

# EMERGING TRENDS IN COMMUNICATION MARKET COMPETITION

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OECD DIGITAL ECONOMY  
PAPERS

September 2021 **No. 316**

# Foreword

This report on “Emerging trends in communication market competition” was prepared by the Working Party on Communication Infrastructure and Services Policy (WPCISP) and informed the review of the 2004 *Recommendation of the Council on Broadband Development*. It surveys emerging competition trends in OECD communication markets, covering both fixed and mobile networks.

After the adoption by Council of the *OECD Recommendation on Broadband Connectivity* in February 2021 [[OECD/LEGAL/0322](#)], this report was approved and declassified under the written procedure by the Committee on Digital Economy Policy (CDEP) on 31 August 2021 and was prepared for publication by the OECD Secretariat.

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This publication is a contribution to IOR 1.3.1.2. “Strengthening the foundations for digital transformation” of the 2019-2020 Programme of Work of the CDEP.

*Note to Delegations:*

*This document is also available on O.N.E. under the reference code:*

*DSTI/CDEP/CISP(2019)2/FINAL*

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# Executive summary

This report discusses emerging competition trends in OECD broadband markets, covering both fixed and mobile networks. As wireless networks increasingly become an extension of fixed networks at their core, investment in high-capacity networks and access to backbone and backhaul connectivity becomes crucial. The latter may have effects in substitution of services in the access network (i.e. last mile), where gradually the difference of some mobile and fixed services may become blurred. In addition, the convergence of telecommunication and broadcasting services, and the growing popularity of Over-the-top (OTT) players, has changed the nature of competition in communication markets.

Communication market trends, as well as the different regulatory approaches in place in each OECD country to promote broadband development and foster competition, have had an effect on the competitive landscape in OECD communication markets and the incentives to invest in networks.

A key issue for policy makers and regulators has been the analysis of market structures and their contributing effects delivering efficient and inclusive communication services. Due to convergence, bundles of communication services have become more pervasive in the OECD area. As such, convergence has been a key driver for the push for market consolidation in recent years.

Notwithstanding the trend for consolidation, there is an increased scrutiny in merger review. For example, when approving mergers of Mobile Network Operators (MNOs), authorities in OECD countries have imposed a number of conditions including the divestment of spectrum or facilities (e.g. towers) to open possibilities for new MNOs or an undertaking from the merged player to offer wholesale access obligations. Some OECD countries, under the context of merger analysis, are discussing ways to keep the mobile market open for a fourth player. Other OECD countries have seen new entry in their communication markets.

This report explores the role of horizontal and vertical mergers in communication markets. For example, it reviews horizontal mergers between MNOs in recent years, as well as other forms of consolidation between fixed and mobile operators in order to compete with bundles of communications services. In addition, it provides an overview of the increasing vertical integration of traditional telecommunication operators with content providers to respond to the increase in convergence in telecommunication and broadcasting service markets. Finally, the report presents some of the effects of entry and consolidation in OECD markets. In particular, this section focuses on mobile markets that reduced the number of MNOs (e.g. from four to three), or that experienced entry (e.g. from three to four players).

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# Emerging trends in communication market competition

## Introduction

Identifying market structures that best deliver efficient and inclusive mobile communication services is a key issue for policy makers and regulators across the OECD area. The Working Party on Communication Infrastructures and Services Policy has been closely monitoring market structures over the years and has undertaken previous OECD work in this area, such as the 2014 report examining selected countries that had changed or held constant the number of mobile operators (OECD, 2014<sup>[1]</sup>). The present report analyses emerging trends, how market structures have changed since then, as well as the effects of recent market consolidation and market entry across the OECD.

Mobile networks are increasingly, at their core, an extension of fixed networks. This trend is even more pronounced in the case of 5G as it is critical to deploy backhaul (such as fibre) further into the networks to support increases in speed and capacity and the deployment of small cells, a phenomenon called “network densification” (OECD, 2019<sup>[2]</sup>). This densification will have important technical, regulatory and policy implications for all levels of government, industry and the public. By way of example, some questions that may arise are the implications for competition, infrastructure sharing, and spectrum management.

As spectrum is an essential and scarce resource for the deployment of mobile networks, efficient spectrum management and assignment of spectrum licences influences market entry and can therefore determine competition dynamics in mobile markets. Moreover, as both fixed and mobile networks rely on backhaul connectivity, access to backhaul connectivity as well the underlying infrastructure to deploy it will play a critical role in guaranteeing competitive markets (OECD, 2015<sup>[3]</sup>).

In addition, developments in fixed networks, such as the deployment of networks delivering speeds of 1 Gbps and up to 10 Gbps, will allow for new forms of online services, such as cloud gaming platforms, virtual reality (VR) and augmented reality (AR) applications, among others. The important investments required for both 5G and fixed networks delivering 10 Gbps speeds, raise new questions regarding infrastructure sharing between operators, and emerging forms of co-investment with utility networks.<sup>1</sup> As wireless networks become further extensions of fixed networks, complementarities at the wholesale level tend to increase. At the same time, potential retail competition of some of the services provided by the next evolution of fixed and wireless networks may also become more important.

These developments and the different regulatory measures in place in each country have influenced the competitive landscape in OECD communication markets, as well as the incentives to invest in networks. Several approaches have been taken by OECD countries to promote broadband development and foster competition (Table 1). Examples include the promotion of infrastructure competition but also the promotion of common wholesale infrastructures with regulated or non-regulated wholesale access focusing on competition at the retail level (i.e. “last mile” or access part of the network). Insufficient infrastructure competition in some instances may necessitate ongoing regulatory intervention or oversight, which explains why integrated incumbents in OECD countries were, and in many cases still are, subject to regulatory measures (OECD, 2019<sup>[4]</sup>). However, existing regulatory measures may also have an effect on network upgrade decisions by incumbents.<sup>2</sup>

**Table 1. Overview of different approaches for broadband development<sup>1</sup>**

	<b>Platform based infrastructure competition</b>	<b>Regulated open access or network sharing requirements</b>	<b>Functional separation</b>	<b>Structural separation</b>
Incumbent telecommunication provider	Korea, United States	Most countries	Denmark, Italy, Mexico, United Kingdom	Czech Republic, New Zealand
Incumbent cable company	Korea, United States	Canada, The Netherlands, Belgium		
New entrant in fixed network (including municipal networks)	Sweden, United States			Italy
National fixed broadband networks				Australia, New Zealand, Singapore
Mobile networks	Most countries			Mexico, Rwanda

Notes: 1. Illustrative examples highlighting approaches (i.e. many countries follow multiple approaches).

The United Kingdom provides an example of service-based competition using the infrastructure of a regulated incumbent. BT's Openreach offers unbundled access to fibre optic and copper networks at wholesale prices on a "cost plus" basis (European Commission, 2018<sup>[5]</sup>). End-to-end infrastructure competition, on the other hand, is more evident in mobile markets in OECD countries (Table 1). However, new approaches of shared infrastructure are also emerging in mobile networks. Such is the case of Mexico, where the government opted for a Private Public Partnership (PPP) national wireless wholesaler network using the 700 MHz band, the "Red Compartida". Recent OECD work found that, while there are many approaches used at the wholesale level of broadband markets with an increasing emergence of wireline- and wireless wholesale-only providers, competition on the access level of the network (i.e. last mile) is still more common for the majority of OECD countries (OECD, 2019<sup>[4]</sup>). Whereas traditional communication companies have leased wholesale capacity on their networks, new players are emerging such as Internet firms that are deploying vast networks of submarine cables thus becoming important backbone players. In addition, wholesale-only providers increasingly play an important role for backhaul connectivity.

Although for the most part, fixed communication operators in OECD countries - whether telecommunication or cable television companies-, are vertically integrated, communication markets in OECD countries have also observed other models. These include wholesale-only providers (e.g. municipal fibre networks in Sweden) or providers that are mandated to or voluntarily chose to separate wholesale operations (e.g. the case of the fixed incumbent in the Czech Republic or the former Telecom New Zealand [TNZ]) (OECD, 2019<sup>[4]</sup>).

Convergence has blurred the contours of the telecommunication and broadcasting sectors, as players now compete with bundles. Services, such over-the-top (OTT) video services, as well as the fixed and mobile convergence on the network layer, have led to the commercial response by operators who have increased bundled offers in OECD countries and started to offer their own video services (OECD, 2019<sup>[4]</sup>). Therefore, convergence between previously distinct parts of the communication industry, such as broadcasting, and fixed-mobile convergence, have been two main drivers for the increase of consolidation in OECD countries (OECD, 2017<sup>[6]</sup>).

Previous OECD work found that while market forces should ideally determine the number of players, scarcity of spectrum resources and the need for significant network deployment investments suggest that policy makers might want to influence the number of mobile network operators (MNOs) by promoting or preventing consolidation, according to the case (OECD, 2014<sup>[1]</sup>). The latter should be based on a careful assessment of the national market. Indeed, policy makers in OECD countries aiming to ensure effective competition in communication markets should carefully assess whether market consolidation altering the

number of players in the market will have anti-competitive effects. Other aspects to consider are the type of players involved in the merger (e.g. whether they are both incumbent/symmetric firms, whether one of the players is a challenger firm and whether it is a vertical or horizontal merger), the geographical markets of the firms involved, the potential efficiency gains, as well as the degree of common ownership among firms.

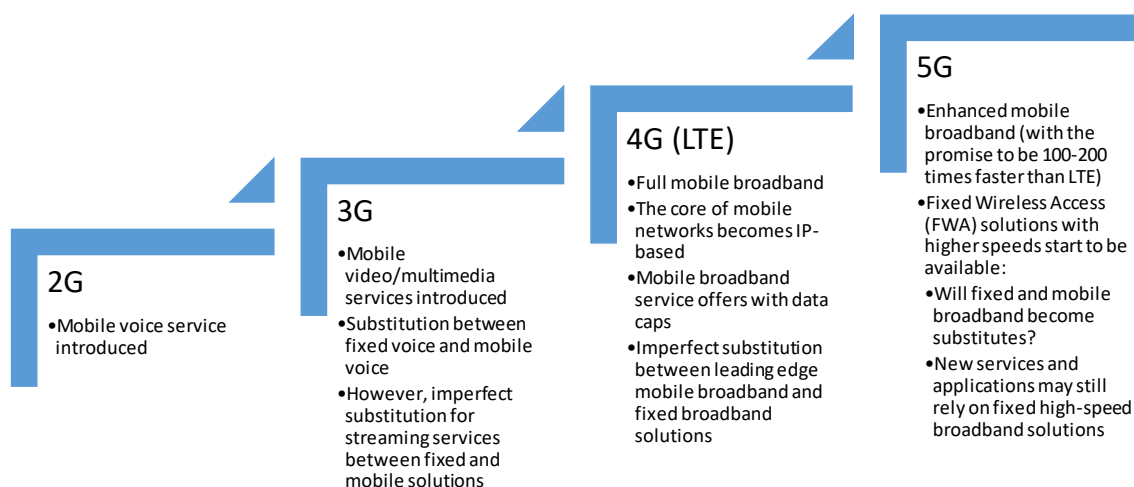
The present report discusses emerging competition trends in OECD broadband markets, covering both fixed and mobile networks. It explores the role of horizontal and vertical mergers in communication markets and provides an overview of the increasing vertical integration of traditional communication operators with content providers to respond to convergence in telecommunication and broadcasting service markets and the demand for bundled services by consumers. Finally, the report presents some of the effects of consolidation and entry. In particular, this section focuses on mobile markets that reduced the number of MNOs (e.g. from four to three), or that experienced entry (e.g. from three to four players).

## The next evolution of networks and new forms of competition in mobile and fixed markets

### *The complementarity of fixed and mobile networks*

In the past, communication networks across the OECD were typically standalone endeavours, with separate firms and business models operating on independent fixed, wireless and broadcasting networks. With an increased convergence of fixed and wireless networks, both fixed and mobile networks continue to play a complementary role in the digital transformation, and, as noted in a report by the European Commission, the convergence of the two technology families are likely to be essential for 5G (European Commission, 2017<sup>[71]</sup>).<sup>3</sup> However, specific services such as chat or voice services provided over fixed and mobile networks have gradually become substitutes in an evolving manner with technological advances. The nature of competition between fixed and mobile services has evolved with each generation of wireless networks (Figure 1) (OECD, 2019<sup>[21]</sup>).

**Figure 1. The evolution of competition\* between services (fixed and mobile) across mobile network generations**



Note: \*Illustrative diagram (i.e. does not exhaustively portray all cases or scenarios).

Source: Adapted from OECD (2019<sup>[21]</sup>) "The Road to 5G networks".



Most OECD countries consider that fixed and mobile services are not complete substitutes at this stage. The European Commission, for example, pointed out in a recent study that mobile and fixed-line broadband are not seen as substitutes in the European Union, but more as complements (European Commission, 2018<sup>[5]</sup>). Some countries, however, consider certain services as substitutes for certain geographical segments, and a couple of countries consider them as partial substitutes. These developments may become more pronounced with the further deployment of 5G networks.

#### *5G and new forms of competition in mobile and fixed markets*

Some of the expected 5G vis-à-vis 4G advantages led some to believe that 5G fixed wireless access (FWA) networks could may be able to compete in the future with fixed broadband services across all services. The way 5G will affect competition between fixed and mobile communication service providers will perhaps vary from country to country (OECD, 2019<sup>[21]</sup>). In some countries, cable companies are conducting 5G trials and mobile operators are investing heavily in fibre to be competitive in this new market environment. Recent developments in FWA in the United States offer a glimpse of what competition between fixed and wireless providers may look like with new solutions provided by 5G. Many industry players believe that 5G FWA solutions could provide consumers with a viable option to fixed broadband in urban areas (OECD, 2019<sup>[21]</sup>).

