



**TSLRIC price review
determination for the
Unbundled Copper Local
Loop and Unbundled
Bitstream Access services**

***Implemented modelling
changes***

Commerce Commission

Ref: 2014-20-DB-ML-ComCom

Public Version

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S.A.S. au capital de 200 000 €

RCS Paris B 394 948 731

June 2015

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0 Context

Following the publication of the Commerce Commission draft determination on TSLRIC models and prices, the industry has submitted its views on the material that was published.

TERA Consultants has reviewed all the submissions made by the industry and has provided its view in a separate document.

TERA Consultants has updated the different models according to the various decisions that have been made by the Commission following the relevant comments and submissions received from the industry.

This document aims at describing all the changes that have been made to the draft models since December 2014. When a change has been made in response to an industry comment agreed by the Commission, the reference to the industry comment is provided and the justification of the change can therefore be found in TERA Consultants' review of the industry comments.

1 UBA cost model

This section aims at describing the changes that have been made to the UBA cost model.

Location of the update	Reason for updating	Description of the update
<p>Input file: "Q 6.17.12 (d) Install Costs", Column I: Add of Fees and Management costs uplift to installation costs</p> <p>UBA Model: "Assets" Column O (Asset costs incl. installation) has been updated</p>	<p>Analysys Mason noted that Indirect costs of installing active equipment were missing and should be included in the unit cost calculation.</p> <p>This is agreed and the model has been adjusted accordingly.</p>	<p>Chorus provided two mark-ups for these additional costs:</p> <ul style="list-style-type: none"> - Service company management overhead fee ([]%) - Chorus project management ([]%) <p>The input workbook has been updated: these mark-ups have been taken into account to calculate the costs of installation.</p> <p>These calculated unit costs have been updated in the UBA model.</p>
<p>UBA Model: "Parameters" line 92:101</p> <p>Network dimensioning!K126:ADU127</p>	<p>Analysys Mason noted that the number of RSP ports should evolve with the national traffic gathered by RSPs.</p> <p>This is agreed, and TERA has updated the model to take into account this evolution.</p>	<p>In the parameters spreadsheet, the total number of ports dedicated to RSP at a national level has been added.</p> <p>The network dimensioning spreadsheet has been updated in order to reflect these updated values and keep the current distribution of ports.</p>
<p>UBA Model: Equipment per year!AB49</p>	<p>The Commission found that the ISAM subrack at exchange cost included some switches installation costs. These have been removed</p>	
<p>Input file:</p>	<p>Analysys Manson reported that SFP</p>	<p>The SFP dimensioning for DSLAMs has been integrated in the model. The 1G SFP used for the</p>

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Location of the update	Reason for updating	Description of the update
<p>Input - Assets: lines 13 and 20 Equipment per year lines 45 and 50</p> <p>UBA model: Assets: Lines 13 and 20 Network dimensioning: lines 32, 52, 91, 113, 126 and 127 Inventory: Lines 13 and 20 Network costing: Lines 33 and 44</p>	<p>were not included into the DSLAM bundles provided by Chorus. After verification, this is agreed and TERA Consultants has therefore add SFPs to the DSLAMs subracks.</p> <p>WIK mentioned that the number of SFP required per DSLAM may vary with the increasing traffic demand: this is agreed and the model now dimensions the number of SFP based on the traffic per subrack.</p>	<p>switch has been used. SFPs ha, been dimensioned based on the required capacity, 850Mbps has been used as the maximum capacity of a single SFP. The dimensioning of FDS has been adjusted accordingly to the number of SFPs used.</p> <p>This leads to a maximum of 2 SFP per DSLAM with a total traffic of 1166Mbps in 2019. The DSLAM is an ISAM 7302, and it supports up to 2 ports up to 10G (The documentation specifies¹ that the 7302 has a dual 10-Gb/s backplane).</p>
<p>Input file: Equipment per year: line 39 Input prices impacted have been pasted into the model.</p>	<p>The currency used was not correct in the input file</p>	<p>The right currency has been set and the correct exchange rate applied.</p>
<p>UBA Model: Network dimensioning: lines 145 to 177, dimensioning of local interconnection has been added</p>	<p>Chorus reported that FDS should be interconnected at a local level in order to avoid interconnecting RSP at each FDS. This is agreed and a local interconnection mechanism has therefore been implemented.</p>	<p>Local interconnection for FDS has been integrated in the UBA model. Engineering rules have been set as follow:</p> <ul style="list-style-type: none"> - If no switch is required, no local interconnection - If only 1 switch is required, no local interconnection - If 2 switches are required, 2 x 10G ports per switch are installed (ring architecture) - It is insured that the number of 10G cards is at least equal to the number of switches
<p>UBA Model: Assets, cells H29 and H30</p>	<p>Chorus reported that FDS 7 and 12 have respectively 5 and 10 card slots available for service cards.</p> <p>After review of the documentation</p>	<p>The model has been updated accordingly.</p>

