INSTITUT LUXEMBOURGEOIS
DE RÉGULATION

frontier
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REVIEW OF BROADBAND REGULATION IN LUXEMBOURG

Final public report prepared for the ILR

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CONTENTS

1 INTRODUCTION AND CONTEXT

The Institut Luxembourgeois de régulation (the ILR) has commissioned Frontier Economics to carry out an assessment of the effectiveness of the current ex ante regulation of wholesale broadband markets in Luxembourg. This report sets out our assessment and our recommendations.

This is a non-confidential version of the report with confidential information removed as indicated by the scissor symbol.

1.1 Background and context

Following the ILR's market definition and competition assessment of wholesale broadband markets, POST was found to have significant market power (SMP). The ILR put in place a number of ex ante remedies to address the risk of market failures identified. POST was found to have a market share of 70% in 2011 with the remaining 30% of the market shared between around ten other firms.

The latest statistics available to the ILR show that POST's market share has not fallen significantly since the remedies were put in place (POST's market share was 64% in 2015). Therefore, the ILR wishes to assess whether the remedies imposed in 2014 achieve its objectives of promoting the interests of end users by facilitating effective and sustainable competition in the wholesale broadband markets. Where current regulations are found to not be effective, the ILR is seeking recommendations on how these regulations could be improved.

1.2 Summary of findings

The starting point for our assessment was to set out the objectives that the broadband regulations aim to achieve, such as increasing the availability of high speed services and competitive prices. These objectives are described in more detail in Section 2.

In Section 3, we assess consumer outcomes, to better understand the extent to which these regulatory objectives are being met. In summary, we find that there is widespread availability of FTTH services, including in rural areas. However, although prices are higher in Luxembourg than the European average (even taking account of differences in purchasing power parity) this is not necessarily problematic given high take-up of 30Mbps+ services. Prices in Luxembourg could be higher for a number of reasons including higher underlying costs of provision and other differences in market and regulatory conditions. Stakeholders were of the view that the relatively low take-up of 100 Mbps services was due to limited consumer demand to date and that demand will now increase as demand for IPTV services increases.

In Section 4, we provide a review of the current broadband regulations in place and identify issues that may affect the future development of the broadband sector in Luxembourg. This is based on our engagement with stakeholders (as described in Annexes B and C) as well as experience from other jurisdictions.

We find that regulation in Luxembourg to date has been largely effective and has permitted a number of operators to enter the market and to grow their subscriber base using wholesale broadband inputs from POST Technologies. Overall, stakeholders consider that the resale, bitstream and unbundled access reference offers cover the products and services that they require at prices that allow them to earn a sufficient margin to compete effectively with POST. Access seekers considered that, in general, they are treated by POST Technologies on a non-discriminatory basis, although some equivalence issues were identified.

In the next three to five years, stakeholders anticipate much greater demand from consumers for higher broadband speed and capacity, particularly as IPTV increases in popularity. Therefore, they anticipate greater migration to fibre based products. We consider that there are five main areas the ILR could address in order to improve consumer outcomes by facilitating the transition to higher bandwidth/ services and to improve the regulatory decision making process. These are summarised below and are described in further detail in Section 5.

- The current structure and level of bitstream prices could lead to margin squeezes as demand for peak hour traffic increases if the current structure and level of retail and wholesale prices were unchanged;
- Delays in provisioning of the in-building cabling necessary to offer full functionality of FTTH services could restrict the take-up of these services;
- There are some examples of discriminatory behaviour that are not currently being identified and addressed within the current regulatory regime;
- As competition in the market increases and new regulations are introduced, there may be more disagreements between POST and access seekers and the need for a robust dispute resolution process may increase; and
- Some stakeholders consider that some regulatory obligations are disproportionate and others consider that they do not have sufficient resources to always actively engage in regulatory decision making.

We also note that a number of other issues were identified as part of our review. However, we focus our recommendations on the areas where we consider the ILR's efforts are best concentrated in order to have the biggest impact on the development of the sector in terms of achieving its regulatory objectives.

1.3 Summary of recommendations

In Section 5 of this report, we set out further consideration of the five areas of focus as well as our recommendations. The table below summarises our recommendations for each of these areas.

Figure 1 Summary of recommendations

Area	Recommendations
Structure and level of bitstream prices	**We recommend the ILR provides additional guidance and reassurance to stakeholders in this area.** The requirement for POST to comply with an economic replicability test (ERT) should prevent margin squeeze as the market develops. However, there appears to be limited understanding of the ERT.
Slow provisioning times	**As part of the next market review, we recommend the ILR develops guidance for the minimum requirements that reference offers should meet. These should cover service level agreements and service level guarantees (SLAs and SLGs) for regulated products. We also recommend consultation with industry on draft reference offers developed by Post Technologies to ensure that they reflect the operational needs of access seekers and the network operator.** Slow provisioning times are driven by a number of factors, some of which are beyond the control of POST Technologies and the ILR. Including additional SLAs and SLGs in reference offers would help to ensure that POST Technologies has an incentive to limit delays within its control.
Discrimination and equivalence of inputs (EOI)	**We recommend a review of the current governance measures that could be used to prevent discriminatory behaviour.** Stakeholders identified examples of discriminatory behaviour that have not been formally reported to the ILR. We do not consider that a formal independent audit would be proportionate in Luxembourg at this stage. However, a more holistic review by the ILR would be useful. This would cover internal governance mechanisms (such as compliance monitoring, staff training, and so on) as well as external monitoring by the ILR.
Dispute resolution	**We recommend that the current dispute resolution process is improved.** This is to ensure that it is used when necessary and also so that POST has the incentive to engage in direct communication with access seekers and to avoid recourse to regulatory intervention. There are three main ways in which the current dispute resolution process could be made more effective: • Greater encouragement of bilateral negotiations through the reference offers; • Providing more structure and clarity of the regulatory dispute resolution process; and • Promoting alternative dispute resolution processes either formally or informally.

Area	Recommendations
Regulatory burden	**We recommend that the ILR considers ways of engaging stakeholders more effectively and efficiently, particularly smaller access seekers.** There may be scope to reduce the resources required by smaller stakeholders to engage in the regulatory decision making process, without significantly impacting on the quality of regulatory decision making. For example, more structured and streamlined data requests, and greater clarity in documents (i.e. .whether the ILR is notifying, seeking comments on a draft proposal or seeking input to identify the relevant issues that will need to be considered). While POST has the highest regulatory burden, we do not find that it is disproportionate. Given the concerns raised by stakeholders over POST's compliance with its EOI obligations, we do not consider that it would be proportionate to remove or reduce other regulatory obligations at this stage. In addition, we do not consider that there is evidence that the ex ante broadband regulation imposed by the ILR is overly burdensome in order to meet the ILR's statutory duties. Also, there are a number of mechanisms in place that prevent disproportionate regulation. These include guidelines from the European Commission, the requirement for the ILR to notify the EC of regulatory decisions and various channels of appeal.

Source: Frontier Economics

2 REGULATORY OBJECTIVES

In this section, we set out our understanding of the ILR's regulatory objectives in order to assess to what extent the regulations currently in place are consistent with these objectives.

The ILR has a statutory duty to support the effective functioning of markets and competition. While the ILR has its formal statutory objectives, the ILR still retains some flexibility on how to best achieve those objectives and to determine its own strategy. In particular, to ensure that outcomes are sustainable, the ILR needs to carefully balance the promotion of consumer interests in the short term with a range of other considerations and impacts on other stakeholders in the market. For example, while lower prices may benefit consumers in the short term, the trade-off is lower investment in the longer term if investors are unable to recover efficiently incurred costs. This is described in Section 2.1 below.

We also consider how the targets for availability of high speed services and other objectives as set out in the 2010 National Broadband Plan for Luxembourg contribute to the ILR's overall objectives (Section 2.2).

The ILR is also subject to the European regulatory framework (as described in Section 2.3) and is required to consider the guidance provided by the European Commission when implementing ex ante regulation.

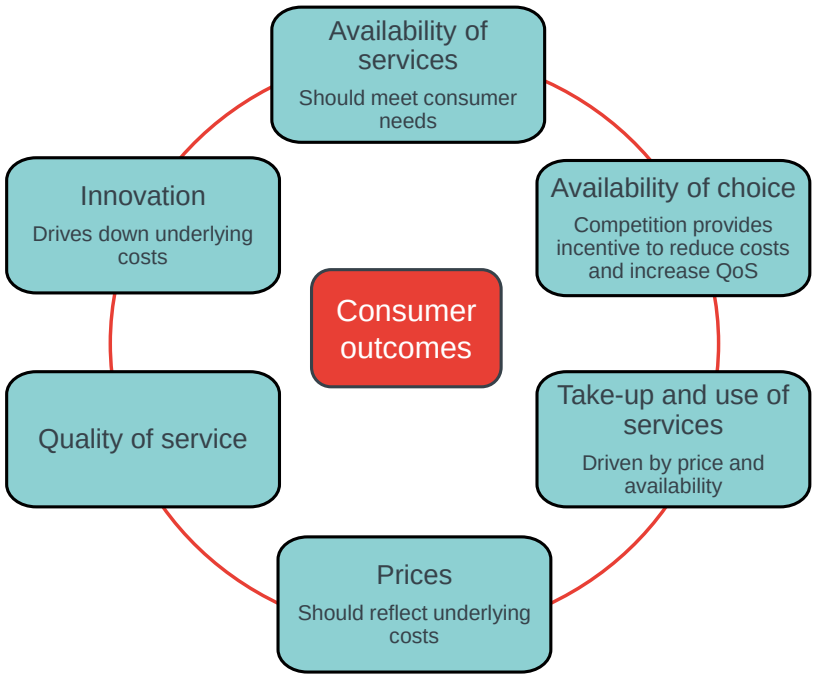
2.1 Effective functioning of markets

The 2011 Luxembourg electronic communications law aims to achieve:

- The creation of a competitive environment and freely functioning market; and
- The regulation of access and interconnection in order to promote sustainable competition and to guarantee the interoperability of services while achieving benefits for consumers.

The figure below illustrates the different aspects of these objectives. We consider the current outcomes in these dimensions in Section 3 below. We note that the law and the remit of the ILR both appear to focus on supply side measures rather than demand side policies (that is, they do not include provisions for stimulating consumer demand other than through pricing and ensuring availability). Therefore, we have focussed our review on the regulations that the ILR currently has in place for operators in the sector (as described in Section 4).

Figure 2. Aspects of competition and how these relate to consumer benefits



Promoting consumer interests relies on the achievement of economic efficiency. This is typically defined in three ways:[1]

- Allocative efficiency – prices should reflect the underlying costs of provision;
- Productive efficiency – goods and services should be provided in the least cost way; and
- Dynamic efficiency – firms should face the incentive to minimise costs in the long term through innovation.

However, there is often a trade-off between achieving these and therefore policy makers need to carefully balance different objectives.

2.2 2010 National Broadband Strategy

In March 2010, the Ministers of Communications and the Economy jointly presented Luxembourg's "National Strategy for Very High Speed Networks". This aimed to increase the speeds offered by existing networks, while encouraging sufficient investment in the rollout of next generation networks, particularly fibre. This recognised the contribution of greater take-up of broadband services not just to individual businesses and households but also to the economy as a whole.

The national broadband strategy identified targets in two main areas:

- Availability of high speed services; and
- Competitive prices.

[1] See, for example, "EU Competition Law and the Information and Communication Technology Network Industries", Andrey Fatur, 2012

These are described in further detail below. To achieve these targets, the Government stated its support for a "strategy based on open and transparent access to networks respecting network neutrality". It also recognised the role of key policy instruments including:

- The implementation of the third telecoms package (transposing new regulations from the 2009 EU electronic communications framework, described in further detail in Section 2.3 below);
- Favouring network deployment, including cable network upgrades; and
- Spectrum policy.

The strategy also identified additional targets that we do not consider here as we understand they are beyond the remit of the ILR.[2]

2.2.1 Widespread availability of high speed services

The 2010 Luxembourg National Strategy for Very High Speed Networks identifies two goals:

- *"Increase, in the short term, the speeds of the existing networks, and,*
- *Provide, in the medium term, access to optical fibre in the entire territory and hence become the first "fibred" country of the European Union."*[3]

The strategy also includes targets such as:[4]

- From 2010
  - 100% access to 2 Mbps downstream and 512 kbps upstream;[5]
- From 2015
  - 100% access to 100 Mbps downstream and 50 Mbps upstream;
  - 50% population coverage of access to 1Gbps;
- From 2020
  - 100% access to 1 Gbps downstream and 500 Mbps upstream to 100% of the population.

Consistently with its objective to be among the European leaders in terms of very high-speed broadband penetration in 2013, these targets are more ambitious than those set in the European Digital Agenda 2020 which committed EU Member States to ensuring rollout of superfast broadband networks to the whole population and ultrafast broadband to 50% of the population by 2020.[6]

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2 These are: creating of economic activity zones connected to very high speed broadband; and connecting all public administrations, academic institutions and research centres to very high speed broadband by the end of 2013.

3 National Strategy for Very High Speed Networks, March 2010

4 However, we note that the ILR has not imposed a universal service obligation on any operators in Luxembourg to achieve these goals.

5 That is, access for all users to a minimum quality of service, irrespective of their geographic situation in the national territory.

6 Superfast broadband is defined by the ILR as download speeds of 30 Mbps, and ultrafast broadband is defined as download speeds of 100Mbps.

2.2.2 Competitive prices

The national broadband plan includes the objective of "competitive" wholesale and retail prices (which the strategy defines as being within the European average) and price monitoring.

2.3 Implementation of the European regulatory framework

In terms of the broadband sector, the ILR's focus to date has been on implementing the 2009 EU telecommunications package. Therefore, our assessment focusses on the regulations that the ILR has introduced as part of this implementation.

The EU package seeks to strengthen the electronic communications market and ensure better rights for consumers. It seeks to do this through (among other measures):

- Only regulating where there is no effective and sustainable competition;
- Revising the rules to ensure more effective competition;
- Enhancing incentives to invest in new high-speed networks that will support innovation in content rich internet services and strengthen the international competitiveness of the European Union; and
- Progressively reducing ex ante regulation and increasing reliance on competition law as competition develops.

The implementation of the EU package is complementary to the Luxembourg National Broadband Strategy as it ensures the efficient use of the network that is being rolled out.

Under the European regulatory framework, the ILR carried out its market definition and market assessment of the following wholesale broadband markets:

- Market 4 (4/2007) – Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location; and
- Market 5 (5/2007) – Wholesale broadband access.

Based on these, the ILR found POST to have significant market power (SMP) in both relevant markets and therefore imposed a number of regulatory obligations. These are set out in Section 4 below.

The ILR did not find any of the cable operators to have SMP in either of these relevant markets and, therefore, they are not subject to any ex ante regulatory obligations. Under the current European regulatory framework, it would be challenging to find that any of the cable operators had SMP in addition to POST, due to the complications of determining joint dominance. Experience from other European jurisdictions has shown that cable operators are generally not found to SMP, even where market share is significantly higher than in Luxembourg, and proposed determinations of SMP for cable networks have raised complex issues.[7]

[7] For example, the EC raised a number of issues with the SMP conducted in the Netherlands where the cable operator had a greater market share than the incumbent.

Further, while wholesale cable access products are available on a commercial basis, stakeholders did not raise the issue of regulated access in our engagement with them. This, combined with other technical and commercial factors suggests that there may be limited demand for such products. In particular, POST, the largest retail operator in the broadband market, would be unlikely to buy access given that it already has national coverage itself. Also, since the SFR and Eltrona cable networks do not overlap, access seekers would need to deal with more than two or more operators to achieve national coverage, particularly as the cable operators combined only offer a combined DOCSIS 3.0 coverage of 70% of households.

3 REVIEW OF COMPETITION AND CONSUMER OUTCOMES

In this section we consider competition, consumer outcomes and how these have developed over time.

Although POST's market share has fallen from 70% in 2011, the incumbent still retains over 60% market share. POST faces competition from access seekers such as Orange and Tango, as well as infrastructure-based competition from the cable operators Eltrona and SFR.

Currently, the ILR's principal tool for achieving its objectives for the broadband market is wholesale access regulation, which facilitates access-based entry using wholesale products such as unbundled access (fibre and copper based), bitstream and resale (see Section 4). Access seekers using unbundled access have been able to gain retail market share below 10%, while those using resale services have been able to gain a market share below 20%. However, in more recent years, the importance of operators using unbundled access has started to fall while resale and bitstream products have grown in importance (see Section 3.1).

The market share of the cable television operators has remained relatively stable over time (around 10%). There could be a number of possible reasons for this, the most important possibly being that cable operators have only recently begun offering broadband services.

In terms of consumer outcomes, we find that although POST has been able to maintain its retail market share and that prices are relatively high, Luxembourg still performs well compared to other EU countries in a number of areas, but in other areas there is room for improvement. These are summarised below and then described in further detail in the rest of this section.

- There is widespread availability of FTTH services, including in rural areas, reflecting high levels of investment in the sector.
- The total number of broadband subscribers has increased over time.
- Subscribers are increasingly upgrading to superfast broadband services in spite of the prices of services in Luxembourg being higher than in other EU countries. While Luxembourg performs well in terms of take-up of services over 30 Mbps compared to the EU average, it falls behind Romania, Sweden, Malta, Netherlands and Belgium. Also, while the take-up of speeds over 100Mbps has increased, it is slightly lower than the EU average and some way behind the most advanced in the EU.
- Bundling of broadband with voice and/or television services is becoming increasingly popular among subscribers. Stakeholders have noted that increasing take-up of IPTV services and use of streaming is driving demand for bandwidth and hence for fibre based and CATV based access.
- While there is limited information relating to customer satisfaction, there are relatively low levels of complaints that are referred to the ILR. This indicates that customer satisfaction is relatively high but that further information would be needed to make a firmer conclusion.

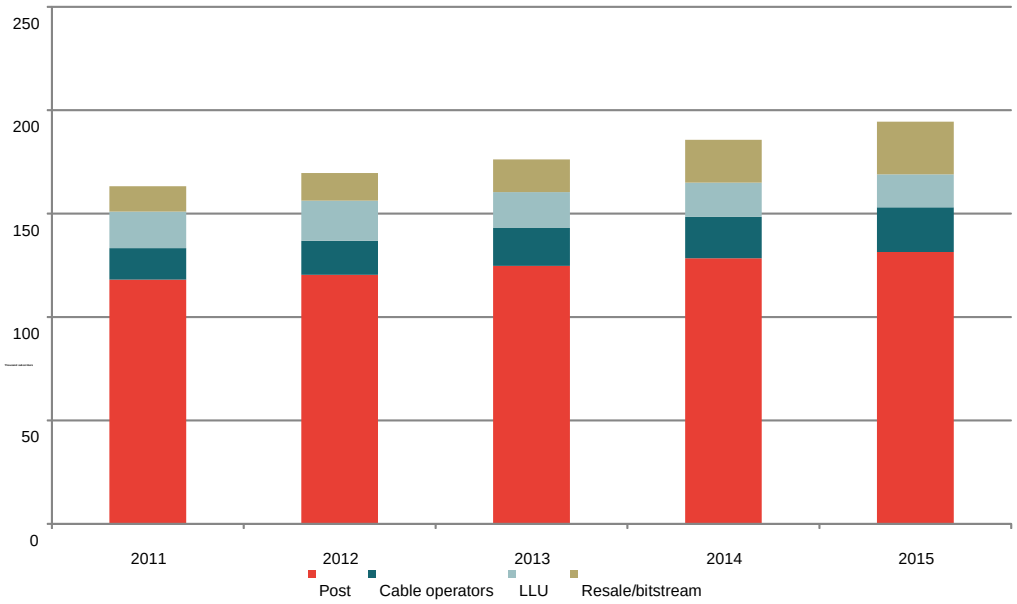
3.1 Overview of competition at the retail level

As can be seen in the figure below, the broadband subscriber market has grown steadily over time to 194,500 connections in 2015. The broadband market in Luxembourg is characterised by one large operator offering FTTN based services on a national basis (POST), a number of access seekers, two large cable television network operators (SFR and Eltrona), and a number of small regional cable network operators. POST had a subscriber market share of over 60% in 2015, slightly lower than its share of around 70% in 2011. We first discuss the competition it has faced from access seekers (access-based competition) and then that faced from cable operators (infrastructure-based competition).

3.1.1 Access-based competition

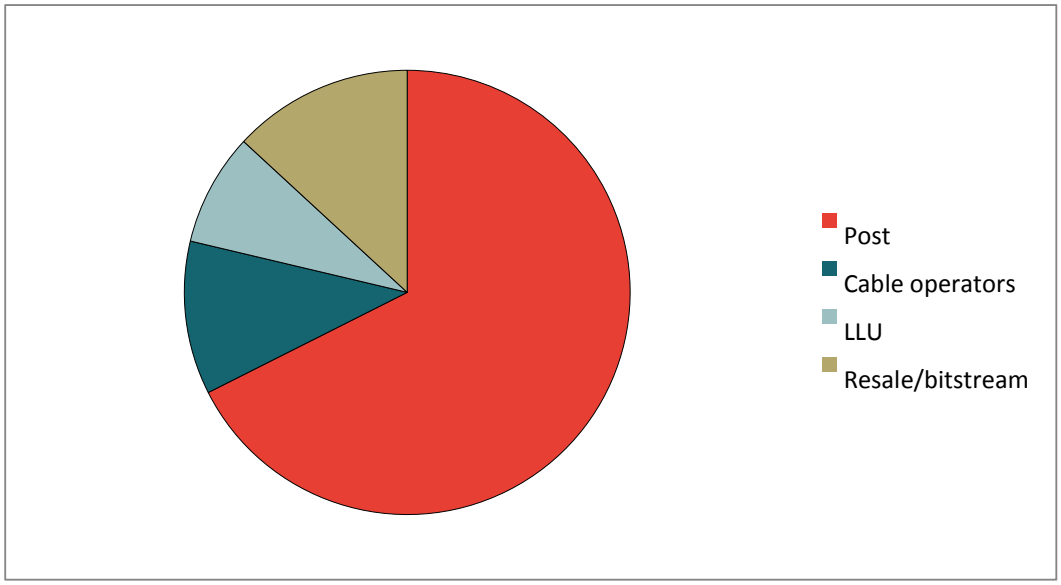
As an operator with significant market power (SMP), POST is required to offer wholesale broadband access (LLU and bitstream) to access seekers on a non-discriminatory basis. This has enabled a number of entrants (such as Tango, Luxembourg Online and Orange) to enter the market and provide retail broadband services. However, they have not eroded POST's subscriber base significantly, as can be seen in the figure below.

Figure 3. Broadband subscribers by access model



Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

Figure 4. Broadband market share 2015



Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

Figure 5 below lists the ten largest retail operators in Luxembourg and their respective market shares. *[✂ confidential]*.

POST retains a market share greater than 60% with no other operator holding a market share greater than 15%. We note that not all access seekers rely solely on the access offers of POST Technologies but in some cases also on Eltrona's CATV network.

Figure 5. Market share of broadband services in Luxembourg – 10 largest operators by connection [confidential]

Rank	Operator	Market share (confidential)
1	*[✂ confidential]*	*[✂ confidential]*
2	*[✂ confidential]*	*[✂ confidential]*
3	*[✂ confidential]*	*[✂ confidential]*
4	*[✂ confidential]*	*[✂ confidential]*
5	*[✂ confidential]*	*[✂ confidential]*
6	*[✂ confidential]*	*[✂ confidential]*
7	*[✂ confidential]*	*[✂ confidential]*
8	*[✂ confidential]*	*[✂ confidential]*
9	*[✂ confidential]*	*[✂ confidential]*
10	*[✂ confidential]*	*[✂ confidential]*

Source: ILR data

Nombre de raccordements Internet à haut débit et très haut au marché de détail. Catégorie 4, SAH Service accès Internet à haut débit (voie descendante < 30Mbits) ; and Catégorie 5, SAT Service accès Internet à très haut débit (voie descendante ≥30Mbps)

Means of entry and choice of technology

According to ILR data, there are 55 operators that are currently licensed to offer retail internet services in Luxembourg (including POST). These include several

international operators (such as Colt, Orange, Proximus, Telefonica, BT Global Services, and Bloomberg Finance) as well as local operators (such as Luxembourg Online and Luxnetwork). However, only 12 of them appear to have had wholesale contracts with POST in place in September 2016 to be able to access services to provide retail broadband services. These are listed in the table below.

