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

Sensitivity Analyses

Commerce Commission

Ref: 2014-20-DB-ML – BU models

TERA Consultants
39, rue d'Aboukir
75002 PARIS
Tél. + 33 (0) 1 55 04 87 10
Fax. +33 (0) 1 53 40 85 15
www.teraconsultants.fr

S.A.S. au capital de 200 000 €
RCS Paris B 394 948 731

July 2015

Summary

1 Introduction

This document exposes sensitivity analyses of the UCLL and UBA models.

The first two sections are a recast of the Model Specifications document.

The third section provides sensitivity analyses aiming at capturing the isolated effects of model changes from December draft to June hard lockdown model.

2 Results

The TSLRIC model for UBA and UCLL have been constructed by following the principles and specifications described in the Model Reference Paper and in the present document. The results of the TSLRIC model are given in the table below, in NZD/month/line, first in 2015, then from 2015 to 2020:

Table 1 – Results of the TSLRIC model for UCLL and BUBA in 2015

Chorus product	Price /customer/month in 2015 (NZD)
UCLL	26.31
BUBA	37.66

Source: TERA Consultants

Table 2 – Results of the TSLRIC model for UCLL and BUBA from 2015 to 2020

Chorus product	2016	2017	2018	2019	2020
UCLL	26.74	27.18	27.63	28.09	28.56
BUBA	37.90	38.16	38.44	38.74	39.08

Source: TERA Consultants

3 Sensitivity analysis

In this section, the results of sensitivity analyses are provided.

For each sensitivity analysis, the prices of the following services are provided:

- UBA additional costs;
- SLU;
- UCLL.

In addition, the total annuities (depreciated capex for 2015) of the following network scopes are provided:

- UBA additional costs;
- SLU backhaul;
- Copper network;
- Fibre network.

The annuity of the fibre network has been adjusted to take into account the geographical scope difference with copper, i.e. the figure shown is the fibre network annuity minus the SLUBH annuity.

3.1 Sensitivity to the geographic scope: TSO-derived boundary

In the base case scenario, only the areas inside the TSO-derived boundary are taken into account to calculate the results. FWA coverage is based on the areas inside the TSO-derived boundary.

The scope of the cost modelling can be extended to the areas outside the TSO-derived boundary. In such a scenario, the FWA coverage areas remain based on the TSO-derived boundary.

This scope extension leads to an increase in UCLL and SLU prices as the areas outside the TSO-derived boundary are the most remote areas of the network. It has of course a small impact on UBA.

Table 3 – Sensitivity to the TSO-derived boundary[1]

Scenario	Annuity (mNZD)			
	UBA	SLUBH	Copper network	Fibre network
Base case scenario	98.16	87.54	345.19	302.07
Including areas outside the TSO-derived boundary	96.77	76.34	451.42	432.55

UCLL price	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
National network	32.47	33.03	33.61	34.20	34.80

SLU price	2016	2017	2018	2019	2020
Base case	11.66	11.79	11.92	12.05	12.19
National network	19.98	20.29	20.61	20.93	21.25

[1] The TSO-derived boundary is based on the area defined in the TSLRIC model used for TSO. Each segment within the road network model was tagged with a TSO value of 'True' if 50% or more of its spatial definition fell within one or more of the convex polygons we calculated based on (December 2001) data about the extent of Telecom's network, otherwise the segment's TSO value was set at false. The convex polygons were derived from the historic customer locations for each exchange area which were grouped into clusters.

UBA price	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
National network	10.63	10.45	10.28	10.13	9.99

Source: TERA Consultants

3.2 Sensitivity to the share of overhead network

In the base case scenario, the share of overhead network at the distribution levels is estimated at 47%.

A sensitivity analysis is run onto the model to assess the impact of changes to the share of overhead network.

When the share of overhead network increases

- Capital costs decrease as aerial routes are less expensive than trenches;
- Opex slightly increase, as LFI increases with share of overhead.

At total, UCLL and SLU prices decrease.

The UBA price is slightly increasing because of the reallocation of common costs.

Table 4 – Sensitivity to the share of overhead network

Scenario	Annuity (mNZD)			
	UBA	SLUBH	Copper network	Fibre network
Base case (47%)	98.16	87.54	345.19	302.07
Overhead 36%	98.16	87.54	354.72	308.88
Overhead 58%	98.16	87.54	335.67	295.26

UCLL price	2016	2017	2018	2019	2020
Base case (47%)	26.74	27.18	27.63	28.09	28.56
Overhead 36%	27.01	27.46	27.92	28.39	28.87
Overhead 58%	26.47	26.90	27.34	27.79	28.24

SLU price	2016	2017	2018	2019	2020
Base case (47%)	11.66	11.79	11.92	12.05	12.19
Overhead 36%	12.07	12.21	12.36	12.50	12.65
Overhead 58%	11.24	11.36	11.48	11.60	11.72

UBA price	2016	2017	2018	2019	2020
Base case (47%)	11.15	10.97	10.80	10.65	10.52
Overhead 36%	11.13	10.95	10.78	10.63	10.50
Overhead 58%	11.18	11.00	10.83	10.68	10.54

Source: TERA Consultants

3.3 Sensitivity to the cost of capital

In the base case scenario, the post-tax nominal WACC is equal to 6.03% and is based on April 2015 data.

