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BEREC Progress Report on managing copper network switch-off

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Contents

Executive Summary

Following BEREC (22) 69 Report on a consistent approach to migration and copper switch-off, this report aims at providing an update on the progress of copper switch-off in Europe, and gathering relevant lessons learnt in the most advanced countries, both on the process itself and its regulation. It is based on a survey conducted in spring 2024 answered by 31 European NRAs including the 27 EU countries.

The survey shows substantial progress on fibre roll out and take-up at European level.

As regards migration and copper switch-off, the data suggests some progress since 2022. The number of countries where the NRA has set rules for the transition process has significantly increased, as did the number of countries where legacy network elements have already been closed.

Just over half of the SMPOs have announced their intention to close (parts of) their legacy network. However, most NRAs expect the total closure will not be achieved until 2030.

NRAs have started to impose rules to regulate the copper switch-off process, mostly through market analysis decisions. The most common obligation is the introduction of notice periods and the definition of an appropriate alternative wholesale access product. The notice period takes usually between 6 months and 2 years, but in some cases it reaches 3 or even 5 years. Most NRAs also imposed data sharing from the SMPO, most of the time with the NRA and/or the ANOs.

Since the 2022 Report, we have also seen an evolution of the legal framework. The new "Gigabit Connectivity Recommendation" (Gigabit Recommendation)[1] provides recommendations regarding the migration and copper switch-off process. Among other things, it introduces the possibility to allow an intermediate step in the process of copper switch-off: a commercial closure. In practice, 12 countries have introduced it in their regulation, often with a shorter notice period of a few months, but sometimes more. The criteria for commercial closure are often similar to switch-off criteria (mostly VHCN availability).

The same recommendation suggests the introduction of a wholesale substitution matrix to ensure that alternative wholesale access products are available when copper is switched off. In practice, few NRAs have already conducted this exercise. However the availability of at least some specific wholesale access products is generally one of the criteria to be met before closing the network and it has been specified with precise rules by NRAs, such as an obligation to provide a reference offer and KPIs and SLGs. Most commonly, this product is VULA or bitstream.

We observe that in the wholesale access market, prices of the switched-off legacy product tend to be lower than the alternative product that is closest in terms of performance. The NRAs typically apply price regulation to the legacy copper-based wholesale access products and the

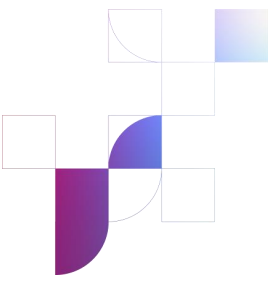
[1] Commission Recommendation on the regulatory promotion of gigabit connectivity, C(2024) 523 final of 6.2.2024. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=PI_COM%3AC%282024%29523

alternative wholesale access products in a market analysis procedure and, therefore, BEREC considers that there may be no need for further rules on the migration costs.

The main issues identified during the first switch-off exercises conducted so far in Europe are the difficulty to avoid forced migrations, and migration issues. In almost all countries where at least some parts of the copper network have been switched-off, a few percent of end users had to be forcibly switched off, leading some countries to postpone some switch-off steps. On the other hand, a longer notice period and efficient communication seem to have a positive impact on that issue. Regarding the technical migration, only a few countries encountered problems. The most common technical problems that occurred were service interruptions and insufficient information sharing with the end users.

The key actions that NRAs have undertaken to facilitate migration and copper switch-off, concern (1) efforts around communication with the end-users, (2) ensuring the availability of adequate alternative wholesale access products, and (3) the implementation of an appropriate notice period.

Regarding (1) communication, BEREC notes that several NRAs highlight that one of the main difficulties lies in the ability to get trust from the end-user, who may for instance think this kind of communication is only a commercial attempt to sell more expensive products or get new clients. Good practices observed are based on a complementary approach between operators' communication towards their clients, and a communication with no visible link with a given operator (either State communication, or information from operators in a neutral format without any logo for instance). Besides, many NRAs point out the need to communicate not only to the end-users, but to all stakeholders, with relevant information adapted to them: alternative operators are often mentioned, but this can also include for instance city councils. Finally, special attention needs to be paid to the needs of vulnerable and older customers that may be more difficult to reach with relevant information in order to avoid a forced switch-off if possible. Regarding (2) the availability of alternative products, NRAs should take into account both the mass market and the business market, which comes with specific needs. BEREC considers that through the substitution matrix approach, the characteristics of the alternative product will be considered, as several factors need to be taken into account like technical characteristics (data rates…), Service Level Agreements (SLAs), price, etc., even though the way they have to be assessed and any target in terms of performance would require a dedicated analysis this report cannot propose. Finally, regarding (3) the implementation of an appropriate notice period, BEREC recognises that there is a wide variability across Europe, but notes that a significant correlation is made with the nature of the regulated product: the more investment the use of the regulated product requires from the alternative operator (like unbundling vs. bitstream for instance), the longer the notice period required. To preserve competition, BEREC considers this to be a good practice, even though the specific situation of each market has also to be taken into account to adapt these periods.



Finally, BEREC notes that in its White Paper on "How to master Europe's digital infrastructure needs?"[2], the European Commission suggested the imposition of target dates on copper switch-off in order to boost transition to fibre. This report shows that 10 countries (8 of which are EU Member States) expect that the main milestone – total switch-off by 2030 – is going to be reached in the given current timelines. On the other hand, in 14 countries (11 of which are EU Member States) no switch-off plans have yet been announced by the SMP operator. This seems to be correlated with the current dynamic of fibre deployments, in a context where some countries experience more difficulties than others, from lack of civil engineering infrastructure to weather issues impacting outside works. Uniform targets across all member states as suggested by the White Paper thus seem overly ambitious and may not be the most appropriate tool to tackle the vastly different situations across Member States, as explained in BEREC's opinion on the White paper. BEREC further wishes to stress the need for an appropriate level of end-user protection, which requires adequate notice periods, end-user information and the availability of alternative comparable access products at a comparable price.

1. Introduction and objective

The European Electronic Communications Code (EECC) sets out the expectation that NRAs should be able to monitor network operators' initiatives for the migration from legacy copper networks to VHCN and to facilitate this process by, where necessary, establishing the conditions for an appropriate migration process.

In Article 81, the EECC lays down rules for the migration from legacy infrastructure and the decommissioning of the copper-based access networks. According to this provision, the SMP operators have to notify the NRA in advance and in a timely manner when they plan to decommission parts of the network. The NRA has to ensure that the decommissioning process follows a transparent timetable and that conditions, including an appropriate notice period for transition are in place. The NRA also has to establish the availability of alternative products of at least comparable quality if necessary to safeguard competition and the rights of end-users. The NRAs also have to take into utmost account the new Gigabit Recommendation[3] which also includes recommendations for the decommissioning of the copper network.

The Commission White Paper "How to master Europe's digital infrastructure needs?" of February 2024 identifies the migration from legacy copper to newly deployed fibre networks as a key process to facilitate the transition towards the new connectivity ecosystem and as a contribution to the EU's green objectives. At the same time, the White Paper suggests that migration and copper switch-off will promote the take-up of new services and thus contribute

[2] Commission White Paper "How to master Europe's digital infrastructure needs?", COM (2024)81 final of 21.2.2024. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2024%3A81%3AFIN

[3] Ibid. footnote 3

to increasing the return on fibre investment and support the achievement of the Digital Decade targets.[4]

The new “Gigabit Recommendation”[5] provides recommendations regarding the migration and copper switch-off process. It includes the possibility to include a "commercial closure" step in the process of copper switch-off. Moreover, it provides guidance on the way NRAs should take fibre roll-out and NGA products into account in their control of the availability of alternative products before copper switch-off. It additionally includes the possibility of the creation, under certain conditions, of price incentives for migration.

BEREC is fully committed to work on topics related to improving the conditions for the expansion and take-up of VHCN across Europe and which ensures a smooth transition from legacy infrastructures.

Managing the copper network switch-off of SMP operators is an ongoing process. It is particularly important to safeguard competition and the rights of end-users. The objective of this project is therefore to examine the progress made by the NRAs and the lessons learned so far in order to best prepare for the copper switch-off phase, when significant or the majority of elements of the copper access network will be switched off. The progress will be mainly measured against the findings of the BEREC Report on a consistent approach to migration and copper switch-off published in 2022.[6] Moreover, this report seeks to provide NRAs a European context for their national monitoring of migration and copper switch-off.

This report draws on BERECs previous work, in particular on the lessons learned at BEREC’s internal workshop on the migration to VHCN networks and copper switch-off with a focus on the needs of the end-users in September 2023 and the BEREC internal workshop on migration from legacy infrastructures to fibre-based networks in 2019.[7]

The report is based on data provided by the NRAs of 31 European countries.[8] It gives an overview of the current status of the SMPO’s migration and switch off progress and its further copper switch-off plans in chapters 2, 3 and 4. In the following chapter 5, a more detailed

[4] Ibid. footnote 2
[5] Ibid. footnote 3
[6] BoR (22) 69, BEREC Report on a consistent approach to migration and copper switch- off, 09.06.2022. https://www.berec.europa.eu/en/document-categories/berec/reports/berec-report-on-a-consistent-approach-to-migration-and-copper-switch-off
[7] BoR (23) 205, Summary report on the outcome of a BEREC internal worshop on the migration to VHCNs and copper switch-off with a focus on the needs of the end-users, 07.12.2023. https://www.berec.europa.eu/en/document-categories/berec/reports/summary-report-on-the-outcome-of-a-berec-internal-workshop-on-the-migration-to-very-high-capacity-networks-and-copper-switch-off-with-a-focus-on-the-needs-of-the-end-users
BoR (19) 236, BEREC summary report on the outcomes of the internal workshop on the migration from legacy infrastructures to fibre-based networks, 05.12.2019. https://www.berec.europa.eu/en/document-categories/berec/reports/berec-summary-report-on-the-outcomes-of-the-internal-workshop-on-the-migration-from-legacy-infrastructures-to-fibre-based-networks
[8] On the data received, BEREC wants to highlight that the results presented in this report are not entirely comparable to the results of the 2022 report because there are some, though not many, differences in the countries that provided data for the respective reports. Moreover, the need to fill out different parts of the questionnaire depended on an affirmative answer to the introductory questions. Therefore the total amount of answers presented below varies between the presented topics.

analysis of the rules set by the NRA for the migration process and copper switch-off will be described. Chapter 6 describes further measures that NRAs could take to facilitate the migration and copper switch-off process. In Chapter 7 the report describes the lessons learned by NRAs over the past years while managing the migration process before setting out its conclusions in Chapter 8. The data on which the analyses are based on are provided in annex 3.

2. Overview of the status quo and plans of the SMPOs' copper switch-off

According to Article 81 EECC, SMPOs shall notify to NRAs any plans to decommission or replace (parts of) the legacy network. NRAs on the other hand shall ensure a proper transition process, including timetables, conditions and the availability of an alternative access product of at least comparable quality on the upgraded network if necessary to safeguard competition and the rights of end-users.

Before going into a more detailed analysis, this section will provide a broad overview of the state of play of the migration and switch-off process along these dimensions (i) announcement by the SMPO, (ii) actual closure of legacy network elements, (iii) SMP on fibre (relevant for the question how to ensure a replacement access product). Finally, this section will provide the view of NRAs regarding switch-off targets suggested in the White Paper on "How to master Europe's digital infrastructure needs?" released by the European Commission in February 2024.[9]

A general overview of the copper switch-off and migration process is illustrated in Table 1. In the majority of countries (17) the SMPO already announced the copper network switch-off, whereas there has not been a concrete announcement of such plans in 14 countries. It has to be noted that in 3 countries (GR, IE, ME) the announcement was made several years ago but this was then not followed by any more detailed information (GR) nor by any concrete switch-off plan proposal (IE, ME). In Croatia, no new announcement has been made according to the new law for electronic communications (in force since 2022).

In 18 countries parts of the copper-based legacy network elements have been closed, whereas all legacy network elements are still in use in 13 countries. In 20 countries[10] the NRA has already set rules for the migration process and copper switch-off.

According to the respective NRA information, the SMPOs operating the legacy network have also SMP on their respective fibre access networks in the whole territory in 19 countries and only in parts of the territory in 7 countries.

[9] Ibid. footnote 4

[10] In Sweden, the rules were set and communicated by the SMPO. In Croatia, the migration and copper switch-off rules were set during the market analysis (decision from 2019). However, a new law for electronic communication (ZEK) came into force in 2022, prescribing migration rules. In 2023, HAKOM therefore removed the rules for the migration and copper switch-off during the new round of market analysis (M1 and M3b).

Table 1[11]: Overview of the copper switch-off

[11]The NRA of Liechtenstein did not respond to the questionnaire, but confirmed that it will reach 100% switch-off by the end of 2024, in line with its response to the 2022 BEREC Report on a consistent approach toward migration and copper switch-off. LKW is the SMPO for copper and fibre since 2007 in LI. In Bulgaria M1 is deregulated since June 2019 and there is no SMPO. Therefore, the NRA could not set a copper network switch-off plan.

Did the SMPO already announce/inform that it plans to switch-off all or parts of its legacy copper access network e.g. close MDFs?																
YES	17															
	BE	CY	DK	EE	ES	FI	FR	HU	IT	LU	MT	NO	PL	PT	SE	SI	SK
NO	14															
	AT	BIH	BG	CZ	DE	GR	HR	IE	KO	LT	LV	ME	RS	RO			

Did the SMPO already close (phase out, no longer use) copper-based network elements (e.g. MDFs) ?																	
YES	18																
	BE	CY	DK	EE	ES	FI	FR	HR	HU	IT	LU	MT	NO	PL	PT	SE	SI	SK
NO	13																
	AT	BIH	BG	CZ	DE	GR	IE	KO	LT	LV	ME	RS	RO				

Did the NRA already set rules (e.g. in market analysis procedure) for the migration process and copper switch-off (e.g. closure of MDFs)?																		
YES	20																	
	BE	CY	CZ	DK	EE	ES	FR	GR	HR	HU	IE	IT	MT	LU	NO	PL	PT	SE	SI	SK
NO	11																	
	AT	BIH	BG	DE	FI	KO	LT	LV	ME	RO	RS									

Does the SMPO, operating the legacy network, also have SMP on fibre?																		
YES	19																	
	BE	CY	CZ	DE	EE	ES	GR	HU	IT	KO	LV	LT	LU	MT	ME	NO	RS	SI	SE	
Part of the countr	7																	
	DK	IE	FI	FR	PL	PT	SK													
NO	4																	
	AT	BIH	BG	RO																

Source: BEREC

In the questionnaire, the NRAs were explicitly confronted with the suggestion made by the European Commission in its white paper on “How to master Europe’s digital infrastructure needs?”, namely to introduce two mandatory milestones for copper switch-off: 80% of the lines switched off by 2028 (milestone M1), and 100% by 2030 (milestone M2). Under this assumption of the legal status quo, only 10 NRAs (8 of which are EU Member States) are predicting that M2 can be reached on time.

Non-confidential statements of the NRAs on the achievability of these milestones, based on the current migration process trend, are summarized in the Table 2.

Table 2: Estimated date of copper switch-off milestones

Switch-off milestone	BE	CY	DK	ES	FR[12]	LI	LU	MT	NO	PT	SE
M1: 80% by 2028	2034	2028	n/a	2025	n/a	2023	n/a	2025	n/a	2027	2019
M2: 100% by 2030	2040	2030	2030	2025[13]	2030	2024	2030	2026	2025[14]	2030	2026

On the other hand, the NRAs in 21 countries (AT, BIH, BG, HU, HR, CZ, EE, FI, DE, GR, IE, IT, KO, LV, LT, ME, PL, RS, RO, SK, SI) cannot predict when M1 and M2 will be reached.

Overall the data suggests some progress since 2022. It is true that the number of countries that have reported announcements made by the SMPO, has slightly declined as some initial announcements have not been implemented. However, since the last report, DK, IE and MT have set rules for the transition process. Moreover, since the 2022 report, CY, DK, FR, IT, SK and HU, have joined the countries to have closed legacy network elements.

3. The current status of the SMPOs’ copper switch-off

In general, the take-up of services based on fibre has increased since the 2022 report for both retail and wholesale services.[15] For example, in France, the take-up increased from around 40% to around 60% for both retail and wholesale services, in Belgium from less than 5% to more than 10% for retail services and 20% for wholesale services. These increases are at the expense of full copper services, which saw more than a 20% drop in multiple countries (FR, HU, IT and NO).

[12] 100% of the lines announced in commercial closure for 2026; 75% of lines in technical closure for 2029; 100% in technical closure in 2030.
[13] 27 May 2025
[14] 2 September 2025
[15] The data presented in this section refer to the situation in April 2024.

In 13 countries (BE, CY, EE, ES, FR, HU, LU, MT, PT, SE, SI, SK, [redacted]), the NRAs responded that customers mostly migrate to fibre services where available as alternative for copper. In Italy, most customers are migrating to FTTC services and in Norway, around 50% of all migrations are to Fixed Wireless Access services.

15 countries (BE, CY, EE, ES, FR, HR, HU, IT, LU, MT, NO, PT, SE, SI & SK) responded that at least some elements of the copper network have been decommissioned by the network operator[16]. In most countries, less than 10% of all MDF's have been closed. Exceptions are Hungary, Norway and Spain where between 25% and 40% of all MDF's have been closed and Sweden, where more than 80% of all MDF's have been closed. In France, MDF closure will start in 2025.

Sweden was the first country to start in 2010 and already has switched off 97% of its copper lines. Spain and Slovenia started in 2015 and 2016 respectively. Norway and Portugal started in 2019, Hungary in 2020, Slovakia in 2021, Malta in 2022, Belgium and France in 2023 and Italy in 2024. In France, Belgium and [redacted] the switch off just started and less than 1% of copper lines are switched off, whereas in Sweden 97% of the copper lines are no longer used. A more detailed overview can be found in Table 3 below.

4. SMPOs' plan for copper switch-off

According to the new Gigabit Recommendation of the European Commission, *"the NRAs should ensure full transparency towards, and the involvement of, all stakeholders during the design and implementation of the decommissioning process and timetable*"[17]. In this section the copper switch-off plans of the SMPOs will be examined. More specifically, which copper-based network elements will be closed by the SMPO, when it will be closed and if a full copper switch off is considered.

In 17 countries (BE, CY, DK, EE, ES, FI, FR, HU, IT, LU, MT NO, PL, PT, SE, SI, SK) the SMPO plans to close MDFs[18]. Only in Italy, the SMPO doesn't plan to also close the street cabinets (SCs). In 7 of these 17 countries (ES, LU, MT, NO, PT, SE, SK) also other copper-based network elements will be closed, such as MSANs (multi-service access nodes) or access lines.

Table 3 provides an overview of the SMPO's copper switch-off plans of the countries where the SMPO has already established such plans[19]. The table shows the current status of the current switch off and the expected closure of MDFs and copper lines for each year until 2028. It also mentions the expected full switch off year of the copper network. In 9 countries the SMP has already announced such a full closure date. In 2025, Norway and Spain will close all MDFs and copper lines, Malta and Sweden by 2026, Portugal, France, Luxembourg, Denmark and

[16] No answers received from other countries.
[17] Ibid. footnote 3
[18] No answer was received from the other countries.
[19] No further information was received from Estonia, Finland and Poland, Denmark and Luxembourg only provided the expected full switch off date.

[redacted] by 2030 and Belgium by 2040. Four of these countries already provided a switch off date in the 2022 report. Sweden, France and Portugal still have the same expected date and Norway expects to close its network 3 years sooner than expected. Although both, Hungary as Italy provided a switch off date in the previous report (2025 and 2023 respectively), both reported that they experience delay in the switch off; in Italy the SMPO recently updated the switch-off Plan, setting to 2028 the date of switch-off (but still maintaining active the SCs).

In nine countries (SI, MT, NO, ES, PT, BE, FR, IT, [redacted]) the SMPO also informed when it will close how many MDFs or copper lines. Five of them also gave input for the 2022 report. In Belgium, Portugal, Slovenia and France, more closures are planned and are more detailed.

Table 3: SMPOs' closure plans for MDF and/or copper lines

Country	**When will the SMP close MDFs / copper lines; how many per year? *), **)**						**Expected full switch off**
	End 2024	2025	2026	2027	2028	After 2028	
BE	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2040
CY	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
DK							2030
ES	91,7% / **66%**	8,3% / **34%**					2025
FR	< 1%	< 1%	2,0%	22,0%	25,0%	50%***)	2030
HU	27% / [redacted]						
IT	<1,0%	0,0%	13,0%				2028****)
LU							2030
MT	[redacted]	21% / **6%**	63% /**16%**				2026
NO	39% / **40%**	61% / **60%**					2025
PT	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2030
SE	86% / **97%**						2026
SI	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
SK	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

*) The percentage of copper lines is in bold.
**) The percentage of MDFs and copper lines is relative with respect to the number before the start of the switch - off.
***) 25% in 2029, 25% in 2030
****) 100% of MDF will be switched off in 2028, but SCs will remain active to provide FTTC services.

The closure of an MDF means that the MDF (and therefore also the copper-based subscriber access lines which end at the MDF) will no longer be used. However, this does not necessarily mean that the MDF location will also be closed. In case the SMPO closes also the MDF location, not only the MDF is no longer used but nothing at the MDF location is further used. This means that other wholesale access services (or retail services) provided at/from location are no longer possible. This can be the case if the complete building is being sold. In 11 countries (BE, ES, IT, LU, NO, PT, SE, SI, SK, [redacted], [redacted]) of the 14 countries in which the SMPO

plans to close MDFs the SMPO informed that it will not only close MDFs but also at least some MDF locations. However, all countries report that a large part of the MDF locations will be reused for FTTH. Italy report that it will abandon MDF locations where it closes an MDF in 65% of the cases.

Thirteen countries (BE, CY, ES, FR, HU, LU, MT, NO, PO, PT, SE, SI, SK) report that the SMPO aims at a full copper switch off. In Italy, the switch off will mainly focus on the LEX and of the copper loop up to the cabinet. In one country (Estonia) in which the SMPO announced plans to close MDFs, information on the type of copper switch-off the SMPO pursues is not (yet) available.

In general and compared with 2022, we see that concrete steps towards copper switch-off have been taken and more countries have identified a path towards full copper switch-off. Nevertheless, in many countries, given the time required for the implementation of a proper transition from legacy networks to VHCN, it is unlikely that the switch-off process will be completed by 2030, as it was only recently started or still needs to be started or even planned.

5. Rules set by the NRA for the migration process and copper switch-off

5.1. Type of procedure

The large majority of NRAs, which have already set rules regarding migration and copper switch-off set those rules for in a market analysis procedure.15 countries (BE, CY, CZ, EE, ES, FR, GR, HR, HU, IT, LU, PL, PT, SI, SK) out of 20 total)[20]. In 2023 the rules were updated in France and in Greece. In 2024 the rules were also updated in Czech Republic and Italy. The rules in Portugal are being discontinued according to the latest market analysis (published in 2023) and in Croatia the NRA rules have been integrated into the new law for electronic communications (in force since 2022).

In 4 countries the rules were set independently from the market analysis procedure (IE, MT, NO, SE). In 2021, during the market analysis review, the Danish NRA decided instead of imposing SMP remedies to bind the SMPO to its commitment that also includes a procedure for the shutdown of copper connections. In Ireland, in 2023 the NRA published its framework for the SMPO to transition from Legacy to Modern Infrastructure for markets in which an operator has been found to have SMP in relevant markets. This framework is therefore intrinsically linked to any market analysis in which an operator was found to have SMP. In Sweden, the rules were set by the SMPO and were updated in 2022. In Norway the latest change to the SMPO obligation to maintain the copper network until September 2025, is the NRA's decision in 2022 pertaining the closure of "empty exchanges" that are no longer in use.

[20] In total, 20 Countries were asked to answer the questions related to section 5 of the report, based on their response to the question whether the NRA has already set rules regarding migration and copper switch-off above.

In Malta, the NRA established a procedure in 2022 requiring the SMPO to inform it on a case-by-case basis for each switch-off area.

In Bulgaria M1 is deregulated since June 2019. Therefore, there is no SMPO and the NRA is not in a position to impose rules on migration and copper switch-off under Article 81 EECC.

5.2. Level and scope of the rules

The NRAs set the rules for the copper switch-off at the level of the MDF in 12 countries (BE, ES, FR, GR, HU, IE, IT, LU, NO, PL, PT, SI), also at the level of the street cabinet in 5 countries (ES, GR, LU, PL, SI), and in a finer or different type of granularity (e.g. single addresses, town level, in building DSL DPU etc.) in 3 countries (ES, FR, LU). In 6 countries (CY, CZ, DK, EE, MT, SK), the appropriate network granularity is not specifically addressed by the rules.

In 15 countries (BE, CY, CZ, DK, ES, FR, GR, HU, IE, LU, NO, PL, PT, SK, SI) the NRAs set the rules for the copper switch-off in the area where the incumbent (or another operator) has SMP and access remedies have been imposed on the SMPO. In Italy, the rules were set only for all the local exchanges involved in the national decommissioning plan. In Estonia and Malta the rules are not specific to any area.

