**N O T A T**

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## Consultation note regarding final model and documentation for geographical modification of DBA's fixed access LRAIC model

On the 8th of November 2017, the Danish Business Authority (DBA) sent the draft LRAIC model and documentation for the upcoming geographical modification of the fixed access LRAIC model to the industry for consultation. The modification includes the option of excluding chosen areas from the cost base in the fixed access LRAIC model, such that regulated prices only reflect regulated areas. The consultation period ended on the 29th of November 2017.

DBA received comments from two companies: TDC and Telia. Telia had no remarks. Below are the DBA's remarks to TDC's comments.

*Chosen rollout scenarios for deregulation*
TDC remarks that DBA has chosen to implement the geographical modification in the P2P scenario only. DBA should be aware that PON network can be the preferred technical solution if TDC decides to deploy fibre networks.

DBA takes note of TDC's remark.

*Scope of the model*

TDC requests DBA to verify, whether the proposed model is usable as a generic model to regulate regional fibre operators with SMP in certain regions. TDC argues that the model is usable to identify the wholesale price of regional fibre networks, where the coverage of the fibre network and corresponding costs are modelled using the geographical properties (flags) of the model.

DBA's modified LRAIC model reflects the changes in obligations of the new market decisions of wholesale market 3a and 3b. That is, it adjusts the calculated costs to the deregulation of 56 zip code areas.

The model has not been modified in order to regulate regional fibre operators, as this was not a part of the abovementioned market decisions, and DBA has not assessed the model's capability to identify wholesale prices of other operators, e.g. regional fibre networks.

*Description of method for calculating active lines per zip code*

TDC finds that the description of the method used for calculating active lines in the consultation note regarding the model reference paper should be included in the final model documentation.

DBA has included the abovementioned description in the final model documentation

*Method for calculating active lines per zip code*

TDC requests DBA to implement a correction to the zip code data in order to avoid bias unit cost calculation. DBA uses zip code data from the market survey to calculate active lines per zip code in the modified model. In the market survey data the total number of active lines is reported, i.e. if given household uses a copper line for PSTN and a coax line for broadband, two lines are reported for this household. However, only one line is modelled in the LRAIC model, since a customer will only use one line in DBA's MEA approach.

Therefore, TDC finds that the number of lines from the market surveys cannot be compared to the equivalent from the LRAIC model. TDC finds that DBA's method is biased in calculating active lines in zip code areas. Compared to market survey lines, more than 300,000 coax lines are removed in the LRAIC model in order to model only one active line per customer in the coax areas. When DBA uses the market survey volume as an allocation factor for the LRAIC volume, the allocated number of active lines in the modified model will systematically be overestimated in zip code areas containing coax customers and underestimated in zip code areas without coax. The total network costs in these areas are however not affected; however, the unit cost in coax areas will be too low and too high in non-coax areas.

DBA agrees with TDC, and DBA will therefore reduce the number of coax lines per zip code used for the calculation of the total number of active lines per zip code. The number of coax lines will be reduced by the same factor as used in the LRAIC Access model in the 'Parameters' sheet cell 'F76' – 'Overlap correction factor for Copper and CATV active lines in copper scenario'. This ensures consistency between the modified LRAIC-model and the market survey data.

The computation of geographical distribution of active lines per zip code can be adjusted to prevent the double counting of the premises with two active lines (coax and copper). This would better align the calculation with the dimensioning of the number of active lines in the model (as this overlap is taken into account). In order to avoid doubt and in order to ensure consistency with the existing model, the reduction in the number of active lines is performed for overlapping TV-only coax customers. If a customer has both a coax and a copper broadband subscription, it is assumed that the customer will need two distinct subscriptions.

As a result of this adjustment, the difference between the numbers of active lines (2,29 M) used in the full coverage scenario (sheet "Parameters", cell I124) and

the sum of the actives lines per zip code (1.58 M) is widened due to the removal of 284,643 active "overlapping" lines.

