EUROPEAN
REGULATORS GROUP
FOR POSTAL SERVICES

ERGP Report on access to the infrastructure for the delivery of parcels

Access & Interoperability Working Group

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Executive summary

The intense development of the parcel market has stimulated innovation in delivery. One option is the vastly increased use of delivery to parcel lockers. However, as parcel lockers are not the only choice available for parcel delivery, the whole picture of the infrastructure for delivery of parcels needs to be addressed, in order to investigate whether there are any competition problems emerging from issues related to access to the infrastructure for parcel delivery and, if so, explore what remedies could be appropriate to solve such problems.

To this respect, this report i) provides a literature review on this topic, ii) describes the market development in parcels delivery across Europe, iii) enlightens technology solutions adopted for delivery illustrating infrastructures currently used (e.g. parcel lockers, Pick-up Drop-off (PUDO) points, etc.), iv) investigates potential competition issues related to access to the infrastructure for parcel delivery (such as the use of parcel lockers, other postal infrastructure receptacles in buildings and delivery in convenience points/postal outlets) and if such infrastructure is open to competitors, v) explores regulatory tools (monitoring, access etc.) that might be used to promote, if needed, competition and end users' satisfaction / well-being.

According to ERGP previous reports, commercial agreements are typically governing the terms of access for the delivery of parcels. The European Regulators Group for Postal Services (ERGP) has proposed open access to postal networks to increase choice and transparency for operators and e-commerce players. It has also recommended further standardisation in areas such as track and trace, digitisation of transport documents and environmentally friendly delivery solutions.

Recent studies conducted in several countries, especially in the north of Europe, highlight the potential benefits of parcel lockers in reducing environmental impact and improving delivery efficiency.

The report, based on the answers to a questionnaire by 32 ERGP countries, shows a varied landscape of parcel delivery modes in Europe, with diverse regulatory/policy approaches, market dynamics and technological innovations influencing the evolution of last mile delivery. The implementation of Out Of Home (OOH) delivery choices represents a significant development in facilitating access to delivery infrastructure and promoting alternative delivery options. This reflects a growing focus on sustainability and efficiency in parcel delivery, opening up opportunities for further innovation and collaboration among stakeholders, especially through the open access to parcel locker stations.

The deliveries out of home would have increased in the last 4 years, according to the data gathered from the questionnaire (11 answers out of 32), although traditional home delivery is still the main method. Whereas Western and Southern European countries would still resort to home deliveries, Northern and Eastern European countries would show a preference for OOH deliveries.

Across ERGP countries, in 2023 there are at least 322 OOH networks (Automated Parcel Machine (APMs) + Assisted Parcel Delivery (APDs)) and over 360 thousand facilities. APMs and APDs strategies rely mainly on closed business models, accounting over two-thirds of the ERGP sample. Postal Operators (POs)/ Parcel Delivery Service Providers (PDSPs) usually adopt closed business models and white label providers tends to implement open networks strategies.

Based on the analysis of the information gathered, it is recommended that policy makers, NRAs and industry stakeholders work together to remove barriers where they exist and promote the adoption of sustainable delivery solutions. This could include incentives for coordinated investments of open access parcel locker infrastructure due to their occupation of public and private spaces, and promoting consumers' awareness and adoption of alternative delivery options. In addition, further research and data collection is needed to monitor the effectiveness of different delivery models and to support evidence-based policy decisions By working together to address challenges and capitalize on opportunities, stakeholders can create a more sustainable and efficient parcel delivery ecosystem in Europe.

Furthermore, the following recommendations are proposed:

- NRA should monitor the OOH sector and common guidelines might be suggested in the future by ERGP for National Regulatory Authorities (NRAs) whose remit facilitates collection of this data.

- Most effective tools to incentivize OOH network deployment are legislative and fiscal levers, as well as regulatory and administrative solutions whereas technical measures and re-use of existing resources are deemed less powerful to incentivize APM network deployment. Such tools can be activated by different public entities (not necessarily the NRA), and their effectiveness could be maximized with a coordinated approach.

- In-depth analysis of the European Union (EU) legal framework might be appropriate with the goal to promote standard and common practices across Europe, starting from the authorization/licensing perimeter and then, the potential application of sector specific and competition law if a Significant Market Power (SMP) operator was identified, in order to ensure consumer's protection.

- The future regulatory framework might clearly specify the elements of postal infrastructure regarding parcel delivery services. Therefore, parcel locker networks and the undertakings operating and maintaining them might be clearly defined in the new regulatory framework in order to grant similar competences to NRAs and, consequently, favoring harmonized access provisions for OOH services. Clearer definitions of Parcel Locker Network (PLNs) and PUDOs could be developed and the possibility to further specify NRAs' competences regarding OOH networks and services might be further analysed in the scope of the review of the EU postal regulatory framework. To this respect, the ERGP recognises the need to further investigate possible amendments/overhauling, with regard to OOH delivery services, to the European legal framework. Evidence collected within this report will be therefore taken into account in ERGP future works, starting from the ongoing analysis leading to the predisposition of the ERGP Report on the outline of the future postal regulatory framework, due next year.

1 Introduction

1.1 Background and objective of the report

The intense development of the parcel market has stimulated innovation in delivery. Along with the traditional "at home" delivery services, ever increasing are "out-of-home" (OOH) delivery solutions: parcel lockers and other receptacles in buildings (home boxes), delivery in convenience points such as PUDOs, Post Offices and postal outlets.

The whole picture of the infrastructure for delivery of parcels needs to be taken into utmost account in order to investigate whether there are any potential competition problems emerging from issues related to access to the infrastructure for parcel delivery and, if this is the case, explore remedies that could be appropriate to solve such problems.

Note that, as already mentioned in previous ERGP reports[1], promotion of competition and protection of users' interest in the postal services sector is one of the main goals of the Postal Services Directive (PSD). Access to the postal networks is an instrument for promoting competition and consumers' satisfaction, which are safeguarded in Articles 11, 11a[2] and 12 of the PSD.

The report therefore is aimed at streamlining questions such as:

- What relevant insights can be drawn from literature research on parcel delivery and access to its infrastructures?
- What is the market development of OOH parcel delivery compared to traditional "at home" delivery? What business models (open vs closed networks) are in place?
- What are the new technical solutions, now and in the future, for OOH parcel delivery?
- What potential competition issues may emerge, if any, in OOH parcel delivery? Are there barriers-to-entry and/or network access denial? Open vs closed networks, is there a problem? Restricted access to OOH infrastructures, is it a threat?
- What regulatory issues are at stake, if any, for OOH? Is there a need for access regulation in OOH parcel delivery? Competition and end-users' satisfaction in delivery, how can be further promoted?

This report first conducts a literature review of existing publications on parcel delivery and access to its infrastructures.

[1] ERGP PL I (19) 10 Report on the development of postal networks and access practices regarding infrastructure related to the parcel market.

[2] Article 11a of the PSD requires Member States (MS) to give all POs/PDSPs access to elements of postal infrastructure – facilities and information resources used in providing postal services – whenever necessary to protect the interest of users and or to promote effective competition.

The report brings an overview on the current situation in the Member States (MS) for parcel delivery. The sector value chain, market development, demand for parcels delivery and operators' business models are analysed together with "white label" providers' strategies. White labels providers are firms that are not necessarily considered postal providers in the current regulatory framework and offer access to their own parcel infrastructure (lockers, home parcel delivery boxes, PUDOs).

Technological features for parcel delivery are described too, focusing on infrastructures currently used (e.g. parcel lockers, PUDOs, etc.) and potential innovations (e.g. drones).

Given market and technological changes, potential competition problems in the access to parcel delivery infrastructure are investigated as well as regulatory measures that could solve identified issues, foster competition and end users' satisfaction.

The report, in the last chapter, examines possible tools available to NRAs for monitoring these OOH infrastructures (parcel lockers, other postal infrastructure receptacles in buildings and delivery in convenience points/postal outlets), with a special focus on OOH managed by white label providers considering the status of such providers in the MS (i.e. the possibility to collect data on their infrastructure and the possibility of potential regulatory measures if they are not considered as postal providers). The report also analyses conditions that, if verified in specific markets and specific circumstances, may potentially suggest access regulation to such networks as well as its feasibility to incorporate financial and other operational factors in the market monitoring exercise performed by the postal NRA. Verification of such conditions is excluded from the report, that only provides general facts registered at European level, without prejudice of further analysis of National policy makers. A special focus is provided on OOH networks *i)* established by universal service providers (USPs) and parcel delivery service providers (PDSPs) and *ii)* managed on a restricted access (open vs closed networks) basis.

Overall, parcel delivery is a multi-faceted activity that can be monitored and addressed in several ways. The report findings are intended to be food-for-thought, supporting further investigation, inter alia, for:

- evolving the postal regulatory framework.
- monitoring new market indicators.
- analysing efficiency effect and climate impact.

1.2 Methodology

The report relies on data provided by NRAs and stakeholders, previous analyses elaborated by ERGP as well as insights by academic research.

A questionnaire was circulated to ERGP members and observers (NRAs) in March 2024, organized into four parts:

- Literature review
- Market development
- Technical aspects
- Competition and Regulatory issues.

32 NRAs[3] answered the questionnaire, on the basis of desk research, country specific conditions and data collected from operators.[4]

Data collected by NRAs provide a snapshot of market developments and technological aspects, with the goal to show trends and main choices adopted by European operators and consumers regarding delivery of parcels, including services and activities that not necessarily belong to (current) postal service regulatory framework, such as lockers, home boxes, PUDOs and postal outlets. As this specific area of investigation is on the boundaries of NRAs competences (NRAs do not always have the power to collect data on OOH services and, if empowered, may monitor such services with different methods), the report paired these data with public information. Consequently, although census data on any market operator are not always available (and therefore totals might be underestimated), data provided in the report represent estimates for European and individual national markets useful for general analysis on market trends and mechanisms.

The ERGP, in addition, analysed main research databases for academic literature as well as previous ERGP reports and public white papers.

The analysis is multi-dimensional: technical (i.e. production processes and standardization activities for OOH infrastructures), economic (i.e. business models and competition mechanisms) and legal (i.e. administrative policies for OOH deployment and municipality rules) issues are considered.

The analysis, furthermore, is multi-sectoral, investigating not only postal sector aspects (i.e. authorization & licensing regime) but also other sector characteristics (i.e. administrative and urbanistic rules for parcel lockers deployment) impacting on delivery of parcels.

The methodology adopts:

- a case-by-case fit-for-purpose approach: identifying, in a pragmatic manner, specific, if any, potential competition issues and, in turn, available tools to address them (tools non necessarily belonging to the NRA toolbox), in order to adapt to a changing market environment.

- a background approach: the analysis of OOH services is not aimed in any way to support (or to prevent) its regulation, but only to understand underlying mechanisms that a regulator might use when considering the possibility of some sort of intervention and, consequently, the report would identify available tools for that purpose, if needed. As a matter of fact, previous ERGP reports (see *infra* chapter 2 – literature review) highlighted that most NRAs do not see the necessity for regulation or have not examined this, as parcel market is competitive enough or that POs/PDSPs can cooperate on a commercial basis.

[3] AT, BE, BG, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IT, LT, LU, LV, MT, ME, MK, NL, NO, PL, PT, RO, RS, SE, SI, SK, TR.

[4] The report references in footnotes the precise sources (NRA's country of origin) of the answers given. A majority of the questions required a "yes" or "no" answer. Where the NRA did not give a definite "yes" or "no" answer, the charts contains "no answer" or "-" or blank cell, whereas if the NRA nevertheless provided relevant information related to the question, this input has been reflected textually in the report.

1.3 Structure of the report

The structure of the report is as follows:

1) Literature review (chapter 2): collection of relevant findings of recent postal studies on parcel delivery and access to its infrastructures.

2) Market development (chapter 3): last-mile value chain; trends in parcel delivery revenues and volumes, split by form of delivery ("at home" vs OOH, both parcel lockers and PUDO points); consumers' habits and their evolution; PUDOs and parcel locker characteristics (size & ownership, business model: open vs closed network, services offered).

3) Technical solutions (chapter 4): descriptions of OOH solutions (currently used infrastructure as parcel lockers, PUDO points, postal outlets, and innovative solutions).

4) Competition & regulatory issues (chapter 5): potential competition issues (legal/administrative barriers-to-entry for parcel lockers deployment, access denial & unfair restricted access to parcel lockers, lack of choice for end-users') and potential regulatory issues to promote competition and to increase end-users' satisfaction.

5) Conclusions and recommendations (chapter 6).

2 Regulatory literature review

In 2019, before the pandemic, the ERGP[5] found that legal provisions are incorporated in national law to enable postal service providers to access the network for parcel delivery in the market. Some countries have specific regulation enabling access to elements of the postal delivery infrastructure of the USP/incumbent. Alternative operators make use of the letter network of the USP/incumbent to deliver letters or small packages in almost half of the countries. The tariffs and conditions of this access practice are typically established through commercial agreements, NRAs playing a regulatory role in some countries. The most common conditions for accessing the infrastructure of the USP/incumbent include transparency, proportionality and non-discrimination. The majority of the NRAs indicated that they have not observed responses by PDSPs on policy or regulatory developments on access to the infrastructure for parcel delivery. A minority of the NRAs from countries that do not have (regulated) access to the parcel infrastructure of the USP/incumbent thinks this would possibly be desirable. Most NRAs do not see the necessity or have not examined this. The most mentioned reasons for this were that the parcel market is competitive enough or that the PDSPs can cooperate on a commercial basis. Other reasons include low interest in accessing these networks in general and the additional administrative burden it may cause. Most NRAs mention both benefits and downsides of access to pick-up locations and/or parcel lockers. Benefits may include the accessibility and convenience of parcel lockers, downsides may include potential disputes, overregulation, capacity issues and reduced incentive to invest. Furthermore, NRAs identified several public interests that could be served by access to pick-up locations and/or parcel lockers, most of which were non-economic and could benefit from access to the parcel infrastructure.

In 2020, the ERGP[6] indicated that NRAs suggested open access for operators and e-commerce players to postal networks and agreements to increase choice and transparency. Other suggested good practices or tools identified were: parcel lockers sharing, the creation and improvement of transparency tools and enhancement of their visibility, as well as integration and cooperation among local providers and international operators by ensuring non-discriminatory access to all players infrastructure across the internal postal market.

In 2021, the ERGP[7] identified possible areas for further standardization: the harmonization of track and trace events, digitalization of postal transport documents, digital identification of POs/PDSPs, as well as innovative solutions to achieve effective and environmental sound delivery (packaging, returns, new delivery modes and parcel lockers delivery).

In 2022, the ERGP[8] concluded that the NRAs have not found additional problems that have urged them to create additional regulation or measures to adapt to the new reality of e-commerce parcels boom in terms of access to postal parcel services. So far, the collection of data to assess the accessibility of e-commerce delivery networks is not a widespread practice within NRAs. Several strategic recommendations were identified for designing access models that could positively impact environmental sustainability in last-mile delivery. These include

[5] ERGP PL I (19) 10 Report on the development of postal networks.

[6] ERGP PL II (20) 28 Report on interconnection models and access to international postal networks.

[7] ERGP (21) 26 Report on harmonised measures related to standardized cross border delivery services.

[8] ERGP PL II (22) 14 Report on access to the postal network in a context of booming ecommerce.

the introduction of legislative measures to encourage the use of parcel lockers and the possibility of common access to parcel lockers, delivery hubs and PUDO points.

In last years, NRAs also conducted analyses, studies and consumer surveys on the parcel delivery market in their countries, with specific focus on OOH delivery.

Regarding studies performed at domestic level by NRAs in terms of consumers' surveys on parcel delivery preferences and/or impact assessment (e.g. environmental advantages) of parcel market growth, a non-exhaustive sample of some recent reports are identified below[9].

In Belgium (2021) consumers still strongly prefer home delivery. The willingness to pay if the delivery location is a parcel locker, would be about two euros less[10].

In Croatia (2023) only 13% of business users utilise parcel lockers, but 40% of them stated that they intend to use them in the future. Only 16% of physical users have used parcel lockers but 90% of them have a positive experience. The physical users who have not used parcel lockers state that they want delivery to their address (57%) in the future, as the locations of parcel boxes do not suit to them (35% of those cases)[11].

In Cyprus according to consumers 60% of them pick up their parcels from the provider premises and 50% have them delivered at home[12].

In Czech Republic, CTU regularly reviews the level of quality and the manner in which universal services are provided and ensured and their general availability throughout the territory of the Czech Republic[13]. The review includes also questions regarding users' preferences. If citizens may choose the delivery option, 58,5% would usually choose delivery on the address, 24,1% in postal outlet/PUDO, 16,2% in parcel locker and 1,2% other. Regarding the use of postal services (e.g. sending or receiving mail and parcels) via a self-service machine, 17,5% answered Yes (for delivery), 8,6% Yes (both for delivery and sending) and 73,9% No. Furthermore, private research[14] based on the data from real traffic (approx. 10% of Czech postal parcel market volumes) accounted for 53,5% delivery on the address and 46,5% delivery in postal outlet/PUDO or parcel locker.

In France, since 2003, Arcep and other public entities publish a survey regarding French people adoption of digital practices. This study aims to enable the public authorities to anticipate major trends and implement a policy that promotes the appropriation of digital technology by all. In 2022, "*Le Baromètre du numérique*" contained several questions about e-commerce and consumers' preferences. Regarding parcel delivery, parcel lockers seem to have started to be developed quite recently and are far to be as successful as the pick-up point

[9] The study "*User needs in the postal sector and evaluation of the regulatory framework*", conducted by WIK consult for the European Commission in 2021 would provide an overview at EU level, available at: https://www.wik.org/fileadmin/Studien/2021/User_needs_in_the_postal_sector_and_evaluation_of_the_regulatory_framework.pdf

[10] https://www.bipt.be/consumers/publication/communication-of-23-february-2021-regarding-the-belgian-postal-end-user

[11] https://www.hakom.hr/UserDocsImages/2023/izvjesca_i_planovi/Istrazivanje%20zadovoljstva%20i%20potreba%20korisnika%20po%C5%A1tanskih%20usluga%20u%20RH_20230220.pdf?vel=1573063

[12] https://ocecpr.ee.cy/agora/paratiritirio-agoras/analyseis

[13] https://ctu.gov.cz/vyzva-k-uplatneni-pripominek-k-zameru-k-zajisteni-poskytovani-zakladnich-sluzeb-podle-zakona-o-0

[14] https://www.ceskalogistika.cz/

delivery: in 2022, 34% of respondents have been delivered most frequently to a pick-up point in the last twelve months, versus 2% for parcel lockers.

In Greece, on May 2022, a nationwide survey was conducted regarding parcel delivery issues within the courier services sector. The survey interviewed roughly 2000 people in urban and rural areas (islands inclusive). The majority of the participants had either sent or received a parcel via courier within a year from the survey completion date, with 20% of them reporting using courier services with high frequency within this time window (i.e. at least 3 or 4 times per month). High penetration in the population with relatively large intensity is shown for parcel purchase through internet, followed by business to business (B2B) consignments, while in the third position in terms of penetration and intensity, business to consumers (B2C) parcel services can be found. More specifically, low penetration is recorded in older ages, higher intensity is found among youngsters, while B2B parcel services are popular among sole traders. COVID pandemic has increased considerably parcel orders through internet, in comparison to the pre-COVID era. Over 90% of the participants have received their parcel at their own premises (either home or work), while more than half of them is aware and have made use of parcel delivery in a postal outlet of the courier company. Interestingly less than a third knew alternative ways (e.g. parcel lockers) of receiving their parcel, while only 1 in 10 have made use of such alternative facilities. The decisive factors of using a courier company instead of the USP for parcel processing includes in decreasing order of importance: speed of delivery, service credibility, customer-oriented add-in services (e.g. track and trace, redirection, etc.) and improved customer service. Most parcels orders are delivered in the next working day, while a request of delivery within a time range in a specific date, or parcel processing within the same day, are less popular delivery options. E-shops are a major driver in linking customers with the courier companies. Participants complain that when purchasing on the internet, there is no choice in selecting the courier company that will deliver the parcel to them, while 80% feel that such a choice should be introduced. Only 54% are satisfied from the courier services they receive. Parcels arrive at their recipients in good condition, while track and trace systems are usually working properly helping consumers to locate their orders. Consumers appear disappointed about the cost and the delivery speed of the courier services offered. Many complaints arise during the communication process (usually via telephone) between the customer and the courier company, due to long waiting times on the phone (or unanswered mails) and unwillingness in serving the customer properly. Complaints are also placed in situations where the parcel is lost, or delivery time is exceedingly long or track and trace system cannot locate the parcel, or the parcel is delivered to the wrong address. In any case, most responders are reluctant in paying a higher price in exchange for a faster delivery process. Awareness and usage of parcel lockers were quite limited. Specifically, less than 30% knew that parcel lockers are an alternative way for parcel delivery. Customers were split evenly among those who strongly favour future use of parcel lockers, those who are fiercely against and those who are indifferent regarding this issue. Among the advantages in incorporating parcel lockers as a method for parcel delivery is the convenience offered in time and place of the service, while a reduced cost is expected from the company's side. On the downside, participants express their concerns that parcels are not fully protected, so the possibility of damage or loss gets higher. The parcel locker network is sparse, meaning that they are located quite far away from recipient's place, making their usage inconvenient. Also lack of human contact and introduction of technology interaction may turn the delivery process into a difficult task for some users.

In Italy, Agcom, in 2021, conducted a survey at national level of main delivery models alternative to home delivery. The analysis was also aimed to identify potential legal or economic barriers to the development of OOH delivery infrastructures such as lockers' network. The proceeding ended with the adoption of decision n. 117/21/CONS which contained

a report for the Italian government to consider some legislative measures to foster the use of parcel lockers including measures in order to: *i)* simplify and standardize procedures for administrative authorizations for installation of parcel lockers; *ii)* establish national legislation for the installation of "condominium lockers"; *iii)* introduce economic and/or tax concessions for the installation of parcel lockers and *iv)* ensure technological neutrality and interoperability of delivery systems.

In Lithuania a survey of postal service users regarding the quality and affordability of postal services was run in 2023 with 1,023 respondents. 62% of the respondents stated that they usually choose to deliver parcels to parcel lockers. Only 16% of respondents chooses to deliver parcels to Post offices. The fact that postal services, which reduce the negative impact on nature and the environment, are important and the postal services users would agree to pay more was indicated by only 8%; 41% said that such services are important, but they would not agree to pay more; 29% stated that such services are not important and they would not agree to pay more; 22% indicated that it is not important to them[15].

In Montenegro, a research done by the NRA (EKIP)[16] in 2022 shown that 90% of individual and 97% of business users use the Internet every day; 70% of individual and 93.7% of business users have completely or partially replaced traditional mail with the Internet and electronic mail; Electronic banking services are used by 36% of individual and 86% of business Internet users, while 52.7% of individual and 52% of business users purchased some goods or services over the Internet in the past six months.

In Romania, the study "Quantitative study on the methods of providing postal services, among end-users – individuals", conducted in June 2022, showed that the reasons for which individuals do not use parcel lockers are: a) They do not exist in the area where I live - 36%, b) I did not have the opportunity, the shops from where I ordered did not offer this option -21%, c) I don't want to pay by card - 15%, d) I do not know what they are - 9%, e) They do not seem safe - 6%, f) I do not want to go to them - 5%.

Apart from ERGP and NRAs, many studies on parcel delivery systems, with particular emphasis on OOH options, have been conducted by research entities (see annex 1 for an academic and consultants' literature review).

[15] https://www.rrt.lt/wp-content/uploads/2024/01/Pasto-paslaugos-naudotoju-tyrimas-2023.pdf

[16] https://ekip.me/page/reports/researches/content

3 Market development

3.1 The value chain

The value chain for last-mile parcel delivery is made up by different infrastructures potentially operated by different actors.

Infrastructures cover the process from sorting at the distribution centre to delivery of postal items to their addressees, that is the distribution phase.

Delivery network points are at the extremities, on one hand, the distribution centre, where sorting and other activities aimed at delivering parcels are carried out, and, on the other hand, the addressee.