Figure 6 Reference offers in place in September 2016

	LLU	Broadband	IP backbone TV
	[✂ confidential]		

Source: Data provided to the ILR by POST Technologies, September 2016

Access seekers using LLU have gained a retail market share below 10%, while those using resale services gained a market share below 20%. However, since 2012, the importance of LLU operators has started to fall while resale and bitstream products have grown in importance.

The figure below shows that at the end of 2015, alternative operators (excluding cable) were using mostly DSL technology (21, 602 subscribers). As end customers have migrated to higher speed services, it appears that access seekers have been more successful using VDSL than DSL (reaching 39% versus 21% share of total

subscribers on each respective access technology). However, this does not appear to be true for FTTH where access seekers have only been able to capture 22% of those subscribers.

Figure 7. Broadband subscribers by access technology and provider

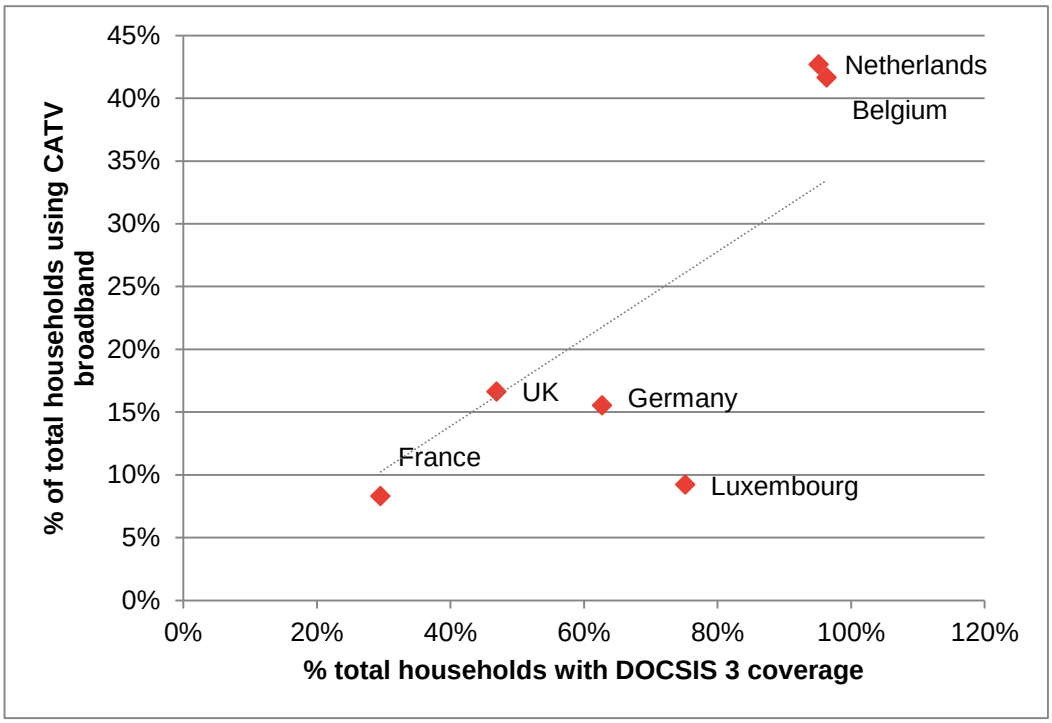
	Cable	DSL	VDSL	FTTH
POST	-	80,388	24,763	25,972
Alternative operators	21,722	21,602	16,162	7,287
- Alternative operators as % of total	100%	21%	39%	22%
Total	21,722	101,990	40,925	33,259

Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

3.1.2 Infrastructure-based competition

The market share of the cable television operators has remained relatively stable over time (around 10%). The figure below shows the percentage of households that have DOCSIS 3 coverage and the percentage of total households that subscribe to CATV broadband. It can be seen that, accounting for coverage, take up of CATV broadband services is relatively low in Luxembourg compared to the other European countries included in the sample.

Figure 8. Percentage of households with DOCSIS 3 coverage and percentage of households using CATV broadband (June 2015)

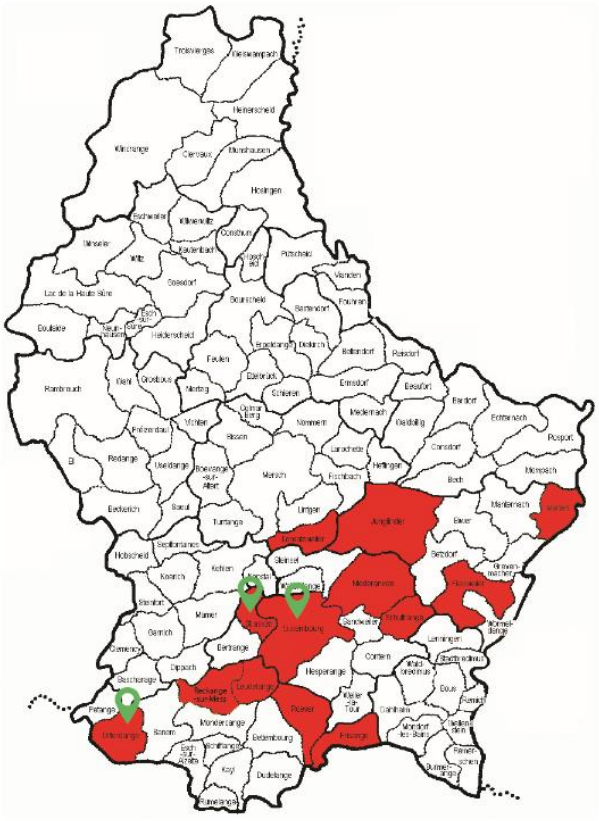


Source: Analysis by Frontier Economics using data from EU Broadband Coverage in Europe in 2015 (available online https://ec.europa.eu/digital-single-market/en/connectivity)

There are a number of possible reasons for relatively low take-up of cable.

- First, cable operators have not focussed on their broadband offerings. In the case of SFR, this is due to limited focus in Luxembourg more generally given that it is managed from Belgium where there is a bigger market.[8] In the case of Eltrona, this appears due to its historic focus on its television offering and only starting to offer broadband services directly to consumers itself very recently (July 2016). A potential result of this is that consumers do not necessary perceive cable networks as being capable of offering high speed internet.[9]
- Second, the fragmentation of cable coverage may make marketing to consumers more difficult. Although the CATV DOCSIS 3 networks only cover 70% of households in aggregate, individual operator's coverage is smaller still. The figure below shows SFR's service coverage areas.

Figure 9 SFR service coverage areas



Source; SFR website, accessed 11 October 2016

[8] We note that SFR's strategy may change now that Telenet has agreed to purchase SFR Belgium and Luxembourg from Altice (subject to approval by the relevant competition authorities). Reuters, 22 December 2016, http://uk.reuters.com/article/uk-altice-m-a-telenet-idUKKBN14B0MW

[9] Source: Enquête sur le comportement du consommateur à l'égard de l'Internet et des technologies de la communication, ILR, 6 June 2011. This study was based on survey data collected in November 2010.

3.2 Availability and choice of services to consumers

As set out in Section 2.1 above, Luxembourg set ambitious universal coverage targets, above those defined in the EU 2020 Digital Agenda. Given these targets, there has been a high level of investment in fibre technology in Luxembourg. By the end of 2015, POST's FTTH network had passed 61% of households by the end of 2015. [10] POST has claimed that it is on track to achieve 100% FTTH coverage by 2020[11].

POST's ADSL/VDSL (copper based broadband from the exchange and fibre to the 'node') coverage was nearly 100% at the end of 2015. Overall cable television network coverage offering broadband (DOCSIS 3) was more than 70% of households.[12] This means that the remaining one third of households are only able to access fixed broadband services either by purchasing directly from POST or from access seekers that rely on POST's network.

In contrast to most European countries where fibre coverage is currently limited to mainly urban areas, FTTP services are available to a third of rural homes in Luxembourg. [13] Only Lithuania (84%), Estonia (51%) and Latvia (47%) currently have higher rural FTTP coverage.

3.3 Use of broadband and superfast broadband

Luxembourg had the highest household penetration of fixed broadband subscriptions in the EU in 2015.[14] According to ILR estimates, household penetration of very fast broadband services (more than 30 Mbps) in Luxembourg in 2015 was approaching 40%.[15] Luxembourg is also among the strongest performers in the EU in terms of fixed broadband connectivity as measured by the European Commission.[16] This measure considers the demand and supply side of fixed broadband taking account of basic and NGA broadband access, as well as the affordability of retail offers.

At a national level, fibre based access represents 16% of total broadband lines in Luxembourg (compared with 73% over DSL and 11% over cable).[17] Luxembourg also has the highest take-up of broadband in rural areas (over 90% compared with an EU average of just over 60%). The ILR has observed that customers are increasingly migrating to internet services offering download speeds of over 30 Mbps provided over xDSL, cable and fibre. This is illustrated in the figure below.

10 Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

11 Telegeography: WiMAX technology has not been used as a broadband access method since 2012

12 Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR. The EU survey estimates DOCSIS 3 coverage at 75% of households as at end June 2015 - EU Broadband Coverage in Europe in 2015 (available online https://ec.europa.eu/digital-single-market/en/connectivity).

13 Europe's Digital Progress Report 2016 – Connectivity. Rural areas were defined as those with population density less than 100 people per square kilometre.

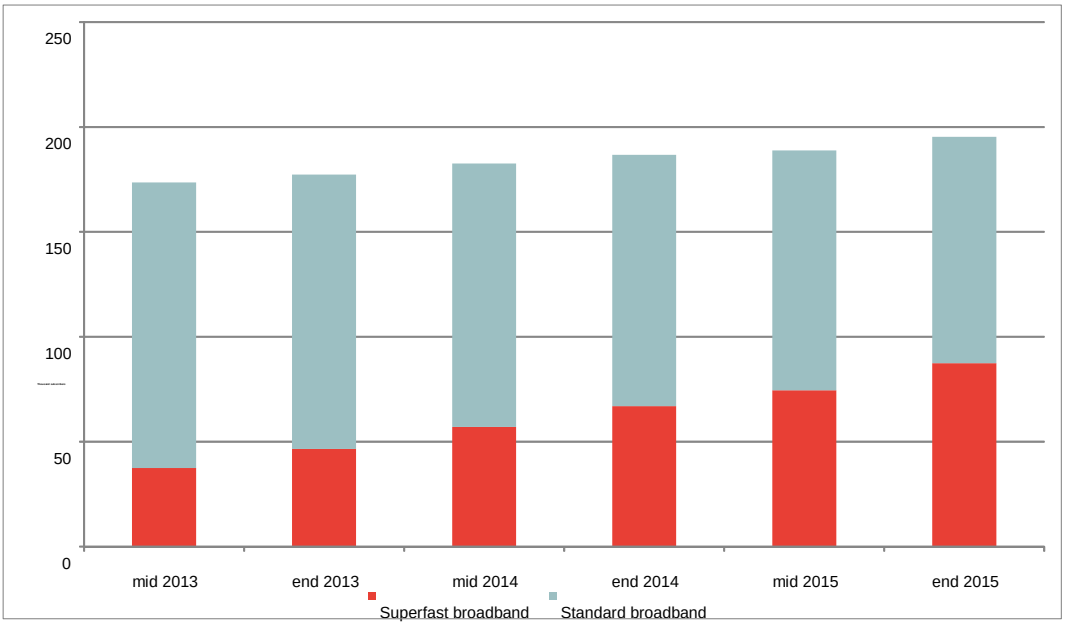
14 Europe's Digital Progress Report 2016 - Connectivity

15 Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

16 With NL, BE and SE being the only countries that are further ahead. Source: Europe's Digital Progress Report 2016

17 Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

Figure 10. Substitution from standard to superfast broadband



Source: ILR

Take-up of broadband services of at least 30 Mbps is high in Luxembourg compared to the EU average (more than 30% of households compared to just over 20% for the EU average, according to the EU Digital Progress Report, but 39% according to ILR data for 2015). According to the EU Digital Progress Report, Luxembourg currently falls behind Romania, Sweden, Malta, Netherlands and Belgium.

Subscriptions to download speeds of over 100Mbps are becoming increasingly important in Luxembourg and represented 12% of all broadband subscribers in 2015. This compares with almost 0% in 2011.[18] However, Luxembourg is below the EU average and some way behind the most advanced in the EU (where more than 25% of households are subscribers to 100Mbps+ services).

3.4 Increased importance of IPTV and bundled offers

Bundled services are becoming increasingly popular in Luxembourg. The figure below shows how more than 80% of broadband subscribers purchased a bundled offer in 2015.[19]

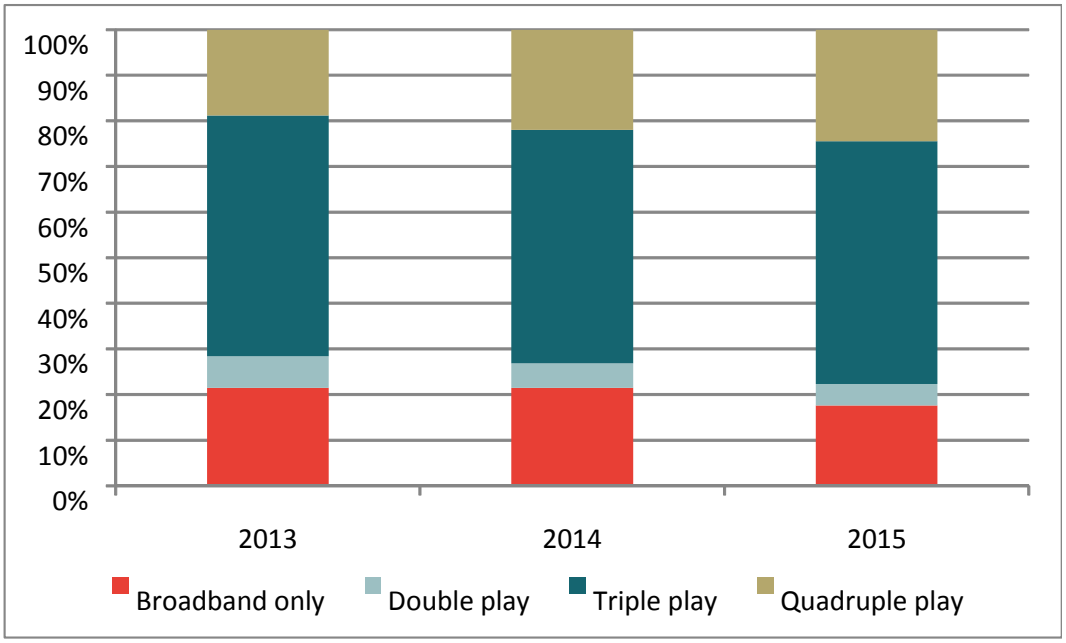
Bundled products can offer better value for money to customers as the price per service in a bundle could be lower than the stand-alone price of the service. Some customers may also value non-price aspects such as the ease of single billing. However, there could be competition concerns in the future if such bundling makes it harder for new entrants if they cannot replicate bundles to attract customers away

[18] Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

[19] We note, however, that POST is not currently permitted to offer quad play services but that other operators are permitted to do so.

from existing players in the market, particularly if there is already limited switching in the fixed voice line market. [20]

Figure 11. Increasing importance over time of bundled offers



Source: Frontier Economics calculations based on ILR data

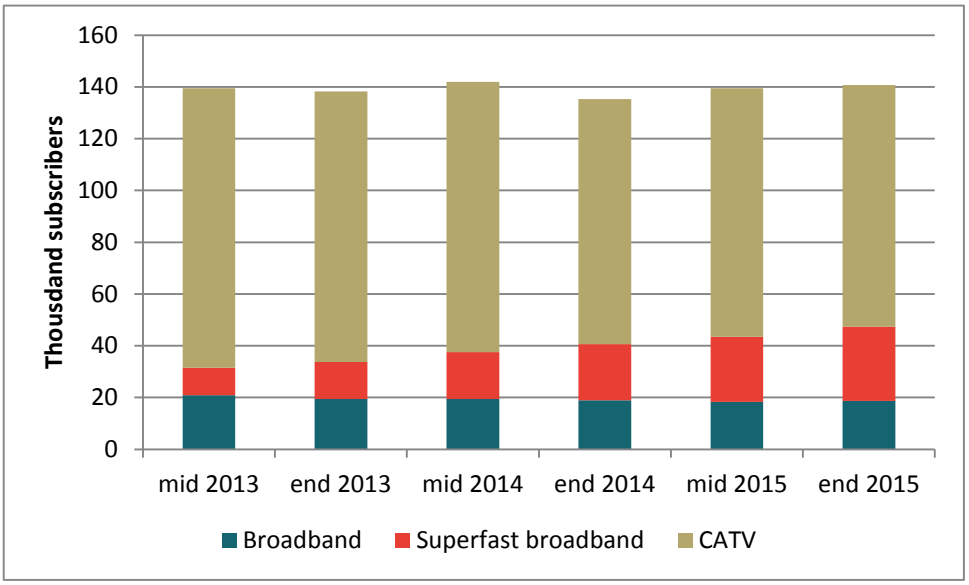
Note: All bundles include broadband, quadruple play offers combine internet, fixed telephony, mobile and television services.

Compared to the EU average, the additional cost to the end user of adding fixed telephony to a standalone broadband offer is low (€3.20-7.20, 40% less than the EU average). However, adding television to a standalone broadband offer, or to a double play offer, is relatively more expensive in Luxembourg (€17.00 – 28.40).

The figure below shows the number of subscribers accessing television through different fixed networks. It can be seen that although the total size of the market has been relatively stable, the number of subscribers accessing television over POST's superfast broadband networks has increased. This may reflect the greater capability of fibre based networks to offer broadcast and IPTV based television compared to copper based networks. It could also reflect the offering of competitive bundles of television and broadband to POST's existing fixed line subscribers.

[20] This appears to be the case in Luxembourg where around 15% of total fixed line subscribers ported their numbers since fixed number portability was introduced in 2000. In 2015, less than 5% of fixed line numbers were ported between operators in Luxembourg (Source: ILR; Rapport statistique des télécommunications du Luxembourg de l'année 2015). Since fixed number portability was introduced in 2000 (source: ILR; http://www.ilr.public.lu/communications_electroniques/decisions/2000/0036_NP-procedure.pdf), around 40, 000 fixed line numbers have been ported (source: ILR; Rapport statistique des télécommunications du Luxembourg de l'année 2015)

Figure 12. Subscribers accessing television over different fixed networks



Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

3.5 Price of services

One of the Luxembourg national broadband strategy objectives is to have prices of fixed broadband services in line with the European average. As described in the rest of this sub-section, we find that prices in Luxembourg are high relative to those in other countries. However, it is possible that higher fibre prices in Luxembourg reflect the cost of providing wider availability of high speed services in Luxembourg compared to other countries (i.e. that some European operators are able to offer lower prices as they cover mainly urban areas and may therefore face lower costs), although we note that this should not affect standard broadband prices where coverage is comparable across countries. Another possible reason could be the higher costs of network rollout in Luxembourg compared to other countries due to factors such as planning restrictions and higher cost of labour.

High broadband prices may be an issue for digital inclusion if this results in some households not being able to access the Internet. Nevertheless, the affordability of fixed broadband services may be less of an issue if mobile broadband services are perceived as an alternative to fixed entry level services. This is because households in Luxembourg would potentially be able to access basic broadband through the mobile network at lower prices.

3.5.1 International comparison of prices

As described in Section 2, one of the objectives of the Luxembourg national broadband strategy is to have prices within the European average. However, fixed broadband prices are relatively high in Luxembourg compared to the rest of the EU (based on the lowest available price subscription) even when taking account of

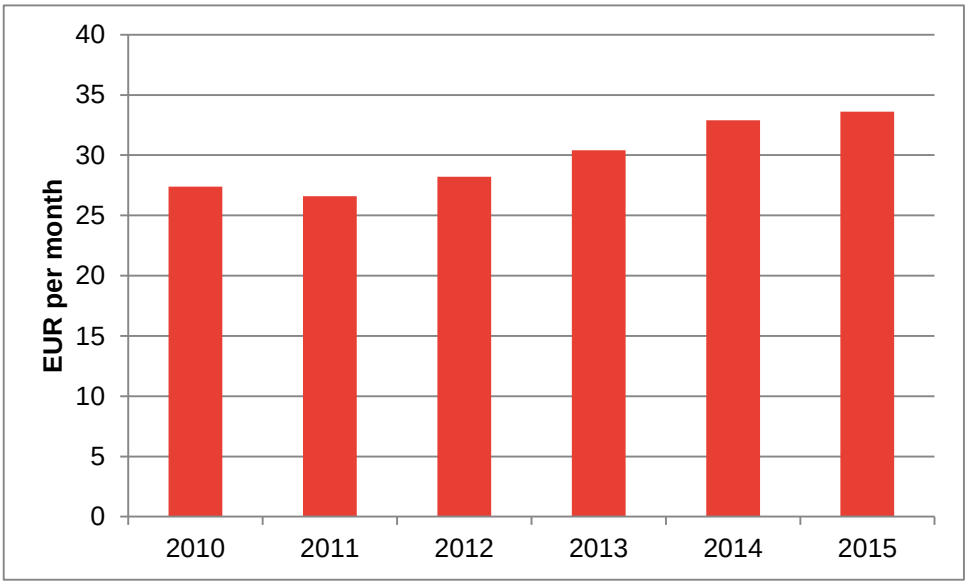
purchasing power parity.[21] In particular, the cheapest offers were on average 24% more expensive in Luxembourg compared to the EU average. Prices for services over 30 Mbps appear to be particularly high compared to the EU average. For example, the standalone broadband offer for 30-100Mbps is 70% more expensive.[22]

Since 2012, the prices of different packages of different speeds of broadband subscriptions have been relatively stable with no discernible upward or downward trends.[23] That said, there was a sharp drop in triple play prices in 2015, particularly for 100+ Mbps services following SFR's introduction of a 200 Mbps triple play offer at the same prices as its previous 50 Mbps offer (around 12% of broadband subscribers used speeds over 100 Mbps in 2015).

3.5.2 ARPU

The average revenue per user per month (ARPU) for broadband services has increased steadily over the last five years. This largely reflects the migration to higher speed services with higher prices (given, as described above, that prices have been relatively stable since 2011).

Figure 13. ARPU per month for standard and 30+ Mbps broadband



Source: Rapport statistique des télécommunications du Luxembourg de l'année 2015, ILR

[21] Source: Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology; this uses using data as at February 2015. Calculation uses February 2015 data and takes account of purchasing power parity.

[22] Although we note that there are some exceptions to this (e.g. 8-12 Mbps double play; and 100+Mbps triple play). Source: Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology; this uses using data as at February 2015.

[23] Source: Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology. This takes account of standalone, double play and triple play offers.

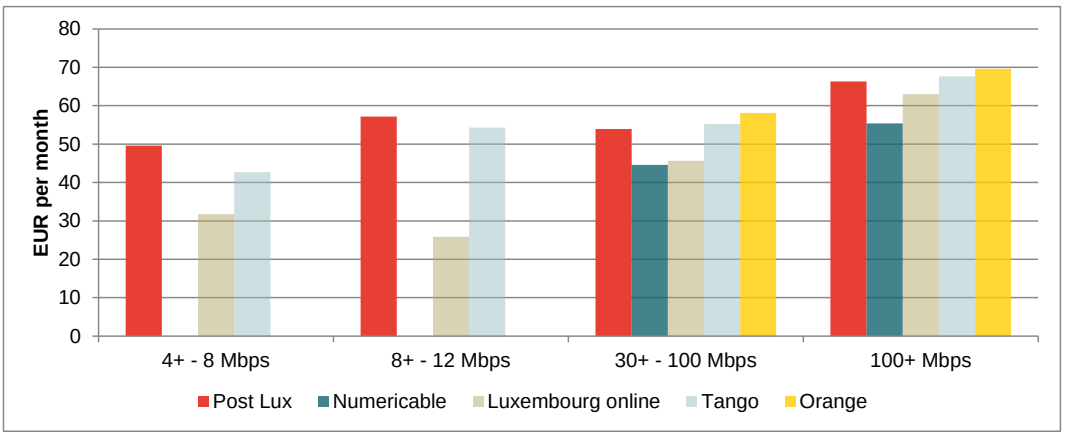
3.5.3 Prices offered by different service providers

The figures below show the prices of monthly subscriptions to standalone and triple play broadband services, respectively in Luxembourg. It can be seen that more retail providers in Luxembourg offer of higher speed services (30+ Mbps and 100+ Mbps) rather than the lower download speeds as these are the services typically purchased by new subscribers.