#### *Access to backhaul and backbone connectivity in OECD countries*

A growth in fibre backhaul availability should help support projected capacity demands, in particular, demands raised by the next evolution of fixed and wireless networks. In addition, it may help foster competition in both fixed and mobile broadband markets.

Several OECD countries have implemented measures to enhance access to backhaul and backbone connectivity (e.g. Australia, Czech Republic, Ireland, France, Korea, Sweden and Switzerland, among many other examples within European countries). In Europe, the framework to regulate these wholesale markets follows the recommendation on *Relevant Product and Service Markets Within the Electronic Communications Sector Susceptible to Ex Ante Regulation* (European Commission, 2014<sup>[8]</sup>). In the European Union framework of *ex ante* regulation, backhaul can be regulated under the relevant market 3.a, which refers to *wholesale local access provided at a fixed location*. This relevant market is usually linked to local loop unbundling (LLU) and it is limited to the access network (e.g. backhaul from the unbundled street cabinet to the Main Distribution Frame [MDF]). In addition, backhaul and backbone connectivity, (not necessarily linked to LLU), is also regulated in most European countries under market 4 (i.e. *wholesale high-quality access at a fixed location*). This includes access to leased lines and Ethernet services. Some examples of OECD countries in the European area include Ireland and the Czech Republic that, in line with the 2014 Recommendation by the European Commission, have regulated access to dark fibre (i.e. access to the backhaul, but only for the realisation of a fixed connection) by imposing obligations on relevant market 3a. Ireland conducted an updated review of the European wholesale market 4, and after public consultation, published its decision on January 2020, which imposed cost-oriented wholesale access obligations to the operator with SMP (ComReg, 2020<sup>[9]</sup>). In Korea, regulation requires network operators to provide access to optical fibre cables, including backhaul; however, to maintain incentives to invest, fibre cables under three years old are excluded from the provision.

Some OECD countries have regulated access to backbone and backhaul connectivity under asymmetric regulation imposed to operators with Significant Market Power (SMP). For example, the Australian Competition and Consumer Commission (ACCC) has declared certain Domestic Transmission Capacity Service routes (i.e. backbone and backhaul connectivity) as not sufficiently competitive, where providers of these regulated services must offer access to them under specified terms and conditions, including pricing (ACCC, 2019<sup>[10]</sup>).<sup>4</sup> ComReg, the Irish communication regulator, has mandated access to dark fibre on the operator with SMP in certain circumstances. In Sweden, the operator with SMP, Telia, is subject to

provide access to a backhaul connection between an operator's co-located equipment and a point no more than 50 km away where connection could be established for transport to the operator's own network, so-called backhaul connection (PTS, 2019<sup>[11]</sup>).<sup>5</sup> In Switzerland, the telecommunication law obliges the operator with SMP to provide wholesale access based on costs in a non-discriminatory fashion. On the other hand, the Communications Regulatory Authority of the Republic of Lithuania (RRT) has deemed there is no need to regulate access to backhaul and backbone facilities as competition is effective in these markets.

Wholesale-only operators also play an important role for backhaul connectivity. Those include pure wholesale-only providers that have been conceived as such (e.g. NetLink Trust in Singapore, municipal fibre networks in Sweden, KOSC Telecom in France), or providers that are mandated to or voluntarily chose to separate wholesale operations, as in the case of the fixed incumbent in the Czech Republic or the former Telecom New Zealand (TNZ) (OECD, 2019<sup>[4]</sup>). The raising number of wholesale networks may have effects on the competitive dynamics in OECD retail communication markets in so far as they provide alternatives to backbone, backhaul and local access infrastructure, hence reducing bottleneck to essential inputs. In addition, future business models of communication operators may benefit from the various wholesale-only providers as it may translate into network deployment cost-savings or the reduction of risks in their retail business (OECD, 2019<sup>[4]</sup>), which is discussed in the next section.

### *Reducing network deployment costs: network sharing*

Infrastructure sharing plays a major role in reducing network deployment costs, and is becoming increasingly common in OECD countries. The main benefits are significant cost savings for operators and increased geographical coverage for users. On the other hand, some regulators and competition authorities may have concerns that network sharing may lead to a reduction in the operator's incentives to invest in its own network, that it may increase the degree of common information among operators leading to collusion and that it may lead fewer networks in a country. Nevertheless, as noted by previous OECD work, although allowing or encouraging network sharing may limit facilities based competition, if subject to certain conditions, it may expand services competition (OECD, 2014<sup>[11]</sup>).

Most network sharing agreements are voluntary between market players, and may vary in terms of the type of sharing as well as the scope of the sharing agreement (e.g. geographic areas). Although in many countries network sharing has not been considered as an alternative to market consolidation, it has, however, been promoted as a general policy to reduce network deployment costs. Furthermore, in some occasions, infrastructure sharing has been used as a remedy to approve mergers (e.g. Ireland and Germany) or as a part of obligations for granting spectrum licenses (e.g. Germany).

As more deployments of the next evolution of broadband networks occur, new partnerships and infrastructure sharing agreements among operators are likely to become common in order to mitigate the costs of deployment. This is illustrated, for example, in Korea that traditionally relied on end-to-end competition model, but for the deployment of 5G networks, has allowed operators to engage in infrastructure sharing. Korea's mobile operators and ISPs (i.e. SK Telecom, KT, LGU+ and SK Broadband) announced in April 2018 that they would share the costs of 5G infrastructure deployment by engaging in infrastructure sharing agreements, and expect to save around KRW 1 trillion (USD 933 million) over the next decade (OECD, 2019<sup>[2]</sup>). In Europe, on October 2019, Másmóvil and Orange in Spain reached 5G and fibre network sharing agreement which will allow Másmóvil to gain access to Orange Spain's 5G mobile network and save EUR 40 million per year (Total Telecom, 2019<sup>[12]</sup>).

At present, many OECD countries have witnessed market players engage in network sharing. These agreements have been either in the form of passive fixed and wireless infrastructure sharing (e.g. sharing of masts, sites, cabinets and conditioning), or through active mobile infrastructure sharing agreements (i.e. the common use of equipment in the access network such as antennae, nodes and radio network controller elements which may include spectrum), such as Radio Access Network (RAN) sharing.<sup>6</sup>

Examples of OECD countries that have encouraged passive fixed infrastructure sharing include Australia, France and Korea. In Australia, with the aim to encourage co-location of facilities and promoting competition by facilitating the entry of new mobile and fixed line operators, the ACCC developed the Facilities Access Code (FAC).<sup>7</sup> The FAC states that the access of certain facilities owned by telecommunication carriers, including mobile towers and underground ducts, is provided to other carriers seeking to install their equipment in those facilities. In France, symmetric regulation on fibre imposes that the firm exploiting a fibre cable must provide reasonable open access to other firms in non-discriminatory terms.<sup>8</sup> In Korea, passive fixed and mobile infrastructure sharing currently takes place, as the Telecommunications Business Act (Article 63) mandates that Korea's three major operators (KT, SKT, LGU+) should consult with each other regarding the joint installation of infrastructure when deploying telecommunication equipment and facilities. All major mobile operators in Korea share radio base stations when natural environment and/or urban aesthetics need to be preserved. In Switzerland, through commercial agreements in the past decade, Swisscom has signed several contracts of cooperation with municipal utilities to deploy the FTTH network on communal territories.

Although passive infrastructure sharing is common in OECD countries (e.g. Korea, Switzerland), there are increasing examples of active infrastructure sharing in OECD countries, such as RAN sharing agreements (e.g. the Czech Republic, Germany, France, Sweden and Switzerland, and roaming agreements (e.g. France and Germany). RAN sharing, which includes antenna, mast and backhaul equipment may help reduce deployment costs.<sup>9</sup> For example, the German spectrum license decision of the 2.1 GHz and 3.6 GHz bands in 2018 included an obligation for licensees to engage in negotiations on the shared use of existing nationwide networks (roaming), and mobile nationwide infrastructure sharing for MNOs (BNetzA, 2018<sup>[13]</sup>). In France, there is a national roaming agreement between Orange and Iliad for the 2G and 3G networks, and a RAN sharing agreement between Bouygues Telecom and SFR. In Sweden, there are three RAN sharing agreements in place (i.e. Svenska UMTS-nät, Net4Mobility and 3GIS). In Switzerland, a RAN sharing agreement exists between Sunrise and Salt that only concerns a limited number of locations, not covering the whole country. In Colombia, there is national roaming regulation in place.

Almost all OECD countries encourage infrastructure sharing provided that the advantages outweigh the drawbacks (i.e. that sharing is not detrimental to competition). That being said, there have been some recent examples of ongoing investigations on the nature of infrastructure sharing agreements in a few OECD countries and whether they infringe national or European Union anti-trust laws (e.g. Czech Republic and Hungary). In the Czech Republic, there is a RAN network sharing agreement in place since 2011 between two mobile operators (i.e. O2 Czech Republic/CETIN and T-Mobile Czech Republic).<sup>10</sup> However, on 25 October 2016, the European Commission started investigating this network sharing agreement to see whether it restricts competition and thereby breaches the European antitrust rules. On August 2019, the European Commission reached the conclusion that while, in general, network sharing among operators may benefit consumers, in this case, “network sharing agreement between the two main mobile operators in Czech Republic restricts competition and thereby harms innovation in breach of EU antitrust rules” (European Commission, 2019<sup>[14]</sup>).

### ***Competing with bundles: the commercial response to convergence***

Bundling allows operators to allocate fixed costs across a range of services and can have beneficial effects for consumers and businesses, such as the convenience of unified billing, new possibilities for innovation and discounts (OECD, 2015<sup>[15]</sup>).

Bundles of services (i.e. commercial offers including two or more communication services) have become more widespread in OECD countries as broadband speeds increase and as the provision of services converges over Protocol (IP)-based networks. For example, in Europe, the penetration of bundles (i.e.

measured as bundled offer subscriptions per 100 households) reached 67% in 2017 (European Commission, 2018<sub>[16]</sub>; OECD, 2015<sub>[15]</sub>).

Quadruple play packages (i.e. including fixed voice, fixed broadband, Pay-TV and mobile broadband) are gaining relevance in OECD countries. Across the OECD area, 45% of operators already advertised, as part of their commercial offers, quadruple play packages in 2015<sup>11</sup> (OECD, 2015<sub>[15]</sub>). In Europe, quadruple-play bundled offer subscriptions per 100 households stood at 11% in 2017. For the same year, the leading countries in terms of quadruple play bundled offer subscriptions per 100 households were France, Portugal and Spain, with a penetration of 42%, 39% and 27%, respectively (European Commission, 2018<sub>[16]</sub>).

The provision of bundled communication services can increase competition if it brings more choices, higher quality, or lower prices to consumers. On the other hand, it may also lead to increased consolidation between fixed and mobile network providers and result in less competition in wholesale and retail markets. This raises a variety of issues with respect to market structures, especially the marginalisation of some players, either because they cannot offer some part of a bundle given that they lack access to networks or content, or because they cannot include all services in their bundled offers on reasonable and competitive terms (OECD, 2015<sub>[15]</sub>).

As bundles become more and more common, assessing the effects they have on competition becomes increasingly challenging. A significant aspect to consider is whether bundled, and especially fixed-mobile integrated offers, can be replicated by several players in the market (OECD, 2015<sub>[15]</sub>). Fixed operators that are not integrated with an MNO could potentially offer quadruple-play bundles if they enter into an agreement with a mobile operator (e.g. mobile virtual network operators [MVNOs]). A different alternative could be consolidation.

In several OECD countries (e.g. Australia, Czech Republic, France, Germany, Hungary, Ireland, Korea, Lithuania, Sweden and Switzerland), mobile services are offered by integrated operators via their own fixed and mobile networks or within the framework of agreements between fixed and mobile operators (e.g. MVNO agreements). In France, the four main operators have a fixed and mobile business and can thus provide triple-and quadruple play offers. Some providers in Ireland also offer fixed and mobile services (e.g. Eircom, Vodafone, and Virgin Media).<sup>12</sup> In Sweden, three out of the four largest mobile operators are integrated operators with fixed and mobile operations so as to offer quadruple play bundles.

### *MVNO competitive dynamics in OECD countries*

In most OECD countries, a number of mobile networks have opened their infrastructure to MVNOs, which operate without their own infrastructure (i.e. they use a spectrum license of a holder's network). MVNOs differ in their nature, and there is a wide range of them across the OECD, varying from sub-brands of MNOs often called flanker brands, to resellers<sup>13</sup> that buy wholesale minutes and data, to full-MVNOs<sup>14</sup> who manage their own network resources, numbers, routing and sales independent of their "host" MNO. Some OECD countries have full MVNOs, such as in Belgium with three full MVNOs and Switzerland with four full MVNOs.

MVNOs can be an important element to increase competition in mobile markets, especially if they can act as full-MVNOs. Being challengers in the market due to their small size, they often provide offers at competitive prices and/or introduce innovative services to the markets. However, for MVNOs to be able to deliver on their promise to increase competition, they need to be able to operate technically and commercially independently from MNOs (i.e. full MVNOs). Even then, without sufficient competition in wholesale markets, it is unlikely they will be able to substitute for the role played by a "challenger MNO" (OECD, 2014<sub>[11]</sub>). Although full MVNOs have better chances of competing with MNOs, the European Commission notes that they have found that even full-MVNOs have experienced difficulties to compete with MNOs in several merger investigations. The communication regulator in the Czech Republic, for example, assessed the competitive environment in the wholesale mobile services market, which includes a replicability assessment of retail mobile services by MVNOs (CTU, 2019<sub>[17]</sub>; CTU, 2019<sub>[18]</sub>).