Traditional delivery services are e.g. "at-home"[17], this implies the delivery of parcels at the addressee location and to the receiver's hand, whereas innovative services are based on OOH delivery solutions, allowing the recipient to withdraw parcels in the neighbourhood, in specific places where parcels are stored.

Other points (nodes) are therefore represented by:

a) Automated Parcel Machine (APM), that is cabinets with drawers devoted to parcel storage and managed remotely and without on-site assistance, such as:
   a. Parcel Locker (PL): an automated facility that allows users a self-service delivery (i.e. pick-up) of parcels or also other postal items and eventually also the collection (i.e. drop-off) located in public areas (i.e. underground stations, railway stations, malls, gas stations, streets, offices, etc.).
   b. Home Parcel Delivery Boxes (HPDB): alternative to traditional home letterboxes allowing delivery of parcels/packets in a smart box (locker) located at the address of recipient (e.g. home, residential estates).

b) Assisted Parcel Delivery (APD), that is commercial activities providing parcel storage and on-site assistance (i.e. manned counters), such as:
   a. Pick-Up Drop-Off (PUDO) point/premise: third party agency as tobacconists, stationery, bookshop, kiosk etc. (i.e. manned counters) offering logistics for last-mile delivery services (and potentially first-mile collection services), not affiliated/belonging to a postal operator/parcel delivery service provider (PO/PDSP).
   b. Postal outlet Point/facility (PoP): a retail point of presence which provides postal services, such as franchisee, etc., affiliated/belonging to a PO/PDSP.
   c. Post office of USPs: postal outlets of the USP used for the provision of universal services as well as other services (e.g. financial services, stationery, non-universal letters and parcels, etc.).

[17] "at home" delivery is an obligation for universal services arising from the Postal Service Directive.

The points are connected by vehicles in charge with conveying parcels towards the addressee. Particular relevance is given by the area very next to the location of the addressee.

Accordingly, actors of the value chain are:

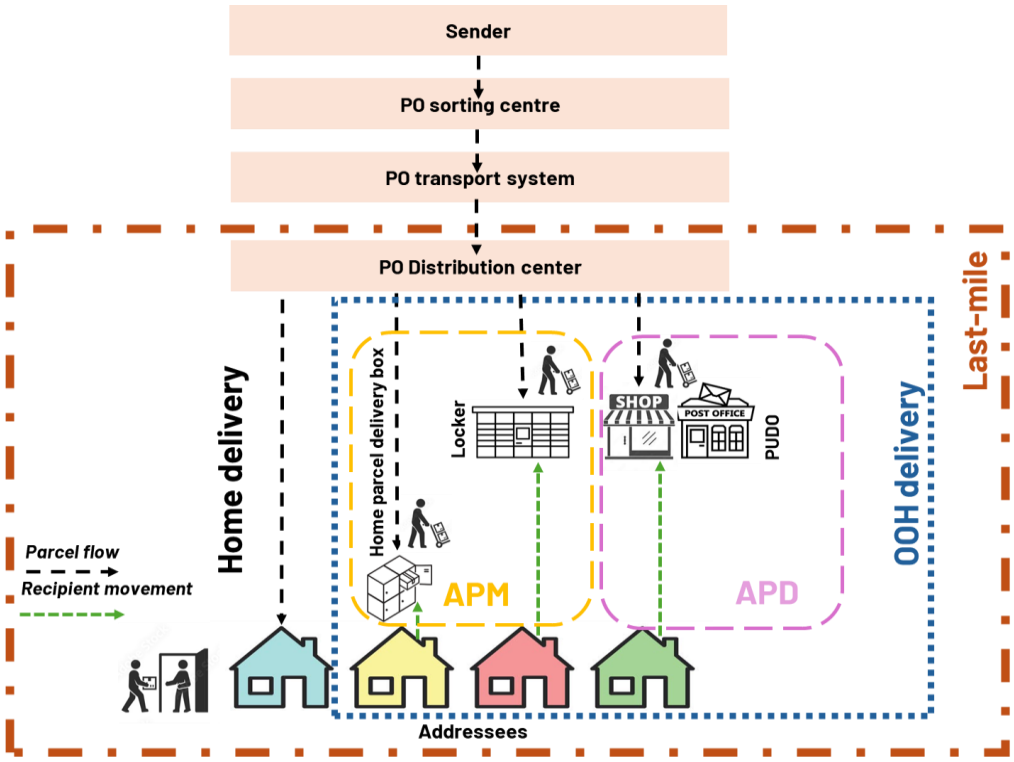
- Postal operators/Parcel Delivery Service Providers (PO/PDSP):
- Automated Parcel Machine providers (APMp), including:
  - Parcel Locker providers (PLp) and
  - Home Parcel Delivery Boxes providers (HPDBp)
- Assisted Parcel Delivery providers (APDp) including:
  - PUDO providers (PUDOp):
  - Post office providers (that is USPs):
  - PoP providers (PoPp):

Each provider makes investments for the infrastructure deployment (CAPEX) and incur in operative costs (OPEX) for network management in order to provide their respective services.

Each operator may provide services to either itself or third parties, according to the business model adopted. As a matter of fact, services could be available to any PO/PDSP which asks for (so called "Open Network model" or briefly "ON model") or only to one PO/PDSP ("Closed Network model" or "CN model").

The operator's behaviour may depend, *inter alia*, on the ownership, that is whether the owner is a PO/PDSP (single or multiple providers ownership) or a White Label operator (WL) that is a single or multi-carrier specialised firm independent from POs/PDSPs (e.g. specialized APM providers, retailers' shops chains, fuel stations chains) or a Blend operator (BO) that is a joint ownership between a PO/PDSP and white label provider.

Figure 1 – The last mile parcel delivery value chain



Source: ERGP Access and Interoperability WG's own elaboration based on the questionnaire circulated in 2024 to NRAs.

3.2 Market trends

In recent years, parcel delivery markets recorded a significant increase in quantities (volumes) and overall turnover (revenues). In the last four years (2019-2022) parcel delivery service volumes have grown by almost 44% and revenues have increased by 45%. In 2022, POs/PDSPs in ERGP countries (members and observers) delivered more than 11,5 billion postal parcels (-2.2% compared to 2021) and generated a turnover for more than 58 billion euros (+2.5% compared to the previous year) (see table 1).

Table 1 – Parcel* delivery volumes and revenues by country (2019-2022)

	Annual volumes (million)				Annual revenues (million)			
	2019	**2020**	**2021**	**2022**	**2019**	**2020**	**2021**	**2022**
AT	222	260	308	325	720	853	1.004	1.055
BE	171	244	260	255	694	985	1.060	1.143
BG	37	40	40	45	134	143	135	166
HR	27	31	35	40	100	114	137	154
CY	9	10	12	12	34	38	40	40
CZ	182	222	252	248	462	594	772	870
DK	96	136	163	154	535	710	808	802
EE	14	20	26	26	91	111	152	157
FI	-	-	-	-	-	-	-	-
FR	1.234	1.389	1.596	1.515	6.421	7.265	8.084	7.993
DE (1)	3.412	4.540	4.671	4.401	18.657	22.282	25.446	25.599
EL	54	72	83	81	282	339	387	424
HU	85	108	124	128	287	372	440	524
IE	82	96	143	151	413	418	590	770
IT	554	767	870	908	3.114	4.005	4.617	4.843
LV	10	20	29	24	-	-	-	125
LT	21	32	46	45	106	135	183	197
LU	16	21	24	25	32	39	46	52
MT	1	1	1	1	-	-	-	-
ME	0	0	0	0	1	1	1	1
NL	399	525	654	611	1.516	1.965	2.582	2.426
MK	-	-	-	-	-	-	-	-
NO	-	-	-	-	-	-	-	-
PL	441	631	780	894	1.200	1.575	1.898	2.222
PT	52	66	77	78	174	222	270	271
RO	142	188	213	225	377	516	574	639
RS	40	44	49	49	103	121	139	157
SK	53	59	68	62	165	182	220	203
SI	18	24	28	27	56	81	108	111
ES	539	682	1.087	1.040	3.932	4.623	6.463	6.587
SE	205	247	276	285	933	1.096	1.278	1.329
TR	-	-	-	-	-	-	-	-
Total	**8.116**	**10.475**	**11.915**	**11.655**	**40.539**	**48.785**	**57.434**	**58.860**

* Parcel delivery for purpose of this Report is given by domestic + inbound parcel services, as per data collected under Cross Border Parcel Regulation, and it doesn't include outbound services, differently from volumes and revenues published in the annual ERGP report on *Core indicators for monitoring the European postal market* where domestic+inbound+outbound are considered.

(1) Data include domestic + inbound + outbound.

Source: ERGP Access and Interoperability WG questionnaire 2024

Analysing that data for geographical macro areas,[18] more than 60% of parcel volumes are delivered to Western European countries (see table 2) while the highest growth rate occurred in Southern European countries with an annual average variation (CAGR) of +20% (+72.9% compared to 2019) (see figure 2).

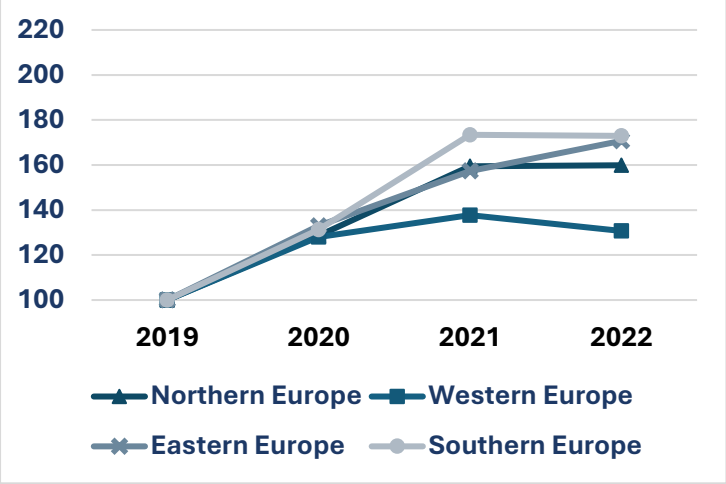
Table 2 – Distribution of volumes and revenues by macro area* (%)

Macro Areas	Annual volumes (% distribution)				Annual revenues (% distribution)			
	2019	2020	2021	2022	2019	2020	2021	2022
Northern Europe (1)	5,3%	5,3%	5,7%	5,9%	5,1%	5,1%	5,2%	5,7%
Western Europe (2)	67,2%	66,6%	63,0%	61,2%	69,2%	68,4%	66,5%	65,0%
Eastern Europe (3)	11,6%	11,9%	12,4%	13,7%	6,5%	6,9%	7,0%	7,9%
Southern Europe (4)	15,9%	16,2%	18,8%	19,2%	19,2%	19,6%	21,2%	21,4%
Total	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

* Each macro-area is given by countries considered in UN classification system (1) Includes DK, EE, FI, IE, LV, LT, NO, SE. (2) Includes AT, BE, FR, DE, LU, NL. (3) Includes BG, CZ, HU, PL, RO, SK. (4) Includes HR, CY, EL, IT, MT, ME, MK, PT, RS, SI, ES, TR.

Source: ERGP Access and Interoperability WG

Figure 2 – Change in volumes by macro area (base 100 year 2019)



Source: ERGP Access and Interoperability WG

Delivery services satisfy goods transportation needs of business firms and consumers, that can be either senders or receivers (B2C, B2B, C2C and C2B). The growth seen in the parcel

[18] Country repartition for macro areas is based on UN classification system.

delivery service was driven by e-commerce parcels: in the four-year period considered, B2C deliveries grew in volumes at an average annual rate (CAGR) of 26.4% while B2B ones only grew by 14.7%.

As a result, the share of B2C parcels in overall volumes has progressively increased: while in 2019 B2C parcel volumes represented almost 58% of the total market, in 2022 they represent almost 64% (see table 3).[19] On the other hand the B2B delivery segment decreased from a share of 35% in 2019 to 29% in 2022. The volumes of parcels sent by consumer over the last 4 years have remained stable (C2C deliveries with a share of around 5% and C2B deliveries around 2%).

Table 3 – Parcel delivery volume breakdown per type of sender and recipient* (2019-2022, %)

	2019	2020	2021	2022
B2C	57,5	61,9	62,5	63,5
B2B	35,4	31,8	31,0	29,1
C2C	4,9	4,5	4,7	5,2
C2B	2,2	1,9	1,8	2,1
	100	100	100	100

* Volumes weighted average for 9 European countries - BE, BG, HR, HU, IT, NL, PL, SK and SE.

Source: ERGP Access and Interoperability WG

The distribution of parcel volumes based on the type of delivery shows, in the last four years, that traditional "home" delivery still represents in the 11 ERGP countries providing data the preferred method by consumers, but the demand is decreasing, from 78.8% in 2019 to 74% in 2022 (see table 4).[20]

End-users' are increasingly choosing OOH deliveries: in 2022, almost 10% of total parcels were delivered to parcel lockers (including home parcel delivery boxes) (compared to 8% in 2019) while deliveries to APDs (PUDOs, postal outlets and post offices) amount to 16.5% of total deliveries (compared to 13% in 2019).

[19] The data reported in the table are the result of the weighted average (for the corresponding volumes) of the responses provided by the following countries: BE, BG, HR, HU, IT, NL, PL, SK and SE.

[20] The data reported in the table are the result of the weighted average (for the corresponding volumes) of the responses provided by the following countries: BE, HR, CZ, HU, IT, MT, NL, PL, RO, ES and SE.

Table 4 – Parcel delivery volume breakdown per type of delivery* (2019-2022, %)

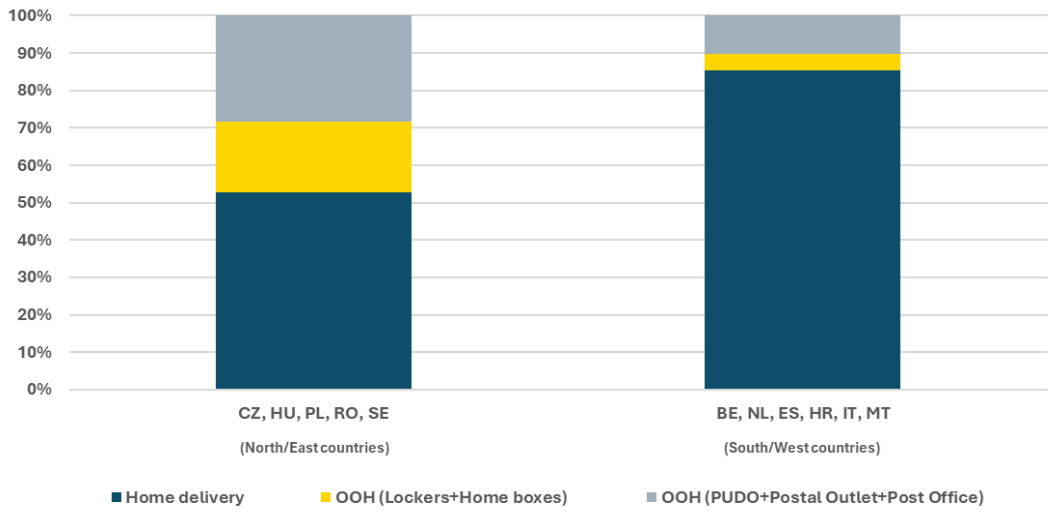
	2019	2020	2021	2022
Home delivery (or to other address)	78,8	79,2	75,0	74,0
OOH Lockers + Home parcel delivery boxes	8,1	8,3	8,4	9,5
OOH PUDO + Postal outlet + Post Office	13,1	12,5	16,6	16,5
Total	100	100	100	100

* Volumes weighted average for 11 European countries - BE, HR, CZ, HU, IT, MT, NL, PL, RO, ES and SE.

Source: ERGP Access and Interoperability WG

Data by countries show that in 2022, consumer in BE, NL, ES, HR, IT and MT (South/West countries) continue to prefer home delivery (on average, more than 85% of total parcel volumes are delivered at home), while consumer in CZ, HU, PL, RO and SE (North/East countries) use home delivery much less (on average, nearly 53% of total parcel volumes)[21] (see figure 3).

Figure 3 – Parcel delivery volume breakdown per type of delivery by countries (2022)



Source: ERGP Access and Interoperability WG

[21] These 11 countries represent approximately 40% of overall volumes in Europe.

3.3 Demand side: Consumers' habits

Parcel consumers' habits considerably changed in recent years, both in quantity demanded and quality of services required.

The demand for parcel delivery services recorded a significant quantitative increase determined, mainly, by the strong growth of e-commerce (as measured by the B2C market segment), that furthermore received an extraordinary push during the COVID-19 pandemic. Demand increase is also due to the development of goods sent by consumers e.g. for e-commerce returns (C2B segment) and in the circular economy environment (increase in C2C)[22].

Consumer needs have been evolving in relation to the quality of the service too. Users may increasingly expect the possibility to choose the time slot (within the entire day – 24 hours per day), the day of the week (7 out of 7, regardless of holidays) and the place (not necessarily at home) for receiving the parcel. The online buyer's satisfaction is linked to the perceived quality of the delivery; in other words, the "customer experience" for delivery services is one of the key factors that determine consumers' propensity to buy online.

A "just-in-time" demand is therefore established, following consumption experiences dictated by the internet click economy, and these habits will consolidate over time, in line with the further expected growth of online purchases.

In this context, "at home" (residential house or business location of the recipient) delivery remains the preferred solution, since it is the destination of the good and no further movements of the parcel are required. However, users may change their habits, switching to OOH solutions, if there are economic advantages in terms of either prices (with OOH delivery resulting less expensive than "at home" services) or quality (with OOH delivery having a nearly zero risk of unsuccessful delivery), minimising inconveniences (i.e. when the OOH delivery is close to the recipient destination or along the route usually taken by the consumer and not large/heavy/bulky).

3.4 Supply-side: commercial strategies, business models and investments

In recent years, POs/PDSPs have been developing delivery methods capable to fit more adequately on users' needs and to satisfy growing demand of B2C services.

Following the developing of e-commerce, parcel delivery services have become "receiver-oriented", focused on recipients' needs rather than senders' needs. Operators, in addition to basic services, offer value-added services such as tracking, delivery notice alerts (e.g. text messages, e-mail) and apps for scheduling deliveries. This applies to postal delivery services both "at home" and "OOH".

[22] Note that E-commerce return present different possibilities: if the consumer uses pre-paid parcel postage provided by the merchant (which is usually free for the consumer), it is qualified as B2X (B2B). It would only qualify as C2X (C2B) if the consumer returning has to buy his/her own postage at list prices.

Traditional "at home" delivery services have been enriched with new features. Delivery is ever more frequent in the afternoon period (not only, for example, in the morning hours or in certain time slots as in the past) and every day (not only, for example, in working days as in the past).

OOH delivery is not only a more flexible solution for consumers being mobile, more adaptable to their lifestyle, but also a more cost-efficient solution for carriers since they are expected to reduce the risk of unsuccessful delivery at first attempt and cut last-mile delivery costs (as it is shown in figure 1 above, OOH delivery implies faster shipment and shorter distances for POs/PDSPs compared to the home delivery, moreover many parcels are conveyed to one place, APM or APD).

Each delivery method has its strengths and weaknesses from the point of view of both provider and receiver (see table 5).

Table 5 –Comparison among delivery methods – strengths and weaknesses

	type of delivery		
	at home	**at PUDO point**	**at APM**
Who is in charge of doing the last-mile delivery?	Delivery operator	Delivery operator	Delivery operator
The presence of addressee is necessary?	Yes	no	no
Physical distance	low	low	variable
Percentage of unsuccessful first attempt deliveries	Medium-high	low	low
Limits to the types of products which can be delivered	none	none	no luxury, fresh and bulky
Maximum parcels quantity which can be delivered	none	Depending on points dedicated space	Depending on total number of slot available
Flexibility of the delivery from the operator's point of view	low	Low-medium	Medium-high
Flexibility of the delivery from the addressee's point of view	N/A	Depending on retailer's opening time	24h, 7/7
Time of delivery	Medium-long	Medium-short	short
Initial investment required	high	low	high
Average cost of delivery	high	low	low
Level of privacy	high	Medium-low	High
Accessibility for vulnerable users	high	Medium*	Medium**
Comfort of delivery for vulnerable users	high	Medium	Medium

** Problems can arise for mobility impaired customers if the shop is not equipped with infrastructures to enhance access for disabled people (e.g. wheelchair slide).*

*** Mobility impaired customers can have limited access to the APM premises (e.g. if there are physical obstacles and/or no specific infrastructures) and to the APM itself (e.g. the draw which contains the parcel is too high). Problems can arise also for blind and deaf people if the APM does not provide them, respectively, voice or screen assistant.*

Source: ERGP Access and Interoperability WG elaboration based on literature review (e.g. Analysis of parcel lockers' efficiency as the last mile delivery solution – the results of the research in Poland, *Iwan* et al. 2015) and NRAs analysis (e.g. Agcom decision n. 117/21/CONS)

Often parcel providers adopt price incentives to change customers' preferences and stimulate OOH delivery. As it has been observed by many NRAs (see table below), POs/PDSPs often differentiate prices for home and OOH delivery, applying a discounted price for OOH delivery compared to home delivery. The price differentiation reflects the cost of delivery: in that

sense, OOH delivery is cheaper because providers sustain lower costs of delivery (better efficiency) compared to delivery at home / to the address.

For instance, OOH parcel delivery prices across Europe are typically set in comparison to traditional "at home" services, that act as benchmark. OOH delivery price might be a discount percentage (e.g. 20-30% less) or a fixed amount (e.g. 40-50 euro/cents less) of the corresponding "at home" service. For example, in Spain, an operator domestic price for delivery in PUDO or locker point in 3 days for 1 kg is 4,59 €, whereas the delivery at home would be approximately double price (9,32 €). Another operator, instead, home delivery for 1 kg parcel (small size XS) within peninsula has double price (14.59 €, VAT included) compared to delivery at the locker point (7.10 €). For a third operator, the drop-off and delivery using the PUDOs could imply a 50% discount, that is OOH delivery would be around 5 euros whereas home delivery may cost around 9 euros.

Pricing schemes therefore incentivise demand for OOH delivery instead of home delivery. However, price differentiation is not a general rule.

Retailers can choose to pass to buyers the price savings offering discounted prices to choose OOH delivery to incentivize OOH delivery among shoppers. It is worth to note that retailers often offer free shipping to stimulate consumers to buy online; in this case there is not price incentives to choose OOH delivery, consumers just choose according to their preferences and needs.

Sometimes lower prices are also applied to OOH parcels collection services (i.e. in Poland discounts are applied in case users drop-off the parcel via an access point such as post office, PUDO, parcel locker) while other times prices are lower even when users submit the parcel required data electronically (i.e. in Slovakia discounts are applied if users filling in data about the parcel through the application).

Table 6 – Price differentiation strategies

	Yes	No
Do POs/PDSPs differentiate prices for home and OOH delivery?	AT[a], BE, BG, HR, CY, CZ, DE[b], DK, EE, ES, IT, LV, LT, NL, PL, RO, RS, SK, SI, SE, TR, NO.	EL[c], LU, MT
Do retailers differentiate prices for home and OOH delivery?	BE, HR, HU, IT, RO, SK.	

[a] Except USP; [b] A minority of competitors; [c] Only the USP applies an extra charge for home delivery as regards domestic parcels, except small packets.

Source: ERGP Access and Interoperability WG questionnaire 2024.