5.3. Stakeholders' involvement

The NRAs involved the stakeholders in 15 countries (BE, CY, CZ, DK, ES, FR, GR, HU, IE, LU, NO, PL, PT, SK, SI), all of which by means of public consultations. Subsequent meetings between the NRA and the stakeholders were organized in Greece. The NRAs of 6 countries (DK, ES, IT, LU, PL, SI) involved the stakeholders as part of the procedure. The NRA in Italy addressed the stakeholders through a technical forum as well.

5.4. Coverage threshold

In 6 countries, the NRAs allow the switch-off of copper network elements only if the NGA rollout has reached a certain coverage. In France, a complete[21] FTTH network at the end of the notice period must be offered, otherwise the switch-off is postponed. For homes that cannot be covered by FTTH, non-NGA alternatives must be made available, at least temporarily. In Greece, 60% of the subscribers served by the legacy network must be covered by FTTC or FTTH network resources before the beginning of the notice period. In Italy 100% of the active lines must be covered by a generic NGA at the beginning of the notice period, in marginal cases including FWA with at least 40Mbps/4Mbps downlink/uplink rates. In Hungary, as a general rule 100% NGA coverage is expected 6 (in areas without wholesale customers) to 12 months (in areas with wholesale customers) before the switch-off is permitted. In Ireland,

[21] The rule tolerates that some homes could remain uncovered by fibre network on strictly identified situations (e.g. third-party refusal of the roll out of fibre to their home, if there is no active copper access for 24 months at least).

100% of in-scope premises in a local exchange area must be passed by modern infrastructure in order for the notice period for switch off of that exchange to commence. In Luxembourg, a 100% FTTH coverage must be available for the switch-off.

In 12 countries (BE, CY, CZ, DK, EE, ES, MT, NO, PL, PT, SI, SK), the rules set by the NRA permit copper switch-off independent of whether the SMPO already reached a certain NGA rollout. An NGA coverage threshold rule is typically not (or no longer) needed in practice in these countries.

5.5. Notice period

An overview of the notice period the NRA imposed on the SMPO before the switch-off of MDFs is depicted in Table 4. In 9 countries (BE, ES, GR, HU, IT, LU, PL, SI, SK), the notice period differs depending on the copper-based wholesale access product used by the ANOs.[22]

Table 4: Notice periods for the technical copper network closure

Notice period	Copper-based wholesale access product used by ANOs		
	Copper-based ULL	VULA or Bitstream	No copper-based wholesale acces product
1 Month			FI
3 Months			PL
6 Months	DK[1)], EE	DK[1)], IT	DK[1)], ES, GR, HU, SI
1 Year	CZ, IT	CZ, ES, GR	BE, LU
15 Months	SE	SE	SE
18 Months	IE[2)]	IE[2)]	IE[2)]
2 Years	BE, ES, GR[3)], HU[4)], PL, SI	BE, HU[4)], PL, SI	
3 Years	FR[5)]	FR[5)]	FR[5)]
5 Years	LU, PT[6)], SK[7)]	LU, SK[7)]	

1) increased to 12 months instead of 6 if the area to be closed contains more than 200 active copper lines

2) generally at least 18 months, but certain "exempt" end users receive at least 24 months notice

3) increased from 2 to 3 years if more than 5.000 active subscribers in the MDF

4) 2 years can be shorted if agreed by all involved ANOs up to a minimum of 6 months

5) where there is more than 95% of fiber coverage, the notice period is reduced to 18 months instead of 3 years

6) if an equivalent wholesale access is guaranteed, this 5 years notice period can be reduced to 3 years

7) if bitstream is used, the notice period is 2 years. The notice periods can be reduced to 1 year under agreement

Source: BEREC

[22] Note that the notice period generally does not correspond to the duration of the entire switch-off process, as after the notice period expiration the migration process must start for remaining customers on the legacy network, requiring additional time to be completed for technical reasons.

Consistently to what was reported in 2022[23], the typical (median values) minimum notice periods before the switch-off is permitted are 6 months in case the ANOs are not using any wholesale products of the SMPO in the considered MDF, between 1,5 and 2 years in case of VULA/ bitstream and 2 years in case of copper-based ULL. In particular, in Greece, Italy and Spain the notice period for copper-based ULL wholesale customers is longer than the one for VULA or bitstream wholesale customers. In Cyprus, the switch-off can start without notice unless a wholesale product is in use, in which case the minimum notice period is not defined but it must be „reasonable“. In Czech Republic, there is no notice period obligation if there are no wholesale customers. In Finland, the notice period to wholesale customers is defined only in the commercial contract. In France, Ireland and Sweden, the presence of wholesale customers is not a factor in the duration of notice periods. In France, the notice period can be halved if the fibre coverage is already at least 95% at the beginning of the notice period. In Portugal, the guarantee of an alternative equivalent wholesale product mitigates the notice period obligations towards the ULL wholesale (from 5 to 3 years). Also, the NRA can set notice periods shorter than 3 years in case of deactivation of loops, with duration depending on the percentage of loops to deactivate compared to the total number of active accesses on the MDF. Also in Greece and Denmark, as specified in Table 4, the number of active lines to be switched off play a role in the determination of the notice period.

In 18 out of 20 countries asked to respond to this question (BE, CY, CZ, DK, ES, FI, FR, GR, HU, IE, IT, LU, MT, NO, PL, PT, SE, SI), the NRAs allow that end-users can be forcibly switched-off, if they do not migrate voluntarily before the announced switch-off date.

5.6. Commercial closure

In 12 countries (CY, CZ, DK, ES, FI, FR, GR, HU, IE, IT, LU, SE), the rules set by the NRA on migration and copper switch-off foresee an intermediate step of commercial closure before the technical one (switch-off of the copper network). In Cyprus and Czech Republic, the commercial closure must be announced by the SMPO to the wholesale customers at least 1 year in advance. In Denmark and Finland, the commercial closure has to be notified only 1 month in advance to the wholesale access seekers. In Cyprus and Finland, the end-users must also be notified, 6 months and 1 month in advance, respectively. In Finland, the commercial closure is allowed only if the alternative wholesale product is at least the same level as the copper access product.

In France, the commercial closure occurs after a 3-year notice period, and it requires the same criteria as the switch-off[24]. In Portugal, Spain and Sweden, the commercial closure can be undertaken at the end of the respective notice periods applicable for the technical closure. Finally, in Italy, commercial closure starts at the beginning of the notice periods, and exactly at the moment when the decision, approving switch-off of specific MDFs is published on

[23] Ibid.footnote 6
[24] These criteria have to be met at commercial closure whereas for the switch-off they have to be met 12 months in advance.

Agcom's website. In Spain, after the notice period, an additional "guard period" of 6 months is granted to allow for the migration of the existing copper users, if any.

In Greece, 3 months after the switch-off notification, the SMPO is allowed to refuse serving new access requests in MDFs where copper ULL wholesale customers are co-located. When more than 5.000 subscribers are active, this time is extended to 6 months. In Hungary, the commercial closure is allowed 12 months after the announcement to the ANOs if they are using the wholesale products of the SMPO, otherwise it is immediately allowed at the announcement (6 months before the technical copper switch-off).

In Ireland, a commercial closure phase is at the discretion of the SMPO and is to be announced at least 6 months in advance to the wholesale customers - such a phase can only commence when an SMPO switch-off proposal has been submitted to and approved by the NRA. The commercial closure can then occur after the notice period only at the premises that are passed by modern infrastructure, which must be a minimum of 75% of that exchange area on the date of the commercial closure. In Luxembourg, the SMPO is allowed to stop offering access to its copper network if fibre is available at an address, generally without any notice period. The NRA in Norway is currently working on a decision regarding commercial closure, which probably will be in force the last year before the technical end-date of the copper network. In Belgium, the SMPO decided to announce a commercial closure 1 year in advance, which was not objected by the NRA or the alternative operators.

5.7. Alternative wholesale access products (WAPs)

Following Article 81 (2) from the EECC, the NRA shall ensure that the decommissioning or replacement process includes a transparent timetable and conditions, including an appropriate notice period for transition, and establishes the availability of alternative products of at least comparable quality providing access to the upgraded network infrastructure if necessary to safeguard competition and the rights of end-users, once the network owner has demonstrated the intent and readiness to switch to upgraded networks. Such products should be represented in a wholesale substitution matrix, as introduced by the Gigabit Recommendation[25].

NRAs currently impose a variety of alternative access products, as summarized in the following table.

[25] Ibid. footnote 3, Point 77.

Table 5 Alternative wholesale access products imposed by NRAs under Art. 81 (2) EECC on the SMPO

Alternative wholesale access products the SMPO has to provide itself[26] before switch-off	NRAs imposing (18 answers)
Duct Access	CY, EE, GR, IE, ES, PT
Copper SLU	GR, HU, IT
Fibre LLU	CZ, EE, HU, LU, SI,
VULA	BE, CY, CZ, GR, HU, IE, IT, NO, SI, ES
VULA with regional and/or national PoH	CY, CZ, GR, SI
Bitstream with regional and/or national PoH	BE, GR, HU, IT, LU, SI, ES
Other	HU, IE, IT, PL

Answers show that a certain variety of wholesale products have to be provided by the SMPO with VULA at local level being the most adopted service, whereas copper SLU is the least used, but this depends on the availability of wholesale services depending on national circumstances (e.g., copper SLU is useful only for FTTC-based access seekers). In many cases the products are the same wholesale access products imposed on the relevant markets.

In four countries, NRAs also specified a different product to assist the migration; this is the case of Italy (FWA service), Hungary (local bitstream access if the alternative network is cable HFC), Ireland (a product that shall be proposed in the SMPO's Switch-off Proposal for approval by the NRA)[27] and Poland. In Portugal, no obligation to supply a new wholesale product was imposed on the SMPO, and only a duct and pole access is imposed as usual remedy.

In 2 countries (DK, FI) no alternative wholesale products have to be provided by the SMPO. In France the alternative WAP (fibre LLU) can be provided by any operator, as long as its provision is ensured.

Not all NRAs demand the availability of alternative WAP at the same stage of the migration process. The right moment has to take into account the need to protect end users, which requires this obligation to be met as early as possible in the process; competition dynamics which require at every step a sufficient number of offers in the market; efficiency of the copper switch-off programme (communication, incentive to migrate quickly, etc.) which may require in some cases that it does not last too long; and proportionality of the obligation imposed on the SMPO. The right balance can depend on various factors specific to each market's situation. It appears that 3 main different options were chosen by NRAs in that respect. 5

[26] in some cases (like in Fr) the availability of WAP is necessary before switch off but can be provided by another operator than the SMPO

[27] Existing mandated FTTH services in the regulated WLA market could be used as ACPs (Alternative Comparable Products), while other ACPs will be considered on the basis that they must be of comparable quality and functionality to the legacy Infrastructure-based service that they are replacing. ComReg has set out that adequate alternative wholesale access product must comply with the price controls applicable to that SMP market(s). In particular, as substitutes for the legacy products which they will replace, the alternative wholesale access products will be subject to any price control that applies to the relevant market concerned (See ComReg Decision D09/23).

NRAs (BE, CY, EE, IT, LU) decided that the availability of the alternative WAP would be required prior to or at the time of the switch-off announcement. 6 NRAs (EE, ES, FR, GR, HU, IE) set the time prior to or at the time of the commercial closure. Finally, 3 NRAs linked the moment when this obligation is checked to the final switch-off (CZ, FR, SI), either stating the product has to be available before it (CZ, SI) or 12 months before it (FR[28]).

Another interesting question investigates if alternative WAPs are specifically imposed in presence of copper switch-off, as a special remedy; from the information gathered, it seems that in the majority of cases this is not the case. Only in Italy the NRA imposed an alternative WAP only in presence of switch-off (FWA wholesale service).

In most of the countries providing an answer (14 out of 17), WAPs are provided based on a reference offer; in 11 countries of these 14, also specific KPIs and SLGs are foreseen, together with the imposition of non-discrimination obligation.[29]

In 8 countries, alternative WAPs are provided also by other operators than the SMPO (CZ, DK, FI, FR, IT, SI, ES, SE); in 7 of these cases FTTH/B is provided by other providers, whereas only in the Czech Republic FTTC is provided and in one other case (IT) also FWA is provided by other operators.

The possibility to allow the SMPO to switch off an MDF where the alternative VHCN network is deployed by another operator is not clearly defined in some countries, whereas in three countries, this is not possible (CY, CZ, HU). In 6 countries, on the other hand, it is possible without a specific pre-condition or limitation (DK, FI, FR, PL, ES, SE). In Italy, this is possible in case other operators may provide alternative WAPs to migrate customers, and the SMPO demonstrated a specific agreement with the ANOs with this scope. In Bulgaria, there is no rule defined that would prohibit this, but in practice, the NRA will evaluate case by case. In Greece, this is possible only if the prerequisites set by the relevant rules are met, whereas in Ireland, this is possible for a limited list of in-scope premises which will not be reached by SMPO (exceptions), under assessment of the NRA. Finally, in Slovenia, this is possible only if an open access network is present, the presence of an alternative operator is not sufficient.

Most responses received (11 out of 15), indicate that there is a difference in wholesale access price between the switched-off legacy product and the alternative product that is closest in terms of performance; in all these cases, prices of the alternative product are higher than the legacy one; in 4 countries (CY, CZ, EE, SI), instead, there is no difference in prices.[30]

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[28] In France, since commercial closure is an optional stage of the process, the obligation has to be checked on 2 different timeframes: 12 months before switch-off in all cases, and in case of a commercial closure, it is also checked when this commercial closure occurs.

[29] In Denmark, as lines are only switched-off in areas where there are alternatives services available, there was no need for regulation of this, but this will possibly be included in upcoming market analysis regarding new market decisions. In France, non-discrimination rules are imposed under symmetrical regulation of fibre access, applicable to the roll-out of fibre in a copper switch-off context.

[30] In one country (FR) this is clear only for business access products, whereas for the consumer access products, switched-off legacy products and fibre products are not strictly comparable since fibre retail operators supply themselves with co-investment offers. As a consequence, recurring costs associated to fibre products are

Only in Italy, the NRA has identified a substitution matrix which shows for each legacy WAP the corresponding alternative WAP; in Belgium, the SMPO is not obliged by the NRA to provide alternative WAPs but has proposed a substitution matrix which the NRA is monitoring.

5.8. Legacy wholesale access products (WAPs)

As a consequence of switching-off the legacy network, also legacy wholesale access products will no longer be available. The table below shows the typology of previously existing products that will no longer be available after the copper switch-off, among the countries.

Table 6 Previously existing SMPO WAPs no longer available after copper switch-off

Previously existing SMPO WAPs no longer available after copper switch-off	Countries
Copper-based ULL	BE, CY, DK, EE, FI, FR, GR, HU, IE, IT, LU, MT, PL, PT, SK, SI, ES, SE
Copper-based VULA	BE, DK, FI, HU, IE, LU, SK, SI, SE
Copper-based VULA with regional/national PoH	BG, CY, DK, FI, GR, HU, IE, SK, SI, SE
Copper-based bitstream with regional/national PoH	BE, CY, DK, FI, FR, GR, HU, IE, IT, LU, PL, PT, SK, SI, ES, SE
Other*	IE, IT, ES

* Copper-based leased lines in Ireland, and Italy and Spain, also WLR in Italy.

Table 6 above shows that the most impacted wholesale legacy products are ULL and bitstream with regional/national PoH, followed by copper-based VULA.

5.9. Migration costs

The majority of NRAs currently apply price regulation to the legacy copper-based wholesale access products and the alternative wholesale access products in a market analysis procedure. Usually no other specific migration costs regulation was put into place so far. However, NRAs may consider these rules to be insufficient and, therefore, set further specific rules regarding the migration costs; this is the case for NRAs in only 5 countries (CY, FR, GR, IE, IT) providing answers (the situation was similar in 2022, when 5 countries out of 17 set specific rules on this topic). From the information gathered, it is possible to affirm that, in

significantly lower than those associated to wholesale prices for local loop unbundling whereas the overall costing appears higher when integrating the cost of capital.

general, the rules set by NRAs are specifically imposed to share the impact of the migration costs between the SMPO and the access seekers.

In France, the NRA established (in the 2023 market analysis decision) that, when approaching the technical closure, the SMPO could not impose termination fees to ANOs since they do not have any other choice than terminating their contracts in a copper switch-off context.

In Greece, the NRA has identified various costs related to the migration procedure and, in the relevant procedure, the distribution of these costs is specified. In practice, the SMPO will bear the costs related to the de-activation of legacy wholesale product, the ANOs will bear the costs for the activation of new wholesale products, whereas other costs for the migration (e.g. transfer of backhaul circuits to a new PoP, modification of existing backhaul circuit) are shared between the SMP and the related ANO.

In Ireland, the established rules specify that during copper switch off, once copper-based services are no longer available to new subscribers, the incumbent must provide the alternative service at the standard connection cost. This condition only arises once copper switch off has been triggered.

In Italy, the regulation established that one-off wholesale costs (activation and de-activation fees) are covered by the SMPO for the migrated lines on the Local Exchanges subject to switch-off; the SMPO has also to cover additional costs for decommissioning of co-location in old local exchanges and for interconnection equipment to migrate customers. In addition, the wholesale price of the NGA “substituting” service is equalized, during the migration period, to the wholesale price of the “substituted” copper service until the switch-off of the local exchange is realized.

Finally, in Portugal, the notice periods were set sufficiently long that the beneficiaries of the wholesale offers can recover most of the investment costs by the time they have to migrate to the alternative WAP.

Regarding the possibility for the NRAs to allow the SMPO to increase the wholesale copper access prices during the transition period, 5 NRAs explicitly confirmed this point.

More specifically, in Czech Republic, based on the relevant market analyses results, the price control obligation was not imposed on the relevant wholesale services.[31]

In Finland, the price increase is the result from lower active line volumes.

In France, the increase of wholesale copper access prices is allowed as a result of the evolution of competition conditions on the market due to the progressive roll out of fibre; the

[31] The NRA imposed obligations related to price control on the SMPO, namely the cost orientation for the dark fibre and colocation and the economic replicability test (ERT) between non-NGA (copper) and NGA-based services (fibre, VULA) between markets 1(3a) and 3b in order to keep for all access seekers economic space to climb up the ladder of investment.

price increase is limited in time and there is also a claw-back mechanism foreseen in case of delays in proceeding with the switch-off process.

In Ireland, price increases are not related to copper switch off, however following a recent market analysis, cost oriented FTTC VULA prices may be increased annually by Consumer Price Index.

Finally, in the last of these 5 countries (Sweden), copper access has been deregulated entirely by the NRA.

Among the other NRAs not explicitly allowing SMPO to increase the wholesale copper access prices during the transition period, in 3 of them the copper price is regulated using a cost model (IT, where the cost model determines an increase in copper prices until 2028, GR and CY).

In other countries, the issue of permitting price increase in copper services is not considered relevant: in Belgium, because there is no need to force end users to migrate by increasing copper prices since migration happens naturally; in Denmark, where currently the SMPO's plans for copper switch off are rather sporadic and thus the question of price increase has not yet been relevant; in Spain, where the market analysis did not address this issue; in Portugal, where the number of accesses supported on copper LLU and wholesale copper bitstream offers has been increasingly residual.

5.10. Information provided by the SMPO

This question addresses the information that the SMPO has to provide during the switch-off process, either to the NRA, ANOs or others. In 5 countries no specific information was indicated as mandatory (EE, LU, NO, PL, SK). In the 15 other countries answering the question, some data has to be shared with at least another party. Beyond the common switch-off plan, other examples of data expected under these obligations include replacement technology (FI), identification of copper or fibre lines (FR), information on coverage (GR), legacy and alternative WAPs (HU), list of in-scope premises exceptions (IE), changes to the coverage of copper and DSL bitstream offers (PT) or planned coverage of the non-copper networks in each MDF (ES).

In contrast, only 12 countries imposed data or information sharing obligations at the time of the 2022 report. The mentioned information has to be provided in all cases to ANOs and/or NRAs but not to other entities, with the exception of France, where the SMPO has to provide the general public with some of the information provided to ANOs.

5.11. Evolution of QoS on legacy copper

The rules on migration could foresee changes to the SMPO’s service level agreement obligations on its legacy network, like different Service Level Agreement (SLA) on areas with commercial closure.

Only France has defined such different treatment of SLAs: the market analysis decisions allow the SMPO to lighten some of its quality of service obligations after commercial closure (after-sale service and threshold indicators). This question was not evaluated in the 2022 report.

5.12. Non-discrimination control

Another aspect which the switch-off rules could specify (not evaluated in the last report) are constraints in terms of choice of the area of switch-off. For example, there could be restrictions if there is a switch-off focus in areas in which the SMPO is itself providing the alternative infrastructure.

4 countries indicate that they foresee such constraints: Cyprus, France[32], Italy[33] and Slovenia.

As most Member States define the switch-off conditions in a market analysis procedure, there is in general an associated non-discrimination obligation, which can be leveraged by NRAs to avoid potential disadvantages of alternative operators. As the previous report[34] indicates, such a non-discrimination obligation could, for example, include that the copper switch-off has to apply equally to both SMPO and ANOs, i.e., if in the switch-off area ANOs are no longer allowed to order or use the SMPO's copper-based wholesale access products, then also the SMPO is no longer allowed to order or use copper lines (at retail and wholesale level and for internal use).

5.13. After switch-off

The switch-off rules define the frame of obligations and constraints until a certain MDF is switched-off, and thus copper in that MDF is no longer used. However, there could be additional obligations regarding the post switch-off moment, for example obligations to remove copper cables or to remove equipment of alternative providers in the MDF location. Apart from any such obligations, the SMPOs could have plans regarding the copper cables. These aspects were not evaluated in the previous report.

No country[35] has imposed any obligation to keep or remove the legacy copper cables after switch-off. Regarding SMPO plans for the copper cables, Cyprus, Estonia, Finland, France, Spain and Sweden indicate that the copper (at least parts of it) may or will be removed. Other countries do not have information about the SMPO plans, or state that the cables will stay in

[32] The SMPO is not allowed, under its non-discrimination obligation set in the market analysis decision, to prioritize areas where it could benefit from the switch-off more than its competitors.
[33] There is a general provision regarding non-discrimination obligation which intrinsically constraints the SMPO in the process of switch-off; in addition, it is foreseen that during the switch-off process, the SMPO has to give preference to areas where the level of take-up of fibre services is higher.
[34] Ibid. footnote 6, under point 5.10
[35] Portugal indicates that the SMPO already has the obligation to remove the dead cables under the ORAC (duct) regulation.

the ground (Belgium). Two countries (MT and SI) indicated that the SMP expressed concerns about the costs of removing the copper cables and the associated risks.

An additional aspect are possible rules regarding removal of equipment like DSLAM installed by ANOs in an MDF location, after switch-off. Only Spain set explicit rules in this regard (to negotiate its removal), while Belgium, Finland, Italy, Slovakia, Slovenia and Sweden indicated that, in practice, ANOs remove their own equipment.

Compared to the report in 2022, the answers collected in this report show a gradual country-specific adaptation of the rules, but no major changes are observed with respect to the overall regulatory approach of the NRAs.

6. Further measures taken by the NRA

NRAs may not only set rules for the migration process and copper switch-off but may also take further measures. For example, they could provide information to the public on their respective website, monitor the migration process, or other actions which might be considered relevant in each country.

There are 8 NRAs that provide information to the public (BE, FI, FR, IT, LU, NO, ES, SE) on their website, giving information about the notifications and switch-off dates.

15 NRAs out of 18 responses received, responded that they monitor the migration process; monitored aspects include, depending on the NRA, the provided information, reported problems, monitoring fibre lines, or statistics. This is done in some cases via meetings with the SMPO. This is an improvement over the last 2022 report, where 9 countries monitored the process.

Regarding other possible actions, 7 NRAs indicate some measures they take to help users (Finland, Spain), increase awareness on the process (FR, LU, ES), address users on copper (NO) or identify problems (IT).[36]

7. Lessons learned so far

The report shows a progression of the copper switch-off processes among countries. These evolutions give the opportunity to try to identify difficulties that arose and also rules that prove themselves efficient in order to facilitate voluntary migrations and more globally to meet the conditions set for the switch-off.

[36] MT indicated that additional safeguards are put in place by way of the universal service obligation.

7.1 Forced migration

13 countries (PT, FI, EE, DK, FR, BE, ES, CZ, SK, CY, MT, SI, LU) reported that operators set incentives for end-users to migrate voluntarily before the switch-off. Among the incentives identified, operators in 7 countries (FI, EE, IT, DK, BE, CY, MT) enhanced migrations with marketing incentives and commercial offers (e.g. alternative product at a lower price, free or reduced installation costs for in-house fibre connection). In 3 countries (PT, SK, MT) they promoted migrations prior to the switch-off through communication campaigns advertising the benefits of fibre. In France, retail operators set up anticipated suspensions of remaining end-users' accesses on copper network. In Spain, the fact that copper-based retail offers and low-speed FTTH based offers have the same price, for a greater performance allowed by FTTH products, constituted a natural incentive for migrations.