¹ Documentation of the ISAM 7302: <http://www.alcatel-lucent.com/products/7302-intelligent-services-access-manager>

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	relative to FDS, this is agreed and the model has been updated the model.	
DashBoard!H26	Integrated to be able to calculate UBA costs based on FTTH	Add of a parameter to choose the modelled core access technology
Geographical data!41:42		Add of the total number of lines per exchange
Assets!20:21		Add of FTTH line cards and SFP for FTTH
OPEX and ACCESS!58:2262	Change implemented in order to avoid circular references in other formulas	As non-network costs are proportionate to annualized capex + opex, the scenario selection is performed before non-network cost allocation, in order to avoid circular references in formulas. In column H, scenario selection is performed based on annual costs before non-network costs allocation.
Network dimensioning!20:32 Network dimensioning!88:101	Integrated to be able to calculate UBA costs based on FTTH	Add of scenario selection (copper or fibre) In case of FTTH, all customers are served from the exchange (no street cabinets).
Network dimensioning!122:124 Network dimensioning!128 Network dimensioning!145:147		Dimensioning of FTTH cards and SFPs Update of DSLAM Subrack dimensioning Dimensioning including RBI
Inventory!21:22		Inventory for FTTH cards and SFPs
Network costing!45:46		Costing for FTTH cards and SFPs
Allocation keys!H50:H53		The number of FWA customers must be taken into account to allocate costs properly in the FTTH+FWA scenario
Dashboard!H63	Update of the allocation factor for the backhaul. The draft model was indeed allocating 1/3 of costs to other services (typically leased lines based on fibre) while 5% of costs where	100% of backhaul is allocated to xDSL

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	already allocated to other services, which was creating a double allocation of costs to other services for this portion of the network	
DashBoard!H26	Comments made by AM/Chorus on the level of saving of a fibre network compared to a copper network	The cost saving for OPEX is set to 40% in the base case scenario instead of 50%. The cost saving for the fibre network is applied on the OPEX of an old copper network whereas it was previously applied on the OPEX of a new copper network
Dashboard!H24	HFC demand to be added in the UCLL modelling following Commission decision	HFC demand has been added to LFC demand.
DashBoard!H18 and H11:H12	Starting period set to December 2015 following Commission decision	Starting period updated to December 2015. WACC updated accordingly. NB: WACC has been updated consistently in all models.
Parameters!H63:65	Update of the allocation factor for the backhaul. The draft model was indeed allocating 1/3 of costs to other services (typically leased lines based on fibre) while 5% of costs were already allocated to other services, which was creating a double allocation of costs to other services for this portion of the network	The cabinet to exchange factor has been set to 100% instead of 2/3 because 5% of costs were already allocated to non-xDSL services. The Exchange to FDS factor has been set to the level of the share of revenue
Dashboard	Add of parameters for more flexibility	The price control period can be changed
Dashboard	Add of parameters for more flexibility	Growth is included (it is set to 0%)
Dashboard	Add of a parameter for more flexibility	Prices can be smoothed over the control period or not

2 UCLL cost model

This section aims at tracking all the changes made to the UCLL models. In this section,

- “Access model” refers to the Microsoft Access model:
 - Submodels are either VBA sheets, tables or Access SQL queries;
- “Cost model” refers to the Excel access network cost model;
- “Inputs” refer to the Excel unit costs model;
- “Trenches” refer to the trench-specific Excel unit costs model.