Providers' willingness to invest in OOH infrastructures is based on expected profits which in turn depend on: *i*) cost of investment (capex and opex), including savings granted by OOH delivery compared to home delivery and *ii*) consumers' propensity to substitute home delivery with OOH delivery. For this reason, the choice to install OOH infrastructures (parcel lockers and

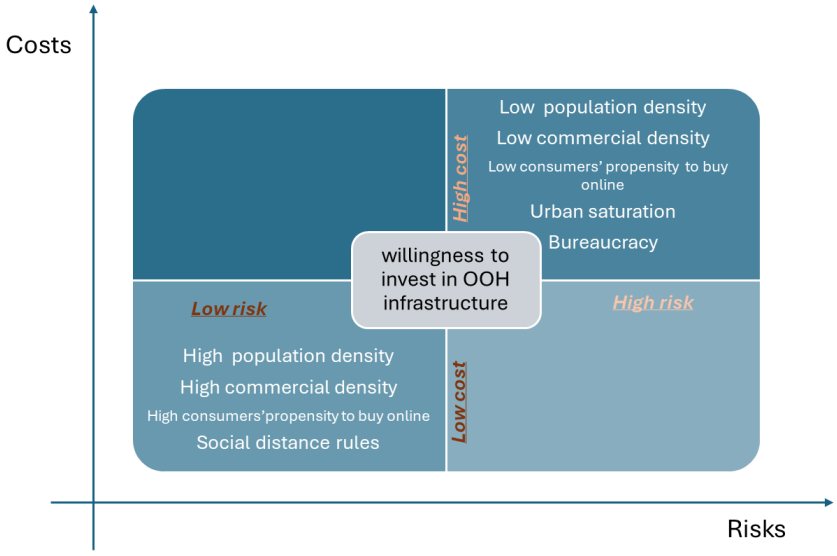
home parcel delivery boxes, PUDOs networks, postal outlets) may depend on many factors (see the figure 4 below):

- OOH quantity demand, in turn connected to parcel market volumes (boosted by e-commerce) and consumers' propensity to online shopping and locker/PUDO capillarity (i.e. proximity to consumers' destination or their "daily" route).
- Population density.
- Commercial density (points of interest, commercial activities etc.).
- Room availability, in case of parcel lockers and home parcel delivery boxes (not only the area for the locker, but also the space around the lockers to ensure the pick up of the parcel in a comfortable and safe environment).
- Consumers' safety and area accessibility, especially if parcels contain high value goods.
- Urbanistic and administrative rules.
- Environmental motivations (reducing traffic, pollution etc.).
- Medical motivations (i.e. during the pandemic period, lockers have been used in order to avoid contacts among postal employees and users).
- Consumers' motivation to collect the parcel from somewhere away from the home instead of having it comfortably brought to the home, especially for people not being mobile or working from home.
- Installation costs (capex) and recurrent management costs (opex).
- Cost savings granted to POs/PDSPs by OOH services compared to "at home" delivery.[23]
- Delivery infrastructures installed.

These factors can be classified in order of risk degree and cost level (figure 4).

[23] The development of OOH delivery – allowing operators to centralize multiple deliveries in a single point – significantly reduces the average cost of parcel delivery as it shortens the "last mile" and reduces the case for undelivered parcels. Consequently, efficiency gains favour both POs/PDSPs, given costs savings (private surplus), and the community, given lower traffic congestion and pollution (social surplus).

Figure 4 – Investment factors



Source: ERGP Access and Interoperability WG

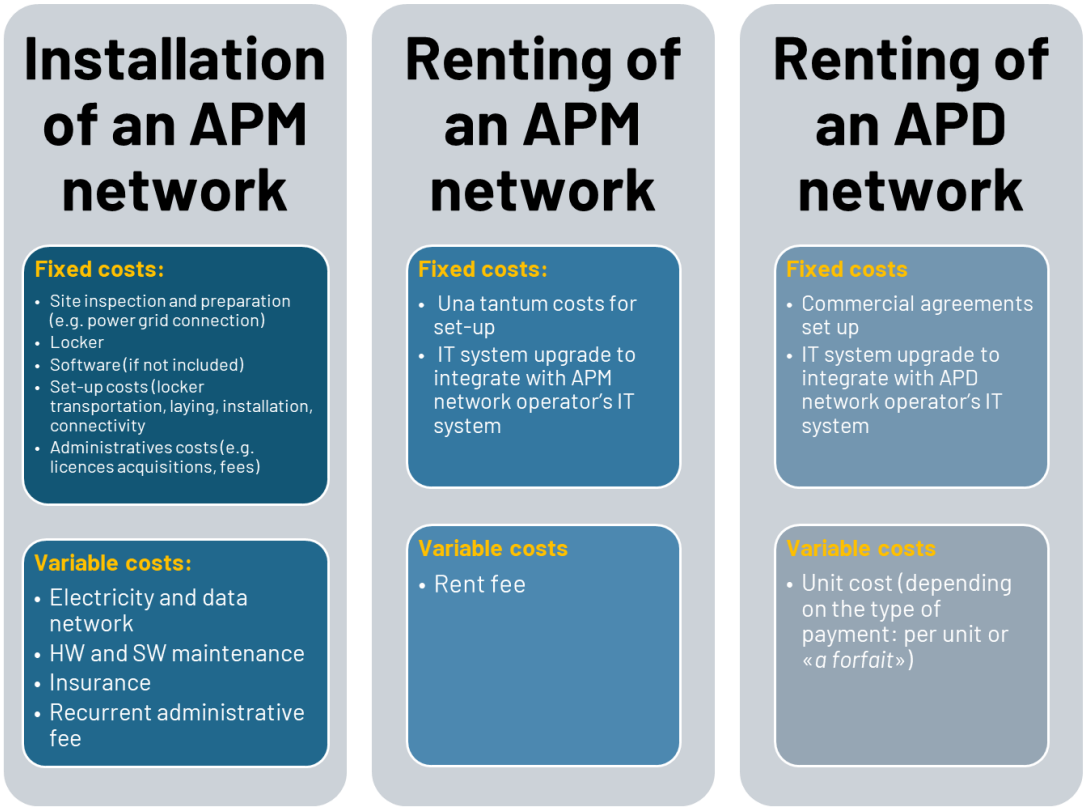
Abovementioned factors are evaluated by operators not only nationwide, but also area-per-area, that is for each area of the territory.

OOH services, furthermore, are not mutually exclusive, that is the same area may be served simultaneously with more networks of the same type (e.g. parcel lockers of diverse providers) and of different types (e.g. parcel locker and PUDO). Consequently, their deployment deals also with minimum level of scale and OOH demand substitutability.

Actual investments, in a nutshell, depend on expected costs and revenues. More specifically, investments' decisions, on costs side, is determined by technological, economic, and legal aspects impacting on CAPEX and OPEX[24] (see Figure 5).

[24] It has emerged also during AGCOM's proceeding of 2021 with the adoption of decision n. 117/21/CONS which contained a report for the Italian government to solicit some legislative measures to foster the use of parcel lockers.

Figure 5 – Make or Buy strategies



Source: ERGP Access and Interoperability WG

According to data gathered by NRAs CAPEX varies from 3 to 10 million euros per network (assuming a network size of about 5,000-10,000 lockers) and yearly OPEX vary from 500 to 1.000 euros per locker.

As far as revenues are concerned, investments' decisions depend on several possible alternative commercial strategies as experienced across Europe: this report tracked across 32 European countries, through the questionnaire submitted to the NRAs, 117 APM networks and 205 APD networks (115 PUDOs, and 90 postal outlets/US Post Offices networks).

It must be noted that data provided for APM and APD here and in the following parts of the report have to be considered as an estimation and it is likely that data are underestimated since NRAs do not always have, as reported in chapter 5, the power to collect data on APM and APD. If this is the case, furthermore, NRAs may either not monitor such services as a whole or adopt different classifications. Nevertheless, data provided hereinafter cover, as already said, 32 European countries and for each of them some hints have been collected. Despite of the limitations found, data gathered are adequate to show trends and main choices adopted by European operators and consumers, without prejudice of more in-depth possible future country analysis.

Across Europe, APDs networks (and the number of its access points) are higher than APMs (and its points) (see table 7).

Table 7 –ERGP Countries APM and APD: number of networks and points (2023)

Network	Number of networks	%	Number of points	%
APM	117	36	109.963*	30
APD (Pudo, Postal outlets, US Post Offices)	205	64	257.744250.320	70
Total	**322**	**100**	**367.707**	**100**

** End 2022*

Source: ERGP Access and Interoperability WG questionnaire 2024.

OOH services can be paid to the parcel locker/PUDO provider by either the PO/PDSP (such as a wholesale service) or the e-retailer (internal service of the e-retailer moving the good from their stores to an OOH delivery point) or the recipient (retail service invoiced directly to the recipient). Retail invoice to e-retailers is the most common rule (see table 8).

Table 8 –ERGP Countries APM and APD: wholesale/retail services

Network	Number of networks	Wholesale	Retail (to e-retailers)	Retail (to the recipient)	No Answer
APM	117	13	38	-	66
APD	205	Usually wholesale, that is APD provider is usually paid by POs/PDSPs			

Source: ERGP Access and Interoperability WG questionnaire 2024.

OOH services, as any other service, can be priced in different ways, with fixed fee per a given period (i.e. monthly rental of total capacity agreed, independent of parcel locker/PUDO actual use) or variable prices (i.e. a given hour/day fee per each parcel actually stored in the parcel locker/PUDO). Fixed pricing is the most common rule (see table 9).

Table 9 – APM and APD: pricing schemes

Network	Number of networks	Fixed pricing	Variable pricing	No Answer
APM	117	15	11	91
APD	205	Usually variable pricing according to the volumes, that is APD provider takes a percentage amount (or a specified fee) from the PO/PDSP per each parcel.		

Source: ERGP Access and Interoperability WG questionnaire 2024.

OOH services can be provided as addition to other services, depending on the network (table 10).

Table 10 – APM and APD: additional services

Network	Add-on services (examples)
APM	merchandising and goods by large scale retail distribution; food; ATM and payments; etc.
APD	Other sector goods, depending on the network: tobacco, newspaper, betting, stationaries, gas and fuel, financial services and payments, etc.

Source: ERGP Access and Interoperability WG questionnaire 2024.

OOH services can be offered by POs/PDSPs (that can install the network on its own or jointly with other operators) or white label providers (single or multi-carrier specialised firm independent from Pos/PDSPs) or blend operators (when the OOH network is a joint ownership between a PO/PDSP and white label provider). At least two-thirds of OOH networks belong to POs/PDSPs (see table 11).

Table 11 – APM and APD: ownership

Network	Number of networks	POs/PDSPs	White label providers	Blend operators	No Answer
APM	117	81	13	1	22
APM (%)	*100%*	*69%*	*11%*	*1%*	*19%*
APD	205	131	19	1	54
APD (%)	*100%*	*64%*	*9%*	*0%*	*26%*
Total	*322*	*212*	*32*	*2*	*76*
Total (%)	*100%*	*66%*	*10%*	*1%*	*24%*

Source: ERGP Access and Interoperability WG questionnaire 2024.

OOH services are offered to all POs/PDSPs (Open network) or only one PO/PDSP (Closed network). Closed network is the most common business model adopted by OOH providers (see Table 12).

Table 12 – APM and APD: business model

Network	Number of networks	Open networks	Closed networks	No answer
APM	117	18	77	22
APM (%)	*100%*	*15%*	*65%*	*19%*
APD – PUDO	115	10	53	52
APD – PUDO (%)	*100%*	*9%*	*46%*	*45%*

Detailed strategies are described hereinafter, for APMs (chapter 3.4.1), and APDs (chapter 3.4.2).

3.4.1 Automatic Parcel Machines (Parcel lockers and home parcel delivery boxes)

Across ERGP countries, according to data gathered by ERGP, in 2022 APM networks are around 117 and the total number of lockers installed is about 110 thousand, nearly 2,5 times more compared to 2019. HU, RO, PL, CZ and LV have the largest number of APM networks (see table 13 below). The data is certainly underestimated, as pointed out in the Methodology, as in general NRAs are not able to provide detailed information on number of points.

Home parcel delivery boxes seems to be not widespread in EU and NRAs in general don't have exhaustive information on that. Some USPs/PDSPs/specialized undertakings have installed home parcel delivery boxes (i.e. Renz and Decayeux in France, Citibox in Spain, Austrian Post in Austria) or offer them to customers on demand for a fixed one-off fee (e.g. An Post in Ireland - fee of €95 which includes a delivery box, 22 access keys unique to the box, a unique barcode which acts as proof of delivery and installation instruction and accessories for the customer to install the box[25]); some other have conducted some tests (i.e. Correos in Spain deployed home parcel delivery boxes some years ago in blocks of apartments – the network was called "Homepaq"- but it reallocated afterwards many of them as Citypaq lockers in public spaces); finally, in other cases some deployment projects are in the testing phase (e.g. Poste Italiane in Italy).

[25] DeliveryBox for Safe Parcel Delivery | Parcel Post Box | An Post

Table 13 – Parcel lockers in EU: networks and number

MS	(minimum) Number of APM Networks (2023)	Number of installed parcel lockers (total, in units)			
		2019	2020	2021	2022
AT	5	58*	191*	712	1.445
BE	4	188	377	548	823
BG	5	101	116	152	211
HR	3	-	-	155	422
CY	4	5	15	15	17
CZ	7	37	158	1.947*	5.750*
DK	-	500	1.465	1.740	1.756
EE	4	500	699	-	843
FI	-	1.658	2.062	2.288	2.215
FR	6	418*	450*	538*	4.502*
DE	2	6.154	8.454	12.322	15.277
EL	3	25	25	255	1.947
HU	10	188	344	796	2.943
IE (1)	2	10*	56*	56*	56*
IT	3	1.918	2.822	3.771*	5.691*
LV	6	325	503	820	1.093
LT	5	550	836	1.323	1.521
LU	1	104	118	131	133
ME	-	-	-	-	-
MT	2	1.149	1.177	1.328	1.414
NL	3	201	192	-	1.840
MK	-	-	-	-	-
NO	2	26	191	2.800	1.677
PL	6	7.344	11.002	18.419	26.914
PT	2	-	-	194	689
RO	8	440	1.016	2.483	4.051
RS	3	-	60	100	196
SK	5	60	125	873	2.476
SI	1	84	148	234	468
ES	5	8.763	17.254	15.568	19.708
SE	5	-	1.276	4.779	4.779
TR	5	-	-	-	1.343
EU	**117**	**30.806**	**51.132**	**74.347**	**109.963**

(1) Data on number of installed APM refer to An Post, USP, only.

1. Data referring only to countries where data is available. 2. Short strokes (or hyphen) represent data not available.
ERGP Core indicator 2021 BE: USP: Is also being used by alternative operators/increase in mostly in smaller locker stations with fewer lockers. HU: OPSP: new provider entered the market. NL: OPSP: these figures cover only the largest operators and service providers.
ERGP Core indicator 2022 BE: USP: Is also being used by alternative operators/increase in mostly in smaller locker stations with fewer lockers. ES: USP: The decrease in 2021 is due to a change in USP/Incumbent strategy. Parcel lockers are no longer a priority for the USP/Incumbent. FR: USP2017: Data available only for postal operators which have an individual licence for correspondence, granted by the NRA. FR: USP2017: confidential. PT: USP: Data not collected in 2020. For 2021, it was considered CTT Expresso as USP. PT: OPSP: Data not collected in 2020. For 2021, it was considered the maximum number of lockers for each supplier. RO: OPSP: provisional. SE: Extreme boom in establishment of parcel lockers ongoing.
ERGP Core indicator 2023 PT: USP: It was considered that CTT Expresso was USP. PT: OPSP: It was considered the maximum number of lockers for each supplier.

*Source: ERGP Report on core indicators for monitoring the European postal market (years 2021-2023), integrated with ERGP Access and Interoperability WG questionnaire 2024 as indicated with *.*

Across the ERGP countries (see table 14 below), the majority (83) of APM networks are property of a PO/PDSP while 14 out of 118 locker infrastructures are property of white label providers (i.e. "Buy now" and "Quick box" in CY, "OX Point" and "alzaBox" in CZ, "Quadient" in FR, "Smartpost" in LV, "Dexpress" and "Ananas" in RS, "Citibox" and "PUDO24" in ES, "Iboxen" in SE).

Most USPs have their own APM national network (i.e. Austrian Post, bpost, An Post, PostNL, Polish Post, Postnord, Correos) and some others are considering to invest in APM infrastructures (i.e. Poste Italiane in Italy). APM network are strategic assets for international carriers too (i.e. DHL, GLS, Fedex, UPS), that quite often own national APM networks in different EU countries. Other APM multinational providers, which own more than one network across EU, are "Inpost" in PL, ES, FR and IT, "Amazon" in AT, ES, FR and IT, "Omniva" and "Smartpost" in LT and EE, "Z-box" in CZ and SK, "Instabee" in SE and BE.

The most common APM business model is "closed network" (78 out of 118 cases) such as "DHL express", "Inpost", "Amazon". Open network model are adopted by a relatively lower number of providers (20 out of 118 cases, in the majority of cases by white label initiatives) and some examples are "DPD", "GLS" and "KEP" in AT, "bpost" in BE, "Box now" in BG and CY, "OX Point" in CZ, "alzaBox" in CZ and SK, "Smart post" in LV, "CTT" in PT, "Citibox" and "PUDO24" in ES (for further details see table 14).

Table 14 – APM networks, by ownership and business model

MS	Number of APM	By Ownership				By Business Model		
		PO/PDSP	WL	BO	No Answer	Open Net.	Closed Net.	No Answer
AT	5	5	0	0	0	3	2	0
BE	4	4	0	0	0	1	3	0
BG	5	4	0	0	0	1	3	0
HR	3	2	0	1	0	1	3	0
CY	4	2	2	0	0	2	2	0
CZ	7	5	2	0	0	2	5	0
DK	-	-	-	-	-	-	-	-
EE	4	4	0	0	0	0	4	0
FI	-	-	-	-	-	-	-	-
FR	6	2	1	0	3	2	1	3
DE	2	-	-	-	2	-	-	2
EL	3	3	0	0	0	0	3	0
HU	10	9	0	0	1	0	6	4
IE	2	1	1	0	0	0	2	0
IT	3	2	1	0	0	0	3	0
LV	6	3	1	0	2	2	2	2
LT	5	5	0	0	0	0	5	0
LU	1	1	0	0	0	1	0	0
ME	-	-	-	-	-	-	-	-
MT	2	2	0	0	0	0	2	0
NL	3	0	0	0	3	0	0	3
MK	-	-	-	-	-	-	-	
NO	2	0	0	0	2	0	2	0
PL	6	6	0	0	0	0	6	0
PT	2	0	0	0	2	1	0	1
RO	8	8	0	0	0	0	8	0
RS	3	1	2	0	0	0	3	0
SK	5	2	0	0	3	1	1	3
SI	1	1	0	0	0	0	1	0
ES	5	3	2	0	0	3	1	1
SE	5	4	1	0	0	0	5	0
TR	5	4	1	0	0	0	5	0
EU	**117**	**83**	**14**	**1**	**19**	**20**	**78**	**19**

Note: HR reported a network with some parcel lockers closed and some other open.

Source: ERGP Access and Interoperability WG questionnaire 2024.

Information about pricing strategies and conditions are not available for most NRAs: only few NRAs have information on these issues. Based on the information available, retail pricing – that means pricing to sender or receiver – is more commonly used than wholesale pricing (pricing to the delivery operator using the APM) while there is not a predominant model in pricing rules (fixed or variable).

Table 15 – APM networks, by pricing strategies

MS	Number of PLN	Wholesale/Retail Pricing			Variable/Fixed Pricing		
		WL	RE	No Answer	Variable	Fixed	No Answer*
AT	5	0	0	5	0	0	5
BE	4	1	0	3	0	0	4
BG	5	0	2	3	1	1	3
HR	3	0	0	3	0	1	2
CY	4	0	4	0	4	0	0
CZ	7	0	0	7	0	0	7
DK	-	-	-	-	-	-	-
EE	4	0	4	0	0	3	1
FI	-	-	-	-	-	-	-
FR	6	1	0	5	0	0	6
DE	2	-	-	2	-	-	2
EL	3	0	3	0	1	0	2
HU	10	0	1	9	0	1	9
IE	2	0	2	0	1	0	1
IT	3	1	1	1	2	0	1
LV	6	1	3	2	1	2	3
LT	5	1	5	0	0	5	0
LU	1	0	0	1	0	0	1
MT	2	0	0	2	0	1	1
MC	-	-	-	-	-	-	-
NL	3	0	0	3	0	0	3
MK	-	-	-	-	-	-	-
NO	2	0	0	2	0	0	2
PL	6	0	6	0	0	0	6
PT	2	0	0	2	0	0	2
RO	8	0	8	0	0	0	8
RS	3	0	0	3	0	0	3
SK	5	0	0	5	0	0	5
SI	1	1	0	0	0	1	0
ES	5	2	1	2	1	0	4
SE	5	0	0	5	0	0	5
TR	5	5	0	0	0	0	5
EU	**117**	**13**	**40**	**65**	**11**	**15**	**91**

Note: LT reported a network with both retail and wholesale pricing.

** Blank cells, not applicable, not available, not definite "yes" or "no" answer.*

Source: ERGP Access and Interoperability WG questionnaire 2024.

Interestingly, there is not a unique correspondence between ownership and business model: there are open network models adopted by POs/PDSPs (e.g. DPD, GLS, bpost, Vinted Go) and closed network strategies selected by white label providers (i.e. D express, Ananas, BRT locker, Iboxen).

It is worth noting that some multinational operators which own locker networks in different EU countries (i.e. DPD, GLS) adopt different strategies among countries (open network in some countries and closed network in others – see *infra* table 16). Moreover, some providers changed business model during the time (i.e. Inpost in Italy and Spain started as a white label

offering its locker network on a open basis (closed in Spain) and then it became a PO/PDSP using the locker network only for its parcels, in an exclusive manner).

Table 16 – APM networks' business model by ownership

APM networks' ownership	APM networks' business model	
	Open network	**Closed network**
USP	bpost (BE), Correos (ES)	Austrian Post (AT), Croatian Post (HR), Cyprus Post (CY), Omniva (EE), ELTA PostBox (EL), Magyar Posta (HU), An Post (IE), Latvian Post (LV), LP Express (LT), MaltaPost (MT), Polish Post (PL), JP Pošta Srbije (RS), Pošta Slovenije (SI), Postnord (SE), PTT (TR.
Other POs/ PDSPs	DPD (HR)[a], Box Now (BG), Vinted Go (FR), C Solution (RO)..	DHL Express (BE, BG,EE, HU, MT, PL, SW), DPD (HR, EE, CZ, HU, LV, LT, RO), GLS (CZ, HU, RO), Inpost (IT, ES, PL), DPD (AT), GLS (AT), KEP (AT), Amazon (AT, IT), Instabee (BE, SW), ACS (CY, EL), Mondial Relay (BE), Sameday (BG), Speedy (BG), Z-BOX (CZ), PPL parcel box (CZ), WE|DO Box (CZ), Itella Smartpost (EE), SKR DELIVERY SERVICES (EL), Express One (HU), PACKETA (HU, RO), UPS (LV), Omniva (LV), Venipack (LT), Pack Up (LU), Orlen paczki (PL), Allegro (PL), Sameday (RO), FAN Courier (RO), Cargus (RO), C Solution (RO), CNPR (RO), Z-box (SK), Bring (SE), Trendyol Express (TR), Yurtiçi Cargo (TR), Aras Cargo (TR), PUDO Lockers (TR), Pick up (FR).
White label operator	Box Now (CY), Quick Box (CY), Ox Point (CZ), AlzaBox (CZ), Smartpost (LV), Citibox (ES), PUDO24 (ES), Quadient (FR) MyFlexbox (AT); WienBox (AT).	BRT Locker (IT), D Express (RS), ANANAS (RS), Iboxen (SE), Oohpod (IE)
Blend Operator		Ekupi (HR).

[a] *Some lockers are closed some other are open.*

Source: ERGP Access and Interoperability WG questionnaire 2024.

The majority of APM providers started to offer parcel locker solutions recently (i.e. from 2020 onwards) while some other already started in 2010s and very few before (see table 17).

Table 17 – APM, by year of start-up

Operating from		
2000s	**2010s**	**2020s**
Itella (2008) Bring (2005)	AlzaBox (2014) Bpost (2014) Omniva (2010, 2012) DPD (2016, in EE) Amazon (2016) Inpost (2014) MaltaPost (2016) Baliko Box (2015) GLS (2015, in SK) Pošta Slovenije (2016) Instabee (2015, in SE) Sameday (2018) Citibox (2019)	DHL Express (2019, 2020, 2022) Instabee (2022) Sameday BG (2022) Box now (2023) Croatian Post (2021) DPD (2021, 2022) Ekupi (2021) Box Now (2023) Quick Box (2023) ACS (2023) Z-Box (2021, 2023) Ox Point (2021) GLS (2022) PPL Parcelbox (2021) SKR delivery (2020) Sameday 2019) BRT Fermopoint (2023) Venipack (2021) Unisend (2024) UPS (2021) JP Pošta Srbije (2022) D Express (2021) Ananas (2022) Iboxen (2021) Vinted Go (2022) Speedy (2020) Oohpod (2021)

Source: ERGP Access and Interoperability WG questionnaire 2024.