The calculation of the part of the coax users having a copper access can be done using the overlap ratio at the zip code level. This ratio will be used to compute the number of active lines per zip code as shown in the formula below:

**Active lines per zip code = Copper lines per zip code + Fiber lines per zip code + (Coax lines per zip code * Overlap correction factor)**

Furthermore, when allocating active lines another issue arose with the newly created zip code '2150 Nordhavn', which caused small deviations in the allocated costs. The original geographical input for the SQL-model did not include zip code 2150, as the zip code did not exist when the model was created. Instead the buildings were located in zip code 2100. Therefore the model does not include lines passed for zip code 2150 and hence cannot correctly allocate active lines for this zip code based on the market survey.

To ensure consistency between the geographical input and the active lines from the market survey, the number of active lines in zip code 2150 according to the data in the market survey will be allocated to zip code 2100. However, this does not imply that newly created zip codes cannot be deregulated. These zip codes will instead be selected at building level based on addresses.

*Deviation in calculated length of trenches and corresponding costs*

TDC request DBA to investigate whether small deviations in the length of trenches stem from erroneous calculation in the SQL-code. TDC has found that, compared to the existing model, the modified model calculates in broad sense the same total cost of capex in sheet 'Dashboard', cell G24. However, at small deviation exist, which seems to occur for SDP trench length for some specific CO zones (sheet 'FTTHP2P-trenches', column K). E.g.: DAL, GAV, GBY HMM, KØ ØBL,

The deviation does not stem from erroneous SQL-coding but occurs because of removing inactive PDP, i.e. PDP without any households connected, and a PDP connected to a different CO than its physical location.

Compared to the existing model, the total cost of capex (sheet "Dashboard", cell G24) has changed by less than 0.1 pct. This small deviation for the specific CO areas is caused by a change in the amount of assets and trench length following the removal of PDP with no active lines.

TDC has spotted eight COs with more than 10 pct. deviation between the old and the new model: (DAL, GAV, GBY HMM, KØ ØBL, RAB, SUD).

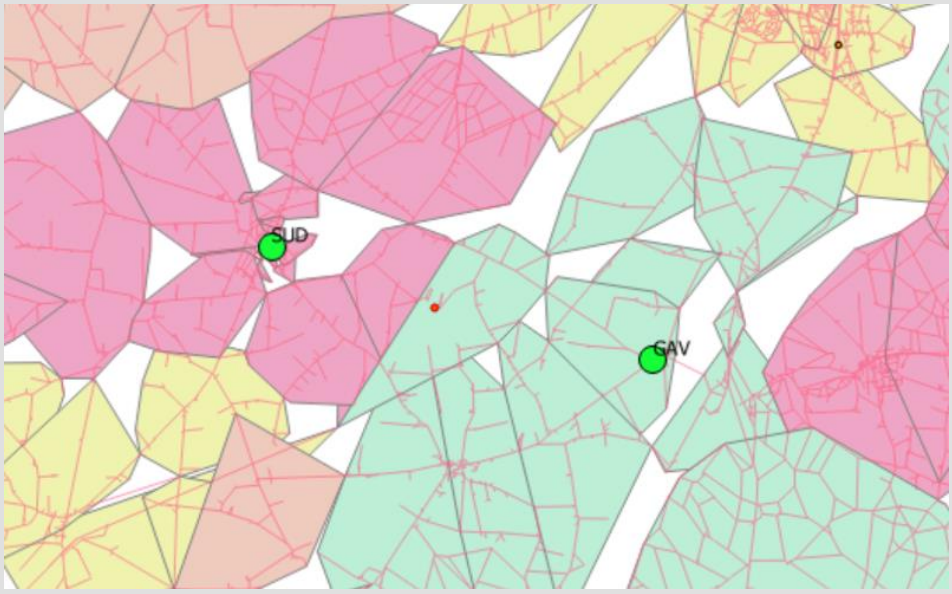
Among those eight COs, seven of these contain between one and four PDP with no active lines as listed in the below table. These inactive PDP has been removed.