The cost of UCLL is highly sensitive to changes in WACC, as many UCLL assets have long asset lives. The cost of UBA is also sensitive to the WACC, to a lesser degree.

Table 5 - Sensitivity to the WACC

Scenario	Annuity (mNZD)			
	UBA	SLUBH	Copper network	Fibre network
Base case (6.03%)	98.16	87.54	345.19	302.07
WACC at 6.53%	101.85	95.41	368.57	320.90

UCLL price	2016	2017	2018	2019	2020
Base case (6.03%)	26.74	27.18	27.63	28.09	28.56
WACC at 6.53%	28.02	28.49	28.97	29.45	29.95

SLU price	2016	2017	2018	2019	2020
Base case (6.03%)	11.66	11.79	11.92	12.05	12.19
WACC at 6.53%	11.89	12.03	12.16	12.29	12.43

UBA price	2016	2017	2018	2019	2020
Base case (6.03%)	11.15	10.97	10.80	10.65	10.52
WACC at 6.53%	11.38	11.20	11.03	10.88	10.74

Source: TERA Consultants

3.4 Sensitivity to price trends

As explained in §**Error! Reference source not found.**~~8.3~~, there are several sources for the price trends:

- The base case scenario corresponds to the most reasonable values identified among all sources.
- The low price trend scenario corresponds to the minimum price trends.
- The high price trend scenario corresponds to the maximum price trends.

As the price trends increase, the prices of the services decrease.

Low sensitivity to price trends reflects narrow ranges for price trends. For instance, price trends for underground infrastructures range from 2% to 3.3%, with base case scenario equal to 3.3%.

Table 6 – Sensitivity to price trends

Scenario	Annuity (mNZD)			
	UBA	SLUBH	Copper network	Fibre network
Base case	98.16	87.54	345.19	302.07
Lower price trends	100.66	100.48	372.74	316.23
Higher price trends	91.77	86.11	345.19	293.96

UCLL price	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Lower price trends	28.03	28.41	28.80	29.20	29.60
Higher price trends	26.34	26.81	27.30	27.79	28.29

SLU price	2016	2017	2018	2019	2020
Base case	11.66	11.79	11.92	12.05	12.19
Lower price trends	11.14	11.28	11.41	11.55	11.69
Higher price trends	11.46	11.61	11.75	11.90	12.05

UBA price	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Lower price trends	11.27	11.08	10.92	10.76	10.63
Higher price trends	10.64	10.75	10.87	10.99	11.13

Source: TERA Consultants

3.5 Sensitivity to the capital contribution for RBI DSLAM

In the base case scenario, the investment of RBI DSLAM is removed.

Including the investment for RBI DSLAM increases the UBA price.

This leads to a reallocation of common costs and therefore leads to a decrease in the price of access products (SLU, UCLL).

Table 7 – Sensitivity to RBI DSLAM capital contribution

Scenario	Annuity (mNZD)			
	UBA	SLUBH	Copper network	Fibre network
Base case	98.16	87.54	345.19	302.07
Including RBI DSLAM investment	107.83	87.54	345.19	302.07

UCLL price	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Including RBI DSLAM investment	26.65	27.09	27.55	28.01	28.48

SLU price	2016	2017	2018	2019	2020
Base case	11.66	11.79	11.92	12.05	12.19
Including RBI DSLAM investment	11.61	11.75	11.88	12.01	12.15

UBA price	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Including RBI DSLAM investment	12.00	11.79	11.59	11.41	11.25

Source: TERA Consultants

3.6 Sensitivity to the cost adjustment method to select the cheapest technology

The costing of the UCLL is based on the cheapest roll-out scenario between the FTTH/FWA MEA and the FTTN MEA.

The choice of the cheapest configuration can be either performed at:

- The MDF level;
- National level.

In the base case scenario, the choice is performed at the national level.

The cost adjustment at the MDF level allows performing a greater adjustment on costs and therefore decreases the price of the access products (UCLL, SLU).

This leads to a reallocation of common costs and therefore leads to decrease the UBA price.

As the FTTH/FWA MEA network is cheaper than the FTTN MEA network, choosing a 100% FTTN network would lead to significantly higher prices for the UCLL.