Location of the update	Reason for updating	Description of the update
Access model, “Poles”, GetSectionPoles_withpriorknowledge function	The number of poles is underestimated in the model. The calculation provides in fact the minimum. Alternative approach as the one suggested by Analysys Mason should be implemented. (AM, §2.7 Number of poles along the road segment)	The number of poles was determined according to two combined criteria: p_1 stemming from the equipment supported by poles, p_2 stemming from limit distance. In order to reflect heterogeneous distribution of buildings along sections, p is set as the average of $p_1 + p_2$ and $\max(p_1, p_2)$ instead of $\max(p_1, p_2)$
Access model, “Poles”, GetFbLeadinFirstPole and GetCuLeadinFirstPole functions, and parameter “PoleHeight”	Due to height constraints, the lead-ins connecting buildings on the minor side require a pole being installed on the opposite side of the road. (AM, §2.8 Deployment of poles)	When buildings are located on both sides, poles that support CCTs or FATs are duplicated. Plus, the height of poles has been increased.
UCLL model, “Inventory”, “Assets” and “MDF data”	Poles on the major side are reused electricity poles while poles on the	Among poles allocated to lead-in, poles that bear distribution points are on the major side, then electricity poles. In the lead-in inventories, electricity poles are copied from the number of

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Location of the update	Reason for updating	Description of the update
	minor side and in lead-in are telecom poles	distribution poles, while telecom poles are inferred from total poles (from the Access model) minus electricity poles. Distribution and feeder poles are deemed as electricity poles. This is performed in the "Inventory" sheet. The pole asset has been split into "Pole" (telecom) and "Pole_D" (electricity), in the "Assets" sheet. Sharing parameter has been as well split in MDF data sheet, as electricity poles are shared with utilities whereas telecom poles are not.
UCLL model, "Investment" and "Annual cost" sheet, lines related to poles	Poles on the major side are reused electricity poles. Regulatory and compliance costs have been deleted as they are already taken into account in rental unit costs of electricity poles.	Regulatory and compliance costs have been deleted as they are already taken into account in rental unit costs of electricity poles.
Trenches, "Geotype per MDF", G743:M1762 & Q743:W1760 Access model, "STATS SOIL TYPE"	The soil-type blend should be computed without the ex-TSO areas since these are removed. Keeping them means the distribution of soil types is not appropriate (see Analysys Mason, §3.3 Trenching)	The blend of soil types per MDF has been computed without the ex-TSO areas.
Inputs, "Unit cost calculation", I4	Design costs should be included in the unit cost of joints and poles (see Analysys Mason comment §3.4)	Design costs have been included in the unit costs of joints and poles
Inputs, "Unit cost calculation", sections Distribution points and Street cabinets	Unit cost of street cabinets CCT and FAT should be updated according to the file provided by Chorus	Unit costs of street cabinets (active and passive), CCTs and FATs have been updated according to the file provided by Chorus. The unit cost of FATs is assessed as a weighted average of 4 ports, 8 ports and 12 ports FAT

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Location of the update	Reason for updating	Description of the update
	(20140821_Confidential_B3_C_Q 3.7 Fibre and copper cabinet nodes and cable terminals.pdf) (AM, §3.4 Other costs)	unit costs provided by Chorus, weights being computed in the Access model. Note that unit costs include design costs and service company overheads.
Cost model, "Inventory", J3 and lines referring to MW links	MW links shall be removed (WIK, §4.2.7)	The number of MW links has been set to zero.
Access model, "Trenches", GetSizeTrenchMinor_Fb, GetSizeTrenchCross_Fb, GetSizeTrenchMajor_Fb_Access functions Access model, PARAMETERS, "LargeSubductDiam", "SubductDiam" and "SubductInnerLimit" Inputs, "Unit cost calculation", Duct section	Use of sub-ducts with different diameters (WIK, §4.2.9.5)	Two different sizes of subducts can be used (14 mm and 25 mm outer diameter). When cable diameter does not exceed 8.5 mm, a 14 mm subduct is used. Otherwise, a 25 mm subduct is used. Subduct cost have been updated to reflect decreasing in material costs of subducts. Subduct installation costs are based on installation costs provided by Chorus ("20140919_Con_B3_C_Q 8.1 Files").
Inputs, "Unit cost calculation", Duct section	Inconsistent mark-up applied to duct costs (WIK, 4.2 §117 (cross submission))	In the updated model developed by Beca, duct prices are consistent from urban to rural areas. Duct unit costs have been updated accordingly.
Access model, PARAMETERS, "Fcount_FWA" Access model, "Fibre cables", GetNb_BackhaulCables and GetBackhaulFibre functions Access model, "Joints",	Optimization and merging of SLUBH and FWA cables (WIK, §5.4.5 and §5.6.5)	FWA and SLUBH cables have been merged into 12F cables, according to the following rules: <ul style="list-style-type: none"> • 1 fibre per FWA or SLUBH link; • When number of links exceeds 12, 2 or more 12F fibre cables are used; • Cables, joints, subducts, shares of ducts and manholes are allocated between FWA and SLUBH according to the number of links.

