Wholesale Broadband Access VDSL2

Annex 7: Roles & Responsabilities throughout the OLO CPE lifecycle

proXimus

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1   Preamble

Tits document aims at clarifying and defining all the roles & responsibilities of Proximus and OLO throughout the lifecycle of an OLO Customer Premises Equipment ("OLO CPE"). This step is important as many of the current WBA processes are affected by the introduction of an OLO CPE.

The present document and its appendixes form one unit and cannot be dissociated the one from the other. No part of this document can be read or understood on its own, or used in any such or other way than integrated in the document in its entirety.

In this document, when responsibilities are assigned to the OLO, the OLO can have help from its subcontractor(s) (e.g. CPE-vendors, another OLO, specialized labs …) but under any circumstances the OLO remains the sole responsible and the sole contact point towards Proximus.

The present document is an Annex to the WBA VDSL2 offer, approved by the BIPT, and will be considered as binding and applicable upon Proximus and the OLO as from its publication. In the event the General Terms and Conditions of the WBA VDSL2 Offer contain clauses which are contradictory with the clauses of the present document, the latter shall prevail.

2 Contractual relationship / engagement between Proximus and OLO

If an OLO decides to use its own VDSL2 OLO CPE OLO to connect with on the Proximus's VDSL2 network of Proximus, the OLO commits to the following:

- The OLO informs Proximus in writing of its intention to use its own VDSL2 OLO CPE, indicating the expected timing of launch;

- The OLO accepts and commits that it (possibly with the help of its subcontractor(s)):
  - has sufficient knowledge of the VDSL2 physical Layer;
  - has sufficient knowledge and capability to engineer, develop and operate its OLO CPE OLO's own CPE;
  - has the capability to strictly respect the retro-planning as defined in this document, which could foresee very short timelines (e.g.: security updates to be done in a few weeks time);
  - has the capability to test and align OLO's own CPE its OLO CPE against all DSLAM firmware upgrades proposed announced by Proximus within the timeline as defined in this document;
  - is assigning the necessary resources (human resources, lab environment, hardware and software) allowing to respect its obligations as defined in this document;

- The OLO agrees with the content of this document and fully endorses the related Roles & Responsibilities;

- The OLO agrees with and assumes all consequences, as defined in this document (for instance if not respecting its obligations or when not reaching the deadlines);

- The OLO acknowledges and agrees that Proximus will not engineer nor operate the OLO CPE in any way, and that Proximus has no responsibility whatsoever for the proper functioning of the OLO CPE;

- The OLO accepts that Proximus will not have any additional tasks or obligations than the one those described in this document;

- OLO commits to provide a yearly recurring forecast of the number of WBA VDLS2 lines that will be equipped with OLO CPE.

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3 Executive summary

Proximus will consider that an OLO CPE will ~~operate~~ behave in a similar manner as a Proximus CPE. The OLO will have to ensure that its modem will be interoperable with the Proximus IT Systems to enable the provisioning and repair processes (cf. Chapter 6.1.1). Proximus will provide the OLO with a series of tests ("OLO CPE Test Plan" as described in Appendix 1 of this document) that the OLO CPE must successfully pass by means of one of the proposed OLO CPE certification services as described in chapter 6.3 "OLO CPE Certification Services". The OLO CPE test plan verifies that the OLO CPE supports the main line configurations used by ~~into~~ the Proximus VDSL2 Network~~s~~, but it does not ~~give~~ guarantee~~s about~~ the correctness of CPE behavior, nor ~~the~~ CPE performance~~s~~, nor the accuracy of reporting parameters. Hence the OLO will assume the responsibilities of the operational consequences of a situation where the OLO CPE should behave differently from a Proximus CPE.

Hence R&R are defined as follows (more details to be found in the indicated chapters):

- Engineering (Chapter ~~6~~5.1):
    - o The OLO CPE shall respect some minimum technical requirements (Chapter 6.1). The evolution of technical requirements will be communicated according to the planned ~~Network U~~upgrades process (Network & OLO CPE - (Chapter ~~6~~5.1.2)
    - o The OLO CPE must be validated ~~by OLO~~ according to the OLO CPE Test Plan (Chapter 6) before being connected to the Proximus VDSL2 Network by means of one of the proposed OLO CPE certification services Proximus offers ~~before being connected to Proximus VDSL2 Network~~ (Chapter 6.3~~Chapter 6.1.1~~)
    - o If the OLO~~'s~~ CPE or the OLO CPE Test Plan evolves (Chapter 6.2), the tests mentioned in the OLO CPE Test Plan ~~should~~ shall be re-validated by ~~the OLO~~means of one of the proposed OLO CPE certification services Proximus offers ~~(Chapter 6.1.2)~~ (Chapter 6.3)
    - o For all network upgrades a common retro-planning will enable a clear communication and planning between Proximus and OLO (Chapter ~~6~~5.1.2)

- Operational (Chapter ~~6~~5.2):
    - o Line Ordering (Chapter ~~6.2.2~~5.2.1): The ordering ~~procedure~~ process ~~will~~ remain~~s~~ unchanged. ~~compared to the current one~~
    - o Install (Chapter ~~6.2.3~~5.2.2 & Appendix 4):
        - Everytime an OLO CPE is connected to the Proximus network, the OLO will be responsible to launch a "Test de Bonne Fin" (Appendix 3) on the ~~relevant~~ concerned line.
        - Once ~~the~~ the "Test de Bonne Fin" is over :
            - Proximus will apply the line profile (provisioning, repair, ~~or~~ basic or fall-back) on the concerned OLO line based on the outcome of the Proximus Repair Profile Advisor (RPA) analysis.
            - Then, the OLO will eventually (optional~~ly~~) be able to choose a different line profile following certain conditions.
    - o Repair (Chapter ~~6.2.6~~5.2.5):
        - Proximus will provide the OLO with the same repair tools for an OLO CPE as for a Proximus CPE. But Proximus ~~will~~ can not guarantee that the repair logic used in these tools w~~ill work in~~ould apply the same way as with a Proximus CPE
        - In case of repair disputes, the OLO shall install a Proximus CPE to be used instead of (or with) the OLO CPE either in a ~~one~~ One ~~box~~ Box or a ~~2 box~~Two Box (preferred solution) model.

- Certification (Chapter 6.3)
  - o The OLO shall order the appropriate certification services out of the list of certification services Proximus offers.
  - o Proximus will perform the ordered certification services (in collaboration with the OLO if foreseen that way) within a reasonable timeframe but within the foreseen timings for recertifications and synchronisation tests triggered by DSLAM firmware upgrades.

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4 Confidentiality

The information disclosed by Proximus (or its subcontractor(s)) in the frame of this R&R document will be covered by an NDA. This NDA needs to be signed between Proximus and the OLO prior to any information disclosure. In no event shall Proximus (or its subcontractor(s)) be compelled to deliver or disclose any more information to the OLOs beyond what is reasonably needed for the OLOs to develop, deploy, exploit and maintain its own VDSL2 OLO CPEs in compatibility with the Proximus VDSL2 network and with Proximus's VDSL2 bitstream wholesale service (WBA offer).

Moreover, if Proximus is subject to a confidentiality obligation vis-à-vis specific subcontractor(s) or a third-party, Proximus will do its best to include the OLO into this NDA, but cannot guarantee that the subcontractor(s) or the third-party will accept the new multi-lateral agreement.

5 Roles & Responsibilities

5.1 Engineering Activities

5.1.1 New CPE Introduction

General

Proximus will consider that an OLO CPE will ~~operate~~ behave in a similar manner as a Proximus CPE. The OLO will have to ensure that its modem ~~will be~~is interoperable with the Proximus IT systems ~~to enable~~for the provisioning and repair processes, which requires the support of the physical layer OAM configuration and performance monitoring parameters defined in ITU-T G.997.1 and support of the transceiver functional requirements of ITU-T G.993.2 (Very high speed Digital Subscriber Line transceivers 2).

Proximus will provide ~~OLO with~~a series of tests ("OLO CPE Test Plan" as described in Appendix 1 of this document) that the OLO CPE must successfully pass by means of one of the appropriate certification services from the list of OLO CPE certification services Proximus offers . The OLO CPE test plan verifies that the OLO CPE supports the main line configurations used in the~~to~~ Proximus VDSL2 Network~~s~~, but it does not ~~give~~guarantee~~s~~ ~~about~~the correctness of CPE behavior, nor ~~the~~ CPE performance~~s~~, nor the accuracy of reporting parameters[1].

Hence the OLO will assume the responsibilit~~y~~ies of the operational consequences of a situation where the OLO CPE ~~should~~would behave differently from a Proximus CPE.

The OLO CPE will be treated, when possible, as a Proximus CPE for all operational (Install & Repair) activities. Nonetheless, all engineering (new OLO CPE introduction & Upgrades) activities need to be defined.