Among the countries that already experienced a switch-off, except in one (SI), some end-users had to be forcibly switched-off before the end of the process. 3 countries (PT, FI, MT) stated that a residual part of customers was concerned by a forced switch-off, without going into details. In Spain, the percentage of end-users forcibly switched-off varies between broadband customers and POTS customers, with 0,5% for the first category and 5% for the second. In 3 countries (SE, [redacted], [redacted]), copper switch-off operations have led to 2%-3% of end-users forcibly switched off. In France, this percentage reached 9% during the first operation of copper switch-off. Some of these countries (FI, FR, [redacted]) identified that these percentages vary between rural and urban areas, with higher percentages of customers forcibly switched-off in rural areas. Finally, 1 country (ES) sees a difference in the number of customers forcibly switched-off between telephone-based customers and broadband customers.

Some rules have been identified to avoid forced migrations, with a specific importance given by 5 countries (ES, IT, FR, CZ, SI) to transparency efforts. A proper notice period appears particularly beneficial with respect to other operators and end-users for 4 other countries (BE, ES, MT, SE). 3 countries (FR, ES, SI) considered that checking the availability of an alternative product prior to the switch-off was efficient to avoid forced migrations. Other means to avoid forced migrations were also identified, each by a single country: the set-up of price incentives by operators (IT), the capacity for operators to temporarily suspend accesses to encourage migrations (FR), the capacity for operators to terminate contracts with a notice period (HU) and the need for a good mobile quality service (SE).

A postponing of the switch-off due to insufficient voluntary migrations was necessary in 3 countries (FI, MT, SI). Some solutions are identified to avoid such situation in the future. In 1 country (FI) the NRA had to intervene in a few cases in favor of end-users. For the last country (SI), the difficulties met are due to neighbors not allowing the trespassing to pull fibre cable over their property. For 12 others countries (PT, IT, DK, FR, BE, ES, CZ, SK, HU, CY, SE, LU) the level of migrations did not require to postpone the switch-off.

7.2 Migration issues

The migration process can be subject to a variety of issues for end-users. While 10 countries confirm they did not meet any issue during their migration processes (EE, IT, DK, BE, CZ, HU, CY, MT, SI, LU), 6 countries (PT, FI, FR, ES, SK, SE) share a more troubled experience. Among the issues encountered by end-users during their migrations, service interruptions and an insufficient level of information given to them are the main issues identified, each mentioned by 4 countries (PT, ES, SK, SE for the first one and PT, ES, FI, SE for the second). 3 countries (PT, FI, SE) faced a dissatisfaction of end-users towards the migration process, but only in isolated cases in PT. 2 countries (FI, SE) pointed out an insufficient information given to alternative operators. 1 country (FR) mentioned difficulties that can be met during the rollout of the final segment of fibre with sometimes important costs imposed to the customer or the risk of scams around unnecessary construction work paid by the consumer.

A variety of rules were found relevant to avoid such issues. 4 countries (FR, ES, MT, SI) emphasized the need to ensure the availability of an alternative product before the switch-off. 3 countries (BE, CZ, SE) put emphasis on the need for a large transparency and information of all interested parties in order to facilitate migrations. The importance of a notice period is also stressed by 2 countries (FR, CZ). 1 country (PT) referred that the migration process was handled by the SMPO without intervention of the NRA. On the contrary, the Hungarian NRA finds that the regulated migration procedure was particularly relevant to avoid migration issues. Finally, France identifies the capacity for operators to temporarily suspend accesses to encourage migrations as a relevant practice to avoid migration issues.

7.3 Overall perspective

Even though the copper switch-off process is due to carry on for several years in most countries, some learnings can already be identified. 5 countries (FR, BE, ES, MT, SE) gather around the need for a large provision of information and transparency as the main learning of their switch-off process. For 3 other countries (ES, SE, LU), the main learning lies in the need for an institutional and/or neutral communication, especially in order to reach some end-users in digital exclusion or reluctant to migrate. The experience of 2 countries (FR, SE) also highlights the need to anticipate the switch-off, in particular, for France, the need to anticipate the control of conditions set for the closure in order to grant predictability to operators. 1 country (FI) finds the switch-off process easier to manage with rules settled by the NRA. The benefits of competition are also a key learning for 2 countries, with one country (BE) considering important to grant the possibility for end-users to migrate to alternative operators and one country (HU) noticing the benefits of infrastructure competition. Moreover, 1 country (FR) considers it important to take into account specific situations where the roll out of fibre is impossible.

Answers show room for improvement in the processes of each country:

- To further anticipate the control of criteria in order to give more visibility to alternative operators and to industrialize the process (FR);

- To clarify the SMPO's communication in order to allow more transparency (BE);
- To further challenge competition and to allow end-users to migrate to alternative operators in addition to the SMPO (BE);
- To give more support to the end-users in the final stages of the switch-off (ES);
- To better promote the benefits of fibre in order to facilitate migrations (MT);
- To better reach end-users that are reluctant to migration to fibre networks (SI);
- To adapt the regulation in the light of new European legislation (HU).

A large transparency on the switch-off process mixed with a wide communication to all interested parties are both identified as a key to succeed in the migration process. From one country to another, a variety of entities intervene to communicate to the public around the switch-off process. In 4 countries (PT, CY, MT, SE), the SMPO is the main actor communicating to the public. In less frequent cases, the NRA communicates alongside the SMPO (IT) or communicates alone (LU). Operators take their share in the communication process in 3 countries (SK, HU, SI) where they are the only source of communication. In 3 other countries (FI, BE, ES), NRAs and operators communicate each but independently on the subject. Finally, along with the SMPO, NRA, operators and ministries play a part in the communication process in 2 countries (FR, NO).

Some types of communications have proven themselves successful. Where some countries value an institutional and neutral communication to complete the operators' communication (FR), through national consumer agencies (SE) or through a public consultation (IT), other countries highlight the success of direct communication to consumers (BE), sometimes through meetings and letters (PT) or through emails allowing the booking of an appointment for the customer (MT). The role of the NRA in the communication is also advertised by one country (ES) with the publication of the list of MDF locations to be switched-off along with articles on the switch-off process on the NRA's blog.

One of the questions raised by the copper switch-off process lies in whether the switch-off led to a boost to fixed VHCN uptake. 5 countries (ES, SK, SI, PT, FR) reported that no specific shift from copper to fixed VHCN can be linked to the copper switch-off. Among these countries, 2 of them (FR, CZ) consider that it might be too soon to observe such a boost. 2 other countries (PT, SE) observe an uptake of fixed VHCN regardless of copper switch-off, more directly linked to the expansion of fibre. On the contrary, 3 countries (HU, FI, [redacted]) notice a shift to fixed VHCN due to copper switch-off, for some (FI) limited to some regions only.

8. Conclusions

As regards migration and copper switch-off, the data suggests some progress since 2022. The number of countries where the NRA has set rules for the transition process has increased, as did the number of countries where legacy network elements have already been closed. By setting up rules for the transition process, including on appropriate notice periods, NRAs are

getting ready for the next concrete steps of copper switch-off. Moreover, those first concrete steps reflect the expectation of NRAs that SMPOs are likely to start migration and switch-off processes.

Just over half of the SMPOs have announced their intention to close (parts of) their legacy network. However, most NRAs expect the total closure will not be achieved until 2030.

NRAs have started to impose rules to regulate the copper switch-off process, mostly through market analysis decisions. The most common obligation is the introduction of notice periods and the definition of an appropriate alternative wholesale access product. Most NRAs also imposed data sharing from the SMPO, most of the time with the NRA and/or the ANOs.

Moreover, it should be noted that the Gigabit Recommendation is still quite new and therefore there has not been a lot of experience regarding its practical application and its benefits to aid the migration and switch-off process of legacy networks still needs to fully materialize in practice.

The lessons learned so far by NRAs already involved in a copper switch-off process highlight key factors for the success of such process. Firstly, a broad and effective communication strategy, through a variety of public and private actors, seems to be relevant in order to anticipate and avoid migration issues and to reach end-users reluctant to migration. Indeed, answers illustrate that one of the main issues encountered during the migration process is an insufficient information given to end-users and other alternative operators. Secondly, an appropriate notice period allows time to both meet the conditions set for the copper switch-off and also facilitates voluntary migrations to the greatest extent possible.

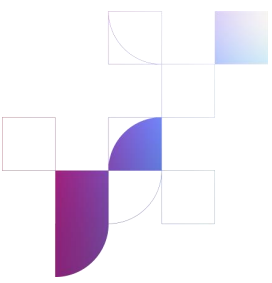
As for alternative wholesale access products within the meaning of Article 81 (2) EECC, with at least comparable quality providing access to the upgraded network infrastructure, VULA over fibre at local level is the most adopted service by NRAs. Generally, no specific services are defined to allowing switch-off of the legacy network, and prices of the alternative products are higher than the legacy ones in most cases. Regarding the possibility of allowing the SMPO to switch off an MDF where the alternative VHCN network is deployed by another operator, this is explicitly specified in some countries. Given the novelty of the Gigabit Recommendation, so far a substitution matrix showing for each legacy WAP the corresponding alternative WAP is defined in only one country.

Some NRAs set further specific rules regarding the migration costs, in addition to standard SMP price regulation defined under market analysis (the situation was similar in 2022 Report). In general, the rules set by NRAs are specifically imposed to share the impact of the migration cost between the SMPO and the access seekers. Regarding the possibility for the NRAs to allow the SMPO to increase the wholesale copper access prices during the transition period, some NRAs explicitly confirmed this possibility; however, generally this behaviour appears to be not strictly related to the scope of switching-off legacy networks.

In general and compared with 2022, we can observe substantial progress in terms of VHCN deployment. Moreover, we see that concrete steps towards the switch-off of legacy networks have been taken and more countries have identified a path towards full copper switch-off.

However, the availability of an alternative fixed product provided by a new VHCN is of utmost importance before concrete steps towards the switch-off of legacy networks can be undertaken on a larger scale. Therefore, in many countries the switch off process will not be completed by 2030 given the required time for VHCN deployment and the subsequent steps to achieve full switch-off.

BEREC finally wants to stress that it is of utmost importance to achieve migration to VHCNs and copper switch-off but that the process must not be rushed due to the need for an appropriate level of end-user protection, which requires to foresee adequate notice periods, end-user information and the availability of adequate alternative access products at a comparable price.



Annex 1 (Abbreviations for countries)

Abbreviation	Country	Abbreviation	Country	Abbreviation	Country
AL	Albania	FR	France	MT	Malta
AT	Austria	GR	Greece	NMK	North Macedonia
BIH	Bosnia and Herzegovina	HU	Hungary	NO	Norway
BE	Belgium	HR	Croatia	NL	Netherlands
BG	Bulgaria	IS	Iceland	PL	Poland
CY	Cyprus	IE	Ireland		
CH	Switzerland	IT	Italy	PT	Portugal
CZ	Czech Republic	KO	Kosovo	RO	Romania
DK	Denmark	LI	Liechtenstein	RS	Serbia
DE	Germany	LT	Lithuania	SE	Sweden
EE	Estonia	LU	Luxembourg	SI	Slovenia
ES	Spain	LV	Latvia	SK	Slovakia
FI	Finland	ME	Montenegro	TR	Turkiye

Annex 2 (Abbreviations)

ACP	Alternative Comparable Product
ANO	Alternative Network Operator
BSA	BitStream Access
CPE	Customer Premises Equipment
CPS	Carrier Pre-Selection
CS	Carrier Selection
DPU	Distribution Point Unit
DSLAM	Digital Subscriber Line Access Multiplexer
EECC	European Electronic Communications Code
FTTB	Fibre To The Building
FTTC	Fibre To The Cabinet
FTTEx	Fibre To The Exchange
FTTH	Fibre To The Home
FWA	Fixed Wireless Access
HFC	Hybrid Fibre Coax
ISDN	Integrated Services Digital Network
KPI	Key Performance Indicators
LLU	Local Loop Unbundling
MDF	Main Distribution Frame
MSAN	Multi Service Access Node
NGA	Next Generation Access
NGN	Next Generation Network
NRA	National Regulatory Authority
NTP	Network Termination Point
OLT	Optical Line Termination
PON	Passive Optical Network

POP	Point of Presence
POTS	Plain Old Telephone Service
PSTN	Public Switched Telephone Network
SAL	Subscriber Access Line
SC	Street Cabinet
SLA	Service Level Agreement
SLG	Service Level Guarantee
SLU	Sub-Loop Unbundling
SMP	Significant Market Power
SMPO	SMP Operator
ULL	Unbundled Local Loop
VoIP	Voice over IP
VULA	Virtual Unbundled Local Access
WAP	Wholesale Access Product
WLA	Wholesale Local Access
WLR	Wholesale Line Rental

List of Tables

Annex 3 (NRAs data in tables) Basic data of the report (as of May 2024)

Annex 3.1: Basic data used in section 2

Table 7: Overview questions (AT, BE, BIH, BG, HR, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE)

Country	Did the SMP operator (hereafter SMPO) already announce/inform that it plans to switch off all or parts of its legacy copper access network e.g. close main distribution frames (hereafter MDFs)?	Did the SMPO already close (phase out, no longer use) copper-based network elements (e.g. MDFs)?	Did the NRA already set rules (e.g. in market analysis procedure) for the migration process and copper switch-off (e.g. closure of MDFs)?	Does the SMPO, operating the legacy network also have SMP on fibre (Yes/No/only in parts of the country)	In the current trajectory, when would copper switch-off reach 80% of the lines?	In the current trajectory, when would copper switch-off reach 100% of the lines?
Austria	No	No	No	No	n/a[37]	
Belgium	Yes	Yes	Yes	Yes	2034	2040
Bosnia and Herzegovina	No	No	No	No	n/a	
Bulgaria	No	No	No	No	n/a	
Croatia	No	Yes[38]	Yes[39]	Only in parts of the country	n/a	
Cyprus	Yes	Yes	Yes	Yes	2028	2030
Czech Republic	No	No	Yes	Yes	n/a	
Denmark	Yes	Yes	Yes	Only in parts of the country	n/a	2030
Estonia	Yes	Yes	Yes	Yes	n/a[40]	

[37] Significantly after 2030
[38] The SMPO closed only two MDFs (in remote rural areas) in line with the rules had been set during the market analysis process (2019).
[39] The migration rules are now integrated in the law
[40] In end of 2025 all ADSLx copper is switced-off. VDSLx and VDSLx vectoring remain with an unknown switch-off date. VDSLx vectoring allows speeds of up to 200 Mbps. VDSLx remain mainly in sparsely populated areas where new fibre deployments are not economically viable. In such areas, in some cases VDSLx are replaced by a mobile connection rather than a fibre connection because it is more cost effective.

Finland	Yes	Yes[41]	No	only in parts of the country	n/a[42]	
France	Yes	Yes	Yes	only in parts of the country	2029[43]	2030[44]
Germany	No	No	No	Yes	n/a[45]	
Greece	No[46]	No	Yes	Yes	n/a[47]	
Hungary	Yes	Yes	Yes	Yes	n/a	
Ireland	No[48]	No	Yes	only in parts of the country	n/a	

[41] (original answer was “no”). The situation in Finland regarding copper switch-off is rather complex and there are differences between operators. We have had 21 operators with copper networks. Of these operators 4 have already switched-off their copper networks. In the 1990s we had 3 million subscriptions in the copper networks. Nowadays we have less than 200.000 subscriptions left in use. The three biggest operators Elisa, Telia and DNA still have the copper network in use, but likely at least the ADSL and VDSL services will be closed in a few years.

[42] There are 18 operators with SMP in copper local loops. Some of the smaller ones have already switched off copper, but the three major operators DNA, Elisa and Telia still use copper networks. At the end of 2023 there was 200.000 subscriptions in the copper network left. Some operators have informed us they will switch-off the lines in 2025-26, but possible there can still be copper lines left in 2030.

[43] 100% of the lines announced in commercial closure for 2026 and 75% of lines in technical closure for 2029.

[44] 100% of lines announced in commercial closure for 2026 and in technical closure for 2030.

[45] At this point, no copper switch off has taken place in Germany. The reason for this mainly is that the take up rate concerning fibre is too low at the moment. Instead, most customers are satisfied with their copper connections for now. By the end of 2023, there have still been less than 50 % homes passed with FttH/B in Germany, although this figure has recently risen significantly. Only half of these homes have been connected and only one quarter of these connections were activated. Moreover, there are slightly over 60% homes passed with HFC Networks, capable of delivering speeds of > 1Gbps. Approximately 20 % of all customers in Germany are currently supplied via broadband cable (lines activated). There is currently neither a binding nor a voluntary trajectory for switching off copper in Germany. In view of the low take-up rate, we believe that forced migration would be counterproductive at this point. In order to prepare and accelerate migration, the process is currently intensely discussed in a multilateral stakeholder working group (Gigabitforum). A market interface for migration is to be developed. In addition, questions regarding owners of the housing industry and wholesale customers are tackled in order to speed up the migration and ultimately the switch off process. For the reasons stated above, an estimation of the switch-off trajectory regarding 80 or 100% of the lines is not possible at this moment. It is however clear that this milestones cannot be reached by 2028/2030 respectively.

[46] in 2019 the incumbent in Greece had announced an intention to switch off 17 exchange centers in the next 5 years (a 5 year advance announcement was needed according to the legal framework at the time). But coming to the end of this 5 year period, this intention has never been implemented and no further announcement or development on this has been made. EETT, as mentioned throughout the questionnaire has set at the beginning of 2023 specific rules for the copper switch off, within the last Market Analysis. No further intention or related announcement has been made since.

[47] EETT has set rules for migration to NGA networks without setting specific time targets. The rules consist mainly of prerequisites for ensuring a smooth switch-off for the market as well as the end-users.

[48] In March 2021, the incumbent operator Eircom issued a white paper outlining its intention to switch-off its copper network. At that point, the EECC was not transposed into Irish law. ComReg began work on a framework regarding the Migration from Legacy Infrastructure which included a Call for Inputs, Consultation and finally a Decision (D09/23) issued in November 2023.This Decision outlined various requirements for Eircom to abide by when switching off its copper network. This included a Switch-off Proposal which must be submitted to ComReg for approval before copper switch-off can begin. The initial white paper issued by Eircom does not contain

Source: BEREC

sufficient detail to be considered a Switch-off Proposal. Eircom has yet to submit a Switch-off Proposal regarding Migration from Legacy Infrastructure. Based on the above timeline, I think we can see why the answer to the question was Yes in 2021, but no in 2024, as we have not received a Switch-off Proposal.

Table 8: Overview questions (IT, KO, LV, LT, LU, MT, ME, NO)

Country	Did the SMP operator (hereafter SMPO) already announce/inform that it plans to switch off all or parts of its legacy copper access network e.g. close main distribution frames (hereafter MDFs)?	Did the SMPO already close (phase out, no longer use) copper-based network elements (e.g. MDFs)?	Did the NRA already set rules (e.g. in market analysis procedure) for the migration process and copper switch-off (e.g. closure of MDFs)?	Does the SMPO, operating the legacy network also have SMP on fibre (Yes/No/only in parts of the country)	In the current trajectory, when would copper switch-off reach 80% of the lines?	In the current trajectory, when would copper switch-off reach 100% of the lines?
Italy	Yes	Yes	Yes	Yes	n/a[49]	
Kosovo	No	No	No	Yes	n/a	n/a
Latvia	No	No	No	Yes	[50]	
Lithuania	No	No	No	Yes	In the past[51]	n/a
Luxembourg	Yes	Yes	Yes	Yes		2030
Malta	Yes	Yes	Yes	Yes	End 2025	End 2026
Montenegro	No[52]	No	No	Yes	n/a	n/a
Norway	Yes	Yes	Yes	Yes		2025[53]

Source: BEREC

[49] White paper considers the switch off of the entire copper network. The current Plan for decommissioning of SMPO foresees switch-off of 100% of MDFs, but, with the migration toward both FTTC and FTTH networks. So, based on this, it is not currently possible to provide answers to the question, because the current Plan for decommissioning does not provide a specific date for the full decommissioning of copper cables (migration toward FTTC will leave copper cables active in the secondary network segment).

[50] Without such regulation it depends on the business plan of the operator and the choice of end users.

[51] We have 80% FTTx lines (SMPO + other operators) and 14% of xDSL lines (SMPO) of all fixed lines. So we consider that this milestone is already reached , but in case of SMPO only 3/4 of lines are FTTx and 1/4 remains of cooper

[52] In 2021, our answer was "Yes", based on our understanding and the information available to us. Specifically, our SMP operator had publicly declared plans to develop an FTTH access network and to transition customers to this network in the following years. However, to date, the SMP operator has not submitted any formal plan with a timetable to EKIP for switching off all or parts of its copper access network, despite ongoing development of the FTTH access network. Given this, our current response to the question is "No".

[53] The copper-switch off in Norway will reach 100% latest at the 2nd of September 2025. That is the final date for Telenors copper-obligations in Norway.

Table 9: Overview questions (PL, PT, RS, RO, SK, SI, ES, SE)

Country	Did the SMP operator (hereafter SMPO) already announce/inform that it plans to switch off all or parts of its legacy copper access network e.g. close main distribution frames (hereafter MDFs)?	Did the SMPO already close (phase out, no longer use) copper-based network elements (e.g. MDFs)?	Did the NRA already set rules (e.g. in market analysis procedure) for the migration process and copper switch-off (e.g. closure of MDFs)?	Does the SMPO, operating the legacy network also have SMP on fibre (Yes/No/only in parts of the country)	In the current trajectory, when would copper switch-off reach: a. 80% of the lines?	In the current trajectory, when would copper switch-off reach: b. 100% of the lines?
Poland	Yes	Yes[54]	Yes	only in parts of the country	n/a	
Portugal	Yes	Yes	No	only in parts of the country	2027	2030
Republic of Serbia	No	No	No	Yes	n/a[55]	
Romania	No	No	No	No	n/a	
Slovakia	Yes	Yes	Yes	only in parts of the country	n/a[56]	n/a
Slovenia	Yes	Yes	Yes	Yes	n/a	
Spain	Yes	Yes	Yes	Yes	2025[57]	2025[58]
Sweden	Yes	Yes	Yes	Yes	2019	2026

Source: BEREC

[54] (original answer was „no“, answer changed to yes by the editor) Orange Polska phased-out only a part of its copper network and a large part of their network (especially in rural areas) is still copper based.

[55] At this moment SMPO has not adopted a copper switch off plan and SMPO does not yet plan to close MDFs and information when it will close MDFs is not available. Besides, RATEL has not set binding rules for copper switch-off.

[56] Not before 2030 based on the current development of the network

[57] June 2025. Please note that active copper lines are already, and since years, only a residual part of broadband lines. The percentages given refer to the total copper pairs (including non-active) in the switched-off MDFs in relation to the copper pairs in all MDFs. Regarding active lines, 97% of lines compared to the copper peak usage have been migrated as of April 2024.

[58] June 2025

Annex 3.2: Basic data used in section 3

Table 10: The current status of the SMPO's copper switch-off (BE, CY, DK)

Country	Belgium	Cyprus	Denmark
On the wholesale level - What percentage and total number of the active (ie, in use) subscriber access lines relying on SMPO's wholesale access products (excluding self-supply) are based on:			
• FTTH (no copper)?	[20-30]%	Confidential	Confidential
• FTTC/B/street/distribution point (part of the copper loop is used)?	[70-80]%	Confidential	
• FTTEx (full copper loop is used)?	[0-10]%	Confidential	Confidential
• Other type of access (which?)?			Confidential
On the overall use of SMPO's network - What percentage and total number of the active (ie, in use) subscriber access lines relying on the SMPO's networks (including self-supply) are based on			
• FTTH (no copper)?	[10-20]%	Confidential	Confidential
• FTTC/B/street/distribution point (part of the copper loop is used)?	[80-90]%	Confidential	
• FTTEx (full copper loop is used)?	[0-10]%	Confidential	Confidential
• Other type of access (which?)?			Confidential
On the overall market migration state, all networks combined - What percentage and total number of the active (ie, in use) subscriber access lines are based on:			
• FTTH (no copper)?	[0-10]%	51,4% (183455)	Confidential
• FTTC/B/street/distribution point (part of the copper loop is used)?	[40-50]%	27,3% (97297)	
• FTTEx (full copper loop is used)?	[0-10]%		Confidential
• Other type of access (which?)?	HFC: [50-60]%	DOCSIS 3.0-3.1: 21,3% (75855)	Confidential

Source: BEREC

Table 11: The current status of the SMPO's copper switch-off (EE, FR, HU)

Country	Estonia	France	Hungary
On the wholesale level - What percentage and total number of the active (ie, in use) subscriber access lines relying on SMPO's wholesale access products (excluding self-supply) are based on:			
• FTTH (no copper)?	Confidential	~60% (7.4 millions)	[30-40]%
• FTTC/B/street/distribution point (part of the copper loop is used)?	Confidential		[0-10]%
• FTTEx (full copper loop is used)?	Confidential		[40-50]%
• Other type of access (which?)?	Confidential	Copper wholesale access product: ~40% (4.6 millions)	Cable (HFC): [10-20]%[59]
On the overall use of SMPO's network - What percentage and total number of the active (ie, in use) subscriber access lines relying on the SMPO's networks (including self-supply) are based on			
• FTTH (no copper)?	Confidential	~ 60% (15.6 millions)	[40-50]%
• FTTC/B/street/distribution point (part of the copper loop is used)?	Confidential		[0-10]%
• FTTEx (full copper loop is used)?	Confidential	~40% (10.4 millions)	[10-20]%
• Other type of access (which?)?	*12% (FWA)*		Cable (HFC): [30-40]%[60]
On the overall market migration state, all networks combined - What percentage and total number of the active (ie, in use) subscriber access lines are based on:			
• FTTH (no copper)?	Confidential	66%	39% 1.428.536
• FTTC/B/street/distribution point (part of the copper loop is used)?	Confidential		4% 161.429
• FTTEx (full copper loop is used)?	Confidential	27	14% 533.489

[59] Please note that the data are of the end of 2022.
[60] The data are of the end of 2022 and refer to the entire networks of the 3 SMPOs, not only to those geographical areas where they are assigned as SMPO.