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Location of the update	Reason for updating	Description of the update
<p>GetBackhaulJoints function Access model, "Trenches", GetSizeTrenchMajor_Cu_OtherNetworks and GetSizeTrenchMajor_Fb_OtherNetworks functions Access model, "Manholes", GetManholesMajor_Cu and GetManholesMajor_Fb functions Access model, "Ducts", GetSubductLength_Backhaul function Access model, PROCESS SECTION MODELLING, fields "FIBRE_FWA_FB", "LENGTH_SUBDUCTS_FWA_FB" & "JOINTS_FWA_FB"</p>		
<p>Access model, PARAMETERS, "CuSurplusXXX", "FbSurplusXXX", "CuCurvatureOHXXX" and "FbCurvatureOHXXX"</p>	<p>Cable surplus to be decreased, aerial sag to be increased (WIK, §5.8.5)</p>	<p>Surpluses have been decreased to 1 meter for terminations (ETP, distribution points, MDF, etc.) and 2 meters for joints. Aerial sag has been increased to 2%.</p>
<p>Inputs, "Unit cost calculation", Manholes section</p>	<p>Blend between the different types of manhole to be updated based on the modelling (WIK §5.8.8)</p>	<p>The blend between the different types of manholes (pit, small manhole, medium manhole and large manhole) are derived from the modelling:</p> <ul style="list-style-type: none"> • Pit: manhole without any joint; • Small manhole: manhole with one joint; • Medium manhole: manhole with two joints; • Large manhole: manhole with more than three joints.
<p>Inputs, "Unit cost calculation", Copper</p>	<p>Missing costs to be included (cable installation costs, arborist costs). See</p>	<p>Fibre and copper cables have been updated with the unit costs used in the model developed by Chorus.</p>

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and fibre cables sections	Analysys Mason comments §3.1 and Chorus comment 148	No data has been provided for arborist costs.
Access model, SOURCE tables	Updated geomarketing database to account for new horizontal lengths (see Analysys Mason comment §2.3) and optimised coverage areas (see WIK comment §3.3)	The Commission has provided an updated geomarketing database: <ul style="list-style-type: none"> • With new horizontal lengths; • With MDF and SC coverage areas based on Voronoi's polygons approach instead of actual coverage areas (i.e. buildings are now connected to their closest SC/MDF instead of their actual parent SC/MDF).
Access model, "Dimensioning at section level" routine	FWA assets to be consistent with TSO areas (see WIK comment §3.5)	FWA assets have been removed when sections are outside TSO areas (output multiplied by "AccountTSO"). Hence, only Core DSLAM, Core Exchange and Core EAS assets are taken into account in non-TSO areas.
Cost model, "Import from Access"	Fibre opex driven by actual number of FTTH and FWA dwellings passed	A new output of the Access model has been added to the cost model : the number of FTTH and FWA dwellings passed, in order to assess opex with accuracy
Trenches model, "Trenching unit costs (w duct labour) b" sheet	Chain digger technology cannot be used in non-town urban areas – Comment from BECA	Two trenching costs have been computed: <ul style="list-style-type: none"> - Rural: same methodology, with rural-specific soil type blend - Urban: the methodology has been reviewed: <ul style="list-style-type: none"> o Chain digger technology cannot be selected as the cheapest technology o Reinstatement costs have been added to open trench technology, on the basis of 3 meters reinstated per building. <p>The blend is then performed between urban and rural unit costs, at the MDF level.</p> <p>Plus, traffic management costs have been added and the ducts unit costs have been updated to reflect switch from PVC to PE.</p>
Trenches model, "Trenching unit costs (w duct labour) b" sheet	Additional reinforcement costs for large trenches (see Analysys Mason comment §2.14)	Reinforcement costs have been added to critical trenches (that distribute more than 5000 lines). Trenching unit costs have been increased accordingly (critical trenches/total trenches *