Design & Development

In respect with its confidentiality constraints, Proximus will communicate to an OLO, at the moment it enters the OLO CPE processus for the first time, under NDA, the ongoing Network Upgrades (minor/major/strategic/ VDSL2 layer reconfiguration) and the already foreseen or considered future Network Upgrades (minor/major/ strategic/VDSL2 layer reconfiguration) known at that moment. Although, even if Proximus provides such information, it does not mean that this information ~~will be~~is binding in any way. Proximus will always be able to change its roadmap according to its strategy.

The OLO CPE shall respect ~~some~~a minimum set of technical requirements, namely compliancy to ITU SG15 standards, including compliancy to "G.Vector Friendliness" in Upstream and Downstream, according G.993.2 annex Y. Alternatively, if the OLO wants to benefit from the vectoring evolution, the OLO CPE shall be compliant with "G.Vector and the necessary stabilization features for an efficient G.Vector (like for instance G.INP)".

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[1] Additionally it shall be noticed that the respect of ITU Standard and the Broadband Forum test plans (TR-114, TR-115 and TR-138) do not ensure that ~~the~~ OLO CPE performance~~s~~, behavior and accuracy of reporting parameters will be similar to the Proximus CPE.

The OLO must be aware that ~~due to the implementation of~~the current legacy VDSL2 linecards in the Proximus network have a~~, the~~ startfrequency (f_{OL}) which is not the same as for the ADSL/2/2+ bandplans ~~as for the VDSL2 bandplans. For VDSL2, The current~~ startfrequency (f_{OL}) on the current VDSL2 legacy line cards is at 138 kHz. ~~The, the~~ OLO must take this into account in its OLO CPE HW and/or SW. The new vectoring line cards that are being deployed support a different bandplan with the ~~Introduction of VDSL2 linecards supporting also other bandplans, where~~ VDSL2 upstream U0 startfrequency (f_{OL})~~is~~ at 25 kHz and the stopfrequency (f_{OH}) ~~could be~~at 276 kHz.~~is envisaged~~. The OLO CPE must ~~shall~~ be compatible with both types of linecards and bandplans.

~~Proximus highly recommends solving these issues by use of an external or internal high pass filter (not to be confused with the mandatory central splitter at NTP), knowing that the OLO takes all responsibilities related to the correct functioning of this solution, and to the potential impacts on provisioning and repair for xDSL and voice. OLO must make its own choice with regards to the CPE high pass filter design. Proximus shall not be responsible for issues that could result from the design by OLO of such filter.~~

Testing

The OLO is the sole responsible to get its OLO CPE certified according to the OLO CPE ~~test plan~~Test Plan (provided in Appendix 1 of this document) by means of the appropriate certification test from the proposed OLO CPE certification services Proximus offers. ~~; for this purpose the OLO can be helped by its sub-contractor(s). OLO will give the final results of such OLO CPE certification to Proximus~~ The OLO will order an appropriate certification service from the list of certification services Proximus offers. ~~Proximus will not participate in any way to the testing of an OLO CPE nor in the relationship between OLO and its sub-contractor(s).~~

~~The testing~~A certification does not guarantee in any way that the OLO CPE will operate the same way as a Proximus CPE. The OLO will assume the responsibility of the operational consequences of a situation where the OLO CPE ~~should~~behaves differently ~~from~~as a Proximus CPE.

If necessary, ~~OLO shall contact the vendor of Proximus's DSLAM to perform such tests (or via one of the OLO's subcontractor(s)). Proximus will inform the OLO about the relevant DSLAM firmware that needs to be tested. If necessary, in case of an NDA, Proximus will give the authorization to the vendor of Proximus's DSLAM to deliver the referenced DSLAM firmware in order to perform the tests~~ an OLO can request to Proximus to perform Ad-hoc tests to solve issues that require a testing environment which is difficult to replicate such as the Proximus vectoring testing environment.

Proximus authorizes OLOs to label certified OLO CPEs with the mention « authorised on the VDSL network of Proximus »

Launch

The OLO will inform Proximus of ~~a~~the launch of a new OLO CPE at least 3 months in advance before ~~an~~the OLO CPE is plugged into Proximus network.

The OLO will have to provide all the relevant information, which includes but is not limited to:

- ~~Certification report according to OLO CPE Test Plan (as defined previously)~~
- Technical details of the physical VDSL2 layer:
    - VDSL2 Chipset manufacturer and version
    - VDSL2 Chipset firmware version
    - Start frequency of high pass filter in OLO CPE (if applicable)
    - Status with regard to support of G.Vector, G.Vector Friendliness and G.INP.

- All information relative to the CPE Vendor, Version and firmware version allowing to identify the OLO CPE in by the Proximus network

- Purchase order for the appropriate Proximus certification service from the list of certification services Proximus offers. (see chapter 6.3 "OLO CPE Certification Services").

5.1.2 Upgrades (Network & OLO CPE)

Network

In case of Proximus intends to changes and upgrades its network infrastructure (DSLAM's), the choice to execute or not DSLAM upgradesthe upgrade is the sole responsibility of Proximus.

Definitions:

- <u>VDSL2 DSLAM Proxy Firmware:</u> The software package responsible of driving the VDSL2 chipset.
- <u>Minor upgrade</u>: a DSLAM software ("SW") upgrade not requiring a new VDSL2 DSLAM proxy firmware ("FW"), typically emergency fixes/bug fixes on higher layers.
- <u>Major upgrade</u>: a DSLAM SW upgrade requiring:
  - A new VDSL2 DSLAM proxy FW on already deployed linecards (typically bug fixes or service evolutions on the VDSL2 physical layer) and/or
  - The gradual introduction of a new hardware ("HW") linecard in the Proximus DSLAMs without outphasing of the already deployed linecards (typically triggered by DSLAM vendor HW evolution, or by the introduction of new functionalities) and/or
  - The gradual introduction of a new linecard in the Proximus DSLAMs which can lead to a replacement of the already deployed linecards on a limited scale and/or
  - Introduction of a new HW supplier.
- <u>Strategic upgrade</u>:
  - A DSLAM SW upgrade combined with a massive HW-swap of already deployed VDSL2 linecards in the Proximus DSLAMs. The mMassive introduction of the VDSL2 Vectoring technology in the Proximus DSLAM network is an example.
- <u>VDSL2 layer (re-)configuration</u>:
  - The introduction of new VDSL2 profiles or the activation of new VDSL2 features without a DSLAM SW upgrade, so consequently without change of the VDSL2 DSLAM proxy. Examples: introduction of a symmetrical VDSL2 profile (spectrum + service profile), introduction of a VDSL2 profile for long loops (spectrum + service profile), adaptation of the actual UPBO-profile, adaptation of an existing spectrum profile, …
- <u>Synchronization checks</u>: is a subset of tests (defined in chapter 7.4) of the OLO CPE Test Plan that verifies the synchronization of the VDSL line for relevant Proximus access network configurations.

Legend for the figure illustrating the network upgrade:

Legend

DSLAM N	Version of DSLAM before upgrade
DSLAM N+1	Version of DSLAM after upgrade
CPE N	Version of CPE validated by OLO against DSLAM version N according to a OLO CPE Test Plan _provided to OLOs_
CPE N+1	Version of CPE validated by OLO against DSLAM version N+1 according to a OLO CPE Test Plan approved by BIPT. It is possible that it correspond to same HW and SW than CPE in version N.
CPE N.bis	Version of CPE designed to pass synchronisation checks against DSLAM version N and N+1. Required only when CPE version N is not able to pass synchronisation checks against DSLAM version N+1.

IOP — DSLAM ↔ CPE: The indicated DSLAM-CPE combination pass the OLO CPE Test Plan as approved by BIPT. Risk of interoperability issues may not be excluded but should be at an acceptable level.

Sync — DSLAM ↔ CPE: The indicated DSLAM-CPE combination pass the synchronisation checks. Risk of no synchronisation in field conditions may not be excluded but should be at an acceptable level.