According to information available to NRAs, APM networks are used not only for last-mile delivery services, but in many cases also for first-mile parcel collection and in some cases for the provision of additional services not belonging to the postal sector (see table 18 below).

The service of delivery of registered mail is offered mainly by USP (i.e. AT, BE). In CZ there are two PLNs owned by retailers, called "AlzaBox" and "Rohlík", which are used by owners for delivery of goods sold in their online store (i.e. groceries and other goods). In HU lockers are used also for "Cash on delivery" services, notification and COD handlings; moreover, it is worth to note that in HU certain foods are allowed to be brought in postal packages.

In some countries lockers are used also to provide services different from postal ones, such as ATM and payments: i.e. bpost in BE; "Cash on Delivery" in all SK APM networks and the USP makes also possible payments by QR code. In IT lockers are used by e-retailers to offer to e-shoppers "click & collect services" that make available the online purchased good at the shop in a dedicated locker. In HU some APM providers offer services such as "From table to table" and the possibility to store and deliver in lockers dangerous (i.e. fuel and flammable material), goods. Some other projects have been elaborating to widen the use of lockers (e.g. in CZ project for electronic notice board for municipalities, library services, etc.).

Table 18 – APM networks, by type of delivery services offered

MS	Last-mile delivery of					First-mile collection of					Other		
	postal parcels	(registered) letters	merchandising and goods by large scale	food	Other	postal parcels	(registered) letters	merchandising and goods by large scale	food	Other	ATM and payments	Smart services*	Other
AT	✓	✓	✓	×	▪	✓	×	×	×	▪	×	×	▪
BE	✓	✓	✓	▪	×	✓	✓	✓	▪	×	✓(1)	×	
BG	✓	✓	✓	×	▪	✓	✓	✓	×	▪	×	×	▪
HR	✓	×	▪	×	▪	✓	×	▪	×	▪	✓	×	×
CY	✓	×	✓	×	▪	✓	×	×	×	▪	▪	▪	▪
CZ	✓	×	✓	✓	▪	✓	×	×	×	▪	▪	▪	▪
DK	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
EE	✓	✓	✓	×	▪	✓	▪	✓	×	▪	×	×	▪
FI	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
FR	✓	▪	×	×	×	✓	▪	▪	▪	▪	▪	▪	▪
DE	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
EL	✓	✓	×	×	×	✓	×	×	×	×	✓	×	×
HU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓
IE	✓	×	✓	▪	▪	✓	×	✓	▪	▪	×	×	▪
IT	✓	×	×	×	▪	✓	×	×	×	×	×	×	✓
LV	✓	✓	✓	×	×	✓	×	✓	×	×	×	×	×
LT	✓	▪	▪	✓	▪	✓	▪	▪	✓	▪	▪	▪	▪
LU	✓	×	✓	×	▪	✓	×	×	×	▪	×	×	×
MT	✓	✓	✓	×	×	×	×	×	×	×	×	×	×
ME	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
NL	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
MK	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
NO	✓	▪	▪	▪	▪	▪	▪	▪	▪	▪	×	×	▪
PL	✓	×	✓	×	▪	✓	×	▪	×	▪	×	×	▪
PT	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
RO	✓	✓	▪	▪	▪	✓	✓	▪	▪	▪	✓	▪	▪
RS	✓	✓	×	×	▪	×	×	×	×	▪	×	×	×
SK	✓	×	✓	×	▪	✓	×	×	×	▪	✓	×	▪
SI	✓	×	✓	×	▪	✓	×	✓	×	▪	▪	▪	▪
ES	✓	×	×	▪	▪	✓	×	×	×	▪	×	▪	▪
SE	✓	▪	▪	▪	▪	✓	▪	▪	▪	▪	▪	▪	▪
TR	✓	×	×	×	▪	×	×	×	×	▪	×	×	▪
Total yes	25	10	14	3	1	21	4	7	2	1	6	0	2
Total no	0	11	6	17	5	3	16	11	18	5	13	17	7
Total no answer	7	11	12	12	26	8	12	14	12	26	13	15	23
Total	32	32	32	32	32	32	32	32	32	32	32	32	32
Total yes (%)	78	31	44	9	3	66	13	22	6	3	19	0	6
Total no (%)	0	34	19	53	16	9	50	34	56	16	41	53	22
Total no answer (%)	22	34	38	38	81	25	38	44	38	81	41	47	72
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100

(1) ATM services offered by USP but not always near the parcel locker, same for letter services.

Source: ERGP Access and Interoperability WG questionnaire 2024.

3.4.2 Assisted Delivery Points (PUDO, postal outlet and post office)

Across the ERGP countries (see table 19), there are more than 200 APD delivery networks with around 250 thousand of points, including USP post offices, other PDSPs' agencies (postal outlets) and third-party retailers' points (PUDOs). The data is certainly underestimated as in general NRAs are not able to provide detailed information on number of points.

Table 19 – APDs networks in EU (2023)

MS	TOTAL APD POINTS (including Post Offices, Postal Outlets, PUDOs)	TOTAL APD NETWORK (including USP's, PDSPs' and PUDOs' networks)
AT	1.698	7
BE	8.079	9
BG	9.327	20
HR	3.077	7
CY	1.425	12
CZ	25.700	9
DK	1.247	4
EE	1.589	9
FI	-	1
FR	42.100	8
DE	-	1
EL	947	3
HU	14.417	23
IE	4.190	5
IT	53.257	10
LV	523	4
LT	509	5
LU	-	1
MT	110	2
ME	117	1
NL	-	4
NO	-	3
PL	7.600	1
PT	2.375	1
RO	33	5
RS	2.115	6
SK	2.975	13
SI	937	3
ES	40.979	15
SE	8.446	7
TR	23.973	6
EU	**257.744**	**205**

Source: ERGP Access and Interoperability WG questionnaire 2024.

As far as PUDOs infrastructures are concerned, the ERGP inquiry revealed the presence of 115 PUDO networks across Europe, with total number of PUDO's points almost doubled in the period 2019-2022, from about 95 to 190 thousand of points.

Table 20 – PUDO networks and points in EU (2019-2023)

MS	(minimum) Number of PUDO Network 2023	Number of PUDO points/premises (total, in units)				
		2019	2020	2021	2022	2023
AT	5	3.441	3.794	4.722	4.819	1.337
BE	8	-	-	-	8.079	-
BG	-	-	-	-	-	-
HR	3	1.500	1.600	1.700	1.600	2.000
CY	2	56	56	56	57	57
CZ	8	4.281	6.421	12.231	19.397	22.713
DK	-	-	-	-	-	-
EE	1	1	167	168	87	58
FI	-	-	-	-	-	-
FR	7	10.500	13.000	21.331	22.200	25.100
DE	-	59.111	59.198	61.911	60.686	-
EL	1	429	429	429	470	-
HU	12	4.173	4.154	4.427	6.207	6.058
IE	5	-	-	-	-	4.190
IT	9	5.963	12.427	17.802	29.343	40.502
LV	3	27	75	238	297	347
LT	4	-	-	-	244	309
LU	-	-	-	-	-	-
MT	2	33	33	36	38	40
ME	-	-	-	-	-	-
NL	3	-	-	-	9.356	-
MK						
NO	2	-	-	-	-	-
PL	-	-	-	-	-	-
PT	-	-	-	-	-	-
RO	4	-	-	-	-	-
RS	4	-	-	-	-	227
SK	6	1.318	1.710	2.371	3.173	-
SI	1	831	886	1.137	2.088	295
ES	14	3.693	4.881	8.358	11.083	32.800
SE	6	-	-	-	-	8.251
TR	5	-	-	3.396	11.509	10.485
EU	**115**	**95.357**	**108.831**	**140.313**	**190.733**	**154.769**

Source: ERGP Access and Interoperability WG questionnaire 2024.

As described by the following table, with few exceptions (i.e. HR, CY, DK, FR, IT, ME, PL, PT, RO, RS, SI), the number of USP's post offices is decreasing from 2019 to 2023 in most countries.

Even if the amount of post offices is decreasing, the coverage of commercial delivery points for parcels is increasing thanks to the development of the use of third party's retail networks (e.g. tobacconists, supermarkets, stationery shops) as PUDOs and to the deployment of APM networks. Moreover, due to the increase of B2C and C2X deliveries, couriers are increasing their investments in postal outlets, opening branded agencies for last-mile and first-mile delivery, especially in densely populated areas.

Table 21 – USPs' networks (amount of post offices) in EU

MS	Post Office of the USP				
	2019	2020	2021	2022	2023
AT	413	402	395	379	361
BE	658	658	653	657	
BG	2.978	2.973	2.973	2.972	
HR	1.016	1.016	1.016	1.016	1.016
CY	1.093	1.093	1.093	1.093	1.093
CZ	3.310	3.297	3.292	3.281	2.987
DK	1.024	1.020	1.138	1.170	
EE	264	264	258	155	117
FI	-	-	-	-	-
FR[a]	17.007	16.943	17.038	17.321	17.000[b]
DE (1)	12.766-	12.820-	12.868-	12.709-	-
EL	665	655	639	622	475
HU	2.604	2.589	2.579	2.166	1.890
IE	1.044	1.026	1.004	996	-
IT	12.809	12.765	12.761	12.755	12.755
LV	347	306	261	241	176
LT	723	378	272	198	200
LU	-	-	-	-	-
MT	40	40	41	41	41
ME	108	108	110	111	117
NL	-	-	-	3.802	-
MK	-	-	-	-	-
NO	-	25	23	6	-
PL	7.600	7.600	7.600	7.600	7.600
PT	2.383	2.370	2.366	2.371	2.375
RO	34	34	34	33	
RS	1.526	1.518	1.500	1.540	1.558
SK	1.504	1.504	1.426	1.394	1.373
SI	487	487	485	478	
ES	8.510	8.381	8.298	8.285	
SE	-	-	-	-	195
TR	4.766	4.417	4.100	3.936	3.573
EU	**85.679**	**84.689**	**84.223**	**87.328**	**54.902**

(1) Including all postal outlets of the USP

[a] *Including Post offices, postal contact points, Community agencies and partner outlets,* [b] *The USP must have at least 17,000 postal outlet points throughout France, however the total amount of postal contact points for 2023 is not available yet.*

Source: ERGP Access and Interoperability WG questionnaire 2024.

The majority of PUDOs is owned by POs/PDSPs (see table 22). Some examples of white label networks are Ekupi in Croatia, GLS, Carrefour and BRT Fermopoint in Italy, Itella in Latvia and the USP's PUDO network in Slovenia. In these cases, collection points for pick-up or drop-off activities are usually owned by independent third party retailers such as malls, fuel stations, tobaccos, etc.

As far as concerned the business model closed network is the most common. However, there are some examples of open network such as bpost in Belgium, DPD in Croatia, Inpost GLS and BRT Fermopoint in Italy.

Table 22 – PUDO networks, by ownership and business model (2023)

MS	(minimum) Number of PUDO	By Ownership				By Business Model		
		PO/ PDSP	WL	BO	No Answer	Open Net.	Closed Net.	No Answer
AT	5	5	0	0	0	0	5	0
BE	8	2	7	0	0	1	7	0
BG	-	-	-	-	-	-	-	-
HR	3	2	1	0	0	2	1	0
CY	2	2	0	0	0	0	2	0
CZ	8	8	0	0	0	0	8	0
DK	-	-	-	-	-	-	-	-
EE	1	0	1	0	0	0	1	0
FI	-	-	-	-	-	-	-	-
FR	7	2	0	0	5	1	1	5
DE	-	-	-	-	-	-	-	-
EL	1	1	0	0	0	0	1	0
HU	12	0	0	0	12	1	11	0
IE	5	4	1	0	0	0	5	0
IT	9	2	6	0	1	3	5	1
LV	3	0	2	0	1	1	1	1
LT	4	4	0	0	0	0	4	0
LU	-	-	-	-	-	-	-	-
MT	2	0	0	0-	2	0	0	2
ME	-	-	-	-	-	-	-	-
NL	3	0	0	0	3	0	0	3
MK	-	-	-	-	-	-	-	-
NO	2	1	0	1	0	0	0	2
PL	-	-	-	-	-	-	-	-
PT	-	-	-	-	-	-	-	-
RO	4	0	0	0	4	0	0	4
RS	4	3	0	0	1	0	3	1
SK	6	0	0	0	6	0	0	6
SI	1	0	1	0	0	1	0	0
ES	14	0	0	0	14	0	0	14
SE	6	0	0	0	6	0	0	6
TR	5	5	0	0	0	0	5	0
Total	**115**	**41**	**19**	**1**	**5**	**10**	**60**	**45**

Note: BE reported a network owned by both PO and WL.
Source: ERGP Access and Interoperability WG questionnaire 2024.

The majority of postal providers (both USP or PDSPs) adopts a closed network model while white label providers adopt both open and closed business model (see table 23).

It is interesting to note that some multinational operators which own lockers network in different countries (i.e. DPD, GLS, UPS) adopt different strategies among countries.

Table 23 – PUDO networks' business model by ownership

PUDOs' Ownership	PUDOs' Business model	
	Open network	**Closed network**
USP	Bpost (BE)	Austrian Post (AT), An Post (IE), Indabox (Poste Italiane's Group), Kipoint (Poste Italiane's Group, IT),
Other POs/ PDSPs	DPD (HR)[a], Vinted Go (FR)	DHL Express (AT, CZ), GLS Parcel Shop (AT, CZ), UPS Access Point (AT, CZ), DPD (AT), Airtrans (CY), Kronos Express (CY), Zásilkovna (CZ), Balíkovna (CZ), PPL Parcelshop (CZ), Pickup (CZ, FR, HR), WE|DO POINT (CZ), ACS (EL), Parcel Connect (IE), Smartpost (LT), Venipak (LT), DPD (LT), Recaras (LT), AKS EXPRESS KURIR DOO ŠABAC (RS), BEXEXPRESS DOO ŠABAC (RS), Aras Cargo (TR), MNG Cargo (TR) Trendyol Express (TR), Yurtiçi Cargo (TR), Sendeo (TR). DPD (IE), UPS (IE)
White label operator	GLS parcel Shop network (IT), BRT-Fermopoint, Inpost (IT), Smartpost (LV), Canguro (ES)	Ekupi (HR), Drop2shop (IE), FIT -Italian tobaccos shops federation (IT), Carrefour- Italian supermarkets' chain (IT), API -Italian refueling stations' chain (IT).

[a] *Some PUDOs are open some other are closed.*

Source: ERGP Access and Interoperability WG questionnaire 2024.

PUDO providers offer parcel storage and on-site assistance mainly since 2010s and 2020s, while some other started in 2000s (see table 23).

Table 24 –PUDO networks, by year of start-up

Operating from		
2000s	**2010s**	**2020s**
DHL (2003, in HU) DPD (2003, in HU) Express One Hungary (2008) FedEx Express Hungary Transportation (2004) FoxPost (2005) GLS (2003, in HU) SPRINTER Futárszolgálat (2002)	FIT (2018) Indabox (2018) Kipoint (2018) Carrefour (2019) Packeta Z-Point (2018) Smartpost (2019) DPD (2016, in HR) Ekupi (2010) Zásilkovna (2010) GLS Parcel Shop (2014, in CZ) GLS (2019, in IT) Pickup (2014) DHL Service Point (2016, in CZ) UPS Access Point (2019, in CZ) AS Eesti Post (2011) Packeta (2019) UPS Magyarország Szállítmányozó (2010, in HU) AKS EXPRESS KURIR DOO ŠABAC (2010) BEXEXPRESS DOO ŠABAC (2015) GLS Parcel Shop (2014, in SK) Pošta Slovenije (2008)	Balíkovna (2020) BRT Fermopoint (2020) API (2020) Inpost Point (2021) Venipak (2021) Ananas (2021) PoštaPOINT (2023) CITY EXPRESS DOO BEOGRAD (2020) Aras Cargo (2021) MNG Cargo (2021) Trendyol Express (2021) Yurtiçi Cargo (2022) Sendeo (2022) Vinted Go (2023) PuntoPack (2023)

Source: ERGP Access and Interoperability WG questionnaire 2024.

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4 Technological issues

The ERGP examined the technological aspects associated with parcel lockers and PUDO points and, more generally, the issue of innovative solutions in relation to parcel delivery. In this context, NRAs do not have enough information in this area, relying on facts provided by PLN operators or public data.

4.1 Parcel lockers

As far as the hardware for parcel lockers is concerned, various types are used, most of which are modular devices allowing for variability in size, e.g. according to the expected flows of parcels in each location. The main module is mainly equipped with LCD panel and keyboard (or touchscreen) to enter the PIN to access the locker, some of them are equipped also with barcode or QR code reader. Additional modules contain only drawers served by the main module. Some types of parcel lockers are without any screen and are accessed only via the mobile application (using Bluetooth connection).

The software for booking and management of the lockers is used by the operators themselves or installed by the manufacturer, with application programming interfaces (APIs) being used most often for communication. For data transfer and network connection, the most common connection is mobile (SIM), less often WAN, Wi-Fi or fixed connection. Some parcel machines are powered by solar panels, so they do not require an electrical connection. As far as security is concerned, if a surveillance system is used, it is most often CCTV, only rarely an alarm.

In relation to the recipients, the most common way of receiving a notification is by SMS or email, another way is by Viber message or mobile application, the use of which in some cases is the only possible way.

PIN, barcode or QR code eventually mobile application are the most common ways to access the drawer with the stored parcel. The way depends also on whether the parcel locker is equipped with a touch screen or not.

Most NRAs[26] also do not have data on interoperability among PLNs. Two NRAs (MT and PL) indicated that there is no interoperability. Two NRAs (CZ and SE) noted provision of interoperability solutions, but they don't have information about the technology. Only three NRAs[27] provide information on solutions to favour interoperability. In Italy, some operators have APIs that allow them to integrate their systems with any type of partner. Similarly, the interoperability in Greece is ensured using API and VPN connection to central services. In Lithuania, business customers can use pass-through service, which allows any partner to place a parcel directly into a parcel locker for the collection by the customer at the desired parcel locker. In this case the receiver gets a delivery notification immediately and the parcel is not going through the delivery network. This functionality can be used by other operators, as well as freelance couriers or other partners, preferring to do the delivery part themselves.

[26] No data provided by these NRAs: AT, BE, BG, ES, FI, FR, CY, DE, DK, HR, HU, IE, LV, LU, ME, NL, PT, RO, RS, SI, SK.
[27] EL, IT, LT.

From the regulatory aspect, none of NRAs are aware of implementation and have information about recommendations based on the standardisation work done by CEN TC/331[28].

As usage of parcel lockers becomes a common way of delivery, it is desirable to find solutions to enable access to them also for people with locomotor disabilities or blind. Totally 18 NRAs are not aware of such solutions[29] and one NRA[30] stated that such solutions were not adopted.

Some operators generally stated that most of their parcel lockers are accessible[31], conveniently accessible for the residents with mobility disabilities[32] or that that the parcel lockers are adapted to serve persons with visual impairments[33] without description of concrete adopted solutions.

The Belgian USP (bpost) offers a large range of different delivery methods with different accessibility levels and interactions, depending on the disability, and users can choose the method they prefer.

Some operators[34] adapted their parcel lockers to be wheelchair-accessible, i.e. adapted placement of the handling surface, parcels to be placed only to the lower drawers. Hungarian USP (Magyar Posta) specified that the user can request such easy access delivery in the interface for parcel dispatch. Similar functionality for the parcel addressed to a wheelchair user to be placed only to the lower lockers is being currently developed by OMNIVA (Lithuanian operator).

In Italy, some operators are working on solutions to adapt their parcel lockers to help people with locomotor disabilities (e.g. "easy access" cells located in the middle row of the parcel locker) or the blind.

Other adopted solutions mentioned by NRAs or operators are use of ramp and embossed keypad for entering PIN[35], voice operation and braille alphabet buttons[36], information in the app where in the parcel locker a specific parcel is being delivered, large sized numbers for entering pin code or speakers to direct the user[37].

The Turkish NRA stated that according to the "Procedures and Principles for the Implementation of Delivery Services" issued by the NRA[38], special needs of disabled individuals should be taken into consideration as much as possible regarding technical characteristics of parcel lockers.

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[28] https://standards.cencenelec.eu/dyn/www/f?p=205:7:0::::FSP_ORG_ID,FSP_LANG_ID:6312,25&cs=17A1A42D99A0F53819E044484CFF608A1

[29] AT, CY, CZ, DE, DK, FI, FR, HR, IE, LU, MT, ME, NL, PT, RO, RS, SI, SK.

[30] LV.

[31] HU (DPD).

[32] LT (LP Express).

[33] LT (Itella – Smartpost Lockers).

[34] EL, HU, LT.

[35] BG (DHL).

[36] PL.

[37] SE.

[38] "https://www.btk.gov.tr/uploads/boarddecisions/alternatif-teslimat-modellerinin-uygulanmasina-yonelik-usul-ve-esaslar/115-2023-web.pdf.

4.2 PUDO points

ERGP asked about the common ways used for the delivery of parcels in PUDO points. There are two main ways how the parcels are delivered in PUDO points, upon presentation of code received by SMS or e-mail and/or upon proof of identity with an ID card[39]. Technological procedures applied by the operators are described in the table below (see table 25).

Table 25 – Technological procedures applied for the delivery of parcels in PUDO points

Presentation of code received by SMS or e-mail	CY, CZ, EL, LV, MT, PL, SI, SK
Notification (paper or via SMS/e-mail), proof of identity and signature	HR
Presentation of code and proof of identity (e.g. by ID card)	RO, RS, SE
Combination of more previous methods	BE, ES, HU, LT, TR, IT, FR
No answer / N/A	AT, BG, DE, DK, FI, IE, LU, ME[40], NL, PT

4.3 Innovative solutions

The ERGP also dealt with innovative solutions and their usage in parcel delivery related to the technologies adopted by providers or applications used by customers.

POs/PDSPs try to meet the users' needs and provide recipients with the possibility to change the delivery address/time of a parcel or track the progress of the delivery (Track and Trace). The ERGP asked whether the possibility to redirect the parcel to an alternative address is given also immediately before the delivery is scheduled to take place. According to answers of 17 NRAs[41], at least some operators in their countries offer this possibility. There is no such possibility in four countries[42].

Real-time tracking of parcel (postal delivery vehicle) during the delivery process is available from some operators in nine countries[43].

The use of drones can be considered as one innovative delivery method. The use of them was tested in 7 countries[44]. E.g. in Croatia, the USP tested drone delivery of small postal items to the islands few years ago, but it gave up on the regular use. Similarly, the USP in Ireland tested drone delivery to an island in 2018, the NRA has no information whether it is still operational.

Only three NRAs[45] reported additional technological innovations. Czech operator Zásilkovna (member of Packeta group) uses robots to sort parcels instead of machines with sorting

[39] In Sweden, the electronical identification in the form of "Bank-ID" can also be used.
[40] In Montenegro, there are no PUDO points yet.
[41] AT, BG, CZ, EL, ES, FR, HR, HU, IE, IT, LV, ME, MT, RO, RS, SI, SK.
[42] CY, LU, SE (redirection is possible only day before), TR.
[43] AT, CZ, EL, ES, FR, HU, SE, SK, TR.
[44] DK, EL, ES, FR, HR, IE, IT.
[45] CZ, IT, LT.

belts[46]. In Lithuania, two innovative solutions are mentioned. Operator OMNIVA is able to deliver multiple parcels in one drawer to use minimum quantity of drawers and save capacity for other recipients, regardless of whether these parcels are delivered within one delivery or more (e.g. next day). Operator LP Express installed an autonomous ECO parcel locker. This so-called mobile parcel locker (ECO) does not require an electricity or internet connection and can be powered by rechargeable solar panels. Such flexibility allows this kind of parcel lockers to be placed closer to places convenient for customers or can be promptly moved to the place where parcel flows are the highest at a given time. In Italy, one operator is working on solar panel on top of its lockers to make them even more sustainable, as it is the case in Romania.