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Location of the update	Reason for updating	Description of the update
		additional costs per meter).
Access model, "Parameters"	FWA capacity to be set higher (see Network Strategy comment "Capacity per sector is too low")	FWA peak throughput per cell has been increased from 16.7 Mbps to 22 Mbps.
Access model, "Set FWA coverage" routine UCLL model, "Import from ACCESS" and "Inventory"	FWA coverage based on the DSL network following Commerce Commission decision	<p>FWA coverage set according to distance criteria (>5.3 km to first active node), in TSO pre 2001 areas, without any capacity constraint. This is performed in the routine "Set FWA coverage".</p> <p>FWA costs are assessed in two steps:</p> <ul style="list-style-type: none"> • Nominal FWA costs are assessed according to Vodafone's RBI sites • Costs are adjusted to match actual throughput demand (when the demand is twice the Vodafone's capacity, FWA costs are doubled.) <p>Adjustment is performed in the sheet "Inventory", ahead of the FWA inventories.</p>
Inputs, "Export to the cost model"	Active cabinet asset life to be consistent with DSLAM asset lives (see Analysys Mason comment §4.3)	<p>Active cabinets incremental costs have been transferred from the UCLL model to the UBA model:</p> <ul style="list-style-type: none"> - In the UCLL model, active cabinet unit costs have been aligned with passive cabinet unit costs - Incremental costs (active minus passive) have been added to rack unit costs in the UBA model <p>This change has no impact on total capex (transfer from UCLL to UBA) but has an impact of total annual capex, as the incremental costs are annualized consistently with DSLAM asset life, which is shorter than cabinet asset life.</p>
Access model, SOURCE BUILDINGS	Updated database with corrected vertical length (see Analysys Mason comment §2.3)	The Commission has provided an updated database with corrected vertical lengths (total vertical lengths increasing from 45 thousands km to 50 thousands km)

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Location of the update	Reason for updating	Description of the update
Access model, “Dimensioning at the section level” and “Parameters”	Trenches from roads to buildings are shared, and do not follow rectilinear paths (see Analysys Mason comment §2.3)	The Commission has provided an updated database with vertical trench length, resulting from vertical trenches sharing. Plus, parameter “SubOptimalPath” has been added to reflect trenches do not follow strictly rectilinear paths.
Access model, queries related to distribution and feeder inputs	TSO modelling following the Commerce Commission decision	Alternative approach for TSO modeling <ul style="list-style-type: none"> • In TSO areas, the network is dimensioned for the whole country • In non-TSO areas, the network is dimensioned solely for TSO areas Interim queries related to distribution and feeder demand inputs have been duplicated according to the two scopes (TSO or national). The demand selection is then performed according to section location (inside or outside the TSO).
Access model, queries related to distribution and feeder inputs, table “PROCESS SECTION MODELLING” and “FILL PROCESS BUILDING MODELLING”	Post 2001 subdivisions following decision from the Commerce Commission	Dimensioning adjusted to pre-2001 network for underground infrastructures (actual network for other assets dimensioned at the section level). For that purpose, queries related to distribution and feeder inputs have been duplicated as well as fields related the distribution and feeder demand in the table “PROCESS SECTION MODELLING”. Plus, only pre-2001 subdivisions are modeled (selection performed in the query “FILL PROCESS BUILDING MODELLING”).
Access model, “Dimensioning at the building level”	Lead in underground infrastructures are charged to the end-user as part of the connection fees following decision from the Commerce Commission	Lead-in dedicated underground infrastructures (vertical trenches, ducts) have been set to 0 in the routine “Dimensioning at the building level”.
UCLL model, “MDF data” sheet	Sharing of underground infrastructures following decision from the Commerce Commission	Sharing parameter for UG infrastructures set to 5%, while benefits from sharing set to 50% (total cost reduction: 2.5%)

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Location of the update	Reason for updating	Description of the update
UCLL model, "Assets" sheet	Sharing of FWA base stations (see Vodafone comment § E1.4 (h))	Unit costs of FWA base stations are divided by the number of operators operating on the base station.
UCLL model, "MDF data" sheet	Share of aerial network following decision from the Commerce Commission	Share of aerial network updated to <ul style="list-style-type: none"> • 45% for lead in (fibre and copper) • 47% for distribution (fibre and copper) • 0% for feeder (copper)

3 OPEX cost model

This section aims at tracking all the changes made to the OPEX model.