NE N → NE N+1: Upgrade of Network Element (NE) in the field from version N to version N+1

Field — Situation in the field

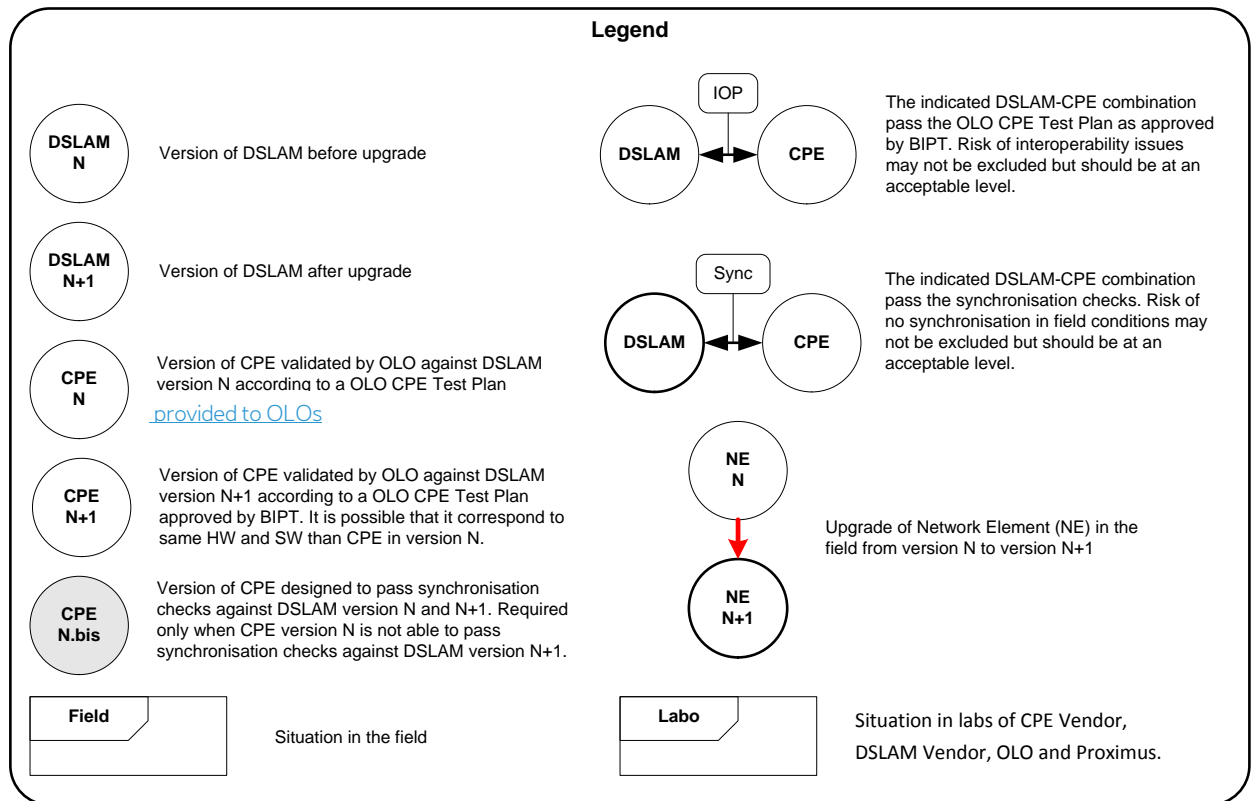**Labo** — Situation in labs of CPE Vendor, DSLAM Vendor, OLO and Proximus.

Figure 1: Legend for the figure 2 illustrating the network upgrade

Figure 2 hereafter illustrates the network upgrade and the necessary steps for the alignment of a CPE (see legend above):
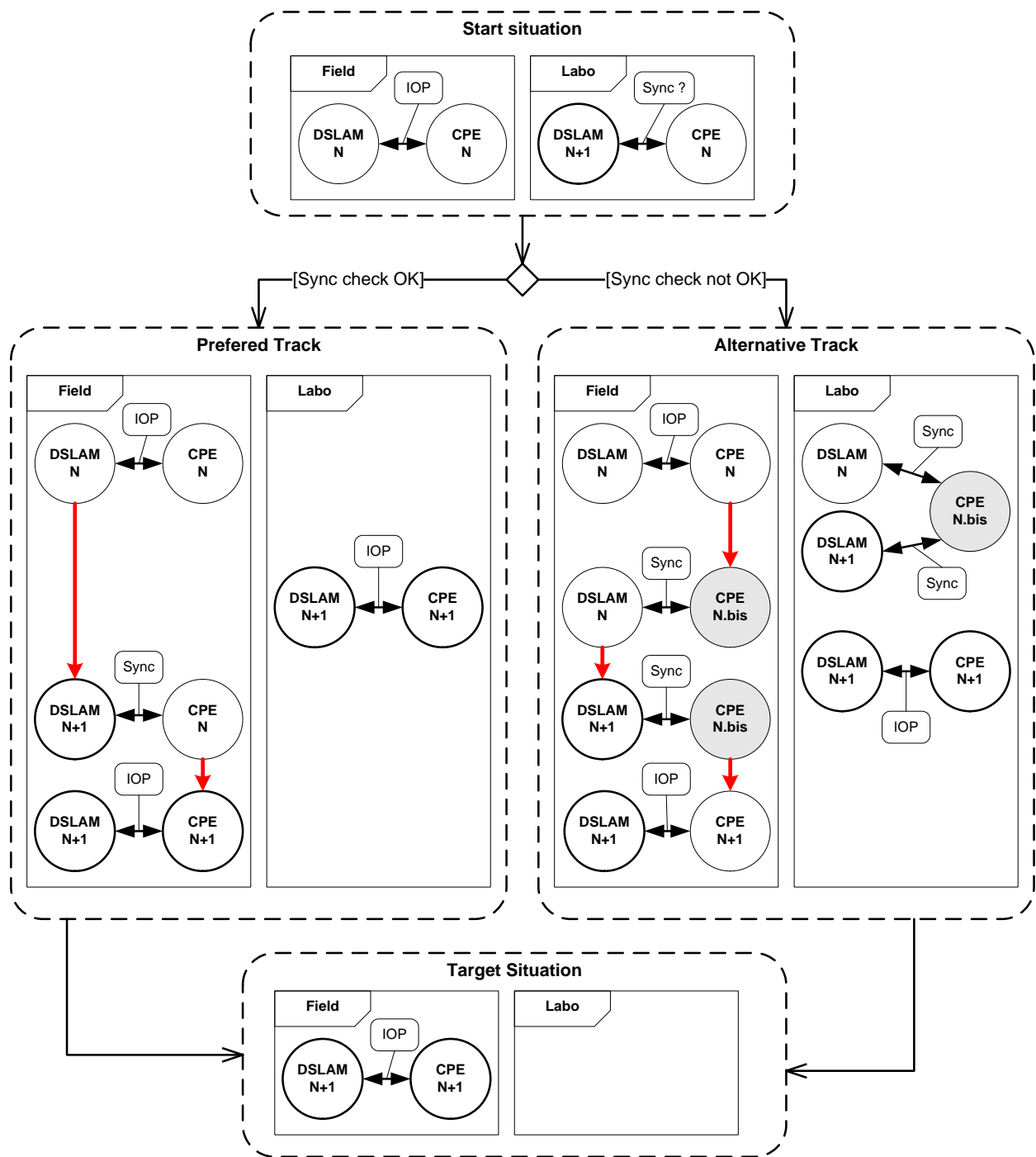

Figure 2: Network upgrades tracks, "Preferred" vs. "Alternative" track

As illustrated on Figure 2, for a Network Upgrade there are 2 possible tracks that an OLO CPE can follow depending on the results of the Synchronization checks performed for this OLO CPE. Based on the outcome of these Synchronization checks (in "Start Situation"), independently for each OLO CPE, the "Preferred track" or the "Alternative track" will be selected naturally.

In order to decide on the track to follow by an OLO CPE ("Preferred" versus "Alternative"), the OLO can order a "Basic synchronisation check" (see chapter 6.3 "OLO CPE Certification Services") Proximus will then execute a basic Synchronization checks with the OLO CPE. Proximus will limit this effort and will elect maximum 5 OLO CPEs chosen as the most representative of the network (the list of CPEs shall be approved by BIPT).

In order to allow Proximus to execute this the ordered "Basic synchronisation check" test, the OLO will provide Proximus with 4 pieces of each of its elected OLO CPE(s) in the latest SW version. In case of OLO CPEa SW upgrade from already certified OLO CPEs from version N to version N+1, Proximus and the OLO will agree on how to the upgrade of these 4 OLO CPEs in order to have at all time the most recent OLO CPE SW available in the Proximus labs. Those CPE's will be pro-actively delivered by the OLO to Proximus free of charge.

Proximus engages to perform this test – if timely ordered - in the first phase of the lab testing cycle with comparable timing as with the Proximus CPE testing (knowing that Proximus will first execute this test on the Proximus CPEs in order to detect potential DSLAM related generic VDSL2 issues first), in order to detect potential issues with OLO CPE related to basic synchronization as from the beginning. Proximus will communicate the results of this test to the OLO.

Obviously, for other OLO CPEs on which Proximus do not perform the Synchronization checks, Proximus highly recommends the OLO to perform the testing himself and to communicate the results to Proximus as from Step 2 of Table 1 and each time a new DSLAM version is communicated by Proximus.

The reference time (Step 6 in Table 1 with time = 0) for "DLSAM network SW upgrade" is independent of the track followed by each of the CPE (OLO CPEs and Proximus CPEs).