4.4 Data privacy and security

The provision of postal services is inherently linked to the requirement of confidentiality. The use of digital technologies in the delivery process requires additional requirements on data privacy and security of personal data in digital form.

Such requirements are arising primarily form the GDPR[47]. This regulation sets obligations regarding personal data protection. Another horizontal regulation affecting the security of digital data is NIS 2 Directive[48]. According to this directive, postal and courier services are included in other critical sectors and this directive applies to them if they are qualified as medium-sized or exceed the ceilings for medium-sized enterprise.

To the question on awareness of existing protocols and technologies in place to ensure the privacy and security of customer data, the majority of NRAs answered that they do not have such information[49] or did not answer[50].

Only 4 NRAs[51] gave a positive response. Croatian NRA specified, that it has a general knowledge, but this task falls in the competence of agency for personal data protection. NRA form Montenegro referred to the provisions of the postal act concerning generally the confidentiality of postal items. The Turkish NRA issued "Procedures and Principles for the Implementation of Delivery Services" in which stipulates requirement that "the system or software used ensures the confidentiality of the personal data of the sender and receiver".

Italian NRA mentioned that all postal operators implement the main security tools and protocols to communicate with their customers such as inter alia https and FTPS protocols or credentials for authentication or passwords.

[46] https://www.zasilkovna.cz/blog/zasilkovnaci-nasi-superhrdinove-roboti
[47] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).
[48] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive).
[49] BE, BG, CY, CZ, DK, EL, IE, SE, SI.
[50] AT, DE, FI, FR, HU, LT, LU, LV, MT, NL, PL, PT, RO, RS, SK.
[51] HR, IT, ME, TR.

5 Competition, consumer and regulatory issues

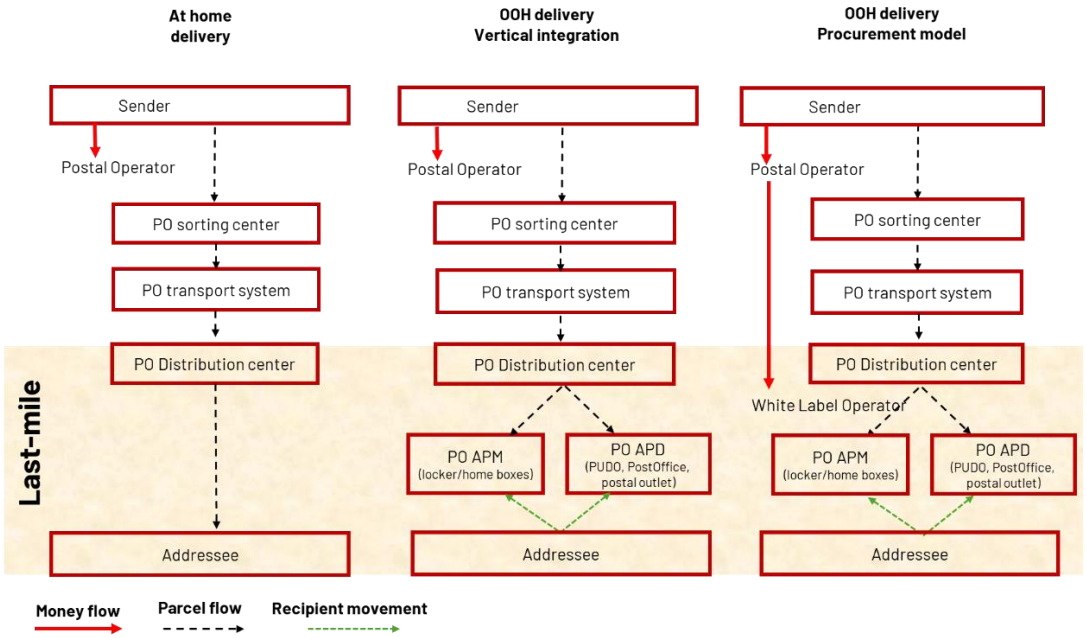
Last-mile parcel delivery services registered a massive increase in recent years, both in quantity demand and quality. End-users, ever increasing, require deliveries, *inter alia*, all day long (24H), 7 days per week, with parcel tracking options and withdrawal not only "at home" but also "OOH", at convenient points both APMs (lockers and home boxes) and APDs (PUDOs, postal outlets and post offices).

OOH services are provided by either POs/PDSPs or white label operators. The former treats OOH services as an input paid with the parcel delivery price, as a part of it, and they may also sell capacity to other POs/PDSPs. The latter sells OOH services to POs/PDSPs, that bundle APM/APD service with parcel delivery.[52]

The last-mile parcel delivery is therefore evolving, with OOH services considered as system support activities, not necessarily remunerated directly with their own price but priced in bundle with parcel delivery: e.g. parcel delivery at the locker point is still priced with one price as delivery at home, but (usually) cheaper due to the lower cost of human labour (better efficiency) compared to the traditional delivery to the recipient address ("at home").

Accordingly, the market design, beyond the traditional "at home" structure, can be divided in two main categories: vertically integrated solutions (PO/PDSPs own their APM/APD network) and procurement methods (PO/PDSP purchases storage services, either APM or APD, from white labels or other PO/PDSPs) (figure 6).

Figure 6 – Last mile parcel delivery market design



Source: ERGP Access and Interoperability WG

[52] In theory, white label may sell its "storage" capacity directly to the sender or the recipient or even, outside the postal sector, to commercial activities selling food, merchandising and commodities but not clear evidence emerged on this respect.

In a nutshell, the vertical integration case differs from "at home" case because parcel stops at the APM/PUDO point, where the addressee picks-up the parcel. In the procurement model, in addition, there is a monetary transaction between APM/APD provider and the PO/PDSP (including transactions between a vertically integrated postal operator and a PO/PDSP without its own APM/APD network).

The PO/PDSP, in any case, is (usually) the entity responsible for the secure operation of delivery and OOH services management is considered a specific function of the APM/APD provider: end-users (senders and recipients), in case of disservices and inconveniences with OOH services, typically refer to the PO/PDSP that in turn involves the APM/APD provider (either internal unit or white label).

OOH services, therefore, can be seen ancillary services, complementary to parcel delivery, improving its variety and quality, and contributing to better guarantee that delivery supply meets with European end-users expected quality standards and some European consumers' needs[53]: OOH services, as a matter of fact, give one more delivery option to users, that can be exploited by some of them (e.g. commuters present at home only late evening /early morning) without affecting other users keen to use home delivery (e.g. vulnerable users or users not having a car). Given that no solution fits for all customers, the availability of OOH delivery options (in addition to home delivery) enhance consumer well-being/satisfaction.

OOH services are part of parcel delivery by POs/PDSPs and the incurred costs associated with OOH provision are recovered through the postal tariff. Nevertheless, APM/APD services need to be considered as separated from the parcel delivery. As any other product provided by a subject to the benefit of others, OOH services are bought and purchased from the implicated agents by market-driven mechanisms.

APM/APD services, consequently, need to be taken into the utmost account in the competition process of parcel delivery, distinguishing OOH services and parcel delivery in order to assess the efficiency of the system, the adequateness (prices and quality) of the different competitive activities, and potential competition issues that may emerge regarding OOH and access to the infrastructure for parcel delivery (such as the use of parcel lockers, other postal infrastructure receptacles in buildings and delivery in convenience points/postal outlets) (see *infra* chapter 5.1).

OOH services impact on the end-user experience for parcel delivery and potential consumers' issues may emerge, in terms of unsatisfied demand and problems encountered by end-users when using parcel lockers, home parcel delivery boxes, PUDOs, postal outlets etc. (see *infra* chapter 5.2).

Regulatory tools (monitoring, access etc.) that might be used to promote, if needed, competition and end users' satisfaction / well-being must be based on the underlying identified problem, proportionate and justified. Remedies that could be appropriate to solve such potential problems are explored and keeping in mind that no specific issues have emerged yet (see *infra* chapter 5.3).

[53] See Regulatory literature review (chapter 2) for evidence on increasing users' adoption of OOH services.

5.1 Competition issues

OOH delivery services, in recent years, have been developing in the ERGP countries, relying on market forces and without public intervention.

As shown by evidence gathered by ERGP (see *supra* chapter 3):

- OOH services are increasingly used by consumers: in 2023, 117 APM networks and 205 APD networks have been counted, with a 4-year rate increase (2022 vs 2019) of, respectively, nearly 2,5 and 2-times more.

- The range of OOH services offered by APM/APD networks is widening beyond last-mile, including in some cases first-mile collection services and other services such as ATM and payments, smart services, electronic notice board for municipalities, library services etc.

- OOH services are provided mainly by POs/PDSPs (at least, in three-quarter cases) but also by white label operators.

- OOH services are priced by either fixed fee per a given usage/period (i.e. monthly rental of total capacity agreed, independent of actual use) or variable rates (i.e. a given hour/day fee per each locker actually used).[54] This is the case mainly for parcel locker services, with the ERGP sample showing "fixed strategies" in 15 cases and "variable strategies" in 11 cases, whereas PUDOs are expected to have variable prices proportionally to the quantity of parcels picked up at the PUDO point.

- OOH services, when self-produced – that is the PO/PDSP deploys its own parcel locker network and/or postal outlet – may have the cost embedded in the postal tariff and the PO/PDSP may, in some cases and on its own free choice, keep an internal industrial accounting system.

- OOH services produced by each OOH network are offered either to any PO/PDSP, so called open network strategy, or only to one operator, so called closed network. Evidence shows that POs/PDSPs mainly adopt a closed network strategies and white labels usually an open network one, offering their services to more POs/PDSPs.

The functioning of OOH services directly impacts on European parcel delivery services:

- OOH parcel delivery prices in many countries are usually different and lower than "at home" delivery.

- In case of different prices for home and out of home delivery, OOH parcel delivery prices across Europe are typically set in comparison to traditional "at home" services, that act as benchmark. OOH delivery price might imply a rebate percentage (e.g. 20-

[54] Two-part tariffs are also in place, with a monthly fee limited to a minimum number of uses and extra payments beyond the minimum threshold.

30% less) or a fixed amount (e.g. 40-50 euro/cents less) of the corresponding "at home" service or there are special services with OOH delivery with reduced price.

- OOH parcel delivery prices are not systematic in Europe, and this might be the case when OOH market is not yet mature, with a low penetration on the territory. No discounts (for OOH delivery compared to "at home" delivery) may also occur when OOH services are bundled with online shopping (e-retailers selling goods and shipment altogether): in this case, particularly when delivery costs are relatively low compared to the value of the good sold online, marketing strategies may lead to one-price-fits-all, for good and shipment, either OOH or "at home". Consequently, OOH savings are not translated to end-users and OOH advantages are not passed on to the end-user, and the price lever (price for delivery to the locker/PUDO point lower than home delivery) is not fully exploited in order to encourage recipients to select an OOH option, via cheaper OOH delivery.

- OOH parcel delivery is often offered as an option to redirect a parcel if the original destination is no longer suitable (e.g. some operators use marketing claims such as An Post, Ireland: "A free and easy way to manage your deliveries. Redirect your items to a nearby locker where they will be safely stored until you're ready to collect them. You can also send parcels or return online shopping from a locker near you.").

Moreover, in the last five years, European parcel delivery markets show:

- On the supply-side, volumes and revenues are ever increasing, average revenue per parcel is stable, POs/PDSPs' volume demands are shifting upward by virtue of e-commerce growth. Each market is populated served by several providers. Different business models, offers and strategies are put in place by POs/PDSPs. No major antitrust cases have recently been reported.

- On the demand-side, consumers' delivery needs are satisfied in different ways: traditional "at home" delivery services have been enriched with ancillary options such as tracking, text alerting (email, sms, etc.). Delivery services have been complemented by OOH services, with parcel delivery at parcel lockers/PUDO points.

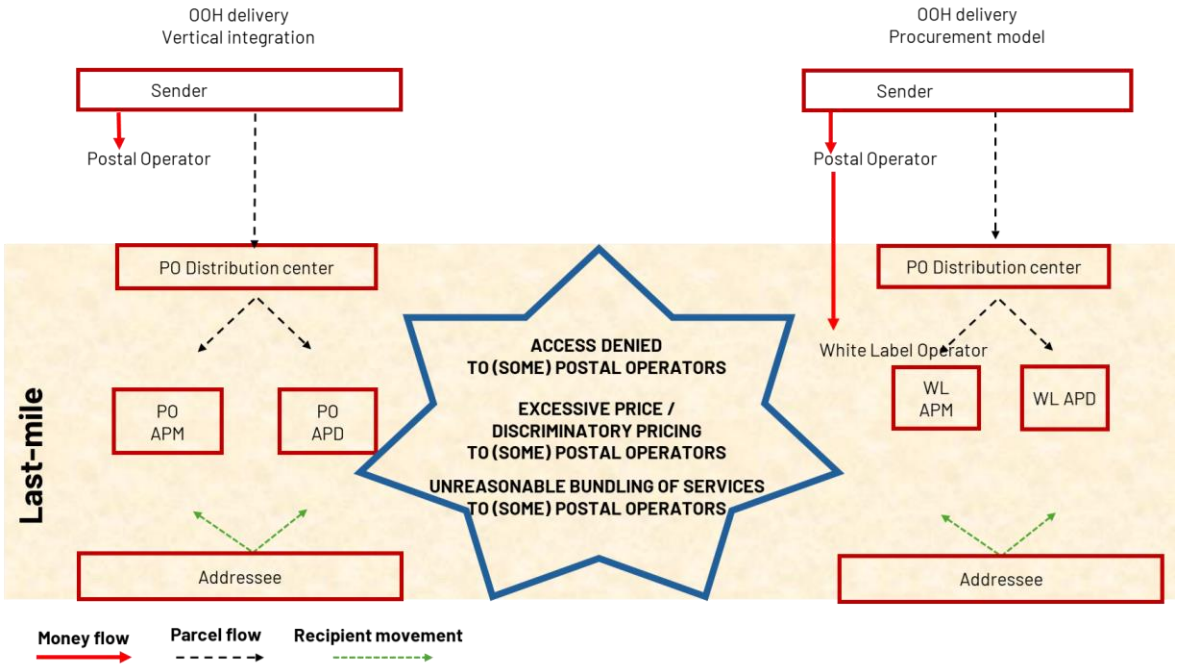
In this environment, abovementioned data support the presence of a certain degree of competition across Europe.

NRAs, as a matter of fact, haven't experienced so far competition issues on parcel locker/PUDO deployment and management. Collected evidence shows no major competition cases filed on OOH services across Europe, apart from an ongoing case in Czech Republic where the National competition authority (ÚOHS) is dealing with the contractual arrangements between a PO/PDSP and operators of its PUDO points which require them to refrain from any competitive behaviour towards it, both for the duration of the contract and for a certain period after its termination.

Likewise, NRAs received no major complaints so far, according to the collected evidence, regarding eventual access denial (access complaints) to parcel lockers/PUDOs.

However, potential competition issues and market failures may emerge in case a PO/PDSP would have a Significant Market Power (SMP) in the relevant market for parcel delivery (figure 9).

Figure 7 – Main potential competition issues



Source: ERGP Access and Interoperability WG

A potential competition issue, in this context, might be represented by access denial if, and only if, the infrastructure would become an essential facility. No evidence emerged to this respect in the survey with regard to OOH infrastructures and, anyhow, NRAs should check such hypothesis against specific circumstances and characteristics of the country relevant market, starting with usual antitrust toolbox. In particular, essential facility requires that:[55]

- The input must be shareable, i.e. it can be used simultaneously by both the owner and the competitors, otherwise the owner having to give up or compress its business due to insufficient capacity of the input itself.

- The input must be essential, i.e. there must be no substitutes similar enough to allow the economic activity to be carried out even without using the input in question.

- The input must be non-duplicable, i.e. it must not be economically convenient in a reasonable time-period to produce an alternative input that performs the same functions.

[55] Motta, *Competition policy: Theory and practice*, Cambridge University Press, 2004. Motta & Polo *Antitrust*, Il Mulino 2005.

Other potential competition issues, in case of not sufficient competition, might be represented by SMP undertaking offering OOH access to third party:

- with excessive price or discriminatory pricing.
- with different quality levels (non-price issues, such e.g. quality discrimination, withholding information, etc.).
- unreasonably bundled to parcel delivery, in case of vertically integrated PO/PDSP, or to other components which are unnecessary for the provision of the product, in case of white label providers.

It might be emphasized that evidence gathered in the survey– as already said – show in Europe i) many OOH networks, ii) OOH services offered by both vertical integrated operators and white labels providers, adopting either closed or open network models, iii) different pricing schemes for parcel delivery, with prices for "at home" delivery service ("stand-alone") and for e-commerce parcel delivery bundled to OOH services, etc.: such variety in commercial strategies do not suggest, *prima facie*, hurdles to competition and, therefore, no indication have been collected supporting abovementioned potential competition issues in the European countries.

Moreover, it's worth noting that policy makers (NRAs, competition authorities etc.), prior to identifying abovementioned potential competition problems (and, if such issues would be identified, to address them with appropriate regulatory tools – see *infra* chapter 5.3), would have to define the appropriate relevant market.

In such a context, the presence of OOH services (ancillary services) complementary to parcel delivery (primary service) might be treated with the standard Small but Significant Not transitory Increase in Price (SSNIP) test as envisaged by the antitrust market definition, just in case a competition problem arises. [56]

5.2 Consumers issues

The usage of OOH services is ever increasing across Europe, and the market is responding to users' demand, as experienced during COVID-19 pandemic and shown by the recent development of alternative delivery solutions, in terms of market share (see *supra* table 4) and number of APM/APD points (see *supra* table 7).

The share of APM/APD delivery solution is expected to be higher in the future (e.g. some French operators forecast a 60% market share on 2030 for OOH services in France) and PDSPs – as reported by some NRAs – have been collaborating with PLNs and PUDOs networks in order to expand the OOH coverage.

[56] Concretely, the answer to the question whether ancillary products (OOH services) should be considered as separate from the primary market (parcel delivery) will first depend on whether the price of OOH represents a considerable portion of the price of parcel delivery.

Furthermore, consumers benefit from widespread OOH coverage on the national territory by virtue of the combination of PUDOs, postal outlets and post offices, public and private parcel lockers, which guarantee them a withdrawal point in their neighbourhood (e.g. one Italian operator estimates the presence of a collection point within 5 minutes by car for 94% of the population and within 1 km on foot for 80% of the population).

Some operators reported that consumers value parcel lockers for the lower price of the delivery, the opening hours of the parcel lockers (in particular, when located in public spaces) and their proximity, whereas PUDO point, compared to parcel lockers, might have shorter opening hours and a high waiting time.

Within this environment, unsatisfied end-user demand for OOH services is mostly encountered in rural areas where parcel lockers and PUDOs are not close enough to the addressee, but specific critical cases have not been registered so far at national levels across Europe and NRAs haven't filed specific cases from the market.

End-users' satisfaction with OOH delivery services decreases significantly when consumers have to travel quite a lot to pick up the parcel. The International Post Corporation (IPC) provided further data with the IPC Cross-Border E-Commerce Shopper Survey 2024: "The survey found that satisfaction is clearly correlated to distance travelled to that location. Half of those who travelled up to 100m were extremely satisfied with their delivery location. As soon as consumers had to travel more than 100m to pick up their item, their level of satisfaction decreased. The level of extremely satisfied respondents was only 18% for those whose OOH delivery location point was located more than 1 km away".[57]

NRAs, anyway, monitor the market and, in general, receive so far few user "complaints" and reports on the functioning of APM/PUDOs.

Main issues registered by NRAs on potential disservices and inconveniences associated to OOH services regard:

- short pickup time for parcel lockers (sometimes typically 48 or 72 hours).
- redirection of parcel to some other APM (or PUDO) point or alternative address, if the locker is full or out-of-order (sometimes parcel will be moved to the nearest parcel lockers to speed up the delivery, for example at Christmas, while the next nearest parcel locker may be a few kilometres away).
- APM is not working and there is no real time support.
- No PIN code is available during the parcel pick-up (but it can be solved via customer support tools).
- lockers box too small (and in this way the item being sent is damaged).
- machine-malfunction.

[57] IPC Press Release 22-02-2024 https://www.ipc.be/news-portal/general-news/2024/02/22/12/52/cross-border-consumers-are-highly-satisfied-with-delivery-location

- "at-home" delivery sometimes are left, instead, in parcel lockers without prior notification or telephone call, especially in skyscrapers or similar buildings.

The main reasons for avoidance of PL by users – according to an investigation of the Slovenian NRA, AKOS[58] - resulted: Location (43%), Complicated use (21%), Lack of awareness (12%), No need (12%), Only when there's no other option (4%), Time consuming (2%), Limited dimensions for packages (1%), Other (2%), I don't know, No answer (3%).[59]

OOH services may be used by POs/PDSPs to increase quality of parcel delivery, reducing cases of unsuccessful delivery:

- No detailed information and statistics emerged on numbers of parcels/packets where delivery is unsuccessful on the first attempt by POs/PDSPs to home deliveries (as the OOH deliveries would avoid that problem).[60] Such a phenomenon is mainly concentrated in X2C, since business recipients have usually a specific organization for retrieval. Some unofficial data estimates failures up-to 5-10% in first attempt parcel delivery, e.g. the Deloitte study[61] of February 2020 identified that the parcel delivery service providers have 10-15% failed deliveries in 1st attempt. NRAs usually monitors only the QoS of the Universal Service.

- When at home (first) delivery fails, APM/PUDO points are used as "backup" solution. NRAs report a number of ways used by POs/PDSPs to deal with unsuccessful delivery of postal items. The method of further delivery depends on the operator, the type of service chosen, as well as the place of delivery. These circumstances must be specified in the postal terms and conditions of the POs/PDSPs. The most common delivery methods in case of unsuccessful delivery are the following: repeated delivery the next day (in some cases, the delivery is repeated twice) and then delivery of the package to the nearest PUDO/parcel locker/distribution centre/post office.

- Many operators, furthermore, interact with recipients before and after shipment. When the interaction takes place before shipment, unsuccessful deliveries reduces significantly and, usually, interaction makes possible the change of delivery location and OOH choices are quite often selected to get delivery done.

- Many providers allow the recipient to manage the delivery before (PRE) or after (POST) the first (failed) delivery attempt. Data provided by some operators show that consumers interacting with providers use more intensively OOH solutions (respect to the standard shipment case), and this is the case especially when interaction takes place before first attempt delivery. For example, one operator experienced that the recipient contacted after the first unsuccessful delivery attempt is likely to opt for

[58] AKOS, in particular, investigated motivations disincentivising the usage of parcel locker in Slovenia, asking to a sample of users "Why don't you choose to deliver to a parcel machine more often?".

[59] Source: https://www.akos-rs.si/fileadmin/user_upload/dokumenti/Raziskave__analize__porocila_in_statistika/Posta/Raziskava_o_nakupnih_navadah_uporabnikov_pri_kupovanju_preko_spleta_2023.pdf, page 35.

[60] ERGP asked to NRAs "Do you have any statistics or information on the number of parcels/packets where delivery is unsuccessful on the first attempt by postal operators? Please provide a summary if affirmative".

[61] Deloitte's report (in Spanish) titled "Last mile logistics – Challenges and solutions in Spain, February 2020":https://www2.deloitte.com/es/es/pages/operations/articles/logistica-de-ultima-milla.html

OOH solutions in 30% of cases whereas the recipient contacted before first attempt is likely to opt for OOH solutions in 60% of cases.

These data would suggest that APM/PUDOs solutions are not yet enough known among all consumers.

The propensity to use parcel lockers/PUDOs by consumers therefore records further growth margins. In this regard, several studies show that the buyer may not be willing to travel the distance necessary to reach the nearest parcel locker/PUDO when is more than 1 kilometre away, as it is the case for a part of the European population. Furthermore, the price of deliveries does not always incorporate all the economic advantages: as already seen, home delivery is often offered free of charge by the online seller, so the buyer is not incentivized to choose delivery to the parcel locker/PUDO, which remains a valid option, from the recipient point of view, only if there is a specific need for delivery flexibility.

Furthermore, the availability of PUDO/parcel lockers is not yet enough widespread throughout the national territory and their coverage can still grow. In particular, the distribution of parcel lockers across the national territory is uneven and concentrated in metropolitan areas and with high population density (due to their greater profitability).