For both standalone broadband services and triple play services, SFR offers lower prices than service providers using POST's VDSL and FTTH network. However, as shown in Section 3.1, SFR has not been able to attract market share to a significant degree.

It can also be seen that access seekers using POST's network (such as Luxembourg Online, Tango and Orange) have largely been able to match or offer slightly lower prices than POST.

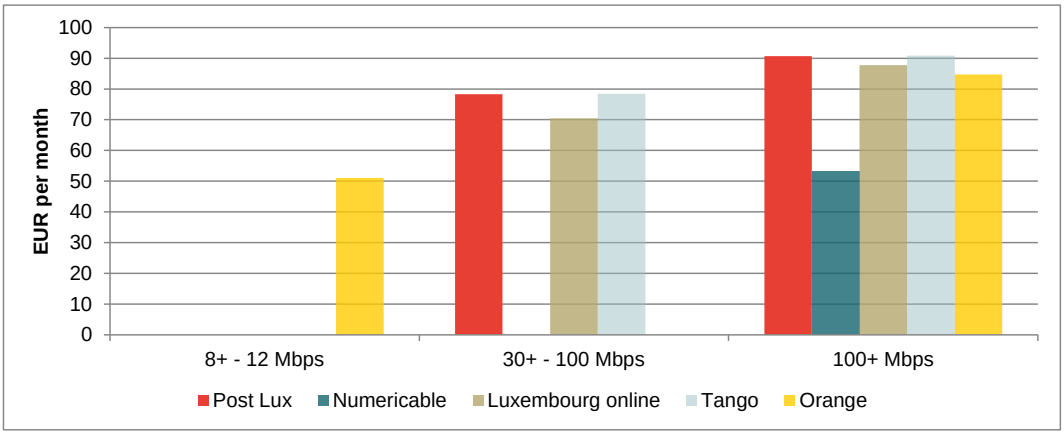
Figure 14. Prices of standalone broadband services in Luxembourg (February 2015)



Source: Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology; this uses using data as at February 2015.

Note: These prices are for the least expensive offers of the five main ISPs covering at least 90% of the fixed broadband market.

Figure 15. Prices of triple play broadband services in Luxembourg (February 2015)



Source: *Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology*

Note: *These prices are for the least expensive offers of the five main ISPs covering at least 90% of the fixed broadband market.*

Compared to the EU average, the difference in price between subscriptions for 30 + Mbps and slower speeds is much higher in Luxembourg. The difference between the prices for 30-100 Mbps services and 100+ Mbps services is much lower in Luxembourg compared to the EU average.[24] This is surprising given that Luxembourg actually leads in the EU in terms of take up of 30+ Mbps services but performs less well with respect to take up of 100+Mbps services. This may in part be driven by POST offering 30-100Mbps services at a lower price than 8-12 Mbps services (see Figure 14 above). This also suggests that the relative prices are not the primary reason for the low take up of 100+Mbps services in Luxembourg.

3.5.4 Prices of mobile data services

Although mobile data access is not a perfect substitute for fixed data access in many circumstances, if mobile services are seen as an "entry level" broadband service then it may not necessarily be problematic that fixed broadband prices are high in Luxembourg compared to other countries.

As shown in the figures below, mobile operators in Luxembourg offer access to mobile data services at prices that are relatively low compared to neighbouring countries (including Belgium, Netherlands, France, Germany and the UK). Nevertheless, further information would be required to determine whether lower income households are able to access to broadband services and what the implications would be for digital inclusion.

[24] Source: Broadband Internet Access Cost (BIAC) 2015, A study prepared for the European Commission, DG Communications Networks, Content & Technology

Figure 16 Low volume mobile internet (500MB<1GB) – cost per month[25]

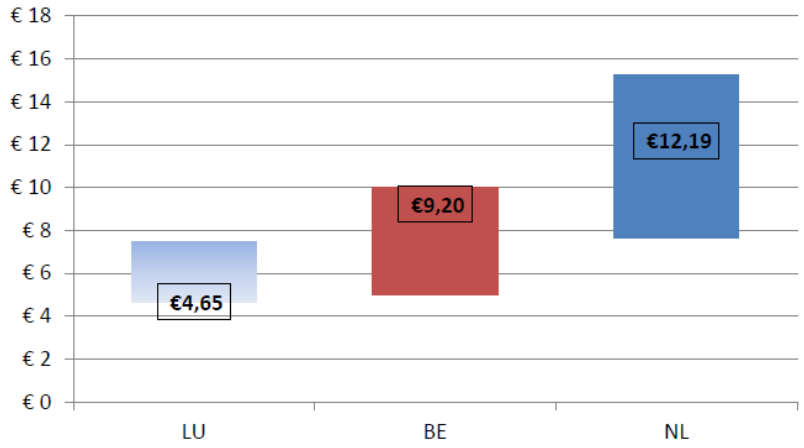


Figure 17 High volume mobile internet (2GB<5GB) – cost per month[26]

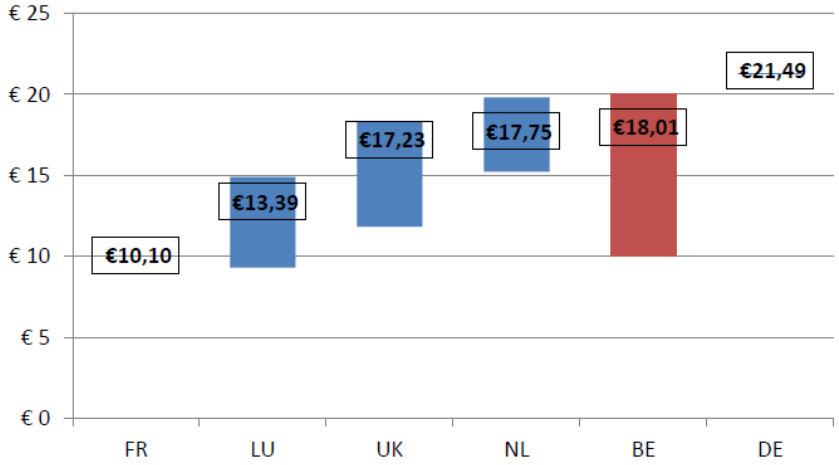
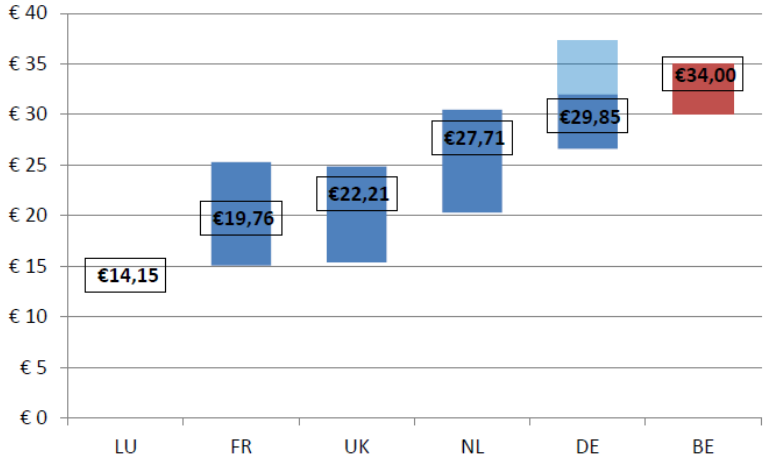


Figure 18 Very high volume mobile internet (5GB<10GB) – cost per month[27]



[25] Source: IBPT analysis; prices as at August 2015 including VAT and using EUR PPP exchange rates.

[26] Source: IBPT analysis; prices as at August 2015 including VAT and using EUR PPP exchange rates.

[27] Source: IBPT analysis; prices as at August 2015 including VAT and using EUR PPP exchange rates.

3.6 Customer satisfaction and quality of service

Over the last three years, there have been 20-30 complaints referred to the ILR under the alternative dispute resolution procedure each year relating to the provision of standalone and bundled broadband services[28]. This relatively low number of complaints (compared to the quantum of complaints received by other national regulatory authorities such as Ofcom in the UK[29]) could be interpreted as evidence that consumers in Luxembourg are largely satisfied with the services they receive or that the operators are able to resolve complaints themselves. Alternatively, it could be interpreted as consumers not voicing their concerns to the ILR, because they are unaware of the role that the ILR can play in addressing them.

Complaints referred to the ILR have related to a variety of issues included over-billing, billing for services not received, non-provision of services subscribed to, line faults, and mis-selling. However, there does not appear to be any single area that is a particular issue for customers.

The proportion of these complaints relating to POST appear relatively low (around 10% of total complaints on average) compared to POST's market share. In contrast, the proportion of complaints relating to Tango (around 35% on average), and to a lesser degree Orange and LOL (less than 20% on average), is high given their market shares. However, given the relatively small sample size, we do not consider that this is evidence of an underlying issue with these specific providers. One or two complaints were received each year relating to Eltrona and none were received relating to SFR.

[28] This translates to about 2.5-5 complaints per 100, 000 subscribers. In the UK, Ofcom receives around 15-20 residential broadband complaints per 100, 000 subscribers each quarter between 2013 and 2016. It does not include complaints consumers may have made directly to their providers or to other agencies (e.g. Alternative Dispute Resolution schemes).

Source: Telecoms and Pay TV Complaints Q2 (April to June) 2016, Publication date: 28 September 2016 https://www.ofcom.org.uk/__data/assets/pdf_file/0029/90893/Complaints-publication-Telecoms-and-Pay-TV-Complaints-Q2-2016.pdf

[29] On average, Ofcom receives nearly 300 calls a day from consumers, many of which result in complaints. See Telecoms and Pay TV Complaints, Q3 2016. Available at https://www.ofcom.org.uk/__data/assets/pdf_file/0018/96021/Telecoms-and-Pay-TV-Complaints-Q3-2016.pdf

4 REVIEW OF REGULATIONS AND ISSUES IDENTIFIED

In this section, we set out our review of the broadband regulation currently in place, in order to identify the factors contributing to the outcomes at the wholesale level. We also consider issues raised by stakeholders. The rest of this section is structured as follows:

- Summary of issues identified (Section 4.1);
- Commercial viability of unbundled access in terms of both pricing and non-price terms and conditions of access (Section 4.2);
- Commercial viability of bitstream and resale access in terms of both pricing and non-price terms and conditions of access (Section 4.3);
- Reference offers (Section 4.4);
- Equivalence of inputs (Section 4.5);
- Requirement to produce separated accounts (Section 4.6);
- Lowering the cost of entry (Section 4.7);
- Other regulatory issues raised by stakeholders (Section 4.8); and
- Issues beyond the remit of the ILR (see Section 4.9).

4.1 Summary of issues identified

As described in the previous section, to date, access based entry has relied largely on active wholesale access products (such as bitstream and resale products) rather than unbundled access.

We describe in Section 4.3 below that while operators have not offered much product differentiation using bitstream and resale products, stakeholders consider that their customers are satisfied with the services they receive. In Section 4.2, we describe how copper unbundling was available relatively cheaply after regulation reduced prices. It has been used by Luxembourg Online to provide retail broadband services and also by mobile operators to connect base stations to backhaul networks.

As we describe in Section 4.2 below, to date access seekers have favoured bitstream and resale services over unbundled access, given that it was known that unbundled copper access would become obsolete as the fibre network was rolled out further. However, over the next few years, unbundled fibre access could become more popular as:

- IPTV and bundled packages become more popular with end users meaning that bandwidth will become increasingly important and make investment in unbundled fibre more attractive commercially;
- Greater certainty over technology – a number of operators have now already conducted trials of using unbundled fibre access and are preparing for wider rollout; and

- Continued fibre network rollout resulting in more extensive and contiguous availability of unbundled fibre.

There were mixed views from stakeholders on the effectiveness of regulation and the role of the ILR. Almost every stakeholder raised the issue of in-building cabling necessary for upgrading a customer from copper to fibre based access (see Section 4.2). In addition, while the smaller access seekers were largely satisfied with the reference offers (see Section 4.4) and the compliance of POST with its EOI obligation, larger access seekers seem to have concerns about EOI (see Section 4.5). The requirement to produce separated accounts has had limited impact to date as it has not yet been fully implemented (see Section 4.6) and the EC cost reduction directive has only just been formally transposed into Luxembourg law (see Section 4.7).

Although most stakeholders welcomed the availability of services in the reference offers, most considered that the ILR has not been proportionate in implementing regulations and requirements from the European Commission (see Section 4.8.2).

4.2 Commercial viability of unbundled access

Below we describe the unbundled products that POST is required to provide and how prices need to be consistent with an economic replicability test (ERT). We then assess how access seekers have been able to enter the market using these regulated products and the issues that they have faced.

We find that fibre coverage has continued to increase in Luxembourg due to government policy which is, to a large degree, independent of the ILR. Although in recent years the use of unbundled copper access has fallen in favour or wholesale bitstream and resale products, access seekers have indicated that their demand for unbundled fibre access is likely to increase in the medium term. The reliance on bitstream to date may have meant in the past that product differentiation at the retail level was more limited. However, this does not appear to have been to the material detriment of competition or of consumers. Further, this also does not appear to be the result of regulatory or market failure.

Nevertheless, there are a number of issues that could be addressed to ensure that take-up of unbundled fibre access is not limited in the future (i.e. that unbundled fibre is used by access seekers where it is economically efficient for them to do so).

4.2.1 Unbundled products provided by POST

POST is required to provide unbundled access to both its fibre and copper infrastructure.

For its copper infrastructure, POST must provide:

- Fully unbundled access to the local loop from existing and future MDFs;
- Fully unbundled access to the local sub-loop from existing and future sub-distributors; and
- Where sub-loop unbundling is not possible, POST must offer VULA.

Similarly to the copper offering, POST is required to provide the following products on its fibre infrastructure:

- Fully unbundled access to the point-to-point fibre local loop from existing and future main distributors;
- Fully unbundled access to the point-to-point fibre sub-loop from existing and future sub-distributors; and
- Fully unbundled access to the point-to-multi-point fibre sub-loop from existing and future sub-distributors, if this is unavailable, VULA and access to WDM from the current and future main distributors and sub-distributors should be provided.

In addition to unbundling offers, POST is also obliged to provide access to its civil engineering such as space within ducts between the endpoint of the final client and a concentration point. Where this is not available, POST should allow access to dark fibre. POST must also provide co-location services for all its wholesale products, as necessary.

4.2.2 Pricing of wholesale products

The recurring and one-off charges for copper-based products must be regulated based on the costs of a hypothetical efficient operator in Luxembourg. In practice, this translates to the tariff ceilings being set on a bottom up long run incremental cost plus ((BU-LRIC+) basis for copper based products, consistent with the relevant EC Recommendation.

For NGA products, the ILR has differentiated its remedies in line with the EC's 2013 recommendation to promote competition and enhance the broadband investment environment.[30] Accordingly, the prices for NGA access products do not have to be cost-oriented under the following conditions:

- Traditional access products have prices below the costs that would be incurred by a hypothetical efficient operator;
- POST ensures EOI; and
- POST conducts and submits an ERT for all flagship services or products it offers on the downstream retail markets (described below).

[30] See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0466&from=EN

The ILR required that EOI was implemented within one year of the remedy being enforced. We discuss POST's EOI obligation in further detail in Section 4.5 below.

Economic replicability test (ERT)

As described above, an ERT is used to regulate the prices for wholesale products used to provide retail NGA services. The ERT aims to ensure that a hypothetical efficient access seeker can replicate the incumbent's retail offer using wholesale access products in a manner such that:

Downstream retail price > Costs of providing the retail product based on wholesale access inputs

This requires the following inputs to be defined:

- The retail products on which the test is carried out;
- The costs that would be incurred by the hypothetical access seeker in providing the retail product (which will also depend on the assumed level of efficiency of the hypothetical access seeker);
- The time period over which the test is carried out; and
- A discount rate to discount the costs and revenues incurred over this set time period.

We discuss each of these elements for the ILR's ERT below.

Retail products covered.

The ERT is applied to POST's "flagship" products. These are defined as the broadband retail products that together constitute 70% of its revenue. The products are selected sequentially, in descending order of revenue, until the combined revenue equals 70%. Furthermore, products which individually constitute 10% of POST's revenue share are also defined as flagship products. Bundles can also be flagship products and are subject to the ERT if they require regulated wholesale products as inputs.

Calculations of costs

The costs of providing the retail product include the three elements set out in the table below.

Figure 19 Costs included in the ERT

Element	Description
The cost of the relevant wholesale input	This includes up front and on-going charges related to the wholesale products, including call termination.
Downstream costs	These include the access seeker's own network costs and retail costs.
Regulatory costs	These include the fees that operators pay to the ILR for numbering.

In estimating downstream costs, the ERT assumes a hypothetical access seeker that would be "similarly efficient" to POST. This means that it would have the same

cost function as POST but would not benefit from the same economies of scale and scope. Costs are calculated based on a LRIC+ basis and then adjusted for an assumed 15% market share.

Time period

The test covers a one year period and POST is required to present the results of its test to the ILR on 31 May each year. Because some of the costs described above may be lumpy, the investment and one-off costs are annualised as follows:

- The investment/network costs are allocated over the economic life of the asset; and
- One-off retail costs are allocated over the customer lifetime.

Once annualised, the costs are discounted using the WACC and compared with a similarly discounted stream of revenues. The chosen WACC should ideally reflect the risk of the retail business of the hypothetical access seeker. The ILR currently assumes a WACC of 10%.

The ILR remedies are consistent with the EC Recommendation

The ILR's remedies are compliant with the EC Recommendation on the regulation of next generation networks.[31] The Recommendation provides for the use of the ERT to regulate prices for LLU and VULA as long as:

- There is a demonstrable retail price constraint from infrastructure based competition or a price anchor from cost oriented wholesale copper access prices; and
- There is an obligation of providing wholesale access services on the basis of EOI.

The Recommendation aims to set wholesale prices in a manner that strikes an appropriate balance between ensuring efficient entry and sufficient incentives to invest and, in particular, to deploy NGA networks. The ERT looks to achieve this in two main ways.

- First, although the incumbent has flexibility in how it sets the prices for its fibre-based access products, it cannot set the prices much higher than the copper-based products. This is because access seekers would have the option to switch back to copper. In theory, therefore, prices for NGA wholesale products should not be set at a level that excludes access seekers.
- Second, pricing flexibility also allows the incumbent to earn a return on its investment. This creates incentives for it to invest in NGA networks.

In terms of the implementation of the ERT in Luxembourg, we see that both of the Recommendation's conditions have been fulfilled. Firstly, fibre and copper have been defined to be part of the same market for Market 4/2007, and copper wholesale prices are cost-oriented, implying that the first condition holds.[32]

[31] See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0466&from=EN

[32] Being in the same market implies that copper-based products being priced at cost can act as an anchor for fibre-based products. This could mean that that although POST has flexibility in how it sets the prices for its fibre-based access products, it cannot set the prices much higher than the copper-based products as

Furthermore, there also exists a constraint from the cable operators, implying that there is a retail price constraint from infrastructure-based competition. Secondly, the ILR has imposed an EOI requirement, thereby fulfilling the second condition above (although as we note in Section 5, the implementation of this obligation could be improved). Thus, given that the ILR has implemented regulation as per the Recommendation, it should be consistent with the EC's objectives of encouraging investment and facilitating entry. In addition, the government policy of national fibre rollout by POST (which is government owned) means that it is less important to create commercial incentives for investment in NGA networks. .

4.2.3 Assessment of entry through unbundled access products

We describe below how fibre coverage has continued to increase and that, although in recent years the use of unbundled copper access has fallen in favour of wholesale bitstream and resale products, the evidence suggests that the use of unbundled fibre access will increase in the medium term. Although this may have meant in the past that product differentiation at the retail level was more limited, this does not appear to be the result of regulatory or market failure, particularly given that end-user demand for fibre based products to have been limited to date.

Fibre coverage has continued to increase

As seen in Section 2.2.1, fibre deployment had been increasing prior to 2014 and has continued to increase. POST's FTTN/DSL (copper pair and VDSL) coverage was nearly 100% at the end of 2015 and its FTTH network passed 60% of households. However, as discussed below, although the use of unbundled copper access has continued to decline, we do not consider that this is due to regulatory or to market failure. Moreover, access seekers have indicated that their demand for unbundled fibre access will increase in the medium term once unbundled fibre is available more widely and consumer demand for bandwidth grows.

The use of unbundled access has been declining

Despite the fact that the regulation through the ERT aims to not discourage entry/take-up, the ILR has found that access seekers are increasingly providing next generation retail products using bitstream and resale wholesale products. This is not necessarily to the detriment of either end-consumers or access seekers if the ILR's primary objective is to achieve widespread take-up of NGA products at the retail level.

As described in the previous section, the take-up of LLU in Luxembourg has been declining since it has become clear that copper based access will become obsolete and there have been a number of issues with fibre based access, while that of resale has increased. As unbundled access allows a greater degree of product differentiation by the access seeker, this may mean that competition at the retail may have been less intense than it could have been had LLU take-up been higher.

access seekers have the option to switch back to copper. Similarly, the ILR has imposed an EOI requirement, thereby fulfilling the second condition above.

However, based on our review and our discussions with stakeholders, we do not consider that the limited take up of unbundled access is due to market or regulatory failure. Instead, there are likely to be a number of alternative explanations for this. These are described in the bullet points below.

- Stakeholders described to us how customers were largely satisfied with the products available to them both in terms of the download speeds available to them and the variety of packages on offer. Therefore, on the whole, stakeholders considered that they were able to compete effectively in the market with the wholesale products available to them and that they did not necessarily require the ability to further differentiate their retail products than they were able to using the resale and bitstream products.
- Stakeholders also described to us that it is only since the end of 2016 that end user demand for bandwidth is starting to increase beyond the capabilities offered by copper based services. Stakeholders described how this is being driven by demand for IPTV services. Therefore, given that it was known that copper would become a legacy technology, it made more commercial sense for access seekers to wait for further unbundled fibre availability rather than investing in unbundled copper access. Using resale and bitstream services would have allowed access seekers to compete in the market until unbundled fibre became available. For example, one operator noted that the availability of bitstream services has allowed it to protect its mobile market share through the offering of quad-play bundles.
- The rollout of POST's fibre network has been on a street-by-street basis. This means that there were not contiguous areas with fibre coverage, but rather, scattered streets where fibre was available. Therefore, access seekers would not have been able to establish sufficient economies of scale at each point of presence to make investment in the necessary equipment commercially viable.
- POST has been rolling out its fibre network in collaboration with expansion by other utilities. This meant that POST (and, implicitly, its access seekers) had limited control of when a given street would be covered. This would have made it difficult for access seekers to plan where to invest.
- Even where a street has had fibre installed, not every building will necessarily have access to full fibre services and this limits the commercial viability of investing in unbundled fibre access. While this affects resale, bitstream and unbundled fibre access, it has less of an impact on the commercial viability of resale and bitstream access where the access seeker can pick and choose buildings that already have full functionality.

  Difficulties in installing in-building fibre cabling mean that there may be delays in offering full fibre services to a given building. In particular, there is no requirement on building owners to retrofit fibre cables into old buildings and it is unclear who should pay for the cabling. Further, where there are multiple owners of one building, it may be difficult and time-consuming to agree access (one stakeholder described how building owners will often only meet once a year to discuss and agree such issues). In addition, sudden increase in demand for fibre based services has meant that POST does not have sufficient staff to install the cabling (this issue is discussed further in Section 5.2 below).

Demand for unbundled fibre could increase in the next year

A number of stakeholders indicated their plans to use unbundled fibre access from POST Technologies increasingly over the coming years. This is driven by:

- Increasing consumer demand for bandwidth driven by increased demand for IPTV services (although we note that some of this demand could be met through bitstream and resale); and
- Unbundled fibre access available in more contiguous geographic areas as fibre rollout has increased over time.