Some example of upgrade scenarii can be found in Appendix 2 of the present document. More generally, the following Engineering Retro-planning and associated Roles & Responsibilities shall be respected by Proximus and the OLOs:

Step		Responsible	Minor Upgrade	VDSL2 layer (re-) configuration	Major Upgrade	Strategic Upgrade
1	PROXIMUS informs OLO of DSLAM upgrade	Proximus	- 1 Month	Mostly project based According to WBA offer	- 6 months or earlier	-12 months or earlier
2	PROXIMUS provides OLO with technical information ([1]) (draft)	Proximus	NA	NA	- 6 Months	- 12 Months
3	PROXIMUS communicates evolving technical information the relevant DSLAM SW and FW versions to OLO for engineering purposes and inform OLOs when the Field Trial recertification can start.	Proximus	NA	NA	Continuous ([2])	Continuous ([2])
4	PROXIMUS provides OLO with final technical information ([1]) + OLO CPE Test Plan to be used (final)	Proximus	NA	- 3 Months	- 3 Months	- 3 Months
5	PROXIMUS's new DSLAM SW validated and communicated to OLO for final OLO regression testing CPE N and or N+1 testing finalisation.	Proximus	NA	NA	- 1 Month	- 1 Month
6	DSLAM network SW upgrade	Proximus	Start: 0 End ([3]): + 3 weeks	0 (Re)-configuration applied	Start: 0 End ([3]): + 6 weeks	Start: 0 End ([3]): + 8 weeks
7	OLO provides CPE N+1 to DSLAM N+1 validation report to PROXIMUS DSLAM upgrade finished	Proximus	NA+ 3 weeks ([3])	0 Delta validation for the new configurations	+ 6 weeks ([3])	+ 8 weeks ([3])
8	OLO and PROXIMUS start the CPE SW upgrade if required ([4])	Proximus & OLO	NA	NA	At end of network upgrade (step 7)	At end of network upgrade (step 7)
9	Activation of new DSLM functionalities or VDSL2 new configurations as from	Proximus	0	0	+3 Months	+3 Months

Table 1: DSLAM Upgrade Retro-Planning

(1)   "Technical information" is the specific DSLAM HW and SW choices and/or the DSLAM parameters and settings important to enable CPE engineering ~~in~~ for the specific Proximus context for the elements subject of change during the DSLAM upgrade.

International standards, Broadband Forum recommendations, generic DSLAM vendor product information … are not part of this technical information. Examples of technical information: the list of DSLAM linecards supporting the targeted functionalities, specific VDSL2-layer DSLAM settings influencing the CPE interoperability, the chipset proxies integrated in the DSLAM linecard SW …

(2)   During the engineering process, Proximus will communicate any evolving "Technical information" data that might have impact on the CPE engineering for the specific Proximus context ~~its intermediate engineering DSLAM SW versions~~ towards the OLO in order to allow the OLO to keep the same pace in its own engineering cycle of its own CPE.

~~Proximus recommends OLOs to have a good relationship with Proximus VDSL2 DSLAM Provider (currently ALU) to perform all necessary actions (testing, debugging and troubleshooting) described in this document.~~

The above timeline also indirectly explains that the OLO can put~~s~~ in place its own (himself or through sub-contracting) engineering track to validate its CPE against the Proximus DSLAMs through a Field Trial approach. This is valid as well for the engineering of a new OLO CPE as well as for the (maintenance) evolution of the existing OLO CPE to keep pace with the Proximus DSLAM network evolution. Proximus will inform OLOs who ordered a Field Trial recertification when an (intermediate) DSLAM firmware is considered being sufficiently stable to start the field trial.

(3)   The end date of a DSLAM SW upgrade is not pre-defined. The mentioned end dates are dates referring to SW updates (not HW updates) and the dates mentioned in Table 1 are only indicative and can in reality differ. Potential root causes for later end dates of a DSLAM SW are the upgrade procedure, the upgrade time windows, the availability of resources, the quality risks and related checks, unexpected errors in the upgrade procedure or in the DSLAM SW, the number of first offices (= number of DSLAMs where the new DSLAM SW is loaded and which are evaluated to verify the network quality) … Also the DSLAM SW upgrade can be accompanied by a DSLAM HW upgrade, the latter requiring a significant longer roll-out time (potentially multiple years) due to the needed physical interventions in all ROPs ~~in~~ of the access network.

The gradual activation of a new functionality comes typically in the months after the end of the DSLAM SW upgrade.

(4)   If an OLO CPE in version N or N.bis already passes the OLO CPE Test Plan for the DSLAM version N+1, then the OLO does not need to upgrade its CPE. The CPE will be considered ~~naturally~~ as being in version N+1, and will become the new version N for the next cycle.

If not, the OLO must make the necessary CPE SW updates starting at the corresponding date and ending within a reasonable timeframe, the latter being maximum 3 months. The OLO will communicate the technical information about the OLO CPE towards Proximus and the status of its OLO CPE upgrades process. After these 3 months, Proximus ~~will~~ can decide to no longer support the OLO CPE firmware version N and can remove it from the whitelist after having informed the OLOs.~~.~~

Proximus is allowed to activate the new VDSL2 functionalities supported by the DSLAM SW N+1 as from 3 months after finalization of the DSLAM network SW upgrade irrespective of the support of the OLO CPE of these functionalities and irrespective of the potential negative consequences on the OLO CPE.

In case the activation of these new functionalities ~~have~~ has no impact on the CPE SW (so the functionalities only requiring a minor upgrade or a (re-)configuration), Proximus can activate these new functionalities directly as from the start of the DSLAM upgrade. Proximus will notify the OLOs of such functionality activations in its VDSL2 network.

During Steps 1, 2 and 3, the exactness of all information provided by Proximus will not be guaranteed, and such information will be for informative and indicative purposes only. Proximus ~~shall be able~~is allowed to make any changes ~~desired~~ to the technical information it needs in order to ~~perform~~deploy its VDSL2 network strategy.

Proximus has the right to ~~apply another delayed~~delay the timing based on technical, operational, commercial, legal, regulatory and/or strategic reasons. In case of delay Proximus will inform the ~~OLO~~OLOs with an updated timeline (if available).

Proximus acknowledges that having 2 parallel~~s~~ major and/or strategic upgrades running at the same time between the steps 4 to 6 can be difficult to handle. Hence Proximus will not have 2 major and/or strategic DSLAM upgrades in the whole network running at the same time between steps 4 to 6 (3 Months period~~s~~). It means that the second network upgrade can only enter in step 4 when the first network upgrade has completed the step 6. Proximus reserves the right to perform some DSLAM upgrade impacting a limited number of VDSL2 lines for pilot and field trial purpose at any time on top of any already ongoing upgrade. Proximus will notify OLOs of the zone/lines impacted by these pilots or field trials. Two kinds of Pilots or field trial shall be distinguished:

- Trial for pure R&D purposes: This kind of trial is typically not frequent, very limited in time, very limited in number of lines and is not necessarily linked to ~~possible~~a planned network upgrade~~s~~. For this kind of trial Proximus will take the necessary actions to limit as much as possible the risk for ~~the~~ OLO lines.

- Trial to validate a future network upgrade~~s~~: This kind of trial takes place between step 2 and 5 of the retro-planning. The result of the Synchronization checks should already be available before the start of the trial, this would enable to estimate and minimize the risks for the OLO lines.

In both cases, during a pilot/field trial when the OLO CPE with SW version N is not compatible with the DSLAM under test, the OLO ~~might~~needs to use a different CPE (instead/in front of OLO CPE specific to the pilot/field trial) as Proximus ~~would~~might also be required to do so for its own CPE. In case these field trials would impact too much some OLO lines, a bi-lateral discussion ~~should~~will be held.

The OLO CPE Test Plan will be subject to updates ~~depending~~caused by planned ~~on~~network upgrades. The final OLO CPE Test Plan to be used ~~by OLO~~for the OLO CPE certification will be given at step 4 as described in Table 1. For "VDSL2 layer (re-) configuration", If appropriate Proximus will offer the possibility of a partial recertification which is limited to a ~~accept to receive from OLO only the~~delta validation representing the difference~~s~~ between the previous OLO CPE Test Plan and the current one, in order to reduce the Proximus ~~OLO~~workload and related OLO cost of the recertification.

Naturally, during the transition period (time between the agreement of the present R&R document between Proximus and the OLO ~~and next planned VDSL2 network upgrades)~~, the retro-planning for the already planned VDSL2 network upgrades might not be applicable as such ~~and~~as these timeline~~s~~ might ~~shift~~be shorter.

Roles & Responsibilities for specific cases / scenarios need also to be defined:

- Fall-Back Scenario: In case of a DSLAM SW upgrade failure, as the OLO CPE still is in the SW version N it was ~~supposed to be~~already compatible ~~before~~with the DSLAM SW version N, Proximus ~~should~~is allowed ~~be able~~ to go back from DSLAM SW N+1 to ~~its~~the previous firmware (N) without ~~OLO's~~prior agreement of the OLOs. Proximus will notify the OLO~~s~~ when such a scenario ~~shall~~occur~~s~~.