MVNOs are not generally mandated by regulation, but rather commercial agreements that arise where operators settle the wholesale conditions (i.e. MVNO wholesale inputs) based on market terms. However, in some instances, regulators have seen these MVNOs as important tools in ensuring the competitiveness of a market and introduced some obligations. They range from the requirement to host MVNOs as a commitment prior to approving mergers between mobile network operators (e.g. the mergers in Austria in 2013, Ireland and Germany in 2014, and Norway in 2015), to obligations in the context of spectrum licenses, to a general regulation to allow MVNOs use the network of operators (Colombia). For example, the German spectrum license decision of the 2.1 GHz and 3.6 GHz bands in 2018 included several measures to promote competition, such as an obligation for licensees to negotiate network access in 3G, 4G or 5G with service providers. The definition of service providers in Germany includes MVNOs,<sup>15</sup> and the German Bundesnetzagentur (BNetzA), the communication regulator, is therefore allowed, in the event of infringements, to intervene in order to protect competition by acting as an arbitrator (BNetzA, 2018<sub>[13]</sub>).

Mobile virtual network operators (MVNOs) have become significant players in recent years in some OECD communication markets. Table 2 provides an overview of MVNOs that may range from flanker brands, to reseller companies, to full MVNOs. The indicated shares of MVNOs subscriptions over total subscriptions includes flanker brands for some countries. While the Table provides an overview of the presence of MVNOs, it does not allow to draw conclusions on the competitive pressure that MNVOs exert in different countries as this would require a more detailed analysis of the nature of those MNVOs in the respective OECD member countries.

In Germany and in the Netherlands the share of MVNO subscriptions relative to total cellular subscriptions in 2018 reached 20.1% and 16.9%, respectively. In the case of Germany, MVNO subscriptions includes those by “managed service providers”, also known as *resellers*, as well as flanker brands partially owned by one of the three main MNOs. For a second group of OECD countries, the market share of MVNOs in terms of mobile subscriptions was around 7-13% in the same year (e.g. Australia, Austria, Belgium, Czech Republic, France, Ireland, Italy, Japan, Spain and the United States). For the rest of OECD countries, the share of MVNO subscriptions was below 5% (Table 2). Australia has 51 MVNOs present in the mobile market and has noted that, although mobile market shares have remained relatively stable in recent years, MVNOs are making some progress in the past two years and account for 13% of markets share in 2017-18 (ACCC, 2019<sub>[19]</sub>). By contrast, in Sweden, with also a large number of MVNOs (i.e. 45), MNOs accounted for 96% the mobile subscribers in 2018.<sup>16</sup>

Table 2. MVNOs present in OECD countries

	Total mobile cellular subscriptions, 2018	MVNOs subscribers (End 2018)	Share of MVNO subscriptions over mobile subs. (%)	Number of MVNOs
Australia	27 870 000	3 507 530	12.6%	51
Austria	16 530 441	1 200 000	7.3%	15
Belgium	11 916 735	905 764	7.6%	3
Canada	33 211 401	451 000	1.4%	..
Chile	25 178 981	247 893	1.0%	4
Colombia	64 513 977	4 596 401	7.1%	4
Czech Republic	13 705 387	991 286	7.2%	245
Denmark	7 197 000	..	..	1
Estonia	1 924 034	..	0.0%	1
Finland	9 530 000	..	..	0
France	93 867 215	8 614 741	9.2%	25
Germany	136 958 000	27 500 000	20.1%	5
Greece	15 354 388	62 781	0.4%	1
Hungary	11 831 338	145 380	1.23%	7
Iceland	424 720	11 420	2.7%	1
Ireland	6 282 346	589 187	9.4%	4
Israel	10 830 000	..	..	4
Italy	103 638 887	8 447 663	8.2%	19
Japan	177 816 158	19 050 000	10.7%	528
Korea	66 355 778	7 989 453	12%	44
Latvia	2 799 054	..	..	0
Lithuania	3 764 670	85 479	2.3%	4
Luxembourg	951 800	35 000	3.7%	4
Mexico	114 328 699	..	..	..
Netherlands	27 087 000	4 575 000	16.9%	40
New Zealand	6 400 000	69 000	1.1%	3
Norway	5 720 892	76 065	1.3%	3
Poland	48 285 511	2 214 507	4.6%	83
Portugal	17 541 568	291 246	1.7%	3
Slovak Republic	7 241 702	..	0.0%	0
Slovenia	2 465 857	74 651	3.0%	3
Spain	54 161 014	4 928 000	9.1%	12
Sweden	14 316 905	522 735	3.7%	45
Switzerland	10 808 148	324 200	3.0%	4
Turkey	80 117 999	..	..	0
United Kingdom	83 997 855	..	..	26
United States	421 800 000	39 700 000	9.4%	..

Notes: \* **On the number of MVNOs.** Some countries include flanker brands (i.e. sub-brands owned by mobile network operators, including incumbents) while other countries such as Canada omit those flanker brands and only count MVNOs not belonging to MNOs. Some countries only account for full MVNOs while others include resellers. Belgium: 3 full MVNOs (Lycamobile, Vectone, Medialaan); Finland: 0 pure MVNOs and 6 service providers in addition to 4 MNOs; France: around 25 MVNOs with commercial contracts with MNOs; Japan: 528 MVNOs that deal directly with MNO; Netherlands: approximately 40; Spain: 12 full MVNOs, including flanker brands (plus 20 Service Provider MVO or resellers); Switzerland: 4 full MVNOs up until 31 May 2019. \*\***On MVNO subscriber data.** Australia: 2017-18: Around 13% of mobile services in operation are MVNO subscribers; Canada: The number of subscribers reported above includes figures from MVNO and resellers/re-billers; Germany: total number includes subscribers of "managed service providers" and mobile virtual network operators; Japan: data for March 2019; Slovenia: confidential data; Spain: 9.1% of total customers belongs to MVNO, amounting to 4 928 000 subscribers; Switzerland: preliminary results for 2018; United States: source Form 477, preliminary and subject to change.

Source: OECD countries' responses to the data questionnaire for the DEO 2020.

## Consolidation and entry communication markets across the OECD area

### Mobile market consolidation

Many OECD countries have experienced a wave of mergers and acquisitions (M&A) activity in the past years. As of 2018, most OECD countries had three or four mobile network operators (MNOs). While the number of MNOs has contracted from four to three in some countries in recent years due to mergers and acquisitions (e.g. Australia, Austria, Germany, Ireland, Italy, Japan, the Netherlands, and Norway), in other countries the amount has increased from three to four (e.g. Chile, Colombia, France, Czech Republic, France, Hungary, Iceland, the Netherlands, the Slovak Republic and Slovenia). Some countries have even gone from four to five MNOs (i.e. Luxembourg and Israel) (Table 3). In addition, mergers have also occurred in other regions, such as the case of Brazil that witnessed the merger between Oi Mobile and Brasil Telecom in 2008.

**Table 3. Mobile market structure (number of mobile network operators) in OECD countries, 2008-18<sup>1</sup>**

Country	2008	2014	2016	2018	Notes
Australia	4	3	4	3**	Vodafone (Merged Q2 2009). *In April 2017, TPG enters the mobile market. In August 2018 TPG announced a potential merger with Vodafone, which was completed in 2020 (Vodafone, 2020 <sup>[20]</sup> ).
Austria	4	3	3	3	Hutchison 3G and Orange (Merged Q1 2013).
Belgium	3	3	3	3	
Canada	3*	4	4	4	Freedom Mobile (Shaw Communications) enters market in December 2009. * In 2008 there were more than 3 MNOs in certain regions. In Canada, the fourth MNO comes in the form of regional competition. Prior to 2009 this was limited to regions with regional telephone incumbents adding wireless services, e.g. Saskatchewan with SaskTel. Since 2009 there has been entry (e.g. Freedom, Videotron, Eastlink) so that there is now a fourth MNO in most regions.
Chile	4	3	4	4	Wom (challenger firm) enters 2015 by acquiring VTR Movil (Nextel or Liberty Global which closed in Q3 2013).
Colombia	3	4*	4	4**	Avantel (challenger firm) enters in 2012; *ETB (regional operator) starts operations on October 2014; UNE (EPM, regional operator) Merged Q3 2014 with Tigo. **Partners Telecom Colombia (WOM) entered the Colombian market in 2020 as a new challenger. At the moment of writing, WOM proposed a "merger by absorption" of its sister company, Avantel (CommsUpdate, 2021 <sup>[21]</sup> ).
Czech Republic	3	3	3*	3*	*Nordic Telecom, a full MVNO, entered the Czech market in 2015. However, they are not a full MNO, so not included in the changes.
Denmark	4*	4	4	4*	*Net1 (ice group) entered the market January 2008, **and divested operations in 2020. At the moment of writing, there were four MNOs in Denmark (TDC, Telenor, Hi3G and Telia). Telia and Telenor have a RAN sharing agreement since 2012, and attempted to merge in 2015 (but withdrew the merger application).
Estonia	5	3	3	3	KOU (Televork) (Merged Q1 2012); Tallinn Mobile (ProGroup) (Merged Q4 2010)
Finland	4	4	4	4	
France	3	4	4	4	Free (Iliad, challenger firm) enters market January 2012
Germany	4	3	3	3**	E-Plus (KPN) (Merged Q4 2014). **New entrant in 5G auction on March 2019 (1&1, an MVNO) paved the way for a 4th operator in Germany
Greece	3	3	3	3	Q Telecom (Merged Q2 2007)
Hungary	3	3	3	4	MVM Net enters the market January 2017
Iceland	3	4	4	4	Hringidan enters the market March 2010
Ireland	4	3	3	3	O2 (Telefonica) (Merged Q3 2014); December 2017 Iliad (challenger firm) buys 32.9% of Eir
Israel	4	5	5	6*	Iliad (Golan Telecom, challenger firm) enters market in 2012; We4G (018 Xfone) enters market in April 2018; Pelephone (Bezeq) in deep financial problems since 2018.
Italy	4	4	4*	4**	WIND (VimpelCom) Merged Q4 2016; Iliad Italy (challenger firm) was founded in 2016 and started operations in 2017. *The merger remedy was such that there were always technically 4 MNOs in Italy. **In July 2019, Fastweb became a licensed MNO in Italy, and as such, the Italian mobile market had five MNOs in 2020.

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Japan	5	4	3	3	Willcom (Merged Q2 2014 with YMobile), and Ymobile merged with Softbank in Q2 2015
Korea	4	4	4	4	
Latvia	4	4	4	4	In March 2008, the new entrant mobile network operator (MNO)
Lithuania	3	3	4	4	AB Lietuvos radijo ir televizijos centras (JSC Radio and television centre) entered the market in 2016. Provides only data transmission services via a 4G network.
Luxembourg	4	5	5	5	LOL Mobile (Luxembourg Online) enters market April 2007; JOIN Experience (JOIN Wireless / POST) enters market January 2014
Mexico	4	4	3	4*	*AT&T enters Mexico in 2015 and acquires Nextel; Altan Redes starts operations in June 2018. In 2019, Telefonica makes a move to return spectrum licenses to the communication regulator in Mexico (IFT), and signs a network sharing agreement with AT&T.
Netherlands	3	4	4	3	Ziggo (Liberty Global) enters market May 2012 and then is merged Q4 2016; Tele2 enters market January 2015 and is merged Q1 2019.
New Zealand	4	4	4	4	
Norway	5	4	3	3	Network Norway (Merged Q4 2011) and Tele2 enters the market in 2011; Tele2 (Merged Q1 2015).
Poland	6	5	5	5	Nordisk Polska (Merged Q3 2009); Aero2 (Merged Q4 2011); Aero2 (Midas) (Merged Q2 2016).
Portugal	4	3	3	3	Zapp (Closed Q3 2011)
Slovak Republic	3	3	4	4	4ka (SWAN Mobile) enters the market in March 2015.
Slovenia	3*	4	4	4	T-2 enters market June 2008.
Spain	4	4	4	4	
Sweden	5	4	4*	4*	Spring Mobil (Swefour) (Merged Q3 2010) *Four mobile network operators are active on the Swedish market. However, given that active infrastructure sharing (RAN) is used in Sweden, the number of mobile access networks are rather three (i.e. Tele2 and Telenor have a joint company Net4Mobility which has a national 2G and 4G network, and both Tele2 and Telenor have their own core networks).
Switzerland	4	3	3	3	Tele2 entered January 2005 and merged Q4 2008; in&phone (Unify) (Closed Q1 2012).
Turkey	3	3	3	3	
United Kingdom	5	4*	4	4	Orange (Merged Q2 2010); June 2014 Relish Broadband enters the Market; Relish Broadband (UK Broadband) (Merged Q2 2017).
United States	4	4	4	4**	**The Sprint and T-Mobile merger went through as of 1 April 2020, effectively bringing the mobile market in the United States down to 3 MNOs. The Department of Justice (DoJ) gave its approval in July 2019, and on 16 October 2019, the FCC passed the vote to clear the merger. The merged entity faced a multi-State lawsuit against it. On April 2020, T-Mobile acquired Sprint in the United States, bringing down the total of MNOs in the country from four to three in 2020.

*Legend:* Blue highlight means entry of a challenger firm; green highlight means the increase of MNOs; orange highlight means the decrease of MNOs (e.g. from four-three or from five-four).

*Notes:* 1. The table only covers market structure changes until 2018. Changes in market structure after 2018 are flagged in the “notes” column marked by “\*\*”.

*Source:* OECD elaboration using GSMA Intelligence (2019<sub>[22]</sub>), *Data and Analysis for the Mobile Industry* (database), <https://data.gsmainelligence.com/> (accessed on 20 February 2019).