• Other type of access (which?)?	Confidential	Cable or wireless network:7%	Cable (HFC, coax)[61] 42% (1.558.665)

Source: BEREC

[61] Please note that the data are of the end of 2022.

Table 12: The current status of the SMPO's copper switch-off (IT, LT, LU)

Country	Italy	Lithuania	Luxembourg
On the wholesale level - What percentage and total number of the active (ie, in use) subscriber access lines relying on SMPO's wholesale access products (excluding self-supply) are based on:			
• FTTH (no copper)?	2,1% (150.000)	100% (11463)	
• FTTC/B/street/distribution point (part of the copper loop is used)?	81,7% (5.887.000)[62]		
• FTTEx (full copper loop is used)?	16,2% (1.169.000)		
• Other type of access (which?)?			
On the overall use of SMPO's network - What percentage and total number of the active (ie, in use) subscriber access lines relying on the SMPO's networks (including self-supply) are based on			
• FTTH (no copper)?	8,9% (1.351.000)	(326 080)	73% (164000)
• FTTC/B/street/distribution point (part of the copper loop is used)?	65% (9.865.000)[63]	(627)	27% (62000)
• FTTEx (full copper loop is used)?	23,5% (3.564.000)		[64]
• Other type of access (which?)?	FWA: 2,6% (399.000)	xDSL (111019)	
On the overall market migration state, all networks combined - What percentage and total number of the active (ie, in use) subscriber access lines are based on:			
• FTTH (no copper)?	22,9% (4.608.000)		66% (164000)
• FTTC/B/street/distribution point (part of the copper loop is used)?	49% (9.865.000)[65]		25% (62000)
• FTTEx (full copper loop is used)?	17,7% (3.564.000)		[66]
• Other type of access (which?)?	FWA: 10,5% (2.108.000)		Coax net.: 9% (23500)

Source: BEREC

[62] FTTC/B means FTTC in this case. All data refer to end of 2023.
[63] FTTC/B means FTTC in this case. All data refer to end of 2023.
[64] We make no difference between FTTC/B/street/distribution point and FTTEx.
[65] Note that FTTB means FTTC in this case. The percentages consider all fixed networks (including SMP and other non-SMP networks, FTTH and FWA).
[66] We make no difference between FTTC/B/street/distribution point and FTTEx.

Table 13: The current status of the SMPO's copper switch-off (MT, NO, PT)

Country	Malta	Norway	Portugal
On the wholesale level - What percentage and total number of the active (ie, in use) subscriber access lines relying on SMPO's wholesale access products (excluding self-supply) are based on:			
• FTTH (no copper)?	100% (4,478)	63% (48101)	
• FTTC/B/street/distribution point (part of the copper loop is used)?		0% (38)	
• FTTEx (full copper loop is used)?		20% (15541)	
• Other type of access (which?)?		FWA: 17% (13279)	Confidential[67]
On the overall use of SMPO's network - What percentage and total number of the active (ie, in use) subscriber access lines relying on the SMPO's networks (including self-supply) are based on			
• FTTH (no copper)?	[60-70]%	59% (463894)	Confidential
• FTTC/B/street/distribution point (part of the copper loop is used)?	[10-20]%	0% (38)	Confidential
• FTTEx (full copper loop is used)?	[10-20]%	2% (15541)	Confidential
• Other type of access (which?)?	FWA: [5-10]%	FWA & HFC: 41% (318345)	Confidential
On the overall market migration state, all networks combined - What percentage and total number of the active (ie, in use) subscriber access lines are based on:			
• FTTH (no copper)?	[68]	72 % (1774641)	66,2% (3.048 thousand)
• FTTC/B/street/distribution point (part of the copper loop is used)?		0 % (38)	
• FTTEx (full copper loop is used)?		1 % (15541)	
• Other type of access (which?)?		HFC & FWA: 27% (669876)	33,8% (1.553 thousand) Cable (1.172 thousand) Mobile (241 thousand) and xDSL (128 thousand)

[67] Confidential data

[68] In Malta, only the SMPO (GO) is migrating from its legacy copper network. As at end Q4 2023, GO had a market share of 48.9% for fixed telephony subscribers and 46.8% for fixed broadband subscribers, and its distribution of subscriber access lines (SALs) is shown above. Melita, with a market share of 47.4% for fixed telephony subscribers and 47.2% for fixed broadband subscribers as at Q4 2023, primarily makes use of coaxial SALs, with some use of fibre-based SALs and FWA. For example, as at Q4 2023, 95.5% of Melita's fixed broadband subscribers made use of coaxial SALs.

Source: BEREC

Table 14: The current status of the SMPO's copper switch-off (SK, SI, ES, SE)

Country	Slovakia	Slovenia	Spain	Sweden
On the wholesale level - What percentage and total number of the active (ie, in use) subscriber access lines relying on SMPO's wholesale access products (excluding self-supply) are based on:				
• FTTH (no copper)?	Confidential	65,6% (97.876)	95% (3.3M)	97% (51034)
• FTTC/B/street/distribution point (part of the copper loop is used)?				3% (1658)
• FTTEx (full copper loop is used)?	Confidential [69]	34.4% (51.287)	5% (182k)	
• Other type of access (which?)?				
On the overall use of SMPO's network - What percentage and total number of the active (ie, in use) subscriber access lines relying on the SMPO's networks (including self-supply) are based on				
• FTTH (no copper)?	Confidential	64,1% (208.702)	92.4% (8.7M)	92% (509751)
• FTTC/B/street/distribution point (part of the copper loop is used)?			1.1% (100k)	8% (43835)
• FTTEx (full copper loop is used)?	Confidential [70]	35,9% (117.088)	2.9% (276k)	
• Other type of access (which?)?	Confidential		FWA: 3.3% (300k)	
On the overall market migration state, all networks combined - What percentage and total number of the active (ie, in use) subscriber access lines are based on:				
• FTTH (no copper)?	Confidential		86.4% (15M)	97% (1523441)
• FTTC/B/street/distribution point (part of the copper loop is used)?			0.6% (100k)	3% (43835)
• FTTEx (full copper loop is used)?	Confidential [71]		1.6% (276k)	
• Other type of access (which?)?	Confidential		HFC : 8.5% (1.5M) FWA: 2.9% (510k)	

Source: BEREC

[69] FTTEx together with FTTC/B/street/distribution point
[70] Ibid. footnote 69
[71] Ibid. footnote 69

Table 15: The current status of the SMPO's copper switch-off (BE, CY, DK, EE)

Country	Belgium	Cyprus	Denmark	Estonia
To which alternative access network are end-users migrated? Please give quantitative indications (like percentages) if available – if not, please provide rough comparison (most/some/no end-users are migrated to the alternative network):				
• FTTH	Most	99%	Confidential	Mostly
• FTTB	None			Mostly
• Cable/HFC	Some		Confidential	No
• FWA	None	1%		No
• Mobile	None		Confidential	Some
• Other	none			no
Did the SMPO already switch off (phase out, no longer use)				
• MDFs (Yes/No)?	No	No	n.a	Yes
• Not yet MDFs but street cabinets (Yes/No)?	Yes	Yes	n.a	
• Not yet MDFs and street cabinets but other copper-based network elements (Yes(which?)/No)?	NO		n.a	
If the SMPO already switched-off MDFs:				
• How many MDFs in total did the SMPO already switch- off?	MDFs are reused for FTTH			n/a
• What percentage of its MDFs did the SMPO already switch off?	See above			n/a
• What percentage of copper lines are already switched off compared to the peak usage of the copper network?	<1%			n/a
• When was the first MDF switched off?	First street cabinet switched off beginning of 2023			n/a

Source: BEREC

Table 16: The current status of the SMPO's copper switch-off (FI, FR, HU, IT)

Country	Finland	France	Hungary	Italy
To which alternative access network are end-users migrated? Please give quantitative indications (like percentages) if available – if not, please provide rough comparison (most/some/no end-users are migrated to the alternative network):				
• FTTH		Mostly	Most	27,8%
• FTTB	15%[72]		Some	59,5%[73]
• Cable/HFC	5%		Some	0%
• FWA			No	12,7%
• Mobile	80%		No	n/a[74]
• Other			No	
Did the SMPO already switch off (phase out, no longer use)				
• MDFs (Yes/No)?	No	No[75]	Yes	Yes[76]
• Not yet MDFs but street cabinets (Yes/No)?	No	Yes	No	
• Not yet MDFs and street cabinets but other copper-based network elements (Yes(which?)/No)?	No[77]	No	No	
If the SMPO already switched-off MDFs:				
• How many MDFs in total did the SMPO already switch-off?			492	*62 (see above)*
• What percentage of its MDFs did the SMPO already switch off?		Less than 1%	27%	
• What percentage of copper lines are already switched off compared to the peak usage of the copper network?			*50-70% (estimated value)*	
• When was the first MDF switched off?			2020	*2024 (see above)*

Source: BEREC

[72] Estimation-based
[73] Note that FTTB means FTTC in this case.
[74] Please note that migration to mobile is not considered, so the percentages only consider fixed networks (including SMP and other non-SMP FTTH networks and FWA networks).
[75] None for now. First MDF will be switched-off in 2025.
[76] In May 2024, the first 62 Local Exchanges have been switched-off over a total of about 10.000.
[77] Some smaller operators have already done the switch-off, but the three big operators have not done it.

Table 17: The current status of the SMPO's copper switch-off (LU, MT, NO, PT)

Country	Luxembourg	Malta	Norway	Portugal
To which alternative access network are end-users migrated? Please give quantitative indications (like percentages) if available – if not, please provide rough comparison (most/some/no end-users are migrated to the alternative network):				
• FTTH	>95%	Most	40%[78]	Most
• FTTB		Some		n/a
• Cable/HFC			10%	Few
• FWA		Few	50%	Some
• Mobile			[79]	n/a
• Other			[80]	n/a
Did the SMPO already switch off (phase out, no longer use)				
• MDFs (Yes/No)?	No	Yes	Yes	Yes
• Not yet MDFs but street cabinets (Yes/No)?	Yes	Yes		
• Not yet MDFs and street cabinets but other copper-based network elements (Yes(which?)/No)?				
If the SMPO already switched-off MDFs:				
• How many MDFs in total did the SMPO already switch- off?		1 - see the response above	1561	Confidential[81]
• What percentage of its MDFs did the SMPO already switch off?		Confidential	39%	Confidential
• What percentage of copper lines are already switched off compared to the peak usage of the copper network?		Confidential	40%	Confidential
• When was the first MDF switched off?		June 2024	2019	2019

Source: BEREC

[78] Based on Telenor retained customers - 60%. The 40% percent that churned migrated to fibre (<95%)
[79] Substitute for PSTN in residential and business market.
[80] IP -telephony substitute for PSTN in business market.
[81] Confidential data

Table 18: The current status of the SMPO's copper switch-off (SK, SI, ES, SE)

Country	Slovakia	Slovenia	Spain	Sweden
To which alternative access network are end-users migrated? Please give quantitative indications (like percentages) if available – if not, please provide rough comparison (most/some/no end-users are migrated to the alternative network):				
• FTTH	~100%	Almost 100%	Most	71%
• FTTB				
• Cable/HFC				8%
• FWA			Some	
• Mobile				21%
• Other		<1%[82]		
Did the SMPO already switch off (phase out, no longer use)				
• MDFs (Yes/No)?	Yes	Yes	Yes	Yes
• Not yet MDFs but street cabinets (Yes/No)?	Yes	No		No
• Not yet MDFs and street cabinets but other copper-based network elements (Yes(which?)/No)?	Yes Access nodes - MSANs	No SMPO switched off some MDFs, some SCs and some lines.		No all parts of telephone exchanges, lines and street cabinets
If the SMPO already switched-off MDFs:				
• How many MDFs in total did the SMPO already switch- off?	Confidential		3037[83]	5684
• What percentage of its MDFs did the SMPO already switch off?	Confidential		36%	86%
• What percentage of copper lines are already switched off compared to the peak usage of the copper network?	Confidential		27%[84]	97%
• When was the first MDF switched off?	2021		Nov. 2015	2010

Source: BEREC

[82] Migration to open BB networks is also possible according to the decision on M1
[83] Apr. 2024
[84] Ratio of copper pairs in switched-off MDFs to total number of copper pairs in all MDFs. Regarding active lines, 97% of lines compared to the copper peak usage have been migrated as of April 2024

Annex 3.3: Basic data used in section 4

Table 19: SMPO's plan for copper switch-off (BE, CY, DK, EE)

Country	Belgium	Cyprus	Denmark	Estonia
Does the SMPO plan to start to switch off (phase out, no longer use)				
• MDFs (Yes/No)?	Yes	Yes		Yes
• Street cabinets (Yes/No)?	Yes	Yes		
• Other copper-based network elements (Yes(which?)/No)?	No	No	[85]	
Please indicate the amount and percentage of total of MDFs and lines that the SMPO intends to switch off by				
• the end of 2024	[0-10]%[86]	Confidential	n/a	n/a
• the end of 2025	[0-10]%	Confidential	n/a	n/a
• the end of 2026	[10-20]%	Confidential	n/a	n/a
• the end of 2027	[10-20]%	Confidential	n/a	n/a
• the end of 2028	[20-30]%	Confidential	n/a	n/a
• after 2028	[30-40]%	Confidential	n/a	n/a
Did the SMPO already announce when it will switch off all MDFs (Yes(when?)/No)?	Yes, 2040	Yes, 2030[87]	Yes, 2030	
Does the SMPO plan to switch off not only MDFs but also the entire location of MDF locations (e.g. selling the building) (Yes/No)?	Yes	n/a[88]	n/a	n/a
• If this is the case, what is the percentage of the MDFs the SMPO plans to close, where it will also close the MDF location?	[89]			

Source: BEREC

[85] The SMPO has not specified the element, but in the notice of switchoffs the SMPO referes to "numbers of active lines affected in areas" or "sets of new adresses". Longer notice if more than 200 actitve lines.
[86] Further info is confidential
[87] Confidential
[88] Not decided yet
[89] Proximus plans to reuse the MDFs as much as possible for FTTH. The closing of an MDF location is exceptional.

Table 20: SMPO's plan for copper switch-off (FR, HU, IT)

Country	France	Hungary	Italy
Does the SMPO plan to start to switch off (phase out, no longer use)			
• MDFs (Yes/No)?	Yes	Yes	Yes
• Street cabinets (Yes/No)?	Yes	Yes	No
• Other copper-based network elements (Yes(which?)/No)?			No
Please indicate the amount and percentage of total of MDFs and lines that the SMPO intends to switch off by			
• the end of 2024	<1%, 225700 lines		<1%, 62 LEXs
• the end of 2025	<1%, 256700 lines		<1%, 62 LEXs
• the end of 2026	3%, 1,2Mio lines		14%, 1404 LEXs
• the end of 2027	25%, 10,5 Mio lines		n/a[90]
• the end of 2028	50%, 21Mio lines		100%
• after 2028	75%, 31,5Mio lines and 100% of lines by end 2030		
Did the SMPO already announce when it will switch off all MDFs (Yes(when?)/No)?	Yes[91]	No	Yes (2028)
Does the SMPO plan to switch off not only MDFs but also the entire location of MDF locations (e.g. selling the building) (Yes/No)?	Yes	Yes	Yes
• If this is the case, what is the percentage of the MDFs the SMPO plans to close, where it will also close the MDF location?	[92]	n/a	65%[93]

Source: BEREC

[90] Decommissioning plan foreseen 100% MDFs will be switched-off in 2028.
[91] SMPO announced the technical closure of all copper lines for 2030. The switch-off of MDFs will follow until 2031. The list of MDFs subjected to a switch-off is progressively being defined by the SMPO on a delayed calendar compared to lines.
[92] SMPO announced its will to maintain at least 8 000 MDFs (on approximately 21 000) and will progressively define the list of MDFs that will be entirely closed.
[93] 6678 LEXs, over a total amount of about 10.200 LEXs, will be closed (leaving the building).

Table 21: SMPO's plan for copper switch-off (LU, MT, NO, PL, PT)

Country	Luxembourg	Malta	Norway	Poland	Portugal
Does the SMPO plan to start to switch off (phase out, no longer use)					
• MDFs (Yes/No)?	Yes	Yes	Yes[94]		Yes
• Street cabinets (Yes/No)?	Yes	Yes	Yes		Yes
• Other copper-based network elements (Yes(which?)/No)?	Yes	Yes	Yes		Yes[95]
Please indicate the amount and percentage of total of MDFs and lines that the SMPO intends to switch off by					
• the end of 2024		8% 10,800 lines (3 MDFs)			Confidential
• the end of 2025		6% 8,100 lines (4 MDFs)	100%		Confidential
• the end of 2026		16% 22,950 lines (12 MDFs)			Confidential
• the end of 2027					Confidential
• the end of 2028					Confidential
• after 2028					Confidential
Did the SMPO already announce when it will switch off all MDFs (Yes(when?)/No)?		No	Yes[96]	No	Yes, 2030
Does the SMPO plan to switch off not only MDFs but also the entire location of MDF locations (e.g. selling the building) (Yes/No)?	Yes	Confidential	Yes		Yes
• If this is the case, what is the percentage of the MDFs the SMPO plans to close, where it will also close the MDF location?	20%	Confidential	[97]		Confidential

Source: BEREC

[94] Telenors plan is to switch-off the entire copper network latest at 2nd of September 2025, and has already emptied the copper network for its own end customers.
[95] Access lines (copper)
[96] Telenors will switch-off the entire copper network latest at 2nd of September 2025, because this is the date set by Nkom.
[97] Not sure about the percentage, but Telenor has stated that they will also decommission cabins and other physical infrastructure related to the copper network.

Table 22: SMPO's plan for copper switch-off (SK, SI, ES, SE)

Country	Slovakia	Slovenia	Spain	Sweden
Does the SMPO plan to start to switch off (phase out, no longer use)				
• MDFs (Yes/No)?	Yes	Yes	Yes	Yes
• Street cabinets (Yes/No)?	Yes	Yes	Yes	Yes
• Other copper-based network elements (Yes(which?)/No)?	Yes[98]	No	Yes[99]	Yes[100]
Please indicate the amount and percentage of total of MDFs and lines that the SMPO intends to switch off by				
• the end of 2024	n/a	[101]	91.7% MDF (7814) 66% copper pairs[102]	
• the end of 2025	n/a		100% MDF (8526), 100% copper pairs	
• the end of 2026	n/a			100%
• the end of 2027	n/a			
• the end of 2028	n/a	(Up to 40%)		
• after 2028	n/a			
Did the SMPO already announce when it will switch off all MDFs (Yes(when?)/No)?	No	No	yes, end of May 2025	Yes, 2026
Does the SMPO plan to switch off not only MDFs but also the entire location of MDF locations (e.g. selling the building) (Yes/No)?	Yes	Yes	Yes	No
• If this is the case, what is the percentage of the MDFs the SMPO plans to close, where it will also close the MDF location?	n/a	n/a	30%-40%	

Source: BEREC

[98] Confidential
[99] Copper terminal boxes, typically serving a building. This is exceptional and on demand
[100] all parts of telephone exchanges, lines and street cabinets
[101] Confidential
[102] Ratio of copper pairs in switched-off MDFs to total number of copper pairs in all MDFs

Table 23: SMPO's plan for copper switch-off (BE, CY, DK, EE)

Country	Belgium	Cyprus	Denmark	Estonia
Which type of copper switch-off does the SMPO pursue:				
• Switch-off of the full copper loop (e.g. migration to FTTH)?	Yes	Yes[103]	n/a	n/a
• Switch-off of the copper loop up to the building (migration to FTTB)?	No		n/a	n/a
• Other (please specify)	No			
Has the SMPO made a public announcement only to operators or also to the population?	Operators; Population	Operators; Population	Operators; Population	Operators; Population
• How?	Communication on retail and wholesale website	Copper decommissioning plan on a yearly basis (shared with Operators & NRA). Customers informed on quarterly basis (targeted campaigns)	The SMPO's website https://tdcnet.dk/infrastruktur/kobberudfasning/	
• When?	First general communication in 2018, then specific communications for each MDF closure			

Source: BEREC

[103] Switch-off of the full copper loop (migration to FTTH)

Table 24: SMPO's plan for copper switch-off (FR, HU, IT)

Country	France	Hungary	Italy
Which type of copper switch-off does the SMPO pursue:			
• Switch-off of the full copper loop (e.g. migration to FTTH)?	Yes	Yes	No
• Switch-off of the copper loop up to the building (migration to FTTB)?	No	No	No
• Other (please specify)		No	Yes[104]
Has the SMPO made a public announcement only to operators or also to the population?	Operators;	Operators, Population	Operators
• How?	No public announcement made by the SMPO, has only notified operators of its plan to switch off copper and continues to notify operators at each new stage of the copper switch off process. The SMPO also informs mayors if their town in concerned by a copper switch-off operation in the following years.		Decommissioning Plan published on the SMP wholesale website.
• When?	The first announcement to operators, the NRA and the government was made in 2019. Ever since, the SMPO yearly notified operators for each new stage of the process. The SMPO also informs mayors if their town in concerned by a copper switch-off operation in the following years.		Firstly on May 2017, then updated Plan on August 2018 and finally in 2024.

Source: BEREC

[104] For the moment, switch-off of the LEXs and of the copper loop up to the cabinet (migration to FTTC).

Table 25: SMPO's plan for copper switch-off (LU, MT, NO, PL, PT)

Country	Luxembourg	Malta	Norway	Poland	Portugal
Which type of copper switch-off does the SMPO pursue:					
• Switch-off of the full copper loop (e.g. migration to FTTH)?	Yes	Yes	Yes	x	Yes
• Switch-off of the copper loop up to the building (migration to FTTB)?					No
• Other (please specify)					No
Has the SMPO made a public announcement only to operators or also to the population?	Operators; Population	Population	Operators; population		Operators
• How?		Annual Financial Report and Press statements regarding FTTH roll-out.	Telenor announced publicly in 2019 that they would shut down the copper network by 2022. However, Nkom instructed Telenor to maintain the copper network during a transitional period until 2nd of September 2025.		By letters and meetings
• When?		2023	2019		2020

Source: BEREC

Table 26: SMPO's plan for copper switch-off (SK, SI, ES, SE)

Country	Slovakia	Slovenia	Spain	Sweden
Which type of copper switch-off does the SMPO pursue:				
• Switch-off of the full copper loop (e.g. migration to FTTH)?	Yes	Yes	Yes	Yes
• Switch-off of the copper loop up to the building (migration to FTTB)?	Not preferred	No	No	No
• Other (please specify)	Depends on features and availability of alternative solution			
Has the SMPO made a public announcement only to operators or also to the population?	Operators	Operators	Operators; Population	Operators; Population
• How?	Mutual consent		Telefónica made public announcements about its intention to switch-off copper, including press notes.	press meeting, web pages
• When?	6 months in advance		Starting 2015	2021

Source: BEREC

Annex 3.4: Basic data used in section 5

Table 27: Rules set by the NRA for the migration process and copper switch-off - Type of procedure (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Did the NRA set the rules for the migration process and the copper switch-off in a market analysis procedure?	Yes	Yes	Yes	No	Yes
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA has to set rules before the next round of market analysis, as the SMPO notified to the NRA that it plans to switch off its copper-based access network (according to Art. 81 of the EECC) and the NRA has not yet set rules for the copper switch-off in the last market analysis procedure?					
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA already set rules for the copper switch-off in the last market analysis procedure, however, it was necessary to amend these rules since the SMPO’s copper switch-off plan or other relevant circumstances changed significantly?					
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because of other reasons (which?)				Yes[105]	
When did the NRA initially set the rules?	2018	It set rules in the market analysis	For the first time in 2010.	Dec 2021	In 2017 in market 3a.[106]
When was the latest update of the rules?	No update	2022	The last update was in 2024.	None	No update

Source: BEREC

[105] When answering the following question under section D DBA has inserted the procedures in TDC's commitment although these procedures were not rules set by DBA.
In the latest Market decision the Danish Business Authority (DBA) refrained from imposing TDC SMP obligations since TDC gave a commitment, which DBA made binding in its decision of 17 December 2021.
TDC did not have concrete plans to close the copper network, and therefore the commitment does not have a plan for full switch off. However, due to the ongoing reduction in the number of customers on copper, it was anticipated that the number of customers in parts of the copper network would become so low that it would become disproportionately expensive for TDC NET to maintain the network. As a result, TDC NET reserved the right to take the copper network out of service in central areas or cable sectors. The commitment therefore includes a procedure for the shutdown of copper connections.
[106] Only rule is that SMPO has to announce copper LLU users 6 month before switch-off and offer fibre LLU or duct access services.