- OLO blocked in its development cycle:

- o If an OLO can prove interoperability issues with the new DSLAM SW N+1 at the latest at "- 1 month" (so 1 month before the start of the DSLAM SW upgrade): In case the interoperability issues have a proven major impact on the OLO CPE, Proximus will accept from the OLO a maximum delay of 1 month ~~maximum for~~allowing the OLO to validate and finish its development/test. After this one month period, Proximus will implement the new DSLAM SW in its network.
- o If an OLO is late in its development cycle without proven VDSL2 interoperability issues with major impact on the OLO CPE, then Proximus is allowed to deploy its new DSLAM SW, starting at day "0", irrespective of potential negative consequences on the OLO CPE.
- ~~o~~ If an OLO ~~can~~ no ~~longer~~ longer can upgrade its OLO CPE, then Proximus is entitled to deploy its new DSLAM SW even if the OLO is not yet ready, irrespective of potential negative consequences on the OLO CPE. If necessary, an OLO shall install a Proximus CPE or another whitelisted OLO CPE to be used instead of (or with) the OLO CPE either in a ~~one box~~One Box or a ~~2 box~~Two Box (preferred solution) model. If an OLO CPE is not ~~capable~~able to work in a ~~2 box~~Two Box solution, then a Proximus CPE or another whitelisted OLO CPE shall be installed by the OLO to replace the outdated OLO CPE without any guarantees that a Proximus CPE or another whitelisted OLO CPE will operate correctly with the OLO services.

- • Urgent DSLAM upgrade:

  - o **without** impact on the VDSL2 layer: The notification period will be reduced to 1 day (step 1 in Table 1). Urgency can be triggered by *i.a.* security issues, stability issues with equipment ...
  - o **with** impact on the VDSL2 layer:
    - ▪ Proximus will notify the OLO as soon as the Urgent DSLAM ~~Upgrade~~upgrade is needed. The OLOs ~~shall~~will receive all new ~~Firmware~~firmware information 3 weeks before the upgrade (step 1 in Table 1).
    - ▪ If an OLO can prove interoperability issues with the new DSLAM SW at the latest at "- 3 working days" (so 3 working days before the start of the DSLAM SW upgrade): In case the interoperability issues have a proven major impact on the OLO CPE, Proximus will accept from the OLO a delay of 2 weeks (on top of the 3 initial) maximum for the OLO to validate and finish its development/test. ~~Passed~~After this period, Proximus ~~will~~can implement the new SW in its network.
    - ▪ Proximus is committed to manage an urgent DSLAM upgrade in such a way that collateral damage is avoided or minimized for OLOs who are decided to manage the OLO CPE SW upgrade as a priority. Proximus will also do the utmost to have executed in this timeframe any ordered certification tests (e.g. a Field Trial) before starting the new urgent SW implementation in its network.

OLO CPE

In case an OLO changes and/or upgrades its CPE (impacting Physical access layer[2]): a re-certification is needed ~~needs to take place~~ by means of the appropriate certification process following the same procedure as defined in chapter 5.1.1, "New CPE Introduction". The OLO ~~should be~~is responsible to re-validate and re-engineer its CPE. The new firmware will be validated ~~with OLO CPE Test Plan~~by means of one of the appropriate certification

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[2] Corresponding to layer 1 of the OSI model.

services from the list of OLO CPE certification services Proximus offers which is based on the OLO CPE Test Plan as published was available 3 months before the launch date of the current latest SW version N of the DSLAM firmware unless as far as it does not impactis related to a the planned network upgrade to SW version N+1s.

In case an OLO would only changes higher functional services in its CPE (no impact on physical Physical access layer[2]), the OLO should shall order communicatean "Administrative certification" to Proximus for the new firmware version used (so that Proximus can add it to the whitelist of validated firmwares) 1 month in advance and formally confirmwith the formal confirmation from the OLO that indeed the OLO CPE upgrade had has no impact on the physical Physical access layer, hence no re-/additional certification is required.

Although it remains recommended that all OLO CPEs get equipped with the latest certified version of the OLO CPE firmware, Proximus can keep previous OLO CPE firmwares whitelisted as long as they remain compatible with the DSLAM firmware.

5.2 Operational Activities

5.2.1 Line Ordering & Associated Provisioning Profile

No ~~change~~ impact on ~~the~~ ~~current~~ line ordering processes ~~is required~~.

All additional information below in this chapter is for information and explanatory purposes only. Only the line ordering processes from the WBA offer ("Main Body" and "Annex Planning & Operations") are ~~to be considered as being~~ the sole reference.

When an OLO orders a WBA line, Proximus will send back the Provisioning Profile (as described in the "VDSL2 deployment rules" of the "Main Body") according to the Proximus~~'s~~ VDSL2 engineering rules.

This Provisioning Profile will be set and activated on the OLO line. ~~When~~ Once the OLO CPE ~~will be~~ is installed (cf. chapter 5.2.2~~6.2.2~~ for more details on installation), the OLO will launch a "Test de Bonne Fin" (TBF). ~~The~~ This TBF first checks, ~~at~~ with the Provisioning profile, the quality of the line. If the tests are successful, the line will be kept ~~in~~ on its Provisioning Profile. If not, the line will be downgraded to a lower "Repair Profile" or to the Basic Connectivity Profile if the line is truly faulty. The list of "Repair Profiles" associated to "Provisioning Profiles" is available in the section "Repair for spectral issues reasons" of the Annex 3 "Planning and Operations".

NB: For more details on:

- The TBF itself, please refer to Appendix 3 of this document;
- How to launch a TBF thanks to the external service, please refer to Appendix 4 of this document;
- The different line profiles, please refer to Appendix 6 of this document.

Hence several Repair profiles are assigned to ~~for~~ each Provisioning Profile ~~is associated several repair profiles~~. The Provisioning Profile and its assigned underlying Repair Profiles (the common Basic Connectivity Profile being the minimal Repair Profile) form a Provisioning Profile Group which is independent from the ~~two others~~other Provisioning Profile Groups.
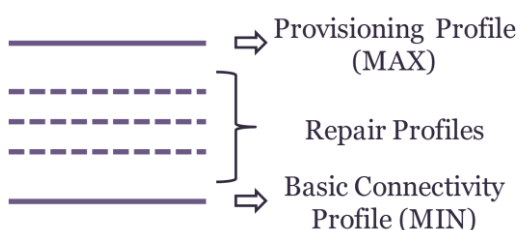

Figure 3: Example of a Provisioning Group: a Provisioning Profile associated with its Repair Profiles

5.2.2 Installation

All current WBA provisioning processes will apply but the OLO ~~will be~~is responsible to launch a TBF as soon as an OLO CPE is connected to the Proximus~~'s~~ network. Proximus has designed an external API (SOAP / XML service) available for OLOs to remotely launch the TBF (cf. Appendix 4 of the present document for more details).

If Proximus notices that an OLO does not automatically launch a TBF on each new line when an OLO CPE is connected to its network, Proximus reserves the right to put, by default, all newly provisioned lines in the Basic Connectivity Profile until the OLO launches the TBF (where the line profile will be adapted depending on the TBF result).

After having performed the TBF, the result and technical information of such a TBF will be sent back to the OLO (through the external API described above). Proximus will send back all technical information as defined in Appendix 5 of this document.

Currently there are two installation methods:

1. DIY: When the DIY install is done, the OLO should shall launch a TBF as soon as the CPE is connected to the Proximus network.
2. Telecom: For a Telecom install, the process shall be is as follows:
   - Proximus would installs the NTP as today. The installation procedure is equivalent to the current installation.
   - All tests performed by a Proximus's technician to test the line (same as today) will be are done with a Proximus CPE,
   - As soon as the OLO CPE is connected to the Proximus VDSL2 network, the OLO must will have to launch a TBF.

At the end of the TBF, Proximus will apply a line profile on the concerned line concerned depending on the result of the Proximus's Repair Profile Advisor (RPA). In return, optionally, the OLO will be entitled to choose a different line profile (to be applied activated by Proximus on the line concerned) which shall be based on the minimal requirements below:

	Basic Profile	Repair Profile	Provisioning Profile
Basic Connectivity Profile	The only way to "leave" the Basic Connectivity Profile is to re-launch the TBF so with a that TBF result which is at least a Repair Profile		
Other Profile	OLO could can choose any of the legacy line profiles from the Provisioning Profile Group but cannot request a profile from a different Provisioning Group, the vectoring profiles or the fall back profile		

Table 2: Capability & Constraints for OLO to update Line Profile following a TBF

The Line Profile change is an extension (optional step) of the TBF launch external service as defined in Appendix 4 of the present document.

If Proximus notices that an OLO launches too many[3] TBFs on a the same line, Proximus reserves the right to limit an OLO in the number of TBFs launched per line.

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[3] Per OLO, a maximum of 3 TBFs per line per month and a maximum total number of "n" TBFs per day, where n = 500 x the percentage of WBA lines of the OLO concerned compared to the total number of WBA lines; 500 being the maximum number of TBF per day that Proximus could can launch support.

5.2.3 **Remote OLO CPE Management**

Proximus highly recommends OLOs to have their own OLO CPE Management platform. If an OLO decides not to, it will have to upgrade manually all its CPEs in case of Network or CPE Upgrade in the time-frame defined in chapter 6.1.2.

In case an OLO decides to have its own Management platform, the OLO will have complete access to its CPE. The OLO will can use any of its their VLANs (as defined in the WBA offer) to and can use any protocol necessary to remotely manage its their CPEs. Proximus will in no way block any of this traffic.

5.2.4 **Spectrum Management (No harm to the network)**

Proximus will implements protection mechanisms to minimize the risk that a line could disturb other lines due to an abnormal behavior of the CPE.