Some stakeholders also indicated that they have already conducted trials and are now ready to purchase unbundled fibre access on a larger scale.

There remain issues that will need to be addressed

Nevertheless, there are a number of issues that could be addressed to ensure that take-up of unbundled fibre access is not limited in the future. These are described in the sub-section below.

4.2.4 Issues identified

There appear to be two main issues in relation to the commercial viability of unbundled fibre access:

- Slow and costly provisioning (summarised below and then described in further detail in Section 5.2 with recommendations); and
- Discrimination and EOI issues (summarised in Section 4.5 and then described in further detail in Section 5.3 with recommendations).

We note that these issues also apply to bitstream and resale.

Slow and costly provisioning

Stakeholders raised concerns around the time taken by POST Technologies for provisioning of both business and residential services. If a customer wishes to upgrade to fibre, then this requires upgrading internal cabling at the customer premises. One operator noted the high cost of migrating from bitstream access to unbundled fibre and that some operators remain on copper even though they want to migrate subscribers more quickly onto fibre.[33]

POST Telecom also noted that improvements could be made in the speed of line installation. It noted that there were common peaks in demand for line installations which led to delays in provisioning.

This is an issue that will become increasingly problematic as end-user demand for bandwidth increases and access seekers will wish to increasingly upgrade to fibre based access. We note that the reference offers do not contain sufficiently detailed SLAs. Stakeholders considered that a lack of SLGs or penalties associated with

[33] EOI meeting minutes, 26 June 2016

the SLAs may be a contributing factor. We describe this and propose our recommendations in Section 5.2 below.

4.3 Commercial viability of bitstream and resale

In this sub-section, we describe the services that POST is required to provide as part of its SMP obligations. In particular, in addition to offering a range of pre-defined services in its reference offers, POST is also required to cater to reasonable requests for alternative product specifications. Similarly to fibre based LLU, prices for bitstream and resale products must be set consistently with an ERT. As we described in Section 3, bitstream and resale products have been the preferred model of entry in recent years. However, as described in Section 4.2, the relative attractiveness of these products may change as many of the issues relating to unbundled access have now been overcome.

We find that the regulations in place have allowed access seekers to enter the market and compete with POST. Overall, stakeholders appeared to be content with the services available and their ability to compete with POST's retail division on a non-discriminatory basis. However, in addition to the issues identified with respect to unbundled access (difficulties migrating between access products, slow provisioning times and EOI issues), stakeholders voiced some concerns over the structure of prices. However, these should be addressed by the ERT requirement.

4.3.1 Products provided by POST and their pricing

The remedies in Market 5/2007 require POST to provide copper and fibre broadband access products at:

- Each main distribution frame (MDF / POP); and or
- A concentration point for national coverage.

Accordingly, POST offers a series of "profiles". Some of these have pre-defined configurations and others allow the access seeker more flexibility (e.g. in the specifications relating to upstream and downstream speeds). The ILR requires POST to cater to requests for alternative profiles, subject to the access seeker's requests being "reasonable". This can include, for example, other symmetrical and asymmetrical profiles.

Furthermore, POST is required to provide these products as "naked" broadband offers i.e. to not link them to the provision of a phone line. The features or capabilities of the product should not be unreasonably restricted by POST.

Finally, POST must provide access to applications relating to data processing and the provision of video and voice distribution of audio visual content. Indeed, this is included in POST's Reference Offer for Broadband (ROB). Access seekers request a special profile which can include support of multicast traffic management which allows the delivery of applications such as IPTV. POST is then required to provide a quote that accounts for the specifications requested by the access seeker.

Multicast is available only on certain bitstream products. For example, it is not available on some legacy DSL bitstream profiles because the Multicast flows

available may be limited depending on the transmission capacity available. Moreover, POST does not include the provision or encoding of audio, video channels and other content.

As with the unbundled access products, POST must provide relevant colocation services for bitstream and resale products.

These products are subject to an ERT. The details of this test have been discussed in Section 4.2.2. The ERT applies to any flagship product, and is not defined in terms of a particular technology i.e. it does not apply to only NGA retail products. Therefore, the relevant wholesale input could be copper-based. As discussed in the previous section, the European Commission recommends that prices for next generation access products should be based on an ERT.

4.3.2 Assessment of bitstream and resale based entry

Stakeholders expressed that they were largely satisfied with the wholesale products and services available and that they are able to earn sufficient margins to compete with POST. Although there exists the possibility to request alternative profiles to those defined in the reference offers, this appears to be relatively rare. In particular, access seekers generally considered that they were able to offer the levels of service and the range of products that end users require using the products in the reference offers.

Nevertheless, in addition to the issues identified in relation to unbundled access (that is, migration between wholesale access products, slow provisioning and equivalence issues), stakeholders expressed concerns over the structure and level of bitstream prices. In particular, some were concerned about the impact on their margins and peak hour traffic increases. However, this should not be an issue as the ERT should indicate if the charges are such that there is potential for margin squeeze (see Section 5.1).

4.4 Reference offers

4.4.1 Overview of the reference offers

As described above, POST is required to publish reference offers as part of its SMP obligations for Markets 4/2007 and 5/2007. The following reference offers are publicly available from the POST Technologies website:

- Reference Offer for Broadband Services (ROB);[34]
- Reference Co-Location Offer (RCO);[35]

[34] Version 23/09/2015 (149 pages) ; https://www.posttechnologies.lu/documents/194199/3995569/2015+09+23_ROB.pdf/e120ee32-b7f5-4e4f-b3f2-ca1e04409a96

[35] Version 01/10/2015 (42 pages) ; https://www.posttechnologies.lu/documents/194199/2697759/20150110+RCO+2015.pdf/142bc7eb-e4c8-4ff4-a103-a92aa6ed9f84

- Reference Offer for Leased Line Services (ROLLS);[36] and
- Reference Unbundling Offer (RUO) – Copper and Fibre[37].

4.4.2 Assessment of the reference offers

As described in Section 5.3, the reference offers that we have reviewed appear to be complete. In particular, they appear to contain the services that we would expect, and they offer access seekers a relatively good degree of flexibility in terms of the products offered and provisions for rush orders. However, there appear to be limitations in some areas. In particular:

- Service level agreements (SLAs) are not always defined for different levels of service and are therefore subject to commercial negotiation which is not always successful in practice (we describe some specific issues in Section 5.2 below);
- The demand forecasting requirements could limit the ability of access seekers to grow quickly (see below);
- The migration process under the ROB could create unnecessary delays;
- There is a lack of clarity over how POST Technologies determines whether co-location or duct space is available; and
- There is a lack of process for handling billing disputes.

Our review is based on observations of the reference documents above and experience of similar services and reference offers for those services in other jurisdictions. Based on our review, we find that there is a relatively good degree of flexibility for the services being provided by POST Technologies (e.g. there are provisions for rush orders in the ROB; the RCO and the ROLLS provide a good selection of products and offer a pragmatic approach). The reference offers appear to include the services and ancillary services, with the details of one-off and recurring charges that we would expect to see.

While there appear to us to be limitations in a number of areas (as listed in the bullet points below), stakeholders did not raise any specific issues with respect to the reference offers apart from in respect to SLAs (see Section 5.2).

- **Forecasts in the ROB and ROLLS**

  The text of the ROB and ROLLS relating to demand forecasts are unclear and appear to be able to restrict the ability of an access seeker to drive up volumes. This can result in a long glide path for growing its business in two main ways.

  First, the three month notice period required for demand forecasts restricts flexibility and provides POST with advanced notice of a forthcoming marketing campaign. This could be problematic if there is insufficient information

[36] Version 22/04/2016 (39 pages); https://www.posttechnologies.lu/documents/194199/4466887/ROLLS+V1.0/287c9e7a-238f-47a0-a227-c08718a1c010

[37] Version 01/10/2015 (87 pages); https://www.posttechnologies.lu/documents/194199/2697755/RUO+20151001.pdf/3ad7cec5-ed4d-424a-85e5-6d277ac98ca2

segregation between POST Technologies and POST's retail division. As described in Section 5.2, this was one potential concern raised by stakeholders.

Second, POST Technologies offers no commitment to meeting demand forecasts submitted, only to making "every possible effort". Such a phrase is open to interpretation and could therefore be legally difficult to enforce.

- **Migration process in the ROB**

  The migration process in the ROB is lengthy and relies on written communication by the end user (e.g. from bitstream to unbundled fibre). As identified by access seekers in the EOI meetings (see Section 4.2), this can act as a barrier when trying to migrate a customer because the customer may not carry out the required steps. Best practice internationally is now to allow customers to switch as smoothly and as quickly as possible.

- **Lack of clarity in the RCO and RUO about site survey charges and process for determining space available**

  It is unclear from the RCO whether the site survey should be paid for by the access seeker. It is also unclear what the process would be if POST Technologies informs an access seeker that there is no space available. This could be the case if there is no space available either currently or in the future. Also, it is unclear whether the process is robust enough to deal with competing requests from multiple operators given that the amount of available co-location space is limited.

  Similarly, although the RUO contains duct access (duct sharing services – DSS), there are a number of terms that make the process of determining duct availability unclear. In particular, POST Technologies states that "sharing shall be based on practicability, technical feasibility and availability". It also notes a number of exceptions to where duct access would be permitted (e.g. 20% of ducts must be kept unoccupied, and some must be "kept vacant for as a maintenance duct and as an alternative to any damaged one(s)." A site survey is required to determine duct availability, although it is unclear who incurs this cost. Such a survey also does not guarantee that the duct will be available once a formal order has been submitted and new analysis would need to be completed.

- **Lack of process for billing disputes**

  The reference offers do not refer to a standard process for disputing the bill received from POST Technologies for any of the services included in any of the SLAs.[38] We describe our recommendations in relation to dispute resolution in Section 5.4 below.

[38] Based on our experience in other jurisdictions, the process would typically be that the access seeker would pay the undisputed amount of the bill. A process is then applied to determine whether the disputed amount should be paid.

4.5 Equivalence of inputs

4.5.1 Overview of regulations on non-discrimination

Below, we describe the non-discrimination obligations that POST is subject to and the measures used to monitor POST's compliance with these.

Equivalence of Inputs

A condition for the implementation of the ERT was that POST must implement Equivalence of Inputs (EOI). This requires POST to ensure that it provides services and information through the same operational procedures and systems as those used by its own retail arm.

Furthermore, POST is required to ensure that services and information are provided:

- Within the same time;
- Under the same terms and conditions; and
- At the same level of reliability and performance as those enjoyed by its own retail arm.

KPIs

The remedies in both Market 4/2007 and 5/2007 include a requirement to publish key performance indicators (KPIs). These are required to cover the following aspects of service provision:

- Delivery, availability of information, ordering process;
- Quality of service level especially in cases of failure; and
- In event of a failure, the repair time and the time of migration between different regulated wholesale inputs.

POST is required to measure these KPIs for each access seeker as well as its own retail arm and provide these to the ILR at regular intervals. POST must also publish non-confidential versions of the KPIs for the access seekers wherein its performance on the KPIs can be presented in aggregate.

KPIs are a necessary element in a regulatory framework that seeks to ensure non-discrimination. KPIs can serve a dual purpose. The first is to monitor non-discrimination by allowing the ILR to see whether POST is consistently providing better service to its retail arm than that to other access seekers. The second is to make sure that levels of service are sufficiently high (i.e. in line with those expected in a competitive market) for both POST retail and access seekers even where there is no discrimination.

The ILR can conduct an audit of POST's performance either itself or appoint an independent auditor to do so.

4.5.2 Issues identified

The KPIs are published on a quarterly basis and provide granularity on POST's performance with each access seeker. While the access seekers themselves cannot compare the service they have received with any other access seeker individually, they are able to compare their service with POST's average performance in that month. This should allow them to judge if they have received relatively worse or better service. To date, there have not been any formal complaints from access seekers based on the KPI data. However, we understand from the ILR that Tango had previously raised the issue about the low level of KPIs with POST Technologies and this was resolved in bilateral negotiations. Nevertheless, it is unclear whether this level of service has also been offered to other access seekers.[39]

We describe the issues identified in relation to EOI in Section 5.3. In particular, stakeholders identified some examples of overt discriminatory behaviour and raised concerns about subtler discriminatory behaviour by POST.

4.6 Requirement to produce separated accounts

4.6.1 Overview of the regulation

For a number of years there has been a requirement for POST to prepare its separated accounts

The ILR introduced new accounting separation (AS) guidelines in December 2015. These were aimed at streamlining the existing AS guidelines that were in place to reduce the regulatory burden on POST and also to ensure that the ILR had access to relevant cost and revenue information.

As set out in the 2015 AS guidelines,[40]

> *"the overall objectives for accounting separation are to support the effective implementation of other SMP remedies such as cost orientation, non-discrimination and transparency"*

POST is required to develop its separated accounts in line with the guidelines. These include guidelines on the information that should be provided to the ILR, the supporting documentation required setting out the approach used in the preparation of the accounts and the requirement for an independent audit and POST sign off of the accounts. POST is also required to publish on its website the separated accounts and supporting documentation for the financial year 2016.

4.6.2 Assessment of accounting separation

Having an AS system in place also helps to ensure that the SMP operator is able to respond to any ad hoc data requests necessary for the ILR to make future regulatory decisions. However, the new AS guidelines were published in December 2015 and only came into force on 1 January 2016. The exact details

[39] The ILR notes that this was as part of the EOI meetings.

[40] Accounting separation guidelines for the SMP operator, December 2015

of the information to be included are still being developed by Post and the ILR. This means that it is too early to determine to what extent the new format separated accounts will support the ILR's regulatory objectives.

4.7 Lowering the cost of entry – the EC's cost reduction directive

4.7.1 Overview of the regulation

The EC issued a directive on measures to reduce the cost of deploying high-speed electronic communications networks in 2014. This has very recently been adopted by the Chambre de Deputés as part of *le projet de loi n° 6867*.[41]

The Directive aims to lower the cost of deployment by limiting costly civil engineering works. The current draft transposition into Luxembourgish law states that civil engineering work represents around 70% of the total cost of deploying a broadband network. The Directive and so, the law, therefore encourage the use of existing infrastructure to minimise this cost.

To this end, the Directive imposes a number of requirements, including those described below.

- **Access to existing physical infrastructure**

  Network operators (these include providers of telecommunications services, energy, gas, etc.) are required to provide electronic communications networks access to their physical infrastructure to enable the deployment of high-speed networks. For example, a fixed broadband provider could use an energy company's ducts to deploy a fibre network.

- **Transparency concerning physical infrastructure**

  Telecommunications services providers ("telecoms providers" hereafter) can therefore request certain information on the existing physical infrastructure of any network operator. This can include the location of the infrastructure, its type and current use, and so on.

- **Coordination of civil works**

  Network operators can negotiate the agreements to coordinate civil works with telecoms providers that aim to deploy their networks using the network operator's infrastructure.

- **Access to in-building physical infrastructure**

  This requires that all newly constructed buildings should be equipped with high-speed-ready in-building physical infrastructure, up to the network termination points. Furthermore, in buildings where there is shared ownership, owners will be required to vote on whether in-building cabling should be upgraded. Where there is a simple majority vote by co-owners of a given building, telecoms providers will have the right to access existing in-building physical infrastructure

[41] 8 February 2017; http://www.digital-luxembourg.public.lu/fr/actualites/infrastructure/2017/20170208_costreduction/index.html

to deploy high-speed networks. In this respect, the national law will go further than the EC Directive.

4.7.2 Assessment of the cost-reduction law

In principle, the Cost Reduction Directive (and its transposition into Luxembourgish law) facilitates lower cost deployment of fibre networks. Given the size of the market and the potential difficulties in achieving scale, the use of existing infrastructure is more likely to reduce inefficient duplication. Similarly, requiring new buildings to have "high-speed-ready" infrastructure will also aid the expansion of high-speed services.

However, civil works are already co-ordinated in Luxembourg. Our understanding from POST is that the utilities providers and POST co-ordinate their civil engineering work on a street-by-street basis to benefit from economies of scope. Therefore, POST does not consider that the implementation of this directive will have any impact on its investment decisions.

4.8 Other regulatory issues

In addition to the regulatory issues identified with respect to specific regulations, we identified two further issues:

- Areas for improvement in the dispute resolution process; and
- Perceptions of the regulatory burden.

These are summarised below and then described in further detail with our recommendations in Sections 5.4 and 5.5 below.

4.8.1 Dispute resolution

We understand from the ILR that, in recent years, no formal complaints have been made by access seekers to the ILR and that the ILR has not launched its own investigations. However, our discussions with stakeholders indicated instances where the ILR has not been proactive in responding to complaints and enforcing regulation. In addition, as competition in the market increases and access seekers move to fibre based services, the issues faced by access seekers become more complex and therefore the scope for disputes will increase.

Further detail on the potential issues and our recommendations are set out in Section 5.4 below.

4.8.2 Overall regulatory burden

As part of our review, we asked stakeholders their views on the resources required to engage with the regulatory decision making process and to comply with regulatory obligations. Although most thought that the reference offers had enabled them to enter and compete in the market, many access seekers considered that the regulatory burden was disproportionate in three main respects:

1. Smaller access seekers consider that they do not have the resources to respond to the ILR's data requests;
2. POST has questioned whether it should face downstream regulation (such as the ERT) given its EOI obligation which it considers it has fully implemented; and
3. Stakeholders questioned the need to implement European best practice given the small size of Luxembourg.

Our recommendations in relation to these issues are set out in Section 5.5 below.

4.9 Issues beyond the remit of the ILR

Stakeholders also identified two further issues. However, we do not consider these to be within the remit of the ILR and have therefore not considered these in this report.

4.9.1 ROB does not include IPTV

Tango noted that the ROB (reference offer for broadband) does not include a wholesale IPTV service. [42] Nevertheless, POST Technologies does offer the functionality for access seekers to be able to provide IPTV services, however it does not provide the digital content itself.

There is a single organisation that manages the access to content use rights from content providers in Luxembourg. It then provides this access to POST and to other operators offering IPTV services. This organisation brings together a number of organisations:

- RTL (who is responsible for channels);
- BCE (who is responsible for broadcasting and transmission); and
- Content owners.

When referring to this organisation, access seekers referred to "RTL". Therefore, we use the same terminology in our discussion below.

RTL provides two TV packages for operators to purchase on a non-exclusive basis: a basic package and an add-on premium package. For each package, RTL requires a guaranteed minimum number of subscribers. However, some stakeholders considered that this offered POST Telecom a competitive advantage which may be difficult to replicate since they have not been able to negotiate different terms and conditions separately with RTL. They are therefore concerned that the terms and conditions that have been agreed do not necessarily meet their own commercial needs – particularly as they typically operate at a smaller scale to POST and may therefore find it harder to meet the guaranteed minimum number of subscribers. It is unclear that POST has a competitive advantage given that the RTL offer is available to other access seekers with charges based on a per

[42] EOI meeting 24 June 2015. Although the meeting minutes do not specify, we presume that this relates to IPTV content rather than transport.

subscriber basis and on the same terms and conditions as POST. Also, access seekers are able to access content from other sources.

4.9.2 Common ownership

We understand that POST has a controlling stake in a number of alternate operators (Visual Online, Eltrona). One stakeholder raised a concern about whether POST's ownership of Eltrona could mean that information about its expansion plans would be shared with POST Retail. Eltrona may also be able to purchase wholesale inputs from POST Technologies on a preferential basis. However, such concerns were not substantiated with any evidence of discriminatory behaviour and therefore falls outside of the remit of the ILR.

5 RECOMMENDATIONS

As described in the previous section, we consider that there are five main areas the ILR could address in order to improve consumer outcomes by facilitating the transition to higher bandwidth/ services and to improve the regulatory decision making process. These are summarised below and our recommendations relating to them set out in the rest of this section.

- A concern from access seekers that the current structure and level of bitstream prices could lead to margin squeezes as demand for peak hour traffic increases (Section 5.1);
- The slow provisioning of the in-building cabling necessary to offer full functionality of FTTH services could delay the take-up of these services (Section 5.2);
- There are some examples of discriminatory behaviour that are not currently being identified and addressed (Section 5.3);
- As competition in the market increases and new regulations are introduced, the need for a robust dispute resolution process will increase (Section 5.4); and
- Some stakeholders consider that regulatory requirements are over burdensome and sometimes do not engage in regulatory decision making (Section 5.5).

As described in Section 4, we identified a number of other issues as part of our review. However, we focus our recommendations on the issues that we consider the ILR is able to address in order to have the biggest impact on the development of the sector in terms of achieving its regulatory objectives.

5.1 Structure and level of bitstream prices

Stakeholders expressed concern about the structure and level of bitstream prices (see Annex C for details). In particular, the charges for bitstream services are non-linear and based on traffic carried meaning that there could be very high charges reflecting usage at peak time. Stakeholders are concerned that this could make using bitstream unprofitable if the current levels of prices are maintained as peak demand increases over time. However, the regulatory requirement for POST to meet the ERT on a forward looking basis means that, in principle, this should not be an issue as the ERT would indicate if the charges are such that there is potential for margin squeeze. Our recommendation is therefore that the ILR provides greater clarity in this area to stakeholders.

5.1.1 Overview of the ERT

As discussed in Section 4.2.2. above, the ERT is used to regulate the prices for wholesale products that are used to provide retail NGA services. The ERT aims to ensure that a hypothetical efficient access seeker can replicate the incumbent's retail offer using wholesale access products in a manner such that:

Downstream retail price > Costs of providing the retail product based on the wholesale inputs

The details of the test are provided in Section 4.2.2 above. We focus on the treatment of peak time traffic in the ERT below.

5.1.2 How the ERT considers peak time traffic

Stakeholders described to us how the pricing of the bitstream product is non-linear. The bitstream service is configured based on an assumption of the average monthly usage at peak hours for best effort traffic (Excess Information Rate). However, if the actual average usage at peak hours when aggregated is higher than this assumed average then the access seekers have to pay an overcharge.

This structure of charges is also reflected in the ERT. The cost of providing the retail product incurred by the access seeker is calculated to account for the basic monthly charge, as well as the overcharge for traffic in excess of the assumed average. The ERT tool can then be used to calculate the resulting margin and whether or not there is a margin squeeze. The ERT tool is available to access seekers from the ILR.

5.1.3 Recommendations

As discussed above, the ERT has been designed to reflect the structure of bitstream pricing. This pricing structure is common and access seekers should be able to minimise the overcharge through traffic management (for example, throttling the usage of customers at peak times).[43] However, it could potentially introduce some uncertainty if demand is growing quickly and unpredictably. Therefore, forecasts of usage patterns should be updated regularly using data on peak hour usage.

Finally, we recommend that the ILR ensures that access seekers have a fuller understanding of how the ERT tool can be used so that they can identify if and when there is a need to revise the peak usage assumptions.

5.2 Slow provisioning times

Most buildings in Luxembourg have copper and/or co-axial in-building wiring, and only new builds are required to have fibre cables pre-installed. Therefore, although households may be "passed" by fibre, new in-house cabling would be necessary to provide fibre-based broadband services. As well as being costly (with the cost borne directly by access seekers), stakeholders have noted the long time that it takes to provision in-house cabling.

Stakeholders identified two main factors driving this.

- First, operators face difficulty in obtaining permission from residential building owners to install cabling. This often requires members of the syndicate of

[43] Note that this remains in line with net neutrality requirements as long as throttling takes place in a non-discriminatory manner. To this end, regulations can be introduced which require operators to publish their traffic management policies.

owners to jointly agree to the installation of cabling and often such decisions are only taken on an annual basis. For business customers in shared buildings, access seekers struggle to obtain permission from the building landlords to install cables where POST has already installed its own.

- Second, the reference offers do not have SLAs or SLGs for residential services meaning that POST has limited incentive to provision services in an efficient manner. Further, access seekers seem reluctant to carry out such installations themselves although they did not provide specific reasons why.

The first of these factors is beyond the control and the remit of the ILR. Nevertheless, we note that it may be addressed to some degree by the implementation of the new cost reduction law (see Section 4.7). Therefore, we focus on the need for SLAs and SLGs in order to ensure that access seekers are able to compete with POST effectively.