Location of the update	Reason for updating	Description of the update
OPEX model, sheet "Alloc key"	Compute an allocation key based on revenues for the SLUBH	The revenues have been allocated between the 3 services using the SLUBH: 'voice', "UBA" and "leased lines". Some revenues have been excluded as they were not related to one of the services using the SLUBH.
OPEX model, sheet "EXPORT"	The modelling of the level of adjustment in the FTTH network leads to deriving two different sets of outputs, one for the copper network, one for the fibre network	The output of the OPEX model has been duplicated. One contains the outputs for the copper network, when the LFI is set to 9.4%, corresponding to the level of faults incurred by a new copper network as defined in the annex 8.1 of the documentation paper. The second set of outputs is for the FTTH network. The LFI is set to []% corresponding to the real chorus LFI ([]%) adjusted for a higher % of aerial (Chorus network aerial % is circa 5% whereas the model assumption is 47%). The UBA model contains the adjustment parameter that will compute by how much the level of OPEX is reduced as compared to a copper network incurring a LFI of []%.
OPEX model, sheet "EXPORT"	Backdating modelling	The output of the OPEX model has been updated in order to export the results from 2014 to 2020 to the UBA cost model instead of 2015 to 2019 in the draft model.
Sheet "costs summary", Cells J15:J16	See comment from Analysys Mason §5.1	LFI efficiency adjustment does not apply to "Alcatel Lucent maintenance" and "Engineering services" categories.
Sheet "Parameters", Cell I20	See comment from Analysys Mason §5.2	Set target copper LFI to 9.4% instead of 9.9%
All over the OPEX model	See comment from Analysys Mason	Change the model to allocate non-network expenses based on both annualised CAPEX and

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Location of the update	Reason for updating	Description of the update
	§5.4	OPEX already allocated (this will have to be performed in the CAPEX model as CAPEX inputs will be required)
Sheet "Other costs", Cells L125:L127	See comment from WIK §143b	Consider advertising categories as "out of scope"
<p>2 new sheets aiming at allocating IT costs:</p> <ul style="list-style-type: none"> - IT Chorus - IT allocation Chorus <p>+ changes in sheet "IT allocation"</p>	See comment from WIK §400-403	<p>TERA has intended to enhance IT costs allocation using new information provided by Chorus (in Chorus/Analysys model):</p> <ul style="list-style-type: none"> - "IT Chorus" input sheet is an extract from Chorus model mapping IT systems to services (see lines 390 to 517 mainly). - Sheet "IT allocation Chorus" is a calculation sheet where an allocation key between copper / UBA / fibre / other is built (cost of the different IT systems are allocated to the services making use of the IT system based on the number of lines (outputs of the allocation key lines 371 and following). <p>These new allocation keys have been used in the sheet "IT allocation" (column T to W)</p> <p>IT systems for which no allocation key could be derived are treated as non-network cost (an EPMU is the most relevant approach since no key based on cost-causality can be derived). This is done by setting a "1" in column M of the "IT allocation" sheet.</p>
Sheet "Alloc key" cells K119:L325	This output is required in the NRC model	Calculation of the part of revenues corresponding to provisioning as these are required as inputs in the NRC model
<p>Sheet "costs summary" lines 198 to 203</p> <p>Sheet "EXPORT" (Section 7)</p>	This output is required in the NRC model	<p>Calculation of the share of non-network costs allocated to non-recurring charges.</p> <p>This is then pasted in the section 7 of the "EXPORT" sheet as it has to be used in the NRC model</p>
New sheet "Energy CAPEX"	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	<p>This input sheet provides MEA Power capex inputs for each type of sites.</p> <p>This enables the power costs assessment to be consistent with sites MEA valuation.</p>