5.3 Regulatory issues

Market development for OOH services is experienced across Europe. APM/APD solutions are dynamically offered to European end-users for parcel delivery, and they are expected to expand in the short-medium term (see *supra* chapter 3).

The market for APM/APDs does not appear to suffer from either market failure or lack of competition as several actors are entering the market and investing to install OOH networks.

Further development of OOH delivery sector, nevertheless, might potentially be jeopardized in specific circumstances, if (and only if) the market will not deliver a sufficient degree of competition (see *supra* chapter 5.1) or major problems will materialise in the consumer experience (see *supra* chapter 5.2).

Granted that regulation is justified when market failures arise on the market and/or when ex post competition law cannot maintain effective competition on the market, hereinafter the analysis is focused whether NRAs would have the appropriate tools in case market failures occur in one of the European markets.

To this respect, a survey of the European legal and regulatory framework for OOH services is provided (see *infra* chapter 5.3.1), starting from the postal authorisation/license regime in place across Europe for OOH service provision, concentrating then on laws issued by legislators and rules set by governmental bodies and regulators.

Then, available remedies are matched to potential competition problems (see *infra* chapter 5.3.2), available consumers' protection measures are paired to potential consumers' issues (see *infra* chapter 5.3.3) and some considerations are elaborated on incentives to invest for installation of APM networks (see *infra* chapter 5.3.4).

The goal is to verify which tools might be used to further increase, if needed, competition in parcel delivery, consumers' satisfaction, and the coverage of OOH networks.

5.3.1 European legal and regulatory framework for OOH services

Across Europe, in most cases APM/APD owners do not need authorization, while 4 NRAs answered that owners need authorization for PLN (CY, EL, IT and TR) and 2 for PUDOs (CY and EL) (see table 26), so that their infrastructure is used by other undertakings (i.e. POs/PDSPs).

In Germany, APM/APD owners have an obligation only to notify the BNetzA but they do not need authorization for PLN or PUDO's (only postal operators who provide letter services up to 1 kg need a license).

NRAs for MS where authorization is not needed for PLNs' and PUDOs' owners specified that only POs/PDSPs need authorization because other entities, who are providing services in the name of the PO/PDSP, are not considered as PO/PDSP and therefore they do not need an authorization.

Some NRAs point out, on the other hand, how parcel lockers represent a different way of parcel delivery, alternative to the traditional home delivery, the latter involving delivery into the hands of the recipient or to a person delegated by the same. Therefore, parcel delivery via a parcel locker would be part of the distribution activity, considering that the "storage" phase of the package in the parcel locker for the time from its insertion by the PO/PDSP to the moment of collection by the recipient, is within the "delivery" phase. In other words, delivery occurs with a delay and this "delay" is nothing other than the stock (also decisive on this point is the fact that these parcel lockers can also perform a "collection" function, in cases where they are used by senders to drop-off the package to a PO/PDSP and, in this case, the locker works as "setup box", i.e. an access point to the network). EETT specified that authorization is required in Greece for PLNs' and PUDOs' owners, stating that both entities are part of the postal network and therefore need authorization.

Table 26 – Postal authorisation/license regime in place across EU for OOH service provision

	Parcel Locker	PUDO
AT	×	×
BE	×	×
BG	×	×
HR	×	×
CY	✓	✓
CZ	×	×
DK	×	×
EE	×	×
FI	×	×
FR	×	×
DE	×	×
EL	✓	✓
HU	×	×
IE	×	×
IT	✓	×
LV	×	×
LT	×	×
LU	×	×
MT	×	▪
ME	×	×
NL	×	×
MK	▪	▪
NO	▪	▪
PL	×	×
PT	×	×
RO	×	×
RS	×	×
SK	×	×
SI	×	×
ES	×	×
SE	×	×
TR	✓	×
Total yes	4	2
Total no	26	27
Total no answer*	2	3
Total	32	32
Total yes (%)	13	6
Total no (%)	81	84
Total no answer (%)	6	9
Total (%)	100	100

* Blank cells, not applicable, not available, not definite "yes" or "no" answer.

Source: ERGP Access and Interoperability WG

Independently from the actual authorisation regime in place, end-user complaints related to parcel lockers/PUDOs might be investigated by NRAs, whether the POs/PDSPs own them or not.

As a matter of fact, more than half of NRAs responded that they will investigate end-user complaints related to both parcel lockers and PUDOs if they are owned by a postal service provider, but not if they are owned by a third party. However, from several clarifications given in the answers, it is clear that in the case of a complaint about the postal service, the investigation will be focused on the responsibility of the postal provider who concluded the agreement with the PLNs' or PUDO's regardless of the ownership of the parcel lockers' or PUDO's delivery point.

This is the case also for integrity and security of postal items when they are delivered through parcel lockers and PUDOs owned by the postal service provider or white labels: most NRAs would consider the parcel locker/PUDO facilities as points of access to the postal network, that should meet the same security principles as postal establishments (regardless of whether it applies to POs/PDSPs or their subcontractors).

Collecting data to monitor the development of the postal market is one of the main tasks of the NRA. However, the structural changes during the last two decades in the postal sector by information technology, digitization and new business models in the delivery of goods purchased via e-commerce encourage investigating whether NRAs have the power to collect data on shipments delivered through parcel lockers and PUDOs.

To this respect, almost all NRAs can collect APM/APD data from postal service providers, and nearly half of them also from subcontractors, owners of parcel lockers or PUDOs. However, those NRAs not having such power state that this does not mean that they do not have these data, because they collect data from postal service providers who in turn collect these data from subcontractors.

Furthermore, most NRAs monitor the development of parcel lockers and PUDOs, stating that they collect data from postal service providers, while only a few NRAs answered negatively.

No competition problems have been filed in setting up and managing parcel lockers or PUDOs. Only CTU had one interesting case for the PUDO, previously mentioned. National competition authority (ÚOHS) is dealing with the following contractual arrangement of Zásilkovna. This PO/PDSP has contractual arrangements with the operators of its PUDO points, which require them to refrain from any competitive behaviour towards it, both for the duration of the contract and for a certain period after its termination.

Two-thirds of NRAs answered that they do not have competence (e.g. setting conditions for access, resolving disputes, etc.) in relation to access to parcel lockers and/or PUDOs. Other NRAs, which responded positively on that question, mostly clarify that their competences regarding access to parcel lockers only refer to the USO and the USPs obligation to provide access to its postal network.

From the NRA's answers, PSD and national postal legislation do not prescribe clear conditions or rules for deployment and management of parcel lockers and PUDOs, i.e. for installation, management and access of parcel lockers or PUDOs, and accordingly NRAs do not have own decisions or other acts on APM/APD.

However, this does not mean that the owners of parcel lockers and PUDOs do not face numerous challenges when they want to place their installations in a public space, since

general laws and rules set by other public entities affect APM installation and management. From the NRAs' answers and explanations, it emerges that they do not know exactly, since this is outside their competences, i.e. what legal requirements owners need to meet when installing parcel lockers on public or even private areas, what permits and permissions are needed and from which state or local institution, what the infrastructure needed before putting parcel lockers into operation and so on.[62]

Therefore, NRAs are aware that owners in general need some time from the idea to the installation of their parcel lockers and obtaining permits from the competent state or local authorities. However, all NRAs state that there are no regulatory issues from their side regarding the development of parcel lockers' or PUDO's delivery points, except RTR who state that there is a discussion about the need for physical addresses where parcel lockers installed.

Almost all USPs have their own PLN (only BG, CZ[63] and ME do not), while most USPs do not have PUDO (only DK, EE, FR, HU, LU, SE and TR state that they have some type of contracted access point). Most USPs allow access to their network of parcel lockers, but mostly on a commercial basis. From the explanation of NRAs, no regulatory challenges regarding access to USP's PLN have arisen so far.

The following tables below summarise the answers provided by the NRAs (tables 27--29).

[62] ERGP asked to NRAs: "Are there any access rules on locker/PUDO set by law?".

[63] It is interesting that USP CZ does not have its own network of parcel lockers, but uses PLN of other owners, so there is no possibility to provide access to other providers.

Table 27 – APM/APDs rules set by law and governmental bodies and NRAs (1/3)

	Would end-user complaints relating to locker/ PUDO facilities be investigated by the postal NRA when:				Do postal integrity/security principles apply to locker/ PUDO facilities when:				Has the NRA the power to collect and analyse data on locker/PUDO market development when:				Does the NRA monitor the locker/PUDO market development?	
	Operated by a postal service provider?		Not operated by a postal service provider?		Operated by a postal service provider?		Not operated by a postal service provider?		Operated by a postal service provider?		Not operated by a postal service provider?			
	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO
AT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓
BE	×	×	×	×	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓
BG	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓
HR	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓
CY	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓
CZ	✓	✓	✓	✓	▪	▪	▪	▪	✓	✓	✓	✓	✓	✓
DK	✓	✓	×	×	×	×	×	×	✓	✓	✓	✓	×	×
EE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FI	✓	✓	×	×	✓	✓	×	×	✓	✓	✓	✓	×	×
FR	×	×	×	×	▪	▪	▪	▪	×	×	×	×	×	×
DE	×	×	×	×	▪	▪	▪	▪	▪	▪	▪	▪	✓	×
EL	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓
HU	✓	✓	✓	✓	×	×	×	×	✓	✓	✓	✓	✓	✓
IE	×	×	×	×	▪	▪	▪	▪	▪	▪	▪	▪	×	×
IT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LV	✓	✓	×	×	✓	✓	▪	▪	✓	✓	×	×	✓	×
LT	✓	✓	×	×	✓	✓	▪	▪	✓	✓	×	×	✓	✓
LU	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓
MT	✓	▪	×	▪	✓	▪	×	▪	✓	▪	×	▪	✓	▪
ME	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NL	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	×	×
MK	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
NO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	▪	▪	▪	▪
PL	✓	✓	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓
PT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RO	✓	✓	▪	▪	✓	✓	▪	▪	✓	✓	×	×	✓	✓
RS	×	×	×	×	▪	▪	▪	▪	✓	✓	×	×	✓	✓
SK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓
SI	✓	✓	×	×	✓	✓	×	×	×	×	×	×	×	×
ES	×	×	×	×	✓	✓	×	×	✓	✓	×	×	✓	✓
SE	✓	✓	×	×	×	×	×	×	✓	✓	✓	✓	✓	✓
TR	✓	▪	▪	✓	✓	✓	▪	▪	▪	▪	▪	▪	✓	✓
Yes	24	22	10	11	21	20	8	8	25	24	9	10	23	21
No	6	6	16	15	3	3	10	9	2	2	14	12	7	8
No answer	2	4	6	6	8	9	14	15	5	6	9	10	2	3
Total	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Yes (%)	75	69	31	34	66	63	25	25	78	75	28	31	72	50
No (%)	19	19	50	47	9	9	31	28	6	6	44	38	22	19
No answer (%)	6	13	19	19	25	28	44	47	16	19	28	31	6	31
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 28 – APM/APDs rules set by law and governmental bodies and NRAs (2/3)

	Have you experienced in your country competition issues on locker/PUDO deployment and management?		Do you have any competences regarding access to lockers (e.g. set access conditions, solve disputes)?		Have you experienced in your country access denial (access complaints) to locker/PUDO?		Are there any rules on locker/PUDO deployment and management set by the law?		Are there any access rules on locker/PUDO set by law?	
	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO
AT	×	×	×	×	×	×	×	×	×	×
BE	×	×	✓	✓	×	×	×	×	✓	×
BG	×	×	×	×	×	×	×	×	×	×
HR	×	×	×	×	×	×	×	×	×	×
CY	×	×	×	×	×	×	×	×	×	×
CZ	×	✓	×	×	×	×	▪	▪	×	×
DK	×	×	×	×	×	×	×	×	×	×
EE	×	×	✓	✓	×	×	×	✓	×	✓
FI	×	×	×	×	×	×	×	×	×	×
FR	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
DE	▪	▪	×	×	×	×	×	×	×	×
EL	×	×	×	×	×	×	×	×	×	×
HU	▪	▪	×	×	×	×	×	×	×	×
IE	▪	▪	×	×	×	×	▪	▪	▪	▪
IT	×	×	×	×	×	×	✓	✓	×	×
LV	×	×	×	×	×	×	×	×	✓	×
LT	×	×	✓	✓	×	×	▪	▪	✓	✓
LU	×	×	✓	✓	×	×	×	×	✓	✓
MT	×	▪	×	▪	×		×	▪	×	▪
ME	×	×	×	×	×	×	×	×	×	×
NL	×	×	×	×	×	×	×	×	×	×
MK	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
NO	×	×	✓	▪	×	×	×	×	×	×
PL	×	×	×	×	×	×	×	×	×	×
PT	▪	▪	✓	✓	▪	▪	×	×	×	×
RO	▪	▪	▪	▪	×	×	×	×	▪	▪
RS	×	×	×	×	×	×	×	×	×	×
SK	×	×	×	×	×	×	×	×	×	×
SI	×	×	✓	✓	×	×	×	×	×	×
ES	×	×	✓	✓	×	×	×	×	×	×
SE	×	×	×	×	×	×	×	×	×	×
TR	×	×	✓	✓	×	×	✓	✓	×	×
YES	0	1	9	8	0	0	2	3	4	3
NO	25	23	20	19	29	28	25	23	24	24
No answer	7	8	3	5	3	4	5	6	4	5
Total	32	32	32	32	32	32	32	32	32	32
Yes (%)	0	3	28	25	0	0	6	9	13	9
No (%)	78	72	63	59	91	88	78	72	75	75
No answer (%)	22	25	9	16	9	12	16	19	13	16
Total (%)	100	100	100	100	100	100	100	100	100	100

Table 29 – APM/APDs rules set by law and governmental bodies and NRAs (3/3)

	Are there any rules on locker/PUDO deployment and management issued by the NRA?		Are there any rules on locker/PUDO deployment and management issued by entities different from NRA (Ministry, municipality, etc.)? E.g. for urban planning, location, layout, accessibility for the disabled		Is there any issue on parcel locker/PUDO development that is pending on some regulatory development in your country? For example, having a physical address for parcel lockers is it problematic?		Does the USP have its own parcel lockers? If yes, is the USP offering access to its parcel lockers? If yes, is the access granted on the basis of regulatory provision or commercial agreements? Do you see a regulatory issue?	
	Locker	PUDO	Locker	PUDO	Locker	PUDO	Locker	PUDO
AT	×	×	✓	×	✓	×	yes	
BE	×	×	▪	▪	×	▪	yes	
BG	×	×	×	×	×	×	no	
HR	×	×	✓	✓	×	×	Y/N/N	
CY	×	×	▪	▪	×	×	Y/N/N/N	Y/N/N/N
CZ	×	×	×	×	×	×	no	
DK	×	×	×	×	×	×	yes	yes
EE	×	×	×	×	×	×	yes	yes
FI	×	×	▪	▪	▪	▪	Y/N/N	
FR	▪	▪	▪	▪	▪	▪	yes	yes
DE	×	×	×	×	×	×	yes	
EL	×	×	×	×	×	×	n/a	
HU	×	×	×	×	▪	▪	yes	yes
IE	×	×	✓	✓	×	×	Y/N/N/NA	
IT	▪	▪	▪	▪	▪	▪	Y/NO/NA/NO	no
LV	×	×	×	×	×	×	yes	no
LT	×	×	▪	▪	×	×	yes	
LU	×	×	✓	✓	×	×	yes	yes
MT	×	▪	×	▪	×	▪	(1) yes (2) no	
ME	×	×	×	×	×	×	no	no
NL	×	×	×	×	×	×	yes	no
MK	▪	▪	▪	▪	▪	▪		
NO	×	×	▪	▪	▪	▪	yes	
PL	×	×	×	×	×	×	Y/N/N/N	no
PT	×	×	×	×	×	×	Y/▪/If yes, commercial agreements/Not until now	
RO	✓	×	×	×	×	×		
RS	×	×	▪	×	×	×	yes	
SK	×	×	×	×	×	×	YES	
SI	×	×	×	×	×	×	Y/N/-/N	Y/N/-/N
ES	×	×	×	×	×	×	yes	
SE	×	×	✓	✓	×	×	YES	YES
TR	×	×	×	×	×	×	YES	YES
YES	1	0	5	4	1	0	26	9
NO	28	28	18	19	25	24	3	5
NO ANSWER	3	4	9	9	6	8	3	18
TOTAL	32	32	32	32	32	32	32	32
YES (%)	3	0	16	13	3	0	81	28
NO (%)	88	88	56	59	78	75	9	16
NO ANSWER (%)	9	13	28	28	19	25	9	56
TOTAL (%)	100	100	100	100	100	100	100	100

5.3.2 Promoting further competition

Main potential competition issues and market failures identified, if a PO/PDSP had SMP in the relevant market, are (see above chapter 5.1.):

- access denial to OOH networks (if, and only if, the infrastructure would be an essential facility).
- excessive or discriminatory pricing for OOH services.
- low quality standards or quality discrimination in the provision of OOH services.
- unreasonable bundling of OOH services with other services (parcel delivery in the case of vertically integrated PO/PDSP or other components which are unnecessary for the provision of the product).

In such cases, the list – not exhaustive – of possible obligations, according to competition policy theory, includes mandatory access to and use of specific network facilities, non-discrimination and transparency rules, and price control such as prohibition of excessive or predatory pricing, undue price discrimination or unreasonable bundling of services.

Obligations would be imposed onto undertakings based on the nature of the identified problem, proportionate and justified in the light of the regulatory objectives, ensuring that the operator:

- meets reasonable requests for access to, and use of, specific network elements and associated facilities, *inter alia* in situations where the NRA considers that denial of access or unreasonable terms and conditions having a similar effect would hinder the emergence of a sustainable competitive market at the retail level, or would not be in the end-user's interest (obligation of access to, and use of, specific network facilities).
- applies equivalent conditions in equivalent circumstances to other undertakings providing equivalent services, and provides services and information to others under the same conditions and of the same quality as it provides for its own services, or those of its subsidiaries or partners (obligation of non-discrimination).
- makes public specified information, such as technical specifications, network characteristics, terms and conditions for supply and use, and prices (obligation of transparency).
- sets prices in line with sustainable competition, efficiency and consumers' welfare maximisation (price control), without excessive burden on end-users, or predatory strategies, undue discrimination or unreasonable bundling of services.

As seen in the regulatory section (see above 5.3), the abovementioned obligations do not belong to standard toolbox for parcel market regulation, and regulatory boundaries on OOH services are not clearly set across Europe and there is some uncertainty on the actual empowerment of NRAs based on the PSD.

To this end, further analyses of the regulatory framework might be appropriate to verify possible amendments to the legal system finalised to clearly define NRAs powers about OOH services. In detail, as far potential competition issues on OOH services are concerned, further analysis could be focused on NRAs capacity to impose, in case of market failure, regarding OOH network and services, obligations on access, non-discrimination and transparency as well as price control.

5.3.3 Improving consumers' protection

Potential consumers' issues associated with OOH services – as analysed above (see section 5.2) – regard three main categories:

- lack of information on OOH services such as their location, prices, pickup timing and conditions, provided security systems, consumers' rights etc.
- disservices and inconveniences such as short pickup time, redirection of parcel to some other APM (or PUDO) point, APM malfunctioning, delay in receiving PIN code, items damaged as lockers box too small etc.
- unsatisfied end-user demand for OOH services, mostly accounted in rural areas where parcel lockers and PUDOs are not close enough to the addressee (but again specific critical cases have not been registered at national levels across Europe).

In such cases, transparency rules and quality controls on OOH services offered by OOH providers may be appropriate i) to ensure complete information on OOH services and ii) to prevent disservices.

Such rules would be applied, if needed, *erga omnes*, that is to all OOH providers, for the benefit of end users.

The primary objective would be, if this is not the case, guaranteeing OOH services information in a clear and timely manner, easily consultable and comparable. In fact, from the consumer's point of view, a partial and incomplete knowledge of OOH services' characteristics could considerably limit the ability to make fully informed choices.

The regulator would therefore identify the relevant dimensions that can contribute to the end user's full knowledge of the OOH services available on the market, i.e. the essential parameters that qualify these services, the forms, times and those responsible for the controls, as well as the communication methods that can be adopted in order to ensure transparent and effective information for the end user.

Such factors should be combined with the scope to guarantee "precision", "understandability" and "immediacy" of the information, balancing "precision", ensured through detailed information, and "understandability", based on simplicity and synthesis.

The availability of clear, comparable and easily consultable information, i.e. the transparency of the technical and economic conditions for the provision of OOH services, also represents a tool for promoting competition: the consumer is fully informed about the different economic and technical conditions of the services offered by various POs/PDSPs and will have an interest, ceteris paribus, in changing supplier to take advantage of the offers considered most advantageous and convenient, given the consumption profile. In this way, end users aware of prices charged by the different operators and of any variations established by one of them can respond to the increase in final delivery prices by changing the quantity requested, as well as the service provider. Therefore, operators would be refrained (disincentivised) to set high and excessive prices for OOH delivery services.

Therefore, regulatory measures that might be considered useful, in specific circumstances, to increase the ability of OOH consumers to optimise their choices and thus to benefit fully from competition are:

- Transparency and publication of information, encouraging the publication of detailed, clear, accurate, comprehensive, and comparable information on OOH terms and conditions (prices, characteristics etc).

- Control on quality of OOH services, monitoring disservices and inconvenience experienced by consumers.

As seen in the regulatory survey (see above section 5.3.1), boundaries of regulatory powers on OOH services are not clearly set across Europe and some uncertainty raised on the actual empowerment of NRAs based on the PSD.

To this end, further analyses of the regulatory framework might be appropriate in order to verify possible amendments to the legal system finalised to clearly define NRAs powers with regard to OOH services. In detail, as far OOH consumers' protection is concerned, further analysis could be focused on NRAs capacity to adopt measures on *i)* transparency and publication of information on OOH services, and *ii)* control of quality of OOH services to address potential OOH consumers' issues.

5.3.4 Incentives for OOH network installations

End-users' unsatisfied demand, as abovementioned, may occur in OOH services. Such situations would be (more) likely to verify if an undertaking operating in the relevant market had SMP, that is to say a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers. Under-investment in OOH networks may also occur in the presence of externalities, e.g. if the private price of home delivery is lower than its social price (including for example negative externalities such as pollution and C02 emission).

In general, i) the number of APMs in Europe is constantly growing, also in rural areas, ii) where APMs are not available, other OOH services might be present, and iii) the parcel market would be competitive so far, so incentives for installation of APM networks may be seen as not strictly necessary if other OOH services would meet users' needs and provide the efficiency and delivery cost savings searched by the PO/PDSP.

On the other hand, i) consumers' value OOH services, ii) coverage of APM is far from total population (not only in rural areas), iii) APM networks could have a direct and positive green effect, and iv) competitive bottlenecks may materialise, so in specific areas or circumstances incentives to the installation of APM networks might be considered.