Table 28: Rules set by the NRA for the migration process and copper switch-off - Type of procedure (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Did the NRA set the rules for the migration process and the copper switch-off in a market analysis procedure?	No	Yes	Yes	Yes	No
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA has to set rules before the next round of market analysis, as the SMPO notified to the NRA that it plans to switch off its copper-based access network (according to Art. 81 of the EECC) and the NRA has not yet set rules for the copper switch-off in the last market analysis procedure?					
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA already set rules for the copper switch-off in the last market analysis procedure, however, it was necessary to amend these rules since the SMPO’s copper switch-off plan or other relevant circumstances changed significantly?					
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because of other reasons (which?)	[107]				Yes[108]
When did the NRA initially set the rules?		In market analysis decisions of 2020.	Within market analysis for Market 1 -EETT's Decision 1063/02/30.01.2023	2011	On 1 November 2023, "Framework for the Migration from Legacy Infrastructure to Modern Infrastructure", ComReg Decision D09/23. See https://www.comreg.ie/publication/framework-for-the-migration-from-legacy-infrastructure-to-modern-infrastructure-2
When was the latest update of the rules?		At the end of 2023.		2017	1 November 2023. See above

Source: BEREC

[107] The NRA do not have the powers to set rules on the copper switch-off according to Finnish law.
[108] SMPO shared with the ComReg (National Regulatory Authority) and also published on its website, what it described as a “white paper” entitled “Copper switch-off: Leaving a legacy for the Future” in which SMPO signalled its intent to migrate copper-based services to largely fibre-based networks and ultimately switch off its copper access network.

Table 29: Rules set by the NRA for the migration process and copper switch-off - Type of procedure (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Did the NRA set the rules for the migration process and the copper switch-off in a market analysis procedure?	Yes	Yes	No	No	Yes
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA has to set rules before the next round of market analysis, as the SMPO notified to the NRA that it plans to switch off its copper-based access network (according to Art. 81 of the EECC) and the NRA has not yet set rules for the copper switch-off in the last market analysis procedure?				Yes	
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA already set rules for the copper switch-off in the last market analysis procedure, however, it was necessary to amend these rules since the SMPO’s copper switch-off plan or other relevant circumstances changed significantly?					
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because of other reasons (which?)			Yes[109]	Yes	
When did the NRA initially set the rules?	2019	Aug. 2014	Oct. 2022	2020[110]	2014
When was the latest update of the rules?	2024[111]	Mar. 2019	No updates	2022[112]	2019

Source: BEREC

[109] Given the absence of wholesale access seekers/users on the SMPO’s copper network, the MCA considered that prescribed rules, possibly following a market analysis procedure, were not necessary in Malta. Nevertheless, given the possible impact on retail end-users, the MCA established a procedure requiring the SMPO to inform it on a case-by-case basis (i.e. for each switch-off area e.g. all subscribers in a given locality) to ensure that all subscribers would be migrated to an alternative product prior to the switch-off, and to ensure that appropriate safeguards have been implemented for specific cases (e.g. PBXs, elevators, point-of-sale terminals, ‘telecare’ devices, etc.).

[110] In September 2020 (Nkoms "Copper Decision"), shortly after Telenor announced in 2019 that they would shut down the copper network by 2022. Telenor has not presented a migration plan which Nkom could approve. Therefore, there are no regulations for the migration process in Norway, beyond the obligation Telenor has to maintain the entire copper network, with the adjustments Nkom has made to the access obligation, until September 2, 2025.

[111] Rules have been updated in the current market analysis, approved on April 30, 2024 and published on May 6.

[112] No rules have been established for the migration process itself in Norway. Telenor has no remaining end customers on copper, but there are still about 16,000 copper customers remaining (access buyer’s customers). But the latest change to Telenors obligation to maintain the copper network, is Nkoms`s decision of 8th of June 2022 pertaining to the closure of "empty exchanges" that are no longer in use.

Table 30: Rules set by the NRA for the migration process and copper switch-off - Type of procedure (PT,SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Did the NRA set the rules for the migration process and the copper switch-off in a market analysis procedure?	No	Yes	Yes	Yes	No
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA has to set rules before the next round of market analysis, as the SMPO notified to the NRA that it plans to switch off its copper-based access network (according to Art. 81 of the EECC) and the NRA has not yet set rules for the copper switch-off in the last market analysis procedure?					No
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because the NRA already set rules for the copper switch-off in the last market analysis procedure, however, it was necessary to amend these rules since the SMPO’s copper switch-off plan or other relevant circumstances changed significantly?					No
• If your answer to question is „No“, did the NRA set the rules outside a market analysis procedure because of other reasons (which?)	Yes[113]				Yes[114]
When did the NRA initially set the rules?	Feb. 2010[115]	2018	With the issuance of the decision in 2011	2009	SMPO set the rules 2010
When was the latest update of the rules?	No updates[116]	No update	2020	2021	2022

Source: BEREC

[113] Because it was just the set of pre-notification periods of migration of copper loops and MDF closure.
[114] The NRA has not set the rules for migration. The SMPO did.
[115] February 2010 ANACOM decision in what regards to pre-notice periods of migration of local loops and regarding pre-notice of MDF closure. In the context of the former March 2017 market 3a (2014) analysis those rules were maintained.
[116] The copper regulation will be discontinued. See M1/2020 analysis performed by ANACOM and published in December 2023.

Table 31: Rules set by the NRA for the migration process and copper switch-off - Level and scope of the rules (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
At which level did the NRA set the rules for the migration process and copper switch-off (i.e., which unit is allowed to be switched-off as a whole):					
• at the level of the MDF (Yes/No)?	Yes				
• at the level of the street cabinets (Yes/No)?					
• other level (Yes(which?)/No)?		Yes[117]	No[118]	Yes[119]	[120]
In which area did the NRA set rules for the copper switch-off					
• where the incumbent has SMP and access remedies are imposed on the incumbent (Yes/No)?	Yes	Yes	Yes	Yes	
• only in some parts of this area (Yes(which areas, why)/No)?		No		No	
• also in other areas (Yes(which areas, why)/No)?		No		No	[121]

Source: BEREC

[117] There is a general provision that the SMP may decommission its core network or part of it provided that will inform in due time all the beneficiaries and be able to provide satisfactory alternative wholesale access

[118] There is no defined level, but it is generally based on location.

[119] Not depending on level, but on numbers of active lines affected in areas or sets of new adresses. Longer notice if more than 200 actitve lines.

[120] No levels. Only rule is that SMPO has to announce copper LLU users 6 month before switch-off and offer fibre LLU or duct access services.

[121] No areas. Only rule is that SMPO has to announce copper LLU users 6 month before switch-off and offer fibre LLU or duct access services.

Table 32: Rules set by the NRA for the migration process and copper switch-off - Level and scope of the rules (FR, GR, HU, IE, IT)

Country	France	Greece	Hungary	Ireland	Italy
At which level did the NRA set the rules for the migration process and copper switch-off (i.e., which unit is allowed to be switched-off as a whole):					
• at the level of the MDF (Yes/No)?	Yes	Yes	Yes	Yes	Yes
• at the level of the street cabinets (Yes/No)?	No	Yes	No	No	No
• other level (Yes(which?)/No)?	Yes[122]		No	No	No
In which area did the NRA set rules for the copper switch-off					
• where the incumbent has SMP and access remedies are imposed on the incumbent (Yes/No)?	Yes	Yes	Yes	Yes	No
• only in some parts of this area (Yes(which areas, why)/No)?	No		No	No	No
• also in other areas (Yes(which areas, why)/No)?	No		No	No	Yes[123]

Source: BEREC

[122] Switch-off also allowed at the town level, and town district when relevant, and for large cities at some administrative sub-town levels.
[123] Rules have been set for all the LEXs involved in the decommissioning Plan at national level.

Table 33: Rules set by the NRA for the migration process and copper switch-off - Level and scope of the rules (LU, MT, NO, PL, PT)

Country	Luxembourg	Malta	Norway	Poland	Portugal
At which level did the NRA set the rules for the migration process and copper switch-off (i.e., which unit is allowed to be switched-off as a whole):					
• at the level of the MDF (Yes/No)?	Yes		Yes	Yes	Yes
• at the level of the street cabinets (Yes/No)?	Yes			Yes	No
• other level (Yes(which?)/No)?	Yes[124]	Yes[125]	Yes[126]		
In which area did the NRA set rules for the copper switch-off					
• where the incumbent has SMP and access remedies are imposed on the incumbent (Yes/No)?	Yes	No	Yes	Yes	Yes
• only in some parts of this area (Yes(which areas, why)/No)?		No	No	No	
• also in other areas (Yes(which areas, why)/No)?		Yes[127]	No	No	

Source: BEREC

[124] The update of the rules in 2019 allows the switch-off of individual addresses
[125] Whenever the SMPO intends to switch-off elements in its copper network that may affect a given area, such as all subscribers in a specific locality, the SMPO is to notify the MCA. Please refer to the response in footnote 109 for further details.
[126] See question 19 and 20.
[127] As noted above, the MCA's rules are not 'area-specific', rather, the rules apply across all areas where the SMPO is servicing subscribers. Please refer to the response in footnote 109 for further details.

Table 34: Rules set by the NRA for the migration process and copper switch-off - Level and scope of the rules (SK, SI, ES)

Country	Slovakia	Slovenia	Spain
At which level did the NRA set the rules for the migration process and copper switch-off (i.e., which unit is allowed to be switched-off as a whole):			
• at the level of the MDF (Yes/No)?	No	Yes	Yes
• at the level of the street cabinets (Yes/No)?	No	Yes	Yes
• other level (Yes(which?)/No)?	No	No	Yes[128]
In which area did the NRA set rules for the copper switch-off			
• where the incumbent has SMP and access remedies are imposed on the incumbent (Yes/No)?	Yes	Yes	Yes
• only in some parts of this area (Yes(which areas, why)/No)?	No	No	
• also in other areas (Yes(which areas, why)/No)?	No	No	

Source: BEREC

[128] Specific copper boxes, typically serving a building, can be switched-off on demand if properly justified, subject to approval by CNMC

Table 35: Rules set by the NRA for the migration process and copper switch-off - Stakeholder involvement (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Did the NRA involve stakeholders when it set the rules for the migration process and copper switch-off (Yes/No)?	Yes	Yes	Yes	Yes	No
If the answer is “Yes”, how did the NRA involve stakeholders:					
• by means of a public consultation of the draft measures according to Art 23(1) of the EECC (Yes/No)?	Yes	Yes	Yes		
• stakeholders (e.g. network operators) are a party in the procedure (Yes/No)?		No		Yes	
• in a technical forum (Yes/No)?		No			
• by other means (Yes(which?)/No)?		No			
If the answer is “No”, why not?					

Source: BEREC

Table 36: Rules set by the NRA for the migration process and copper switch-off - Stakeholder involvement (FR, GR, HU, IE)

Country	France	Greece	Hungary	Ireland
Did the NRA involve stakeholders when it set the rules for the migration process and copper switch-off (Yes/No)?	Yes	Yes	Yes	Yes
If the answer is “Yes”, how did the NRA involve stakeholders:		Yes		
• by means of a public consultation of the draft measures according to Art 23(1) of the EECC (Yes/No)?	Yes		Yes	Yes
• stakeholders (e.g. network operators) are a party in the procedure (Yes/No)?			No	No
• in a technical forum (Yes/No)?	No		No	No
• by other means (Yes(which?)/No)?	No	Yes[129]	No	No
If the answer is “No”, why not?				

Source: BEREC

[129] After the PC was concluded, meetings with the stakeholders were organised by EETT to further analyse issues raised.

Table 37: Rules set by the NRA for the migration process and copper switch-off - Stakeholder involvement (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Did the NRA involve stakeholders when it set the rules for the migration process and copper switch-off (Yes/No)?	Yes	Yes	No	Yes	Yes
If the answer is "Yes", how did the NRA involve stakeholders:					
• by means of a public consultation of the draft measures according to Art 23(1) of the EECC (Yes/No)?	Yes	Yes			Yes
• stakeholders (e.g. network operators) are a party in the procedure (Yes/No)?	Yes	Yes			Yes
• in a technical forum (Yes/No)?	Yes				No
• by other means (Yes(which?)/No)?	No			Yes[130]	No
If the answer is "No", why not?			[131]		

Source: BEREC

[130] Regarding rules for migration process - see question 19 and 20. EECC is still not implemented in Norway, but all of Nkom`s descisions regarding copper switch-off have been subject to public hearings.

[131] There are currently no alternative network operators that are relying on the SMPO's copper access network for the provision of retail services. Furthermore, the MCA took into consideration the fact that it is technically possible for services that could be affected by the copper switch-off to also be availed of on alternative networks (e.g. 'telecare' type of services) and/or for bespoke arrangements to be made to continue availing of the same service on new Subscriber Access Line (SAL) technology provided by the SMPO (e.g. via an IAD for PBX).

Table 38: Rules set by the NRA for the migration process and copper switch-off - Stakeholder involvement (PT, SK, SI, ES)

Country	Portugal	Slovakia	Slovenia	Spain
Did the NRA involve stakeholders when it set the rules for the migration process and copper switch-off (Yes/No)?	Yes	No	Yes	Yes
If the answer is “Yes”, how did the NRA involve stakeholders:				
• by means of a public consultation of the draft measures according to Art 23(1) of the EECC (Yes/No)?			Yes	Yes
• stakeholders (e.g. network operators) are a party in the procedure (Yes/No)?			Yes	Yes
• in a technical forum (Yes/No)?			No	No
• by other means (Yes(which?)/No)?	Yes[132]		No	No
If the answer is “No”, why not?		Rules do not exist yet, the list of "rules" is in the form of notification obligation.		

Source: BEREC

[132] The decision was subject to public consultation (before the EECC was published)

Table 39: Rules set by the NRA for the migration process and copper switch-off - Coverage threshold (BE, CY, CZ DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Do the rules set by the NRA permit copper switch-off only in case a certain NGA coverage is reached (Yes/No)?	No	No	No		
If the answer is “Yes”:					
• Which NGA architecture (e.g. FTTC/B/H) needs to be rolled out to what extent (e.g. 80/90/100% homes passed)?					
• If less than 100% homes need to be passed, are there any WAPs foreseen for that non-NGA alternative network? Is there a general access obligation to that non-NGA alternative network, imposed in a market analysis?					
• When (at the beginning, during or at the end of the notice period)?					
• Has this rule proved efficient or was it hard to implement?					
If the answer is “No”, why not? Did you miss this lever afterwards?	No, not needed in practice		CTU did not consider that condition to be important.	For the time being there is no sign that SMP operator will switch off copper in areas where there are no alternatives. Furthermore the coverage with VCHN is in general high in Denmark.	No threshold. Only rule is that SMPO has to announce copper LLU users 6 month before switch-off and offer fibre LLU or duct access services.

Source: BEREC

Table 40: Rules set by the NRA for the migration process and copper switch-off - Coverage threshold (FR, GR, HU, IE)

Country	France	Greece	Hungary	Ireland
Do the rules set by the NRA permit copper switch-off only in case a certain NGA coverage is reached (Yes/No)?	Yes	Yes	Yes	Yes
If the answer is "Yes":				
• Which NGA architecture (e.g. FTTC/B/H) needs to be rolled out to what extent (e.g. 80/90/100% homes passed)?	The rule is not expressed in percentage but sets that FTTH networks need to be complete. The rule tolerates that some homes could remain uncovered by fibre network on strictly identified situations (e.g. third-party refusal of the roll out of fibre to their home, if there is no active copper access for 24 months at least).	[133]	Any NGA network. As a general rule 100% coverage is expected.	100% of the in scope premises, with either ceased in-situ copper lines or active copper-based services in a legacy exchange area (or as otherwise agreed with ComReg) are passed by Modern Infrastructure.
• If less than 100% homes need to be passed, are there any WAPs foreseen for that non-NGA alternative network? Is there a general access obligation to that non-NGA alternative network, imposed in a market analysis?	Yes, for the homes that would remain uncovered by fibre network, the rule sets that the SMPO must make sure that non-NGA alternative network are available, at least temporally.	No		
• When (at the beginning, during or at the end of the notice period)?	The NGA architecture needs to be rolled out at the end of the notice period, otherwise the switch-off is postponed.		As a general rule, 6/12 months before the switch off (depending on that ANOs don't use/use WAP in the given area)	100% of in-scope premises need to be passed during the notice period. SMPO can trigger Stop Sell of copper based services to premises

[133] General rules: Full NGA coverage of all existing copper-based end-user connections -Availability of network resources to cover at least 60% of subscribers served by the traditional network. -Availability of the appropriate wholesale products which enable the access seekers to offer similar or better services (characteristics, QoS) to the ones offered by the SMP. Specific parameters(1, 2a&b) are set and should be met before notification 1) Maximum number of subscribers in a LEX with co-location who are affected by the interruption of the copper network (partial or total) per year: 25% of the total subscription base (OTE & OLOs) 2a) Percentage of subscribers who must have migrated to the NGA network that replaces the copper network: 50% of total subscribers (OTE & OLOs) or 85% of OTE subscribers 2b)Percentage of already connected buildings with the FTTH network at the time of switch-off announcement: 50% of the buildings that are covered by the outdoor cabinets that are planned to be switched-off.

				passed once 75% of exchange area is covered by Modern Infrastructure, but SMPO must reach 100% of in-scope premises passed by Modern Infrastructure with 2 years of the start of Stop Sell in that exchange.
• Has this rule proved efficient or was it hard to implement?	This rule is more adapted to the reality of the fibre roll out since 100% of coverage is almost impossible to achieve since the network keeps on evolving with new homes and buildings to cover everyday. This rule also allows to take into account some situations where the fibre roll out is not possible regardless of the responsibility of the operator in charge of the roll out.		We didn't experience any specific implementation problem.	SMPO has yet to submit its Switch-off Proposal to ComReg
If the answer is “No”, why not? Did you miss this lever afterwards?				

Source: BEREC

Table 41: Rules set by the NRA for the migration process and copper switch-off - Coverage threshold (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Do the rules set by the NRA permit copper switch-off only in case a certain NGA coverage is reached (Yes/No)?	Yes	Yes	No	No	No
If the answer is "Yes":					
• Which NGA architecture (e.g. FTTC/B/H) needs to be rolled out to what extent (e.g. 80/90/100% homes passed)?	100% of the active lines covered by generic NGA (including FTTH, FTTC and also FWA in marginal cases).	Fibre (FTTH) must be available - 100%			
• If less than 100% homes need to be passed, are there any WAPs foreseen for that non-NGA alternative network? Is there a general access obligation to that non-NGA alternative network, imposed in a market analysis?	Only FWA is foreseen other than FTTC/B/H. FWA provides at least 40Mbps download/4 Mbps upload.				
• When (at the beginning, during or at the end of the notice period)?	Beginning.				
• Has this rule proved efficient or was it hard to implement?	Some difficulties in providing coverage with adequate performance for business customers. Ad hoc solutions needed in some cases.				
If the answer is "No", why not? Did you miss this lever afterwards?			[134]	The copper switch-off is not related to a certain coverage in Norway, only to the date of 2nd of September, which were established to ensure predictability for access seekers.	UKE didn't see any reason to set any NGA coverage level for copper switch-off. In general the SMPO is migrating its legacy network to fibre, not just switching it off (MDFs are closed when SMPO can migrate its customers to fibre).

[134] In most cases, migration is towards fibre-based SALs (subscriber access line), and, to date, migration to FWA was restricted to some voice-only subscribers. However, should the SMPO inform the MCA that there may be migration of broadband subscribers to other technologies (e.g. FWA), the MCA would communicate the importance that the alternative access product is capable to provide the subscriber with a comparable service and experience available on the copper-based SAL.

Source: BEREC

Table 42: Rules set by the NRA for the migration process and copper switch-off - Coverage threshold (PT, SK, SI, ES)

Country	Portugal	Slovakia	Slovenia	Spain
Do the rules set by the NRA permit copper switch-off only in case a certain NGA coverage is reached (Yes/No)?	No	No	No	No
If the answer is “Yes”:				
• Which NGA architecture (e.g. FTTC/B/H) needs to be rolled out to what extent (e.g. 80/90/100% homes passed)?				
• If less than 100% homes need to be passed, are there any WAPs foreseen for that non-NGA alternative network? Is there a general access obligation to that non-NGA alternative network, imposed in a market analysis?				
• When (at the beginning, during or at the end of the notice period)?				
• Has this rule proved efficient or was it hard to implement?				
If the answer is “No”, why not? Did you miss this lever afterwards?	Migration rules are related with provision of detailed/timely information on SMPO copper access network development, and depend on the impact on the SMPO wholesale customers‘ (e.g., percentage of copper lines to deactivate). Please note that the wheight of cooper access is very low regarding the total number of fixed accesses (both in wholesale and retail levels).	Rules do not exist yet, see answer 23c	The unit (MDF etc.) as soon as every interested user has his own alternate connection. No coverage condition applies.	A threshold was defined in the first set of switch-off rules, 2009, as a safeguard measure in order to avoid potential damage to competition by strategic closures. However, it was removed in the 2016 market revision, as the growth of FTTH was so strong that copper could no longer compete with fibre, and the trend to migration to FTTH was clear.

Source: BEREC

Table 43: Rules set by the NRA for the migration process and copper switch-off – Notice period (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
How long is the notice period in case the SMPO wants to close an MDF where					
• the ANOs do not use any SMPO's copper-based wholesale access product?	1 year	Immediately	There is no time obligation	See below	
• the ANOs use VULA or bitstream?	2 years	See below	1 year	See below	
• the ANOs use copper-based ULL?	2 years	Reasonable timeframe provided that will inform in due time all the beneficiaries and be able to provide satisfactory alternative wholesale access	1 year	[135]	6 months
Does the NRA allow that end-users be forcibly switched-off, if they do not migrate voluntarily before the announced switch-off date?	Yes	Yes	Yes	Yes	

Source: BEREC

[135] The commitment includes the following procedure for noticing and shutdowns of connections: TDC NET can close new orders ("new sales") in an area or a set of addresses with 1 months' notice. TDC NET ensures that the information on stops for new sales is provided through a system, so that the SP customers can set up their systems in advance so that this is taken into account. TDC NET notifies the closure of an area with active copper lines with at least 6 months' notice. For new sales (SP customers who activate network access products during the 1-month notice period) the notice period means that the total notice period will be at least 7 months. In certain cases, TDC NET considers it necessary to give SP customers a longer notice than that stated above, if it becomes necessary to close the copper network in an area, for example a central area with many lines. TDC NET therefore commits to a notice period of 12 months for closing the network in areas with more than 200 active lines.