SLAs set out agreed levels of quality for provisioning and repairs included in the reference offer. Such levels of service are typically defined in terms of the time taken to carry out the work. SLGs are associated with SLAs and specify the level of compensation that the access seeker would be entitled to should the service not be provided at the quality specified in the SLA. The combination of SLAs and SLGs is an essential element of a reference offer as it provides the supplier with an incentive to deliver their service at an appropriate level of quality.

While SLAs are in place for most services in the POST Technologies reference offers, in some instances a SLA is only available for premium services and not for standard services.[44] SLAs are missing entirely from the RCO. Although a full set of SLAs is often not easy to design for co-location, we would expect that it would be possible for some of the ancillary services (e.g. power and air-conditioning). Further, the SLAs in the current reference offers do not always have the level of detail in them that we would expect. For example, there are no SLAs in the ROB for the number of downtimes in a given period (i.e. outages when the service cannot be used, for example because of faults).

There is also a lack of clarity around some of the legal terms used in the reference offers. For example, the ROB refers to “best practice” and does not set out a definition of target levels of service and what the result of not meeting that would be financially. Therefore, it is unclear what the legal status of a commitment to “best practice” would be.

As part of the next market review and development of reference offers, we recommend that this is addressed. Reference offers are typically written by access providers subject to guidance from the regulatory authority on the minimum set of services and level of detail that should be included. These are then subject to industry consultation to ensure that the terms and conditions meet the commercial requirements of both the access seekers and the access provider. Often, there may be areas where the regulator will need to mandate certain provisions as parties may not be able to agree.

[44] For example, in the ROB penalties are only payable for the top two SLA standards (Busines and Premium) but not for the standard service. The RLL and RUO only include an SLA and penalty for Business quality services. There are no penalties in place for the standard services in the RLL and RUO.

In order to inform the ILR's decisions with respect to how SLAs and SLGs should be defined, we set out in Section 5.2.2 to 5.2.5 below a high level review of the broadband reference offers in terms of:

- The services that should be covered (provisioning, fault repairs, migrations and so on);
- The time taken to deliver services;
- How penalties could be calculated when the SLA is not met; and
- The procedures used to monitor compliance with SLAs and payment of SLGs.

Section 5.2.6 contains tables summarising how these factors have been defined in the SLAs and SLGs for wholesale broadband access services (resale, bitstream and unbundled access) in other comparable jurisdictions including Ireland (open eir)[45] and Belgium (Proximus Wholesale). [46] Further details are provided in Annex A.

We note that although our review provides some guidance, care will need to be taken to ensure that the SLAs and SLGs developed in Luxembourg appropriately reflect the local operating conditions faced by POST Technologies and its access seekers.

5.2.1 Summary of recommendations for SLAs

As part of the next market review, we recommend the ILR develops guidance for the minimum requirements that reference offers should meet. These should cover service level agreements and service level guarantees (SLAs and SLGs) for regulated products. We also recommend consultation with industry on the draft reference offers developed by Post Technologies to ensure that they reflect the operational needs of access seekers and the network operator.

SLAs should be used as a mutual process for the benefit of both the access provider and the access seeker to improve its service to customers. In addition to offering access seekers the same level of service as the incumbent's downstream division, the SLAs should also ensure that service levels meet the demands of end users.

While it may be possible for individual access seekers to reach a commercial agreement with POST Technologies for SLAs, the absence of a reference SLA would make such a negotiation difficult for access seekers.

SLAs are best drafted when the access provider supplies a clear definition of the services that it is provisioning or repairing, and more importantly, the services, and the standards that the access seeker needs to provide (see Sections 5.2.2 and

[45] We consider the Access Reference Offer from eircom Limited, Version 8, 03/01/2017, www.openeir.ie; and Wholesale Bitstream Access Refrence Offer from eircom Limited, Version 3.4b, 13/11/2015, www.openeir.ie

[46] We consider the following three relevant reference :offers in Belgium:

- BROBA II – Proximus Reference Offer for Bitstream Access (BROBA II ADSL & SDSL (covering the technologies ADSL, Reach Extended ADSL2, ADSL2+ and SDSL). Annex 5: Basic Service Level Agreement. Approved by the Belgian Institute for POSTal and Telecommunications on 10/10/2016 and partially taking into account the court decisions of 07/01/2015 and 29/06/2016);
- BRUO – Proximus Reference Unbundled Local Loop Offer, and
- WBA VDSL2 – Wholesale Broadband Access VDSL2.

5.2.3). This ensures the avoidance of any ambiguity that could ultimately result in issues for the end-user. A primary example of this is the clear demarcation required when reporting faults. An access seeker must make clear steps to ensure that it can definitely prove that any fault that its end users are reporting are a fault that can be proved to be in the access provider's network. In the case where a fault has been wrongly, or inaccurately identified to be on the network of the access provider's network then the access seeker should be in receipt of a form of penalty.

SLAs should be applied to both business and residential services, although there could be options of enhanced or improved SLAs for business services. SLAs should be backed up with guarantees and compensation payments (see Section 5.2.4). Such compensation payments should both compensate access seekers for non-delivery of service levels, as well as provide the access provider with sufficient incentive to meet the agreed service level. To ensure that such SLGs are effective, there should be compliance monitoring (see Section 5.2.5).

5.2.2 Services covered by SLAs

In order to allow efficient competition and to allow other/entrant operators (access seeker) to compete on equivalent terms those operators need to be able to offer end-users guarantees that are at least as good as those being offered by the retail arm of the wholesale network provider (the access provider).

SLAs typically cover both provisioning and repairs although the level of detail provided in the reference offer is variable. These are each described in further detail below.

Provisioning

Reference offers will typically define standard provisioning services such as the different types of lines that will be installed. However, the level of detail provided for each of the steps of provisioning can vary greatly. For example, the Proximus bitstream reference offer identifies different types of provisioning services:

- End-user lines,
- Shared VLAN or service qualities, and
- OLO access lines.

The level of service for each of these types of provisioning are defined in terms of the following:

- Individual steps of the provisioning process and timings (including receipt and acceptance of order, slot availability, appointment being kept, due date respected, and notification of order completion);
- The proportion of installations that should be carried out correctly in the first attempt ("first time right");[47]

[47] There may be reasons, independent from the responsibility of the operators, that an installation is not carried out first time right. Therefore, the reference offer could include a list of exceptions that would be permissible, such as adverse weather conditions, errors on the part of the access seeker, the end customer not permitting access to the building, and so on. The proportion could also be set to less than 100%.

- Stop-clock or freeze rules (i.e. when the provisioning is considered to be complete, or when the clock is frozen through mutual agreement); and
- The escalation process for when a given step of provisioning is not met.

Such detail is not provided in the open eir reference offer. While additional detail can provide access seekers with greater clarity, allowing them to communicate with their end users how delayed services may be, it can also allow an access provider to delay at a given stage of provisioning and then "stop the clock" on the timers for provisioning.

Repairs

The Proximus bitstream offer identifies different types of lines that can be repaired (end user line, end user line with splicing intervention, Ethernet transport, and OLO access line).

The repairs for these lines are then described in terms of the individual steps of the repair process and timings. It also describes the escalation process for when a given step of provisioning is not met.

In contrast, the open eir reference offer sets out different types of repair but only commits to the total time taken to repair a fault (see below).

5.2.3 Time taken to deliver services

Provisioning

As described above, the Proximus reference offers include a greater level of detail in terms of the individual steps required to carry out different provisioning services. Accordingly, the Proximus reference offer also contains agreed timings for the individual steps, as well as the total provisioning time. For example, the BROBA sets out the following total provisioning timers.

Service	Timers		
BROBA without customer visit	8 working days 95% incl. "done"	18 working days 99% incl. "done"	42 working days 100% incl. "done"
BROBA with customer visit	10 working days 95% incl. "done"	20 working days 99% incl. "done"	42 working days 100% incl. "done"

Repairs

Under the open eir reference offer, different fault repair times are offered depending on whether the access seeker is able to provide line test data. The access seeker is also required to check that the fault is not due to faults of its own equipment, the port associated with the line or CPE before a repair request is accepted by open eir.

5.2.4 Calculation of penalties for non-performance of SLAs

In order to provide those guarantees, and any compensation payments, the guarantees offered by the wholesale provider (service provider) need to compensate the access seeker. In its review of SLGs,[48] Ofcom identified a number of general principles for determining the level of SLG payments. These are summarised in the table below.

Figure 20 Ofcom general principles for determining SLG payments

Principle	Description
When agreed service levels are not met, make provision for compensation to be made based on a pre-estimate of an average communications provider's (CP's) loss	The level of compensation should be sufficient to compensate for the level of loss by the CP, and to incentivise the access provider to provide better service
Ensure that CPs are entitled to make a claim for additional loss	
Pay compensation on a per event basis	
Ensure that there are no caps on compensation	The average loss defined in the SLG should not restrict additional claims beyond this or any other arbitrary cap
Ensure that compensation payments are made proactively	Access seekers stated that they did not make compensation claims because they did not know whether they would be successful and therefore whether the internal expenditure would be justified.

Source: Ofcom

The greater the 'requirement' for the competing operator to be seen to be offering an 'equivalent' service to the service being offered by the dominant operator the greater the need to have SLAs and specifically compensation payments aligned with key steps of, for example, the provisioning process. As observed in the reference offers for Belgium, there are eight distinct process steps, measures and guarantees for the provision process alone.

As described above, the Proximus reference offer contains a relatively detailed description of the different steps required for provisioning and repairs. However, compensations are calculated per timer without cascade effect, meaning that if a timer has been exceeded, compensations will only be due for this single timer (e.g. if a problem occurs on the access line, compensation will be paid only for the OLO Access Line and not for the Ethernet Transport or the End-User line). Compensation for delays in the total provisioning time is fixed at €5 per working day with a maximum of €30. Additional compensation is due if the committed percentage of appointments are not kept (€20 per appointment) or the committed percentage of due dates are not met (€40 per due date). For repairs, compensation depends on the percentage of the daily recurring fee per end user line (150% per calendar day).

An access seeker may only claim compensation once its aggregated KPI is less than the SLA for the whole calendar year. Compensation is paid through the

[48] Service level guarantees: incentivising performance, Ofcom Statement and Directions, March 2008. Available online: https://www.ofcom.org.uk/__data/assets/pdf_file/0020/33617/statement.pdf

access seeker's invoice. Together with an invoice, the access seeker must provide Proximus with the necessary information in case of a delayed provisioning or repair timer or any shortage of Proximus that give cause for the compensations. The access seeker is required to submit a detailed request for compensation to Proximus for the previous calendar year within maximum 4 months after the first working day of the following calendar year.

The open eir reference offers define fixed service credits for not meeting the performance metric target for validating orders, accepting orders and advising of the completion of orders. These are €12.70 per account per working day or part thereof delay. For fault resolution, the service credit increase as the over-run of repair time increases (from €4 up to €10, see Annex A.1 below).

The reference offer states that a flat fee of €30 will remain in place until an alternative calculation is agreed. Guidelines for payment of penalty credits are also included.

- Openeir should provide operators with penalty statements one month in arrears of measurement with payment made in the next billing cycle;
- The applicable penalty to be paid as difference between actual percentage achieved and the target percentage;
- In the event that the operators of the opinion that penalty liability has been incorrectly calculated then a claim must be submitted in writing;
- In the case of a query, any supporting documentation must be supplied within 10 working days of request by openeir; and
- Any adjustment will be remitted by way of credit against the account associated with the claim.

5.2.5 Procedures used to monitor compliance

Access providers are typically required to measure and to monitor KPIs to ensure that they are meeting the agreed SLAs. Such information is then provided to the access seeker on a regular agreed basis (e.g. monthly, every two months or quarterly).

The Proximus reference offer defines the KPI that will be used to measure compliance with SLA and the frequency of the measurement (typically bi-monthly or monthly). For example, for the request validation timer, the Proximus reference offer sets out the SLA as in the table below.

Validation/Rejection Timer	Percentage of orders validated or rejected within the corresponding validation timer
30 minutes	50%
2 working days	95%

5 working days	99%

Proximus is required to carry out measurement of its performance every two months in terms of the following:

$$\%\ \text{XML Validate}^{i} = \frac{\text{Number of orders for which the Validate (or Reject) XML is sent within timer}^{i}\ (1)}{\text{Total number of orders (2)}}$$

With i = {30 minutes; 2 working days; 5 working days}

(1) Total number of orders, for the considered bi-monthly period, having the Validate or Reject XML sent within the i timer.
(2) Total number of orders validated or rejected during the considered bi-monthly period.

The compensation in the case that Proximus does not respect the committed percentage as indicated in the definition in the SLA, the Access Seeker will be entitled to a compensation per due date not respected of €40.

In Ireland, Open eir is responsible for monitoring and measuring performance metrics and shall report on the agreed metrics on a monthly basis for provision and a quarterly basis for repair. Provisional performance reports are provided within 20 working days of the end of the month. Repair performance reports are provided within one month of the end of the reporting quarter.

5.2.6 Summary of Irish and Belgian SLAs and SLGs

In Annex A, we provide figures summarising the SLA and SLGs we have reviewed in Ireland and in Belgium for the following services:

- Advice of acceptance of order;
- Intermediate steps in order completion;
- Completion of order;
- Advice of completion of order; and
- Repairs.

5.3 Issues related to discrimination and EOI

As mentioned in Section 4.2.2, the EC's 2013 Recommendation to promote competition and enhance the broadband investment environment[49] recommended that EOI was a necessary condition for regulation with an ERT. Equivalence helps to ensure non-discrimination by ensuring that there is a level playing field and that vertical integration does not give POST an unsurpassable competitive advantage. EOI is therefore an important element of the regulatory regime.

Stakeholders considered that EOI had been implemented for processes i.e. POST Retail goes through the same processes and procedure that any access seeker does). However, larger access seekers did raise some concern around the possibility that POST Technologies shares information with POST Retail regarding access seekers expansion plans and that POST Retail may receive preferential

[49] See http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0466&from=EN

treatment when booking slots for appointments with the technician. This would imply issues around strategic decisions being influenced by the retail arm. However, no evidence was provided in support of this.

Smaller access seekers also raised concerns around discrimination. One small access seeker pointed out that POST Technologies had been advertising its fibre roll-out in a manner that only identified POST Retail as an operator that provided fibre connections to end users. Another small access seeker mentioned that it had been informed that POST Technologies technicians, when providing services for access seekers, tell end customers that services would be superior if they were with POST Retail. Further details are provided in Annex C.

We consider that the issues can be grouped into two main groups:

- Overtly discriminatory behaviour; and
- Subtler discriminatory behaviour.

However, as described further below, given the size of Luxembourg the resources that would be required to address subtler discriminatory behaviour directly would be unlikely to be proportionate. Therefore, we do not consider addressing this issue in detail but instead we recommend that the ILR focusses addressing overtly discriminatory behaviour and how regulatory governance can be used to attempt to align POST's incentives with non-discrimination. In Section 5.3.3 we provide a framework that the ILR could use to review the current situation and identify areas for improvement.

5.3.1 Overtly discriminatory behaviour

Anecdotal examples of overtly discriminatory behaviours provided by stakeholders include POST Technologies staff distributing POST Retail advertising when laying fibre cables; and POST Technologies engineering staff attributing poor quality of service to access seekers without justification. Further details are provided in Annex C.

By their nature, overt issues are easily identified. Adopting a strict approach (both by POST and the ILR) to stopping such behaviour would demonstrate a clear regulatory commitment to equivalence.

As set out below (Section 5.3.3 on governance), the main mechanism for identifying discriminatory behaviour appears to be by access seekers through the complaints process. However, as described in Section 5.4, the dispute resolution process could be improved in a number of ways. Some potential additional mechanisms are identified in Section 5.3.3 below on governance.

5.3.2 Subtler discriminatory behaviour

Examples of subtler discriminatory behaviour would include information sharing between POST's retail and wholesale divisions; availability of network rollout plans; and slower provisioning times for access seekers. Such behaviour is both harder to identify and more resource intensive to remedy. In particular, the experience in other jurisdictions with functional separation (such as the UK and Ireland), is that true EOI is very expensive to implement as well as to monitor and enforce on an

on-going basis (not least because of the cost of separating internal information systems). Further, such issues could persist to some degree unless structural separation is implemented. Given the size of Luxembourg, this is unlikely to be a proportionate solution. Therefore, we have not considered this option further in this report. Nevertheless, we note that governance can try to mitigate some of these issues.

5.3.3 Governance

We understand from the ILR that it has reviewed the documentation provided to it by POST in relation to POST's implementation of its EOI obligation. Based on its review, the ILR concluded that there is no evidence to suggest that the EOI obligation has not been implemented. However, in our discussions with stakeholders, both [✂ confidential] and [✂ confidential] indicated that they are not satisfied with this conclusion. In particular, stakeholders suggested that:

- A more formal assessment was required;
- It was suggested that POST should be subject to an independent external audit of its compliance with its EOI obligation as such an audit would be more credible;
- The oversight and governance of the implementation of POST's EOI obligation should be clearer; and
- More is required to clarify the criteria for assessing whether EOI has been implemented.

In principle, there are a number of governance mechanisms that can be used to ensure the effective implementation of the EOI obligation. These include:

- Internal governance mechanisms within POST;
- External monitoring by the ILR; and
- External independent audit.

These are described in further detail below. Overall, we find that there appear to be a number of areas for improving both internal governance mechanisms and the monitoring by the ILR. While there may be benefits of an external independent audit, we consider that improving the areas identified below is more likely to have a greater impact on ensuring effective EOI in Luxembourg.

Internal governance mechanisms

In the "Document cadre" that POST submitted to the ILR, POST sets out the implementation of its EOI obligation. The documentation includes four additional documents setting out: the products included; the processes for supplying those products; incidents, faults and planned works; and the provision of information.

POST states that this documentation covers the themes identified by the EOI working group in December 2014. However, the documentation is focussed on outcomes, rather than on the processes in place to facilitate those outcomes. In addition, it does not describe a system for monitoring both the processes and the outcomes.

In order to be able to assess POST's other internal governance mechanisms, the following key areas would need to be considered. This is largely in line with the list of areas that were covered by Ofcom and ComReg as part of their reviews (as described in further detail in the text box below).

OVERVIEW OF ASPECTS OF INTERNAL GOVERNANCE

- Definition of the boundary between upstream and downstream divisions.
- Governance (e.g. whether there is a separate board to monitor and report on compliance) and where the responsibility lies for identifying and reporting breaches.
- Whether employee incentives depend solely on the performance of their division and not on the performance of other divisions or the company as a whole.
- Control and influence over investment expenditure.
- Separation of business systems and processes (whether physically or virtually) for pricing, product development, fault management and so on.
- How the wholesale division takes account of the needs of other access seekers when planning network rollout or improvements.
- Scope and effectiveness of monitoring of compliance.
- Board and other senior management sign off on compliance.

POST has carried out its own internal audit in June 2016 of the implementation of its EOI obligation in 14 main areas (see table below). It set out its conclusions of this review in a presentation submitted to the ILR.[50] The review set out to provide assurance that there is no discrimination between POST Telecoms and other operators in Markets 4 (2007) and 5 (2007). The results of this suggest that functional separation has not been entirely successful, particularly with respect to the sharing of information between the retail and wholesale arms.

[50] "Equivalence des intrants, conclusions de la mission d'audit interne", 14 June 2016.

Figure 21 Areas covered by EPT's internal audit

Areas with no issues identified	
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
Areas with issues identified	
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*
[✂ confidential]	*[✂ confidential]*

Source: June 2016 EOI minutes
Note: Based on the period from 15 January to 20 February 2016

External monitoring by the ILR

When the ILR notified the EC of its intention to impose the EOI obligation, the EC recommended that the ILR develop an implementation roadmap with key milestones and consequences in cases of non-attainment.[51] However, this does not appear to have been developed.

Nevertheless, there appear to be three main forms of external monitoring of EOI by the ILR at present.

- As described above, the ILR has reviewed the documentation POST provided to it in relation to the implementation of the EOI obligation.
- POST is required to submit KPIs to the ILR on a regular basis. The responsibility sits with access seekers to ensure that they are being treated on a non-discriminatory basis. This means that the KPIs are not systematically reviewed by the ILR.
- Access seekers are able to report incidents of discriminatory treatment to the ILR for review. As described in Section 5.4 below, the main mechanism for doing so appears to be through the dispute resolution process but this could be improved in a number of ways. An additional way of making it easier for access seekers to alert the ILR to instances of discriminatory treatment could be a short

[51] EC implementation report

survey of access seekers. This is the approach that was adopted in New Zealand where access seekers were asked to provide their views on how their confidential information was being treated. Nevertheless, the proportionality of doing so would need to be assessed in the context of the overall regulatory burden faced by stakeholders (as discussed in Section 5.5 below).

Independent external audit

In some countries where functional separation have been implemented (such as in the UK, Ireland and New Zealand[52]), formal independent external audits have not been carried out. However, as described above, the national regulatory authorities have commissioned their own reviews of the implementation of EOI.

In practice, it is likely to be costly to carry out a formal independent external audit in the same way that a regulator may require for other regulatory obligations (e.g. compliance with charge controls, or regulatory cost reporting). We would envisage that POST would need to prepare a statement of its compliance along with the necessary information and evidence to support such a statement. A large volume of evidence is likely to be required.[53]

However, such an audit would likely to be focussed on the process of EOI and would not consider the outcomes in the market. For example, if the audit identified that POST Telecom had access to repair information to which the access seekers did not, further work would be required to determine whether this actually had an impact on the access seekers' ability to compete. This limits the usefulness of the audit.

Review of the implementation of EOI

Our recommendation is therefore a review by the ILR as this could benefit the sector in two main ways:

- Providing additional confidence to access seekers (and therefore investors) that practices are non-discriminatory; and
- Where practices are discriminatory, identifying areas for improvement and providing a more holistic view of the impact of the behaviours on the ability of access seekers to compete in the market.

Ofcom has carried out a large scale strategic review in the UK which included a review of EOI and the Irish regulator is currently reviewing the functional separation of eir. The figure below summarises the scope of these reviews and it can be seen that they are very different in scope. Nevertheless, these have been resource intensive going into very detailed analysis of the implementation of EOI obligations. We do not consider that such level of detail would be proportionate in Luxembourg given its size and that POST has only recently separated. However, the scope of these reviews could be used to inform the scope of a review in Luxembourg, albeit at a much higher level.

[52] Prior to the full structural separation of Telecom New Zealand

[53] This could include KPIs, details of processes, details of processes actually being carried out, and so on.

In Figure 23, we provide a summary of the areas of internal and external governance described in the sections above. This also provides a potential framework for carrying out a general review in Luxembourg. The level of depth and detail for each area of review would need to be proportionate to the regulatory context in Luxembourg. We also note that any such review should focus on the impact of different measures and policies on the ability of access seekers to compete in the market on an equivalent basis with POST. This is to ensure that any recommendations and subsequent regulatory obligations are proportionate.