If this is the case, the policy maker (not necessarily the NRA though) has different tools to incentivise the installation of APM networks. According to the ERGP survey, main tools are re-use of existing resources (i.e. phone box, newspaper kiosks, etc.), regulatory (i.e. simplification, such as no end user signature at the withdrawal), administrative (i.e. procedural harmonisation at local level for their installation in public areas or private premises), legislative (i.e. urbanistic rules such dedicated locker areas in new buildings), technical (i.e.

harmonisation and standardisation of terminals/interoperability between tracking systems, etc.), and fiscal (i.e. tax reduction for investments) solutions (table 26).[64]

Table 30 – Incentives for parcel locker deployment

	Re-use of existing resources	Regulatory solutions	Administrative solutions	Legislative solutions	Technical solutions	Fiscal solutions
AT	MEDIUM	HIGH	LOW	HIGH	LOW	MEDIUM
BE	MEDIUM	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM
BG	LOW	HIGH	MEDIUM	HIGH	MEDIUM	HIGH
HR	LOW	MEDIUM	HIGH	HIGH	HIGH	MEDIUM
CY	HIGH	MEDIUM	HIGH	HIGH	LOW	HIGH
CZ	LOW	LOW	MEDIUM	MEDIUM	LOW	LOW
DK						
EE	LOW	HIGH	HIGH	LOW	MEDIUM	LOW
FI	LOW	LOW	LOW	LOW	LOW	LOW
FR	MEDIUM	HIGH	HIGH	HIGH	LOW	HIGH
DE						
EL	MEDIUM	HIGH	HIGH	HIGH	HIGH	HIGH
HU	LOW	HIGH	HIGH	HIGH	HIGH	MEDIUM
IE						
IT	LOW	MEDIUM	HIGH	HIGH	HIGH	HIGH
LV			MEDIUM	HIGH	MEDIUM	HIGH
LT	LOW	MEDIUM	LOW			
LU						
MT	LOW	LOW	HIGH	MEDIUM	HIGH	HIGH
ME						
NL						
MK						
NO	LOW	MEDIUM	MEDIUM	LOW	MEDIUM	MEDIUM
PL	LOW	LOW	LOW	LOW	LOW	HIGH
PT						
RO						
RS	MEDIUM	HIGH	LOW	MEDIUM	LOW	MEDIUM
SK	LOW	HIGH	MEDIUM	LOW	MEDIUM	HIGH
SI						
ES	MEDIUM	LOW	LOW	MEDIUM	LOW	LOW
SE	LOW	LOW	MEDIUM	MEDIUM	LOW	LOW
TR	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
Total low	13	7	6	5	9	5
Total medium	6	5	7	6	6	6
Total high	2	9	9	10	6	10
Total no answer	11	11	10	11	11	11
Total	32	32	32	32	32	32
Total low (%)	41	22	19	16	28	16
Total medium (%)	19	16	22	19	19	19
Total high (%)	6	28	28	31	19	31
Total no answer (%)	34	34	31	34	34	34
Total (%)	100	100	100	100	100	100

Source: ERGP Access and Interoperability WG

[64] Tools for incentivising OOH networks have been analysed by Agcom, the Italian postal regulator in 2021 (see Agcom decision n. 117/21/CONS).

According to the ERGP survey, most effective tools are legislative and fiscal levers (10 "high" answers out of 32), as well as regulatory and administrative solutions (9 "high" answers out of 32). Technical measures (6 "high" answers out of 32) and favouring re-use of existing resources (2 "high" answers out of 32) are deemed less powerful to incentivise APM network deployment.

In detail, having said that intervention might not be supported by market evidence since scarcity of parcel lockers is not everywhere noticed and recipients anyway may have access to PUDOs in their surrounding area, each option could boost competition, making it easier for competitors to roll out a network of parcel lockers.

The re-use of existing resources may prevent problem of limited public spaces. The surface of the telephone booths would allow the installation of low-capacity lockers, whereas newspaper kiosks may fit the goals (but they would be similar to PUDO kiosks). Location is a key variable: consumers could prefer to pick up parcels in more secure places (malls, shops…) rather than in the street (e.g. PLNs use supermarkets to install their parcel lockers that in return increases number of consumers visiting the premise).

Regulatory solutions are enlisted because APM are seen as an additional option for end-users, as such a gain for recipients and operators (cost savings). For example, mandatory signature of the addressee, if requested by regulation, might be removed, and substituted by QR-codes and PIN codes, already in use in APM networks, in order to speed up parcel locker installation: the pin code sent to the phone to open the locker could be treated as a signature. No signature is required with the parcel locker use, just the pin code received by email/SMS/push notification.

Administrative solutions might be used to reduce bureaucracy and to build fast lane procedure for APM installation. Each municipality has its own ordinances, making difficult the implementation of the investment on the ground. APM providers may therefore benefit of *a)* harmonization across the municipalities on the approval process for installation of lockers *b)* standardisation of rules and processes at a local administrations level. With increasing number of boxes from different operators and their accumulation in public spaces, the need to guide their placement will gradually increase.

Legislative solutions are deemed effective especially for specific cases e.g. if for the new buildings (with a minimum number of residents) would be mandatory to reserve space for lockers.

Regarding interoperability in open access lockers, technical aspects don't appear invasive since PDSPs just need to integrate with the IT system of those lockers providers. Anyhow, any technical issue needs to be raised in front of standardization institutions in case interoperability problems would eventually arise.

Fiscal costs should be assessed respect to social savings in terms of environmental impact (reduction of emission).

Other solutions may be contemplated such as:

a) Open the Postal Outlets to other PDSPs.

b) Monitor the commercial practices of the main PLNs/PUDOs which may have a very aggressive pricing strategy, such as exclusivity conditions in their contracts.

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6 Conclusions and recommendations

In recent years (2019-2022) parcel delivery service volumes have grown by almost 44% and revenues have increased by 45%. In 2022, POs/PDSPs in Europe delivered more than 11,5 billion postal parcels.

The intense development of the parcel market has stimulated innovation in delivery. Along with the traditional "at home" delivery services, ever increasing are OOH delivery solutions: parcel lockers and other receptacles in buildings (home boxes), delivery in convenience points such as PUDOs, Post Offices and postal outlets. In 2022, almost 10% of total parcels were delivered to APMs (compared to 8% in 2019) while deliveries to APDs amount to 16,5% of total deliveries (compared to 13% in 2019) (see table 4 for details and countries included). OOH delivery (APD+APM) accounts for nearly 27% of total deliveries in 2022, it was about 21% in 2019[65].

Literature review

Such trend is closely examined by the ERGP, NRAs, and research entities. In recent years, the ERGP thoroughly investigated parcel delivery markets.

In parallel, NRAs promoted specific initiatives on OOH parcel delivery services.

European and world-wide parcel delivery markets (and OOH services) have been analysed by many research entities too (see annex 1).

The ERGP, in this report, starting from updated evidence on **market development** and **technological innovation** further investigated **potential competition problems** emerging from issues related to access to the infrastructures for parcel delivery **and explored what possible remedies** could be appropriate to solve such problems.

Market developments

Last-mile value chain is evolving with the occurrence of OOH services. Traditional home delivery services imply the delivery of parcels at the addressee location and to the receiver's hand, whereas OOH delivery solutions allow the recipient to withdraw parcels in the neighbourhood, in specific places where parcels are stored:

a) Automated Parcel Machine (APM), such as:
   a. Parcel Locker (PL).
   b. Home Parcel Delivery Boxes (HPDB).

b) Assisted Parcel Delivery (APD), such as:
   a. Pick-Up Drop-Off (PUDO) point/premise.
   b. Postal outlet Point/facility (PoP).
   c. Post office of USPs.

[65] Based on weighted average volumes of 11 European countries providing that data (BE, HR, CZ, HU, IT, MT, NL, PL, RO, ES and SE).

Consumer needs have been evolving. Users increasingly expect the possibility to choose the time slot (within the entire day – 24 hours per day), the day of the week (7 out of 7, regardless of holidays) and the place (not necessarily at home) for receiving the parcel. The customer experience for parcel delivery is ever more oriented to just-in-time services, and home and OOH solutions are complementary methods to meet such evolving demand, given that APMs and APDs are flexible solution for consumers, adaptable to their lifestyle.

POs/PDSPs, accordingly, have been developing home and OOH delivery methods capable to fit more adequately on users' needs and to satisfy growing demand: parcel delivery services have become "receiver-oriented", with value-added services such as tracking, delivery notice alerts (e.g. text messages, e-mail) and apps for scheduling deliveries. OOH delivery is seen as a cost-efficient solution for carriers, reducing the risk of unsuccessful delivery at first attempt and cutting last-mile delivery costs.

The market is investing in APM and APD networks. Across ERGP countries, in 2023, there are at least 322 OOH networks (APMs+APDs) and over 360 thousand facilities. In detail:

- APM networks are around 117 and the total number of lockers installed is about 110 thousand of points (data referred to end 2022), nearly 2,5 times more compared to 2019.
- APD networks are more than 200 with around 250 thousand of points, including USPs post offices, other PDSPs' agencies (postal outlets) and third-party retailers' points (PUDOs).

POs/PDSPs own the vast majority of the 322 European APM/APD networks: in total 207, split by 85 post offices/postal outlets, 41 PUDOs and 81 APMs. Within POs/PDSPs, most USPs have the largest OOH coverage, based on post offices, third party agencies and APM networks (installed by the USP or to be installed in the next future). White label providers are present in both APM and APD parcel delivery services, owning at least 13 APM networks and tens of PUDOs networks. Such firms (and networks) therefore are involved in the delivery of millions of parcels every day in Europe.

APMs and APDs strategies rely mainly on closed business models, accounting over two-thirds of the ERGP sample. POs/PDSPs usually adopt closed business models and white label providers tend to implement open networks strategies.

Pricing structure of OOH services is mainly based on wholesale payments from POs/PDSPs to OOH providers, with usually variable pricing proportionate to volumes (per each parcel, the OOH provider takes a percentage amount, or a specified fee, from the PO/PDSP).

Nevertheless, classification of networks per ownership, business model, and pricing structure has not been provided by NRAs in many cases, as evidence that further analysis should be performed in order to standardise data collection in the future where remit of NRA facilitates collection of such data.

Recommendations in the field of market development are:

- The incessant transformations of parcel delivery markets suggest the opportunity to keep up with monitoring OOH services demanded by users and supplied by operators, also with specific regard to consumers' needs for universal services.

- NRAs – where data collection powers allow – should monitor how the OOH sector impacts on last mile activities and some guidelines could be produced by ERGP to standardise/harmonize data collection for OOH services (i.e. ownership, business model, and pricing structure), given the different approaches observed across ERGP countries.

Technological issues

ERGP, in this report, examined the technological aspects associated with parcel lockers and PUDO points and, more generally, the issue of innovative solutions in relation to parcel delivery.

Types of hardware used for parcel lockers are various, most of which are modular devices allowing for different size of drawers. The software for booking and management of the lockers is used by the operators themselves or installed by the manufacturer, with application programming interfaces (APIs) being used most often for communication. For data transfer and network connection, the most common connection is mobile (SIM), less often WAN, Wi-Fi or fixed connection. Recipients get notification usually by SMS or email. PIN, barcode or QR code and eventually mobile application are the most common ways to access the drawer with the stored parcel.

Delivery of parcels in PUDO points rely mainly upon presentation of code received by SMS or e-mail and/or upon proof of identity with an ID card.

Main innovations in parcel delivery are real-time tracking of parcel (postal delivery vehicle) during the delivery process, and in the future the use of drones, that is in the testing phase in some countries. Furthermore, ever increasing is the number of operators that make APM and APD conveniently accessible for the residents with mobility disabilities or adapted to serve persons with visual impairments.

Recommendations in the field of technological innovations are:

- Periodical and standardised data collection on OOH technological innovations might be useful for eventual regulation of access to parcel lockers or PUDO points or dispute resolution (even in the scope to enable ever more the access for people with locomotor disabilities or blind, given users' preference to use parcel lockers), and common guidelines might be suggested in the future by ERGP for NRAs whose remit facilitates collection of these data.

Competition, consumer and regulatory issues

The last-mile parcel delivery market is evolving, with OOH services ever more relevant in the shipment process. OOH services are provided by either POs/PDSPs or white label operators.

The market design can be divided in three main categories: traditional "at home" structure, vertically integrated solutions (PO/PDSPs own their APM/APD network) and procurement methods (PO/PDSP purchases storage services, either APM or APD, from white labels or other PO/PDSPs). In a nutshell, the vertical integration case differs from "at home" case because parcel stops at the APM/PUDO point, where the addressee picks-up the parcel. In the procurement model, in addition, there is a monetary transaction between APM/APD provider and the PO/PDSP (including transactions between a vertically integrated postal operator and a PO/PDSP without its own APM/APD network).

Development of OOH delivery services, in recent years, relied on market forces and without public intervention. In ERGP countries, wider range of services is provided, different pricing schemes are offered to the market, OOH parcel delivery prices are usually different and lower than "at home" delivery, both open and closed strategies are implemented by operators. In this environment, abovementioned data support the presence of a certain degree of competition across Europe in the provision of OOH services.

NRAs, as a matter of fact, haven't experienced so far competition issues on parcel locker/PUDO deployment and management, and no major antitrust cases have recently been reported. Likewise, NRAs received no major complaints so far, according to the collected evidence, regarding eventual access denial (access complaints) to parcel lockers/PUDOs. A potential competition issue, in this context, might be represented by access denial if, and only if, the infrastructure would become an essential facility.

ERGP, however, investigated a) potential competition, b) consumer and c) OOH network deployment and investment issues in OOH provision.

Potential competition issues in case of SMP in parcel delivery market, might be:

- access denial.
- excessive price or discriminatory pricing.
- different quality levels (non-price issues, such e.g. quality discrimination, withholding information, etc.).
- services unreasonably bundled to parcel delivery, in case of vertically integrated PO/PDSP, or to other components which are unnecessary for the provision of the product, in case of white label providers.

In such cases, the list – not exhaustive – of possible obligations, according to competition policy theory, includes mandatory access to and use of specific network facilities, non-discrimination and transparency rules, and price control such as prohibition of excessive or predatory pricing, undue price discrimination or unreasonable bundling of services. All these measures would apply only in case of SMP operator.

Recommendations in the field of competition promotion are:

- Given that obligations deriving from competition policy theory do not always belong to standard toolbox for parcel market regulation, regulatory boundaries on OOH services are not clearly set across Europe and there is some uncertainty on the

actual empowerment of NRAs based on the PSD/Cross-border parcel regulation, further analyses of the regulatory framework might be appropriate to verify possible amendments to the legal system to establish NRAs powers about OOH services.

Potential consumers' issues associated with OOH services regard three main categories:

- lack of information on OOH services such as their location, prices, pickup timing and conditions, provided security systems, consumers' rights etc.
- disservices and inconveniences such as short pickup time, redirection of parcel to some other APM (or PUDO) point, APM malfunctioning, delay in receiving PIN code, items damaged as lockers box too small etc.
- unsatisfied end-user demand for OOH services, most likely reported in rural areas where parcel lockers and PUDOs are not close enough to the addressee (but again specific critical cases have not been registered at national levels across Europe).

In such cases, transparency rules and quality controls on OOH services offered by OOH providers may be appropriate i) to ensure complete information on OOH services and ii) to prevent disservices.

Such rules would be applied, if needed, to all OOH providers, for the benefit of end users.

Recommendations in the field of consumer protection are:

- Further analyses may be envisaged on the legal basis and on possible amendments to the PSD/Cross-border parcel regulation in order to introduce clear specification for transparency and quality controls on OOH services and what role NRAs could have to protect OOH users.

Network deployment and investment issues may arise in specific areas or circumstances: the coverage of APM networks might be considered insufficient and the public sector might contemplate incentives for APM installation.

The policy maker has different tools to incentivise the installation of APM networks. According to the ERGP survey, main tools are re-use of existing resources (i.e. phone box, newspaper kiosks), regulatory (i.e. simplification, such as no end user signature at the withdrawal), administrative (i.e. procedural harmonisation at local level for their installation in public areas or private premises), legislative (i.e. urbanistic rules such dedicated locker areas in new buildings), technical (i.e. harmonisation and standardisation of terminals/interoperability between tracking systems, etc.), and fiscal (i.e. tax reduction for investments) solutions.

Recommendations in the field of OOH network deployment and investments are:

- Most effective tools for incentivize network deployments and investments in OOH services are legislative (i.e. urbanistic rules such dedicated locker areas in new buildings) and fiscal levers (i.e. tax reduction), as well as regulatory (i.e. simplification, such as no end user signature at the withdrawal) and administrative solutions (i.e. procedural harmonisation at local level) whereas technical measures (i.e. harmonisation and standardisation of terminals) and re-use of existing resources (i.e. phone box, newspaper kiosks) are deemed less powerful to incentivise APM network deployment.

- public entities (not necessarily the NRA) may adopt different incentivizing tools, and their effectiveness could be maximised with a coordinated approach.

- Postal NRAs may have a coordinating role, making worthwhile further analysis on potential coordinating powers, and activation of moral suasion activities by postal NRAs.

In parallel, the analyses noticed that no specific powers for OOH regulations are granted in PSD/national law. However, evidence does not always seem to be clear, reflecting uncertainty in actual legal framework on OOH services, with some members stating that although there are no sector-specific regulations for this area, there are various tools for data collection and monitoring, consumers' protection, dispute resolution and handling complaints when OOH services are at stake.

Regulatory powers should in any case be strictly connected to the authorization/licensing regime. Across Europe, in most cases APM/APD owners do not need authorization, although not everywhere. On one hand, PLNs' and PUDOs' are providing services in the name of the PO/PDSP, that own the authorization. On the other hand, parcel delivery at the locker can be seen as part of the distribution activity, considering that the "storage" phase of the package in the parcel locker comes before the moment of collection by the recipient/addressee (and moreover in some cases the locker can also perform a "collection" function, working like a "red post-box", i.e. an access point to the network).

Recommendations in the field of NRAs' powers are:

- In-depth analysis of the EU legal framework might be appropriate with the goal to promote standard and common practices across ERGP countries for OOH services.

- Clearer definition of PLNs and PUDOs and the possibility to further specify NRAs' competences regarding OOH networks and services (e.g. data gathering provisions connected to the monitoring exercise cited above) might be further analysed in the scope of the review of the EU postal regulatory framework.

In general, the future regulatory framework – given abovementioned a) potential competition, consumers' and investment issues, b) uncertainty on the regulatory framework in place – might clearly specify the elements of postal infrastructure regarding parcel delivery services (irrespectively of being out the universal service scope) so that the NRAs can monitor them, verify that parcel delivery service markets work appropriately, only performing a regulatory action if necessary. Therefore, parcel locker networks and the undertakings operating and maintaining them might be clearly defined in the new regulatory framework in order to ensure similar competences to NRAs and, consequently, favouring harmonised access provisions for OOH services.

To this respect, the ERGP recognises the need to further investigate possible amendments/overhauling, with regard to OOH delivery services, to the European legal framework. Evidence collected within this report will be therefore taken into account in ERGP future works, starting from the ongoing analysis leading to the predisposition of the ERGP Report on the outline of the future postal regulatory framework, due next year.

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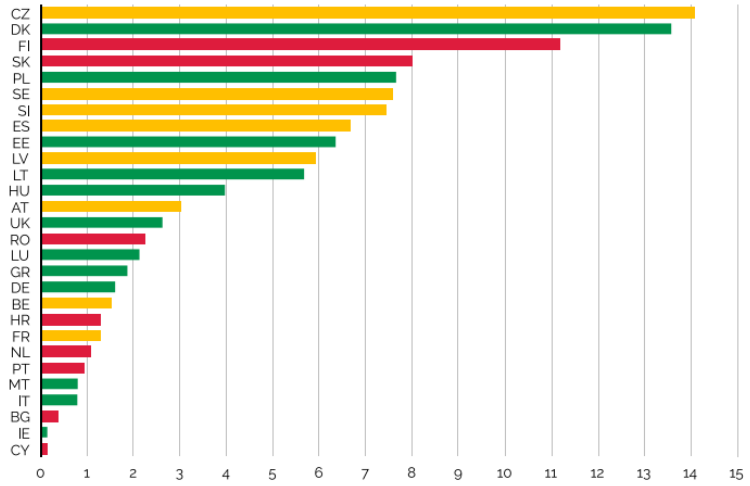
Annex 1 - Literature review (academic and consulting)

A study led by the University of Lund in 2023[66] shows that parcel lockers carry a substantial potential to reduce the negative environmental and social effect of e-commerce logistics. They can contribute to minimize the emissions associated with the deliveries, and the noise pollution. From a social perspective, they can contribute to increase service availability, the attractiveness of residential areas and the road safety. However, they are not yet utilized strategically for this. The primary focus tends to be on their financial benefits and the urgent need to increase handling capacity by PDSPs. The Swedish PLN market is not set yet: (1) PLN infrastructure is expanding, (2) legislation is changing, (3) the ways market actors incorporate PLNs in their operations and business models are not set yet. Most environmentally pleasing scenarios would require a high degree of collaboration and open systems, which is possible in Sweden given market openness to innovation, flexibility, and collaboration history but this is not the situation yet.

Furthermore, the study found that deliveries in Sweden are heavily dominated by OOH modes, particularly the use of attended delivery points and parcel lockers, which account for 75% of all deliveries. This places Sweden among the highest in Europe for OHH delivery adoption, second only to Finland. In 2022, 10% of Sweden's deliveries were performed through parcel lockers. In the last quarter of 2022, 14% of PostNord's deliveries were performed through parcel lockers in both large and small towns, in comparison with 2% in 2019 and 5% in 2020. In 2022, DHL utilized lockers for 18% of the deliveries. According to expert estimates[67], a viable PLN requires at least 1 station per 10,000 inhabitants. In Sweden, there would be around 7,5 stations/10,000 inhabitants.

Figure 8 - Number of Parcel Lockers per 10,000 inhabitants in the EU and the UK in 2022



Source: OOH Delivery in Europe 2023, by Last Mile Experts.

[66] Parcel Locker Policy: Review and Future Directions. Available at: https://aster.lindholmen.se/en/project/parcel-locker-policy.

[67] The study cites the report OOH Delivery in Europe 2023 conducted by Last Mile Experts.

The Nordic study states that parcel lockers have become popular due to the following advantages: >99% successful first-time delivery, flexible to sudden volume changes (modularity and scalability), consolidation, high capacity per delivery point, independence from consumer, and control over the consumer experience. There is a potential 15.7% reduction[68] in total distribution costs, driven by the introduction of parcel lockers complementary to the existing delivery network, which can lead to increase in operations efficiency and a reduction in fleet size. In Sweden, parcel lockers are available in different forms of hardware and business models. Besides the most common form with the 30-100-cell kiosks operated by a dedicated carrier, there are also offers of individual household lockers (e.g., E-drop by Nowaste Logistics), as well as agnostic (open) system parcel locker prover (i.e., IBoxen). Moreover, an increasing number of supermarket chains are collaborating with delivery and e-commerce companies to implement parcel lockers at their branches. However, such partnerships entail both positive and negative factors, including capacity limitations, opening hours, security, and parking space availability.

Examples of these collaborations can be found in Lind in Poland and Lithuania, as well as in Sweden, where COOP and ICA have joined forces with Instabox, Budbee, PostNord, and others. PDSPs in Sweden further utilize the same approach to placement, by setting agreements with private landowners.

A study conducted with Swedish consumers has demonstrated that parcel lockers enable the creation of functional, financial, emotional, and social values.[69] As parcel lockers continue to expand and gain popularity in various markets, consumers have become more accustomed to the technology. In Europe, high satisfaction rates with parcel locker deliveries have been consistently reported in DE, PL, FR, SE, NO, FI, DK, UK, NL and all other developed e-commerce markets where data is available. The study identifies the latest scientific reports demonstrating that parcel lockers have a superior environmental performance compared to other delivery modes. However, the effectiveness of this conclusion depends on factors such as location (distance to the consumer and vehicle routing), utilization rate, and network and service design. The research identifies 4 case studies: Poland, Norway, Sweden and Singapore[70].

The study identifies PL as a case of self-regulated market. PL would be the "locker land" due to the highest number of parcel lockers among all European countries, with DE on the second place with roughly half the number of lockers. In 2023, InPost's number of lockers in PL reached 20,000. 81% of PL's consumers utilize parcel lockers for their deliveries, while courier deliveries to home and office are also high (43%). The PLN expansion has been largely self-regulated by the market. Its high locker density leads to high service availability, high rate of successful first-attempt deliveries, short pick-up distances, high handling capacity, high consolidation, infrastructure redundancy and opportunistic locker placement.

Norway is identified as a case of permissive policies in an open market. In 2020, Norway Post found that the optimal distance for placing pick-up locations in urban residential areas for consumer convenience is 350 meters, with a maximum acceptable walking distance of 500

[68] Figure obtained from Van Duin, J.R., Wiegmans, B.W., van Arem, B., and van Amstel, Y. (2020), "*From home delivery to parcel lockers: A case study in Amsterdam*", Transportation Research Procedia, Vol. 46 No., pp. 37-44.

[69] Finding from Vakulenko, Y., Hellström, D., and Hjort, K. (2018), "*What's in the parcel locker? Exploring customer value in e-commerce last mile delivery*", Journal of Business Research, Vol. 88 No., pp. 421-427.