A non exclusive list of situations where a VDSL2 line could disturb other lines because of its CPE behavior is given hereunder:

- The CPE does not respect the UPBO mechanism and sends too much upstream power.

- The CPE is unable to achieve a stable synchronization and creates fluctuating noise conditions in the cable.

- The CPE has a very bad LCL (Longitudinal Conversion Loss) resulting in a very strong egress to other lines.

Proximus proposes to can use any of the following criteria for to determining determine that an individual line is a potential disturber:

- Lines wherefore the computation of the received upstream PSD at the DSLAM based on carrier date TxPSD + carrier data HLOG is above the UPBO reference PSD[4].

- Lines wherefore the computation of the received power at the DSLAM in band U1 based on the upstream power in band U1 – line attenuation of band U1 is above a specific threshold that should not be below the value obtained when computing the power under the UPBO reference PSD[4] into band U1.

- Lines that will who trigger an UPBO violation alarm (with UPBO Policing activated). The UPBO violation alarm can be triggered by the DSLAM when it detects that the received Power is above the UPBO reference PSD[4].

- "Unstable lines" that are defined as having more than 50 Resynchronizations or failed initialization per days.

- Disturbance may also be observed from correlation with performances statistics from other lines.

- Once the G.Vector will be implemented, lines that would who don't not support "G.Vector Friendliness", or "G.Vector and the necessary stabilization features for an efficient G.Vector like (e.g. G.INP)".

This list might be updated at a later stage, under validation by BIPT.

When an individual line will be is identified as being a potential disturber in accordance with the criteria set above, Proximus will have has the right to put the this line in a Basic Connectivity Profile, or another specific profile to limit the risk of disturbance. Proximus shall will inform the OLO of such an action. For situations where a line is

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[4] defined by UPBOPSD(f) into ITU-T G.993.2 §7.2.1.3.2 and using the a and b parameters that are defined per band into BRUO annex C

considered as potential disturber because it is very unstable, the line ~~should~~ can be monitored in Basic Connectivity Profile, and the TBF ~~should~~ must be re-launched by the OLO to retest the line. Following the TBF result, necessary repair actions ~~should~~ shall be undertaken by OLO (line profile downgrade, physical repair …). If the line continues to be "very unstable" for 5 working days, even ~~in~~ with the Basic Connectivity Profile, the line ~~shall~~ can be disabled or the OLO shall install a Proximus CPE or another whitelisted OLO CPE to be used instead of (or with) the OLO CPE either in ~~a one~~ One ~~box~~ Box or a ~~2~~ Two box (preferred solution) model. Proximus highly recommends that any OLO CPE is~~should be~~ able to operate in a One Box or a Two Box Model.

If all above actions are not sufficient to avoid disturbance to other lines, Proximus reserves the right to disconnect the line while notifying the OLO.

The OLO will not be able to change the line profile (as described in chapter 5.2.2~~6.2.2~~) of a potential disturber line until the line has been repaired and is back to a normal state.

Moreover if an OLO has too many lines that are being qualified as being potential disturbers or if Proximus detects an interoperability issue with an OLO CPE or if ~~the OLO CPE Test Plan (cf. chapter 5.1.1)~~a mandatory recertification (cf chapter 5.1.2) was not respected, Proximus ~~reserves~~has the right to stop the OLO to ~~introduce~~ deploy any additional OLO CPE~~s~~ in its network until a solution is found by the OLO and validated e.g. through a (partial) recertification. ~~by Proximus.~~ Proximus will collaborate in good faith by informing OLO of all (relevant) facts that cause the disturbances but it is the OLO or its subcontractor who must perform the analysis's necessary to remedy these interoperability issues. ~~-~~

If Proximus can provide evidence that of a specific certified OLO CPE most or all instances disturb other VDSL lines, then the concerned OLO CPE can be withdrawn from the whitelist which invokes the activation of the fall back line profile on all these lines. Proximus shall discuss such a decision with the impacted OLOs before withdrawing the concerned OLO CPE from the whitelist. Once the issues of the OLO CPE are solved and appropriate recertification testing is finished the OLO CPE will be whitelisted again.

If Proximus finds in its network an OLO CPE ~~which~~whose description and validation (for a specific DSLAM version) ~~has~~ was not ~~been~~ given by the OLO previously in accordance with Chapter 5.1.1~~6.1.1~~, Proximus ~~will have~~has the right to put the line in a Basic Connectivity Profile, or another specific profile to limit the risk of disturbance, or completely disconnect the line immediately. Proximus shall inform the OLO beforehand of such an action.

5.2.5 Repair

The OLO ~~will be~~is responsible for its 1ˢᵗ line helpdesk. Such 1ˢᵗ line helpdesk services ~~will~~must be equivalent to the 1ˢᵗ line helpdesk services currently provided by Proximus.

All Proximus repair processes and tools have been developed to be able to interact and collect information from the CPE through the DSLAM. Having an OLO CPE pass~~ing~~ the "OLO CPE Test Plan" allows collecting some information from the OLO CPE. Hence the OLO should be able to use all Proximus repair tools on its CPE, but Proximus cannot guarantee any of the repair actions proposed by the repair tools as they are made for a Proximus CPE. Hence the OLO recognizes that the level of the repair services performed on a line with an OLO CPE might not be equivalent to the repair services performed on a line equipped with a Proximus CPE.

If Proximus is sent on site for repair, all Proximus tests ~~shall~~will be done with a Proximus CPE (The c~~C~~urrent Proximus CPE with the current FW (N) validated with DSLAM (N)). If the test with a Proximus CPE shows no abnormality, a wrongful repair shall apply and be paid by the OLO. If the OLO contests the result of the Proximus CPE, the OLO shall ~~add~~install a Proximus CPE before its own CPE in a ~~two~~ Two ~~box~~ Box model for a minimum period of one month to be able to analyze the underlying network issue(s). This raises again the necessity for an OLO CPE to be able to operate in a ~~one~~ One box and a Two Box ~~or two-box~~ solution. If an OLO CPE is not capable to work in a ~~2 box~~Two Box solution, then a Proximus CPE shall be installed by the OLO to replace the OLO CPE without any guarantees that a Proximus CPE will operate correctly with the OLO services. At the beginning of the

monitoring period, the ticket concerning the troubled line will be automatically closed and a new one will be reopened by the OLO at the end of the one month monitoring period.

5.2.6 End-User Topology changes

If for some reason, the network topology should changes at the end-user's side which includes but is not restricted to the end-user's CPE or a change of internal cabling, the OLO will perform a new TBF on the line.

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6 Appendix 1: OLO CPE Test Plan and OLO CPE Certification Services – High level definition

6.1 OLO CPE validation

This section describes high level the "OLO CPE Test Plan". As mentioned in the chapter "Roles & Responsibilities" of the present Annex, the OLO CPE Test Plan can evolve over time triggered by planned Upgrades upgrades of the DLSAM software. When the Test Plan changes, Proximus will provide under NDA the Beneficiary OLOs with technical information and later, at "Step 4" of the DSLAM Upgrade Retro-Planning, with the final version of the OLO CPE Test Plan to be usedProximus will use to perform the certification services OLO ordered.

The scope of the Test Plan is to enable the evaluation of the transmission layer of a VDSL2 system under pre-defined lab conditions, with as main focus the "no harm to the network" principle. The performancesPerformance and the correct functioning of the OLO CPE under test are not in the scope of this Test Plan. The sole target is to avoid averse as long as it does not risk impacting on other lines in the network or on the Proximus provisioning- and repair processes.

The successful execution of the OLO CPE Test Plan for a specific equipmentOLO CPE with SW version N is not a sufficient condition to validate the equipment for field deployment. The validation by the OLO for field deployment should also be done in a broader process context that looks also to the functional- -and the performance aspects not covered by this Test Plan.

In the framework of a CPE validation for WBA-VDSL2 the following aspects, which go beyond the Test Plan, should be considered as well:

- Acceptance by the operator that intends to deploy the an OLO CPE of the roles and responsibilities related to an OLO CPE deployment.

- OLO CPE evolution possibilities to stay aligned with the network evolution.

- Guarantee that the operator that will deploy the concerned OLO CPE will continue to make it evolve in order to stay aligned with the network evolution.

- Compatibility with higher layers.

- Field trials

- …

Because it is impossible to reproduce all field conditions in the laboratory, the successful execution of the Test Plan for a specific OLO CPE is not a guarantee that it will work correctly in the fieldon the Proximus VDSL2 network in all circumstances.

Different types of Upgrades have been defined (see paragraph "Upgrades (Network & OLO CPE)". A "Minor" upgrade does not impact the current version of the Test Plan but a "VDSL2 layer (re-configuration", a "Major" upgrade or a "Strategic" upgrade might incur modifications of the Test Plan.

The Test Plan includes a set of tests that mainly verify a "no harm to the network" and verify correct interactions with the provisioning- and repair tools in use on the Proximus VDSL2 network.

6.2 Planned modifications to the Test Plan

Beneficiary who signed a Non-Disclosure Agreement will receive 3 Months before the start of the DSLAM network SW upgrade, if applicable, an updated confidential version of the adapted OLO CPE Test Plan which will include a "partial recertification" option if appropriate.