A merger that took the market from four to three MNOs is that of T-Mobile and Sprint in the United States. The companies announced their intention to consolidate in 2019. The Department of Justice (DoJ) gave its approval in July 2019 subject to remedies, and on 16 October 2019, the FCC passed the vote to clear the merger (Department of Justice, 2019<sub>[23]</sub>; Reuters, 2019<sub>[24]</sub>). The T-Mobile-Sprint merger still faced a multi-State lawsuit trying to block it (NYT, 2019<sub>[25]</sub>). However, the companies negotiated with the states involved to try to go through with the acquisition. For example, the Attorney General of the state of Mississippi reached an agreement with the merging parties to withdraw the legal challenge in exchange on the new merged entity to deploy a 5G network in Mississippi within three years covering 62% of the State’s population (Reuters, 2019<sub>[26]</sub>). On 1 April 2020, the T-Mobile-Sprint transaction finally proceeded, subject to remedies that the DoJ and multiple states had reached in a settlement agreement with the merging parties and Dish (DoJ, 2020<sub>[27]</sub>).

Despite the wave of mergers, scrutiny of these mergers remains a key concern of regulatory authorities and competition agencies. Many of the mergers approved in OECD countries since 2014 were subject to



conditions (or remedies), such as behavioural commitments to facilitate the presence of MVNOs or a more equitable distribution of spectrum resources among operators. For example, in Ireland and Germany in 2014 (as well as Austria in 2012), mergers were cleared subject to MVNO remedies with some offers to divest spectrum. Studies have found that several of the remedies imposed have not been effective and have given rise to price increases (Lear, DIW Berlin and Analysys Mason, 2017<sup>[28]</sup>; RTR, 2016<sup>[29]</sup>; BWB, 2016<sup>[30]</sup>; BEREC, 2018<sup>[31]</sup>).

More recently, it could be observed that OECD countries have been more reluctant to approve mergers. Some intended mergers that would have taken place in the mobile market in some OECD countries (from four to three players) were prevented. Such is the case of Switzerland in 2010, the United States in 2011, Denmark in 2015 and the United Kingdom in 2016 (Table 4). However, at the end of May 2020, the General Court of the European Union annulled the European Commission's decision to block the 2016 merger of Three and O2 in the United Kingdom (Competition Policy International, 2020<sup>[32]</sup>). In the United States, while the attempted merger of T-Mobile by AT&T in 2011 was blocked, the merger between Sprint and T-Mobile was approved in 2020.

Other mergers have been approved subject to structural remedies, as in the case of Italy in 2016 for the merger by Hutchinson/WIND/JV. The clearance of this merger by the European Commission was conditional on remedies going beyond those proposed in Europe before, which enabled the entry of a new MNO. The approval of the T-Mobile-Sprint in 2020 also included structural remedies aimed at promoting market entry in the future (i.e. Dish). Such remedies included that the merging party must divest Sprint's prepaid business, 20 000 cell sites and spectrum assets to Dish. In addition, T-Mobile must grant Dish access to its network for seven years through an MVNO agreement while Dish transforms its business and deploys a 5G network (DoJ, 2020<sup>[27]</sup>).

**Table 4. Mergers (accepted and blocked) of mobile telecommunication operators in OECD countries with remedies, 2006-19**

Year	Country	Players involved in the merger	Change of players	Was the merger Cleared or Blocked?
2005	Chile	Telefonica/Bellsouth		Cleared
2005	The Netherlands	KPN/Telfort	5 to 4	Cleared
2006	Austria	T-Mobile/Tele.ring	5 to 4	Cleared. Remedies: Divestiture of spectrum and sites
2006	Greece	TPG IV/Apax/Q-Telecom	4 to 3	Cleared. No remedies
2007	The Netherlands	T-Mobile/Orange	4 to 3	Cleared. No remedies
2008	Switzerland	Tele2/TDC Sunrise (Q4 2008)	4 to 3	Cleared
2009	Australia	Vodafone/Hutchison-3 (Q2 2009)	4 to 3	Cleared
2010	Estonia	Tallinn Mobile (ProGroup) Merged Q4 2010*	5 to 4	Cleared
2010	Sweden	Tele2/Spring Mobil (Swefour) Merged Q3	5 to 4	Cleared
2010	Switzerland	Orange/TDC Sunrise (intended merger)	3 to 2	Blocked
2010	United Kingdom	T-Mobile/Orange (they form EE)	5 to 4	Cleared. Remedies: National roaming; divestiture of spectrum
2011	Norway	Tele2 buys Network Norway (Q4)* (Tele2 entered market in January 2011)	5 to 4	Cleared
2011	United States	AT&T/T-Mobile (intended merger)	4 to 3	Blocked

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2012	Estonia	KOU (Telework) merged	Q1*	4 to 3		Cleared
2012	Greece	Vodafone/Wind Hellas (intended merger)		3 to 2		Blocked
2012	Japan	Softbank purchases eAccess		5 to 4		Cleared
2013	Austria	Hutchinson 3G/Orange (Q1)		4 to 3	Cleared. Remedies: Divestiture of spectrum; MVNO-access	
2013	United States	T-Mobile purchases MetroPCS; Softbank purchases Sprint and Clearwire; AT&T purchased Allied Wireless				Cleared
2014	Colombia	Tigo (mobile) merged with UNE (fixed and mobile)			Cleared. Remedies: Spectrum divestiture	
2014	Denmark	TeliaSonera/Telenor (intended merger)		4 to 3		Transaction withdrawn
2014	Ireland	Hutchinson 3G/ O2 (Telefonica), Q3		4 to 3	Cleared. Remedies: MVNO-access; divestiture of spectrum; network sharing	
2014	Germany	Telefonica/E-Plus (KPN) (Q4)		4 to 3	Cleared. Remedies: MVNO-access (i.e. mobile bitstream access or MBA); divestiture of spectrum; and improving commercial terms for MVNOs (e.g. national roaming to MVNOs)	
2014	Japan	eAccess merges with Willcom and becomes Ymobile (Merged Q2)		5 to 4		Cleared
2014	United States	AT&T purchases leap		4 to 4		Cleared
2015	Japan	Ymobile/Softbank (Q2 2015)		4 to 3		Cleared
2015	Mexico	AT&T acquires Iusacell and Nextel				Cleared
2015	Norway	Tele2/TeliaSonera (Merged Q1 2015)		4 to 3	Cleared. Remedies: Divestiture of infrastructure, and spectrum to ICE; Specific conditions for co-location; Commitment to offer MVNO access to Norwegian mobile operators; Sale of three Tele2 stores to ICE, among other remedies.	
2015	Denmark	Telia/Telenor/JV		4 to 3		Abandoned
2016	United Kingdom	Hutchinson 3G/Telefonica (intended merger)		4 to 3	Blocked by the European Commission in 2016 (decision annulled in 2020) <sup>1</sup> .	
2016	Belgium	Base (KPN) sells to Telenet (Liberty Global, full MVNO)		3 to 3	Cleared. Remedies: Acquisition approved by the European Commission on 6 February 2016. Liberty Global committed to MVNO divestiture (owned previously by BASE), and to sell part of BASE's customer base to a competing MVNO	
2016	Italy	Hutchinson 3G/WIND		4 to 3	Cleared. Remedies: New MNO entry with divestiture of spectrum and sites and transitional roaming agreement	
2018	Australia	Vodafone Australia/ TPG (intended merger)		4 to 3	Cleared. The ACCC has opposed the merger, and Vodafone Hutchison Australia and TPG Telecom challenged this decision in Federal Court. In 2020, the Australian Federal Court declared the proposed merger between Vodafone and TPG would not have the effect of substantially lessening competition in the market (Federal Court of Australia, 2020 <sup>[33]</sup> ).	
2019	United States	Sprint/T-Mobile		4 to 3		Cleared

Notes: 1. On 11 May 2016, the European Commission adopted a decision in which it blocked the proposed acquisition of Telefónica UK ('O2') by Hutchison 3G UK ('Three') (European Commission, 2016<sup>[34]</sup>). On 28 May 2020, the General Court of the European Union annulled the Commission's decision (Court of Justice of the European Union, 2020<sup>[35]</sup>).

Sources: Own elaboration based on news reports; OECD (2014<sup>[1]</sup>) "Wireless Market Structures and Network Sharing," <https://doi.org/10.1787/5jxt46dzl9r2-en>; GSMA Intelligence (2019<sup>[22]</sup>), *Data and Analysis for the Mobile Industry* (database), <https://data.gsmaintelligence.com/> (accessed on 20 February 2019), OECD (2016<sup>[36]</sup>) "Agency Decision-Making in Merger Cases, from a Prohibition Decision to a Conditional Clearance: Note by Norway" <https://www.oecd.org/daf/competition/agency-decision-making-in-merger-cases.htm>; and Table 1 of Aguzzoni et al (2017<sup>[37]</sup>) "Ex-post Analysis of Mobile Telecom Mergers: The Case of Austria and the Netherlands" <https://link.springer.com/article/10.1007/s10645-017-9308-5>.

Scrutiny has also increased concerning the acquisition of regional players. For example, in 2017, Canada's Competition Bureau examined the acquisition of a regional competitor, Manitoba Telecom Services (MTS) by Bell Canada (Bell), one of Canada's three national wireless carriers. In order to address the likely substantial reduction of competition due to the merger, Bell agreed to divest subscribers, retail locations, and spectrum and provide temporary access to a mobile wireless network in a specified territory to a new entrant.<sup>17</sup> In Canada, general scrutiny on regional player acquisitions is important as they often compete, collectively and respectively by region, with the three national incumbents.

Some OECD countries, under the context of merger analysis, are discussing ways to keep the market open for a fourth player, such as in the United States with the remedies imposed in the T-Mobile/Sprint merger. This follows a similar rationale as the remedies taken in Italy in 2016. The main condition imposed by the DoJ in the T-Mobile- Sprint merger would be for T-Mobile to divest a substantial amount of assets to Dish so that it could potentially become the fourth wireless carrier (Department of Justice, 2020<sup>[38]</sup>).

In addition, innovative remedies in merger analysis are also being discussed that could help reduce switching costs for users, reducing barriers to entry. For example, within the context of remedies imposed in the T-Mobile-Sprint merger in the United States, the Department of Justice (DoJ), in addition to the terms intended to make Dish a new forth competitor, the remedies included "behavioural" measures. Such measures included requiring that the merged entity and Dish support embedded SIMS (eSIMs)<sup>18</sup> to enable users to easily switch between wireless providers (Department of Justice, 2020<sup>[38]</sup>).

Another question frequently discussed is whether regulatory and competition authorities would be more lenient to cross-country mergers versus within country consolidation. In fact, many MNOs are already present in several OECD countries (Table 5). This aspect of the merger approval debate has been particularly prominent in the European Union, as the Digital Single Market has established as a priority the reduction of "fragmentation" by improving the availability, quality, and affordability of communication services that may vary significantly across the region. While it may seem that the European Commission would be perhaps less likely to identify competition problems in cross-border mergers, MNOs appear more interested in within-country consolidation (Genakos, Valletti and Verboven, 2017<sup>[39]</sup>).

**Table 5. Large mobile network operators (MNOs) present simultaneously in several OECD countries**

Company	List of OECD Countries where the company is present	Total of OECD mobile markets
America Móvil	Austria (Austria Telekom 51%); Chile; Colombia; Mexico	4
Altice	France (SFR) and Portugal (MEO)	2
AT&T	Mexico; United States	2
Deutsche Telekom (T-Mobile)	Austria; Czech Republic; Germany; Greece; Hungary; Netherlands; Poland; Slovak Republic; United Kingdom* (EE is part of BT, but DT has only a 12% minority stake in BT); United States (64.78% of T-Mobile)	9*
Iliad (Free)	France; Ireland; Israel; Italy	4
Liberty Global (Virgin, Unity Media, Telenet)	Belgium; Ireland; Netherlands; Poland; Slovak Republic; Switzerland; United Kingdom	8**
Orange	Belgium; France; Luxembourg; Poland; Slovak Republic; Spain	6
Softbank	Japan; United States	2
Telia	Denmark; Estonia; Finland; Latvia; Lithuania; Norway	6
Telefónica	Chile; Colombia; Germany; Mexico; Spain; United Kingdom	6
Telenor	Denmark; Norway; Sweden	3
Three (CK Hutchinson)	Australia; Austria; Denmark; Ireland; Israel; Italy; Norway; Sweden; United Kingdom	9
Vodafone	Australia; Czech Republic; Germany; Greece; Hungary; Ireland; Italy; Netherlands; New Zealand; Portugal; Spain; Turkey; United Kingdom	13
WOM	Colombia; Chile	2

Note: \* In the United Kingdom, EE is part of BT, and Deutsche Telekom (DT) has only a 12 % minority stake in BT. Therefore the United Kingdom is not counted in this table as part of DT's footprint. \*\*In Hungary, Liberty Global is not an MNO, but an MVNO, and therefore is not taken into account in this list. The number also reflect the change by the acquisition of Liberty Global in Czech Republic, Germany, Hungary and Romani was acquired by Vodafone.

Source: Own elaboration based on company reports.

### **Market entry in OECD countries: overview since 2008**

Mobile markets in OECD countries have witnessed a wave of mergers since 2008, but also substantial market entry in the 2008-18 period (Table 6). The significant entry into mobile markets has been especially due to 4G spectrum auctions, reflecting the role of auctions to spur competition in markets. Further changes may arise as countries in 2019 are in the process of assigning 5G spectrum. In Germany, a fourth player is entering the market due to the 5G auction. Overall, market entry in OECD countries such as Chile, France, and Italy, has resulted in substantial changes in market dynamics.