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Location of the update	Reason for updating	Description of the update
Sheet "parameters" lines 28 and following	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	Power parameters have been added to allow depreciation calculations.
Sheet "Buildings analysis" New sheet "spark sqm"	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	For Chorus sites (column M), square meters are now in line with the MEA sites (and not existing sites) in order to have consistency with the site valuation. For Telecom sites (column L), a new sheet "spark sqm" provides more accurate square meters data for Spark owned sites. Power CAPEX are assessed in column W and X The cost of square meters occupied by power equipment are assessed in column Y and Z
Sheet "Rent&Taxes allocation"	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	Figure in cell I23 updated to capture missing T2 property charges as highlighted by Chorus.
Sheet "parameters" cell I29	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	A 80% utilisation factor for square meters has been implemented (based on a comment from Analysys Mason) This aims at avoiding over-optimisation as floor space cannot be 100% occupied and future requirements if any need to be anticipated.
Sheet "FAR analysis" cells Q16:Q17	Enhancement of power / accommodation calculations (supported by Annex B of AM x-	Power systems have been disregarded from the FAR in order to avoid double counting with the power systems modelled following the MEA valuation.

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	submission) – Comment considered as reasonable and correct, therefore the change has been implemented	
Sheets results lines 99 to 101	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment considered as reasonable and correct, therefore the change has been implemented	Floor space costs allocated to power have been added to per Mwh costs. This is in line with the cost causality principle: Floor space costs allocated to power will then be allocated to assets making more use of power.
Sheets “Maint allocation”	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment has been indeed considered as reasonable and correct, therefore the change has been implemented	Maintenance of power equipment is now allocated to per MWh costs. Column AV has been added for power allocation This is in line with the cost causality principle: Maintenance of power equipment costs will then be allocated to assets making more use of power.
Sheet “Results” Lines 87 to 91	Enhancement of power / accommodation calculations (supported by Annex B of AM x-submission) – Comment has been indeed considered as reasonable and correct, therefore the change has been implemented	Assessment of per sq.m. accommodation costs as the sum of: - building cost - property maintenance - pay costs related to property infrastructure - rates This is in line with the cost causality principle: these costs will then be allocated to assets making more use of floor space.
Sheet “Results” Lines 107 to 112	Enhancement of power / accommodation calculations (supported by Annex B of AM x-	Assessment of per MWh power costs as the sum of: - Electricity price

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Location of the update	Reason for updating	Description of the update
	submission) – Comment considered as reasonable and correct, therefore the change has been implemented	<ul style="list-style-type: none"> - Property maintenance related to electricity - Indirect capex related to power - Floor space costs allocated to power - Power OPEX/ maintenance / Power project OPEX <p>This is in line with the cost causality principle: these costs will then be allocated to assets making more use of power.</p>

4 Price trends model

This section aims at tracking all the changes made to the price trends model.

Location of the update	Reason for updating	Description of the update
Sheet “Core PT benchmark” cells Q12:S17	See Network Strategy comment on price trends §6.1	A Card/Rack split taken from the CORE model is now used instead of benchmark one. These are hardcoded and not updated on a regular basis in order to avoid circular references.
Sheet “Core PT benchmark” G18 and G21	See Network Strategy comment on price trends §6.1	Swedish inputs for power and air conditioning are now included
Sheet “Core PT benchmark”	See Network Strategy comment on	Option to disregard Australian model inputs (this option is not activated in the base case)

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Location of the update	Reason for updating	Description of the update
Column E	price trends §6.1	
Sheet "Analysis" line 26	See Network Strategy comment on price trends §6.2	Model changed in order to have consistent quarter for the beginning and the end of the period for CPI (no impact as NZIER indexes are now used)
Sheet "Analysis" line 28	See Network Strategy comment on price trends §6.2	Model changed in order to have consistent quarter for the beginning and the end of the period for GDP (no impact as NZIER indexes are now used)
Sheet "Analysis" line 27	See Network Strategy comment on price trends §6.2	Linkage error corrected for LCI index (no impact as NZIER indexes are now used)
Sheet "Analysis" cells X25 and AC25	Error in the buildings forecasts	Only the "total" line is now considered.
New "NZIER summary" sheet	Response to CEG comment	Use NZIER recommended indexes
New "scenarios" sheet	Manage all changes listed above	Cells D36:D43 enable to select/unselect the changes listed above
Sheet "Analysis" lines 122-123	Get a long term price trends that accounts both for the machinery and labour components of trenching costs	Use NZIER inputs for trenches price trends
Sheet "Core PT benchmark" columns J,K,L	NS Price trends §6.1	Median value is used instead of average of benchmarked countries in order to derive long term price trends for active equipment