~~Beneficiaries who signed a Non-Disclosure Agreement will receive at the latest 6 weeks before the start date of the application of new line profiles an updated version of the OLO CPE Test Plan with updated versions of the different files which contain line profile related data.~~

6.3 OLO CPE Certification Services

The simplified OLO CPE Test Plan still verifies that the OLO CPE supports the main line configurations used into the Proximus VDSL2 Network but it does not give guarantees about the correctness of CPE behaviour, nor CPE performances. The certification cycle has been further simplified by having removed a number of less relevant tests.

Proximus offers these OLO CPE certification Services at predefined rates which will be communicated to Beneficiaries who signed the NDA.

Different OLO CPE certification services are developed in order to suit all most common use cases:

1. A **Full certification** with the simplified Test Plan is the mandatory approach for the introduction of a new OLO CPE.

2. An **Administrative** certification allows the whitelisting of an upgraded CPE firmware which contains only functional changes or an upgraded CPE hardware which reuses a certified data pump (hardware & firmware).

3. A **Field trial** certification is suited for the recertification of an upgraded data pump which is already largely present in the Proximus VDSL2 Network. A Field trial is performed as a bilaterally agreed multi-stage approach with a gradual roll-out of the new OLO CPE firmware while Proximus monitors the VDSL2 Network on "harm to the network".

4. A **Fast track** field trial certification is available for the quick recertification of an urgent firmware upgrade; e.g. to solve security issues.

5. A **Basic synchronisation check** towards a new major or strategic DSLAM firmware version is available to check if an upcoming DSLAM firmware upgrade requires a CPE firmware upgrade or not. The check includes the different synchronisation checks required for the upgrade (e.g. a first check against the engineering version of the new DSLAM firmware and a second check against the final version of the new DSLAM firmware.

6. Limited capacity for **ad-hoc** tests in the Proximus lab can only be ordered to solve issues related to the parts of the test plan which require the Proximus vectoring testing environment.

7. A **Partial recertification** check will be included in the updated Test Plan – e.g. linked to a planned Major- or Strategic DSLAM firmware upgrade – if a partial recertification for OLO CPEs which are already certified suffices. Similarly an OLO can discuss bilaterally a partial recertification process in case the OLO CPE firmware is upgraded with changes to the VDSL2 datapump.

Proximus will confirm a committed throughput time within 5 working days after having received a firm order for an OLO CPE certification service. The throughput time depends amongst others on availability of testing slots in the Proximus VDSL2 lab.

- For recertifications triggered by a Major or a Strategic update of the DSLAMs Proximus will perform timely ordered recertifications within the foreseen timings of the DSLAM Upgrade Retro-Planning which is 3 months ([5]) except for a motivated "Fast Track" field trial where Proximus will target at having performed an initial "no harm to the network"-check within 15 working days after completion by the OLO of the CPE firmware upgrades.

- Proximus will target at having performed "Full certifications" of OLO-CPEs that are triggered by the OLO - e.g. to validate a new OLO CPE - within 4 months after having received the firm order.

- Proximus will target at having executed "Administrative certifications" within 5 working days after having received the firm order.

- Similarly Proximus will target at having performed "Field trials" that are triggered by the OLO – e.g. to validate a new OLO CPE firmware – within 4 months which starts once the OLO upgraded a sufficient number of OLO CPEs with the new firmware.

A recertification of an existing OLO CPE is triggered by Proximus through the notification of a Major- or Strategic DSLAM upgrade or is triggered by the OLO in case the OLO CPE firmware is upgraded with changes on the VDSL2-datapump. See chapter 5.1.2 for details.

For any OLO certification service with a negative result Proximus will explain the reasons for it and will negotiate in good faith the possible next steps which can be an included additional monitoring effort during the ongoing "Field Trial" recertification, a specific "Partial certification" for the failed tests or a new full "Full certification" for a failed new OLO CPE if all the tests must be redone once the updated OLO CPE becomes available.

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[5]   3 months is the time between step 4 and step 6 of the DSLAM Upgrade Retro-Planning in Table 1

7 Appendix 2: Example of DSLAM & CPE upgrades

7.1 Upgrade scenario example for a major upgrade

Scenario for a major upgrade			
Step	Date	Proximus	OLO
1	D – 6 months or earlier	PROXIMUS informs the OLOs of intention to upgrade DSLAM (=Step 1 in table 1)	ack.
2	D – 6 months	ack.	OLO orders a Synchronisation check and provides a CPE version N unless PROXIMUS already has the CPE version N..
3	D – 6 months	PROXIMUS informs the OLO of first DSLAM engineering version that is supposed to be representative for the future target version (=Step 2 in table 1)	ack.
4	D – 6 months		OLO starts to work on CPE to develop version N+1
5	D – 6 months	PROXIMUS perform ordered basic sync test with OLO CPE version N against engineering version of DSLAM.	
6	D – 6 months	Basic sync tests of OLO CPE version N against engineering version of DSLAM are OK. PROXIMUS informs the OLO.	ack.
7	D – 3 months	PROXIMUS informs the OLO of final DSLAM version N+1 (=Step 4 in table 1)	ack.
8	D – 3 months or sooner	PROXIMUS perform ordered basic sync test with OLO CPE version N against DSLAM version N+1.	
9	D – 3 months or sooner	Basic sync tests of OLO CPE version N against DSLAM version N+1. PROXIMUS informs the OLO.	ack.
10	D – 3 months		OLO continues to work on CPE to develop version N+1
11	D – 2 months		OLO has a candidate for CPE version N+1
12	D – 1 month	End PROXIMUS DSLAM validation. PROXIMUS confirms the upgrade to version N+1 (=Step 5 in table 1).	ack.
13	D – 1 months		Proximus (and OLO) starts continues ordered certifications validation of CPE version N+1 against DSLAM version N+1
14	D + 0 day	Start of DSLAM upgrade (=Step 6 in table 1)	
15	D + 6 weeks	End of DSLAM upgrade	

Step	Date	Proximus	OLO
16	D + 2 months		OLO validated performance of CPE version N+1 against DSLAM version N+1
17	D + 2 months	ack.	OLO can communicates CPE N+1 performance validation report to PROXIMUS
18	D + 2 months		OLO start migration of OLO CPE in the field from version N to version N+1
19	D + 5 months	PROXIMUS assumes and all deployed OLO CPEs in the field have SW are in version N+1	
20	D + 5 months	DSLAM N+1 becomes the new version N for the next upgrade	CPE N+1 becomes the new version N for the next upgrade

7.2 Upgrade scenario example for a strategic upgrade

Scenario for a strategic upgrade in case of a synchronization issue with CPE N & DSLAM N+1			
Step	Date	Proximus	OLO
1	D – 12 months or earlier	PROXIMUS informs the OLOs of intention to upgrade DSLAM (=Step 1 in table 1)	ack.
2	D – 12 months	ack.	OLO orders a Synchronisation check and provides a CPE version N unless PROXIMUS already has the CPE version N.
3	D – 12 months	PROXIMUS informs the OLO of first DSLAM engineering version that is supposed to be representative for the future target version (=Step 2 in table 1)	ack.
4	D – 12 months	PROXIMUS perform ordered basic sync test with OLO CPE version N against engineering version of DSLAM.	
5	D – 12 months	Basic sync tests of OLO CPE version N against engineering version of DSLAM are **not OK**. PROXIMUS informs the OLO.	ack.
6	D – 12 months		OLO starts to develop a bug fix to enable sync against engineering DSLAM version
7	D – 5 months		OLO releases a CPE versions N.bis that solves the sync against engineering DSLAM version issue and still sync with DSLAM version N.