**Table 6. Entry into mobile markets in the OECD area, 2008-20**

Year	Country	Number of operators	MNO entering the market
2008	Slovenia	3 to 4	T-2
2009	New Zealand	2 to 3	2Degrees
2009	Poland	4 to 6	Aero2, Centernet
2010	Iceland	3 to 4	Hringidan
2012	Colombia	3 to 4*	Avantel
2012	France	3 to 4	Free (Iliad)
2012	Israel	4 to 5	Golan Telecom (Iliad)
2012	The Netherlands	3 to 4*	Ziggo Liberty
2014	Luxembourg	4 to 5	Join Experience
2015	Chile	3 to 4	WOM enters market
2015	Slovak Republic	3 to 4	4ka (SWAN Mobile)
2015	The Netherlands	4*	Tele2
2016	Lithuania	3 to 4	AB Lietuvos radijo ir televizijos centras
2016-18	Italy	3 to 4	Iliad Italy
2017	Hungary	3 to 4	MVN Net
2018	Israel	5 to 6*	We4G
2020	Colombia	3 to 4*	WOM

Notes: \* In the Netherlands: Ziggo (Liberty Global) entered the market in May 2012, and then merged Q4 2016; with Vodafone; Tele2 entered the market January 2015 merging in Q1 2019 with T-Mobile; at present there are only three MNOs. In Israel: Iliad (Golan Telecom) entered the market in 2012, and We4G (018 Xfone) entered in April 2018. However, Pelephone (Bezeq) has declared to be in deep financial problems since 2018, so may exit the Israeli market. In Colombia: WOM entered the Colombian market in 2020 and filed a merger proposal to acquire Avantel. The merger approval was still ongoing at the moment of writing.

Source: OECD elaboration using GSMA Intelligence (2019<sup>[22]</sup>), *Data and Analysis for the Mobile Industry* (database), <https://data.gsmainelligence.com/> (accessed on 20 February 2019).

## Other considerations that may influence competitive outcomes

### Common Ownership

“Common ownership” refers to the simultaneous ownership of shares by institutional investors in multiple competing firms. Previous OECD work has noted that it is increasing in some markets, and highlighted that common ownership has been linked with competition concerns (Capobianco, 2017<sup>[40]</sup>). In particular, common ownership may hinder competition either by creating incentives that facilitate collusion, or by encouraging decisions benefiting one portfolio of firms at the expense of others. However, since common ownership in many instances involves minority shares, it may frequently not be taken into account in conventional merger analysis (Capobianco, 2017<sup>[40]</sup>).

The ability of minority shareholders with simultaneous shares in competing firms to hinder competition may depend on the corporate structure of the firms (i.e. the degree of influence they have on the board). In this case, the merger may increase the incentives of the merged entity to raise prices (i.e. unilateral effects). However, even if there is no substantial influence by institutional investors given the corporate governance of companies, minority shareholdings may still facilitate collusion. That is, there may be an increased likelihood of tacit collusion resulting from a merger (i.e. coordinated effects). As such, common ownership may be an important factor to take into account when analysing the effects of a merger.

Some OECD countries have begun to consider common ownership when assessing merger decisions. For example, in Mexico, the communication regulator, the Instituto Federal de Telecomunicaciones (IFT), has highlighted that institutional investors often hold shares in publicly listed companies in the Mexican communication sector. Therefore, common ownership by institutional investors has been relevant in the analysis of some merger cases. The IFT looked at several mergers involving common ownership, but none

of these cases led to a conclusion of a harm to competition, mainly because common institutional investors did not have the right to designate, remove or veto any of the members of the board, directors or managers. The IFT analysed this in a recent a transaction between owners of television channels, which was cleared with remedies (OECD, 2018<sup>[41]</sup>).

The Monopolkommission, an independent expert committee advising the German government and legislature on competition policy issues, recently published a report on “common ownership.” The report surveyed the world’s biggest asset-management companies, and found that large institutional investors hold shares in several communication companies. In particular, the largest telecommunication providers in Europe have common ownership by six main institutional investors, that together represent holdings in average of more than 10% of shares (Table 7) (Monopolkommission, 2018<sup>[42]</sup>).

**Table 7. Common investors in the largest telecommunication companies in Europe<sup>1</sup> as a percentage of shares**

Investor	Deutsche Telekom (%)	Telefónica (%)	Vodafone (%)	Orange (%)	KPN (%)	BT Group (%)
Blackrock	3.29	4.87	6.08	2.54	4.75	5.11
Vanguard	1.69	1.02	2.94	1.80	1.82	2.50
Norway	1.58	1.43	2.32	1.88	2.72	1.61
State Street	1.23	0.98	2.72	0.61	0.36	2.04
Invesco	0.75	0.55	1.23	1.23	0.37	3.13
Capital Group	0.27	3.07	2.93		3.01	2.00
<b>Sum of shares</b>	<b>8.81</b>	<b>11.92</b>	<b>18.22</b>	<b>8.06</b>	<b>13.03</b>	<b>16.39</b>

Note: 1. The table only includes the six diversified investors with the largest holdings as of January 2018.

Source: Monopolkommission (2018<sup>[42]</sup>), “Common Ownership”, [https://www.monopolkommission.de/images/HG22/Main\\_Report\\_XXII\\_Common\\_Ownership.pdf](https://www.monopolkommission.de/images/HG22/Main_Report_XXII_Common_Ownership.pdf).

### ***The type of players involved in a merger: symmetric- vs. challenger-firm merger***

The effect of mobile market entry and mergers depends not only on the number of active operators at the outset, but also on the type of firms involved in the transaction. For example, a disruptive firm (i.e. a challenger firm) tends to have very different short and long-term behaviours from those of a symmetrical firm, and hence different effects when acquired by a larger firm. Sometimes a challenger firm may discourage any attempt to sustain collusion, in line with the economic intuition that collusion is easier to sustain “among equals” (Ivaldi et al., 2003<sup>[43]</sup>). Previous literature has found that for collusion to be self-enforcing, firms should have a similar long-run view (Harrington, 1989<sup>[44]</sup>). As such, a disruptive entrant may alter a pre-existing collusive outcome. Therefore, a merger with highly asymmetric firms, e.g. a large incumbent and challenger firm, may lead to increased coordinated effects, also known as tacit collusion.

### **Vertical and horizontal mergers in communication markets in the OECD**

In most cases, firms aim to offer a bundle of services to benefit from the complimentary nature of the networks and to compete more effectively against rivals.<sup>19</sup> Therefore, operators seeking to broaden their appeal by competing in bundles has been one of the reasons behind the trend in consolidation among fixed operators, mobile operators, Pay-TV and content providers. However, the trend towards convergence makes it harder for policy makers and regulators to assess outcomes, for example as seen in the case of recent mergers in Spain (Box 1).

Between 2014 and 2018, mergers or acquisitions (M&A) between cable network operators and mobile network operators (MNOs) featured prominently among the transactions with a market value of around USD 500 million, or above. In Europe, fixed operators are consolidating with mobile network operators, and thus achieving a pan-European presence (e.g. Orange, Telefonica, Deutsche Telekom, Telecom Italia, Telia-Sonera, KPN, and BT). That is, fixed and mobile services are often sold by the same operator in major European Union economies (European Commission, 2017<sup>[7]</sup>).

### Box 1. Mergers and market developments in Spain

Bundled products are prevalent in the competitive landscape of the Spanish communication markets. On the one hand, there exists the trend of competing following a “more-for-more” business model strategy, by which operators offer better connection speeds and bandwidth alongside premium TV services that end users value most. This explains that over 80% of the broadband connections in Spain are bundled with at least one mobile subscription. 5-play services, as defined by Spain (i.e. IPTV +fixed broadband+ fixed voice +Mobile voice + Mobile broadband), constitute at least 35% of the broadband lines. On the other hand, this business strategy is complemented by lower-fares commercial offers which do not include premium TV, and that is led by the challenger firm MásMóvil.

Between 2014 and 2016, there were several mergers in communication markets in Spain. The largest were between Vodafone and ONO, approved in July 2014, as well as between Orange and Jazztel, that occurred in May 2015. In the first case, Vodafone, the second largest mobile operator, acquired ONO, the third-largest fixed network operator with its own cable network in most parts of Spain and a mobile virtual network operator (MVNO). In the second case, Orange, the third-largest mobile network operator and third-largest fixed network operator, acquired Jazztel, the fourth-largest fixed network operator. While both Orange and Jazztel primarily used unbundled local loops from Telefónica, they had also started significant investments in their own fibre networks. Jazztel also had an MVNO. This merger was approved by the European Commission with remedies that included:

- a bitstream wholesale offer to a competitor, using Oranges unbundled local loops access to Telefónica’s fixed copper network, with cost-oriented prices, for a period of four plus four years
- the sale to a competitor of a fibre network in five Spanish cities, which covered nearly 800 000 homes or commercial units
- ensuring that the competitor has wholesale mobile access in attractive commercial conditions (including 4G), for a period of four plus four years.

Subsequently, in 2016, a merger was announced between MásMóvil, which had acquired the fibre assets divested by Orange and Jazztel, and Yoigo, the fourth largest mobile network operator, which was approved by the Spanish Competition Authority (Comisión Nacional de los Mercados y la Competencia [CNMC]) without imposing any commitment on the merging parties. Additionally, in 2015, Telefónica acquired DTS, the main satellite Pay-TV operator in Spain. As a result, Telefónica increased its already high market share in Pay-TV, as its premium content is the key to selling bundles in Spain. The agreement to an increased concentration of ownership was subject to several commitments to promote competition, such as the provision of a premium channel offer to competitors.

Source: CNMC responses by Spain to the DEO 2020 Regulatory Questionnaire; OECD (2017<sup>[6]</sup>) “Digital Economy Outlook 2017” <https://doi.org/10.1787/9789264276284-en>

Some recent mergers in the OECD area among MNOs and fixed operators (either cable or fixed telecommunication providers) have been motivated by the desire to provide integrated offers with both fixed and wireless services (e.g. Austria, Belgium, France, and Spain). Those mergers, however, have

also important effects on the network and network management, which will become more important in the future with the further deployment of 5G and the increasing convergence of fixed and mobile networks.

In 2018, the European Commission approved the acquisition of UPC Austria, a fixed telecommunication provider, by T-Mobile Austria, a mobile provider. In 2016, the Spanish merger between MásMóvil, a fixed and mobile operator, and Yoigo, the fourth-largest mobile network operator, was approved.

In addition, examples of MNOs merging with Pay-TV providers and/or fixed cable providers have also been increasing in order to offer triple and quadruple play bundles and for operators to have easier access to the content market.

Many of these mergers have been cleared, some with remedies, with the rationale that it would allow operators to compete with integrated offers (i.e. bundles of communication services including a TV service component). In Belgium, the acquisition of BASE, a Belgian mobile operator, by Liberty Global was cleared (subject to conditions) in February 2016. In France, the MNO SFR (Vivendi), and the cable company Numericable (Altice Group) merged in 2014. In 2014, the European Commission cleared the acquisition of the Spanish firm Grupo Corporativo ONO ("ONO") by Vodafone Group, both companies providing fixed and mobile telecommunication services in Spain.

In the Netherlands, Vodafone and the cable company Liberty Global combined their businesses in a joint venture in 2016 to compete with a TV-broadband-mobile bundle. On October 2018, the merger between Com Hem, mainly providing fixed and Pay-TV services, and Tele2 (a mobile operator) in Sweden was approved. On September 2019 in Switzerland, the Swiss Competition Commission (COMCO) approved, without conditions, the acquisition of UPC Switzerland, the country's largest cable provider, by Sunrise Communications, the second largest telecommunication company in the country after Swisscom providing mobile, Pay-TV and fixed communication services (Sunrise, 2019<sup>[45]</sup>). On 30 April 2021, Sunrise Communications legally acquired UPC Switzerland with the merged entity name becoming "Sunrise UPC" (Sunrise, 2021<sup>[46]</sup>). In a similar move, in the United Kingdom, BT, the main fixed broadband and Pay-TV provider, purchased EE, a mobile operator, from Orange and Deutsche Telekom in 2018 to create an integrated offering, among other motivations.

A recent merger approved in July 2019, also motivated by the increase in convergence, was the acquisition by Vodafone of Liberty Global's business in Czech Republic, Germany, Hungary and Romania for EUR 19 billion (European Commission, 2019<sup>[47]</sup>). As shown in Table 5 of this report, Liberty Global is a major cable company present in nine OECD communication markets, while Vodafone is present in 13 OECD countries. For some industry analysts, this is the largest European communication merger in more than a decade (FT, 2019<sup>[48]</sup>). The European Commission cleared the merger subject to remedies, including Vodafone's offer to allow wholesale access to its cable network in Germany to its rival company, Telefónica Deutschland. The European Commission had concerns, in particular with regards to the German market, as this would have eliminated the important competitive pressure in the retail supply of fixed broadband services, in particular, in the areas served by Liberty Global's subsidiary (Unitymedia). Furthermore, the European Commission expressed concerns that the merger would increase the market power of the merged entity in the market for the wholesale supply of signal for the transmission of TV channels (European Commission, 2019<sup>[47]</sup>) (Box 2).



## Box 2. The Vodafone/Liberty Global merger

### The parties and the transaction

In October 2018, Vodafone notified to the European Commission about its acquisition of certain Liberty Global's assets, namely its cable business in the Czech Republic, Germany, Hungary and Romania. Vodafone is primarily involved in the operation of mobile telecommunication networks and in the provision of mobile telecommunication services. Some of its operating companies also provide cable television, fixed line telephony, broadband Internet access and/or IPTV services. Liberty Global offers television, broadband internet, fixed telephony services as well as mobile services. Liberty Global owned and operated cable networks offering TV, broadband and voice telephony services under the name "UPC" in the Czech Republic, Hungary and Romania, and under the name "Unitymedia" in Germany.

### Assessment of the case

The European Commission identified two main concerns with respect to the German market, specifically that the merged entity would i) eliminate the important competitive constraint exerted by the merging companies on each other in the market for the retail supply of fixed broadband services, and/or ii) increase the market power of the merged entity in the market for the wholesale supply of signal for the transmission of TV channels. The first risk is linked to the fact that while both Vodafone and Unitymedia offer broadband services based on their own cable networks, these networks do not overlap. However, Vodafone is also active in the supply of fixed broadband services in the areas served by Unitymedia, via wholesale access to Deutsche Telekom's network.