Furthermore, the costs of the core network are based on copper technology. Switching to fibre would lead to significant increase in UBA costs and slight decrease in UCLL costs due to common costs reallocation.

Table 8 – Sensitivity of the UCLL price to the cost adjustment method to select the lowest cost technology

	2016	2017	2018	2019	2020
Base case (fibre)	26.74	27.18	27.63	28.09	28.56
Costs based on copper	28.78	29.38	29.99	30.62	31.25
Cost adjustment at the exchange level	24.82	25.28	25.76	26.24	26.73
UBA based on fibre	26.51	26.96	27.42	27.89	28.36

Source: TERA Consultants

Table 9 – Sensitivity of the BUBA price to the cost adjustment method to select the lowest cost technology

	2016	2017	2018	2019	2020
Base case (fibre)	37.90	38.16	38.44	38.74	39.08
Costs based on copper	39.65	40.05	40.48	40.95	41.44
Cost adjustment at the exchange level	36.91	37.18	37.49	37.81	38.15
UBA based on fibre	39.97	40.12	40.30	40.50	40.77

Source: TERA Consultants

4 December draft parameters

Main changes to the December draft model have been undone in order to bridge the price differences from December draft to June hard lockdown models.

These assumptions have been re-implemented:

1. FWA approach;
2. Post 2001 subdivisions;
3. Lead in infrastructure assets;
4. Aerial deployment in distribution and lead in;
5. Price trends;
6. HFC demand;
7. Underground infrastructure sharing;
8. Cost adjustment at MDF level.

It is important to note that most changes are multiplicative. For instance:

- Taking into account the post 2001 subdivisions (as in December) extends the line scope;
- Taking into account all lead in assets (as in December) extends the cost scope;

⇨ In the December draft, both assumptions were combined.

4.1 FWA approach

In the December draft:

- FWA coverage was based on RBI actual coverage, narrowed to match sites' capacity;
- FWA costs were based on actual RBI sites (number of sites, FWA backhaul)

While in the June hard lockdown model:

- FWA coverage is based on copper network (most remote premises to be covered, i.e. distant from 5.3 km to first active node);
- FWA costs are inferred from actual RBI sites and adjusted to match actual demand.

It is important to note that in December draft, FWA coverage was limited to a given set of exchange areas and not to all exchange areas as in June model (when distance criteria were met).

Plus, RBI sites actual coverage was not necessarily aiming at most expensive premises in each exchange area.

Finally, in June model, cost adjustment led to cost reduction for the FWA network as it assumed most remote premises to be delivered with only 150 kbps/line throughput (vs. 250 kbps/line in December draft).

At total, whilst June FWA coverage was actually narrower than in December draft, total fibre + FWA costs are lower in June model.

Table 10 – Sensitivity of the UCLL price to the FWA approach

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Former FWA approach	27.30	27.75	28.20	28.67	29.14

Source: TERA Consultants

UBA prices are affected in the opposite way thanks to cost reallocation effects.

Table 11 – Sensitivity of the UBA price to the FWA approach

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Former FWA approach	11.11	10.93	10.76	10.61	10.48

Source: TERA Consultants

4.2 Post 2001 subdivisions

From December draft to June hard lockdown model, post 2001 subdivisions were partly removed from the modelling:

- Lead ins have been removed;
- Underground access infrastructures have been aligned with pre 2001 network.

However, it is important to note that most of lead-in costs are not incurred in the base case scenario (as lead-in underground infrastructures are not taken into account, cf. next section). Hence, only the latter change has material impact on UCLL costs.

Re-instating post 2001 subdivisions then leads to increase in UCLL costs.

Table 12 – Sensitivity of the UCLL price to the post 2001 subdivisions

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
With post 2001 subdivisions	27.30	27.75	28.20	28.67	29.14

Source: TERA Consultants

UBA prices are affected thanks to cost reallocation effects.

Table 13 – Sensitivity of the UBA price to the post 2001 subdivisions

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
With post 2001 subdivisions	11.07	10.89	10.72	10.57	10.44

Source: TERA Consultants

4.3 Lead-ins

From December draft to June hard lockdown model, lead-in underground infrastructures were removed from modelling.

Those costs accounted for most of lead in costs.

Re-instating lead-in costs leads to significant increase in UCLL costs.

Table 14 – Sensitivity of the UCLL price to lead-in cost scope

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
With all lead-in costs	29.61	30.14	30.69	31.24	31.81

Source: TERA Consultants

UBA prices are affected thanks to cost reallocation effects.

Table 15 – Sensitivity of the UBA price to lead-in cost scope

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
With all lead-in costs	10.93	10.75	10.58	10.43	10.30

Source: TERA Consultants

4.4 Aerial deployment

From December draft to June hard lockdown, aerial deployment was updated

- In lead in, from 49% to 45%;
- In distribution, from 36% to 47%.