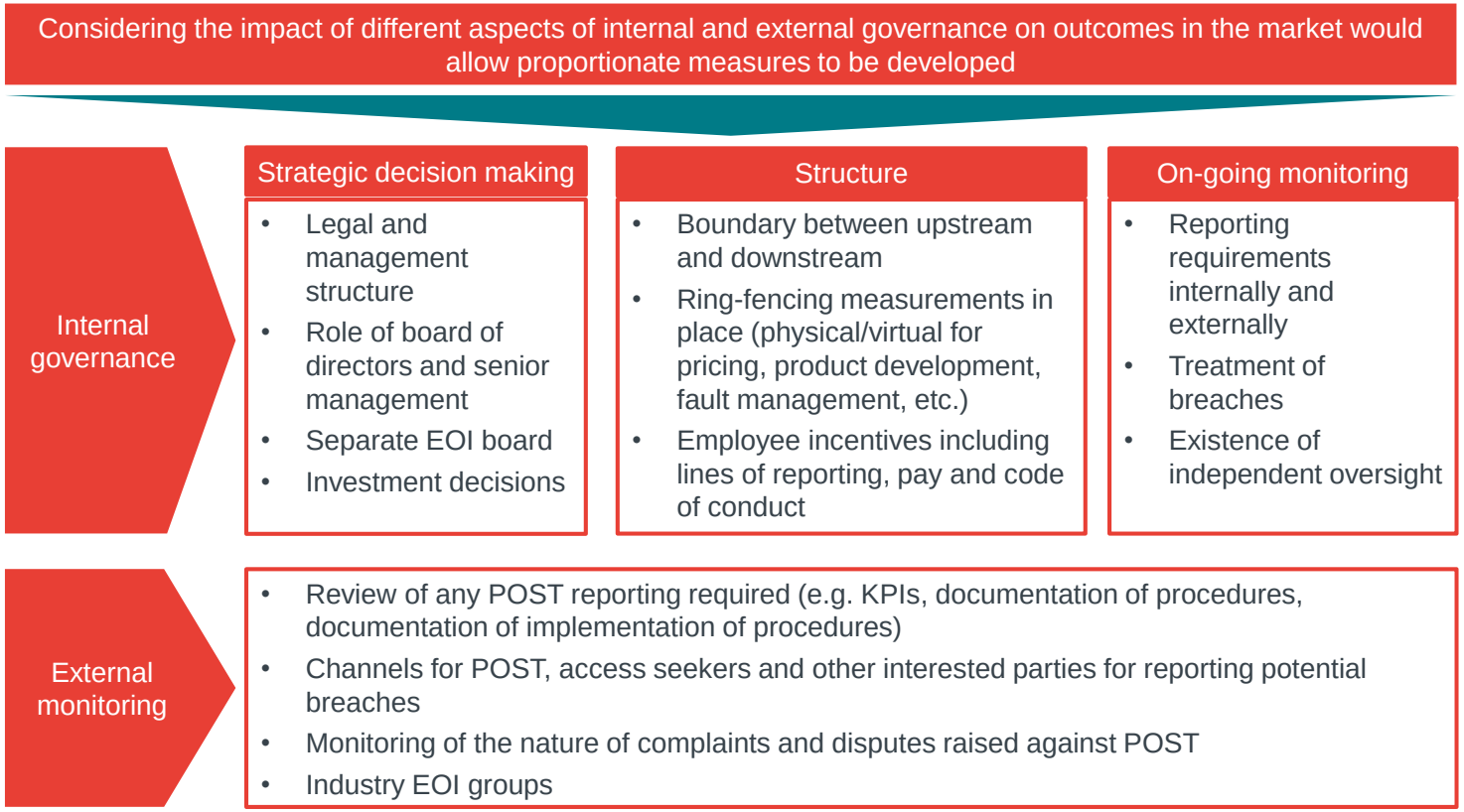
Figure 22 Scope of reviews of EOI carried out in other jurisdictions

Jurisdiction and date	Purpose of review and examples of topics considered
United Kingdom, 2015-16[54]	Ofcom's strategic review of the industry covered a range of issues, among which was a focus on strengthening Openreach's strategic and operational independence, and whether change may be required to the current regulatory model. Ofcom identified four areas for further investigation. First, actual or potential sources of discrimination that may undermine effective downstream competition. Ofcom identified sources of continued discrimination, new opportunities for discrimination as technology evolves, differences in the underlying economics faced by BT's retail division and downstream competitors, product development processes Second, wider concerns beyond competition that could be addressed through a different model of regulation. This included quality of service, management focus, and investment decisions. Third, areas where the current model of functional separation needs to be updated to reflect the current market context, such as changes to the underlying network architecture and economics. This covered the Openreach boundary, governance arrangements, breaches and enforcement. And fourth, the strengths and challenges of structural separation relative to the current model of functional separation.
Ireland, 2016-on-going[55]	In response to concerns raised by industry and issues identified by eir as part of its own internal audit, ComReg is currently carrying out two work streams to review "the effectiveness of what eir has done on a voluntary basis as well as the effectiveness of regulatory obligations." Governance work stream to "assess the suitability for regulatory purposes of the macro structural, governance environment within which the operational risk and control framework operators." This includes eir's legal and management structure, the role of the board of directors and senior management, the independence and governance arrangements of the wholesale arm, independent oversight, codes of conduct and HR matters (e.g. training and performance management). Operations work stream to review the adequacy of the control environment for the operational business processes including product development and the management of associated information. This included sample transaction testing of the operation of controls and the accuracy of source documentation.

[54] Strategic Review of Digital Communications, Discussion document, 16 July 2015

[55] Review of Eir's Regulatory Governance Model, ComReg Information Notice 16/42, May 2016

Figure 23 Potential scope of review of EOI



Source: Frontier Economics

5.4 Dispute resolution

Complaints and disputes often follow the introduction of new laws, new regulatory frameworks and the emergence of competition. With more at stake in an increasingly complex sector, there is a greater focus on concerns about the transparency, predictability, and speed of decision-making. Failure to resolve disputes quickly can result in:

- Delay to the introduction of new services and networks;
- Stopped or reduced investment capital;
- A reduction in competition which could result in increased prices and/or reduction in service quality, and
- A slowdown of liberalisation (with the associated impact on general economic, social and technology enhancements).

Stakeholders considered that there have been instances where the ILR has not been proactive in responding to complaints and enforcing regulation. Historically, there do not appear to have been many disputes. Based on our discussions with stakeholders, potential causes for limited complaints include those listed below. Specific examples are provided in Annex C.

- Unclear responsibility
  - In some cases, access seekers assume that the responsibility of ensuring compliance from POST rests solely with the ILR. This means they do not feel the need to highlight any “errant” behaviour.
- Perceived inaction in the past
  - One stakeholder noted that when issues have been raised with the ILR in the past, no remedial action was taken. This may discourage operators from raising issues with the ILR.

There were also some areas of enforcement that stakeholders raised with us that may not have been separately raised with the ILR. These include:

- Ensuring that VULA is made available where fibre unbundling is not possible;
- Ensuring the threshold for provision of VDSL to POST’s retail arm is the same for other access seekers when a fibre line to the home does not exist; and
- Examples of overt discrimination (as described in Section 5.3 above).

In addition, the POST Technologies reference offers does not provide for a dispute resolution process between the parties of the agreement. This means that legislation dictates the primary dispute methodology in Luxembourg (see text box below).

Art. 81.
(1) Sans préjudice des recours de droit commun, un litige entre entreprises notifiées portant sur les obligations découlant du cadre de la présente loi et de ses règlements et décisions d'exécution peut être soumis à l'Institut.

(2) Le différend est soumis à l'Institut sur initiative d'une des parties au litige par envoi recommandé à l'Institut.

(3) Après avoir mis les parties en mesure de présenter leurs observations de manière contradictoire, l'Institut prend une décision dans un délai de quatre mois à compter de la date de la réception de la demande visée au paragraphe (2).

(4) La décision de l'Institut est rendue publique, dans le respect du secret des affaires. Avant publication, les parties concernées reçoivent un exposé complet des motifs de cette décision.

(5) La décision de l'Institut est susceptible d'un recours au sens de l'article 6 de la présente loi.

(6) L'Institut est habilité à faire office de médiateur entre entreprises notifiées. Dans la mesure où les parties acceptent le résultat de la médiation de l'Institut, le résultat de cette médiation les lie et n'est pas susceptible de recours.

Based on our understanding of the Luxembourg market and our experience from other jurisdictions, we consider there are a number of areas in which the dispute resolution could be improved in Luxembourg. In particular:

- Greater encouragement for effective bilateral negotiations through the reference offers;
- Providing more clarity in the reference offers;
- Providing more structure and clarity of the regulatory dispute resolution process; and
- Promoting alternative dispute resolution processes either formally or informally.

These are described in further detail below.

5.4.1 Effective bilateral negotiations

Encouragement should be provided for the successful resolution of a dispute being attempted by the relevant parties before the dispute is referred or escalated to a regulatory body. This is often the quickest and least costly form of resolution. It also encourages reciprocity and the need to build trust in order to develop an effective and efficient working relationship between the access seeker and the access provider. Our understanding is that this is typically the norm in Luxembourg.

This approach is reflected in the Proximus reference offer where a number of provisions are included to ensure the effectiveness of bilateral negotiations. These include:[56]

[56] Further details are provided in Annex A.

- The requirement that the discussion of disputes or disagreements are held in good faith;
- Requirements that the persons appointed by the parties have "sufficient authority or decision-making power concerning the matter at stake";
- The procedure for escalating disputes internally; and
- The conditions under which a dispute can and should be referred to the national regulatory authority (NRA).

It is also reflected in the eir reference offer where provisions are provided for the escalation of a dispute. These include:[57]

- The requirement to use "best endeavours" to resolve any disputes "in the first instance through negotiation between the parties through the normal contact" before internal escalation and before formal proceedings are started (except in urgent cases);
- Defined time limits for each level of escalation including scope to extend these time limits through mutual agreement; and
- Recognition of the financial distress that can be caused by the withholding of payment as a result of a billing dispute by including provisions for when and how much payment can be withheld.

Where issues are resolved bilaterally, it may be worth ensuring that this is carried out in a non-discriminatory manner. In particular, if additional terms and offers are made to one access seeker for a regulated product then, where reasonable, the same should be available (although not necessarily used) by other access seekers. One way to monitor this would be to require POST Technologies to notify the ILR of complaints that relate to regulated products and services and could potentially affect access seekers. It may also be possible to require POST to automatically offer additional terms and conditions in certain situations (e.g. for regulated products and where the change would have a material impact on the access seeker) unless it can provide objective justification of why this would not be reasonable. This places the responsibility of compliance on POST Technologies rather than the ILR.

5.4.2 Referral of disputes to NRA

However, not all disputes can be resolved bilaterally and may require the NRA to exercise its legal powers, to make decisions resolving disputes that are brought before them.

Two reasons for a dispute being referred to an NRA include:

- If a party to a dispute is acting outside of the relevant law or regulations as laid down then it is a matter for the complaining party to draw the attention of the regulator to this activity in order that the regulatory body can assess the situation and take an appropriate course of action, or

[57] Further details are provided in Annex A.

- It is a matter of a 'commercial' dispute between the two parties on which the parties cannot reach an agreement and therefore the regulatory body is acting in the form of a mediator or arbitrator on the matter.

Regulatory adjudication in disputes by a regulatory body can have the advantage of:

- Being a well-structured channel for decision-making;
- Providing accountability on the part of the official decision-makers, and
- Making available the full force of the regulatory bodies' enforcement mechanisms.

On the other hand, limitations of regulatory adjudication include;

- Introducing delay as the overall process can become lengthy, consuming significant time to obtain inputs from parties, prepare recommended actions by staff, deliberate on decisions, recommend decisions, reconsider decisions and ultimately these decisions could be reviewed in front of the courts;
- Abuse by competitors that use it as part of an overall strategic response to the emergence of competitive market conditions (that is, if the process is available and if regulators are ready to intervene, then frequent disputes could be likely to become a permanent feature of a liberalised market); and
- Lack of necessary economic, legal and financial expertise for the adjudicator to resolve disputes efficiently and finally.

Therefore alternative approaches to regulatory adjudication are used in many jurisdictions. These can include:

- Court adjudication; and
- Alternative dispute resolution (ADR).

We focus our discussion below on ADR approaches as this typically offers a more sustainable and lower cost alternative to court adjudication. That is, a major benefit of ADR methods is that they can preserve and even enhance business relationships between the disputing parties that might otherwise be damaged by the adversarial process (i.e. by understanding the internal workings and processes of each of the parties future avoidance of a similar dispute can be aimed for).

5.4.3 Alternative dispute resolution

The general principle underpinning ADR is that, where possible, it is more beneficial for parties to resolve their disputes by private processes and negotiated agreements rather than through contentious litigation or regulatory adjudication. An ADR can be contained in legislation or within the regulatory framework by including the process for access and interconnection agreements entered into by the parties.

The EU requires NRAs to resolve disputes within a certain time period. ADR encompasses several different processes and procedures that are an alternative to litigation and other official procedures. In essence, it involves procedures for settling disputes by means other than litigation or administrative adjudication.

These methods include arbitration and mediation as well as many hybrids and variations.

5.4.4 Recommendations to improve dispute resolution

We recommend that there are a number of ways in which the ILR could consider improving the dispute resolution process in Luxembourg. Some examples are listed below.

- Publish adjudicated decisions and facilitate access to them in order to provide resources for disputing parties and their advisors. This promotes best practices in resolving disputes;
- Publish examples of innovative dispute resolution procedures, including less formal approaches, in order to promote their adoption by disputing parties;
- Strengthen non-official ADR approaches by endorsing their usage, improving understanding of the legal frameworks in which they operate and support them with official enforcement of their results;
- Establish panels of arbitrators and mediators and collaborating with existing arbitration and mediation institutions (such as the Arbitration of the Chamber of Commerce of the Grand Duchy of Luxembourg Centre);
- Increase collegial sharing of experiences and ideas between telecommunications and the dispute resolution communities, in order to promote better applications of effective techniques in resolving disputes;
- Utilise online resources and services to help policymakers and regulators improve dispute resolution techniques, and importantly; and
- Recognise the dispute prevention is as important as dispute resolution.

5.5 Regulatory burden

On the whole, access seekers appeared to be satisfied with the wholesale broadband access products available from POST. In particular, the availability and pricing of these products have allowed them to compete in the market and they foresee continued growth. This is particularly true given the forecast increased consumer demand for high bandwidth services and that unbundled fibre access will become more widely available. However, here were three main areas in which stakeholders considered that the regulatory burden appeared disproportionate:

1. Smaller access seekers consider that they do not have the resources to respond to the ILR's data requests;
2. POST has questioned whether it should face downstream regulation (such as the ERT) given its EOI obligation which it considers it has fully implemented; and
3. Stakeholders questioned the need to implement European best practice given the small size of Luxembourg.

We address each of these areas and provide recommendations below.

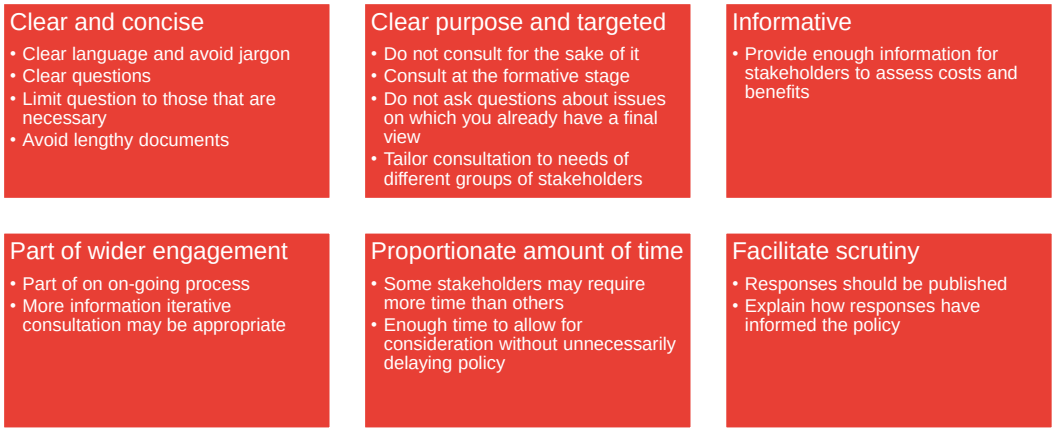
5.5.1 Stakeholder involvement in regulatory decision making

One of the potential reasons smaller access seekers consider the number of data requests to be disproportionately burdensome could be the increased requirement in recent years to submit information given that regulation was relatively limited in the past. Another potential reason could be the high number of consultations in recent years as the ILR has caught up with the implementation of the EC framework.

Nevertheless, we consider there are significant benefits associated with active stakeholder engagement in the regulatory decision making process. In particular, stakeholders are typically better placed than a regulatory authority in terms of the practical implementation and details of regulations. This is because they are typically better able to determine whether proposed regulations will offer them the commercial flexibility that they require to compete effectively in the market and to continue investing efficiently. This helps to ensure that regulation is fit for purpose, robust and proportionate. In addition, early stakeholder involvement in the decision making process can help to increase acceptance of regulations even if not all stakeholder demands are met. This helps to reduce the risk of legal challenge once a regulation is implemented.

Therefore, we recommend that the ILR considers its overall stakeholder engagement strategy to ensure that stakeholders are engaged in the most efficient and effective way. The figure below provides a summary of some general guidance on stakeholder consultations as provided by the UK government to its different departments. This could be informative for the ILR when determining its overall stakeholder engagement strategy.

Figure 24 UK government guidance on stakeholder consultations



Source: *UK government guidance*[58]

Note: *The guidelines also recommend that there should be collective agreement before the publication of a written consultation, as well as that government responses to consultations should be published in a timely fashion and that consultation exercises should not generally be launched during election periods. The guidelines note that they do not have legal force and are subject to statutory and other legal requirements.*

[58] Consultation Principles 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/492132/20160111_Consultation_principles_final.pdf

In addition to the general principles described above, there are a number of practical aspects that the ILR could also take into account. Some examples are provided below based on our experience working in Luxembourg and other jurisdictions in Europe and the rest of the world.

- An annual plan of consultations and investigations could be announced in advance if at all possible. This would allow stakeholders to identify when consultations that particularly affect them to ensure they have the necessary resources in place. The annual plan should also take account of other investigations being carried out at the same time to avoid a given stakeholder being required to respond to multiple issues at the same time. The annual plan should also take account of public and other common holidays (e.g. school holidays). Nevertheless, this should be balanced against the need for flexibility to change the work plan as the year progresses.
- Clear timelines for responding to data requests and consultations should be established. These should allow sufficient time for stakeholders to seek clarifications and to respond appropriately. The ILR could provide guidelines on the circumstances under which extensions would be granted.
- Where data is collected on a regular basis, standard data templates should be used as much as possible to allow stakeholders to more efficiently collect and process data.
- Simplified or shorter data requests could be used for smaller operators. Providing guidelines on the definition of “small” could also be provided (e.g. operators with less than a certain percentage of market share in the affected market or markets).
- Questions within a data request could be marked in terms of priority to allow stakeholders to focus resources on providing the most important information.
- Stakeholder workshops could be used to provide greater clarity on the issues being consulted on and the level of engagement required from different stakeholders. Sometimes, it may be easier for a stakeholder to attend such a workshop rather than reading the full consultation documentation. This also allows for stakeholders to seek clarifications earlier on in the process.
- Stakeholder engagement could be categorised to ensure the appropriate nature of engagement. For example:
  - Inform – when a decision or a final position has already been taken and stakeholders need to be aware of that (e.g. the outcome of the review of regulated price ceilings).
  - Consult – when the ILR is assessing different policy and it requires views from stakeholders in order to make a final decision or form a final position. In such a case, the ILR could provide details of different options considered and the relative costs and benefits of each (e.g. when considering whether a given market should be regulated and how).
  - Collaborate – when the ILR requires input from stakeholders in order to determine the nature of issues that need to be addressed and potential options for addressing them (e.g. the current project we are carrying out).

5.5.2 Scope of regulatory obligations given EOI

As described in Section 4.2, the EC Recommendation suggests the use of the ERT to regulate prices for passive NGA wholesale inputs as long as there is an obligation of providing wholesale access services on the basis of EOI. Therefore, we consider that it remains appropriate to continue to regulate wholesale prices on the basis of the ERT. Further, as described in Section 5.3, it is not clear that POST has fully implemented its EOI obligation.

5.5.3 Mechanisms preventing disproportionate regulation

In designing and implementing regulation, the ILR faces a number of statutory duties under both national law and the EC regulatory framework. As part of our review, we have not seen any concrete evidence of the ILR going beyond these statutory duties nor has that regulation been disproportionate. Further, as described in Section 3, outcomes in the Luxembourg broadband market appear to be relatively strong in terms of both fibre coverage and the take-up of high speed services. The European Commission has also noted that operators in the telecoms sector as a whole have continued to invest at "significant levels of 39.8% of annual revenues, exceeding the level of 26.6 % in 2013."[59]

There are a number of channels that exist to ensure that regulation is proportionate and that the ILR does not overstep its mandate (and also that it does not under-regulate inappropriately). These channels are described below. Therefore, our recommendation is that no specific action is required by the ILR in this respect beyond the mechanisms currently in place.

EC guidance

Under the EC's Digital Agenda, the EC set out its Digital Single Market Strategy requiring, among other things, Member States to create "the right conditions for digital networks and services to flourish". Therefore, the EU's telecoms rules "aim to ensure that markets operate more competitively and bring lower prices and better quality of service to consumers and businesses, while ensuring the right regulatory conditions for innovation, investment, fair competition and a level playing field." The EC has defined the relevant product and service markets that are susceptible to ex ante regulation. This limits the markets that the ILR is able to regulate. Further, in recent years, the EC has moved towards deregulation where competition is effective and regulation would be disproportionate. In particular, the 2014 Recommendation on relevant product and service markets further reduced the number of relevant markets to four, below that set out in the 2007 Recommendation.

Controls at the European level

Further control is placed on European NRAs through EC law. In particular, Article 7 of the EU's Electronic Communications Framework Directive (2002/21/EC), national regulatory authorities are required to inform the EC, and

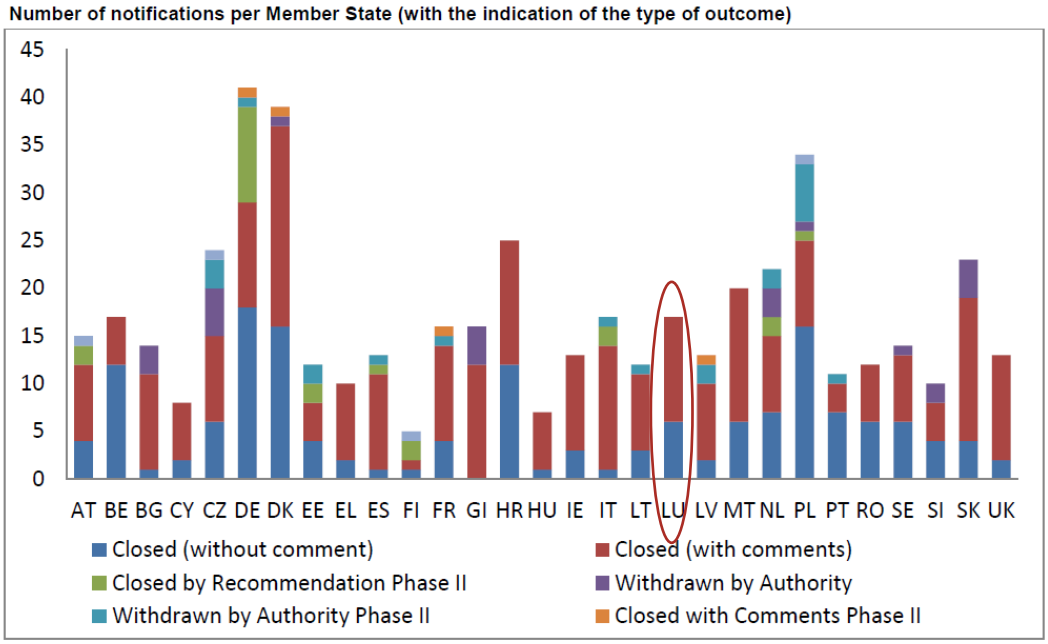
[59] 2015 EC Implementation Report

telecoms regulators in other EU countries, about measures they plan to introduce to solve market problems.[60] The EC assesses the proposed regulations and then approves or comments on them (Phase One). NRAs are required to take the "utmost account" of the comments received from the EC, BEREC and other NRAs as part of this process.

If the EC considers that "the proposed measures would create a barrier to the Single Market, or has serious doubts as to their compatibility with EU law," it can open a more detailed investigation (Phase 2) and ultimately require the NRA to withdraw the measures ("power of veto") if its reservations are confirmed.

The figure below shows the number of notifications by Member State since the end of the transposition phase of last review of the regulatory framework (i.e. between May 2011 and April 2015). It can be seen that the number of notifications by the ILR is largely in line with other Member States, with all being closed either with or without comments. This supports the view that regulation in Luxembourg is proportionate.

Figure 25 Number of notifications by Member State



Source: 2015 EC Implementation Report

Prevention of under-regulation

In addition, where the EC is concerned about insufficient regulation, it also has powers of investigation. In October 2014, the EC referred Luxembourg to the Court of Justice for failure to comply with the Framework Directive. The case was later withdrawn after the ILR provided its second round of analysis.