Table 44: Rules set by the NRA for the migration process and copper switch-off – Notice period (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
How long is the notice period in case the SMPO wants to close an MDF where					
• the ANOs do not use any SMPO's copper-based wholesale access product?	1 month	See below	6 months	6 months	n.a
• the ANOs use VULA or bitstream?	depends on the commercial contract	See below	12 months[136]	2 years. Can be shorter if agreed by all involved ANOs but minimum 6 months.	18-24 months[137]
• the ANOs use copper-based ULL?	depends on the commercial contract	The SMPO has to respect a notice period of 36 months before proceeding to the technical closure. This notice period does not vary according to the use of copper network par ANO. However, the notice period can be shortened in areas where the fibre roll out is the most advanced: where there is more than 95% of fibre coverage, the SMPO can benefit of a notice period of 18 months instead of 36.	24-36 months[138]	2 years. Can be shorter if agreed by all involved ANOs but minimum 6 months.	Copper-based ULL was deregulated on 18 January 2024. SMPO can withdraw access to existing copper-based ULL on 17 January 2025.
Does the NRA allow that end-users be forcibly switched-off, if they do not migrate voluntarily before the announced switch-off date?	Yes	Yes	Yes	Yes	Yes

Source: BEREC

[136] Partial or full decommissioning of copper network in LEX without OLOs physical presence but with Wholesale Central Access services --> 12 months

[137] In general, at least 18 months' notice, however exempt end users receive at least 24 months' notice. "Exempt User" means an end user providing critical infrastructure or a vulnerable end user, in each case relying on legacy-based services and as determined by the Retail Service Provider, or an end user of products supported by regulated LB TI WHQA services;

[138] Decommissioning of copper network in LEX with ANO's physical presence and up to 5.000 active subscribers - >24 months -Decommissioning of copper network in LEX with ANO's physical presence and more than 5.000 active subscribers --> 36 months

Table 45: Rules set by the NRA for the migration process and copper switch-off – Notice period (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
How long is the notice period in case the SMPO wants to close an MDF where					
• the ANOs do not use any SMPO's copper-based wholesale access product?	n/a	1 year	Not applicable, there are no ANOs using SMPO's copper-based wholesale access products		3 months
• the ANOs use VULA or bitstream?	6 months (new 2024 rules)	5 year	See above		Up to 2 years
• the ANOs use copper-based ULL?	12 months (new 2024 rules)	5 year	See above		Up to 2 years
Does the NRA allow that end-users be forcibly switched-off, if they do not migrate voluntarily before the announced switch-off date?	Yes	Yes	Yes	Yes	Yes

Source: BEREC

Table 46: Rules set by the NRA for the migration process and copper switch-off – Notice period (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
How long is the notice period in case the SMPO wants to close an MDF where					
• the ANOs do not use any SMPO's copper-based wholesale access product?	n/a	Bitstream: 2 years without agreement, 1 year with agreement; VULA/ULL: 5 years without agreement, 1 year with agreement	6 months	6 months	15 months
• the ANOs use VULA or bitstream?	n/a	Bitstream: 2 years without agreement, 1 year with agreement; VULA: 5 years without agreement, 1 year with agreement	2 years	1 year	15 months
• the ANOs use copper-based ULL?	ANACOM set a 5-year notice period for total switch-off of an MDF, with co-located operators. If an equivalent wholesale access is guaranteed, this notice period can be reduced to 3 years. ANACOM has also set shorter notice periods in case of deactivation of loops (for reasons attributable to MEO) in exchanges with co-located operators (these notice periods depend on the percentage of loops to deactivate comparing to the total number of active accesses on the MDF).	5 years without agreement, 1 year with agreement	2 years	2 years (5 years before 2021)	15 months
Does the NRA allow that end-users be forcibly switched-off, if they do not migrate voluntarily before the announced switch-off date?	Yes		Yes	Yes	Yes

Source: BEREC

Table 47: Rules set by the NRA for the migration process and copper switch-off – Commercial closure (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Do the rules on migration and copper switch-off foresee an intermediate step of commercial closure	No	Yes	Yes	Yes	No
If “Yes”, please specify:					
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform access seekers?		One year in advance	1 year	1 month.	
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform end users?		Six months in advance	There is no time obligation	No obligation for the SMPO to inform the enduser.	
Are the criteria (e.g. alternative wholesale access product, FTTC/B/H etc.) needed to be met before the SMPO can proceed to commercial closure of the legacy network the same as for the switch-off itself?	No	Yes	Yes	Yes	
• If “No”, please explain the differences.	NRA did not impose any rules on commercial closure, but is monitoring the migration. SMPO has proposed its own criteria for commercial closure. SMPO informs the access seekers 1 yr in advance.				

Source: BEREC

Table 48: Rules set by the NRA for the migration process and copper switch-off – Commercial closure (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Do the rules on migration and copper switch-off foresee an intermediate step of commercial closure	Yes	Yes	Yes	Yes	Yes
If "Yes", please specify:					
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform access seekers?	1 month	36 months	[139]	[140]	At least 6 months in advance
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform end users?	1 month	36 months	Not defined	no special rules.	The Retail Service Provider (RSP) informs its end users. SMPO informs RSP at least 6 months in advance.
Are the criteria (e.g. alternative wholesale access product, FTTC/B/H etc.) needed to be met before the SMPO can proceed to commercial closure of the legacy network the same as for the switch-off itself?	Yes	Yes	Yes	Yes	No
• If "No", please explain the differences.	The alternative wholesale product should be at at least the same level as the copper access product	There is no specific criteria for the commercial closure but these criteria are to be met before the commercial closure. Arcep could control the criteria again between the commercial closure and the technical closure.			[141]

Source: BEREC

[139] Time until discontinuation of serving new requests for the copper network--> In case of Partial or full decommissioning of copper network in LEX without OLOs physical presence/ with Wholesale Central Access services-->immediately Decommissioning of copper network in LEX with OLO physical presence and up to 5.000 active subscribers--> 3 months Decommissioning of copper network in LEX with OLO physical presence and more than 5.000 active subscribers--> 6 months

[140] If ANOs use the network: 12 months, if ANOs don't use the network: commercial closure is possible at the time of announcement (6 months before the switch-off).

[141] Criteria for SMPO to proceed to commercial closure include:
- submit a detailed Switch-off Proposal to ComReg
- approval of Switch-off Proposal by ComReg (which then becomes the Switch-off Plan and is published by the SMPO)

Table 49: Rules set by the NRA for the migration process and copper switch-off – Commercial closure (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Do the rules on migration and copper switch-off foresee an intermediate step of commercial closure	Yes	Yes	No	No	No
If "Yes", please specify:					
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform access seekers?	[142]				
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform end users?	Not specified				
Are the criteria (e.g. alternative wholesale access product, FTTC/B/H etc.) needed to be met before the SMPO can proceed to commercial closure of the legacy network the same as for the switch-off itself?	Yes	No		No	No
• If "No", please explain the differences.		The SMP Operator is not required anymore to offer access to its copper network if fibre is available at an address. This is a general rule which applies everywhere without the need to communicate it for a certain period in advance		Nkom is now currently working on a decision regarding commercial closure, which probably will be in force from around 2nd of September 2024, which means the last year before the end-date of the copper network in Norway.	

Source: BEREC

[142] Commercial closure at the beginning of the notice period (only in the new 2024 rules).

Table 50: Rules set by the NRA for the migration process and copper switch-off – Commercial closure (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Do the rules on migration and copper switch-off foresee an intermediate step of commercial closure	No	No	No	Yes	Yes
If “Yes”, please specify:					
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform access seekers?	5 years			Advance time is the notice period: At the end of the notice period new customers are no longer allowed on copper; therefore, commercial closure is the end of the notice period. After this event, 6 months (guard period) are granted (if still some customers are on copper) in order to allow for migration of existing customers	15 months
• How long in advance of the commercial closure of the legacy network does the SMPO need to inform end users?	n/a			See above	15 months
Are the criteria (e.g. alternative wholesale access product, FTTC/B/H etc.) needed to be met before the SMPO can proceed to commercial closure of the legacy network the same as for the switch-off itself?	No	No	No	No	No
• If “No”, please explain the differences.	The criteria is the notice period. Closing the legacy network will switch-off the SMPO as well	Rules do not exist yet	No commercial closure is foreseen at the moment.	Not applicable. commercial closure is an automatic event at the end of the notice period, so no different criteria	SMPO has the right to decide for their network

Source: BEREC

Table 51: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 1 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Which alternative WAPs have to be provided in the alternative network deployed by the SMPO?					
• Duct access	No	Yes	No	No	Yes
• Copper SLU	No	No	No	No	
• Fibre LLU	No	No	Yes	No	Yes
• VULA	Yes	Yes	Yes	No	
• VULA with regional and/or national PoH	No	Yes	Yes	No	
• Bitstream with regional and/or national PoH	Yes	No	No	No	
• Other (which)	No[143]	No	No	No	
At which stage of the migration process is the alternative WAP to be provided (e.g. prior to switch-off announcement, prior to commercial closure, at commercial closure, final switch-off, other)?	prior to switch-off announcement	prior to switch-off announcement	No later than the final switch-off.	n/a	Prior to commercial closure

Source: BEREC

[143] Please note that SMPO is not obliged by BIPT to provide alternative WAPs, but has proposed a substitution matrix which BIPT is monitoring.

Table 52: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 1 (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Which alternative WAPs have to be provided in the alternative network deployed by the SMPO?					
• Duct access	No	No	Yes	No	No
• Copper SLU	No	No	Yes	Yes	
• Fibre LLU	No	No	No	Yes	
• VULA	No	No	Yes	Yes	Yes
• VULA with regional and/or national PoH	No	No	Yes	No	No
• Bitstream with regional and/or national PoH	No	No	Yes	Yes	No
• Other (which)	No	No	No	Yes - Local bitstream access if the alternative network is cable (HFC).	Yes[144]
At which stage of the migration process is the alternative WAP to be provided (e.g. prior to switch-off announcement, prior to commercial closure, at commercial closure, final switch-off, other)?		[145]	at the time of commercial closure	by the time of wholesale commercial closure	[146]

Source: BEREC

[144] As the rules for copper switch-off were set by ComReg outside of a Market Analysis, the Alternative Comparable Products (ACPs) are not defined within the rules. The ACPs to be used by the SMPO shall be proposed in the SMPO's Switch-off Proposal for approval by ComReg. It is anticipated that existing mandated FTTH services in the regulated Wholesale Local Access (WLA) market could be used as ACPs, while other ACPs will be considered on the basis that they must be of comparable quality and functionality to the Legacy Infrastructure-based service that they are replacing.

[145] At the commercial closure or 12 months before the technical closure. The SMPO have to check that these products are made available by at least one operator on each copper switch-off area. The alternative WAPs that needs to be provided by operators is fibre LLU.

[146] The ACPs which SMPO plans to use shall be included in SMPO's Switch-off Proposal.

Prior to commercial closure in an exchange, at least 75% of in-scope premises must be passed by ACPs (deliverable within 15 working days). 100% coverage of in-scope premises by ACPs in an exchange must be reached within 2 years of commercial close of the exchange. 100% coverage of in-scope premises in the exchange triggers the Switch-off Phase 1 notice which is issued at least 12 months before switch-off occurs (for non-exempt users).

Table 53: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 1 (IT, LU, NO, PL)

Country	Italy	Luxembourg	Norway	Poland
Which alternative WAPs have to be provided in the alternative network deployed by the SMPO?				
• Duct access	No			
• Copper SLU	Yes			
• Fibre LLU	No	Yes		
• VULA	Yes		Yes	
• VULA with regional and/or national PoH	No			
• Bitstream with regional and/or national PoH	Yes	Yes		
• Other (which)	Yes - FWA only if FTTC or FTTH are not available, and in marginal cases. Bitstream provided until its de-regulation (November 2025).			Yes
At which stage of the migration process is the alternative WAP to be provided (e.g. prior to switch-off announcement, prior to commercial closure, at commercial closure, final switch-off, other)?	At switch-off announcement	prior to switch-off announcement		Current access technology must be provided for 2 years, from the date SMPO informed the ANOs using this telecommunications access about plans to migrate to the next generation access (NGA) network.

Source: BEREC

Table 54: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 1 (PT, SI, ES, SE)

Country	Portugal	Slovenia	Spain	Sweden
Which alternative WAPs have to be provided in the alternative network deployed by the SMPO?				
• Duct access	No	No	Yes	No
• Copper SLU	No	No	No	No
• Fibre LLU	No	Yes	No	No
• VULA	No	Yes	Yes (if in a competitive area)	No
• VULA with regional and/or national PoH	No	Yes	No	No
• Bitstream with regional and/or national PoH	No	Yes	Yes (if in a competitive area)	No
• Other (which)	No		No	No
At which stage of the migration process is the alternative WAP to be provided (e.g. prior to switch-off announcement, prior to commercial closure, at commercial closure, final switch-off, other)?	n/a	Prior to final switch-off	Not defined. In practice, WAP is available prior to the end of the notice period (ie, prior to commercial closure).	

Source: BEREC

Table 55: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 2 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Which of the alternative WAPs (see above) are:					
• imposed on the SMPO independent of the copper switch-off as a "usual" remedy on a regulated market?	None	Duct access,Copper SLU, Fibre LLU, VULA, VULA with regional and/or national PoH	Duct access (only for backhaul), Copper SLU, Fibre LLU, VULA.	n/a	
• imposed on the SMPO only in case of copper switch-off (e.g. closure of MDFs)?	None		Undefined	n/a	
• Imposed on the SMPO to check that they are provided by at least 1 operator (alternative operators or the SMPO) in case of copper switch-off?	None		Undefined	n/a	
Are the WAPs to be provided based on					
• a reference offer for these WAPs?	Yes	Yes	Yes	No	Yes
• specific KPIs and SLGs?	Yes	Yes	Yes	No	No
• under a non-discrimination obligation?	Yes	Yes	Yes	No	No
If above answers are "No" please explain why not?				[147]	
Are there alternative WAPs provided by other operators than the SMPO?	No	No	Yes	Yes	No
• If "Yes", please specify: based on which access network (e.g. FTTC/B/H)?			FTTC/H	FTTH	
• If "Yes", please specify: to what extent? e.g. in the area of some/many/all MDFs			Only on a limited scale.	Many	

Source: BEREC

[147] Currently, lines are only closed down in areas where there are alternatives. The plan for closure is continually being concretized taking this into account. In other words, there has so far been no need for regulation of this. Will possibly be included in upcoming market analysis regarding new market decisions.

Table 56: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 2 (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Which of the alternative WAPs (see above) are:					
• imposed on the SMPO independent of the copper switch-off as a "usual" remedy on a regulated market?			Duct access, Copper SLU, VULA, VULA/Bitstream with regional and/or national PoH, [][148]	Duct access, copper SLU, fibre LLU, VULA, local and national bitstream access.	Duct Access, VULA
• imposed on the SMPO only in case of copper switch-off (e.g. closure of MDFs)?		None		None	
• Imposed on the SMPO to check that they are provided by at least 1 operator (alternative operators or the SMPO) in case of copper switch-off?		Fibre LLU		None	
Are the WAPs to be provided based on					
• a reference offer for these WAPs?	No	Yes	Yes	Yes	Yes
• specific KPIs and SLGs?	No	Yes	Yes	No	Yes
• under a non-discrimination obligation?	No	No	Yes	No	Yes
If above answers are "No" please explain why not?	Traficom does not have the right to set specific requirements	[149]			
Are there alternative WAPs provided by other operators than the SMPO?	Yes	Yes	No	No	No
• If "Yes", please specify: based on which access network (e.g. FTTC/B/H)?		FTTH			
• If "Yes", please specify: to what extent? e.g. in the area of some/many/all MDFs		In the copper switch-off area, that can be a town, a district of a town or a MDFs area			

Source: BEREC

[148] All of the above at q29

[149] Not under market analysis decisions but symmetrical regulation of fibre requires all fibre operators to provide fibre on a non-discriminatory basis. This rule is applicable to the roll-out of fibre in a copper switch-off context.

Table 57: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 2 (IT, LU, NO, PL)

Country	Italy	Luxembourg	Norway	Poland
Which of the alternative WAPs (see above) are:				
• imposed on the SMPO independent of the copper switch-off as a "usual" remedy on a regulated market?	Duct access, Copper SLU, fibre LLU, VULA, VULA/Bitstream with regional and/or national PoH [150]	Duct access, Copper SLU, fibre LLU, VULA, VULA/Bitstream with regional and/or national PoH [151]		
• imposed on the SMPO only in case of copper switch-off (e.g. closure of MDFs)?	FWA			X
• Imposed on the SMPO to check that they are provided by at least 1 operator (alternative operators or the SMPO) in case of copper switch-off?				
Are the WAPs to be provided based on				
• a reference offer for these WAPs?	Yes	Yes		Yes
• specific KPIs and SLGs?	Yes			Yes
• under a non-discrimination obligation?	Yes			Yes
If above answers are "No" please explain why not?				
Are there alternative WAPs provided by other operators than the SMPO?	Yes	No		No
• If "Yes", please specify: based on which access network (e.g. FTTC/B/H)?	FWA and FTTH.[152]			
• If "Yes", please specify: to what extent? e.g. in the area of some/many/all MDFs	Not specified			

Source: BEREC

[150] All the above are imposed as usual remedy, with the exception of FWA.
[151] All
[152] Alternative WAPs provided by alternative network operators are considered in the process of approving switch-off if the SMPO has a specific agreement with the ANOs.

Table 58: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 2 (PT, SI, ES, SE)

Country	Portugal	Slovenia	Spain	Sweden
Which of the alternative WAPs (see above) are:				
• imposed on the SMPO independent of the copper switch-off as a "usual" remedy on a regulated market?	SMPO Duct and pole access remedy	Fibre LLU,VULA,VULA/bitstream with regional and/or national PoH[153]	Duct access, VULA, VULA/Bitstream with regional and/or national PoH	Fibre LLU
• imposed on the SMPO only in case of copper switch-off (e.g. closure of MDFs)?	n/a	None	None	
• Imposed on the SMPO to check that they are provided by at least 1 operator (alternative operators or the SMPO) in case of copper switch-off?	n/a	n/a	None	
Are the WAPs to be provided based on				
• a reference offer for these WAPs?	Yes	Yes	Yes	No
• specific KPIs and SLGs?	Yes	Yes	Yes	No
• under a non-discrimination obligation?	Yes	Yes	Yes	No
If above answers are "No" please explain why not?				No rules mention WAPs
Are there alternative WAPs provided by other operators than the SMPO?	No	Yes	Yes	Yes
• If "Yes", please specify: based on which access network (e.g. FTTC/B/H)?		FTTH	FTTH	FTTC/B/H
• If "Yes", please specify: to what extent? e.g. in the area of some/many/all MDFs		if open BB network is present in the area and able to offer a fibre	in the area of some MDFs	many

Source: BEREC

[153] all WAPs marked with "Yes"

Table 59: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 3 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Is the SMPO allowed to switch off an MDF where the alternative NGA network is deployed by another operator?	There is no rule defined that would prohibit this, but in practice, the BIPT will evaluate this use case.	No	No	Yes	Switch-off process is practically over, no any copper LLU anymore. No MDF-s with another operator.
Is there a difference in wholesale access price between the switched-off legacy product and the alternative product that is closest in terms of performance?	Yes	No	No	Yes	No
• If "Yes" please explain if the price of the alternative product is lower or higher? What is the difference in %?	Bitstream VDSL2 (15,40 EUR) vs Bitstream PON Type 0 (19 EUR 50Mbps)			The prices are described in the commiment of the incumbent operator: The maximum average price in 2024 for copper POI2 is: 1347 The maximum price in 2024 for 100 Mbit/s fibre POI2 is: 1640 The difference is 21,7%. [154]	
Has the NRA produced a substitution matrix which shows for each legacy WAP the corresponding alternative WAP(s)?	No	No	No	No	No

Source: BEREC

[154] NB: Do to commitments copper has a maximum average price while fibre has anchor prices (respectively 100 mbit/s & 1000 mbit/s).

Table 60: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 3 (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Is the SMPO allowed to switch off an MDF where the alternative NGA network is deployed by another operator?	Yes	Yes	Yes, if the prerequisites set by the relevant rules are met.	No	[155]
Is there a difference in wholesale access price between the switched-off legacy product and the alternative product that is closest in terms of performance?	Yes		Yes	Yes	Yes
• If "Yes" please explain if the price of the alternative product is lower or higher? What is the difference in %?	Prices vary in the country.	[156]	Difference varies according to various products. For a 24 Mbps product, FTTC price would be 14% higher than LLU whereas for FTTH, price would be 39% up. (in any case these wholesale prices are defined by the NGA bottom-up model.)	Alternative WAP 1-4higher than legacy[157]	FTTH price is approx 15% higher then FTTC (Copper Based) price
Has the NRA produced a substitution matrix which shows for each legacy WAP the corresponding alternative WAP(s)?	No	No	No	No	No

Source: BEREC

[155] SMPO must submit to ComReg a list of in-scope premises which will not be reached by SMPO (exceptions) in advance of Milestone 2 (100% of in-scope premises passed). This list may included premises which, for example, are derelict, or in some cases which are passed by an alternative non-SMP provider of Modern Infrastructure. ComReg may apply conditions on SMPO in respect to these exceptions. For example, if the alternative provider cannot provide a requested service to such an exceptional premises during the switch-off period, the onus reverts to SMPO to provide an ACP.

[156] Confidential

[157] In technical terms the most comparable WAP on copper vs. NGA network is the national bitstream access (NBSA). The price of the alternative (HFC, GPON) NBSA is 1-4% higher than the price of the copper NBSA of the same speed.

Table 61: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 3 (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta[158]	Norway	Poland
Is the SMPO allowed to switch off an MDF where the alternative NGA network is deployed by another operator?	Yes, Other operators may provide alternative WAPs to migrate customers, but the SMPO has to demonstrate a specific agreement with the ANOs with this scope.				Yes
Is there a difference in wholesale access price between the switched-off legacy product and the alternative product that is closest in terms of performance?	Yes	Yes			Yes
• If "Yes" please explain if the price of the alternative product is lower or higher? What is the difference in %?	As for monthly rental fees, from copper LLU to FTTC VULA +27% (but VULA includes also active equipment rental); from copper bitstream to FTTC bitstream -3,1%.	Monthly rental : LLU: Copper is 9.06€ and Fibre 19.95€. For Bitstream there is no price difference between CU and FO.			
Has the NRA produced a substitution matrix which shows for each legacy WAP the corresponding alternative WAP(s)?	Yes				No

Source: BEREC

[158] The questions related to alternative wholesale access products are not applicable in the case of Malta since there are no ANOs making use of the SMPO's copper access network.

Table 62: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) Part 3 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Is the SMPO allowed to switch off an MDF where the alternative NGA network is deployed by another operator?	n/a		Only if open BB network is present there. Not another AO.	Yes	Yes
Is there a difference in wholesale access price between the switched-off legacy product and the alternative product that is closest in terms of performance?			No	Yes	
• If "Yes" please explain if the price of the alternative product is lower or higher? What is the difference in %?				FTTH VULA is 94% higher than copper ULL	
Has the NRA produced a substitution matrix which shows for each legacy WAP the corresponding alternative WAP(s)?	No		No	No	No

Source: BEREC

Table 63: Rules set by the NRA for the migration process and copper switch-off – Legacy wholesale access products (WAPs) (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Which legacy WAPs of the SMPO will no longer be available after the copper switch-off?					
• Copper-based ULL?	Yes	Yes		Yes	Yes
• Copper-based VULA?	Yes	No		Yes	No
• Copper-based VULA with regional/national PoH?	Yes	Yes		Yes	No
• Copper-based bitstream with regional/national PoH?	Yes	Yes		Yes	No
• Other? If “Yes”, please explain which other legacy WAPs of the SMPO will no longer be available after the copper switch-off?	No	No		No	

Source: BEREC

Table 64: Rules set by the NRA for the migration process and copper switch-off – Legacy wholesale access products (WAPs) (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Which legacy WAPs of the SMPO will no longer be available after the copper switch-off?					
• Copper-based ULL?	Yes	Yes	Yes	Yes	Yes (will no longer be available after the copper switch-off)
• Copper-based VULA?	Yes		No	Yes	Yes
• Copper-based VULA with regional/national PoH?	Yes		Yes	Yes	Yes
• Copper-based bitstream with regional/national PoH?	Yes	Yes	Yes	Yes	Yes
• Other? If “Yes”, please explain which other legacy WAPs of the SMPO will no longer be available after the copper switch-off?				No	Yes, Copper-based leased lines

Source: BEREC

Table 65: Rules set by the NRA for the migration process and copper switch-off – Alternative wholesale access products (WAPs) (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Which legacy WAPs of the SMPO will no longer be available after the copper switch-off?					
• Copper-based ULL?	Yes	Yes	Yes		Yes
• Copper-based VULA?	No	Yes			
• Copper-based VULA with regional/national PoH?	No				
• Copper-based bitstream with regional/national PoH?	Yes	Yes			Yes
• Other? If “Yes”, please explain which other legacy WAPs of the SMPO will no longer be available after the copper switch-off?	Yes, WLR, copper based leased lines.				

Source: BEREC

Table 66: Rules set by the NRA for the migration process and copper switch-off – Legacy wholesale access products (WAPs) (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Which legacy WAPs of the SMPO will no longer be available after the copper switch-off?					
• Copper-based ULL?	Yes	Yes	Yes	Yes	Yes
• Copper-based VULA?	No	Yes	Yes		Yes
• Copper-based VULA with regional/national PoH?	No	Yes	Yes		Yes
• Copper-based bitstream with regional/national PoH?	Yes	Yes	Yes	Yes	Yes
• Other? If “Yes”, please explain which other legacy WAPs of the SMPO will no longer be available after the copper switch-off?	No			Yes, Copper-based leased lines	

Source: BEREC

Table 67: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 1 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
The NRAs typically apply price regulation to the legacy copper-based wholesale access products and the alternative wholesale access products in a market analysis procedure and, therefore, there may be no need for further rules on the migration costs:					
• Did the NRA consider these rules to be not sufficient and, therefore, set further specific rules with regard to the migration costs (Yes/No)?	No	Yes	No	No	No
• If this is the case, which rules and why?		migration to Fibre optic and copper (vectoring) does not entail any additional cost			

Source: BEREC

Table 68: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 1 (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
The NRAs typically apply price regulation to the legacy copper-based wholesale access products and the alternative wholesale access products in a market analysis procedure and, therefore, there may be no need for further rules on the migration costs:					
• Did the NRA consider these rules to be not sufficient and, therefore, set further specific rules with regard to the migration costs (Yes/No)?	No	Yes	Yes	No	Yes
• If this is the case, which rules and why?		The 2023 market analysis decision ruled that, when approaching the technical closure, the SMPO could not impose termination fees to ANOs since they do not have any other choice than terminating their contracts in a copper switch-off context.	EETT has identified various costs related to the migration procedure. In the relevant procedure, the distributuion of these costs is specified. In practice the SMP will bear the costs related to the deactivation of legacy wholesale product, the ANOs will bear the costs o for activation of new wholesale product, whereas other costs for the migration (eg. transfer of backhaul circuits to a new PoP, modification of existing backhaul circuit) are divided between the SMP and the related ANO.		During Copper Switch Off once Copper-based services are no longer available to new subscribers the incumbent must provide the alternative service at the standard connection cost. This condition only arises once Copper Switch Off is triggered.