It is important to note that this analysis slightly differs from the one conducted in section 3.22.2 as lead-in aerial deployment was not tested in the latter.

Table 16 – Sensitivity of the UCLL price to aerial deployment

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
With December assumptions	27.09	27.55	28.01	28.48	28.96

Source: TERA Consultants

UBA prices are affected thanks to cost reallocation effects.

Table 17 – Sensitivity of the UBA price to aerial deployment

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
With December assumptions	11.12	10.94	10.77	10.62	10.49

Source: TERA Consultants

4.5 Price trends

Price trends have been updated from December draft to June hard lockdown model.

Table 18 – Price trends used in the modelling

Asset type	Draft model December 2014	Hard lockdown June 2015
Copper cables	2.84%	2.61%
Copper joints	2.48%	2.00%
Copper Distribution points	2.44%	2.00%
Fibre Distribution points	2.46%	2.00%
Fibre cables	4.19%	-0.30%
Fibre joints	2.46%	2.00%
Ducts	3.00%	3.30%
Trenches	3.00%	3.30%
Poles	2.38%	2.00%
Chambers/Manholes/Joint holes	2.54%	2.00%
MDF/ODF	1.61%	2.78%
FWA base stations - Active	-5.00%	-5.00%
FWA base stations - Passive	2.18%	2.00%
Submarine links (cables/landing stations)	2.18%	2.00%
Microwave links	2.18%	2.00%
DWDM links (active part)	-4.75%	-5.00%
DSLAM (card/subrack/rack)	-4.80%	-5.00%
Switches/routers (card/subrack/rack/SFP)	-4.98%	-6.18%
Building/Land	2.18%	2.00%
Power equipment	2.00%	2.00%
Air-conditioning equipment	0.50%	0.80%
Site equipment (e.g. security equipment)	2.18%	2.00%
OPEX - Manwork related	2.58%	2.00%
OPEX - Non manwork related	0.00%	0.00%

Source: TERA Consultants

Price trends for fibre cable and joints have been decreased, while price trends for underground infrastructures have been slightly increased.

Price trends for core assets have also been decreased.

At total, in the updated model, UCLL costs have increased from December draft.

Table 19 – Sensitivity of the UCLL price to price trends

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
With December assumptions	25.80	26.39	26.99	27.61	28.24

Source: TERA Consultants

UBA prices are also affected by cost reallocation effects.

Table 20 – Sensitivity of the UBA price to price trends

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
With December assumptions	11.14	10.98	10.82	10.69	10.57

Source: TERA Consultants

4.6 HFC demand

HFC demand has been added for UCLL price determination in the hard lockdown model.

Those additional lines lead to a 4% decrease in UCLL price.

Table 21 – Sensitivity of the UCLL price to HFC demand

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Without HFC demand	27.72	28.18	28.65	29.12	29.61

Source: TERA Consultants

HFC demand has no impact on UBA prices as it does not affect total UCLL costs – which are used to allocate common costs – but only costs per line.

Table 22 – Sensitivity of the UBA price to HFC demand

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Without HFC demand	11.15	10.97	10.80	10.65	10.52

Source: TERA Consultants

4.7 Infrastructure sharing

From December draft to June hard lockdown, sharing assumptions for underground infrastructures have been updated from 0% to compound 2.5% (5% of trenches shared with 50% sharing benefits).

Table 23 – Sensitivity of the UCLL price to HFC demand

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Without infrastructure sharing	26.92	27.36	27.82	28.28	28.76

Source: TERA Consultants

UBA prices are in addition affected by cost reallocation effects in reverse. At total, UBA prices are barely affected.

Table 24 – Sensitivity of the UBA price to HFC demand

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Without infrastructure sharing	11.17	10.99	10.82	10.67	10.54

Source: TERA Consultants

4.8 Cost adjustment at MDF level

In December draft as in June hard lockdown, cost adjustment is performed at the national level.

However, cost adjustment at the MDF level is provided in both models as a feature.

Cost adjustment at the MDF level allows more cost optimization for UCLL.

Table 25 – Sensitivity of the UCLL price to cost adjustment

	2016	2017	2018	2019	2020
Base case	26.74	27.18	27.63	28.09	28.56
Cost adjustment at the exchange level	24.82	25.28	25.76	26.24	26.73

Source: TERA Consultants

Table 26 – Sensitivity of the UBA price to cost adjustment

	2016	2017	2018	2019	2020
Base case	11.15	10.97	10.80	10.65	10.52
Cost adjustment at the exchange level	12.09	11.9	11.73	11.57	11.42

Source: TERA Consultants