[60] http://europa.eu/rapid/press-release_MEMO-10-226_en.htm

Right of appeal of ILR decisions at the national level

Under national law, the Administrative Court can judicially review ILR decisions. Between 2014 and March 2015, the ILR adopted 22 regulatory decisions. Only one was challenged (the interim cap on mobile termination rates based on a benchmark). This was upheld by the Court on the grounds that the ILR had not taken adequate account of the specificities of the Luxembourg market. This shows that while appeals are rare, there is a process for reviewing them.

Controls from the Conseil de la concurrence

The ILR is required to obtain prior agreement from the national competition authority (*Conseil de la concurrence*), before adopting measures that would impact on the market. Therefore, there is a mutual exchange of information and comments between the two organisations.

ANNEX A REFERENCE OFFERS IN BELGIUM AND IRELAND

A.1 Summary of Irish and Belgian SLAs and SLGs

In the figures below we summarise the SLA and SLGs we have reviewed in Ireland and in Belgium for the following services:

- Figure 26 Advice of acceptance of order;
- Figure 27 Intermediate steps in order completion;
- Figure 28 Completion of order;
- Figure 29 Advice of completion of order; and
- Figure 30 Repairs

Figure 26 Advice of acceptance of order

			Time taken to validate or reject a provisioning request	Percentage of orders validated or rejected within the corresponding validation timer	Penalty
Open eir	ULMP, LS and GLUMP standard validations timeframes [61]	Order validation	Advice of acceptance of the order by 17:00 hours on the working day the request was recorded on the UG	98% of requests	€ 12.70 per account affected per working day or part thereof of delay
Proximus	Bitstream and LLU, WBA	XML validation timer	30 minutes	50%	
			2 working days	95%	
			5 working days	99%	

[61] ULMP- unbundled local metallic path
LS - line sharing
GLUMP - combined Geographic Number Portability and ULMP

Figure 27 Intermediate steps in order completion

			Working days	% availability	Penalty
Proximus	Bitstream and LLU, WBA	Slot Availability Without Visit in Working days	9	95%	
			19	99%	
			45	100%	
Proximus	Bitstream and LLU, WBA	Slot Availability With Visit in Working days	11	95%	
			22	99%	
			45	100%	
Proximus		Availability of the proposed slot (after small network adaptation) with respect to the order date and to the applicable defined timers.	20	85%	
			29	95%	
			39	99%	
Proximus		Appointment kept	Orders with end-user visit must respect all their end user visit appointments.	95%	€20 per appointment not kept
Proximus		Due Date Respect	Respect of due date communicated to access seeker	95%	€40 per due date not respected

Figure 28 Completion of order

			Working days	% of requests completed	Penalty
Open eir	ULMP, LS and GLUMP standard delivery timeframes	Delivery notification - provision of ULMP on a working line	Advice of completion of accepted order by 1700 on the 5th working day following order submission	95%	€ 12.70 per account affected per working day or part thereof of delay
Open eir	Standalone NGA services (FTTC bitstream plus, FTTH bitstream plus, FTTC VUA, FTTH VUA), also includes POTS based services	Provisioning by appointment date		100%	€30 flat fee until alternative calculations agreed
Proximus	Total provisioning timer - BROBA	BROBA without customer visit	8	95%	€5 per working day with a maximum of €30
			18	99%	
			42	100%	
		BROBA with customer visit	10	95%	€5 per working day with a maximum of €30
			20	99%	
			42	100%	
	Total provisioning timer - LLU	Shared Pair or Raw Copper without customer visit	8	95%	€5 per working day with a maximum of €30
			18	99%	

			Working days	% of requests completed	Penalty
			42	100%	
	Total provisioning timer - LLU	Shared Pair or Raw Copper with customer visit	10	95%	€5 per working day with a maximum of €30
			20	99%	
			42	100%	
	Total provisioning timer - WBA	WBA VDSL2 without customer visit	8	95%	€5 per working day with a maximum of €30
			18	99%	
			42	100%	
		WBA VDSL2 without customer visit	10	95%	
			20	99%	
			42	100%	
		First time right installation (FTR) within 14 calendar days of provisioning closure date	Installations with customer visit + installations without customer visit except fault located at KVD/LDC, introduction box and NTP	98%	Compensation equal to the Activation Fee of the line
			Installations without customer visit including fault located at KVD/LDC, introduction box and NTP	93%	Compensation equal to the Activation Fee of the line

Figure 29 Advice of completion of order

		Working days	% of requests completed	Penalty
Open eir	Advice of completion of order following recording of request	By 1700 on the 1st working day following the working day of the requests was recorded on the UG.	90% of requests in accordance with performance metric	€ 12.70 per account affected per working day or part thereof of delay.
Proximus	Advice of completion of order following completion of order	Within one working day following the closure of the order (actual completion date).	98%	

Figure 30 Repairs

Repairs			Working days	% of requests completed	Penalty
Open eir		ULMP fault resolution – No line Test Data supplied by AS	3	73%	€4 per fault
			6	92%	€7 per fault
			11	100%	€10 per fault
Open eir		ULMP fault resolution– with line Test Data supplied by AS	2	73%	€4 per fault
			5	92%	€7 per fault
			10	100%	€10 per fault
Proximus		Repairs	Before the end of the second half working day following the opening of ticket	90%	150% of daily rental fee per calendar day
			Before the end of the fourth half working day following the opening of ticket	95%	
Open eir	Standalone NGA services (FTTC bitstream plus, FFTH bitstream plus, FTTC VUA, FTTH VUA), also includes POTS based services	Repair time (excluding "parked" time)	2	73%	€4 per fault
			5	92%	€7 per fault
			10	100%	€10 per fault

Note: the open eir penalty is calculated by: (number of faults subject to penalty) x (multiplier) x penalty, where the penalty is the €4, 7 or 10 that is in the table. The multiplier is calculated as the average penalty days for all fault tickets in breach up to a capped value.

A.2 Proximus

Proximus offer three relevant reference offers, these are:

- BROBA II – Proximus Reference Offer for Bitstream Access;
- BRUO – Proximus Reference Unbundled Local Loop Offer, and
- WBA VDSL2 – Wholesale Broadband Access VDSL2.

A.2.1 Provisioning timers

Provisioning timers – Provisioning of End-User Line

"*The provisioning of End-User Line is the activation of the ADSL/SDSL on the line of an individual End-User*."

In the scope of provisioning, eight indicators are used to measure the performance of Proximus. These are identified as:

- XML Validation Timer[62]
- Slot Availability (Open Calendar ordering interface)
- Appointment Kept
- Due Date Respected
- XML Done Timer
- Slot Availability after Small Network Adaptation (SNA) detection (Open Calendar Interface)
- Total Provisioning Timer (XML ordering interface)
- First Time Right (FTR) installation

These SLAs and SLGs are described in more detail below.

XML Validation Timer

Service Level Agreement

Validation/Rejection Timer	Percentage of orders validated or rejected within the corresponding validation timer
30 minutes	50%
2 working days	95%
5 working days	99%

Key Performance Indicator

The Bi-monthly computation is as follows:

$$\%\ \text{XML Validate}^{i} = \frac{\text{Number of orders for which the Validate (or Reject) XML is sent within timer}^{i}\ (1)}{\text{Total number of orders (2)}}$$

With i = {30 minutes; 2 working days; 5 working days}

[62] The XML Validation Timer gives the time between the VALIDATE/REJECT XML and the receipt of the order.

(3) Total number of orders, for the considered bi-monthly period, having the Validate or Reject XML sent within the i timer.
(4) Total number of orders validated or rejected during the considered bi-monthly period.

Slot Availability Timer Definition

Slot Availability measures the availability of the proposed slot with respect to the order date and to the applicable defined timers. Slot Availability is considered as respected if at least one slot is proposed within the defined timers or if at least one slot is proposed with respect to SRD (late SRD) for all works orders.

Service Level Agreement

Slot availability with be measured in two parts

- For ordered products not exceeding the volume forecasts (subject to SLA)
- For ordered products exceeding the volume forecasts (not subject to SLA).

For each ordered product subject to SLA, the first timeslot proposed must be within the following timer:

Type %	Slot Availability Without Visit in Working days	Slot Availability With Visit in Working days
95%	9	11
99%	19	22
100%	45	45

Key Performance Indicator

Bi-monthly computation is as follows:

$$\%\ \text{Slot Availability} = \frac{\text{Number of confirmed ordered products for which the first timeslot proposed is within timer (or at latest on SRD if SRD>timer) for all work orders}}{\text{Total number of confirmed ordered products}}$$

Appointment kept

Appointment Kept measures the number of orders with End-User visit that have respected all their End-User visit appointments.

Service Level Agreement

Minimum of 95% of orders with end-user visit must respect all their end user visit appointments.

Key performance indicator

Bi-monthly computation is as follows:

$$\%\ \text{Appointment Kept} = \frac{\text{Number of orders for which all End-User Visit appointments are kept}}{\text{Number of orders having at least one End-User Visit}}$$

Due Date Respect

Measures the number of orders for which all Due Dates were respected by Proximus. An order has respected the Due Date if the closure date is the same day as the Due Date communicated to the beneficiary of the order.

Service level agreement

Minimum 95% of orders must respect all Due Dates communicated to the beneficiary

Key performance indicator

Bi-monthly computation is as follows:

$$\%\ \text{Due Date Respected} = \frac{\text{Number of orders for which all due dates were respected}}{\text{Total number of orders}}$$

XML Done Timer definition

The XML Done Timer gives the elapsed time between the date of the XML Done and the actual completion date of the order. As soon as the implementations is done, Proximus will notify the beneficiary of the completion of the order. This confirmation is done by sending a message through email system. Each closure of an order triggers computation of the Done timer. The Done timer per order is computed as the elapsed time between actual completion date and ready for service date passed to the beneficiary via Done XML.

Service level agreement

Minimum 98% of the orders closed during the considered period must have the Done message sent within one working day following the closure of the order (actual completion date).

Key performance indicator

Bi-monthly computation is as follows:

$$\%\ \text{XML Done} = \frac{\text{Number of orders for which the done (reject) XML is sent within timer}}{\text{Total number of orders}}$$

Slot availability after small network adaptation (SNA) detection (open calendar interface)

Slot availability after SNA detection measures the availability of the proposed slot with respect to the order date and to the applicable defined timers. Slot availability after SNA detection is considered as respected if at least one slot is proposed within the defined timers or if at least one slot is proposed with respect to SRD (late SRD) for all work orders.

Service level agreement

For each ordered product subject to SLA, the first timeslot proposed must be within the following timers:

Type %	Slot Availability After SNA detection in Working days
85%	20
95%	29

99%	39

Key performance indicator

Bi-monthly computation is as follows:

$$\text{\% Slot availability after SNA detection} = \frac{\text{Number of confirmed order products for which the first timeslot proposes is within timer (or at the latest on SRD if SRD>timer) for all work orders for which SNA intervention is needed}}{\text{Total number of confirmed ordered products for which SNA intervention is needed}}$$

Total provisioning timer

The total provisioning timer is the elapsed time between the reception of the order XML and the Ready for Service date passed to the beneficiary through the XML Done message. The total provisioning timer includes a validation of an order, the implementation and the done notification.

Service level agreement

The total provisioning timer will be respected by Proximus are set out in the following table:

Service	Timers		
BROBA without customer visit	8 WD 95% incl. “done”	18 WD 99% incl. “done”	42 WD 100% incl. “done”
BROBA with customer visit	10 WD 95% incl. “done”	20 WD 99% incl. “done”	42 WD 100% incl. “done”

Key performance indicator

Bi-monthly computation is as follows:

$$\text{\% Total Provisioning Timer Respected} = \frac{\text{Total number of orders having respected their Total Provisioning Timer}}{\text{Total number of orders subject to Total Provisioning Timer}}$$

First time right installation (FTR)

The definition for a Non-FTR installation is a line brought into service by Proximus for which a repair ticket is created for this line by the beneficiary within fourteen (14) calendar days after provisioning closure date, giving a fault located on Proximus’s access network, and caused by Proximus or third party working for Proximus.

Service level agreement

The FTRs are to be respected by Proximus are:

% FTR	Applicable lines
98%	Installations with customer visit + installations without customer visit except fault located at KVD/LDC, introduction box and NTP

93%	Installations without customer visit including fault located at KVD/LDC, introduction box and NTP

Key performance indicator

$$\%\ \text{First Time Right} = \frac{\text{Total number of orders having respected the FTR}}{\text{Total number of orders subject to FTR}}$$

A.2.2 Repair times

Repair timers – Repair of End-User Line

The repair timer on the End-User line starts when Proximus receives a Trouble mention based on the issue description communicated by the Beneficiary and ends at the closure of this Trouble Ticket after the Beneficiary has received feedback from Proximus and has agreed with the closure of the ticket or hasn't reacted within 24 hours to Proximus's feedback. If an appointment is needed at the End-User address or at third party site and the problem resides on the End-User line, it is up to the Beneficiary to arrange an appointment at the End-User/Third Party premises.

Service Level Agreement

Minimum 90% of repair tickets should respect the following timer:

	Timer
Repair timer End-User line (to be respected by Proximus)	Before the end of the second half working day following the opening of ticket

Minimum 95% of repair tickets should respect the following timer:

	Timer
Repair timer End-User line (to be respected by Proximus)	Before the end of the fourth half working day following the opening of ticket

Key Performance Indicator

Bi-monthly computation is as follows:

$$\%\ \text{Repair Timer on End-User Line} = \frac{\text{Total number of repair trouble tickets} - \text{Total number of trouble tickets with Proximus responsibility not closed within the repair timer}}{\text{Total number of repair trouble tickets}}$$

A.2.3 Terms and conditions for compensation

Compensations are applicable per the Beneficiary in the cases that Proximus has not respected its commitment on provisioning and repair timers, excluding the cases in which the Beneficiary is responsible for the delay or in the case of force majeure. Compensations are calculated per timer without cascade effect, meaning that if a timer has been exceeded,

compensations will only be due for this single timer (e.g. if a problem occurs on the access line, compensation will be paid only for the OLO Access Line and not for the Ethernet Transport or the End-User line).

In order to determine the population of orders/tickets subject to compensations, the following method will be applied:

- Orders/tickets will be sorted in an ascending order according to their level of compliance with the SLA.
- The (100%-%SLA) of worst cases will be removed from the calculation of compensations.
- The other cases (% SLA -% KPI) will be subject to compensation (in case of positive value).

To assess whether or not OLO XYZ (the Access Seeker) is eligible for compensations the following checks will be done in case of a claim:

- Has Proximus met %SLA at BRxx level for OLO XYZ during calendar year 20xx?
- If no, Proximus will compute performance for the given OLO (%KPI) and identify the orders for which SLA was missed.
- In this example let's say that 100 cases were missed for OLO XYZ whose ordered volume for the calendar year was 1000.
- Out of these cases identified (100 in this example), Proximus will take out (100%-%SLA) (50 in this example) of the worst cases. The worst cases are determined on the total number of orders ((100%-%SLA) of 1000 = 50 in this example).
- Out of the remaining cases, Proximus will pay compensations ([Missed SLA: 100 orders] – [(100%-%SLA) worst cases: 50 orders] = 50 orders in this example)

Compensations may only be claimed by the Beneficiary when his aggregated KPI at BRxx level is inferior to the SLA for the whole calendar year. Illustration on compensations: reference is made to annex entitled 'Methodology regarding computation of compensations' documented on the Personal Page of Proximus Wholesale's website (in the section Regulated Services – BROBA – Reference Offer).

Compensations will be settled through a Beneficiary's invoice without VAT.

Together with an invoice, the Beneficiary must provide Proximus with the necessary information in case of a delayed Provisioning or Repair Timer or any shortage of Proximus that give cause for the compensations.

The Beneficiary will submit a detailed request for compensation to Proximus for the previous calendar year within maximum 4 months after the first working day of the following calendar year.

Non First Time Right Installation (Basic SLA)

These compensations are applicable as described in the section 'Terms and conditions for Compensations' of the Annex 5 Basic Service Level Agreement.

The compensation due by Proximus per Non First Time Right Installation related to a specific BROBA II line is equal to the Activation Fee of the BROBA II Service on this End-User line, as defined in the section 'Tariffs applicable for the End-User lines' of this document.

Compensations for Non First Time Right Installation will be settled through a Beneficiary's invoice without VAT.

Total Provisioning Timer Escalations (XML ordering Interface) (Basic SLA)

In cases that Proximus has not respected its commitment to provision the Beneficiary within the agreed minimum lead time, the Beneficiary will be entitled to a compensation per End-User line and per working day, according to the rules presented in the following table.

	Compensation
Provisioning Timer Escalation	€5 per working day with a maximum of €30

Appointment Not Kept (Basic SLA)

In cases that Proximus has not respected the committed percentage as indicated in the definition of the SLA, the Beneficiary will be entitled to a compensation per Appointment not kept in the relating period.

	Compensation
Per appointment not kept (at order level)	€20

Due Date Not Respected (Basic SLA)

In cases that Proximus has not respected the committed percentage as indicated in the definition of the SLA, the Beneficiary will be entitled to a compensation per Due Date not respected.

	Compensation
Per Due Date not Respected (at order level)	€40

Repair End-User Line Timer Escalations (Basic SLA)

The Beneficiary will be entitled to a compensation that corresponds to a percentage of the daily recurring fee per End-User line.

	Compensation
Repair Timer Escalations (to be respected by Proximus)	150% of daily rental fee per calendar day.

Proximus Reference ULL Offer[63]

The SLA scheme is based on the same eight steps as described above.

The total provisioning timer will be respected by Proximus are set out in the following table:

Service	Timers

[63] Proximus Reference ULL Offer. Raw Copper & Share Pair. Annex G1, Basic Service Level Agreement. Approved by BIPT on 10/10/2016 and partially taking into account the court decisions of 07/01/2015 and 29/06/2016

Shared Pair or Raw Copper without customer visit	8 WD 95% incl. “done”	18 WD 99% incl. “done”	42 WD 100% incl. “done”
Shared Pair or Raw Copper with customer visit	10 WD 95% incl. “done”	20 WD 99% incl. “done”	42 WD 100% incl. “done”

Additional Compensation

Non First Time Right Installation (Basic SLA)

The compensation due by Proximus per Non First Time Right Installation related to a specific BRUO line is equal to the Activation Fee of the BRUO Service on this End-User line, as defined in the section “One time fees” of this document.

Pre-provisioning Timer Escalations (Basic SLA)

	Compensation
Pre-provisioning Timer Escalations (to be respected by Proximus)	• In case of 15 working days to be respected by Proximus: compensation of €200 per working day delay. • In case of 40 working days to be respected by Proximus: compensation of €300 per working day delay • In case of quotation to be respected by Proximus: compensation of €400 per working day delay

Proximus Wholesale Broadband Access[64]

The SLA scheme is based on the same eight steps as described above.

The total provisioning timer will be respected by Proximus are set out in the following table:

Service	**Timers**		
WBA VDSL2 without customer visit	8 WD 95% incl. “done”	18 WD 99% incl. “done”	42 WD 100% incl. “done”
WBA VDSL2 without customer visit	10 WD 95% incl. “done”	20 WD 99% incl. “done”	42 WD 100% incl. “done”

A.2.4 Dispute resolution

Proximus agreements contain requirements that the persons appointed by the parties have *“sufficient authority or decision-making power concerning the matter at stake”* and also defines when a dispute can/should be escalated to the BIPT as the NRA. The following is an extract from Proximus’ BROBA:

Dispute Resolution Procedure

- *The [single point of contact (SPOC)] shall, on an ongoing basis, attempt to solve any dispute, controversy or claim between the parties concerning the*

[64] Wholesale Broadband Access VDSL2. Annex 4: Basic Service Level Agreement. Approved by the Belgian Institute for POSTal services and Telecommunications on 10/10/2016 and partially taking into account the court decisions of 07/01/2015 and 29/06/2016. Version 14

interpretation, application and implementation of the present the contract and its annexes (a "dispute") through discussions held in good faith.

- *In the event that the parties have been unable to solve any dispute, then upon notice of either party, each of the parties will appoint a designated senior business executive (other than their respective SPOC) whose task it will be to meet for the purpose of endeavouring to resolve the dispute. Each party shall ensure that their respective designated executive has sufficient authority or decision-making power concerning the matter at stake. The designated executives will meet as often as the parties reasonably deem necessary in order to gather and furnish to the other all information with respect to the matter in issue which the parties believed to be appropriate in connection with its resolution. Such executives will discuss the dispute and will negotiate in good faith in an effort to resolve the dispute without the necessity of any formal proceeding relating thereto.*
- *In the event the parties failed to reach such a solution and/or settlement within fifteen (15) working days as from the receipt of the above notice, they shall escalate the matter to a higher level within their respective organisations. Discussions at that level will be conducted as described in the paragraph above. The parties may, at any given escalation level, agreed to extend the time limits described in this article and in the article above when they consider it necessary in order to facilitate that an agreement be concluded on the subject matter of the dispute.*
- *Except in the cases of urgency, as determined in good faith by the party calling the dispute, no formal proceedings for the resolution of the dispute may be started until the earlier to occur of (a) a good faith conclusion by the designated executives that amicable resolution through continued negotiation of the matter in issue does not pay likely or (b) the parties have failed to reach an agreement on the dispute within 15 working days of the escalation of the dispute as described in the paragraph above.*
- *Without prejudice to the above and without prejudice to the rights of each party in case of dispute, each party shall be entitled to call on the BIPT for a decision for disputes regarding the interpretation of the present general terms and conditions and/or its annexes. In consideration of the legal framework, the relevant BROBA reference offer and the relevant BIPT advice on the BROBA, BIPT will take a decision.*

A.3 Open eir

Access Reference Offer (ARO)[65] sets out the services and terms and conditions relating to access products including: physical collocation, line sharing, and on bundled local metallic path.

The wholesale bitstream access reference offer (WBARO)[66] states that the services and terms and conditions relating to the bitstream access products for both standard and minimum term contracts. In addition to the actual terms

[65] Access Reference Offer from eircom Limited, Version 8, 03/01/2017, www.openeir.ie

[66] Wholesale Bitstream Access Refrence Offer from eircom Limited, Version 3.4b, 13/11/2015, www.openeir.ie

conditions, the reference offer also includes a pricelist, product description and SLAs.

A.3.1 SLA

Account/line status enquiry

Activity number	Activity description	Performance metric	Performance target	Service credit for not meeting performance metric target
1	DRL order type	Advice of completion of the accepted order by 1700 on the 1st working day following the working day of the requests was recorded on the UG.	90% of requests in accordance with performance metric	€ 12.70 per account affected per working day or part thereof of delay.

ULMP, LS and GLUMP standard validations timeframes

4	Order validation - acceptance or rejection of an order for ULMP	Advice of acceptance of the order by 17:00 hours on the working day the request was recorded on the UG	98% of requests in accordance with performance metric	€ 12.70 per account affected per working day or part thereof of delay

ULMP, LS and GLUMP standard delivery timeframes

12	Delivery notification - provision of ULMP on a working line	Advice of completion of accepted order by 1700 on the 5th working day following order submission	95% of requests in accordance with performance metric	€ 12.70 per account affected per working day or part thereof of delay

Fault repair service level summary

For the purposes of this SLA, a fault is defined as any reported condition ULMP/LS access network circuit which does not meet eircom's operational PSTN standards, as defined in the access reference offer, Annex C, service schedules 102, 103 and 106, appendix 1.

The Access Seeker is responsible to undertake initial testing to prove the fault to the eircom local loop circuit, prior to submitting a valid full report.

The Access Seeker is also responsible to prove all faults out of its own equipment and the port associated with the line and perform CPE testing before reporting the fault, which would then be accepted by eircom.