Source: BEREC

Table 69: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 1 (IT, LU, NO, PL)

Country	Italy	Luxembourg	Norway	Poland
The NRAs typically apply price regulation to the legacy copper-based wholesale access products and the alternative wholesale access products in a market analysis procedure and, therefore, there may be no need for further rules on the migration costs:				
• Did the NRA consider these rules to be not sufficient and, therefore, set further specific rules with regard to the migration costs (Yes/No)?	Yes	No		No
• If this is the case, which rules and why?	One-off wholesale costs (activation and de-activation fees) covered by SMPO for the migrated lines. SMPO also covers additional cost for decommissioning of co-location OAO' sites, for co-location in new LEXs and for interconnection equipment to migrate customers. Wholesale price of the NGA "substituting" service is equalized, during the migration period, to the wholesale price of the "substituted" copper service until the switch-off of the local exchange is realized.			

Source: BEREC

Table 70: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 1 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
The NRAs typically apply price regulation to the legacy copper-based wholesale access products and the alternative wholesale access products in a market analysis procedure and, therefore, there may be no need for further rules on the migration costs:					
• Did the NRA consider these rules to be not sufficient and, therefore, set further specific rules with regard to the migration costs (Yes/No)?	No	No	No	No	No
• If this is the case, which rules and why?					

Source: BEREC

Table 71: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 2 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Does the NRA allow the SMPO operator to increase the wholesale copper access prices during the transition period (Yes/No)?	No	No	Yes	No	No
• If Yes					
○ Is this price increase the result of an additional price premium (Yes/No)?					
○ Does it result from ever lower active line volumes (Yes/No)?					
○ Other reasons (Yes(which?/No)?			Yes[159]		
• If Yes, is there a time limit on the price increase (yes/no)?			No		
○ If yes, is a claw-back mechanism foreseen in case of delays (yes/no)?					
○ If not, why?			Based on the relevant market analyses results the strict price control obligation was not imposed on the relevant wholesale services in question (copper access). Therefore, the possible increase in wholesale prices for the copper access is not related to and is not affecting the copper switch-off.		
• If this is not the case, why not?	No need to force end users to migrate by increasing copper prices since migration happens naturally.	Any price increase will be based on the calculation of OCECPR's costing models		Currently, the SMPO's plans for copper switch off are rather sporadic. Thus the question of	

[159] The CTU imposed obligations related to price control on the SMP, namely the cost orientation for the dark fibre and colocation (LRIC+ based cost model respecting principles of the EC Recommendation on non-discrimination and costing methodologies) and the economic replicability test (ERT) between non-NGA (copper) and NGA-based services (fibre, VULA) between markets 1(3a) and 3b in order to keep for all access seekers economic space to climb up the ladder of investment.

				price increase has not yet been relevant.	

Source: BEREC

Table 72: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 2 (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Does the NRA allow the SMPO operator to increase the wholesale copper access prices during the transition period (Yes/No)?	Yes	Yes	No	No	Yes
• If Yes					
○ Is this price increase the result of an additional price premium (Yes/No)?		No			
○ Does it result from ever lower active line volumes (Yes/No)?	Yes	No			
○ Other reasons (Yes(which?/No)?		Yes[160]			Yes As part of the recent Market Analysis FTTC prices may be increased annually by CPI.
• If Yes, is there a time limit on the price increase (yes/no)?	No	Yes			No
○ If yes, is a claw-back mechanism foreseen in case of delays (yes/no)?		Yes there is a claw-back mechanism			
○ If not, why?					Price increase is not related to Copper Switch Off.
• If this is not the case, why not?			Prices are in any case regulated according to the NGA bottom up model	[161]	

Source: BEREC

[160] The increase of wholesale copper access prices is allowed as a result of the evolution of competition conditions on the market due to the progressive roll out of fibre. Nonetheless, this increase is conditioned and proportionate to the evolution identified.

[161] Our current price control obligation was estabilished in a market decision which was issued well before the EU recommendation referring to the opportunity of allowing the SMPO to increase the wholesale copper access prices during the transition period.
We assess that market incentives drive all market players to the copper switch-off and SMPOs are able to switch off their copper network (with forcible switch-off if necessary) without a temporary increase of copper WAP prices. In addition, we expect an increase in copper WAP prices in our BU LRIC costing modell due to the decreasing volumes.

Table 73: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 2 (IT, LU, NO, PL)

Country	Italy	Luxembourg	Norway	Poland
Does the NRA allow the SMPO operator to increase the wholesale copper access prices during the transition period (Yes/No)?	No	No		No
• If Yes				
○ Is this price increase the result of an additional price premium (Yes/No)?				
○ Does it result from ever lower active line volumes (Yes/No)?				
○ Other reasons (Yes(which?/No)?				
• If Yes, is there a time limit on the price increase (yes/no)?				
○ If yes, is a claw-back mechanism foreseen in case of delays (yes/no)?				
○ If not, why?				
• If this is not the case, why not?	Copper prices are regulated; prices are increasing from 2024 to 2028 as a result of application of BULRIC model in the current market analysis.			

Source: BEREC

Table 74: Rules set by the NRA for the migration process and copper switch-off – Migration costs Part 2 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Does the NRA allow the SMPO operator to increase the wholesale copper access prices during the transition period (Yes/No)?	No		No	No	Yes
• If Yes					
○ Is this price increase the result of an additional price premium (Yes/No)?					
○ Does it result from ever lower active line volumes (Yes/No)?					
○ Other reasons (Yes(which?/No)?					
• If Yes, is there a time limit on the price increase (yes/no)?					No
○ If yes, is a claw-back mechanism foreseen in case of delays (yes/no)?					
○ If not, why?					Copper access has been deregulated entirely by PTS.
• If this is not the case, why not?	The number of accesses supported on LLU and wholesale bitstream offers has been increasingly residual. Also, the notice periods that were set already foresee that the beneficiaries of the wholesale offers can recover the instalation costs at the exchange. Additionally, it was not imposed on the SMPO an obligation to supply a new wholesale products.			The market analysis did not address it	

Source: BEREC

Table 75: Rules set by the NRA for the migration process and copper switch-off – Information provided by the SMPO (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
What information does the SMPO have to provide at which stage of the switch-off process to the:					
• NRAs?	Full plans	Plan of switch off		The SMPO inform the DBA continuously on their plans	No rules
• ANOs?	Full plans	Plan of switch off	The date, the location, including detailed specifications.	[162]	No rules
• Other entities (explain which entities)?					

Source: BEREC

[162] The commitment includes the following procedure for noticing and shutdowns of connections: TDC NET can close new orders ("new sales") in an area or a set of addresses with 1 month's notice. TDC NET ensures that the information on stops for new sales is provided through a system, so that the SP customers can set up their systems in advance so that this is taken into account. TDC NET notifies the closure of an area with active copper lines with at least 6 months' notice. For new sales (SP customers who activate network access products during the 1-month notice period) the notice period means that the total notice period will be at least 7 months. In certain cases, TDC NET considers it necessary to give SP customers a longer notice than that stated above, if it becomes necessary to close the copper network in an area, for example a central area with many lines. TDC NET therefore commits to a notice period of 12 months for closing the network in areas with more than 200 active lines.

Table 76: Rules set by the NRA for the migration process and copper switch-off – Information provided by the SMPO (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
What information does the SMPO have to provide at which stage of the switch-off process to the:					
• NRAs?	6 months before switch-off which lines will be decommissioned and replaced by what technology	The SMPO has to notifiy Arcep at the launch of every notice period for a new copper switch-off operation. Arcep needs to be provided with all the information provided to ANOs (see below).	Information on coverage, % of connected and passed buildings, penetration of NGA subscribers, provided biannually.	- Name of the legacy WAPs involved in the switch-off - The geographical area of the switch-off - The points of access (MDFs) involved - Exact timing of the switch-off - Name of the available alternative WAPs	[163]
• ANOs?		[164]	same as the above	Same as above	[165]
• Other entities (explain which entities)?		[166]			

Source: BEREC

[163] SMPO must provide a detailed Switch-off Proposal to ComReg for approval. The Switch-off Proposal shall contain detailed information regarding:- ACPs (proposed and existing) - Timelines (for each exchange) - Communications plan SMPO must provide a list of in-scope premises exceptions (if any) on a per exchange basis where it does not pass 100% and reasons why for approval\conditions to be added by ComReg The status of these premises will be kept accurate in the In-Scope Premises File (ISPF) - see below

[164] The SMPO has to notify ANOs at the launch of every notice period. The SMPO also has to provide information to ANOs at different stages of the switch-off process: - Information of identification of copper lines included in the switch-off operation notified and of fibre lines identified at the same location, in order to help identify the missing rfibre roll outs and to facilitate migrations o For wholesale fibre operators: at the launch of the notice period, 6 months prior to the commercial closure o For retail operators: at the launch of the notice period, 12 months prior to the technical closure and 6 months prior to the technical closure - Information about the uncovered houses to help control the respect of criteria set by Arcep: for both wholesale and retail operators: o At the launch of the notice period o 6 months prior the to commercial closure o 3 months iprior to the commercial closure o At the commercial closure

[165] SMPO must publish the approved Switch-off Proposal (now Switch-off Plan) Following publication of the Switch-off Plan, SMPO must publish: - a weekly In-Scope Premises File (ISPF) listing all in-scope premises and their current status - a monthly monitoring report outlining the status of each exchange - notifications as per the Milestones 1-4 on a per exchange basis as they are reached

[166] The SMPO has to provide the general public with some of the information provided to ANOs, by publishing them in open data. In addition, the SMPO has to publish, also in open data, information about the follow-up of the switch off process. This publication is due: o At the launch of the notice period o At the commercial closure of 12 months prior to the technical closure on a semi-annual frequency

Table 77: Rules set by the NRA for the migration process and copper switch-off – Information provided by the SMPO (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
What information does the SMPO have to provide at which stage of the switch-off process to the:					
• NRAs?	Decommissioning Plan. Periodic proposal of Local Exchanges to be decommissioned (early announcement).		Please refer to the response in footnote 109 for further details.		So far, the requirements in this regard have not been specified
• ANOs?	Decommissioning Plan. Periodic proposal of Local Exchanges to be decommissioned (early announcement) only after approval of Agcom.		Not applicable in the case of Malta since there are **no ANOs** making use of the SMPO's copper access network.		So far, the requirements in this regard have not been specified
• Other entities (explain which entities)?					

Source: BEREC

Table 78: Rules set by the NRA for the migration process and copper switch-off – Information provided by the SMPO (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
What information does the SMPO have to provide at which stage of the switch-off process to the:					
• NRAs?	SMPO MDFs being switched-off...changes to the coverage of copper RUO and bitstream offers.		Switch-off time plan	Like info to ANOs, and additionally detailed information about each MDF area covered by FTTH (number of passed homes, associated MPoP). It includes current state and planned state in the next 3 months	Info on which MDFs 15 months before switch-off
• ANOs?	[167]		None	[168]	Info on which MDFs 15 months before switch-off
• Other entities (explain which entities)?					

Source: BEREC

[167] In case of relocation of loops for reasons attributable to SMPO, and for the PA where there are co-deployed operators, SMPO shall give notice with at least: - 12 months in advance, for a number of active loops to be relocated lower than 1/3 of the total of active loops in the referred PA; - 36 months in advance, for a number of active loops to be relocated higher than 1/3 and lower than 2/3 of the total active loops in the referred PA; - 60 months in advance, for a number of active loops to be relocated higher than 2/3 of the total number of active loops in the referred PA (including the switch-off of the PA). This period may be reduced to 36 months in case an equivalent active access is ensured". Under these circumstances, PA is equivalent to a local MDF/exchange.

[168] There is a general obligation to provide information about the FTTH network, including the MPoPs (OLT location) and their area of coverage. It includes current state and planned state in the next 3 months; this information must be kept up to date. Additionally, for each MDF to be switched-off, information about the planned coverage of the alternative networks, when announcing that the MDF will be switched-off. The NRA and the ANOs are to be informed at the same time about each MDF to be switched-off, the information includes the end of the notice period and the end of the guard period

Table 79: Rules set by the NRA for the migration process and copper switch-off – Evolution of QoS on legacy copper and Non-discrimination control (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Do the rules on migration foresee changes to the SMPO's service level agreement obligations on its legacy network?[169] (yes/no)	No	No	No	No	No
• If yes, please describe					
Do the rules on copper switch-off constrain the SMPO in terms of choice of the area of switch-off? e.g. can he focus his switch off plans on areas where the SMPO is itself providing the alternative infrastructure?	No	Yes	No	No	No
• if yes, on which legal basis?		Market analysis 2022			

Source: BEREC

[169] For instance, do the SLA indicators only focus on areas where no commercial closure has taken place?

Table 80: Rules set by the NRA for the migration process and copper switch-off – Evolution of QoS on legacy copper and Non-discrimination control (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
Do the rules on migration foresee changes to the SMPO's service level agreement obligations on its legacy network?[170] (yes/no)		Yes	No	No	Yes
• If yes, please describe		[171]			[172]
Do the rules on copper switch-off constrain the SMPO in terms of choice of the area of switch-off? e.g. can he focus his switch off plans on areas where the SMPO is itself providing the alternative infrastructure?	No	Yes	No	No	No
• if yes, on which legal basis?		[173]			

Source: BEREC

[170] For instance, do the SLA indicators only focus on areas where no commercial closure has taken place?

[171] As a general principle, the SMPO has to maintain the same service level agreement until the complete switch off of its network. However, the market analysis decisions allow the SMPO to lighten some of its quality-of-service obligations after commercial closure:
- The after-sale service can be adapted and restrained to a fee-for-service pricing ;
- The computation of threshold indicators for the appreciation of the quality-of-service on copper only applies to lines not already subjected to a switch-off operation.

[172] When an exchange area has been switched off and decommissioned (i.e. the copper lines have been put beyond use), SMP obligations related to copper-based services in that exchange area are withdrawn.

[173] The SMPO is not allowed, under its non-discrimination obligation set in the market analysis decision, to prioritize areas where it could benefit from the switch-off more than its competitors. To avoid this risk, the SMPO is subject to a transparency obligation and to a consultation of ANOs to ensure that they are all equally represented in the chosen areas for the switch-off.

Table 81: Rules set by the NRA for the migration process and copper switch-off – Evolution of QoS on legacy copper and Non-discrimination control (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Do the rules on migration foresee changes to the SMPO's service level agreement obligations on its legacy network?[174] (yes/no)	No		No		No
• If yes, please describe					
Do the rules on copper switch-off constrain the SMPO in terms of choice of the area of switch-off? e.g. can he focus his switch off plans on areas where the SMPO is itself providing the alternative infrastructure?	Yes	No	No		No
• if yes, on which legal basis?	Agcom will monitor the migration process in order to guarantee non-discrimination conditions.				

Source: BEREC

[174] For instance, do the SLA indicators only focus on areas where no commercial closure has taken place?

Table 82: Rules set by the NRA for the migration process and copper switch-off – Evolution of QoS on legacy copper and Non-discrimination control (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Do the rules on migration foresee changes to the SMPO's service level agreement obligations on its legacy network?[175] (yes/no)	No		No	No	No
• If yes, please describe					
Do the rules on copper switch-off constrain the SMPO in terms of choice of the area of switch-off? e.g. can he focus his switch off plans on areas where the SMPO is itself providing the alternative infrastructure?	No		Yes	No	No
• if yes, on which legal basis?			Regulatory final decision		

Source: BEREC

[175] For instance, do the SLA indicators only focus on areas where no commercial closure has taken place?

Table 83: Rules set by the NRA for the migration process and copper switch-off – After switch-off (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
After an MDF is switched off, are there any constraints or obligations on the SMPO about what to do with the legacy infrastructure (e.g. obligation to remove legacy cables to free up space in ducts, obligation not to remove cables in shared ducts where this might damage alternative infrastructures)?	No	No such obligation	No	No	No rules
What are the plans of the SMPO regarding the copper cables after switch-off?	Leave in the ground	The copper may be removed	We have no information.	DBA has no information	Remove cables
Did the NRA set any rules regarding what to do after switch-off with the equipment (like DSLAM) installed by ANOs in an MDF location?	No	No	No	No	No
• If “Yes”, please specify which rules?					
• If “No”, please explain what happens to that equipment in practice?	ANOs have to remove any own equipment	It's a SMPO decision	It depends on the decision of the SMPO.	n/a	No data

Source: BEREC

Table 84: Rules set by the NRA for the migration process and copper switch-off – After switch-off (FI, FR, GR, HU, IE)

Country	Finland	France	Greece	Hungary	Ireland
After an MDF is switched off, are there any constraints or obligations on the SMPO about what to do with the legacy infrastructure (e.g. obligation to remove legacy cables to free up space in ducts, obligation not to remove cables in shared ducts where this might damage alternative infrastructures)?	No	No	No	No	[176]
What are the plans of the SMPO regarding the copper cables after switch-off?	Some copper cables are removed, some remain.	The SMPO plans to retrieve copper cables and recycle them.	Not available	We have no specific information	SMPO has not submitted its Switch-off Proposal to ComReg
Did the NRA set any rules regarding what to do after switch-off with the equipment (like DSLAM) installed by ANOs in an MDF location?	No		No	No	No
• If "Yes", please specify which rules?					
• If "No", please explain what happens to that equipment in practice?	Operators mostly remove them, but some equipment might remain.		Copper switch off has not yet been announced.	The operators have to comply with the current environmental legislation.	In practice, it is up to the ANO to decide what to do with their exchange equipment. ComReg would expect that ANOs would decommission such equipment as there will be a cost associated with it, even if only the space within the exchange building.

Source: BEREC

[176] The Decommissioning Phase follows the Switch-off Phase on an exchange by exchange basis. At this point the copper lines must be put beyond use by SMPO. This could be disconnecting them from the active equipment or at the MDF. The copper lines must not be used for any service. There is no obligation to remove copper lines from ducts or poles within the rules for copper switch off.

Table 85: Rules set by the NRA for the migration process and copper switch-off – After switch-off (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
After an MDF is switched off, are there any constraints or obligations on the SMPO about what to do with the legacy infrastructure (e.g. obligation to remove legacy cables to free up space in ducts, obligation not to remove cables in shared ducts where this might damage alternative infrastructures)?	No	No	No	No fixed obligations at the moment.	No
What are the plans of the SMPO regarding the copper cables after switch-off?	not available information		[177]		No
Did the NRA set any rules regarding what to do after switch-off with the equipment (like DSLAM) installed by ANOs in an MDF location?	No	No	No	No	No
• If “Yes”, please specify which rules?					
• If “No”, please explain what happens to that equipment in practice?	Equipment have to be dismissed from the site.		There are no ANOs making use of the SMPO’s copper access network.	Not sure, therefor this is something we will have to take a look at.	

Source: BEREC

[177] The SMPO reported that no plans have been made yet because of the significant expense and time needed to carry out this activity. In addition, the SMPO mentioned that most of the fibre cables were placed within the same ducts that were occupied by copper cables. To this effect, the SMPO stated that pulling out copper cables is extremely risky as there is a high probability that the copper cable would damage the delicate fibre cables passing adjacent and in many cases tangled with it.

Table 86: Rules set by the NRA for the migration process and copper switch-off – After switch-off (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
After an MDF is switched off, are there any constraints or obligations on the SMPO about what to do with the legacy infrastructure (e.g. obligation to remove legacy cables to free up space in ducts, obligation not to remove cables in shared ducts where this might damage alternative infrastructures)?	The SMPO already has the obligation to remove the dead cables under the ORAC (duct) regulation.	No	No	No obligations regarding copper cables	No
What are the plans of the SMPO regarding the copper cables after switch-off?	n/a		We don't know. The SMPO expressed concern about the costs of pulling out the cables and a fear to damage the rest of the cables when pulling the old copper cables out. So only if it is urgent to make space in the tubes, for now.	Telefónica has sold part of its copper cables to a third party, to be removed after switch-off. Until the switch-off, Telefónica remains the sole resposible for operation of the cables as an electronic communications network	Overhead cables are taken down, while buried cables stay in the ground. Removed equipment is recycled.
Did the NRA set any rules regarding what to do after switch-off with the equipment (like DSLAM) installed by ANOs in an MDF location?	No	No	No	Yes	No
• If “Yes”, please specify which rules?				SMPO and ANOs with collocated equipment (such as DSLAM) have to negotiate its removal, which will take place at the end of the guard period (ie, after no customer is on copper).	
• If “No”, please explain what happens to that equipment in practice?	n/a	The equipment will be dismantled	SMPO and AOs make their own agreement.		ANO picks up their equipment

Source: BEREC

Annex 3.5: Basic data used in section 6

Table 87: Further measures taken by the NRA (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Does the NRA provide information relevant for the copper switch-off to the public (e.g. on its website)?	Yes	No	No	No	No
• If “Yes”, please explain what information and how?	Communication issued by BIPT on status of copper switch off				
Does the NRA monitor the migration process?	Yes	Yes	Yes	Yes	No
• If “Yes”, please explain what does the NRA monitor?	Any problems reported by ANOs and end-users during migration	They are informed about all steps as well as the detailed plan	By controlling the information published.	The SMPO informs the DBA continuously on their plans	
• If “No”, please explain why not?					
Does the NRA also take other actions? (e.g. direct support of end-users in rural areas where the availability of alternative products may be difficult, information to „critical businesses”)	No	No	No	No	No
• If “Yes”, please explain which measures?					

Source: BEREC

Table 88: Further measures taken by the NRA (FI, FR, HU)

Country	Finland	France	Hungary
Does the NRA provide information relevant for the copper switch-off to the public (e.g. on its website)?	Yes	Yes	No
• If “Yes”, please explain what information and how?	Only regarding the notification obligation of SMP operators	Every notification from the SMP operator is registered and monitored. The NRA monitors that alternative products are offered.	
Does the NRA monitor the migration process?	Yes	Yes	Yes
• If “Yes”, please explain what does the NRA monitor?	Every notification from the SMP operator is registered and monitored. The NRA monitors that alternative products are offered.	Follow-up of the decrease of copper lines with the ANOs, monitoring the commercially blocked fibre lines to ensure their eligibility to WAPs prior to the technical closure and allow migrations to happen.	We monitor the information published by the SMPOs
• If “No”, please explain why not?			
Does the NRA also take other actions? (e.g. direct support of end-users in rural areas where the availability of alternative products may be difficult, information to „critical businesses”)	Yes	Yes	No
• If “Yes”, please explain which measures?	Give advice to users on the availability of alternative products and negotiate with SMP operators and user.	Information campaign organized with the government to bring awareness of the need to migrate for critical business.	

Source: BEREC

Table 89: Further measures taken by the NRA (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway	Poland
Does the NRA provide information relevant for the copper switch-off to the public (e.g. on its website)?	Yes	Yes	No	Yes	No
• If "Yes", please explain what information and how?	The decision approving the decommission of the announced LEXs is published on Agcom's website.	ILR provides information to the public which includes also a tool where someone can check the copper switch-off date: https://myilr.lu/en/copper-phase-out/		Information regarding the switch-off date and process at Nkoms homepages.	
Does the NRA monitor the migration process?	Yes	Yes	Yes	Yes	Yes
• If "Yes", please explain what does the NRA monitor?	[178]	Evolution of copper lines, migration rate	[179]	Nkom holds regular meetings with both Telenor and access buyers regarding the decommissioning of the copper network in Norway, without this being determined or linked to a specific migration plan.	NRA monitors if the obligations concerning migration are fulfilled by SMPO.
• If "No", please explain why not?					
Does the NRA also take other actions? (e.g. direct support of end-users in rural areas where the availability of alternative products may be difficult, information to „critical businesses")	Yes	Yes	Yes	Yes	No
• If "Yes", please explain which measures?	Agcom will monitor the	Public information campaigns, ...	[180]	We are currently doing an internal "mapping" of the remaining copper	

[178] Agcom will monitor the migration process in order to guarantee non-discrimination conditions
SMPO guarantees the respect of the published decommissiong Plan (penalties may be enforced by Agcom)
SMPO publishes every six months the list of LEXs that will likely be announced for decommissioning in the following semester, taking into account the behaviour of the parameters (coverage and take-up) that are considered by Agcom to approve the start of decommissioning.