**Table 1 : Number of empty PDP per CO**

| CO | number of empty PDP per CO |
|---|---|
| RAB | 4 |
| SUD | 2 |
| KØ | 1 |
| GBY | 1 |
| HMM | 1 |
| ØBL | 1 |
| DAL | 1 |

Regarding the last CO GAV, this PDP (red dot) has no active lines and is connected to the CO SUD but is physically located in the GAV area (close to the SUD/GAV boundary) as shown in figure 1. Accordingly, the removal of this PDP will also affect civil engineering in the GAV area.

**Figure 1 : Area covered by a CO – Empty PDP**




*Error in cost allocation using addresses*

TDC requests DBA to explain these systematic low costs for regulated areas, when addresses are used for selection.

TDC's general approach when testing addresses for selection was to select approximately half of the 2.2M addresses randomly and mark these as 'regulated' in a ScC1 and ScC3 scenario. With this approach, TDC expects the average regulated cost to be close (equal) to the non-regulated cost and at the same time to be close (equal) to the overall cost. Furthermore, TDC reverse the above scenarios in ScC2 and ScC4, (where the selected, regulated addresses in the ScC1 and ScC3 scenario are changed/negated to not-regulated and vice versa). TDC expects the regulated cost in ScC1 to be equal to the non-regulated cost in ScC2 and vice versa.

TDC used the following SQL-queries for their approach:

```
ScC1:
UPDATE [Dennark_FTTH_RegulatedArea].[dbo].[Output_Addresses_All]
SET ScC1=0
UPDATE [Denmark_FTTH_RegulatedArea].[dbo].[Output_Addresses_All]
SET ScC1=1  WHERE (Id_Address-round(Id_Address,-1)) > -1
ScC2:
UPDATE [Denmark_FTTH_RegulatedArea].[dbo].[Output_Addresses_All]
SET ScC2=1-ScC1
ScC3:
UPDATE [Denmark_FTTH_RegulatedArea].[dbo].[Output_Addresses_All]
SET ScC3=Side
ScC4:
UPDATE [Denmark_FTTH_RegulatedArea].[dbo].[Output_Addresses_All]
SET ScC4=1-ScC3
```

The results of the model based on the above queries are shown in the table below:

| DKK/year | All area | Regulated area | Non-regulated area |
|---|---|---|---|
| A1 | 1,417 | 1,146 | 1,689 |
| A2 (negation of A1) | 1,417 | 1,148 | 1,686 |
| B1 | 1,417 | 1,171 | 1,659 |
| B2 (negation of B1) | 1,417 | 1,179 | 1,658 |

TDC finds, that in the 'All Areas' selection all four scenarios show 1,417 DKK/year is proof that the total cost on the model is constant as expected.

TDC has further expected a value of 1,417 DKK/year in the regulated scenario as well as in the non-regulated scenario, since the (large) regulation samples have been selected without bias. Given a value different from 1,417 DKK/year in the regulated areas, TDC has expected to be able to reproduce this value for the non-regulated areas in the negated scenario. This is not the case.

DBA has asked TERA to investigate the issue and correct the SQL-code in order to ensure TDC's mentioned approach calculates the expected results.

The incoherence was caused by calculating of the ratio of regulated and non-regulated areas at the road section level incorrectly. The calculation was done on integers instead of being on decimals. As a result the value taken by the ratio was only 1 (if the result was exactly 1) or 0 (for a value between 0 and 0.99), i.e. if one household on a road section was flagged unregulated, the whole road section was treated as unregulated.

These ratios are the proportion of regulated premises in the section. This means that the ratio removed some costs in the regulated areas, which explained the low cost of the regulated areas compared to the non-regulated areas.

This incoherence was made visible by the random selection of addresses in the regulated and non-regulated areas. Indeed the ratio of regulated and non-regulated areas at the section level has an impact on the cost per line only when regulated and non-regulated premises share the same section.

In reality, it is not often the case that a given section has both regulated and unregulated premises. Accordingly, the impact on the scenario defined at the zip code level is limited.

This issue has been fixed by changing the type of the ratio from integers to decimals in the SQL model. The last statement of the procedure A08d_Update_Regulation_Data has been adjusted: the divisions of integers have been preceded by a "1.0*" factor to force it to a float division.