Fault Resolution

ULMP Faults – No line Test Data supplied by AS

Activity number	Activity description	Performance metric	Performance target	Service credit for not meeting performance metric target
22a	Resolution of ULMP fault	Repair time - 3 working days	Target 73%	€4.00
22b		Repair time - 6 working days	Target 92%	€7.00
22c		Repair time - 11 working days	Target 100%	€10.00

ULMP Faults – with line Test Data supplied by AS

Activity number	Activity description	Performance metric	Performance target	Service credit for not meeting performance metric target
23a	Resolution of line share fault or ULMP default with test results	Repair time - 2 working days	Target 73%	€4.00
23b		Repair time - 5 working days	Target 92%	€7.00
23c		Repair time - 10 working days	Target 100%	€10.00

Repair service credit algorithm- ULMP faults-no line test data provided by Access Seeker

Three-day repair

Target	Actual performance	Service credit
73% repair in 3 days	X% = actual 3-day repair performance	Euro 4.00
92% repair in 6 days	Y% = actual 6-day repair performance	Euro 7.00
100% repair in 11 days	Z% = actual 11-day repair performance	Euro 10.00

Faults repaired and applicable for SLA payment for the quarter are assembled to give “List 1”:

List 1 = all tickets assessed under SLA for that period

List 2 = all tickets closed after day 3

List 3 = all tickets closed after day 6

List 4 = all tickets closed after day 11

List 5 = List 2 minus List 3 - all tickets closed on day 4 through 6

List 6 = List 3 minus List 4 -all tickets closed on days 7 through 11

C(x) = count of tickets in a given list

A(x) - average of tickets in a given list

Σ(x) - cumulative ticket days in a given list

73% service credit calculation

Where this SLA is not met, the SLA penalty penalises days 4 to 6 of all tickets in breach. The 73% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(2)-C(1)*(1-0.73)

Multiplier

Penalty days (multiplier) = (Σ(5)-2*C(5)+3C(6)+3C(4))/C(2) - average penalty days all tickets in breach or after day 7 are deemed to have breached this SLA by the maximum 3 days.

Service credit 1 = (number of faults subject to penalty) * (multiplier) * penalty

93% service credit calculation

Where this SLA is not met, the SLA penalty penalises days 7 to 11 of all tickets in breach. The 92% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(3)-C(1)*(1-0.92)

Multiplier

Penalty days (multiplier) = (Σ(6)-6*C(6)+5*C(4))/C(3) - average penalty days all tickets in breach or after day 12 are deemed to have breached this SLA by the maximum 5 days.

Service credit 2 = (number of faults subject to penalty) * (multiplier) * penalty

100% service credit calculation

Number of faults subject to penalty

Number of faults subject to penalty = C(4) (counts all tickets close on or after day 12)

Multiplier

Penalty days (multiplier) = (Σ(4)-11*C(4))/C(4)

Service credit 3 = (number of faults subject to penalty) * (multiplier) * penalty

Total service credit = service credit 1 + service credit 2 + service credit 3

Repair service credit algorithm-line share faults with line test data provided by Access Seeker

Two-day repair

Target	Actual performance	Service credit
73% repair in 2 days	X% = actual 2-day repair performance	Euro 4.00
92% repair in 5 days	Y% = actual 5-day repair performance	Euro 7.00
100% repair in 10 days	Z% = actual 10-day repair performance	Euro 10.00

Faults repaired and applicable for SLA payment for the quarter are assembled to give “List 1”:

List 1 = all tickets assessed under SLA for that period

List 2 = all tickets closed after day 2

List 3 = all tickets closed after day 5

List 4 = all tickets closed after day 10

List 5 = List 2 minus List 3 - all tickets closed on day 3 through 5

List 6 = List 3 minus list 4 -all tickets closed on days 6 through 10

C(x) = count of tickets in a given list

A(x) - average of tickets in a given list

Σ(x) - cumulative ticket days in a given list

73% service credit calculation

Where this SLA is not met, the SLA penalty penalises days 3 to 5 of all tickets in breach. The 73% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(2)-C(1)*(1-0.73)

Multiplier

Penalty days (multiplier) = (Σ(5)-2*C(5)+3C(6)+3C(4))/C(2) - average penalty days all tickets in breach or after day 6 are deemed to have breached this SLA by the maximum 3 days.

Service credit 1 = (number of faults subject to penalty) * (multiplier) * penalty

93% service credit calculation

Where this SLA is not met, the SLA penalty penalises days 6 to 10 of all tickets in breach. The 92% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(3)-C(1)*(1-0.92)

Multiplier

Penalty days (multiplier) = (Σ(6)-5*C(6)+5*C(4))/C(3) - average penalty days all tickets in breach or after day 11 are deemed to have breached this SLA by the maximum 5 days.

Service credit 2 = (number of faults subject to penalty) * (multiplier) * penalty

100% service credit calculation

Number of faults subject to penalty

Number of faults subject to penalty = C(4) (counts all tickets close on or after day 11)

Multiplier

Penalty days (multiplier) = (Σ(4)-10*C(4))/C(4) - average penalty days all tickets in breach or after day 6 are deemed to have breached this SLA by the maximum 3 days.

Service credit 3 = (number of faults subject to penalty) * (multiplier) * penalty

Total service credit = service credit 1 + service credit 2 + service credit 3

Openeir's Next Generation access bitstream plus and VUA SLA version 2

This service level agreement is effective from October 1, 2006. This document details service levels to which open-eir commits with regard to the provision repair of Next Generation access products, hereinafter referred to as NGA products. The service is at all times provided subject the time to the terms and condition set out in the published reference offer for Bitstream plus and VUA products.

The stand-alone NGA products in scope for this service delivery schedule are:

- stand-alone FTTC bitstream plus
- stand-alone FTTH bitstream plus
- stand-alone FTTC VUA
- stand-alone FTTH VUA

Openeir commits to deliver 100% of stand-alone bitstream plus/VUA provide orders by their agreed appointment date following successful validation and subject to the provisions set out in the SLA.

Activity description	Performance metric	Contractual payment for not meeting performance metric target
Delivery of NGA stand-alone services including NTU	100% of validated orders by appointment subject to stated exclusions	See penalty calculation below
Delivery of NGA stand-alone services excluding NTU	100% of validated orders by appointment subject to stated exclusions	See penalty calculation below

Penalty calculation for stand-alone NGA products including NTU installation

Openeir shall be liable to pay a fixed penalty for non-compliance of delivery of service.

The penalty is completed based on the following formula:

a) A flat fee of €30 will remain in place until alternative calculation is agreed.
b) For the avoidance of doubt, the target is to commence installation work within the appointment and in cases where the installation is completed on the appointment date but outside appointment, then openeir will be deemed to have met the performance metric. The appointment day provides flexibility at the local level for the end user/operator and the openeir technician at their mutual convenience, to agree to adjust the actual appointment time; in this case a penalty would not apply.
c) The rule in a) applies to each instance of appointment missed by openeir for that order.

Penalty calculation for stand-alone NGA products excluding NTU installation

The penalty is completed based on the following formula:

a) A flat fee of €30 will remain in place until alternative calculation is agreed.
b) For the avoidance of doubt, the target is to commence installation work within the appointment and in cases where the installation is completed on the appointment date but outside the appointment, then openeir will be deemed to have met the performance metric. The appointment day provides flexibility at the local level for the end user/operator and the openeir technician at their mutual convenience, to agree to adjust the actual appointment time; in this case a penalty would not apply.
c) The rule in a) applies to each instance of appointment missed by openeir for that order.

POTS-Based Service delivery schedule

The POTS based NGA products in scope for this section of the service delivery schedule are:

- POTS based FTTC bitstream plus
- POTS based FTTH bitstream plus
- POTS based FTTC VUA
- POTS based at FTTH VUA

In the case of POTS based NGA services for this schedule the clock only begins when the PSTN line has been delivered or is already operating. The metrics in the schedule only pertains to the bitstream plus/VUA element of the service. Openeir commits to deliver 100% of POTS based bitstream plus/VUA provide orders by their agreed appointment date following successful validation and subject to the provisions set out in this SLA.

Activity description	**Performance metric**	**Contractual payment for not meeting performance metric target**
Delivery of NGA services including NTU	100% of validated orders by appointment subject to exclusions	See penalty calculation below
Delivery of NGA stand-alone services excluding NTU	100% of validated orders by appointment subject exclusions	See penalty calculation below

Penalty calculation for POTS based NGA products including NTU installation

The penalty is completed based on the following formula:

a) A flat fee of €30 will remain in place until alternative calculation is agreed.
b) For the avoidance of doubt, the target is to commence installation work within the appointment and in cases where the installation is completed on the appointment date but outside the appointment, then openeir will be deemed to have met the performance metric. The appointment day provides flexibility at the local level for the end user/operator and the openeir technician at their mutual convenience, to agree to adjust the actual appointment time; in this case a penalty would not apply.
c) The rule in a) applies to each instance of appointment missed by openeir for that order.

Penalty calculation for POTS based NGA products excluding NTU installation

For every working day of delay in the provision of service against the original appointment date, openeir shall be liable to pay a penalty for non-compliance of delivery of service.

The penalty is completed based on the following formula:

a) A flat fee of €30 will remain in place until alternative calculation is agreed.
b) For the avoidance of doubt, the target is to commence installation work within the appointment and in cases where the installation is completed on the appointment date but outside the appointment, then openeir will be deemed to have met the performance metric. The appointment day provides flexibility at the local level for the end user/operator and the openeir technician at their mutual convenience, to agree to adjust the actual appointment time; in this case a penalty would not apply.
c) The rule in a) applies to each instance of appointment missed by openeir for that order.

Repair

Repair time is defined as the duration between the time the fault is received, validated and accepted by openeir in accordance with the fault reporting procedures and the time the fault is closed by openeir and marked as “Pending Clear”, less Parked Time.

Once the fault has either been accepted by the operators as closed or 16 working hours has elapsed from the “Pending Clear” notification, the fault ticket is un-parked and given a “Clear-permanent” status together with an associated final clear code and the fault ticket is closed.

Fault:

The POTS based bitstream plus and POTS based VUA services requires that the end user has a working PSTN line connected to the open-eir network before their bitstream plus/VUA can be provided. A bitstream fault, therefore, is a problem in the open-eir network which prohibits an end user’s bitstream plus/VUA service, while the end user still has the ability to make or receive calls to or from open-eir’s switched network.

The POTS based bitstream plus and POTS based VUA covered by this SLA are defined as only those faults associated with or occurring from the bitstream plus and VUA reports to the handover points in the operator, unless excluded as defined in appendix 2.

Stand-alone repair schedule

The NGA products in scope for this section the repair schedule are:

- stand-alone FTTC bitstream plus
- stand-alone FTTH bitstream plus
- stand-alone FTTC VUA
- stand-alone FTTH VUA

Activity description	Performance metric	Performance target	Contractual payment for not meeting performance metric target
Resolution of stand-alone NGA fault	Repair time: 2 working days	Target 73%	€4
Resolution stand-alone NG fault	Repair time: 5 working days	Target 92%	€7
Resolution of stand-alone NGA fault	Repair time: 10 working days	Target 100%	€10

POTS based SLA metrics

The NGA products in scope for this section the repair schedule are:

- POTS based FTTC bitstream plus
- POTS based FTTH bitstream plus
- POTS based FTTC VUA
- POTS based FTTH VUA

Activity description	Performance metric	Performance target	Contractual payment for not meeting performance metric target

Resolution of POTS based NGA fault	Repair time: 2 working days	Target 73%	€4
Resolution POTS based NG fault	Repair time: 5 working days	Target 92%	€7
Resolution of POTS based NGA fault	Repair time: 10 working days	Target 100%	€10

Appendix 1-penalty algorithm

Target	**Actual performance**	**Penalty**
73% repair in 2 working days	X% = actual 2 day repair performance	€4
92% repair in 5 working days	Y% = Actual 5 Day Repair Performance	€7
100% repair in 10 Working days	Z% = Actual 10 Day Repair Performance	€10

Faults Repaired and applicable for SLA payment for the quarter are assembled to give "List 1".

List 1 = all tickets assessed under SLA for that period

List 2 - All tickets closed after Day 2

List 3 = All tickets closed after Day 5

List 4 = All tickets closed after Day 10

List 5 = List 2 minus List 3 – all tickets closed on days 3 through 5

List 6 = List 3 minus List 4 – all tickets closed on days 6 through 10

C(X) = count of tickets in a given list

A(X) – average ticket days in a given list

Σ(X) = cumulative ticket days in a given list.

73% penalty calculation

Where this SLA is not met, the SLA penalty penalises days 3 to 5 of all tickets in breach. The 73% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(2)-C(1)*(1-0.73)

Multiplier

Penalty days (multiplier) = (Σ(5)-2*C(5)+3C(3)+3C(4))/C(2) - average penalty days all tickets in breach or after day 6 are deemed to have breached this SLA by the maximum 3 days.

Penalty 1 = (number of faults subject to penalty) * (multiplier) * penalty

93% penalty calculation

Where this SLA is not met, the SLA penalty penalises days 6 to 10 of all tickets in breach. The 92% target mitigates the commercial impact of this article.

Number of faults subject to penalty

Number of faults subject to penalty = C(3)-C(1)*(1-0.92)

Multiplier

Penalty days (multiplier) = (Σ(6)-5*C(6)+5*C(4))/C(3) - average penalty days all tickets in breach or after day 11 are deemed to have breached this SLA by the maximum 5 days.

Penalty 2 = (number of faults subject to penalty) * (multiplier) * penalty

100% Penalty calculation

Number of faults subject to penalty

Number of faults subject to penalty = C(4) (counts all tickets close on or after day 11)

Multiplier

Penalty days (multiplier) = (Σ(4)-10*C(4))/C(4)

Penalty 3 = (number of faults subject to penalty) * (multiplier) * penalty

A.3.2 Guidelines for payment of penalty credits

Openeir should provide operators with penalty statements one month in arrears of measurement. With payment made in the next billing cycle. The applicable penalty to be paid as difference between actual % achieved and the target %.

In the event that the operators of the opinion that penalty liability has been incorrectly calculated than a claim must be submitted in writing.

In the case of a query, any supporting documentation must be supplied within 10 working days of request by openeir.

Any adjustment will be remitted by way of credit against the account associated with the claim.

A.3.3 Monitoring

Eircom shall be responsible for monitoring and measuring performance metrics and shall report on the agreed metrics on a monthly basis for provision and a quarterly basis for repair. Provisional performance reports will be provided within 20 working days of the end of the month. Repair performance reports will be provided within one month of the end of the reporting quarter.

A.3.4 Dispute resolution

In the example of eir, shown below, provisions are provided for the escalation of a dispute. This is facilitated by a clearly defined timeline for the dispute resolution.

- *This clause shall not be applicable to disputes arising in respect of the following clauses of the licence(s), clause 11.3, payment of licence fee, and clause 11.5, material breach.*
- *Save as provided in [the clause above], each party shall use its best endeavours to resolve any disputes arising concerning implementation, application or interpretation of this agreement in the first instance through negotiation between*

the parties through the normal contact. This phase of the dispute resolution is to be referred to as 'level I'.

- *In the event of the parties failing to resolve the dispute at level I negotiation within two weeks either party shall have a right to invoke the dispute procedures specified herein on the service of notice ("the dispute notice") on the other party. The party serving the notice ("the disputing party") shall include in the dispute notice all relevant details including the nature and extent of the dispute.*
- *Service of the dispute notice shall constitute escalation to level II. Level II shall consist of consultation between the parties in good faith to resolve the dispute.*
- *If the endeavours of the parties to resolve the dispute at level II are not successful within two weeks of escalation of the dispute to level II, either party may upon service of notice ("the level III notice ") on the other, escalate the dispute for determination by the national regulator, hereinafter referred to as level III. The level III notice shall be served on both the national regulator and the other party. The level III notice shall include all details relevant to the dispute together with a submission from both parties as to the nature and extent of the dispute.*
- *The level I dispute notices shall be served [on the provided level I and level II contacts contained in the agreement between the parties].*
- *Time limits specified may be extended by mutual agreement between the parties.*
- *The above procedures are without prejudice to any rights and remedies that may be available to the parties in respect of any breach of any provision of this agreement. Any dispute or queries that arise in relation to the charges or invoices furnished by [operator] to the access seeker are subject to the dispute resolution provisions of this clause.*[67]

Disputes are often relating to disagreements on the billing between operators. Withholding of payments between parties can lead to financial distress and therefore best practice has evolved so that it is only the disputed amount of the billed value is withheld pending the resolution of the dispute. The eir agreement contains the following on this issue:

- *Where a dispute arises in relation to an amount payable in respect of an invoice than the access seeker shall be entitled to withhold payment of the disputed amount due for payment, upon serving [the operator] with the level I notice provided that the disputed amount is greater than 10% of the total invoice amount due for payment.*
- *Where the access seeker invokes the provision of this clause after the due date of a disputed invoice, then the access seeker shall not be entitled to withhold any portion of the amount due and payable.*
- *Following resolution of the dispute, the parties will issue a credit or tender payment as appropriate.*

[67] Access Reference Offer, eircom Wholesale, version 8

ANNEX B DESCRIPTION OF STAKEHOLDER ENGAGEMENT

Following our assessment of the broadband regulations in Luxembourg,[68] Frontier Economics engaged with stakeholders to gain a deeper understanding of the impact of broadband regulation. In this annex, we summarise the information provided by stakeholders as part of this engagement.

Frontier engaged with a wide range of stakeholders in the Luxembourg broadband market including the incumbent, access seekers, operators with competing infrastructure and operators that are licensed to operate in Luxembourg but are not currently active.

Given the large number of potential stakeholders, we divided the list of stakeholders into three main categories (as set out in the figure below) and engaged with each category in different ways (as described in the rest of this section).

Figure 31 Categorisation of stakeholders

Category 1- Larger network operators	Category 2- Larger access seekers	Category 3- Smaller access seekers and OPAL[69]
POST Technologies	POST retail	OPAL
SFR	Tango (now includes Telindus)	Join Experience
Eltrona	Luxembourg Online SA	Mix VOIP
Cegecom	Orange	Innovative Solutions for Finance S.à r.l
	Visual Online	Luxnetwork S.A.
	Telkea	
	Data Centre Luxembourg	
	Cloud Managed Data	

B.1 Face to face meetings with stakeholders

We carried out face to face meetings with Category 1 and 2 stakeholders at the ILR's offices in Luxembourg. Figure 32 below provides the schedule for the meetings held on 9 and 10 November 2016. We note that Telkea and, Data Centre Luxembourg and Cloud Managed Data were unable to attend the meetings and were therefore sent the questionnaire (see below).

Figure 32 Schedule for meetings

Day	Timeslot	Operator
9 November 2016	11h30 -12h30	Coditel S.à r.l. / SFR
	14h00 - 15h00	Visual Online S.A.

[68] As set out in report to the ILR dated 21 October 2016.

[69] This list was proposed by the ILR.

Day	Timeslot	Operator
	15h00 - 16h00	Cegecom S.A.
	16h00 - 17h00	Eltrona Interdiffusion S.A.
10 November 2016	9h30 - 10h30	Entreprise des postes et télécommunications
	10h30 - 11h30	POST Telecom S.A.
	11h30-12h30	Orange Communications Luxembourg S.A.
	14h00 - 15h00	Luxembourg Online S.A.
	15h00 - 16h00	Tango S.A.

The text box below summarises the topics that were discussed with stakeholders in these meetings. The ILR did not attend the meetings so that stakeholders would feel more comfortable raising any sensitive issues.

TOPICS FOR DISCUSSION WITH STAKEHOLDERS

1. General questions about the market:
   - Levels of broadband customer satisfaction in Luxembourg;
   - Evolution of technology shares over time and underlying causes; and
   - Opportunities for entry and expansion in the market.
2. Network investment:
   - Factors influencing decisions relating to network expansion; and
   - Views on the impact of the law transposing the cost reduction directive on deployment of NGA networks.
3. Role of the ILR:
   - In drafting and implementing regulation; and
   - In dispute resolution.
4. Other concerns or comments, if any, regarding:
   - KPIs;
   - Equivalence of inputs; and
   - Any other regulation

B.2 Stakeholder questionnaires

The ILR sent operators in Category 3 a detailed questionnaire that was developed by Frontier Economics (a copy is contained in an annex to this report). We considered that a questionnaire would be the most appropriate way of engaging with smaller access seekers given their resource constraints. Also, we consider that these operators are unlikely to face very different issues to the operators in Category 2, particularly given that we met with a relatively large number of operators in Category 2.

4 November 2016

A REVIEW OF BROADBAND REGULATIONS

Questionnaire for stakeholders

The ILR has commissioned Frontier Economics to provide an assessment of the effectiveness of existing broadband regulations. As part of our review, we are engaging with stakeholders in the market.

This questionnaire will help us gain a deeper understanding of the issues in the Luxembourgish broadband market, if any.

STRUCTURE OF THIS QUESTIONNAIRE

We have grouped our questions into the following categories:

- General questions about the market;
- The role of the ILR;
- Network investment;
- Availability of suitable access products;
- Questions relating to regulations:
  - Reference offers;
  - KPIs; and
  - Equivalence of inputs.
- Any other concerns.

QUESTIONS FOR STAKEHOLDERS

General questions about the market

1. Do you have any information about levels of broadband customer satisfaction in Luxembourg?
   a. How does this vary between household and business customers?
2. The market share of cable television operators has remained relatively stable over time. What do you consider are the reasons for this?
3. To what extent do you think the bundling of voice, data and TV services is becoming increasingly important in Luxembourg?
4. What do you see as the main opportunities for entry and expansion in the market? What do you consider as being the main threats to realising these (commercial, regulatory, legal, technical, etc.)?

Role of the ILR

5. Do you consider that the ILR could play a greater role in promoting competition in the market? What would that role look like?

Network investment

6. To what extent do you consider your requirements as access seekers are taken into account when Post is developing its network?
7. To what extent do you consider the law transposing the cost reduction directive will facilitate the deployment of NGA networks?
8. What factors do you think influence Post Technologies' decision regarding:
   a. Its NGA expansion; and
   b. Its choice of technology in doing so (vectoring/ P2P fibre /PON)

Availability of suitable access products

Factors driving the choice of access product

9. Do you have a preference for providing services using copper rather than fibre, or vice versa, and why?
10. What are your views on the commercial viability of the fibre unbundling products?
11. Do you have a preference for physical unbundling or bitstream/resale and why?
12. Do you have a preference for resale or bitstream and why?
13. Do you face any barriers in acquiring your preferred wholesale product?
14. Do you face any difficulties in migrating from one wholesale product to another or between technologies? If so, please elaborate.

15. Do you consider that there is sufficient availability and access to space for co-location services?

16. What are your views on the effectiveness of the Economic Replicability Test in promoting competition in the retail market?

Features of access products and their implications

17. Do you try to differentiate your retail offer through its technical characteristics or through pricing/commercial offers or both?
    a. What factors influence this choice?
    b. To what extent do you consider that customers would have a preference for differentiated products?

18. If you consider that bundling is valued by customers and your company seeks to offer such services, do you have access to the necessary wholesale products from Post (in terms of both price and technical specification)?

Other regulations

Reference offers

Ease of use and completeness

19. How easy do you find it to follow the processes, terms and conditions of the Reference Offers?

20. Do the services provided in the Reference Offers meet your requirements as an access seeker in terms of the speeds offered and other features?

21. Do you face any barriers in providing IPTV using the wholesale products offered by Post?

22. Do individual SLAs include levels of service for standard products?

23. To what extent have you experienced issues with the forecasting requirements in the ROB and/or the ROLL?

24. To what extent do you think that the process for ordering new wholesale products from Post (i.e. products that do not necessarily exist already or are not included in the reference offers) is efficient?

Compliance

25. Have you ever faced issues over wholesale billing?

26. Have you ever had cause to challenge a POST Technologies site survey for co-location or duct access?

27. Have you ever faced issues in ensuring that service level agreements are complied with?

28. Do you have any other suggestions to improve the Reference Offers?

KPIs

1. Do the KPIs allow you to effectively monitor non-discrimination?
2. Do you have concerns regarding the process for reporting a poor performance on the KPIs to the ILR?

Equivalence of inputs

29. Are you happy with the speed with which you are able to roll-out commercial offers using any new wholesale products or to adapt to any changes in the wholesale products?
30. Do you consider that you are able to compete with Post Retail on an equivalent basis? If not, what are your specific concerns?

Other concerns

31. Are there any other concerns or comments you would like to raise that have not been covered by the above questions?

ANNEX C SUMMARY OF STAKEHOLDER INTERVIEWS

[✂ confidential]

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