As remedies to the concerns raised by the European Commission, Vodafone offered to give another operator – Telefónica – access to the merged entity's cable network in Germany. This commitment would enable Telefónica to replicate the competitive constraint exerted by Vodafone. In addition, Vodafone put forward to refrain from contractually restricting the possibility for broadcasters that are carried on the merged entity's TV platform to also distribute their content via an OTT service. Vodafone also offered to continue to carry the HbbTV signal of Free-to-Air broadcasters, which allows TV customers to be directly connected to the broadcasters' interactive services. In addition, Vodafone committed to not increase the feed-in fees paid by Free-to-Air broadcasters for the transmission of their linear TV channels via Vodafone's cable network.

### Decision

In July 2019, the Commission cleared the merger under the condition of Vodafone's full compliance with the commitments.

Source: European Commission (2019<sup>[47]</sup>), "Commission clears Vodafone's acquisition of Liberty Global's cable business in Czechia, Germany, Hungary and Romania, subject to conditions" [https://europa.eu/rapid/press-release\\_IP-19-4349\\_en.htm](https://europa.eu/rapid/press-release_IP-19-4349_en.htm)

## **Transactions between content providers and content distributors in a convergent environment: mergers and "video" spin-offs**

One vertical merger that received much attention was the acquisition of Time Warner by AT&T in the United States, completed in June 2018. Given that AT&T is considered a content distributor, (as AT&T had previously acquired DirecTV) and Time Warner a content provider, this was analysed as a vertical integration that would enable the company to engage intensively in content production and have ready access to a vast array of video content, including CNN, HBO and Warner Brothers. Engaging in content

production may reduce content acquisition costs while also offering broader revenue opportunities. In addition, it would allow the company to leverage the merger to enter the digital advertising market (OECD, 2019<sup>[4]</sup>). The United States Department of Justice expressed concerns that the transaction would increase the bargaining power of the merged entity, and concluded that these effects would outweigh efficiency gains (DoJ, 2018<sup>[49]</sup>). The DoJ appealed a trial court decision that rejected blocking the merger on antitrust grounds, but on 26 February 2019, the DoJ lost the appeal (NYT, 2019<sup>[50]</sup>). On May 2021, AT&T announced a deal to combine its content unit, WarnerMedia, with Discovery, forming a standalone media company. AT&T's shareholders would maintain shares representing 71% of the new company, while Discovery shareholders would own 29% (AT&T, 2021<sup>[51]</sup>). If approved, this spin-off deal would reverse earlier plans by AT&T to combine content and distribution in a vertically integrated company (CNBC, 2021<sup>[52]</sup>).

Other mergers in the United States include the acquisition of NBC Universal by Comcast in 2011, the merger of AT&T with DirecTV in 2015 (approved with remedies), and Verizon's acquisition of Yahoo in 2017 (Box 3). As a condition of approving the AT&T-Direct TV acquisition, the new merged entity was required by the FCC to expand high-speed Internet access to 12.5 million customer locations within four years of the transaction. Another remedy was that AT&T had to "refrain from imposing discriminatory usage-based allowances or other discriminatory retail terms and conditions on its broadband Internet service," according to the FCC.

### Box 3. Other transactions in the United States driven by convergence

In January 2011, Comcast acquired a 51% majority stake in NBC Universal to increase its role in content production and distribution. In 2013, Comcast acquired the remaining 49%. In July 2015, AT&T completed its acquisition of the satellite-TV provider DirecTV, transforming the company into the largest service provider of Pay-TV in the United States (AT&T, 2015<sup>[54]</sup>). The acquisition of DirecTV allowed AT&T to expand its offers in audio-visual content, which includes premier content such as sports programming and additional video options such as video streaming. On February 2021, AT&T entered into a deal with private equity firm TPG to spin-off its DirecTV, AT&T TV and U-Verse business in the United States, while keeping its video operations in Latin America. AT&T will own 70% of the common equity of the spin-off firm "New DirecTV", and TPG will own 30% (AT&T, 2021<sup>[55]</sup>).

Verizon acquired in 2015 and 2017 two online service companies with a view of growing its revenues in the digital advertising business, and to compete with companies such as Facebook and Google. In 2015, Verizon acquired AOL. Aside from a portfolio of sport and entertainment sites, the company owned a widely-known group of content and media sites such as Engadget, The Huffington Post and TechCrunch. AOL also brought with it a set of advertising technologies, for traditional and digital media, and the possibility for Verizon to become an important player in video advertising. To complement this acquisition, Verizon took over further companies.

In 2017, Verizon bought Yahoo's core Internet business. While Yahoo's search function had declined in popularity, its finance, sport and new channels aggregate an important number of visitors. Verizon combined Yahoo with AOL into a subsidiary called Oath including more than 50 media brands. In November 2018, Oath was rebranded again as "Verizon Media Group". On May 2021, Verizon announced it would sell its media group to the private equity firm Apollo Global Management (CNBC, 2021<sup>[56]</sup>).

Source: OECD (2019<sup>[4]</sup>), "Operators The operators and their future: The state of play and emerging business models of the Future", <https://doi.org/10.1787/60c93aa7-en>

In Spain, Telefónica (Spain) acquired DTS in 2015, the main satellite Pay-TV operator in the country. As the transaction increased Telefónica's market share in Pay-TV, the national competition authority of Spain cleared the merger with conditions.

In Estonia, Elisa, Estonia's second largest mobile network operator, acquired AS Starman (the market leader in Pay-TV) in 2016. The Estonian Competition Authority approved the transaction on March 2017, and according to the European Commission, the merger means there will be a further competitor offering bundled mobile services, fixed Internet and Pay-TV services (European Commission, 2018<sup>[53]</sup>).

### ***The importance of essential inputs, such as interconnection and programming, in merger analysis***

Recent developments related to M&A have highlighted the importance given by regulators to interconnection and programming. With respect to interconnection, examples include the intended merger between Comcast and Time Warner in 2014, and the approved acquisition in 2016 of Time Warner Cable and Bright House Network by Charter Communications in the United States. Concerning programming, the conditions imposed by the European Commission when clearing Telia's acquisition of Bonnier Broadcasting in 2019 is an illustrative example.

The proposal by Comcast to purchase Time Warner Cable (TWC) on February 2014 included elements of analysis of both a horizontal and vertical merger. At the time, Comcast was the largest Pay-TV provider, and largest ISP in the United States. The horizontal nature of the merger came from the fact that both TWC and Comcast are ISPs and Pay-TV providers, and the vertical nature of the merger from the fact that Comcast, by owning NBC Universal, was a vertically integrated content provider also acting as content distributor. One of the main arguments the companies expressed in favour of the merger was that they both operated in separate geographic areas, and hence, the transaction would not reduce retail competition in the broadband or Pay-TV markets. However, after a 14-month regulatory review by the Department of Justice (DoJ) and the Federal Communications Commission (FCC), the merger proposal was withdrawn in 2015 after both agencies expressed that the merger would raise serious competitive concerns.

The merger between TWC and Comcast in 2014 was proposed at a time were OTT providers, such as Netflix and others, were emerging in the United States. The main concerns voiced by the government agencies were that the increased size of the merged entity at the national level would increase the bargaining power of the merged player, potentially creating incentives and the ability to limit the access of two key inputs for potential competitors: interconnection and programming. This in turn could have potentially hindered the emergence of new competitors, such as OTTs (William P. Rogerson, 2018<sup>[57]</sup>) More details on the theories of harm explored regarding this case can be found in Box 4.

In 2016, the Charter Communications acquisition of Time Warner Cable and Bright House Network in the United States also highlighted the importance of interconnection markets. The FCC imposed an obligation on the resulting operator to make interconnection available on a non-discriminatory, settlement-free basis to companies that meet basic criteria. In the same case, the Justice Department also examined whether the merger would allow the resulting company to become an unavoidable gatekeeper for Internet-based services, including online video distribution, that rely on a broadband connection to reach consumers (OECD, 2017<sup>[6]</sup>).

#### Box 4. The three economic theories of harm raised by the proposed Comcast/TWC merger in 2015 by William P. Rogerson, in “The Antitrust Revolution” (2018)

**First theory of harm: Increased Bargaining Power in Interconnection Negotiations.** Larger ISPs have more bargaining power in negotiations over the interconnection fees charged to OTTs and their transit providers, and thus have a greater ability to disadvantage OTTs by negotiating higher interconnection fees.

**Second theory of harm: Increased Bargaining Power in Negotiations with Programmers.** Larger multi-channel video programming distributors (MVPDs) have more bargaining power in negotiations over programming carriage terms, and thus have a greater ability to disadvantage OTTs by negotiating contract terms with third party programmers that limit the availability of programming to OTTs.

**Third theory of harm: Internalization of Externalities.** When an individual MVPD takes actions that disadvantage OTTs, this creates a positive externality for the entire cable industry. The post-transaction entity will internalize a greater share of these externalities and thus have a larger incentive to take actions that disadvantage OTTs.

Source: Rogerson, W. (2018), “Economic Theories of Harm Raised by the Proposed Comcast/TWC Transaction (2015)”, in *The Antitrust Revolution (2018) Chapter 22*, (William P. Rogerson, 2018)<sup>[57]</sup>.

Recent cases have also highlighted the importance of access to programming. For example, in the proposed acquisition of Bonnier Broadcasting by Telia, notified on March 2019, the European Commission raised concerns that the transaction would have significantly reduced competition as Telia’s rivals would risk being shut out of the market due to limited access to the wholesale supply and retail distribution of TV channels in Sweden and Finland (European Commission, 2019<sup>[58]</sup>). The transaction was approved in November 2019 subject to remedies, which included access to the merged entity’s TV distribution segment (i.e. free-to-air, basic Pay-TV and premium Pay-TV sports channels), streaming services, and advertising space (European Commission, 2019<sup>[58]</sup>).

### The effects of consolidation and entry (price and non-price effects)

#### Effects of consolidation in OECD communication markets

Following a merger or acquisition approval, OECD countries take a number of different approaches to assess or monitor market developments. When specific conditions are imposed, the merged entity will generally have to report on fulfilling those remedies. One question that arises in a post-merger case is whether regulatory authorities have the information they need to assess outcomes. Assessing compliance of a precise remedy may be less challenging than general outcomes of a merger. Proponents of mergers often use investment incentives as the main reason for requesting approval (i.e. efficiency gains). However, measuring these efficiency gains proves challenging. A further consideration for merger assessment is the increasing use of shared network facilities between MNOs and its potential to influence investment.

While not all authorities conduct specific post-merger reviews, they are common in a number of countries. Several studies have been particularly focused on mobile market mergers. For example, the Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR) evaluated in 2016 the *ex-post* effects of the transaction between Hutchison 3G and Orange in Austria that took place in 2013. The econometric analysis compared prices in Austria with prices in ten European countries where no merger or entry took place. The findings were that the consolidation had a significant and strong price increasing

effect for smartphone users as well as for mobile voice users. In particular, prices for an Austrian smartphone user would have risen on average around 50%- 90% in the long term (depending on the model specification), whereas prices for mobile voice-only users increased between 22% - 31% (RTR, 2016<sup>[29]</sup>).<sup>20</sup>

In 2018, BEREC published an analysis of post-merger market developments in Europe, focusing on the price effects of four to three MNO mergers. The report included the analysis of the merger of Hutchinson 3G (Three) and O2 in Ireland (2014), the merger between the mobile networks of Telefónica (O2) and KPN (E-Plus) in 2014 in Germany, and the Hutchison 3G and Orange in 2013 in Austria (BEREC, 2018<sup>[31]</sup>). Although, BEREC predominantly analysed *ex-post* price effects of market consolidation, the study also made a qualitative assessment of the impact on quality of service. However, BEREC noted a number of difficulties with measuring quality and even more so for determining the effects of mergers on quality. In all of the three cases considered, BEREC found some evidence that retail prices increased due to the merger compared to the situation without the merger (Box 5).

### Box 5. The “BEREC Report on Post-Merger Market Developments - Price Effects of Mobile Mergers in Austria, Ireland and Germany”

The analysis by BEREC on the Austrian merger of Hutchison 3G and Orange in 2013, compared price developments from 2011-16 in Austria to the average of the seven control group countries (i.e. Belgium, Denmark, Spain, Greece, Italy, Portugal and Sweden). It is important to note that the price trend of the control group cannot be compared to those used in the study by the Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR) evaluated in 2016, as the control group differed. Nevertheless, the results by BEREC suggest that the merger led to a significant price increase in 2014 for the low and the medium usage baskets in Austria, consistent with the results by RTR (2016<sup>[29]</sup>). Despite the entry of an MVNO in late 2014 as part of the remedies imposed when the merger was cleared by the European Commission in December 2012, and MVNO entries in 2015, the price effects of the merger remained at a similar level. Three years after the remedy, in 2016, the price effects became considerably smaller and statistically insignificant, likely caused by competitive pressure from MVNOs.

For the case of Ireland, the Hutchison (3)/Telefónica (O2) merger in 2014, the BEREC report analysed the prices of the low, medium and high usage baskets in Ireland between the first half of 2012 and the first half of 2016, which were compared to prices<sup>21</sup> in the ten control group countries (i.e. Belgium, Czech Republic, Denmark, Spain, Italy, Portugal, Sweden and the United Kingdom). The results found that the merger led to a statistically significant price increase in all three baskets (low, medium and high usage), but that the magnitude and persistence of this effect varied across baskets. The report also suggested that the impact of the MVNO remedy was small. That is, although two MVNOs entered the Irish market in the second half of 2015, their market share remained below 1% each by mid-2017, with one MVNO leaving the market in 2018.