[70] See the mentions to country cases not belonging to the EEA at the end of the Annex.

meters. Such a "slipper distance" slightly varies among European countries (e.g. 300 m in SE) and acts as a threshold indicator, signalling when consumers are likely to switch to environmentally friendly transportation modes, such as walking or biking, for their pick-up trips.

The first conclusions[71] of a pilot project in 2022 in diverse municipalities in the area of Oslo are: parcel lockers shows potential of reducing the traffic load from last mile deliveries compared to manned pick-up points and home delivery; although travel habits depend on location, consumers use car less frequently compared to other delivery locations; PDSPs drive relatively few kilometers on average per parcel delivered in a parcel locker; consumers prefer to collect parcels from parcel lockers at known locations (in the residential area) or on known journeys (at the store or a public transport hub); municipalities have greater leeway to regulate parcel lockers than they use today, e.g. via the Planning and Building Act, permits and procurement rules, local guidelines and cooperation; shared parcel lockers can be a good solution, but the organization must be carefully considered to avoid a poorly utilized network resulting in more kilometers driven per parcel for the PDSPs than the current solution; currently, the large PDSPs with their own PLNs, generally are positive about regulation of parcel lockers, accept to share locations, but not parcel lockers. The pilot study demonstrated that parcel lockers are the most efficient last mile delivery solution, with the lowest total (i.e. consumer+PDSP) traffic load in terms of average kilometers driven per parcel when compared to delivery at a shop/kiosk (i.e. PUDOs) or home delivery options. On the other hand, the least traffic load for the PDSPs would be delivering via PUDOs.

Sweden is identified as a case of restrictive policies in open market. In 2023, after a 1,5-year pilot project, Trafikkontoret in Stockholm introduced restrictions prohibiting the placement of parcel lockers within a 300-meter radius from the closest parcel agents on the public land. As a result, several PLNs involved in the project (e.g. PostNord and IBoxen, the latter, as agnostic (open) parcel lockers) were compelled to either remove or relocate their parcel lockers from the city zone of Stockholm. The initial offers for alternative land for relocation within the city zone were considered too costly by the PLNs operators. The Stockholm case is an example of a market with fast-paced trends, resulting in reactive policies of a restrictive and compensating nature.

The study detects that the utilisation of parcel lockers as a tool to facilitate the environmental transition of e-commerce delivery services can be enhanced through incentivizing and promoting systematic data collection and sharing, environmentally-driven strategic PLN design, consolidation and an holistic system approach to policy development.

The study finds that open systems are highly favoured by various stakeholders, as they offer the potential for sustainable relationships with consumers and parties responsible for issuing parcel locker placement permits. However, it's important to note that the environmental benefits are conditional and not guaranteed. In Sweden, the expansion of PLNs faces certain restrictions due to the strong social agenda and decentralized governing structure. Therefore, strategic and holistic design of PLNs becomes crucial. Consolidation, thorough environmental assessments, and disclosure of operational data need to be considered in order to support informed decision-making.

[71] Research by Caspersen, Jordbakke and Knapskog (2023) titled "Pakkeskapets uforløste potensial Erfaringer fra Drammen, Asker, Bærum og Oslo".

As commented by the white label PLN in Vienna area called Wienbox[72] with occasion of the ERGP Public workshop on environmental sustainability hosted by ANCOM in Bucharest in November 2023, PLNs can help to save up to 40% in CO_2 emissions thanks to more efficient deliveries. Wienbox makes it possible to receive, return, deposit and temporarily store shopping, parcels, laundry orders and more (e.g. deposit of lost items). With a slipper distance of around 250 meters, Wienbox has gained popularity among Viennese citizens. The PLN is available to all PDSPs, strengthens local businesses and promotes cooperation. It saves resources (time, CO_2 emissions) and supports the achievement of climate goals. It aligns well with Smart City Vienna initiatives and is an integral part of urban planning. The website 'wienbox.at' shows all white label parcel lockers which are already in operation in Vienna and the surroundings. There are more than 400 lockers, reckoning over 16,000 drawers, used by 7 PDSPs. The website allows search options for Address, Operator and Use case. However, Wienbox faces a challenge in Austria as parcel lockers currently do not have addresses.

They claim that PDSPs have to deliver parcels to residential or business addresses, involving at least one personal delivery attempt. The more efficient, bundled delivery can have an energy-saving effect. The receiver should have freedom of choice either specifying the address of a parcel locker within a slipper distance or specifying the home address (important for people with limited mobility). Addresses for parcel lockers also make it easier to find a route to that infrastructure in navigation. The Austrian address register is the official address database of Austria, continuously maintained by the responsible municipalities and cities. Wienbox deems that a legal solution is needed in the long term for direct posting to parcel lockers with an address.

Prof. Dr. Andreas Breinbauer and David Strauß (University of Applied Sciences BFI Vienna) have produced several papers on the Wienbox case. In a survey run to consumers in the Vienna District 23 (Kaufpark Alterlaa)[73], they concluded that the most important categories regarding a white label PLN would be the slipper distance, the interface management as well as the technical and physical implementation.

They provide in another research[74] the distribution and density of PLNs in 28 European countries, with data of September 2021. They found that white label PLNs can have positive environmental effects and the adequate design regarding their location and density are very important to reach such goals. The Scandinavian and Baltic countries, along with Poland, were identified as the first movers with high-density networks. They found[75] that the density of lockers in the countries studied cannot be explained (no direct correlation) by the share of e-commerce. A total of 62,886 lockers were identified, with the largest numbers in Poland (17,300), Germany (8,031) and Ukraine (7,065). They deem that, in the future, city logistics networks will use parcel lockers not only as delivery and collection points, but also as

[72] Presentation "Wienbox, An innovative approach to city logistics of the future", by Stefan Tichacek, available at: https://ec.europa.eu/docsroom/documents/57241.

Further information on this Vienna's carrier-neutral PLN can be found at: https://www.thepostalhub.com/podcasts/episode-332-wienbox-vienna-parcel-lockers.

[73] Working Paper Series, "*The Customers Perspective: Erfolgskriterien von Parcel Lockers aus Perspektive der Nutzer:innen -eine induktive qualitative Inhaltanalyse*", Article · February 2023.

[74] Paket-und Umschlagsboxen als innovative Lösung der "Last Mile"- Problematik in Europa?, Article December 2022.

[75] Parcel Lockers: Success Factors And Current Distribution In 28 European Countries, Conference Paper · May 2022.

alternative transshipment points for platform transactions and for click-and-collect purposes.

WIK[76] (2023) specifically examines the market conditions for carrier-agnostic PLNs in 3 countries (AT, NL and SE) and compares them with the German parcel market The study identifies the reasons for the low presence of providers for carrier-agnostic parcel locker stations in DE and discusses the sustainability of this solution compared to door delivery and proprietary parcel locker stations. Carrier-agnostic PLNs can represent a low-emission delivery option[77]. However, one prerequisite for this is that recipients use sustainable means of transport for collection; otherwise, this delivery option can also cause more emissions than delivery to the door. Lockers at decentralised locations or at highly frequented hotspots create different incentives for collection by car, on foot or by bicycle. Compared to proprietary networks, agnostic lockers have the advantage that they can also be used by PDSPs without financial resources to set up their own stations. As a result, this potentially more sustainable delivery option would be available for a higher proportion of parcels. Provider-neutral stations can also be operated economically in areas where a proprietary network cannot cover all the capacity. Parcel locker providers have a major influence on recipient behaviour and the resulting emissions through their choice of location. Three factors are hampering the success of provider-neutral PLNs in DE: the strong position of Deutsche Post DHL for this delivery option and its early market entry with the DHL Packstation; difficulties in finding locations for neutral providers, especially when working with local authorities due to a large number of bureaucratic requirements; the digital skills of Germans and their willingness to utilise innovations are relatively low by international comparison. Driving factors are a competitive parcel market with many players without own locker networks and the cooperation between locker providers and online retailers to integrate the option into online shops. Carrier-agnostic PLNs are an opportunity for PDSPs without proprietary locker networks to utilise the advantages in terms of emission reduction on the last mile. In order to make better use of its sustainability potential, the legal framework for approval at municipal level could be reviewed and decision processes made more efficient. The partially low level of knowledge about the concept of carrier-agnostic PLNs and the advantages and disadvantages from a municipal perspective could be addressed by knowledge transfer measures. More detailed monitoring of developments by the NRA following the practice of regulatory authorities in countries such as SE or NL, would contribute to improved market transparency. The study identifies diverse white label PLNs (open) in the countries analysed: in NL (De Buren, MyPup and BringMe), in AT (the Wienbox cooperative platform, with several white label actors involved: Myflexbox, A1, Storebox, Tamburi, Renz and Variocube), in SE (iBoxen) and in DE (Myflexbox and World of Lockers).

The Postal Hub[78] (2024) recently reported that DHL has launched a new carrier-neutral parcel locker network in Germany, called OneStopBox, offering both parcel delivery and parcel drop-off. The new DHL subsidiary plans to create a network of several thousand parcel locker banks.

[76] WIK • Diskussionsbeitrag Nr. 505, *Kooperative Paketinfrastruktur für nachhaltige Zustellung: Anbieterneutrale Paketstationen*, Sonja Thiele, Dezember 2023. Available (in German) at: https://www.wik.org/en/publications/publication/diskussionsbeitrag-zu-anbieterneutralen-paketstationen-nr-505.

[77] The ERGP notes that the advantage of lower emissions per parcel delivered through an APM would be a common feature of both proprietary and carrier-agnostic PLNs. Hence, coexistence and interoperability among such networks could contribute to greener deliveries and optimised capacity utilisation.

[78] Published on 19 March 2024: https://www.thepostalhub.com/blog/dhl-onestopbox-parcel-locker.

This open network to PDSPs will operate in addition to the existing DHL Packstation (closed) network. Retailers will also be able to drop off purchases at these parcel lockers, giving customers the click-and-collect option. In the first stage, around 100 OneStopBox machines will be installed in 2024, starting with larger German cities. Around 2,000 parcel locker banks are expected to be installed in 2025, complementing the existing network of approximately 13,000 DHL Packstations. The white label PLN Myflexbox entered the German market in late 2022, and now has almost 200 parcel locker banks installed across the country, compared to over 500 parcel locker banks in its home market of Austria. Its parcel lockers are open to PDSPs, e-commerce and retailers. In the Netherlands, PostNL announced at the beginning of 2024 its intention to open up its own PLN to other PDSPs This differs to DHL's approach of creating a subsidiary-operated carrier-neutral network to supplement its existing carrier-specific PLN.

Last Mile Experts (2023) states that the impact on consumer uncertainty caused by the war in Ukraine coupled with a return to the high street led to a dip in the parcel market in 2022[79]. The market is expected to recover in 2023, partly because Europe records some of the highest rates of e-commerce user penetration, with Norway, the UK and Germany boasting the three largest user penetration rates worldwide in 2022, at 82.8%, 82.7% and 80.6%, respectively. The European Courier Express and Parcel (CEP) market is believed to have experienced a 9.1% decline in volume in 2022 when compared to 2021 (i.e. around 16.5 billion parcels, down from 18,1 billion in 2021). Consumers have been turning to consumer-to consumer (C2C) second-hand resale platforms such as Vinted, OLX or eBay, which report relatively high sales growth. Low price and sustainability appear to be the main factors behind this, and most consumers indicate that inflation is a key motivator to buy pre-owned goods. The green last mile is a real challenge and opportunity for retailers and PDSPs. There is a need for tailored last-mile strategies and collaborative approaches. Having a denser OOH network can significantly support the post-pandemic resilience of a country's parcel industry. Poland would have an extremely dense network of around 39 OOH options per 10,000 inhabitants. They identified at the end of 2022 as key markets for PUDO: Germany (51,090), France (49,200), Italy (47,740), UK (45,340) and Poland (29,520); Key APM markets would be: Poland (28,880); UK (15,460); Germany (13,450); France (8,750); Czech Republic (7,480); Key OOH PDSPs, including partners and shared points would be: Deutsche Post/DHL (100,300 PUDOs and 23,930 APMs); DPD (GeoPost) group (66,860 PUDOs and 14,040 APMs); GLS (52,090 PUDOs and 5,800 APMs); InPost (24,420 PUDOs and 28,240 APMs) and UPS (41,910 PUDOs and 5,700 APMs). The effectiveness of an OOH network is largely dependent on the PDSP's deployment strategy maximising the number of potential customers while minimising the risk of excessive deployment costs. In Poland, over half of the shipments are already directed to parcel lockers. OOH can be up to 5 times more efficient per route and provides high quality and customer choice. Locker routes can serve over 1300 parcels vs. an absolute ceiling of around 200 for a dense door to door (D2D) urban courier route. OOH deliveries produce some 60% fewer carbon emissions in urban areas and even less in rural ones. The authors identify some fully open networks in Europe: Myflexbox (DE, AT), Smartmile (FI, NL), Quadient (UK). The positive contributions of such PLNs would be: more efficient, faster development, more points/proximity, sharing benefits. They identify Interactive Delivery Management (IDM) software development as a tool to improve the user experience and drive OOH adoption. The authors identify 25.000 residential parcel

[79] Report "*Out of home delivery in Europe 2023, PUDOs and automated parcel machines, of June 2023*", developed by Last Mile Experts in partnership with Analysis Mason, available at: https://lastmileexperts.com/wp-content/uploads/2023/06/Out-of-home-delivery-in-Europe-2023_PUDOs-and-automated-parcel-machines-report_v1_1.pdf.

lockers operated by white-label PLN Citibox in Spain, mainly in Madrid and Barcelona. The report indicates that last-mile delivery is responsible for 40–60% of total distribution costs for PDSPs. OOH is expected to make up over 50% of deliveries in the Nordics, France, Germany, the Baltics, the Czech Republic, Hungary and Poland. White-label PLNs support cost optimisation, environmentally friendly delivery, and allow for greater OOH network expansion in markets where securing additional locations and partner shops poses challenges. Europe's smart parcel delivery locker market is expected to grow from USD 213.3 million in 2021 to USD 531.1 million by 2028 (a Compound Annual Growth Rate (CAGR) of 13.9%). While some of the most advanced OOH markets in Europe have up to 90% of volumes going through OOH, the authors expect that the optimal split for OOH/D2D parcel volumes will range from 40% to 60%, depending upon market-specific and cultural factors. They cite as good examples of how APM deliveries are an efficient solution for both operators and consumers the Polish giant InPost and Pošta Srbije (Serbian post). The latter average turnover is above 1 parcel per compartment per day, with peaks up to 1.8 or even 2 on in some days. The operator is continuing its dynamic network expansion based on MultiSpace parcel lockers. Some segments will still require home delivery, such as heavy and bulky items, premium "on demand" or e-grocery services. For these to be more efficient, there is a need to develop new technologies such as smart locks (e.g. Amazon Key) for in-home delivery, and refrigerated lockers or robots to make "click & collect" more effective.

The International Post Corporation (IPC) Cross-Border E-Commerce Shopper Survey[80] offers a comprehensive overview of online cross-border consumers' expectations and habits. The 2023 edition, conducted with 32,510 participants from 41 countries worldwide, sheds light on various aspects of the delivery process, including delivery cost, tracking, speed, delivery location, customs, and returns. Satisfaction was highest for delivery location (71% extremely / very satisfied) and lowest for customs (42%). Regarding consumer satisfaction with delivery to OOH locations, such as post office, parcel locker, PUDO point, etc., the survey found that satisfaction is clearly correlated to distance travelled to that location. Half of those who travelled up to 100 m were extremely satisfied with their delivery location. As soon as consumers had to travel more than 100 m to pick up their item, their level of satisfaction decreased. The level of extremely satisfied respondents was only 18% for those whose OOH delivery location point was located more than 1 km away.

Furthermore, two cases of markets not belonging to EEA are identified below.

According to Doddle[81] (2024), traditional home delivery has been the preferred option for UK consumers. However, to increase efficiency, cut costs and reduce emissions, carriers and POs/PDSPs are pushing their alternative delivery options. With the consumer benefits of greater flexibility and choice of how and when they collect parcels, OOH delivery is growing in popularity in the UK, aided by a rise in C2C e-commerce and the increasing popularity of second-hand websites (e.g. Vinted). Nearly three-quarters (74%) of UK adults expected to use OOH delivery options in future. Analysys Mason and Last Mile Expert projections[82] estimate over 50,000 APMs will be deployed before 2030, with a cumulative investment of £1 billion in

[80] https://www.ipc.be/services/markets-and-regulations/cross-border-shopper-survey.

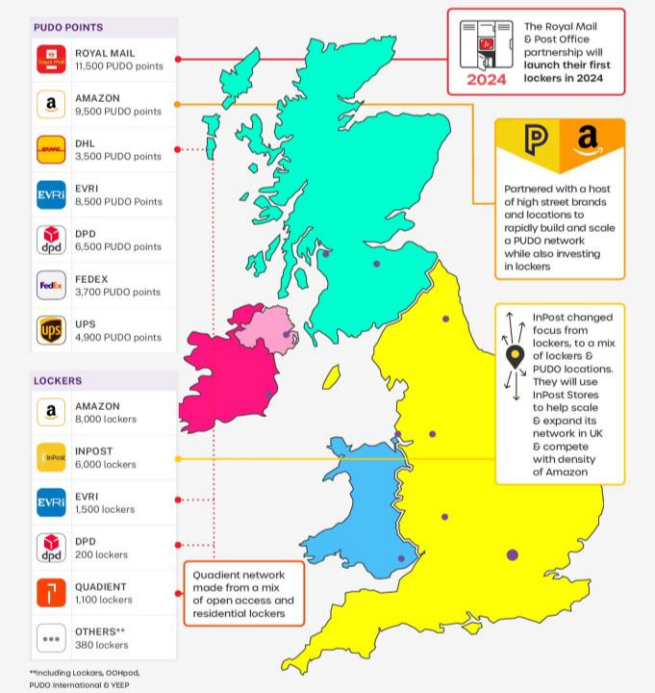
[81] Doddle is a technology platform that, according to its website, makes delivery and returns more sustainable, profitable and scalable. The full article (WHAT DO OUT-OF-HOME NETWORKS LOOK LIKE IN THE UK?, by Bruno Ceccaldi, posted on 8 February 2024) is available at:

https://www.doddle.com/blog/what-do-out-of-home-networks-look-like-in-the-uk.

[82] See their report of year 2023 cited above.

the UK. In the case of InPost, it has approximately 6,000 lockers in the UK, and to beat Amazon's current OOH network size, it would need at least 12,000 new APMs, which would cost over £100m. Expanding with PUDO partners is a more cost-effective way for InPost to achieve denser network coverage. InPost's partnership with Vinted has been very useful for InPost. Since launching a locker-to-locker service for sellers to drop items off at an InPost locker using a QR code, demand across the InPost network has more than doubled quarter by quarter, growing by a further 31% between Q4 2022 and Q1 2023. In Q4, InPost delivered 17.2 million parcels, showing a 169% YoY and +29% QoQ growth. InPost has also launched its PUDO network on the Vinted platform, allowing consumers to collect parcels from InPost Shops. Amazon initially invested in parcel lockers to provide customers with a convenient way to collect their parcels. However, to achieve rapid scale, the company partnered with a host of high street brands and locations to quickly build a PUDO network from as many locations as possible. These partnerships (as well as its continued investment into parcel lockers) has allowed Amazon to have one of the largest collection point networks in the UK, with approximately 17,500 OOH locations, of which 8,000 are parcel lockers, according to Last Mile Experts 2023 European OOH report. Amazon ran promotions where consumers can get £5 (later £4) off their order if they choose to collect at an OOH point. While DHL UK has not developed its own locker network, the company announced a partnership with the open PLN Quadient in September 2022 to offer smart lockers for parcel pick-up throughout the UK. Evri has built a UK network of over 8,500 parcel shops and lockers, assisted through its small-format kiosk, which reduces the workload for store staff when accepting returns and C2C parcel sends across its drop-off points. The Print In ParcelShop devices were developed to remove barriers for those without home printers and help the carrier expand its PUDO network into more independent businesses and fuel stations. Evri is also a partner of the open PLN Quadient, becoming the first carrier to offer the Drop Box and Printer capability to its customers. DPD claims one of its DPD shops can be reached within a 10-minute drive of 93% of the population, while London residents can reach one in just a 5-minute walk. DPD was the first carrier to partner with the open PLN Quadient, joined later by Evri and DHL. Quadient, a French postal and parcel technology company, is building an agnostic locker network in the UK. It launched in 2022 with a plan to get to 5,000 locations "in the coming years". It currently has 1,100 lockers in operation (this figure could include their residential network). The consultant deems that to make carrier-agnostic lockers work, one needs to implement a parcel management software that interfaces with carrier software in real time to manage availability or needs to flood the market with many locker compartments (volume does not exceed capacity). He cites the Hive Box's 300,000 strong network in China. Carriers are also moving towards print-in-store solutions within PUDO networks to also offer a better customer experience, such as Drop-Off Kiosks or Counter-Top Kiosks. Although truly carrier-agnostic lockers haven't traditionally been successful, having a partnership model is a great way for PDSPs to lessen the risk of investing in new proprietary parcel lockers while potentially helping drive demand and volume.

Figure 9 - UK Out-Of-Home Network, by carrier



Source: Doddle (2024).

Finally, the study led by the University of Lund (2023) cited above, identified Singapore as a government-led parcel locker alliance. In 2018 the Singapore government introduced the "Locker Alliance" initiative, which aims to create a connected network of public lockers in residential areas and popular community spots. The alliance lockers are installed as addition to the existing lockers owned and operated by PDSPs. It is organized as an open-access, interoperable digital platform with standardized data interchange that is open to all Locker operators, PDSPs, e-commerce Marketplaces and their Merchants. This enables different PLN operators to work together under a single system, eliminating the need for each PDSP and Marketplace to integrate its systems with multiple PLN operators[83]. The alliance placed 1,500 additional parcel lockers in residential areas, assuring consumer reach within 250 m, led to reduction in dedicated pick-up trips among consumers and diverting of 7.5% of deliveries from the city center to residential areas. The project resulted in a shift from home to OOH delivery and increase in delivery efficiency. Around 95% of parcels were picked up within 1.5 days.

[83] https://www.lockeralliance.net/

Annex 2 – List of NRAs responding to the questionnaire

Country	Acronym	NRA
Austria	AT	RTR
Belgium	BE	BIPT
Bulgaria	BG	CRC
Croatia	HR	HAKOM
Cyprus	CY	OCECPR
Czech Republic	CZ	CTU
Denmark	DK	Trafikstyrelsen
Estonia	EE	ECA
Finland	FI	Traficom
France	FR	Arcep
Germany	DE	BnetzA
Greece	EL	EETT
Hungary	HU	NMHH
Ireland	IE	COMREG
Italy	IT	Agcom
Latvia	LV	SPRK
Lithuania	LT	RRT
Luxembourg	LU	ILR
Malta	MT	MCA
Montenegro	ME	EKIP
Netherlands	NL	ACM
North Macedonia	MK	Postal Agency
Norway	NO	Nkom
Poland	PL	UKE
Portugal	PT	ANACOM
Romania	RO	ANCOM
Republic of Serbia	RS	RATEL
Slovakia	SK	RU
Slovenia	SI	AKOS
Spain	ES	CNMC
Sweden	SE	PTS
Turkey	TR	BTK-ICTA

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Annex 5 – List of abbreviations

APD	Assisted Parcel Delivery
API	Application Programming Interface
APM	Automated Parcel Machine
B2C	Business To Consumers
CAGR	Compound Annual Growth Rate
CEP	Courier Express and Parcel
C2C	Consumer to Consumer
DO	Designated Operator
D2D	Door to Door
EC	European Commission
ERGP	European Regulators Group for Postal Services
EU	European Union
HPDB	Home Parcel Delivery Box
IDM	Interactive Delivery Management
IPC	International Post Corporation
MS	Member State
MVP	Minimum Viable Product
NRA	National Regulatory Authority
OOH	Out-of-home
PDSP	Parcel Delivery Service Provider
PL	Parcel Locker
PLN	Parcel Locker Network
PoP	Postal outlet Point
PSD	Postal Services Directive
PUDO	Pick-up Drop-off
SMP	Significant Market Power
SSNIP	Small but Significant Not transitory Increase in Price
USP	Universal Service Provider
WG	Working Group

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