[179] Further to the information required from the SMPO prior to the migration process as explained in the response in footnote 109, the MCA requests the SMPO to provide it with updates on how the migration proceeded. Furthermore, the MCA collects quarterly statistics from fixed network operators on the quantity of subscriber access lines per technology. Moreover, through the broadband mapping exercise being carried out, in accordance with Article 22 of the EECC, the MCA may also obtain further insight on FTTH roll-out and areas still relying solely on copper-based access.

[180] In line with the European Electronic Communications Code (EECC), the universal service regime in Malta includes access to an adequate broadband internet access service and voice communications services, including the underlying connection, at a fixed location in any given area throughout Malta where there is no existing provider of public electronic communications networks who is in a position to provide connection at a fixed location to the end-users at an affordable price.

	migration process in order to identify potential problems in migrating customers.			customers, and see if its possible to reach them with specific information regarding the decommissioning, because the end-date is coming closer and closer.	

Source: BEREC

Further details on the functional characteristics, eligibility criteria and the designation process may be found in the MCA's Decision Notice "Universal Service Obligations on Electronic Communications Services" available at this link. https://www.mca.org.mt/consultations-decisions/decision-notice-universal-service-obligations-electronic-communications

Table 90: Further measures taken by the NRA (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Does the NRA provide information relevant for the copper switch-off to the public (e.g. on its website)?	No	No	No	Yes	Yes
• If “Yes”, please explain what information and how?				1) List of all MDFs to be switched-off (with location, identification, and committed dates) 2) articles on the blog platform, informing the public about developments or news in the switch-off process 3) Status reports	PTS has a web page with information and links to other organizations' information. PTS organize an annual webinar on technology changes in communication networks.
Does the NRA monitor the migration process?	No	No	Yes	Yes	Yes
• If “Yes”, please explain what does the NRA monitor?			Progress of MDS and lines switched off.	CNMC monitored the switch-off notifications (evolution, statistics). It actively monitors specific details of the process requesting information from the SMPO.	PTS arrange regular meetings with SMPO to get a presentation of how the work is going and what happens next.
• If “No”, please explain why not?					
Does the NRA also take other actions? (e.g. direct support of end-users in rural areas where the availability of alternative products may be difficult, information to „critical businesses”)	No	No	No	Yes	No
• If “Yes”, please explain which measures?				CNMC informally answers questions and complaints of end users regarding the switch-off process	

Source: BEREC

Annex 3.6: Basic data used in section 7

Table 91: Lessons learned so far – Forced migration Part 1 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Did the SMPO or ANOs set incentives for their end-users to migrate voluntarily before the announced switch-off date to avoid that end-users need to be forcibly switched off?	Yes	Yes	No	Yes	Yes
• If “Yes”, please explain which incentives	Installation costs for inhouse fibre connection are free	Discounts to migrate to fibre		The SMPO and several ANOs provide alternative products to the end-user at a lower price or same price. Some of these offers are part of campaigns running for a limited time period.	Marketing
What percentage of end-users connected to a MDF (compared to the peak usage of the MDF) have typically been forcibly switched off, when that MDF was closed? How many end-users are typically concerned for a small MDF/ a large MDF?	Around 2% was forcibly switched off.	n/a	It has not yet been applied in practice, the CTU has no information.	n/a	No data
Do these percentages vary significantly between different areas (e.g. rural vs. urban)? Between products (e.g. between telephone service and broadband)?	So far, switch off has only taken place in urban areas. So no data is available. Also no data available between products.	No	See above	n/a	No data

Source: BEREC

Table 92: Lessons learned so far – Forced migration Part 1 (FI, FR, HU)

Country	Finland	France	Hungary
Did the SMPO or ANOs set incentives for their end-users to migrate voluntarily before the announced switch-off date to avoid that end-users need to be forcibly switched off?	Yes	Yes	No
• If "Yes", please explain which incentives	Special offers for migration	[181]	
What percentage of end-users connected to a MDF (compared to the peak usage of the MDF) have typically been forcibly switched off, when that MDF was closed? How many end-users are typically concerned for a small MDF/ a large MDF?	Very small percentage, only a few customers	The first operation of copper switch off led to 9% of end-users being forcibly switched off.[182]	We have no exact data, but forcible switch-off is marginal.
Do these percentages vary significantly between different areas (e.g. rural vs. urban)? Between products (e.g. between telephone service and broadband)?	No, usually slightly more users in rural areas.	[183]	We have no information.

Source: BEREC

[181] Retail operators set anticipated suspensions of end-users access to bring awareness of the need to migrate. These suspensions take place few months before the technical closure. Retail operators would restore the access once the client reach back to them.

[182] On about 21 500 MDFs:

- 55% of MDFs cover less than 500 lines each ;
- 25% of MDFs cover between 500 and 1500 lines each ;
- 15% of MDFs cover between 1500 and 10 000 lines each ;
- 5% of MDFs cover more than 10 000 lines each.

[183] The first completed operations of copper switch-off concerned rural areas. An operation in urban area is in progress for a technical closure in 2025: migrations are only starting but retail operators identify a slower rhythm than in rural areas.

Table 93: Lessons learned so far – Forced migration Part 1 (IT, LU, MT, NO)

Country	Italy	Luxembourg	Malta	Norway
Did the SMPO or ANOs set incentives for their end-users to migrate voluntarily before the announced switch-off date to avoid that end-users need to be forcibly switched off?	No	Yes	Yes	No
• If “Yes”, please explain which incentives	Not currently, however incentives at retail level are based on commercial strategies of operators and they can change in the future.		The SMPO launched promotional and retail offers, communicated the superiority of the fibre network, and offered free installation of FTTH including ONT and Gateway.	
What percentage of end-users connected to a MDF (compared to the peak usage of the MDF) have typically been forcibly switched off, when that MDF was closed? How many end-users are typically concerned for a small MDF/ a large MDF?	n/a		Very few	
Do these percentages vary significantly between different areas (e.g. rural vs. urban)? Between products (e.g. between telephone service and broadband)?	n/a		No	

Source: BEREC

Table 94: Lessons learned so far – Forced migration Part 1 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Did the SMPO or ANOs set incentives for their end-users to migrate voluntarily before the announced switch-off date to avoid that end-users need to be forcibly switched off?	Yes	Yes	Yes	Yes	No
• If "Yes", please explain which incentives	[184]	Technical advantages of the new network infrastructure advertised.		Copper based retail offers have the same price as low-speed FTTH based offers. This fact, and the big performance gap between ADSL2+ and FTTH moved end users to a fast migration to fibre	
What percentage of end-users connected to a MDF (compared to the peak usage of the MDF) have typically been forcibly switched off, when that MDF was closed? How many end-users are typically concerned for a small MDF/ a large MDF?	Confidential	Not available such kind of statistics	None	The percentage of forcibly switched off users depends on the type of retail service. It is less than 0.5% for broadband customers, and less than 5% for POTS customers.	3 % have been forced off
Do these percentages vary significantly between different areas (e.g. rural vs. urban)? Between products (e.g. between telephone service and broadband)?	[185]	Not available such kind of statistics	No	The identified variation depends on the type of service (telephone service vs broadband)	

Source: BEREC

[184] SMPO operator has been addressing their end-users through campaigns in targeted areas.
ANOs are also increasing their NGA coverage and migrating the customers from the copper-based products to fibre-based products. In this context, no issues are expected to arise.

[185] Confidential

Table 95: Lessons learned so far – Forced migration Part 2 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Which rules/measures were particularly relevant to ensure that no or only a few end-users were actually forcibly switched-off?	no specific rules were defined by BIPT; BIPT launched a website to inform end users on the advantages of fibre and end user rights during the roll out of fibre		Sufficient time for negotiations the SMPO and the access seeker on the allocation.	n/a	No data
Was it necessary for the NRA / the SMPO to postpone switch-off plans because of insufficient voluntary migration of end-users to available alternative products?	No	No	No	No	
• If “Yes”, please explain how can such a situation be avoided?					No data

Source: BEREC

Table 96: Lessons learned so far – Forced migration Part 2 (FI, FR, HU)

Country	Finland	France	Hungary
Which rules/measures were particularly relevant to ensure that no or only a few end-users were actually forcibly switched-off?		• The anticipated suspensions of copper lines ; • The notice period to give the necessary time for all migration to happen; • The control of the criteria at the commercial closure in order to give time for migrations until the technical closure.	[186]
Was it necessary for the NRA / the SMPO to postpone switch-off plans because of insufficient voluntary migration of end-users to available alternative products?	Yes	No	No
• If "Yes", please explain how can such a situation be avoided?	Only in a few cases did NRA intervene in the favor of the user		

Source: BEREC

[186] There are no special rules with regard to the switch-off, because in practice subscribers could usually choose a different product (eg mobile or different fixed technology) from either the same or a different provider. Also, the migration of existing lines to new technologies is quite successful as must subscribers could keep their fixed service and the migration usually resulted in improvements in the quality of service. Terminations occurred in the (rare) cases where the migration would have required significant investment from the SMPO which would not have been commercially viable, or where the subscriber refused to cooperate. As a general rule, ECS providers have to notify subscribers at least 60 days prior to the termination of the existing contract.

Table 97: Lessons learned so far – Forced migration Part 2 (IT, LU, MT, NO)

Country	Italy	Luxembourg	Malta	Norway
Which rules/measures were particularly relevant to ensure that no or only a few end-users were actually forcibly switched-off?	Setting a specific notice period and a migration period in order to leave sufficient time for customers to migrate. Setting price incentives at wholesale level.		The SMPO sent multiple communications through emails, SMS, calls and letters.	
Was it necessary for the NRA / the SMPO to postpone switch-off plans because of insufficient voluntary migration of end-users to available alternative products?	No	No	Yes	No
• If “Yes”, please explain how can such a situation be avoided?			The SMPO is actively pursuing migration campaigns prior to switch off dates.	

Source: BEREC

Table 98: Lessons learned so far – Forced migration Part 2 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Which rules/measures were particularly relevant to ensure that no or only a few end-users were actually forcibly switched-off?	n/a	Not available such kind of statistics	All end users have to be covered by optics before switch-off. SMNO's users have to be switched to the new network first. Switch-off is allowed only 6 months after it was announced.	Relevant actions were the sending of multiple communications to the customers, and the availability of an alternative service	Information and good mobile connectivity
Was it necessary for the NRA / the SMPO to postpone switch-off plans because of insufficient voluntary migration of end-users to available alternative products?	No	No	Yes	No	No
• If “Yes”, please explain how can such a situation be avoided?	n/a		Sometimes neighbours don't allow trespassing to pull the fibre over their property.		

Source: BEREC

Table 99: Lessons learned so far – Migration issues (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Did issues occur (e.g. service interruptions) during the migration process?	No	No	No	Yes	No
If "Yes", which issues:					
• Service interruptions					
• Dissatisfaction of end-users with the end-user product after migration					
• Insufficient (or even incorrect) and/or no timely information for end-users					
• Insufficient (or even incorrect) and/or no timely information for ANOs					
• Others, please specify which issues				No experience yet.	
Which rules/measures were particularly relevant to avoid as much as possible migration issues?	no specific rules were defined by BIPT; BIPT launched a website to inform end users on the advantages of fibre and end user rights during the roll out of fibre		Sufficient time for negotiations the SMPO and the access seeker on the allocation and transparency of whole process.		

Source: BEREC

Table 100: Lessons learned so far – Migration issues (FI, FR, HU)

Country	Finland	France	Hungary
Did issues occur (e.g. service interruptions) during the migration process?	Yes	Yes	No
If "Yes", which issues:			
• Service interruptions		No	
• Dissatisfaction of end-users with the end-user product after migration	Yes	No	
• Insufficient (or even incorrect) and/or no timely information for end-users	Yes	No	
• Insufficient (or even incorrect) and/or no timely information for ANOs	Yes	No	
• Others, please specify which issues		Yes[187]	
Which rules/measures were particularly relevant to avoid as much as possible migration issues?		[188]	The migration procedure defined in the market decision.

Source: BEREC

[187] Some issues can be mentioned :
-The risk of scams by companies using the copper switch-off and the need to migrate to solicit end-users and have them pay for unnecessary work.
- Difficulties arising during the roll-out of the final segment of fibre where some construction is needed and can represent an important cost for the end-user.

[188] -The anticipated suspensions of copper lines;
- The notice period to give the necessary time for all migration to happen ;
- The control of the criteria at the commercial closure in order to give time for migrations until the technical closure.

Table 101: Lessons learned so far – Migration issues (IT, LU, MT, NO, PL)

Country	Italy	Luxembourg	Malta	Norway
Did issues occur (e.g. service interruptions) during the migration process? If this is the case, which issues:: 54a. Service interruptions?	No	No	No	
If “Yes”, which issues:				
• Service interruptions	No	No	No	
• Dissatisfaction of end-users with the end-user product after migration	No	No	No	
• Insufficient (or even incorrect) and/or no timely information for end-users	No	No	No	
• Insufficient (or even incorrect) and/or no timely information for ANOs	No	No	N/A	
• Others, please specify which issues	No			
Which rules/measures were particularly relevant to avoid as much as possible migration issues?			The SMPO noted that, before copper drop is removed, a fibre feasibility check is carried out. Then on site fibre is tested to ensure that service is working till Optical Distribution Point (ODP). At that point installation is carried out and copper is deprovisioned after connection on fibre is working.	

Source: BEREC

Table 102: Lessons learned so far – Migration issues (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Did issues occur (e.g. service interruptions) during the migration process? If this is the case, which issues:: 54a. Service interruptions?	Confidential	Yes	No	Yes	Yes
If "Yes", which issues:					
• Service interruptions	Confidential	Yes		Yes	Yes
• Dissatisfaction of end-users with the end-user product after migration	Confidential [189]	No		No	Yes
• Insufficient (or even incorrect) and/or no timely information for end-users	Confidential	No		Yes	Yes
• Insufficient (or even incorrect) and/or no timely information for ANOs	Confidential	No		No	Yes
• Others, please specify which issues	Confidential	No		Yes[190]	
Which rules/measures were particularly relevant to avoid as much as possible migration issues?	[191]	Service interruption is unavoidable due to technical reasons	SMNO waiting on the spot while AOs user switched off. This way max 1h outage of servise happens.	The most important measure is ensuring that all customers have an alternative technology available, for voice, broadband and IPTV. This can be FTTH, FWA or satellite.	Information

Source: BEREC

[189] Confidential

[190] a) Service interruptions only during the time needed to switch the service to the alternative network. b) The new services are in any case of better quality than the old ones on copper c) Operators send multiple communications to their customers, so cases of no or no timely information are in any case residual, due to errors d) SMPO sends information to all affected ANOs, and the NRA publishes in its web the list of MDFs to be switched-off and the date

[191] The process of migration is being handled by the SMP operator, without the need of ANACOM's intervention. Additionally, in Portugal the number of accesses supported on SMPO local loop unbundling offer and bitstream access offers is residual comparing to the number of accesses of ANOs that use their own solutions, namely based on fibre, and supported on regulated access to ducts and poles.

Table 103: Lessons learned so far – Overall perspective Part 1 (BE, CY, CZ, DK, EE)

Country	Belgium	Cyprus	Czech Republic	Denmark	Estonia
Overall, what were the main learnings for your NRA from the copper switch-off which happened so far?	The communication by the SMP operator needs to clear. The SMP operator needs to be as transparent as possible. The SMP operator can not force end users to migrate to their own fibre retail product, but should also leave the end users the opportunity to migrate to alternative operators.		The defined process has not yet been applied.	No experience yet (SMPO's plans for copper switch off are rather sporadic.")	No data
Where did you make positive experiences, where was (or is) need for improvement?	See above		The defined process has not yet been applied.		No data
Overall, which rules proved to be particularly relevant for the migration and copper switch-off and why?	Rules on transparency: sufficient communication and clear cut off dates.		The defined process has not yet been applied.		No data
Who has communicated the migration and copper switch-off process to the public (e.g. NRA, Ministry, operators)?	The operators communicated directly with their customers. The BIPT issued a communication on the status and process of copper switch off.	SMPO	The defined process has not yet been applied.		No data

Source: BEREC

Table 104: Lessons learned so far – Overall perspective Part 1 (FI, FR, HU)

Country	Finland	France	Hungary
Overall, what were the main learnings for your NRA from the copper switch-off which happened so far?	Copper switch-off would be easier with some more rules by the regulator, but unfortunately Traficom does not have the power the set more detailed rules.	[192]	There has been a substantial degree of migration and copper switch-off so far, without particular regulatory incentives, partly due to the infrastructure competition.
Where did you make positive experiences, where was (or is) need for improvement?		[193]	Our regulation needs to be revised in the light of the relevant EU legislation which came into effect after our current market decision.
Overall, which rules proved to be particularly relevant for the migration and copper switch-off and why?		[194]	The regulation of the migration process in the market decisions (deadlines, information to publish).
Who has communicated the migration and copper switch-off process to the public (e.g. NRA, Ministry, operators)?	Mostly operators and NRA.	[195]	The migration rules are published by the NRA in the market decision, the actual migration is by the operators.

Source: BEREC

[192] -An important need for anticipation to achieve all migrations
- The need to consider specific situations where the roll out of fibre is not possible regardless of the responsibility of the wholesale fibre operator
- The need for a large provision of information by the SMPO: needed as much for other operators to organize the roll-out of fibre where needed and the migrations, than for local authorities to inform their inhabitants and accompany the most fragile public (e.g. elderly population).

[193] -Improvement needed of the anticipation of the appreciation of criteria set for the switch-off, in order to give ANOs more visibility
-Improvement needed to enable an industrialization of the switch-off process with more automatized process

[194] The rule that sets that FTTH networks need to be complete in order to proceed to the switch-off and which tolerates that some homes could remain uncovered by fibre network on strictly identified situations (e.g. third-party refusal of the roll out of fibre to their home, if there is no active copper access for 24 months at least). This rule proved itself to reflect the reality of fibre roll out.

[195] Retail operators to their clients, SMPO, Arcep and Ministry on their respective websites. Mayors of towns included in a switch off operation also communicated at their level.

Table 105: Lessons learned so far – Overall perspective Part 1 (IT, LU, MT, NO)

Country	Italy	Luxembourg	Malta	Norway
Overall, what were the main learnings for your NRA from the copper switch-off which happened so far?	in May 2024 the first LEXs will be switched-off, so we have currently no specific experience on the practical consequences of switch-off.	communication is key	[196]	[197]
Where did you make positive experiences, where was (or is) need for improvement?			The SMPO noted that a positive experience can be obtained by promoting the benefits afforded by fibre-based SALs such as speed and reliability, as well as the lower propensity to faults due to copper and old infrastructure.	
Overall, which rules proved to be particularly relevant for the migration and copper switch-off and why?			[198]	
Who has communicated the migration and copper switch-off process to the public (e.g. NRA, Ministry, operators)?	NRA, SMPO.	NRA	The SMPO communicated directly to affected customers.	Both NRA, Ministry and operators themself.

Source: BEREC

[196] Based on feedback obtained from the SMPO, it is beneficial to conduct proactive campaigns and migrations prior to switch-off to avoid complaints and a smooth transition during infrastructure change. Furthermore, the MCA considers that the ongoing interaction with the SMPO prior to the switch-off process minimises risks and facilitates the migration process.

[197] Since Telenor announced the closure of the copper network in 2029, NKOM's role has been to ensure predictability for access buyers while gradually easing measures to facilitate the closure of copper exchanges that are no longer in use and thus do not affect competition. Providing information to end customers has been crucial, as well as balancing various considerations effectively.

[198] The SMPO noted that it was relevant to ensure that customers are always provided with an alternative solution. This point is emphasised in MCA's rules, where it communicates to the SMPO the importance that the alternative access product is capable to provide the subscriber with a comparable service and experience available on the copper-based SAL.

Table 106: Lessons learned so far – Overall perspective Part 1 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Overall, what were the main learnings for your NRA from the copper switch-off which happened so far?	No relevant lessons learned.		SMNO makes switching on his own, without the incentive. Not all people want to have fibre and some are prepared to obstruct the fibre layout.	Publication of information by NRAs is key, as it sends an institutional message that copper switch-off is a fact[199]	There is a need to set rules for the process. Clear and early timeline are particularly important. Information in many channels is key to reach out to the public. People in digital exclusion are difficult to reach, and therefore traditional media is needed.
Where did you make positive experiences, where was (or is) need for improvement?	We don't see a particular need for improvement (taking in consideration the discontinuation of the regulation of the access to SMPO copper)		Improvement in persuading people who didn't want to switch to fibre.	The definition of a regulatory frame for copper switch-off, known for years to all stakeholders and stable, with only minor changes, was an important and positive contribution. There is possibly room for improvement in areas such as support for end user issues in the final stages of switch-off	The relation between PTS and SMNO is good. PTS get all the information we ask for.
Overall, which rules proved to be particularly relevant for the migration and copper switch-off and why?	Please see answer to Q.55		Rules that set the notice periods.	[200]	A good timetable is important in order to have time to inform all parties and to have the opportunity to spread the word through many media channels.
Who has communicated the migration and copper switch-off process to the public (e.g. NRA, Ministry, operators)?	The SMPO has communicated to the NRA and operators a copper switch-off plan.	Operators	Operators	Operators and the NRA	SMPO

Source: BEREC

[199] User migration to fibre runs smoother when the right market conditions are given. In Spain, copper is seen since years as legacy technology with no advantages. Also, proper information to end users is key: copper switch-off cannot be a surprise.

[200] The mere existence of the rules, since 2009, contributed to an understanding of switch-off as an event which will come sooner or later. It is also key that the rules are easy to understand and implement. Also, the granting of a general switch-off authorisation without the need for approval of each MDF was important; in this sense, the selection of the switch-off unit as the complete MDF area (and not only parts of that area) was relevant

Table 107: Lessons learned so far – Overall perspective Part 2 (BE, CY, CZ, EE)

Country	Belgium	Cyprus	Czech Republic	Estonia
Which types of communications were particularly successful in your view and why?	Direct communication to the customers.		The definied process has not yet been applied.	No data
Have you noticed a substantial shift in market shares (retail and wholesale) due to copper switch-off?	Switch off was started recently, so no data available.	No	The definied process has not yet been applied.	No data
Did you observe a substantial boost to fixed VHCN uptake by end-users due to copper switch-off?	We notice a shift from copper to VHCN networks, but we cannot be sure that this is due to the copper switch off or due to the introduction of a fibre network.		The definied process has not yet been applied.	No data

Source: BEREC

Table 108: Lessons learned so far – Overall perspective Part 2 (FI, FR, HU)

Country	Finland	France	Hungary
Which types of communications were particularly successful in your view and why?		Institutional and neutral communication is seen as the key to enable migrations. Mayors' communications to their inhabitants were quite successful.	
Have you noticed a substantial shift in market shares (retail and wholesale) due to copper switch-off?	Yes, the incumbent operator has lost market shares in some regions.	Not yet	No
Did you observe a substantial boost to fixed VHCN uptake by end-users due to copper switch-off?	Yes, in some regions	Not yet	Yes

Source: BEREC

Table 109: Lessons learned so far – Overall perspective Part 2 (IT, LU, MT, NO)

Country	Italy	Luxembourg	Malta	Norway
Which types of communications were particularly successful in your view and why?	Public consultation.		The SMPO indicated that email was the most successful type of communication, as the customer could understand at their leisure and book an appointment online according to their needs.	
Have you noticed a substantial shift in market shares (retail and wholesale) due to copper switch-off?	n/a	No	Confidential	
Did you observe a substantial boost to fixed VHCN uptake by end-users due to copper switch-off?	n/a		Confidential	

Source: BEREC

Table 110: Lessons learned so far – Overall perspective Part 2 (PT, SK, SI, ES, SE)

Country	Portugal	Slovakia	Slovenia	Spain	Sweden
Which types of communications were particularly successful in your view and why?	Meetings and letters.		n/a	The publication by the NRA of the list of MDFs to be switched-off helped operators when addressing their customers, and helped customers when being addressed by operators. The switch-off process was perceived as backed from the NRA, an official institution. The informal articles about the switch-off in the NRA's blog also helped widespread this information, as these articles were echoed by several technological websites. Finally, the frequent communications of operators to their remaining copper customers when switch-off is near, are key in ensuring a smooth migration	The national consumer agencies are good megaphones for messages to consumers.
Have you noticed a substantial shift in market shares (retail and wholesale) due to copper switch-off?	No		No	No	Yes, all telephone customers have switched to mobile telephony and a majority who use the internet do so via fibre network or cable network.
Did you observe a substantial boost to fixed VHCN uptake by end-users due to copper switch-off?	The fixed VHCN uptake has been observed in PT regardless of the copper switch-off process.	No	No	No. Customers usually migrate to fibre long before the switch-off date. The driver for migration is not the switch-off itself (usually) but the market situation	Yes, in areas where fibre networks are being expanded, customers leave the copper network long before switching off.

Source: BEREC