Regarding the Telefónica (O2)/KPN (E-Plus) merger in 2014 in the German market, BEREC analysed price developments from 2012-16, and compared to prices in ten control countries (i.e. Belgium, Czech Republic, Denmark, Spain, Italy, Portugal, Sweden and the United Kingdom). The study found a price-increasing effect for the German market after the merger compared to other European countries. In the case of the low usage profile, it is uncertain if the estimated results can be generalised to the complete low budget segment, as the study cannot rule out that the pricing behaviour of MVNOs and sub-brands in Germany (which are not included in the study) differs systematically from the observed pricing of MNOs. For the high and medium usage baskets, the results are not very robust across specifications. However, overall, the results show a price-increasing, rather than a price-decreasing, effect.

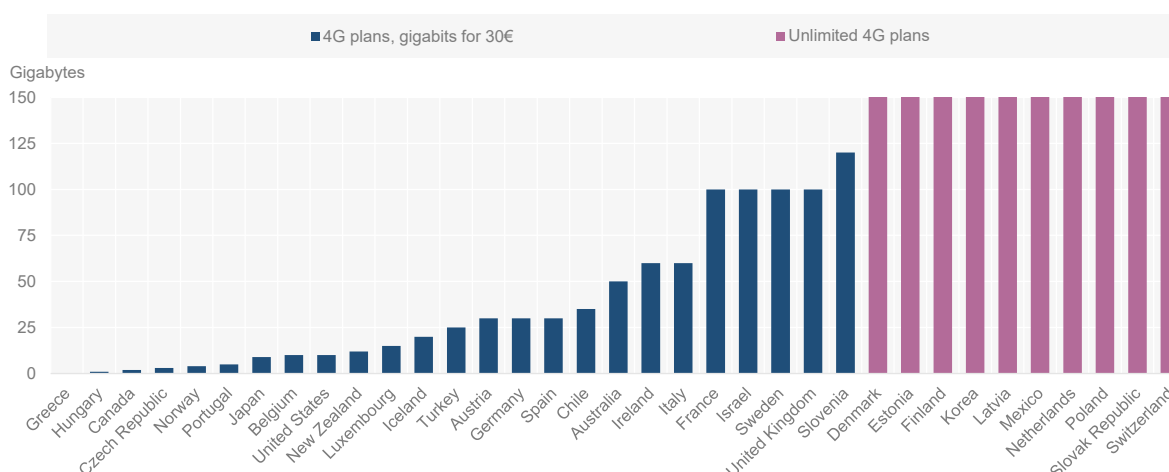
Source: BEREC (2018<sup>[31]</sup>), “Report on Post-Merger Market Developments: Price Effects of Mobile Mergers in Austria, Ireland and Germany”.

Competition plays a clear role in the reduction of prices. In ex-post merger analysis related to mobile mergers, empirical literature points to the price increase effect following mergers in countries that have reduced the number of MNOs. A recent study using a dataset of 33 OECD countries over the period of 2002 to 2014 found that concentration in mobile markets led to retail price increases (Genakos, Valletti and Verboven, 2018<sup>[59]</sup>). Another econometric study evaluating mergers in 27 European countries for the 2003-2010 period found a long run price-increasing effect in countries experiencing mergers of MNOs going from four to three players; however the effect on prices depended on the type of firm involved (Csorba and Papai, 2015<sup>[60]</sup>).

Apart from econometric studies, it is helpful to have a picture (or descriptive statistics) of the evolution of price and quality of communication services in countries that experienced consolidation. A research tank in Finland, called Rewheel Research, has tracked the amount of gigabytes that a EUR 30 mobile data plan buys in different European countries from 2013 to 2018 (Rewheel Research, 2018<sup>[61]</sup>). An interesting observation is that European countries with four MNOs, where four-three mergers were blocked or a fourth MNO entered the market (e.g. Italy, France, Denmark, and the United Kingdom, seem to have more attractive mobile data plans than two of the countries that experienced a reduction in MNOs (e.g. Germany and Austria). This continues to be the case in 2018 (Figure 2).

**Figure 2. The amount of gigabytes that EUR 30 bought in European markets, 2018**

4G smartphone plans with at least 1 000 voice minutes



Note: In 2018 -17 a minimum of three Mbps for HD video was taken into account.

Source: Rewheel Research (2018), "Gigabyte price development in 4 to 3 consolidated versus 4-MNO European markets – September 2013 to March 2018", [http://research.rewheel.fi/insights/2018\\_apr\\_pro\\_4to3\\_consolidation\\_vs\\_4MNO/](http://research.rewheel.fi/insights/2018_apr_pro_4to3_consolidation_vs_4MNO/)

A report on mobile broadband prices prepared for the European Commission in 2018 applied the OECD Price Basket methodology for mobile broadband based on usage patterns (OECD, 2017<sup>[62]</sup>). The report found that for most mobile broadband baskets in the European Union, the least expensive countries (in EUR PPP) were Italy, Poland, Austria, France, the United Kingdom, Luxembourg, and Finland (European Commission, 2018<sup>[63]</sup>). With the exception of Austria and Luxembourg, it displays similar patterns for the year 2018 as the Rewheel Research data.

The analysis of dynamic effects on investment resulting from a merger, and any resulting improvements in the quality of networks and services, is inherently more complex to analyse than shorter term effects, such as prices. Competition authorities have attempted to take into consideration quality effects into their merger review. For example, in the decision adopted by the European Commission in 2016, in which the merger

between Hutchison and O2 in the United Kingdom was blocked, the European Commission considered the potential effects of the merger on network deployment and mobile coverage by assessing the potential effects in the incentives to invest by other MNOs that were part of network sharing arrangements with Hutchison and O2 in the pre-merger setting.

While studies by regulators and competition authorities, as well as the academic studies on the subject, have focused on the price effects of mergers, there is less literature on the “non-price effects”, such as investment or innovation in markets.<sup>22</sup> Although a robust body of academic literature allowing to draw definitive conclusions on the relationship between consolidation and investment in mobile markets is still lacking, a recent exception is a study analysing the effect of mobile market structure in OECD countries on both prices and investments.<sup>23</sup> The authors found that when mobile markets became more concentrated, retail prices increased. At the same time, while capital expenditures increased per operator when the market structure was more concentrated, they did not find a significant effect of market structure on overall industry investments (Genakos, Valletti and Verboven, 2018<sub>[59]</sub>).<sup>24</sup> In other words, while incentives to invest of the merging party may increase in the case of concentration (due to the potential existence of efficiency gains), there is no clear overall effect on general industry investment. The latter may mean that the reduction of competition may have a countervailing effect when measuring overall industry investment.

Many industry stakeholders claim that the main rationale behind mergers are the efficiency gains that may lead to increased investment, suggesting there may be a trade-off between increased prices and increased investment. In particular, MNOs tend to argue that their revenues continue to decline due to increased competition from OTTs, and consolidation would allow them to increase investments required to meet the increasing demand of data traffic on their networks.

The burden of proof to provide evidence of the efficiency gains of mergers usually lies under the responsibility of the merging parties, and not the competition authority, due to inherent asymmetric information of the cost structure of firms. This is the case, for example, of merger proceedings before the European Commission. In many of the mergers in the telecommunication sector submitted to review, the efficiency claims relate to: i) variable cost savings, which should have led to lower prices for consumers, ii) fixed cost savings, which should have freed-up resources for higher network investments, and iii) improved network quality, which should have led to faster network deployment, greater capacity, broader 4G coverage, and higher speeds in the mobile sector. So far, the European Commission has rejected (or accepted to a very limited extent) efficiency claims in merger cases submitted to its review.<sup>25</sup>

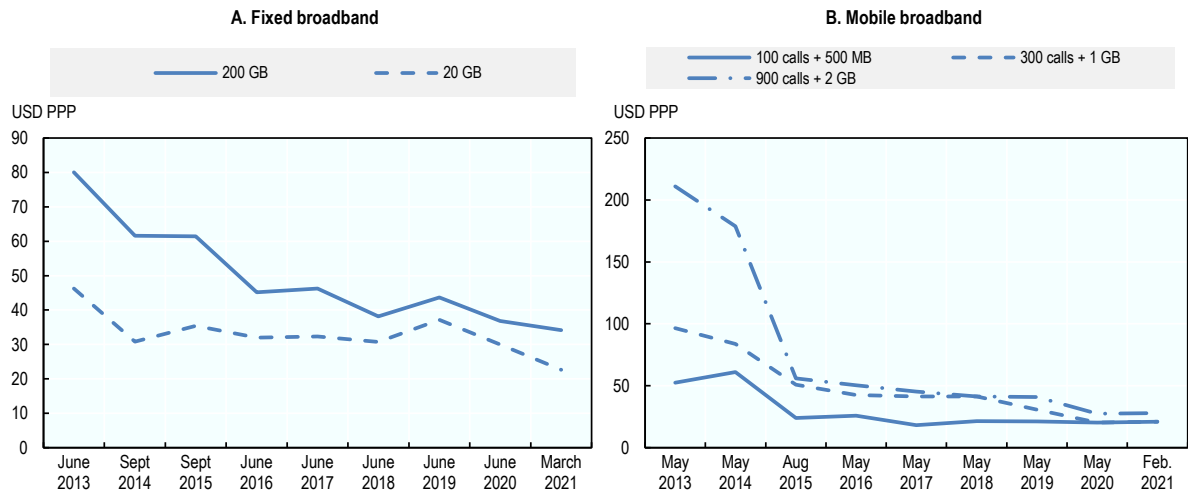
### ***Effects of entry in OECD communication markets***

Several OECD countries have experienced a recent wave of entry in mobile communication markets. Chile, France, Italy and Mexico provide important case studies on market entry and the effects of new operators on market developments.

#### *Chile*

In 2015, through the sale of Nextel Chile to Novator Partners, Chile experienced the entry by a challenger MNO in the mobile market (WOM). This company has successfully positioned itself as a new low-cost mobile operator. The Chilean mobile communication market went from three to four MNOs. Although this challenger firm is still slightly behind the three main mobile operators in Chile (i.e. Entel, Movistar and Claro), according to Subtel's figures, WOM has attained an important share of the market (i.e. 20.4% on March 2021), just behind the third operator (i.e. Claro with a 21% market share). In addition, WOM leads the market in portability figures (Subtel, 2021<sub>[64]</sub>). Substantial reductions in the price of mobile broadband in all three usage baskets can be observed in the Chilean communication market after the entry of this challenger firm (Figure 3).

Figure 3. Chile trends in fixed and mobile broadband prices, 2013-21



Note: PPP = purchasing power parity; GB = Gigabyte; MB = Megabyte.

Source: Strategy Analytics Ltd. Teligen Tariff & Benchmarking Market data using the OECD Price Basket Methodology (OECD, 2017<sup>[62]</sup>), <https://www.strategyanalytics.com/access-services/networks/tariffs---mobile-and-fixed#.WUfZ7m997IU>.

### France

In 2012, the entry of the fourth operator, the challenger firm Free Mobile (Iliad), in the French mobile market, had considerable effects for French consumers. A recent academic paper studied these effects (Bourreau, Sun and Verboven, 2018<sup>[65]</sup>). The authors' findings show that entry contributed considerably to consumer welfare, and according to them, highlighted that the rationale behind the incumbents' launch of flanker brands was a response to a breakdown in pre-existing "tacit collusion" (Bourreau, Sun and Verboven, 2018<sup>[65]</sup>). Therefore, consumers gained largely from the increase in variety of mobile plans by the challenger firm and by the existing firms (51% and 31%, of the consumer gains, respectively). They also benefited, though to a lower extent, by the intensified price competition (responsible for 18% of consumer gains). The authors estimated that entry created a total gross welfare increase of around EUR 2.2 billion (Bourreau, Sun and Verboven, 2018<sup>[65]</sup>).

Grzybowski et al. (2017<sup>[66]</sup>) assessed the impact of competition and regulation on prices of mobile services in France by estimating hedonic price regressions using data on tariff plans offered by the main mobile telecommunication operators in France between May 2011 and December 2014. The authors found that the quality-adjusted price index decreased by about 51% as compared to a decline in average prices without quality adjustment of 8.9%. Moreover, their results show that the reduction in quality-adjusted prices in the last years was largely caused by competition between established operators and by entry of fourth low cost operator. The authors further compared their results from the hedonic price regressions with the alternative OECD and Arcep basket approach, and drew similar conclusions (Grzybowski et al., 2017<sup>[66]</sup>).

As noted in previous OECD work in 2014, France has one of the most dynamic mobile markets in the OECD area with four MNOs and a number of MNVOs (OECD, 2014<sup>[1]</sup>). All these MNOs could be categorised as offering a full range of telecommunication services such as mobile, fixed, Internet and IP television. In fact, as of July 2017, 96% of household broadband subscriptions in France were purchased in a bundle (either 2-, 3-, or 4-play), and 46% were part of a quadruple-play bundle including mobile (European Commission, 2018<sup>[16]</sup>).



While prices in the French mobile market have gone down (OECD, 2014<sup>[71]</sup>), according to data of the French communication regulator, Arcep, investment in the communication sector has been steadily increasing since 2008 (Arcep, 2020<sup>[67]</sup>). Total investment (excluding licenses) has grown by 59.6% in the 2008 to 2019 period, and 40.9% in the 2012-19 period. This translates into a Compound Annual Growth Rate (CAGR) of 4.3% in the 2008-19 period, and 3.9 % in 2012-19. In terms of mobile network investment (3G and 4G deployment), the data from Arcep shows that the CAGR was 12.5% for the 2012- 19 period (see Table A.1 in Annex A for the complete data of the French communication market).

### *Italy*

In 2016, Italy experienced the entry of a challenger MNO as a result of commitments required by the European Commission as a condition of clearance of the Hutchison 3G/WIND merger. Launching services on 29 May 2018, Iliad Italy became the fourth mobile operator in the market. In 2018, in a subsequent decision related to the Italian mobile telecommunication market, the European Commission found that despite it took almost two years for the commercial launch of Iliad, the mere threat of its entry had a disciplinary effect on prices in the market.

