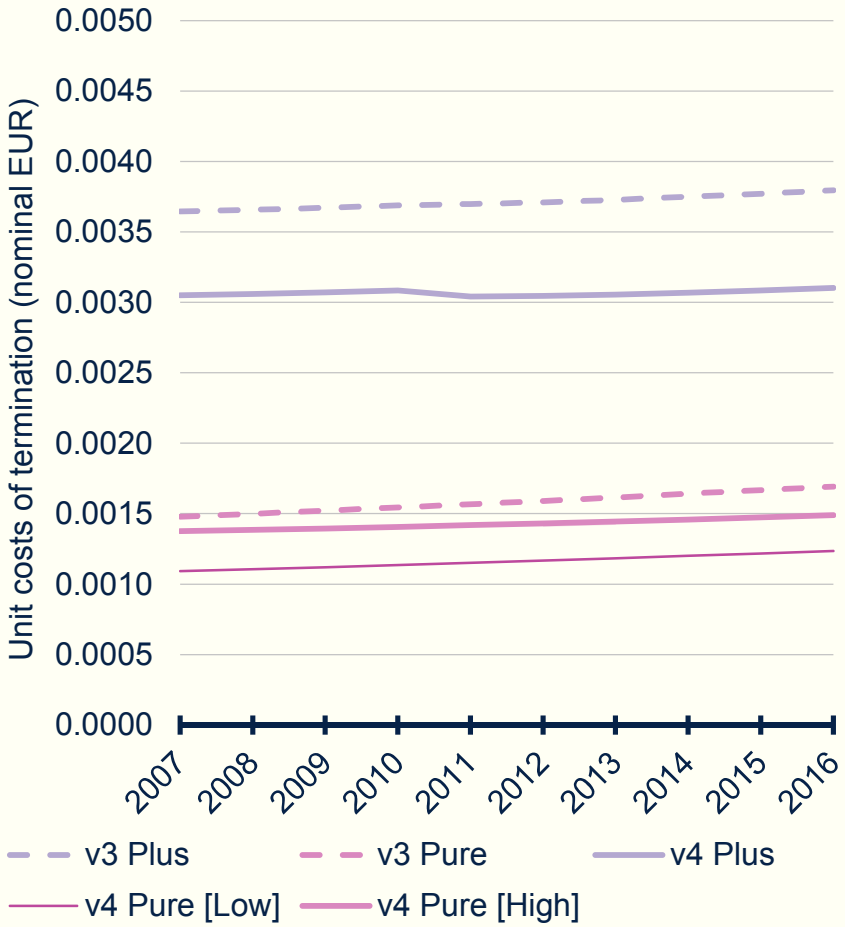
# Comparison of the Pure BULRIC / Plus BULRAIC results from the v3 and v4 models

## Comparison for the fixed model




## Comparison for the mobile model


*Source: v3/v4 models*



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# Next steps following IG2

- Electronic versions of these slides will also be provided
- The model and documents were released to the IG on 12 October 2012
- Industry stakeholders are invited to provide feedback to OPTA on the draft model, by **12 November 2012**

- The spectrum payment inputs will be revisited after the spectrum auction has been completed
- OPTA are evaluating the WACC approach with the NMa

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# Glossary [1/2]

- **2G:** Second generation of mobile telephony
- **3G:** Third generation of mobile telephony
- **4G:** Fourth generation of mobile telephony
- **ADM:** Add-drop multiplexer
- **BAP:** Broadband access platform
- **BSC:** Base station controller
- **BTS:** Base transmitter station or base station
- **BULRAIC:** Bottom-up long-run average incremental cost
- **BULRIC:** Bottom-up long-run incremental cost
- **CK:** Channel kit
- **CWDM:** Conventional wavelength-division multiplexing
- **DCS:** Digital cellular service
- **DWDM:** Dense wavelength-division multiplexing
- **E1:** 2Mbit/s unit of capacity
- **EC:** European Commission
- **EPMU:** Equi-proportionate mark-up
- **FTTC:** Fibre to the cabinet
- **FTTH:** Fibre to the home
- **Gbit/s:** Gigabits per second
- **GSM:** Global system for mobile communications
- **GSN:** GPRS serving node
- **HFC:** Hybrid fibre-coaxial
- **HLR:** Home location register
- **HSDPA:** High-speed downlink packet access
- **HSPA:** High-speed packet access
- **IG:** Industry Group
- **IGW:** Internet gateway
- **IP:** Internet Protocol
- **ISDN:** Integrated services digital network
- **LMA:** Last-mile access
- **LTE:** Long-term evolution
- **LU:** Location update
- **MDF:** Main distribution frame

# Glossary [2/2]

- **MGW:** Media gateway
- **MHz:** Megahertz
- **MPLS:** Multiprotocol label switching
- **MSAN:** Multi-service access node
- **MSC:** Mobile switching centre
- **MSS:** MSC server
- **MVNO:** Mobile virtual network operator
- **NGN:** Next-generation network
- **NMa:** Nederlandse Mededingingsautoriteit
- **NodeB:** Denotes the 3G equivalent of a BTS
- **NTP:** Network termination point
- **OPTA:** Onafhankelijke Post en Telecommunicatie Autoriteit
- **PoI:** Point of interconnect
- **SBC:** Session border controller
- **SIM:** Subscriber identity module
- **STM:** Synchronous transport module
- **TDM:** Time division multiplexing
- **TERM:** Terminal multiplexer
- **TRX:** Transceiver
- **TV:** Television
- **UMTS:** Universal mobile telecommunications systems
- **VDSL:** Very-high-bitrate digital subscriber line
- **VoD:** Video on demand
- **VoIP:** Voice over Internet Protocol
- **VoLTE :** Voice over long-term evolution
- **VPN:** Virtual private network
- **WACC:** Weighted average cost of capital
- **WDM:** Wavelength division multiplexing
- **xDSL:** Digital subscriber line technologies

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