8	D - 5 months	ack.	OLO provides a CPE version N.bis to PROXIMUS.
9	D - 5 months	PROXIMUS perform ordered basic sync test with OLO CPE version N.bis against engineering version of DSLAM.	
10	D - 5 months	Basic sync tests of OLO CPE version N.bis against engineering version of DSLAM are OK. PROXIMUS informs the OLO.	ack.
11	D - 5 months		OLO starts to prepare migration of OLO CPE in the field to version N.bis
12	D - 5 months		OLO continues to work on CPE to develop version N+1
13	D - 3 months	PROXIMUS informs the OLO of final DSLAM version N+1 (=Step 4 in table 1)	ack.
14	D - 3 months	PROXIMUS perform ordered basic sync test with OLO CPE version N.bis against DSLAM version N+1.	
15	D - 3 months	Basic sync tests of OLO CPE version N.bis against DSLAM version N+1. PROXIMUS informs the OLO.	ack.
16	D - 3 months		OLO start migration of OLO CPE in the field from version N to version N.bis
17	D - 3 months		OLO continues to work on CPE to develop version N+1
18	D - 2 months		OLO has a candidate for CPE version N+1
19	D - 1 month	End PROXIMUS DSLAM validation. PROXIMUS confirms the upgrade to version N+1 (=Step 5 in table 1).	ack.
20	D - 1 months		Proximus (and OLO) continues ordered certifications starts validation of CPE version N+1 against DSLAM version N+1
21	D - 1 day	PROXIMUS assumes and OLO CPE in the field are in version N.bis	
22	D + 0 day	Start of DSLAM upgrade (=Step 6 in table 1)	
23	D + 8 weeks	End of DSLAM upgrade	
24	D + 2 months		OLO validated performance of CPE version N+1 against DSLAM version N+1
25	D + 2 months	ack.	OLO can communicate thes CPE N+1 performance validation report to PROXIMUS

26	D + 2 months		OLO start migration of OLO CPE in the field from version N to version N+1
27	D + 5 months	PROXIMUS assumes ~~and~~ all deployed OLO CPE~~s in the field are in~~have SW -version N+1	
28	D + 5 months	DSLAM N+1 becomes the new version N for the next upgrade	CPE N+1 becomes the new version N for the next upgrade

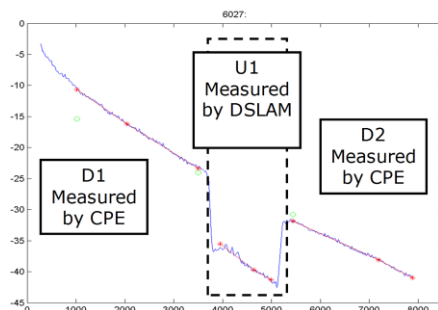# 8 Appendix 3: Additional Information on Proximus's "Test de Bonne Fin"

Proximus developed the "Test de Bonne Fin" (TBF) in order to:

- Better detect wrong VDSL2 installations
- Have a better quality of service :
  - Better stability
  - Less disturbance due to bad neighboring installations
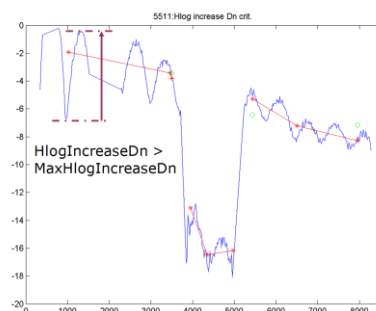 - Optimal ~~vdsl2~~ VDSL2 speed for each end-user

The TBF test is ~~mostly~~ mainly based on 3 ~~kinds~~ inputs of data:

- The Hlog analysis
- Operational data collected by the DSLAM
- Error~~s~~ counters

All values ~~collected~~ obtained ~~by~~ during the TBF are ~~done~~ collected at DSLAM level. No interaction with the CPE at higher layer~~s~~ (SNMP/MIB, TR-69, Remote Access …) is ~~necessary~~ used but ~~it~~ the TBF requires from the OLO CPE the support of the ~~Pp~~hysical layer OAM configuration with performance monitoring parameters as defined in ITU-T G.997.1, and support of the transceiver functional requirements of ITU-T G.993.2 (Very high speed Digital Subscriber Line transceivers 2).

Example of a TBF (HLOG) result for a good Line

Example of a TBF (HLOG) result for a bad Line

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~~One~~ Each TBF is based on several test iterations:

1. The first iteration (~15 minutes) will give a PASS/FAIL status:
   o If the line has some stubs or other important defaults (mostly reported thanks to the Hlog analysis), the line will be considered as faulty and~~-~~ the ~~put in~~ Basic Connectivity Profile will be activated.~~-~~
   o If the line seems to be correct, the test will ~~go on to~~continue with ~~the following iterations~~step 2.~~.~~
2. The next wave of iterations (every ~2 days) will collect data from the DSLAM. The TBF requires 4 days of data (CPE up with traffic) to ~~be able to~~finish. That's why the TBF can ~~last~~ take up to 10 days (fixed limit) to complete.
3. Once the TBF is over~~, and~~, based on all information collected, the Line Profile is then ~~defined~~ choosen by the Proximus "Repair Profile Algorithm" and ~~set~~ activated automatically on the line.

9 Appendix 4: External TBF service high-level description

Proximus has implemented a SOAP/XML interface (based on the current Open Calendar/Certified Technician technology) for the OLO to be able to remotely launch a TBF on a line with an OLO CPE. The requirements for the interface are documented in the "External TBF Service XML Content Description".

Generally, ~~the~~ an OLO can launch a TBF – only after a provisioning DONE – by sending a request to Proximus with the following info:

- CID (OLO must then know which CPE is linked with which line/CID!)
- …

Proximus will acknowledge the Launch Request in a synchronous way and pass a reference ID to indentify uniquely the TBF test. When the TBF is ~~over~~ finished (it can take up to 10 days), Proximus will also send a notification that the TBF test is finished. The OLO can then send another request to fetch the results (cf. Appendix 5 of the present document). The OLO will also be able to send a request to get intermediate results. Anyway, the notification of the completed test will always be sent to the OLO even ~~though~~ if the TBF ~~would have been~~ was triggered by Proximus.

In case a TBF is already ongoing, the ~~previous~~ ongoing TBF will be automatically cancelled. This will help speed~~ing~~ up a repair process, ~~by~~ ~~to~~ avoid~~ing to have to~~ wait~~ing~~ for the first TBF to finish after having accomplished repair actions ~~were accomplished~~. A notification that the ongoing test is cancelled will be sent to the OLO for information (with the reference ID of the cancelled TBF). It ~~might happen~~ is possible that an ongoing ~~previous~~/cancelled TBF ~~had been~~ was launched by Proximus.

At the end of a TBF, Proximus will provision the line profile (Provisioning, Repair or Basic Connectivity) ~~resulting~~ as decided by the ~~from~~ Proximus "Repair Profile Algorithm", as if it ~~was~~ a Proximus CPE was used.

OLO ~~will have~~ has one additional (optional) step in the process to specify the line profile desired:

4. At least a TBF should have been recently launched on the line;
5. The line ~~should~~ shall not be flagged as being a potential disturber;
6. If the TBF result is the Basic Connectivity Profile, the OLO will NOT be able to choose any other profile. A repair action must be performed first by the OLO!
6.7. If a vectoring profile or the fall back profile is active on the line, the OLO will NOT be able to choose any other profile.
7.8. If not, the OLO will be able to choose any other line profile from the same ~~P~~provisioning ~~G~~group (30Mbps, 20Mbps, 16,5Mbps or 12 Mbps).

All ~~this~~ these process~~es~~ only applies to the external (SOAP/XML) service that Proximus has provided to the OLOs in the OLO CPE framework. All other existing methods & processes (eTS, IVR …) to launch a TBF stay as today.

All potential testing related to the launch of a TBF shall be organized by the OLO on one of its own WBA test lines in production. Proximus will not provide the OLO with an end-to-end environment to test such service.

10 Appendix 5: Technical information sent back to OLO after TBF

The information below is the list of measurements (resulting from a TBF request) that will be sent back – optionally – to the OLO. Accordingly and optionally, each OLO will be able to create its own "Repair Profile Algorithm" to decide which Line Profile to apply based on the measurements (and constraints as explained in chapter 5.2.2~~6.2.2~~).

H-log:

- At least an OK /NOK with additional information (what led to this conclusion).

Operational data:

- Upstream aggregateTx power
- Upstream band U1 loop attenuation
- Upstream b and U1 signal Attenuation
- PBO electrical length used (Upstream attenuation at 1MHz)
- PBO electrical length estimated (Downstream attenuation1MHz)
- Downstream actual noise margin
- Upstream actual noise margin
- Downstream attainable bit rate
- Upstream attainable bitRate
- Downstream current bitRate
- Upstream current bitRate
- Downstream highestFrequencyUsed

Error counters:

- Downstream Severely Error Seconds per interval (SES-FE)
- Upstream Severely Error Seconds per interval (SES-NE)
- Downstream Error Seconds per interval (ES-FE)
- Upstream Error Seconds per interval (ES-NE)
- Downstream Code Violations per interval (CV-FE)
- Upstream Code Violations per interval (CV-NE)
- Downstream Forward Error Correction Corrected code words per interval (FECC-FE)
- Upstream (near-end) Forward Error Correction Corrected code words per interval (FECC-NE)
- Upstream Reinits per interval
- Upstream Unavailable Seconds per interval

11 Appendix 6: Line Profiles association during ordering and after TBF

All additional information below in this Appendix is for information and explanatory purpose only. Only the line ordering processes from the WBA offer ("Main Body" and "Annex Planning & Operations") are to be considered as being the sole reference.

All Line Profiles offered in a WBA product are described in section "DSL profiles at uni (Layer1)" of the Annex 2: "Technical specifications".

The Provisioning Profiles are set – during ordering – as described in the "VDSL2 deployment rules" of the "Main Body" according to Proximus's VDSL2 engineering rules.

Following TBF results, in case of line instability, Proximus might downgrade the Line Profile to a "Repair" Profile. The list of "Repair Profiles" associated to "Provisioning Profiles" is available in the section "Repair for spectral issues reasons" of the Annex 3 "Planning and Operations".

◆◆◆◆◆◆   End of document   ◆◆◆◆◆◆