Though it may be too early to assess the effects on entry, Iliad has launched offers at very low prices, and since then, its competitors have reacted. For example, the initial offer was 30 GB of data, unlimited voice minutes and unlimited texts for EUR 6 per month. This resulted in adding one million Italian subscribers in 50 days from the launch. Furthermore, the impact of this low cost offer motivated incumbent operators, TIM, Vodafone and Wind Tre, to react to market entry. TIM and Vodafone launched flanker brands, Kena and Ho, respectively. Vodafone's flanker brand, Ho, was offering 30 GB of data a month for EUR 7 in 2018 (Telecoms, 2018<sup>[68]</sup>). In 2019, Iliad was charging only EUR 7.99 per subscriber, and some analysts wondered whether the strategy would pay-off (Rewheel Research, 2019<sup>[69]</sup>). According to the 2019 price data from Strategy Analytics, for the OECD price mobile broadband price basket of 30 calls and 100 MB of data, offers from all the main providers in Italy had fallen in 2019, with the exception of Tre (Wind Tre) who had instead decided to introduce promotional offers, such as free data (Strategy Analytics, 2020<sup>[70]</sup>). On March 2021, Iliad had reached 9.7% market share of mobile voice subscriptions (AGCOM, 2021<sup>[71]</sup>).<sup>26</sup>

### *Mexico*

There have been substantial price and quality changes in the Mexican telecommunication market after the 2013 Constitutional Reform of Telecommunication in Mexico ("the reform"), that both reflect the level of competition in a service or in anticipation of future changes brought through it. Since then new players entered the Mexican telecommunication market as well as several mobile virtual network operators (MVNOs) providing mobile telephony and mobile broadband (OECD, 2017<sup>[72]</sup>). The reform increased connectivity, adding over 72 million additional mobile broadband subscriptions from 2012 to 2020, which is the equivalent to slightly more than the combined population of Colombia and Chile. Competition in the sector led to a sharp decline in mobile broadband prices, e.g. from 70% to almost 84% for all OECD communication baskets over the 2013 to 2020 period. This allowed many people - especially from low-income households – to connect to the Internet for the first time.

A critical change of the reform was the elimination of restrictions for foreign direct investment (FDI) in telecommunication and satellite services. This allowed the entry, for example, of AT&T to the Mexican telecommunication market through acquisitions of Iusacell-Unefon and Nextel in 2014 and 2015 (OECD, 2017<sup>[72]</sup>). In four years since AT&T started operations, the company increased its market share from 7.7% in October 2015 to 14.9% in June 2019, while the market share of the incumbent, America Móvil, slightly decreased from 69% in 2015 to 63.8% in 2019 (IFT, 2019<sup>[73]</sup>). AT&T made important investments in 4G networks in México, and according to the company's annual report, its LTE network reached over 100 million people in the country by December 2018.

## Concluding remarks

A key issue for policy makers and regulators across the OECD area has been to look at the question on market structures that best deliver efficient and inclusive mobile communication services. As wireless networks become further extensions of fixed networks, complementarities at the wholesale level tend to increase. At the same time, potential retail competition of some of the services provided by the next evolution of fixed and wireless networks may also become greater.

The complementarities between investments in fixed and wireless infrastructure, and the increasing demand of data will require policy makers to keep fostering broadband deployment, and several approaches have been followed by OECD countries. These range from promotion of end-to-end infrastructure competition, or to fostering common wholesale infrastructures with regulated or non-regulated wholesale access and focusing on competition at the retail level (i.e. last mile or access part of the network).

The next evolution of networks will require important investments with an effect on the competition dynamics, where network sharing and increased access to backhaul connectivity may help. In addition, services, such as Over-the-top (OTT) video service providers, as well as the fixed and mobile convergence on the network layer, has led to the commercial response by operators who have increased bundled offers in OECD countries. In this sense, the main drivers for consolidation of communication markets in recent years has been both the need to provide an integrated offer, such as bundles, as well as new investment challenges.

Mobile markets in OECD countries have witnessed a wave of mergers since 2008, but also substantial market entry in the 2008-18 period. While not all authorities conduct specific post-merger reviews, they are common in a number of countries. Several studies have been particularly focused on mobile market mergers, and have found that mergers usually lead to price increases. The dynamic effects of mergers such as the impact on investment and other non-price measures related to the quality of networks, however, are more difficult to assess.

Several OECD countries have experienced a recent wave of entry in mobile communication markets (e.g. Chile, France, Italy and Mexico). The entry of a fourth mobile network operator in these countries had considerable positive effects on consumers, as these markets experienced price reductions, introduction of innovative mobile offers, and increased quality of service.

## Annex 1.A. Main indicators of the French communication sector

Annex Table 1.A.1. France main indicators of the communication sector (2008-19)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mobile Subscriptions (millions)	57.1	60.0	62.4	65.2	68.5	69.9	71.7	72.1	73.0	74.6	75.6	77.2
M2M subscriptions (millions)	0.9	1.6	2.6	3.4	4.7	6.9	8.3	10.6	11.7	14.9	18.2	20.9
Total broadband* subs. (millions)	17.8	19.8	21.4	22.7	24.0	24.9	26.0	26.9	27.7	28.4	29.1	29.8
Very high speed broadband (=>30 Mbps) as a % of total broadband	4%	5%	5%	6%	7%	8%	11%	16%	20%	25%	31%	38%
Number of TV packages bundled with broadband (millions)	7.2	10.0	12.1	13.6	15.3	16.6	17.8	18.6	19.4	20.1	20.7	21.2
Total Revenue (EUR Millions)	43 617	42 939	43 444	42 480	40 922	38 241	37 021	36 444	36 199	36 103	35 607	35 337
Total Mobile Revenue (EUR Millions)	18 669	18 911	19 458	18 957	17 512	15 622	14 709	14 242	14 153	13 095	13 138	13 328
Mobile Revenue from subscriptions (EUR Millions)	18 629	18 867	19 405	18 884	17 431	15 519	14 621	14 145	14 049	12 982	13 013	13 200
Mobile Revenue from M2M (EUR Millions)	39.8	44.1	53.2	73.5	81.0	102.2	87.8	97.0	103.7	113.1	124.8	127.3
Fixed broadband revenue (EUR Millions)	6 817	8 145	8 985	9 538	10 414	10 741	11 020	11 173	11 477	11 819	11 838	11 849
Total investment (excl. licences)* (EUR Millions)	6 529	5 899	6 414	7 294	7 395	7 251	7 042	7 831	8 893	9 564	9 925	10 422
Fixed broadband investment					744	797	944	1 161	1 546	1 897	2 534	2 942
Mobile broadband investment (3G and 4G)					723	0	0	1 240	1 461	1 818	1 696	1 645

Note: \* Total broadband data are slightly different than the Broadband data published by the OECD. The breakdown: Broadband/Very high speed broadband is not used in OECD broadband data.

Source: Arcep (2020<sup>[67]</sup>) « Marché des communications électroniques en France - Année 2019 - Résultats définitifs, Séries chrono-annuelles 1998-2019 » <https://www.arcep.fr/cartes-et-donnees/nos-publications-chiffrees.html>

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## End Notes

<sup>1</sup> For example, street infrastructure such as lampposts, rooftops, water towers, and so forth, can be used to support deployments needed that in turn may lead to co-investment strategies.

<sup>2</sup> A recent empirical study on the subject found that fixed telecommunication incumbents, tend to invest more in new broadband infrastructure, such as fibre, when the access price of legacy networks (e.g. copper unbundling) is raised, while this has no effect on cable operators' decision to upgrade their network (Briglauer, Cambini and Grajek, 2018<sup>[88]</sup>).

<sup>3</sup> Austria notes that in their market they still observe some significant substitution between fixed and wireless networks. In the 3.4-3.8 GHz auction that took place in 2018, tighter caps are applied for those operators that own a large fixed network. Please refer to Section 3.3 on page 19-22 at [https://www.rtr.at/en/inf/Konsult5GAuktion2018/Appendix\\_competition\\_measures.pdf](https://www.rtr.at/en/inf/Konsult5GAuktion2018/Appendix_competition_measures.pdf). Since T-Mobile bought the largest cable network operator (UPC), such a cap was also imposed on T-Mobile.

<sup>4</sup> The ACCC has the ability to declare access to these services under Part XIC of the Competition and Consumer Act 2011.

<sup>5</sup> The SMP-operator should primarily provide backhaul connection by providing access to fibre-based network infrastructure (dark fibre). As an alternative, the SMP-operator should provide backhaul connection by providing optical wavelength or digital connection capacity, depending on the request from the wholesale buying operator. Source: PTS, decision on market 3a, 2015-02-19.

<sup>6</sup> The radio access network sharing consists of the site, mast, antenna, and backhaul. The company managing the site will lease the whole package to an MNO and carry the data to the core network of the MNO. It can use the same radio equipment to broadcast and receive traffic of multiple spectrum license holders (OECD, 2014<sup>[1]</sup>).

<sup>7</sup> "A Code of Access to Telecommunications Transmission Towers, Sites of Towers and Underground Facilities".

<sup>8</sup> See article L.34-8-3 of the CPCE (*Code des postes et des communications électroniques*).

<sup>9</sup> However, some challenges faced by operators in implementing these type of agreements are the inherent differences in network architecture, equipment purchased from different vendors and differences in network management procedures.

<sup>10</sup> The scope of the RAN agreement is expanding. It currently covers all mobile technologies (i.e. 2G, 3G and 4G) and the entire Czech Republic apart from Prague and Brno (i.e. it covers the other cities and all rural areas, which together account for about 85 % of the population).

<sup>11</sup> 34 OECD countries were considered in 2015.

<sup>12</sup> Out of the four MVNOs present in Ireland (i.e. Tesco Mobile Ireland, Postmobile, Virgin Media and Lycamobile), only Virgin Media is present in fixed markets as well with the possibility of provided bundled services with a mobile element.

<sup>13</sup> Reseller service providers are the most basic virtual operators. They purchase calling time from a network operator and sell it to customers, using their own brand name. The MNO provides billing and customer support (OECD, 2014<sub>[11]</sub>).

<sup>14</sup> Full MVNOs rather than just reselling calling time, hire network capacity, obtain an IMSI-range from the communication regulator, issue their SIM-cards and maintain a home location register (HLR), containing data on their customers (OECD, 2014<sub>[11]</sub>).

<sup>15</sup> The award recognizes MVNOs as “service providers”, while also mentioning them as a special case: *“Regarding undertakings with their own network components (MVNOs), the Chamber draws attention to the following: while MVNOs are included by virtue of the wording of section 3 para 6 TKG, they require special treatment. It is highly demanding to connect a MVNO to the network of an assignment holder (e.g. physical connection of the networks). That could lead to a heavy burden for assignment holders, particularly as there are potentially many MVNOs, and could potentially affect assignment holders’ trade or business secrets”* (BNetzA, 2018<sub>[13]</sub>).

<sup>16</sup> Only two Swedish MVNOs have more than 100 000 mobile subscribers, and the average for the remaining MVNOs (or rather resellers) is around 7 000 subscribers.

<sup>17</sup> The study commissioned by the Competition Bureau in Canada found that mobile prices were typically lower in the parts of Canada where there was a strong regional competitor, like MTS, who could disrupt the effects of coordination among national service providers.

<sup>18</sup> eSIMs represent the next generation of SIM technology, replacing physical cards with software capable of remotely switching a device between operators. The technology allows one device to host multiple connectivity providers and it is designed for use across the whole range of wireless devices, including smartphones and IoT modules.

<sup>19</sup> Some industry stakeholders, such as the CEO of Orange, have expressed that operators that remain only fixed or mobile, will face difficulties to remain competitive, and that the consolidation debate stems from the increased convergence (Reuters, 2016<sub>[80]</sub>).

<sup>20</sup> Another related study is the one prepared for the European Commission, the Netherlands Authority for Consumers and Markets (ACM) and the Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR) on the *ex-post* evaluation of the T-Mobile/tele.ring merger in Austria cleared in April 2005, and the T-Mobile/Orange merger in the Netherlands cleared in August 2007 (Aguzzoni et al., 2015<sub>[92]</sub>). The methodology developed in this study was then used in RTR (2016<sub>[29]</sub>) and BEREC (2018<sub>[31]</sub>).

<sup>21</sup> More specifically, in BEREC (2018<sub>[31]</sub>), the first approach (i.e. difference-in-difference [DiD] basic) compares prices in the treated country to an average of prices in the control group. Nevertheless, this approach also controls for other effects (e.g. gross domestic product [GDP], mobile termination rates [MTR], country and time fixed effects). The DiD trend specification includes country linear trends and the synthetic control group approach uses a weighted average of the control group as comparison.

<sup>22</sup> There is no robust body of academic literature, which would allow us to draw definitive conclusions on the relationship between consolidation and investment/network quality in mobile markets. Academic

studies face the additional challenge of obtaining reliable and specific data on network investments by operators.

<sup>23</sup> To address endogeneity concerns, the authors use a “panel data approach including fixed effects to control for systematic differences between countries, general changes over time, and instrumental variables for the remaining endogeneity related to the variables used to proxy market concentration.”

<sup>24</sup> The authors find that compared to no change, a hypothetical four-to-three symmetric merger would increase end user prices by 16.3% on average, while at the same time capital expenditure would go up by 19.3% at the operator level. More realistic asymmetric four-to-three mergers between smaller firms in European countries would increase prices by 4-7% while increasing capital expenditure per operator by 7.5-14%. However, their findings regarding total industry investment indicate that concentration does not change total investment significantly, and hence is not entirely conclusive.

<sup>25</sup> This was because the efficiencies were considered: i) to be more limited than what submitted, ii) not to occur in a sufficiently timely manner or to pass benefit on to consumers to an extent sufficient to counteract anti-competitive effects (e.g. lower prices at odds with evidence on market repair), and iii) because other less anticompetitive alternatives (network sharing) would be commercially attractive realistic and attainable.

<sup>26</sup> Excluding M2M SIM cards.